Simphoenix

DL500 Series

Vector Control General-purpose Inverter

User Manual

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✧ Preface

Thank you for choosing the DL500 series general-purpose vector-type inverter produced by Shenzhen Simphoenix Electric Technology Co., Ltd.

This manual is the user manual for the DL500 series general-purpose vector-type inverter. It will provide you with relevant details and precautions regarding the installation, wiring, function parameters, daily maintenance, and troubleshooting of the DL500 series inverter.

To correctly use this series of inverters, fully leverage the product's excellent performance, and ensure the safety of users and equipment, please read this manual thoroughly before using the DL500 series inverter. Incorrect use may lead to abnormal inverter operation, malfunctions, reduced service life, or even accidents such as equipment damage and personal injury!

This user manual is an accessory attached with the product. Please keep it safe for future inspection and maintenance of the inverter.

Due to our commitment to continuous product improvement, the information provided by our company is subject to change without prior notice.

Simphoenix

DL500 Series General-purpose Vector-type Inverter User Manual
User Manual Version V1.6
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Contents

Chapter 1 Product Confirmation and Precautions

1.1 Product Confirmation

Upon receipt of the product, please carefully inspect the outer packaging for any damage. If there are labels on the outer packaging, please confirm whether the model and specifications on the labels match your order requirements. If any damage or discrepancy is found, please promptly contact your supplier for resolution.

1.1.1 Unpacking Inspection Precautions

When opening the package, please carefully check whether the inverter main unit and its accessories have been damaged, or if any parts are damaged or detached during transportation. Confirm whether the main unit of the inverter and the following accessories are included:

1) User manual;

2) Certificate of conformity;

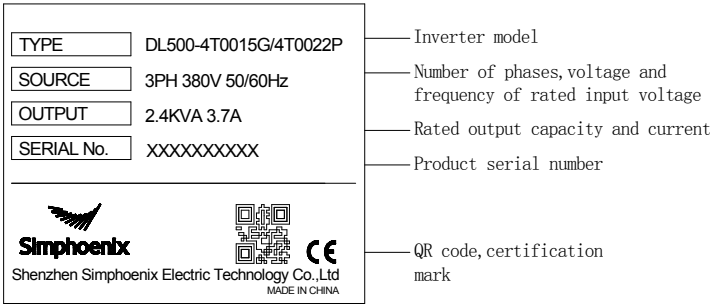
3) Product list;

4) Other ordered accessories.

If anything is missing or damaged, please promptly contact your supplier for resolution.

- Inverter Nameplate

The inverter is affixed with a nameplate indicating its model, rated parameters, product serial number, etc. The content of the nameplate is shown in the figure below:



1.2 Safety Precautions

Before installation, wiring, operation, inspection, and maintenance, please be sure to read this user manual carefully to ensure correct use of this product. In this user manual, "Hint", "Caution", "Warning", and "Danger" are defined as follows:

"Hint": Provides useful information.

"Caution": Matters requiring attention during operation.

"Warning": If not operated as required, it may result in moderate or minor personal injury, or material damage.

"Danger": If not operated as required, it may result in serious equipment damage or personal injury.

1.2.1 Installation Precautions

1. Do not install the inverter on flammable materials, otherwise there is a risk of fire.

2. Do not install the inverter in direct sunlight, otherwise it may lead to dangerous situations.

3. This series of inverters cannot be installed in environments containing explosive gases, otherwise there is a risk of explosion.

4. Do not use damaged or incomplete inverters. Otherwise, it may cause personal injury, fire, and other accidents.

5. Do not disassemble or modify the inverter without authorization.

6. Do not drop foreign objects into the inverter, otherwise it may cause inverter malfunction.

7. During installation, the inverter should be mounted in a location that can bear its weight, otherwise it may fall.

1.2.2 Wiring Safety Precautions

1. Please entrust professional personnel to performing wiring. Improper wiring may cause damage to equipment and personal injury.

2. Perform wiring operations only after the digital display of the inverter panel has been off for 10 minutes, otherwise there is a risk of electric shock.

3. The inverter's grounding terminal must be reliably grounded, otherwise there is a risk of electric

shock.

4. Do not reverse the live and neutral wires, otherwise there are hidden dangers to electrical safety.

5. Do not connect AC power to the U, V, W terminals of the inverter, otherwise it will damage the inverter.

6. Confirm that the input voltage matches the rated voltage of the inverter, otherwise it may damage the inverter.

7. Confirm that the motor and inverter are compatible, otherwise it may damage the motor or trigger inverter protection.

8. Do not directly connect the braking resistor to the DC bus (+), (-) terminals, otherwise it may cause fire.

9. The inverter's leakage current may be greater than 3.5mA. It must be reliably grounded, ensuring that the grounding resistance is less than 0.1Ω. Failure to properly ground the inverter may result in death or serious injury.

10. This inverter is suitable for circuits with short-circuit current below 100kA.

1.2.3 Operational Safety Precautions

1. Do not operate switches with wet hands, otherwise it may cause electric shock.

2. Please install the front cover before connecting the power. Do not remove the cover while the power is connected, otherwise it may cause electric shock.

3. While the inverter is powered on, do not touch the inverter terminals even if the motor is stopped, otherwise it may cause electric shock.

4. If the restart function is used, a sudden restart may occur after an alarm is cleared, so do not approach the load equipment, otherwise it may cause personal injury.

5. Please design the system to ensure personal and property safety even with instantaneous restart.

6. Please set up a separate emergency stop switch, otherwise it may cause personal injury.

7. The temperature of the heat sink and DC reactor may become very high, so do not touch them, otherwise there is a risk of burns.

1.2.4 Maintenance and Inspection Safety Precautions

1. Unless you are trained professional repair personnel, do not perform repair work such as component inspection or replacement. Use insulated protective tools during operations. It is strictly forbidden to leave wire ends or metal objects inside the machine. Otherwise, there is a risk of electric shock, fire, and personal injury.

2. After replacing the control board, corresponding parameters must be set before operation, otherwise there is a risk of property damage.

1.3 General Knowledge

1.3.1 General Application Knowledge for Driving Ordinary Motors

1. When driving an ordinary motor with an inverter, the operating temperature will be slightly higher than when running directly on utility power. Long-term low-speed operation, due to poor heat dissipation, will affect motor life. In this case, a special inverter motor should be selected or the motor load reduced.

2. If an inverter-driven motor is installed on equipment, sometimes resonance may occur due to the natural vibration frequency of the mechanical system, etc. Please consider using elastic couplings and anti-vibration rubber, or use the inverter's skip frequency function to avoid resonance points during operation.

3. When using an inverter to drive an ordinary motor, the noise will be slightly greater than when running directly on utility power. To reduce noise, the inverter's carrier frequency can be appropriately increased.

1.3.2 General Application Knowledge for Driving Special Motors

1. For high-speed motors, if the inverter's set frequency is above 120Hz, please first conduct combination experiments with the motor to confirm safe operation.

2. For synchronous motors, special handling may be required depending on the motor type. Please contact the manufacturer for consultation.

3. Single-phase motors are not suitable for variable speed operation with an inverter. Even with single-phase input, the inverter provides three-phase output, so please use a three-phase motor.

1.3.3 Surrounding Environment

Please use indoors within an ambient temperature of -10 - +45℃ (derating recommended for operating temperatures +45℃ - +50℃), ambient humidity of 5 - 95% (non-condensing), free from dust, direct sunlight, corrosive gases, flammable gases, oil mist, steam, water droplets, or floating fibers and metal particles; if a customer has special requirements, please consult the manufacturer.

1.3.4 General Knowledge for Peripheral Device Connection

1. To protect wiring, install a circuit breaker for wiring on the input side of the inverter. Do not use devices exceeding the recommended capacity.

2. If switching to utility power, etc., when installing an electromagnetic contactor on the output side of the inverter, perform the switchover only after both the inverter and motor have stopped.

3. When using a motor thermal relay, if the wiring length to the motor is long, high-frequency currents flowing through the distributed capacitance of the wiring may sometimes cause tripping even with currents

below the set value of thermal relay. In this case, reduce the carrier frequency before use, or use an output filter.

4. For noise interference, corresponding measures such as connecting filters, using ferrite rings, and shielded wiring can be adopted.

1.3.5 Transportation and Storage

1. When handling the product, grasp the left and right sides of the main unit's bottom with both hands. Do not grasp only the cover or individual parts.

2. Do not apply excessive force to plastic parts, otherwise it may cause dropping or damage.

3. When temporarily storing or storing for a long term, pay attention to the following points:

Store the product in its original packaging box from our company whenever possible;

Long-term storage can lead to deterioration of electrolytic capacitor characteristics. Therefore, power should be supplied once every six months for at least half an hour, and the input voltage must be slowly increased to the rated value using a voltage regulator.

1.4 Disposal Precautions

1. Electrolytic capacitor explosion: Electrolytic capacitors inside the inverter may explode when incinerated.

2. Exhaust gas from burning plastics: Plastics, rubber, and other materials on the inverter will produce harmful, toxic gases when burned.

3. Correct disposal method: Please dispose of the inverter as industrial waste.

1.5 Other Precautions

1. This product cannot be used for life support devices or other applications directly related to human life-threatening situations, otherwise accidents may occur.

2. To avoid major accidents or significant losses caused by supporting equipment malfunctions, please install safety devices on such equipment.

3. When operating the inverter, please follow electrostatic discharge (ESD) prescribed procedures, otherwise internal components of the inverter may be damaged by static electricity.

4. The inverter has undergone withstand voltage tests before leaving the factory. No withstand voltage tests are allowed on any part of the inverter. The inverter uses precise internal components and has EMC, lightning protection, and other designs. High voltage may lead to performance degradation, loss, or even damage to the inverter.

Chapter 2 Product Introduction

2.1 Model Description

DL500-4 T 0015 G

Product series	
DL500	Vector general inverter

Voltage grade	
4	380V
2	220V

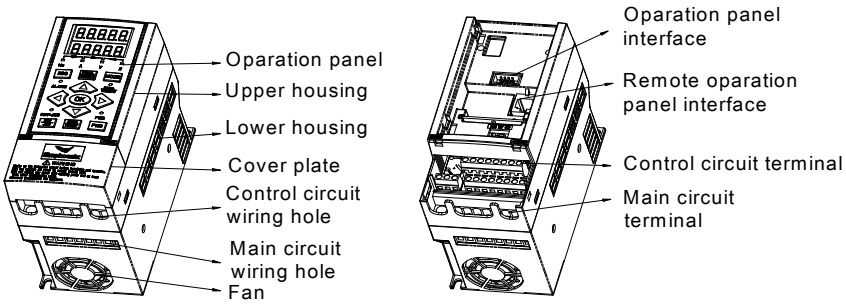
Power supply phase	
T	Three-phase
S	Single phase

Load type	
G	Heavy load
P	Light load

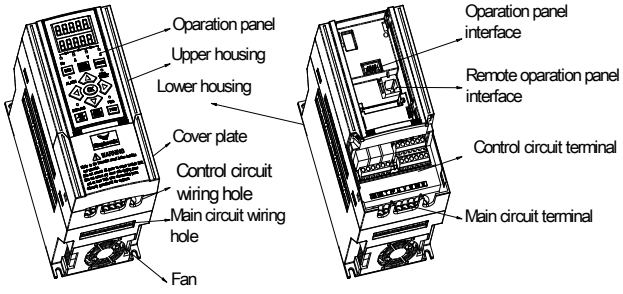
Power grade (KW)	
0011	1.1
0015	1.5
.	.
.	.
.	.
4000	400.0

2.2 Product Appearance Description

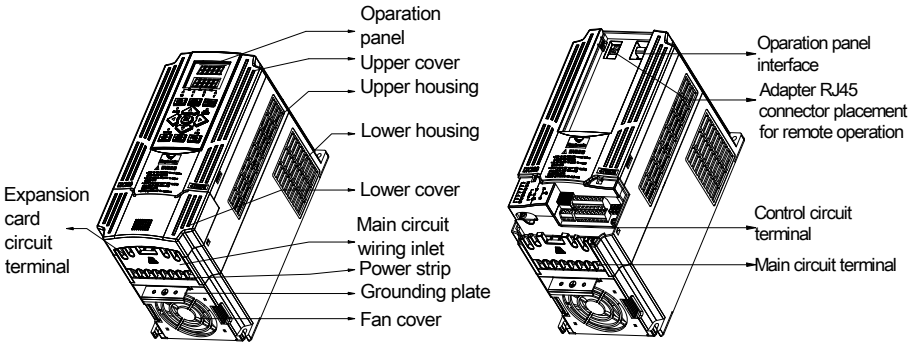
Type I applicable to DL500-4T0011G/4T0015P to DL500-4T0015G/4T0022P models



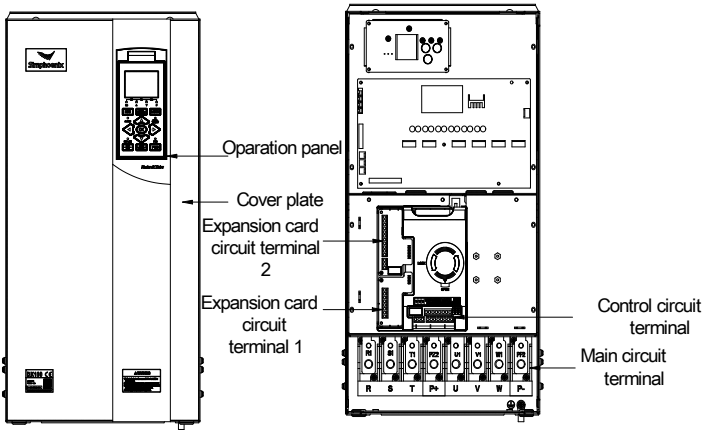
Type II applicable to DL500-4T0022G/4T0030P to DL500-4T0150G/4T0185P models



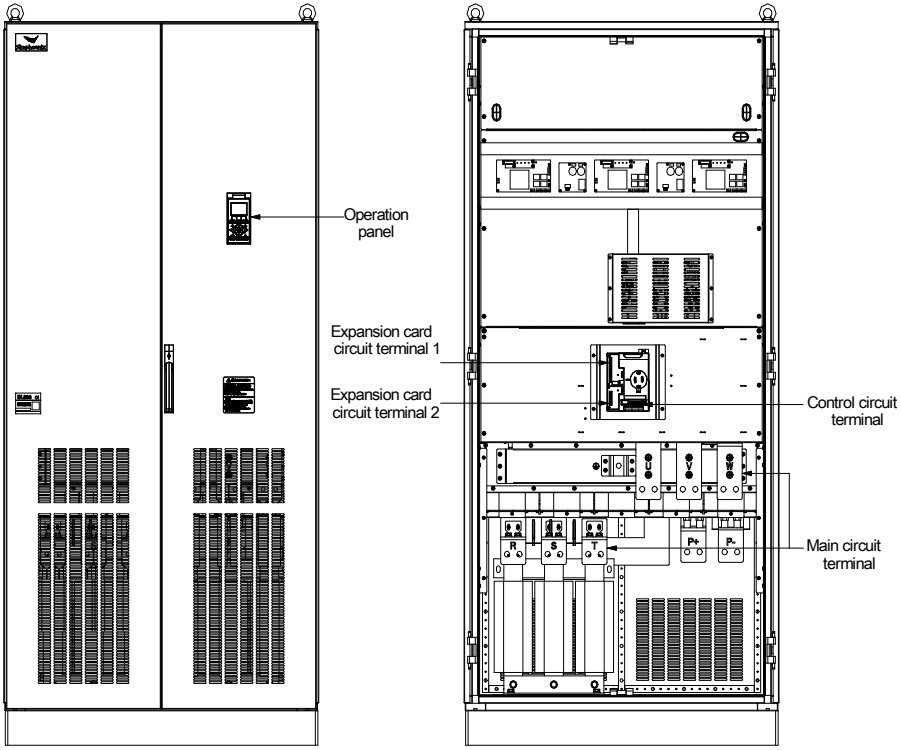
Type III applicable to DL500-4T0185G/4T0220P to DL500-4T0370G/4T0450P models



Type IV applicable to DL500-4T0450G/4T0550P to DL500-4T4000G/4T4500P models



Type V Applicable to the appearance of models from DL500-4T4500G/4T5000P~DL500-4T8000G/4T9000P



2.3 Model Table

Model	General Load Mode			Constant Light Load Mode		
	Rated Capacity (KVA)	Rated Current (A)	Adaptive Motor (KW)	Rated Capacity (KVA)	Rated Current (A)	Adaptive Motor (KW)
DL500-4T0011G/4T0015P	2.0	3.0	1.1	2.4	3.7	1.5
DL500-4T0015G/4T0022P	2.4	3.7	1.5	3.6	5.5	2.2
DL500-4T0022G/4T0030P	3.6	5.5	2.2	4.9	7.5	3.0
DL500-4T0030G/4T0040P	4.9	7.5	3.0	6.3	9.5	4.0
DL500-4T0040G/4T0055P	6.3	9.5	4.0	8.6	13.0	5.5
DL500-4T0055G/4T0075P	8.6	13.0	5.5	11.2	17.0	7.5

DL500-4T0075G/4T0110P	11.2	17.0	7.5	16.5	25	11
DL500-4T0110G/4T0150P	16.5	25	11	21.7	32	15
DL500-4T0150G/4T0185P	21.7	32	15	25.7	37	18.5
DL500-4T0185G/4T0220P	25.7	37	18.5	29.6	45	22
DL500-4T0220G/4T0300P	29.6	45	22	39.5	60	30
DL500-4T0300G/4T0370P	39.5	60	30	49.4	75	37
DL500-4T0370G/4T0450P	49.4	75	37	62.5	95	45
DL500-4T0450G/4T0550P	62.5	95	45	75.7	115	55
DL500-4T0550G/4T0750P	75.7	115	55	98.7	150	75
DL500-4T0750G/4T0900P	98.7	150	75	116	176	90
DL500-4T0900G/4T1100P	116	176	90	138	210	110
DL500-4T1100G/4T1320P	138	210	110	171	260	132
DL500-4T1320G/4T1600P	171	260	132	204	310	160
DL500-4T1600G/4T1850P	204	310	160	237	360	185
DL500-4T1850G/4T2000P	237	360	185	253	385	200
DL500-4T2000G/4T2200P	253	385	200	276	420	220
DL500-4T2200G/4T2500P	276	420	220	313	475	250
DL500-4T2500G/4T2800P	313	475	250	352	535	280
DL500-4T2800G/4T3150P	352	535	280	395	600	315
DL500-4T3150G/4T3500P	395	600	315	424	650	350
DL500-4T3500G/4T4000P	428	650	350	480	730	400
DL500-4T4000G/4T4500P	480	730	400	527	800	450
DL500-4T4500G/4T5000P	527	800	450	592	900	500
DL500-4T5000G/4T5600P	592	900	500	658	1000	560
DL500-4T5600G/4T6300P	658	1000	560	737	1120	630
DL500-4T6300G/4T7000P	737	1120	630	823	1225	700
DL500-4T7000G/4T8000P	823	1225	700	955	1450	800
DL500-4T8000G/4T9000P	955	1450	800	1053	1600	900

2.4 Technical Specifications and Parameters of Product

Input	Input Voltage U1 and Frequency	Three-phase (4T# Series) 380-415V (±10%) 50/60Hz (±5%)
	Output Voltage U2	0-U1
Output	Output Frequency	Low frequency operation mode: 0.00-300.00Hz High frequency operation mode: 0.00-1500.00Hz
	Digital Input	Standard configuration 5 digital inputs (DI) DL500-4T0185G/4T0220P and above models: All can be expanded to 16 channels (optional expansion components)
	Digital Output	Standard configuration 2 digital outputs (DO)
	Pulse Input	•DL500-4T0185G/4T0220P and above models:

		0-100.0KHz pulse input, connected to NPN type OC output (optional)		
	Pulse Output	•DL500-4T0185G/4T0220P and above models: 0-100.0KHz pulse NPN type OC output (optional), can be selected as PWM output mode to expand analog output ports		
	Analog Input	Standard configuration: 0-10V voltage input / 0-20mA current input Optional configuration: -10-10V input (DL500-4T0185G/4T0220P and above)		
	Analog Output	1 channel 0-10V analog output signal (can be selected as 0-20mA current output mode)		
	Contact output	Standard one set of AC 250V/2A normally open, normally closed contacts, expandable to 1-6 sets of normally open, normally closed contacts		
	RS485	Standard Configuration		
Control Characteristics	Control Method	Closed-loop vector control	Open-loop vector control	V/F control
	Starting Torque	0 speed 200%	0 speed 180%	0 speed 180%
	Speed Range	1:1000	1:200	1:100
	Stable Speed Accuracy	±0.02%	±0.2%	±0.5%
	Torque Control Accuracy	±1%	±5%	--
	Torque Response Time	≦5ms	≦25ms	--
	Frequency Resolution	Low frequency operation mode: 0.01Hz High frequency operation mode: 0.1Hz		
	Frequency Accuracy	• Low frequency operation mode: Digital setting-0.01Hz, Analog setting-Maximum frequency×0.1% • High frequency operation mode: Digital setting-0.1Hz, Analog setting-Maximum frequency×0.1%		
	Load Capacity	• General Load Mode: 110%-long term; 150%-60 seconds; 180%-2.5 seconds • Constant Load Mode: 105%-long term		
	Carrier Frequency	• Three-phase voltage vector synthesis mode: 1.58KHz; • Two-phase voltage vector synthesis mode: 1.512KHz Specific carrier frequency related to power level		
	Acceleration/Deceleration Time	0.01-600.00Sec. / 0.01-600.0Min.		
	Flux Braking	Achieve rapid motor deceleration braking by increasing motor flux (30-120% adjustable)		
	DC Braking/Holding Brake	DC braking/holding brake start frequency: 0.0-upper limit frequency, braking/holding brake injection current 0.0-100.0%		
	Startup Frequency	0.0-50.0Hz		
Characteristics Function	Multi-segment Operation	16 segments of frequency/speed operation, with independent settings for each segment's direction, time, acceleration/deceleration; 7 segments of process PID setting		
	Built-in PID	Built-in PID controller, used independently by external devices		
	Wake up Sleep	Built-in PID has simple sleep and wake-up functions		
	MODBUS Communication	Standard MODBUS communication protocol(Standard configuration), flexible parameter read/write mapping function		
	Dynamic Braking	Operating voltage: 340-400/650-800V, braking rate: 50-100%		
	General Functions	Power-off restart, fault self-recovery, motor parameter dynamic/static auto-identification, startup permission enable, run permission enable, startup delay, overcurrent suppression, overvoltage/undervoltage suppression, V/F custom curve, analog input curve correction, broken wire detection, and textile machinery disturbance (swing frequency) operation		
Typical	Virtual I/O Ports	Feature 8 one-to-one virtual output and input ports, enabling convenient implementation of complex engineering site applications without external wiring		

Function	Communication Linkage Synchronization	Easily achieve multi-machine synchronous drive and can freely choose to achieve multi-machine linkage balance based on current, torque, or power
	Load Dynamic Balancing	Also enable dynamic balancing of multi-machine loads (not limited to communication linkage), and able to achieve torque motor characteristics
	Strong Starting Torque	For loads with large inertia and high static friction, a super strong starting torque can be set for a certain period
	Setting Priority	Users can freely choose the priority order of various frequency/speed setting channels, suitable for combined applications in various scenarios
	Setting Combinations	Up to hundreds of frequency, speed, torque, and other setting combinations
	Timer	3 built-in timers: 5 clock types, 5 start trigger methods, multiple gate control signals and operating modes, and 7 output signals
	Counter	2 built-in counters: clock edge selection, 4 startup trigger methods, and 7 output signals
	Macro Parameters	Application Macros: Conveniently set and partially solidify various common group parameters, simplifying parameter settings for general applications
		System Macros: Facilitate switching of equipment operating modes (e.g., high/low frequency operation mode switching), and automatically redefine local parameters
	Parameter Debugging	Any unsaved parameters from field debugging can be stored with one click or discarded and restored to their original values
	Parameter Display	Automatically shield parameters of unused function modules that are not automatically shielded, or selectively display modified, stored, or changed parameters, or selectively display modified, stored, or changed parameters
Protection Function	Power Supply	Undervoltage Protection
	Run Protection	Overcurrent protection, overvoltage protection, inverter overheat protection, inverter overload protection, motor overload protection, output phase loss protection, and IGBT drive protection
	Equipment Abnormality	Current detection abnormality, EEPROM memory abnormality, control unit abnormality, motor overheat, and temperature acquisition circuit fault
	Motor Connection	Motor not connected, motor three-phase parameters unbalanced, and parameter identification error
	Expansion Card	Detect and protect whether expansion cards are compatible or conflicting
Environment	Installation Environment	Indoor vertical installation, not exposed to direct sunlight, free from dust, corrosive or flammable gases, oil mist, water vapor, dripping water, or salt
	Altitude	0-1000 meters; 1000-3000 meters recommended for derated use, output current capacity derates by 10% for every 1000 meters increase
	Ambient Temperature	Operating ambient temperature: -10℃ - +45 ℃ (derated use for 45℃ - 50℃)
	Storage Ambient Temperature	-20 °C - +60 °C
	Humidity	Below 95%, no condensation
	Vibration	< $6m/s^2$
	Environmental Pollution Level	2
	Protection Level	IP20

Chapter 3 Inverter Installation

3.1 Inverter Installation

This series of inverters are wall-mounted or cabinet-type,and should be installed vertically. For proper heat dissipation, please install it indoors in a well-ventilated area. For installation environment, please refer to 1.3.3. If the user has special installation requirements, please contact the manufacturer in advance.

3.1.1 Mounting Surface

Under extreme conditions, the temperature of the heat sink may rise to 90℃. Therefore, ensure that the mounting surface can fully withstand such a temperature rise.

DANGER

Please install it on flame-retardant object such as metal, otherwise may cause fire.

3.1.2 Installation Space

The installation intervals and distance requirements for a single inverter are shown in Figures 3-1-A and 3-1-B. Sufficient space should be left around the inverter.

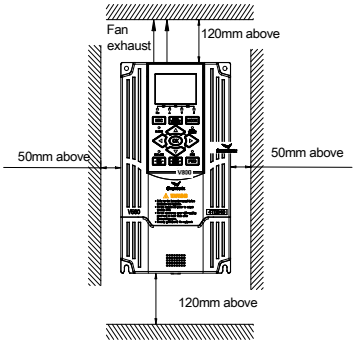


Figure 3-1-A Installation Clearance (30KW and below)

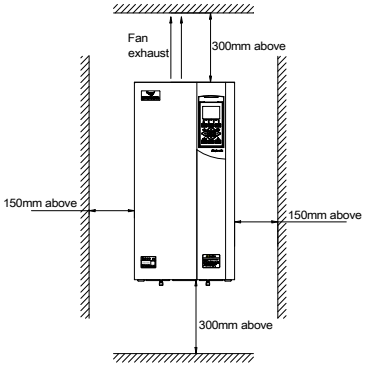


Figure 3-1-B Installation Clearance (37KW and above)

3.1.3 Multiple Unit Installation

If two or more inverters are to be installed in a device or control cabinet, they should generally be installed horizontally as shown in Figure 3-2. If vertical installation is unavoidable, consider installing a partition, as shown in

Figure 3-3, to prevent heat from the lower inverter affecting the upper inverter.

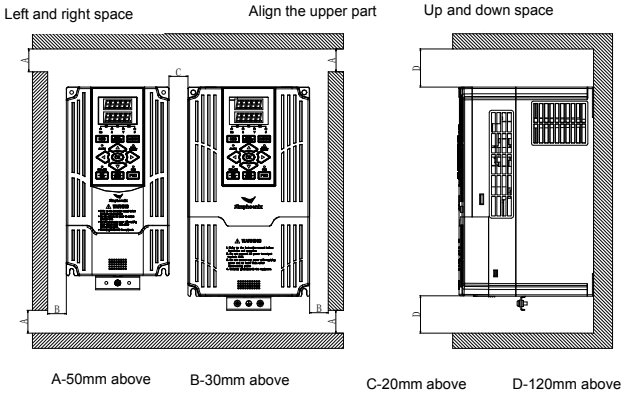


Figure 3-2 Two Inverters (above 15KW) Horizontal Installation Dimensions

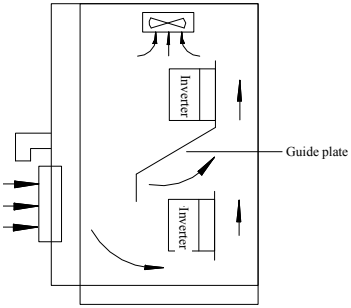
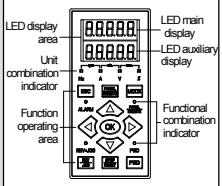
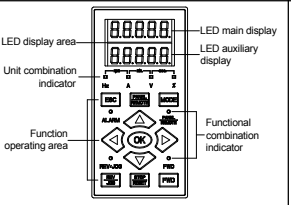
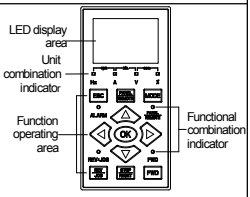
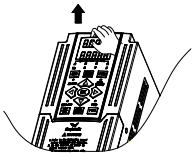
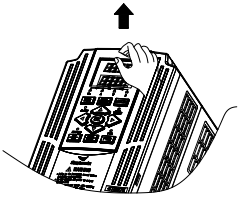
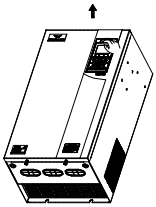
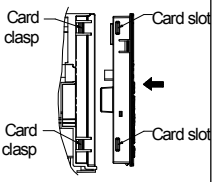
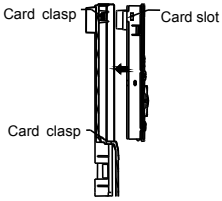
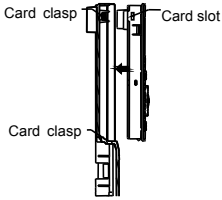


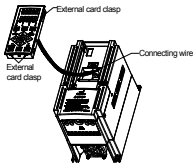
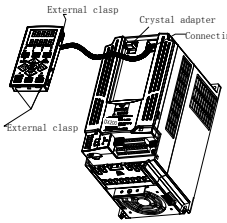
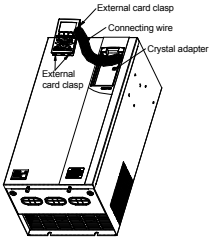
Figure 3-3 Two Inverters Vertical Installation Clearance

- Tight horizontal installation is only permissible for 2.2KW and below, with ambient temperatures of -10℃-45℃ (derating required for 45℃-50℃).
- When installing inverters of different sizes horizontally, please align the top positions of each inverter for easier replacement of cooling fan.
- Do not install in environments with cotton dust or damp dust that could block the heat sink. If use in such an environment is necessary, install it in a control cabinet that prevents cotton dust from entering.
- If installed at an altitude of 1000m or higher, please derate its use. For details, refer to 2.4 Product Technical Specifications.

3.2 Operation Panel Assembly

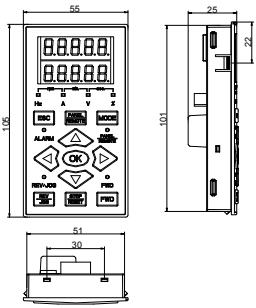
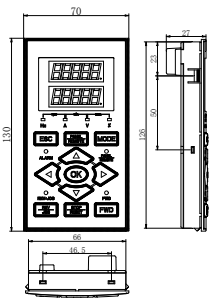
The names, models, codes, and applicable models of the operation panels of DL500 series inverter are shown in Table 3-1:

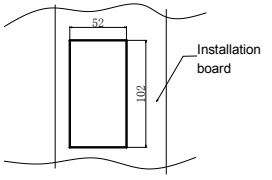
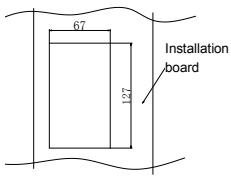
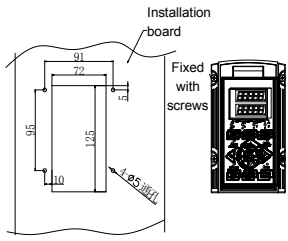
Name	Dual-row LED small panel	Dual-row LED standard operation panel	LCD key panel
Model	DPNL350EM	DPNL360EA	DPNL360CA
Code	050M007033701	050M007360003	050M007360001
Applicable Model	DL500-4T0150G/4T0185P and below (standard)	DL500-4T0185G/4T0220P and above (standard)	DL500-4T4500G/4T5000P and above (standard)
Appearance			
Removal	Insert fingers into the slots on the front of the panel and lift the panel upwards. 	Insert fingers into the slots on the front of the panel and lift the panel upwards. 	Put middle finger in the finger hole site front of the operation panel, slightly lift the panel up. 
Installation	After aligning the panel with the machine's panel slots, press the panel down evenly. 	Align the retaining hooks at the bottom of the panel with the clips below the panel base, then press down the top of the panel. 	Joint the fixed mouth of hook at the bottom of operation panel and spring plate underpanel base, then only push the panel inward. 

Appearance	To remove the operation panel, connect an extension cable as shown in the figure below. 	Remove the operation panel, take off the crystal adapter and place it in the designated location to prevent loss, then connect an extension cable as shown in the figure below. 	Disassemble the operation panel, take crystal joint and put it in the designated position in case of the lost. The extension cord as follow. 

- An extension cable or a commercially available LAN cable (straight-through cable) must be used.
- The maximum length of the extension cable is 15 meters. The shield layer must be connected to the inverter's ground terminal. For lengths over 15 meters, please purchase a remote operation panel accessory.
- Do not route parallel to power lines at close distances.
- The panel must be securely fastened to a stable surface or workbench to prevent damage.

3.3 Panel Installation Dimensions (Operation panel can be flexibly selected according to actual installation needs)

Name	Dual-row LED small panel	Dual-row LED standard operation panel/LCD key pane
Installation Dimensions		
External connection without tray, mounting plate opening diagram	102*52	127*67

		
External connection with tray, Mounting plate opening diagram	This connection method is not available	

➢ If the sheet metal is painted, please increase the opening size appropriately based on the paint thickness. A sheet metal thickness of 1.5mm is recommended.

3.4 Terminal Cover Removal

3.4.1 Plastic Cover Removal and Installation

Removal: Place fingers in the lifting groove at the bottom of the cover (as indicated by the handle position in Figure 3-4), pull forcefully upwards until the clips between the cover and the casing disengage, then pull the cover downwards to remove the casing. As shown in Figure 3-4.

Installation: First, tilt the cover by about 15 degrees, then insert its top fixing tabs into the casing's fixing grooves, and press the cover down firmly until a "click" sound is heard, indicating that the cover is in place.

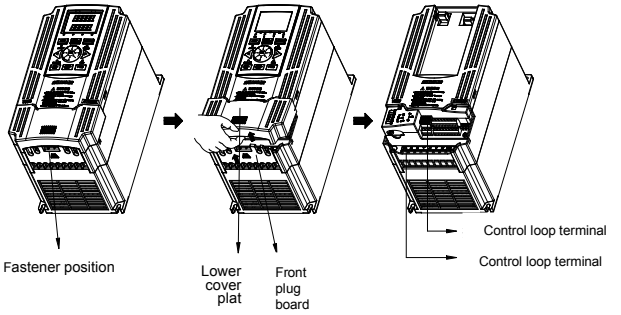


Figure 3-4 Schematic Diagram for Plastic Cover Removal and Installation

3.4.2 Metal Cover Removal and Installation

Removal and installation of the metal cover are shown in Figure 3-5:

Removal

① Remove the two thumb screws at the bottom of the cover;

② Lift the cover upwards to remove it.

Installation

① Hook the cover onto the top of the chassis and lower it, so that the cover is just caught on both sides of the chassis;

② Tighten the two thumb screws at the bottom of the cover surface.

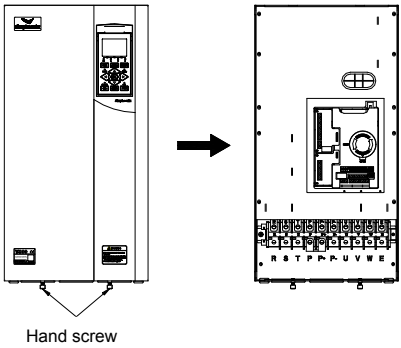
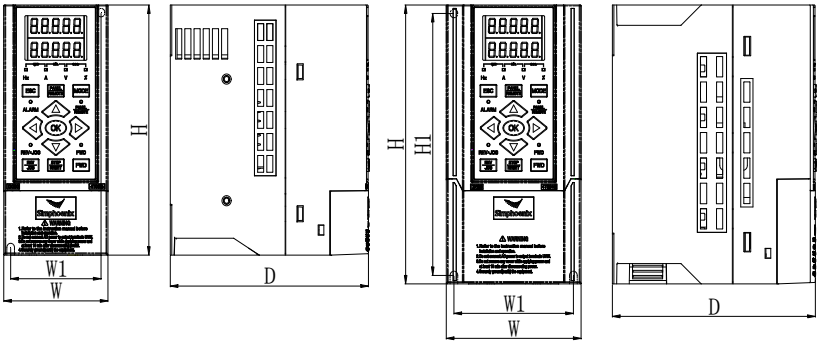


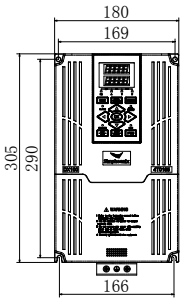
Figure 3-5 Schematic Diagram for Metal Cover Removal and Installation

3.5 Inverter Installation Dimensions

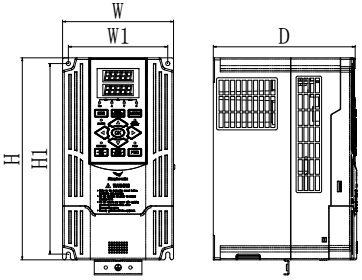


I-class models
DL500-4T0011G/4T0015P～
DL500-4T0015G/4T0022P

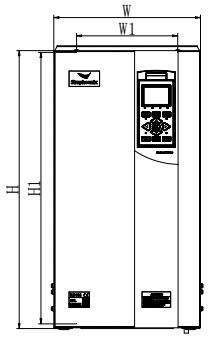
II-class models
DL500-4T0022G/4T0030P～
DL500-4T0150G/4T0185P



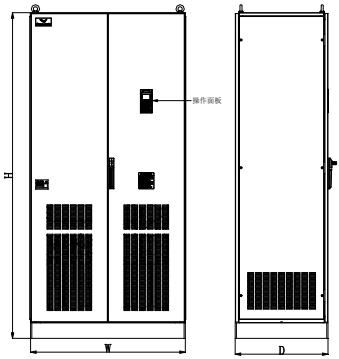
III-class models
DL500-4T0185G/4T0220P



IV-class models
DL500-4T0220G/4T0300P~
DL500-4T0370G/4T0450P



V-class models
DL500-4T0450G/ 4T0550P-DL500-4T4000G/ 4T4500P



VI-class models
DL500-4T4500G/4T5000P-DL500-4T8000G/
4T9000P

The installation dimensions of DL500 series inverters are shown in the table below:

Frequency Converter Model	W1 mm	W mm	H1 mm	H mm	D mm	Net Weight KG	Gross Weight KG	Screw Specifications
DL500-4T0011G/4T0015P	59	68	139	148	130	0.96	1.06	M4
DL500-4T0015G/4T0022P								
DL500-4T0022G/4T0030P	78	88	155	165	133	1.3	1.45	M4
DL500-4T0030G/4T0040P								
DL500-4T0040G/4T0055P								
DL500-4T0055G/4T0075P	99	109	199	209	155	2.1	2.3	M4
DL500-4T0075G/4T0110P								
DL500-4T0110G/4T0150P	134	146	235	249	180	3.7	4.7	M5
DL500-4T0150G/4T0185P								
DL500-4T0185G/4T0220P	169 166	180	290	305	188	7.2	8	M5
DL500-4T0220G/4T0300P	160	210	387	405	211	10.3	11.9	M6
DL500-4T0300G/4T0370P								
DL500-4T0370G/4T0450P	160	250	428	445	216	14.3	16.8	M8
DL500-4T0450G/4T0550P	200	290	525	545	260	27.8	37.8	M8
DL500-4T0550G/4T0750P						30.6	40.6	
DL500-4T0750G/4T0900P	230	330	603	625	280	42.5	53	M10
DL500-4T0900G/4T1100P								
DL500-4T1100G/4T1320P	280	380	760	785	300	58	75	M10
DL500-4T1320G/4T1600P						59	76	
DL500-4T1600G/4T1850P	320	450	919	945	300	80	101	M10
DL500-4T1850G/4T2000P								
DL500-4T2000G/4T2200P								
DL500-4T2200G/4T2500P	350	480	1022	1050	300	90	111	M12
DL500-4T2500G/4T2800P	480	550	1116	1145	300	119	140	M12
DL500-4T2800G/4T3150P						120	141	
DL500-4T3150G/4T3500P						121	142	
DL500-4T3500G/4T4000P	500	670	1173	1200	350	142	175	M12
DL500-4T4000G/4T4500P						144	177	

DL500-4T4500G/4T5000P	/	800	/	2100	600	375	405	/
DL500-4T5000G/4T5600P								
DL500-4T5600G/4T6300P	/	1000	/	2100	600	430	460	/
DL500-4T6300G/4T7000P								
DL500-4T7000G/4T8000P	/	1200	/	2100	600			/
DL500-4T8000G/4T9000P								

Chapter 4 Inverter Wiring

4.1 Wiring Precautions

- Ensure that an intermediate circuit breaker is connected between the inverter and the power supply to prevent accidents from escalating in case of inverter malfunction.
- To reduce electromagnetic interference, please connect surge absorbers to the coils of electromagnetic contactors, relays, and other devices in the circuits surrounding the inverter.
- For frequency setting terminals, meter circuits, and other analog signal wiring, please use shielded cables of 0.3mm² or larger, and connect the shield layer to the inverter's grounding terminal (keep single-ended grounding for the shield layer), with the wiring length of less than 30m.
- For both relay input and output circuits, twisted or shielded cables of 0.75mm² or larger should be used.
- Control wires should be separated from the power lines of the main circuit. Parallel wiring should be separated by more than 10cm, and crossing wiring should be perpendicular.
- The connection between the inverter and the motor should be less than 50m. When the wiring length exceeds 50m, the inverter's carrier characteristics should be appropriately reduced.
- All leads must be fully tightened to the terminals to ensure good contact. Main circuit leads should use cables or copper bars. When using cables, appropriate lugs must be cold-pressed or soldered before wiring.
- The voltage ratings of All leads must match the voltage class of the inverter.
- Please reliably ground the inverter and motor separately and nearby.

Absorption capacitors or other RC absorption devices cannot be installed on the output terminals U, V and W of the inverter, as shown in Figure 4-1.

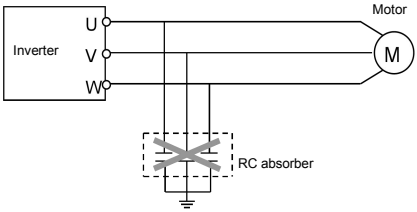


Figure 4-1 Schematic Diagram for Prohibited RC Absorption Device Connection at Output Terminals

4.2 Connection of Optional Accessories to the Inverter

- Power Supply

  Supply power according to the input power specifications designated in this user manual.

- Air Switch

  1) When the inverter is undergoing maintenance or will not be used for a long time, the air circuit breaker isolates the inverter from the power supply;

  2) The air circuit breaker provides protection when there are faults such as short circuits on the inverter's input side.

- AC Input Reactor

  When the grid waveform distortion is severe, or when the mutual influence of high-order harmonics between the inverter and the power supply still does not meet requirements even after configuring a DC reactor, an AC input reactor can be added. An AC input reactor can also improve the power factor on the inverter's input side and reduce the impact of three-phase power voltage imbalance.

- Input Side Filter

  An optional EMI filter can be added to suppress high-frequency noise interference emitted from the inverter's power lines.

- Contactor

  It can cut off the power supply when the system protection function is activated, preventing fault escalation.

- Output Side Filter

  An optional DU/DT filter can be added to suppress interference noise and wire leakage current generated on the inverter's output side.

- AC Output Reactor

  When the wiring from the inverter to the motor is long (over 20 meters), it can suppress radio interference and leakage current.

- Braking Resistor

  Improve the inverter's braking capability and prevent overvoltage faults during deceleration.

Recommended electrical specifications, as well as inverter main circuit screw specifications/tightening torque, are shown in the table below:

Frequency Converter Model	Compatible Motor KW	Wire Gauge (Main Circuit) mm²	Air Circuit Breaker A	Electromagnetic Contactor A	Screw Specifications	Tightening Torque N*m	Recommended Wire Lug Model
DL500-4T0011G/4T0015P	1.1	1.0	10	6	M3.5	0.7-0.9	PTV1.2-9
DL500-4T0015G/4T0022P	1.5	1.5	16	12	M3.5	0.7-0.9	PTV1.2-9
DL500-4T0022G/4T0030P	2.2	2.5	16	12	M3.5	0.7-0.9	PTV2-9
DL500-4T0030G/4T0040P	3.0	2.5	20	18	M3.5	0.7-0.9	PTV2-9
DL500-4T0040G/4T0055P	4.0	4.0	32	18	M3.5	0.7-0.9	PTV5.5-13
DL500-4T0055G/4T0075P	5.5	6.0	32	22	M4	1.2-1.5	RNY5.5-4S
DL500-4T0075G/4T0110P	7.5	6.0	40	32	M4	1.2-1.5	RNY5.5-4S
DL500-4T0110G/4T0150P	11	10	63	32	M5	2-2.5	RNY8-5S
DL500-4T0150G/4T0185P	15	10	63	38	M5	2-2.5	RNY8-5S
DL500-4T0185G/4T0220P	18.5	16	80	45	M5	2-2.5	RNY8-5S
DL500-4T0220G/4T0300P	22	16	100	63	M5	2-2.5	RNY8-5S
DL500-4T0300G/4T0370P	30	25	125	75	M6	4-6	RNY14-6
DL500-4T0370G/4T0450P	37	25	160	85	M8	9-10	T35-8
DL500-4T0450G/4T0550P	45	35	200	110	M8	9-10	T35-8
DL500-4T0550G/4T0750P	55	50	225	140	M8	9-10	T50-8
DL500-4T0750G/4T0900P	75	50	250	170	M8	9-10	T70-8
DL500-4T0900G/4T1100P	90	70	315	205	M10	18-23	T70-10
DL500-4T1100G/4T1320P	110	95	400	250	M10	18-23	T95-10
DL500-4T1320G/4T1600P	132	95	400	330	M10	18-23	T95-10
DL500-4T1600G/4T1850P	160	150	630	330	M10	18-23	T150-10
DL500-4T1850G/4T2000P	185	150	630	400	M12	25-30	T150-12
DL500-4T2000G/4T2200P	200	185	630	400	M12	25-30	T185-12
DL500-4T2200G/4T2500P	220	185	800	500	M12	25-30	T185-12
DL500-4T2500G/4T2800P	250	240	800	500	M12	25-30	T240-12
DL500-4T2800G/4T3150P	280	240	1000	630	M12	25-30	T240-12
DL500-4T3150G/4T3500P	315	2*150	1250	630	M12	25-30	2*T150-12
DL500-4T3500G/4T4000P	350	185*2	1250	780	M12	25-30	2*T185-12
DL500-4T4000G/4T4500P	400	240*2	1600	780	M12	25-30	2*T240-12
DL500-4T4500G/4T5000P	450	240*2	1600	900	M12	25~30	2*T240-12
DL500-4T5000G/4T5600P	500	185*3	1800	1000	M12	25~30	3*T185-12
DL500-4T5600G/4T6300P	560	185*3	1800	1200	M16	40~50	3*T185-16
DL500-4T6300G/4T7000P	630	240*3	2000	1300	M16	40~50	3*T240-16
DL500-4T7000G/4T8000P	700	240*3	2500	1500	M16	40~50	3*T240-16

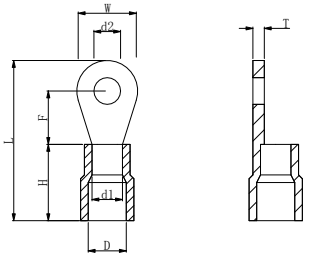
DL500-4T8000G/4T9000P	800	185*4	2800	1800	M16	40~50	4*T185-16

General Control Board and Expansion Card Wiring Terminals			
General Control Board Terminals	Screw Specifications	Tightening Torque (N*m)	Recommended Wire Lug Model
Control Board/Expansion Card Terminals	M2	0.1-0.2	E0.5-6
Control Board/Expansion Card Terminals	M3	0.3-0.4	E0.75-6

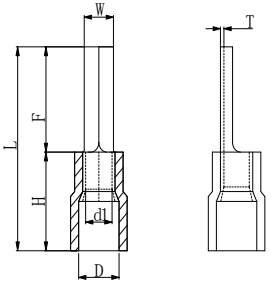
Wire Lug Model		d2 (mm)	W (mm)	F (mm)	L (mm)	H (mm)	d1 (mm)	D (mm)	T (mm)
RNY series	RNY2-4S	4.3	6.6	7.9	22.2	11	2.3	4.8	0.8
	RNY5.5-4S	4.3	7.2	5.9	22.5	13	3.4	6.7	1
	RNY8-5S	5.3	8.8	9.3	29.7	16	4.5	8	1.2
	RNY14-6	6.5	16	14.5	43.5	21.5	5.4	11	1.4

Wire Lug Model		W (mm)	F (mm)	L (mm)	H (mm)	d1 (mm)	D (mm)	T (mm)
PVT/E Series	PTV1.25-9	1.9	9	19	10	1.7	4.2	0.8
	PTV2-9	1.9	9	19	10	2.3	4.7	0.8
	PTV5.5-13	2.8	13	26	13	3.4	6.5	1
	E0.5-6	1.1	6	12	6	1	2.6	/
	E0.75-6	1.1	6	12.3	6.3	1.2	2.8	/

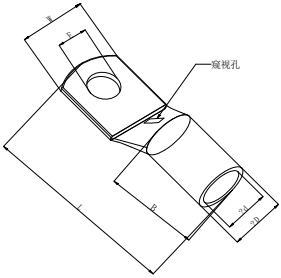
Wire Lug Model		E (mm)	D (mm)	d (mm)	W (mm)	B (mm)	L (mm)
T Series	T25-8	8.3	9.1	6.7	13	13	32
	T35-8	8.3	11	8.6	16.7	16	37
	T50-8	10.3	12.4	9.5	18	17	41
	T70-8	8.3	15	12	22.5	21.5	52.5
	T70-10	10.3	15	12	22.5	21.5	52.5
	T95-10	10.3	17	13.4	25	22.5	55
	T150-10	12.7	21.2	16.5	30	27	67
	T185-12	12.7	23	19	34	30	73
	T240-12	12.7	26.5	21	38	38	91.5
	T240-16	16.5	26.5	21	38	38	91.5
	T300-16	16.5	30	24.5	43	42	98



RNY Series



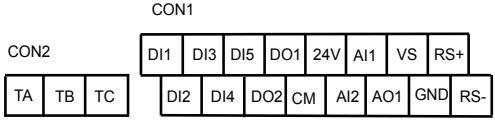
PVT/E Series



T Series

4.3 Control Terminal Wiring

4.3.1 Control Board Standard Terminal Wiring



4.3.2 Control Terminal Function Description

Category	Terminal Label	Name	Terminal Function Description	Specification
Control Terminal	DI1-CM	Multi-function Input Terminal DI1	6 programmable digital input terminals can be programmed by F3.0 group function codes to select 98 types of operation control commands. For details, refer to Table for Multi-function Input Terminal Functions (see Chapter 6)	Optocoupler isolated input: 24Vdc/5mA
	DI2-CM	Multi-function Input Terminal DI2		
	DI3-CM	Multi-function Input Terminal DI3		
	DI4-CM	Multi-function Input Terminal DI4		
	DI5-CM	Multi-function Input Terminal DI5		
Operation Status Output	CM	Input/Output Terminal Common Terminal	2 programmable open collector outputs and 1 programmable relay output terminal can be programmed by F3.1 group function codes to select 71 types of operating status outputs. For details, refer to the Table for Multi-function Output Terminal Variables (see Chapter 6)	Maximum load 50mA when powered by 24V supply of the inverter
	DO1-CM	Multi-function Output Terminal DO1		
	DO2-CM	Multi-function Output Terminal DO2		
	TA	Multi-function Relay Output RO1 TA-TB Normally Closed TA-TC Normally Open		Contact capacity: AC 250V/2A
	TB			
	TC			
Power Supply	CM	+24V Power Supply Reference Ground	Digital input/output terminal power supply	Max output current: 100mA
	24V	+24V Power Supply		
Analog Input	AI1-GND	Analog Input AI1	Use F4 group function codes to select input voltage range, polarity, and other functions	Input voltage: 0-10V, Input current: 0-20mA
	AI2-GND	Analog Input AI2		
Analog Output	AO1-GND	Multi-function Analog Output AO1	For programmable voltage/current signal output terminal, 45 monitoring states are available for selection. For details, refer to the Table for Monitor Variables. (See Chapter 6) JP1, JP2 (refer to 4.3.3 Dip Switch Jumper Selection for details) select output state.	Current output 0-20mA Voltage output: 0-10V Output current with impedance specification: 0-500Ω
Power Supply	GND	Analog Signal Common Terminal		
	VS-GND	+10V/5V Power Supply	Provide +10V/10mA or +5V/50mA power externally	JP3 (refer to 4.3.3 Dip Switch Jumper Selection for details) selection
Communication	RS+/ RS-	485 Communication Interface Positive/negative Terminal	485 Communication Interface	-

4.3.3 Control Board Dip Switch Description

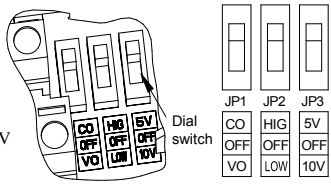
The dip switch has 3 options available

JP1

VO position: Indicating that AO1 terminal outputs voltage signal

OFF position: Indicating that AO1 terminal is in floating state

CO position: Indicating that AO1 outputs current signal



JP2

HIG position: Indicating that DI terminal is effectively closed with 24V

OFF position: Indicating that DI terminal is in floating state

LOW position: Indicating that DI terminal is effectively closed with CM

JP3

5V position: Indicating that VS terminal provides 5V voltage signal externally

OFF position: Indicating that VS terminal is in floating state

10V position: Indicating that VS terminal provides 10V voltage signal externally

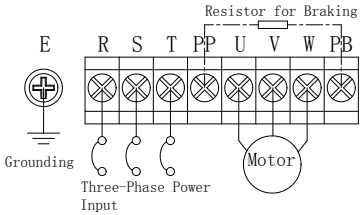
4.4 Main Circuit Terminal Wiring

4.4.1 Terminal Function Description

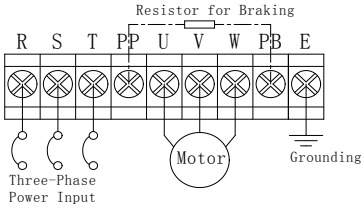
Symbol	Function Description	Symbol	Function Description
P+	DC side positive voltage terminal	PB	Energy consumption braking resistor can be connected between P+ and PB
P-	DC side negative voltage terminal, the bus voltage input terminal of the energy consumption braking unit can be connected between P+ and P-	E	Ground Terminal
R, S, T	Connect to three-phase AC power grid	U, V, W	Connect to three-phase AC motor
L, N	Connect to single-phase AC power grid, L is live wire, N is neutral wire	⏚	Grounding Lug

Caution: Do not reverse the live and neutral wires, otherwise the machine may become live

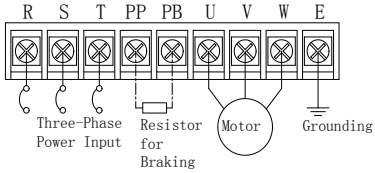
4.4.2 Main Circuit Terminals



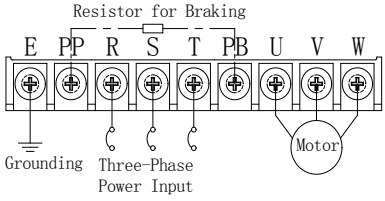
Applicable models:
DL500-4T0011G/4T0015P
DL500-4T0015G/4T0022P



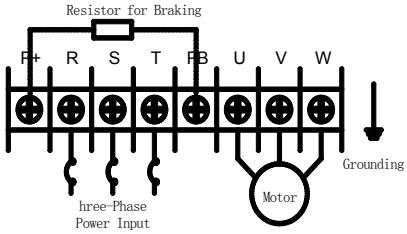
Applicable models:
DL500-4T0022G/4T0030P
DL500-4T0030G/4T0040P
DL500-4T0040G/4T0055P



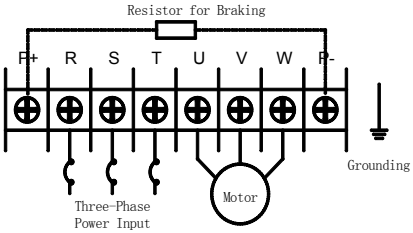
Applicable models:
DL500-4T0055G/4T0075P
DL500-4T0075G/4T0110P



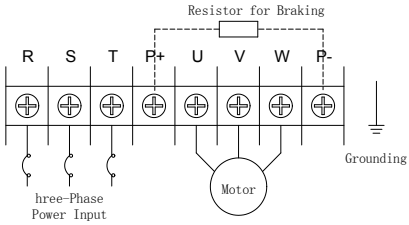
Applicable models:
DL500-4T0110G/4T0150P
DL500-4T0150G/4T0185P



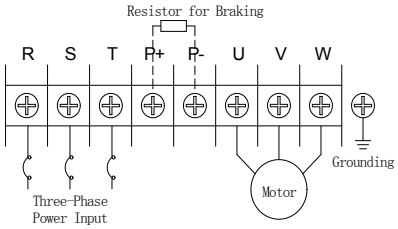
Applicable models:
DL500-4T0185G/4T0220P
DL500-4T0220G/4T0300P
DL500-4T0300G/4T0370P



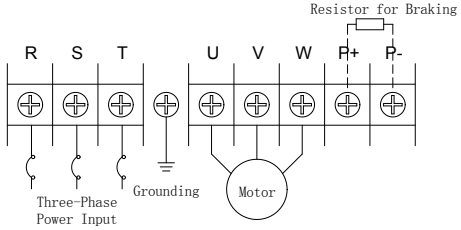
Applicable models:
DL500-4T0370G/4T0450P



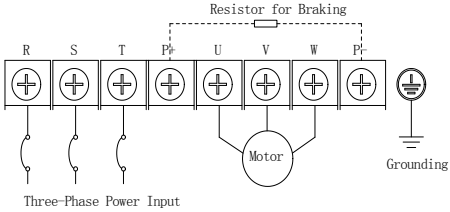
Applicable models:
DL500-4T0450G/4T0550P-
DL500-4T0550G/4T0750P



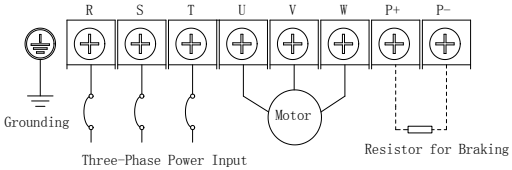
Applicable models:
DL500-4T0750G/4T0900P-
DL500-4T0900G/4T1100P



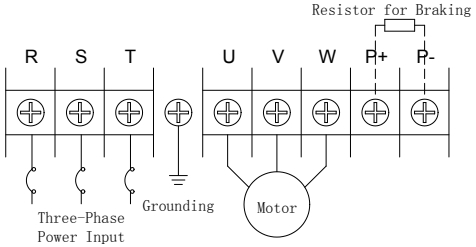
Applicable models:
DL500-4T1100G/4T1320P-
DL500-4T1320G/4T1600P



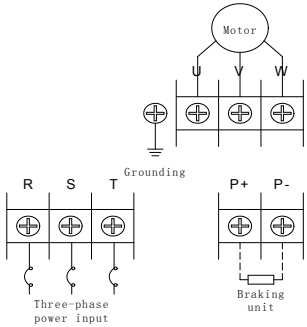
Applicable models:
DL500-4T1600G/4T1850P-
DL500-4T2200G/4T2500P



Applicable models:
DL500-4T2500G/4T2800P-
DL500-4T3150G/4T3500P



Applicable models:
DL500-4T3500G/4T4000P-
DL500-4T4000G/4T4500P



Applicable models:
DL500-4T4500G/4T5000P-
DL500-4T8000G/4T9000P

4.5 Basic Operating Wiring of the Inverter

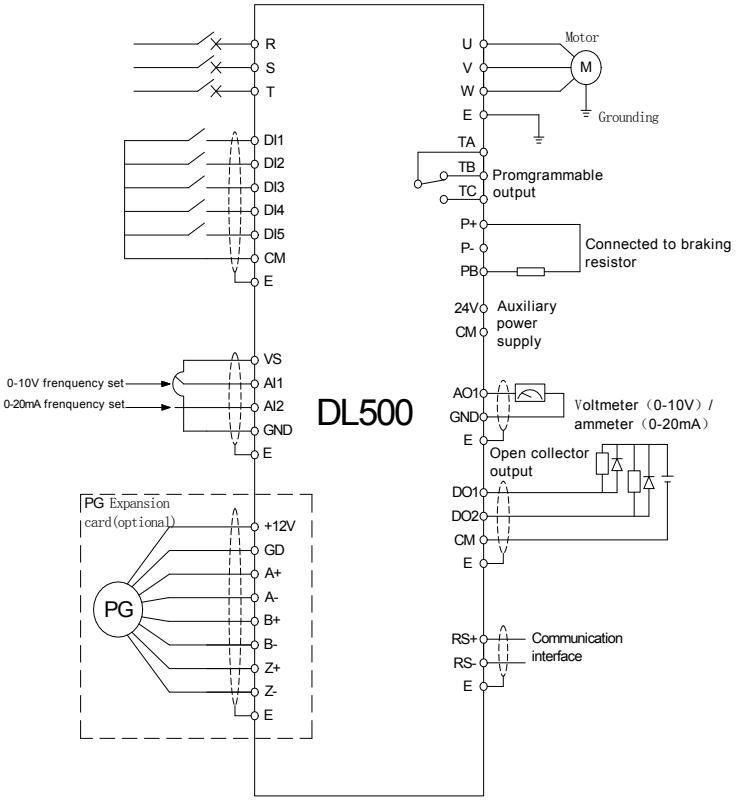
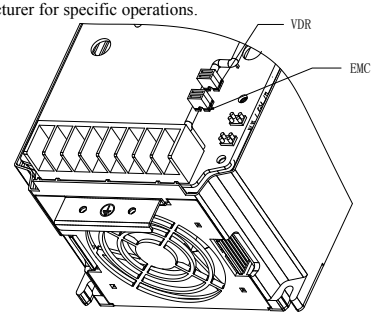


Figure 4-2 Inverter Basic Wiring Diagram for DL500 Series

4.6 Grid System Requirements

- This product is suitable for grounded neutral grid systems. If used in IT grid systems (ungrounded neutral grid systems), the varistor (VDR) and safety capacitor (EMC) ground shorting caps or shorting screws must all be removed, taking DL500-4T0185G/4T0220P as an example, as shown in the VDR and EMC shorting caps in the figure, and filters must not be installed, otherwise it may cause injury or inverter damage.
- In cases where earth leakage circuit breakers are configured, if tripping or leakage occurs, the safety capacitor (EMC) ground jumper cap or shorting screws can be removed, taking DL500-4T0185G/4T0220P as an example, as shown for EMC in the figure. Since each machine has a different design, please consult the manufacturer for specific operations.



Chapter 5 Inverter Operation and Simple Running

5.1 Introduction to Basic Functions of Panel

In addition to basic start and stop control, the inverter's operation panel primarily performs two major functions: monitoring running status parameters and querying/modifying internal parameters. Accordingly, the operation panel can be divided into two working modes: monitoring mode and parameter modification/query mode.

Upon power-up, the main display bar scrolls out our company's logo abbreviation from right to left, and returns to normal display after about 1 second. The auxiliary display bar statically displays the inverter model information, such as "4.0040". The "T, S" in the inverter model are not displayed. After 1 second, it switches to normal display. At this time, the running parameters displayed on the operation panel are determined by the inverter's internal parameters [F0.0.12] and [F0.0.13]. In any state, if there is no key operation for 1 minute, the operation panel will return to the normal monitoring mode. (For the appearance of the operation panel, please refer to Chapter 3)

5.1.1 Operation Panel Description

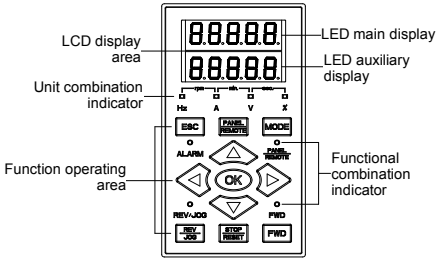


Figure 5-1-A Dual-row LED Small Panel
DL500-4T0150G/4T0185P and below (standard)

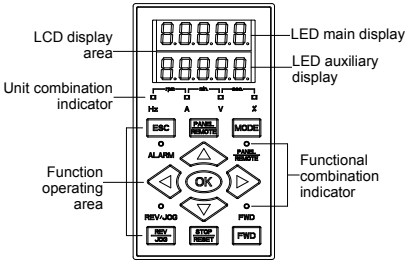


Figure 5-1-B Dual-row LED Standard Operation Panel
DL500-4T0185G/4T0220P and above (standard)

Table 5-1 Key Function Description

Project	Function Description
Main Digital Display	Display the inverter's current operating status parameters and setting parameters
Auxiliary Digital Display	Display the inverter's current operating status parameters and setting parameters
A, Hz, V, %	A, Hz, V display the unit of measurement corresponding to the main digital display data % is for composite unit display Composite unit indicators are defined as follows: Hz + A = RPM; V + % = Sec.; A + V = Min.
FWD, REV	Running status indicator: Its flashing indicates that the inverter is operating in forward or reverse and has voltage output

Project	Function Description
PANEL/REMOTE	Indicator off: External terminal command is active; Indicator on: Operation panel command is active; Indicator flashing: Communication interface (or extended communication board, extended function board, etc.) command is active
Alarm	Warning Indicator Light on indicates that the inverter is in a warning state. Identify the cause and eliminate the anomaly, otherwise it will lead to inverter fault shutdown

Project	Function Description
FWD	**Forward Running Command Key** When the inverter's running command channel is set to operation panel control ([F0.3.33] or [F0.3.34]=0), press this key to issue a forward running command
REV JOG	**Reverse/Jog Running Command Key** When the reverse function is selected ([FF.4.42=###0]) and the inverter's running command channel is set to operation panel control ([F0.3.33] or [F0.3.34]=0), press this key to issue a reverse running command; when the jog function is selected ([FF.4.42=###1]), press this key to issue a jog running command
STOP RESET	**Stop/Reset Key** When the inverter is running, pressing this key will stop it according to the set method. In fault status, pressing this key will reset the inverter, returning it to a normal stopped state. The STOP RESET key can be locked or its function changed by the user (refer to the description of function parameter F0.011)
ESC	**Back Key** In any state, pressing this key will return to the previous state until the normal monitoring mode
MODE	**Mode Key** Toggle display of function parameter groups and monitoring parameter groups. In parameter modification state, pressing this key will cycle through "EROM Stored Value", "Value at this Power-up", and "Panel Backup Value" for the current function code in the auxiliary display bar
◀	**Left Shift Key** Press this key to select the data bit to be modified from right to left, and the modified bit will flash
▶	**Right Shift Key** Press this key to select the data bit to be modified from left to right, and the modified bit will flash
▲ ▼	**Data Modification Key** Used to modify function codes or parameters. If the current setting is for digital input, this key can be used directly to modify the digital set value in normal monitoring mode
PANEL REMOTE	**Local/Terminal/Communication Control Function Key** By setting [F0.0.11]=#1##, users can switch between keyboard control, external terminal control, and communication control functions (the switched state is not stored and will be lost upon power-off)
OK	**OK Key** Confirm current status and parameters (parameters stored in internal memory), and enter the next function menu

5.2 Basic Functions and Operation Methods of Panel

5.2.1 Basic Functions of Panel

In addition to basic functions such as forward running, reverse running, jog running, stop, fault reset, parameter modification and query, and running status parameter monitoring, the operation panel also has the following special functions:

☐ Parameter Copy Read/Backup (Parameter Upload)

This operation panel can copy the inverter's internal parameters to the operation panel (limited to internal parameters publicly accessible to users) and save them permanently. Therefore, users can back up their typical settings to the operation panel for urgent use. Backup parameters in the operation panel do not affect the inverter's operation and can be viewed and modified separately.

When application parameter [F0.0.08]=####1, the keyboard starts reading the inverter's internal parameters, and the operation panel will display the real-time parameter reading process. After parameter backup is complete, the display mode automatically returns to normal monitoring. For details, please refer to Chapter 6. During parameter backup, press **the STOP/RESET key** at any time to terminate the parameter backup operation, and the display will switch back to normal monitoring mode; if an alarm message appears, please refer to Chapter 8.

☐ Parameter Copy/Write (Parameter Download)

This operation panel can copy backup parameters to the inverter's internal memory (limited to internal parameters publicly accessible to users), and users can write their backed-up typical settings from the operation panel to the inverter at once, without modifying them individually.

When the inverter is in stop mode, by setting F0.0.08 to ##12 or ##13, the keyboard starts copying backup parameters to the inverter, and the operation panel will display the real-time parameter copying progress. After parameter copying is complete, the display mode automatically returns to normal monitoring.

During parameter copying, pressing **the STOP/RESET key** can terminate the parameter copying operation at any time, abandoning the copied parameters and switching the display back to normal monitoring mode; if an alarm message appears, please refer to Chapter 8.

☐ Viewing and Modifying of Internal Parameters

In normal monitoring mode, press the **MODE key** to enter the inverter's internal parameter viewing and modification mode, where data can be queried and modified using general methods.

☐ Viewing and Modifying of Panel Backup Parameters

In normal monitoring mode, simultaneously press the **ESC key** and **MODE key** (dual-key compound use) to enter the viewing and modification mode of operation panel backup parameters. When function codes are displayed, the high-order code "F" of the main display will flash, indicating that the currently queried and modified parameters are backup parameters. The method for modifying backup parameters is the same as for internal parameters.

☐ Panel Locking and Unlocking

1) Locking: By setting application parameter F0.0.11, some or all key functions of the panel can be locked.

If the parameter is set to panel lock mode, the inverter will lock the panel immediately upon power-up.

2) Unlocking: Press and hold the **OK key**. Within 5 seconds, click the **Left Shift key** and **Right Shift key** twice in sequence. The panel lock will be temporarily released for 5 minutes. If no key input occurs within 5 minutes, the panel will automatically relock.

To completely unlock the panel, modify the inverter's panel lock parameter [F0.0.11] to "unlocked" state while the panel is temporarily unlocked.

☐ Key Function

This key function is restricted by inverter application parameter F0.0.11. When the function is enabled, in "normal monitoring mode", each press of this key will cycle the running command channel sequentially through "Operation Panel → Local Termina l → Communication Interface → Operation Panel". The **PANEL/REMOTE** indicator light displays the selected command channel. Pressing the OK key within 3 seconds makes the change effective. Pressing the Back key or no confirmation input within 3 seconds will abandon the switch and return to the original state.

When switching the command channel, if the original setting was "Operation Panel" or "Local Terminal", "Communication Interface" defaults to local MODBUS fieldbus.

The running command channel switched by this function is not permanently stored; it reverts to the original setting after the inverter is powered off and restarted. To permanently change the command channel, related application parameters of the inverter need to be modified.

5.2.2 Panel Operation Method

1) Status Parameter Query (Example)

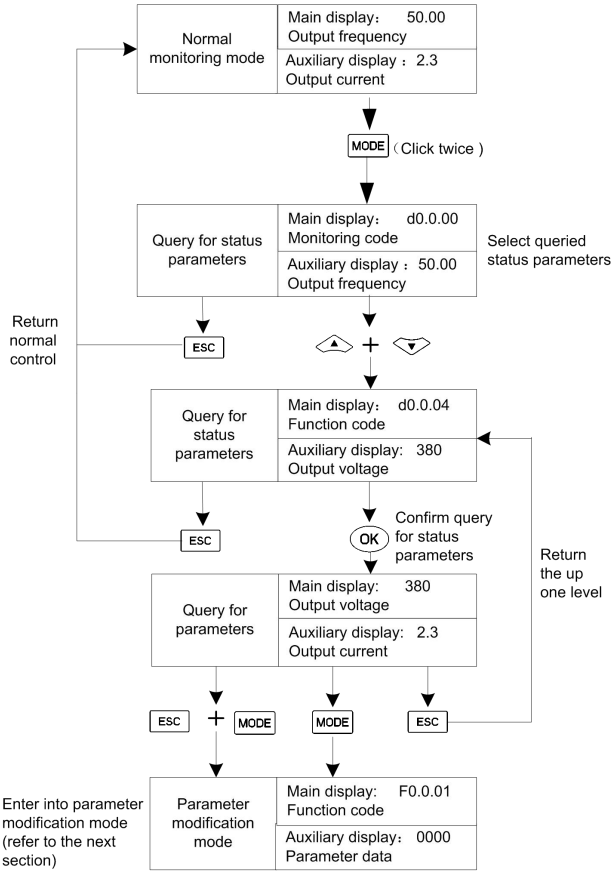


Figure 5-2 Schematic Diagram for Status Parameter Query

2) Parameter Query and Modification (Example)

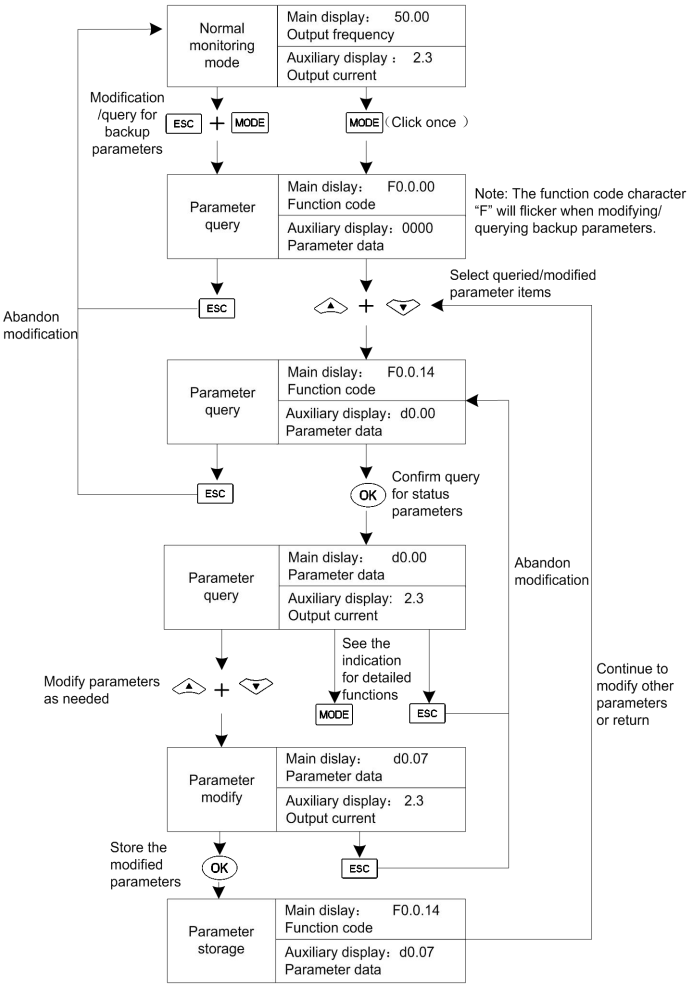


Figure 5-3 Schematic Diagram for Parameter Query and Modification

Note: In this state, repeatedly pressing the **MODE key** will cycle the auxiliary display bar through the following content: Default Auxiliary Monitoring Parameters (Initial State), ⟶ EROM Area Value, ⟶ Initial Power-up Parameter Value, and ⟶ Operation Panel Backup Parameters. When displaying "EROM Area Value", "Initial Power-up Value", or "Operation Panel Backup Parameters", the values will flash.

5.3 Simple Operation of the Inverter

5.3.1 Initial Settings of the Inverter

● Control Mode Selection

The DL500 inverter has three control modes: vector control without PG, vector control with PG, and V/F control. The running control mode is selected by application parameter F0.0.09.

Mode 0: Vector control without PG, also known as speed sensorless vector control and open-loop vector control. It is suitable for applications where an encoder is not installed, but high demands are placed on starting torque and speed control accuracy, and conventional V/F control cannot meet the requirements.

Mode 1: Vector control with PG, also known as closed-loop vector control. It is suitable for applications requiring faster torque response and higher control accuracy.

Mode 2: V/F control mode. In addition to conventional V/F control applications, it can also be used in situations where the inverter drives more than one motor.

The control mode of the inverter is selected differently based on the motor type and control requirements. It is set by parameter F0.0.09=####. For example, if a three-phase asynchronous motor is used on site, it can be selected by setting F0.0.09=##0#. For sites requiring particularly high control accuracy and equipped with speed sensors, F0.0.09=##1# can be set for closed-loop vector control.

● Frequency Input Channel Selection (F0.2.25)

The DL500 inverter has 29 frequency setting methods.

● Running Command Input Channel [F0.3.33]

5.3.2 Simple Operation

It is absolutely prohibited to connect power lines to the U, V, W outputs of the inverter.

□ Simple Wiring Diagram

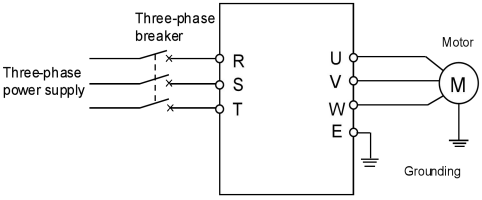


Figure 5-4 SVC Running Wiring

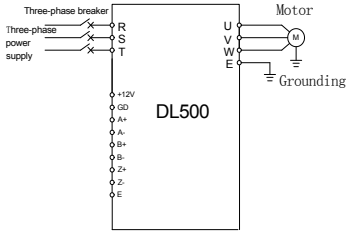


Figure 5-5 VC Running Wiring Diagram

☐ SVC (Sensorless Vector Control) Operation

Taking a 7.5KW inverter driving a 7.5KW three-phase AC asynchronous motor as an example, the operation process is described.

Motor nameplate parameters are:

Rated Power: 7.5KW Rated Voltage: 380V Rated Current: 15.4A
Rated Frequency: 50.00Hz Rated Speed: 1440rpm Encoder Pulses: 1000PPR

Use the operation panel for digital frequency setting and start/stop control.

1. Wiring as shown in Figure 5-4;
2. After confirming correct wiring, close the power switch and power on;
3. Set the following parameters:

   [F0.0.09]=0000 (Sensorless vector control)

   [F0.2.25]=2 (Frequency setting channel)

   [F0.3.33]=0 (Control command)

   [F2.0.00]=7.5 (Motor rated power)

   [F2.0.01]=380 (Motor rated voltage)

   [F2.0.02]=15.4 (Motor rated current)

   [F2.0.03]=50.00 (Motor rated frequency)

   [F2.0.04]=1440 (Motor rated speed)

4. Press the **FWD key** to start the inverter. If motor nameplate parameters (F2.2.00 - F2.0.04) have been modified in the ③, a static parameter identification will automatically start. The inverter outputs 0 frequency, and the auxiliary display shows the current output current (at this time, it is not limited by parameter F0.0.13). When the displayed current stabilizes at 0.0, self-learning ends and operation begins.
5. During operation, use the data modification key to change the inverter's output frequency, achieving motor speed adjustment.
6. Observe if the motor is operating normally. If there is any abnormality, immediately stop running, power off, investigate the cause, and then resume the running;
7. Press the **STOP/RESET key** to stop running; and cut off the power switch.

☐ VC (Sensing vector Control) Running

In addition to the parameters that must be set for SVC running above, the following parameters also need to be set. The wiring diagram is as shown in 5-4.

[F0.0.09]=0010 (Sensing vector control)

[F8.0.04]=0 (Speed feedback channel)

[F8.0.05]=1000 (Encoder pulses per revolution)

[F8.0.06] If Fu.020 fault occurs during startup or positive/reverse periodic vibration, set this parameter to 1 (or swap A, B pulse wiring). Other operations are the same as SVC operation.

If the motor is completely unloaded, slight oscillation may sometimes occur when running at high carrier frequency.
In this case, reduce the carrier frequency setting value (parameter [F1.1.13]).

Chapter 6 Function Parameter Table

Explanations:

"×" indicates that the set value of the parameter cannot be changed when the inverter is running.

"☆" indicates the parameter is relevant with the model of the inverter.

"R" indicates the parameter is just for reading and cannot be changed;

"R/I" indicates the parameter is just for reading and cannot be changed, but can be cleared by initialization.;

"—" indicates the parameter is relevant with the type or status of connected accessories.

Variables: (H) - hexadecimal number; only bitwise data change is permitted (carry bit is not allowed), and the upper and lower limit for bitwise change.

6.1 System management parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.0.00	Macro parameter	**Units: Application macro (0~F)** 0: Void (customized setting) 1: Setting of panel operation digit (factory default) 2: Setting of panel operation shuttle 3: 2 wire control 1(AT1 setting) 4: 2 wire control 2(AT1 setting) 5: 3 wire control 1(AT1 setting) 6: Tool device spindle drive (AT1 setting) **Tens: Reserved** **Hundreds: Configuration macro (reserved)** **Kilobit: System macro (0~F)** 0: Standard operation 1: Variable torque load (e.g. load of fans and pumps) 2: Reserved	1	0000	×
F0.0.01	Parameter display and modification (H)	**Units: Parameter display mode** 0: Display all parameters 1: Display effective configuration parameters 2: Display parameters different from factory default 3: Display modified and stored parameters after power-on this time 4: Display modified and un-stored parameters after power-on this time **Tens: Parameter modification mode** 0: Effective and permanently stored after modification 1: Effective after modification but not stored, and getting lost after power-off **Hundreds: Reserved** **Kilobit: Parameter batch recovery and batch storage** 2: Abandon modifying all un-saved parameters (restoring to original value) 5: Batch storing all modified and un-saved parameters 9: Resume all parameters to initial values at the last power-on	1	0001	
F0.0.02	Modification key for system macro and configuration macro parameters	0~65535(1580)	1	0	×
F0.0.03	Reserve				
F0.0.04	LCD display setting(H)	**Units: Contrast 0~7** **Tens: Normal display mode** 0: Steady mode 1: Single parameter display 2: Dual parameter display 3: Three parameter display	1	0023	-

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.0.05	Parameter locking(H)	**Units: Parameter modification permission** 0: All parameters are permitted to be modified 1: Except for this parameter, frequency digital setting, PID digital setting, revolution digital setting, torque digital setting, locking password parameter (F0.0.06), other parameters are forbidden to be modified. 2: All parameters are forbidden to be modified except for this parameter and the locking password. **Tens: Coded lock** 0: Void 1: Effective – once the password is set, this parameter cannot be modified unless correct password is entered.	1	0000	
F0.0.06	Parameter locking password	0~65535	1	0	
F0.0.07	Parameter initialization	0: No action 1: Factory Reset parameter groups F0>F9 2: Factory Reset parameter groups F0>FA 3: Factory Reset parameter groups F0>FB 4: Factory Reset parameter groups F0>FC 5: Factory Reset parameter groups F0>FD 6: Factory Reset parameter groups F0>FE 7: Factory Reset parameter groups F0>FF 8: Clear away fault records	1	0	×
F0.0.08	Parameter copying(H)	**Units: Upload and download** 0: No action 1: Parameter upload 2: Parameter download 3: Parameter download(except for motor parameter/F2 Group) **Tens: Local download permitted** 0: Parameter download forbidden 1: Parameter download permitted	1	0000	×
F0.0.09	Motor type and control mode selection (H)	**LED Units: Motor 1 type selection** 0: Induction asynchronous motor 1 1: Induction asynchronous motor 2r **LED Tens: Motor 1 control mode** 0: SVC mode/open-loop vector control 1: VC mode/closed-loop vector control 2: V/F control 3: V/F separate control **LED Hundreds: Motor 2 selection type** 0: Induction asynchronous motor 1 1: Induction asynchronous motor 2 2:PMSM **LED Kilobit: Motor 2 control mode** 0: SVC mode/open-loop vector control 1: VC mode/closed-loop vector control 2: V/F control 3: V/F separate control	2020	1	×

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.0.10	Motor selection	0: Motor 1 1: Motor 2 2: Selection of multifunctional input terminal (Function No.41)	1	0	×
F0.0.11	Selection of panel key functions (H)	**Units: Keypad locking** 0: No locking 1: All keys are locked except for UP/DW (Shuttle), Stop and RUN. 2: All keys are locked except for STOP and RUN 3: All keys are locked except for STOP 4: Lock all keys **Tens: STOP button function** 0: Non-panel control mode void 1: Press STOP key in any control mode to stop the device slowly 2: Press STOP key in any control mode to stop the device freely **Hundreds: PANEL/REMOTE button function** 0: Void 1: Stop effective 2: Continuously effective **Kilobit: Reserved**	1	0000	×
F0.0.12	Principal monitoring parameter (H)	d0.0~d0.55 / d1.0~d1.55	1	d0.00	
F0.0.13	Auxiliary monitoring parameter 1 (H)	d0.0~d0.55 / d1.0~d1.55	1	d0.02	
F0.0.14	Auxiliary monitoring parameter 2 (H)	d0.0~d0.55 / d1.0~d1.55	1	d0.04	

6.2 Selection of running commands

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.1.15	Selection of running command source	0: Control command 1 effective 1: Control command 2 effective 2: Selection of multifunctional input terminal (Function No. 11)	1	0	
F0.1.16	Selection of frequency set value (when one source of combination set is bipolar set, the final direction of the combination results shall be the direction of setting source1	0: Frequency setting source 1 is independently effective 1: Frequency setting source 2 is independently effective 2: Selection of multifunctional input terminal (Function No.12) 3: Bound with the start-stop command channel 4: Channel 1 + Channel 2 5: Channel 1 amplified by Channel 2 6: Channel 1 - Channel 2 7: Channel 1 reduced by Channel 2 8: Channel 1 reduced by Channel 2 9: Highest value Channel 1 OR Channel 2 10: Lowest value Channel 1 OR Channel 2 11: √(Channel 1) + √(Channel 2) 12: √(Channel 1 + Channel 2) 13: (Channel1 x Scaling1) + (Channel 2 x Scaling 2)	1	0	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		14: (Channel1 x Scaling1) + (Channel 2 x Scaling 2)			
F0.1.17	Running direction(H)	**Units: Direction switch** 0: Void 1: Negate **Tens: Direction locking** 0: Void (determined by the direction command) 1: FWD locking 2: REV locking	1	0000	
F0.1.18	Action coefficient of frequency setting channel1	0.01~100.00	0.01	1.00	
F0.1.19	Action coefficient of frequency setting channel2	0.01~100.00	0.01	1.00	
F0.1.20	Maximum output frequency	10.00~300.00Hz/100.0~400.0Hz	0.01	60.00	
F0.1.21	Upper limiting frequency	[F0.1.22]~Min. (300.00Hz,[F0.1.20])	0.01	50.00	
F0.1.22	Lower limiting frequency	0.0Hz~[F0.1.21]	0.01	0.0	
F0.1.23	FWD jog frequency	0.0Hz~[F0.1.21]	0.01	10.00	
F0.1.24	REV jog frequency	0.0Hz~[F0.1.21]	0.01	10.00	

6.3 Frequency setting

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.2.25	Frequency setting channel 1	0: Panel digital setting (maintained after stop) 1: Panel digital setting (zero clearing after stop) 2 :Panel digital setting (maintained after stop and saved after power-off) 3: Setting of panel shuttle potentiometer 4: Remote UP/DW 1 (keep value at power off) 5: Remote UP/DW 2 (go to zero when stopped) 6: Remote UP/DW 3 (keep value at power off) 7: Remote UP/DW Bipolar Setting 1 (keep bipolar when stopped) 8: Remote UP/DW Bipolar Setting 2 (keep at power off) 9: Analog input AI1 10: Analog input AI2 11: Analog input AI3 12: Given by the analog input AI1 bipolarity 13: Given by the analog input AI3 bipolarity 14: Pulse input Fin 15: Given by the pulse input bipolarity 16: MODBUS fieldbus set value 1(relative set value) 17: MODBUS fieldbus set value 2(absolute set value) 18: AI1+AI2 19: AI2+AI3 20: AI2+pulse input Fin 21: AI1*AI2/rail-to-rail input (10V) 22: AI1/AI2 23: Process PID output 24: Compensation PID output	1	2	
F0.2.26	Frequency setting channel 2			0	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		25: Disturbance running frequency 26: Automatic multi-sage running frequency 27: Terminal selection multi-stage frequency 28: Virtual analog input SAI1 29: Virtual mode input SAI2 In the case of V/F separate control, F0.2.25 changes to frequency giving channel, and F0.2.26 changes to voltage giving channel.			
F0.2.27	Minimum value of frequency setting source 1	0.0~[F0.2.28]	0.01	0.0	
F0.2.28	Maximum value of frequency setting source 1	[F0.2.27]~[F0.1.20]	0.01	50.0	
F0.2.29	Panel digital set value of frequency setting source 1	0.0~[F0.1.28]	0.01	0.0	
F0.2.30	Minimum value of frequency setting source 2	0.0~[F0.2.31]	0.01	0.0	
F0.2.31	Maximum value of frequency setting source 2	[F0.2.30]~[F0.2.20]	0.01	50.0	
F0.2.32	Panel digital set value of frequency setting source 2	0.0~[F0.2.31]	0.01	0.0	

6.4 Control command source

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.3.33	Control command 1	0: Operating panel 1: External control terminal 2: MODBUS fieldbus /standard expansion card configuration 3:extension communication moudle	1	0	
F0.3.34	Control command 2		1	0	
F0.3.35	External control terminal action mode (H)	**Units: Control command** 0: 2 wire mode 1 1: 2 wire mode 2 2: 3 wire mode 1 3: 3 wire mode 2 **Tens: Command power-on first starting** 0: Running signal level starting 1: Running signal rising edge starting (2 wire mode 1 and 2) **Hundreds: Reserved** **Kilobit: Reserved**	1	0000	×
F0.3.36	Reserve				

6.5 Start and stop

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F0.4.37	Start/Running permission(H)	**LED Units: Start permission** 0: Function closed 1: Permitted when the multifunctional terminal is effective (Function No. 42) 2: Command word from standard fieldbus (standard expansion card) **LED Tens: Reserved** **LED Hundreds: Running permission** 0: Function closed 1: Permitted when the multifunctional terminal is effective (Function No. 43) 2: Command word from standard fieldbus (standard expansion card) **LED Kilobit: The action mode when the running permission signal is void** 0: Free stop 1: Deceleration stop	1	0000	×
F0.4.38	Start/Stop Mode(H)	**Units: Start mode** 0: Normal start 1: Revolution tracking start **Tens: Reserved** **Hundreds: Stop mode** 0: Deceleration stop 1: Free stop	1	0000	×
F0.4.39	Start frequency	0.0~50.00Hz	0.01	0.50	
F0.4.40	Start frequency holding time	0.00~10.00Sec.	0.01	0.0	
F0.4.41	Start pre-excitation current	0.0~100.0(%)	0.1	35.0	
F0.4.42	Start pre-excitation time	0.00~10.00Sec.	0.01	0.10	
F0.4.43	Start delay	0.00~10.00Sec.	0.01	0.0	
F0.4.44	DC band-type brake control	**Units: DC band-type brake function** 0: Closed 1: Open **Tens: Reserved**	1	0	
F0.4.45	DC band type brake/brake initial frequency / speed	0.0~[F0.1.21]	0.01	2.00	
F0.4.46	DC brake action time	0.0~10.00Sec.	0.01	0.0	
F0.4.47	DC band-type brake/brake injection current	0.0~100.0(%)	0.1	50.0	
F0.4.48	Restart after power-off	0: Forbidden 1: Effective	1	0	
F0.4.49	Standby time for restart after power-off/free stop	0.1~10.0Sec.	0.1	0.5	
F0.4.50	FWD and REV transition dead time	0.00~5.00Sec.	0.01	0.00	
F0.4.51	FWD and REV switch mode	0: Switch at zero point 1: Start frequency switch	1	0	
F0.4.52	Zero speed (frequency) detection level	0.00~100.00Hz	0.01	0.10 Hz	
F0.4.53	Zero speed delay time	0.00~10.00Sec.	0.01	0.05	
F0.4.54	Emergency stop mode	0: The inverter will stop in deceleration mode	1	0	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
	(EMS)	according to the emergency stop and deceleration time. 1: The inverter will immediately lock output and the motor will stop in free sliding mode.			

6.6 Acceleration and deceleration characteristics parameters

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F1.0.00	Acceleration and deceleration characteristics parameters	**Units: Accel decele mode** 0: Liner acceleration and deceleration 1: S curve acceleration and deceleration **Tens: Unit of acceleration and deceleration time** 0: Sec. (Second) 1: Min. (Minute)	1	0000	×
F1.0.01	% of S curve at the bottom	5.0~100.0-[F1.0.02]	0.1	15.0	
F1.0.02	% of S curve at mid section	20.0~100.0-[F1.0.01]	0.1	70.0	
F1.0.03	Acceleration time1	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.04	Deceleration time1	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.05	Acceleration time2	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.06	Deceleration time2	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.07	Acceleration time3	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.08	Deceleration time3	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.09	Acceleration 4/jog acceleration time	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.10	Deceleration 4/jog deceleration time	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.11	EMS emergency stop and deceleration time	0.01~ 600.00 (Sec./Min.)	0.01	☆	
F1.0.12	Reserve				

6.7 Carrier frequency

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F1.1.13	Carrier frequency	Three-phase voltage vector composition (FF.4.43=##0#) mode: 1.5~12.0KHz Two-phase voltage vector composition (FF.4.43 =##1#) mode: 1.5~15.0KHz		☆	
F1.1.14	Carrier characteristics	**Units: Load linkage adjustment** 0: Void 1: Effective **Tens: Temperature linkage adjustment** 0: Void 1: Effective **Hundreds: Reference frequency linkage adjustment** 0: Void 1: Effective **Kilobit: Modulation mode** 0: Asynchronous modulation 1: Synchronous modulation 2~5: Sound smooth	1	0111	

6.8 V/F parameters and overload protection (Motor 1)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F1.2.15	Reference frequency of motor 1	5.00~300.00Hz/ 50.0~400.0Hz	0.01	50.00	×
F1.2.16	Reference voltage of motor1	50~500V	1	380/220	
F1.2.17	V/F curve selection for motor 1	0: Customized curve 1: 1.2 times squares curve 2: 1.5 times squares curve 3: Second square curve	1	0	×
F1.2.18	Torque increasing voltage for motor1	0.0~20.0%	0.1	☆	
F1.2.19	Frequency point 1 of motor 1 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.2.20	Voltage point 1 of Motor 1 V/F curve	0~500V	0.1	0.0	
F1.2.21	Frequency point2 of motor 1 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.2.22	Voltage point 2 of Motor 1 V/F curve	0~500V	0.1	0.0	
F1.2.23	Frequency point3 of motor 1 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.2.24	Voltage point 3 of Motor 1 V/F curve	0~500V	0.1	0.0	
F1.2.25	Slip frequency compensation for motor 1	0~150(%)	1	0	

6.9 V/F parameters and overload protection (Motor 2)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F1.3.27	Reference frequency of motor 2	5.00~300.00Hz/ 50.0~400.0Hz	0.01	50.00	×
F1.3.28	Reference voltage of motor 2	50~500V	1	380/220	
F1.3.29	V/F curve selection for motor 2	0: Customized curve 1: 1.2 times squares curve 2: 1.5 times squares curve 3: Second square curve	1	0	×
F1.3.30	Torque increasing voltage for motor2	0.0~20.0%	0.1	☆	
F1.3.31	Frequency point 1 of motor 2 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.3.32	Voltage point 1 of Motor 2 V/F curve	0~500V	0.1	0.0	
F1.3.33	Frequency point 2 of motor 2 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.3.34	Voltage point 2 of Motor 2 V/F curve	0~500	0.1	0.0	
F1.3.35	Frequency point 3 of motor 2 V/F curve	0.0~[F0.1.21]	0.01	0.0	×
F1.3.36	Voltage point 3 of Motor 2 V/F curve	0~500V	0.1	0.0	
F1.3.37	Slip frequency compensation for motor 2	0~150(%)	1	0	

6.10 Steady running

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F1.4.39	Acceleration/deceleration current limiting level	120~180(%)	1	160	
F1.4.40	Software overcurrent protection level	120~200(%)	1	200	
F1.4.41	Retention parameter	Retention parameter	-	-	
F1.4.42	Function selection for adjustors	**Units: Overvoltage suppression adjustor** 0: Closed 1: Effective (Frequency increasing suppression) 2：Terminal inputs **Tens: Under voltage suppression adjustor** 0: Closed 1-5: Effective **Hundreds: Frequency modulation and current limiting adjustor** 0: Closed 1: Effective **Kilobit : Failure Auto Recovery Mode** 0：Speed tracking start 1：Normal Start	1	0111	
F1.4.43	Action level of the overvoltage adjustor	660~800V	1	740	
F1.4.44	Overvoltage adjusting gain	0.10~10.00	0.01	1.00	
F1.4.45	Action level of the under voltage adjustor	[FF.2.35]~480V	1	400V	
F1.4.46	Under voltage adjusting gain	0.10~10.00	0.01	1.00	
F1.4.47	Action level of the frequency decreasing and current limiting adjustor	20~200(%)	1	190	
F1.4.48	Adjusting gain of the frequency decreasing and current limiting adjustor	0.10~10.00	0.01	1.00	
F1.4.49	Recovery times of fault self resetting	0~5 (the self-recovery function is deactivated when it is set to 0)	1	0	
F1.4.50	The recovery waiting time of fault self resetting	0.2~100.0Sec.	0.1	1.0	
F1.4.51	Time period for self resetting timing	900~36000Sec.	1	3600	
F1.4.52	Selection of self resetting fault	**Units: Over current** 0: Self resetting forbidden 1: Self resetting permitted **Units: Overvoltage** 0: Self resetting forbidden 1: Self resetting permitted **Units: Output grounding** 0: Self resetting forbidden 1: Self resetting permitted **Kilobit: Running under voltage** 0: Self resetting forbidden 1: Self resetting permitted	1	0000	
F1.4.53	Display coefficient	0.001~60.000	0.001	1.000	

6.11 Vector running parameters (Motor 1)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F2.0.00	Rated power	0.1~400.0KW	0.1KW	☆	×
F2.0.01	Rated voltage	30~480V	1V	380/220	×
F2.0.02	Rated current	0.01~650.00A	0.01A	☆	×
F2.0.03	Rated frequency	max{5.00,[F2.0.04]/60}~300.00Hz	0.01Hz	50.00	×
F2.0.04	Rated revolution	10~min.{30000,60*[F2.0.03]}rpm	1rpm	☆	×
F2.0.05	Idling current	0.15*[F2.0.02]~0.8*[F2.0.02]	0.01A	☆	×
F2.0.06	Stator resistance	0.01~65000mΩ	☆	☆	×
F2.0.07	Stator inductance	0.001~6500.0mH	☆	☆	×
F2.0.08	Total leakage inductance	0.001~6500.0mH	☆	☆	×
F2.0.09	Rotator time constant	5.0~6500.0ms	0.1ms	☆	×
F2.0.10	Slip compensation coefficient	0.25~2.00	0.01	1.00	
F2.0.11 ~ F2.0.24	Retention parameter				×
F2.0.25	Motor overload protection coefficient	50.0~131.0(%) (131—closed)	0.1	110.0	
F2.0.11	Rated torque of PMSM	0.1~6553.5NM	0.1NM	☆	×
F2.0.12	Rated voltage of PMSM	30~480V	1V	380/220	×
F2.0.13	Rated current of PMSM	0.1~650.0A	0.1A	☆	×
F2.0.14	Rated frequency of PMSM	5.00~300.00Hz	0.01Hz	50.00	×
F2.0.15	Rated revolution of PMSM	10~30000rpm	1	1500	×
F2.0.16	Back EMF coeffcient of PMSM	1.0~2000.0V/1000rpm	0.1	207.0	×
F2.0.17	Torque coeffcient of PMSM	0.10~500.00 Nm/A	0.01	3.00	×
F2.0.18	Identification current of PMSM	1.0~80.0%	0.1	25.0	×
F2.0.19	Stator resistance of PMSM	0.01~65000mΩ		☆	×
F2.0.20	Vertical axis inductance of PMSM	0.001~6500.0mH		☆	×
F2.0.21	Quadrature axis inductance of PMSM	0.001~6500.0mH		☆	×
F2.0.22	Initial angle of PMSM	0~65535	1	0	×
F2.0.23	Z pulse original angle	0.0~359.9	0.1	0.0	×
F2.0.24	reserved	reserved	-	-	×
F2.0.25	Overload protection setting	50.0~131.0(%)（131—closed）	0.1	110.0	

6.12 Vector running parameters (Motor 2)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F2.1.26	Rated power	0.1~1000.0KW	0.1 KW	☆	×
F2.1.27	Rated voltage	30~480V	1V	380/220	×
F2.1.28	Rated current	0.01~650.00A	0.01A	☆	×
F2.1.29	Rated frequency	max{5.00,[F2.1.30]/60}~300.00Hz	0.01Hz	50.00	×
F2.1.30	Rated revolution	10~min.{30000,60* [F2.1.29]}rpm	1rpm	☆	×
F2.1.31	Idling current	0.15*[F2.1.28]~0.8* [F2.1.28]	0.01A	☆	×
F2.1.32	Stator resistance	0.01~65000mΩ	☆	☆	×
F2.1.33	Stator inductance	0.001~6500.0mH	☆	☆	×
F2.1.34	Total leakage inductance	0.001~6500.0mH	☆	☆	×
F2.1.35	Rotator time constant	5.0~6500.0ms	0.1ms	☆	×
F2.1.36	Slip compensation coefficient	0.25~2.00	0.01	1.00	
F2.1.37 ~F2.1.50	Retention parameter				×
F2.1.51	Motor overload protection coefficient	50.0~131.0(%) (131—closed)	0.1	110.0	
F2.1.37	Rated torque of PMSM	0.1~6553.5NM	0.1NM	☆	×
F2.1.38	Rated voltage of PMSM	30~480V	1V	380/220	×
F2.1.39	Rated current of PMSM	0.1~650.0A	0.1A	☆	×
F2.1.40	Rated frequency of PMSM	5.00~300.00Hz	0.01Hz	50.00	×
F2.1.41	Rated revolution of PMSM	10~30000rpm	1	1500	×
F2.1.42	Back EMF coeffcient of PMSM	1.0~2000.0V/1000rpm	0.1	207.0	×
F2.1.43	Torque coeffcient of PMSM	0.10~500.00 Nm/A	0.01	3.00	×
F2.1.44	Identification current of PMSM	1.0~80.0%	0.1	25.0	×
F2.1.45	Stator resistance of PMSM	0.01~65000mΩ		☆	×
F2.1.46	Vertical axis inductance of PMSM	0.001~6500.0mH		☆	×
F2.1.47	Quadrature axis inductance of PMSM	0.001~6500.0mH		☆	×
F2.1.48	Initial angle of PMSM	0~65535	1	0	×
F2.1.49	Z pulse original angle	0.0~359.9	0.1	0.0	×
F2.1.50	reserved	reserved	-	-	×

- The stator resistance, stator inductance and the Minimum Unit of total leakage inductance of asynchronous motors is relevant with different models.

6.13 Parameter measurement and pre-excitation

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F2.2.52	Start excitation time in vector mode	0.02~2.50Sec.	0.01	☆	
F2.2.53	Motor parameter measurement	0: Closed 1: Static identification 2: Static + operating parameter identification 3: Static + operating parameter identification + revolution ratio identification	1	0	×

6.14 Multifunctional input terminal

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F3.0.00	Multifunctional input terminal DI1	0~96	1	0	×
F3.0.01	Multifunctional input terminal DI2	0~96	1	0	×
F3.0.02	Multifunctional input terminal DI3	0~96	1	7	×
F3.0.03	Multifunctional input terminal DI4	0~96	1	8	×
F3.0.04	Multifunctional input terminal DI5	0~96	1	13	×
F3.0.05	Multifunctional input terminal DI6	0~96	1	0	×
F3.0.06	Multifunctional input terminal DI7/ standard expansion card	0~96	1	0	×
F3.0.07	Multifunctional input terminal DI8 / standard expansion card	0~96	1	0	×
F3.0.08	Multifunctional input terminal DI9/Fin/ standard expansion card	0~98	1	97	×
F3.0.09	Multifunctional terminal filtering time (DI1~DI5)	1~50ms	1	5ms	
F3.0.10	Multifunctional terminal filtering time (DI6~DI9) /standard expansion card	1~50ms	1	5ms	
F3.0.11	Input terminal effective level (H)	**Units: DI1~DI4 terminal** 0~F: 4-bit binary, bit=0 power-on effective, 1 disconnection effective **Tens: DI5~DI8 terminal** The same as above **Hundreds: DI9 terminal** The same as above **Kilobit: Reserved**	1	0000	×

6.15 Multifunctional output terminal

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F3.1.12	Multifunctional output terminal DO1	0~71	1	1	
F3.1.13	Multifunctional output terminal DO2	0~71	1	2	
F3.1.14	Multifunctional output terminal DO3/ Fout/standard expansion card	0~71	1	63	
F3.1.15	DO1 terminal effective signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.16	DO1 terminal void signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.17	DO2 terminal effective signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.18	DO2 terminal void signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.19	DO3 terminal effective signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.20	DO3 terminal void signal output delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.21	Multifunctional relay output (RO1A/B/C)	0~71	1	4	
F3.1.22	Multifunctional relay output (RO2A/B/C)/standard expansion card	0~71	1	5	
F3.1.23	RO1 power-on delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.24	RO1 disconnection delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.25	RO2 power-on delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.26	RO2 disconnection delay time	0.0~10.00Sec.	0.01	0.0	
F3.1.27	Input variable of monitor 1	0~44 (revering to the monitor variable comparison table)	1	0	
F3.1.28	Input variables of monitor 2	0~44 (referring to the monitor variable comparison table)	1	1	
F3.1.29	Input variables of monitor 3	0~44 (referring to the monitor variable comparison table)	1	2	
F3.1.30	Lower limiting value of monitor 1 variables (relative to full scale value	0.0~100.0 (%)	0.1	0.0	
F3.1.31	Upper limiting value of monitor 1 variables (relative to full scale value	0.0~100.0 (%)	0.1	100.0	
F3.1.32	Lower limiting value of monitor 2 variables (relative to full scale value	0.0~100.0 (%)	0.1	0.0	
F3.1.33	Upper limiting value of monitor 2 variables (relative to full scale value	0.0~100.0 (%)	0.1	100.0	
F3.1.34	Lower limiting value of monitor 3 variables (relative to full scale value	0.0~100.0 (%)	0.1	0.0	
F3.1.35	Upper limiting value of monitor 3 variables (relative to full scale value	0.0~100.0 (%)	0.1	100.0	

6.16 Pulse input (Configured with standard expansion I/O board, and this group of parameters are effective when D19 selects the frequency input function)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F3.2.36	Minimum pulse input frequency DI9/Fin	0.0~100.00KHz	0.01	0.0	
F3.2.37	Maximum pulse input frequency DI9/Fin	0.01~100.00KHz	0.01	10.0	
F3.2.38	Pulse detection cycle	1ms~20ms	1	10ms	
F3.2.39	Number of single-loop pulse	1~4096	1	1024	
F3.2.40	Mechanical transmission ratio(=pulse shaft revolution: motor shaft revolution)	0.010 ~ 10.000	0.001	1.000	
F3.2.41	Driving wheel diameter (for liner speed calculation)	0.1~2000.0mm	0.1	100.0	
F3.2.42	Maximum accumulative length value	10m~50000m	1m	50000	
F3.2.43	Maximum liner speed	0.01~500.00m/Sec.	0.01	10.00	
F3.2.44	Current accumulative length value	0~50000m	1m	—	R
F3.2.45	Current liner speed	0.0~500.00m/Sec.	0.01	—	R

6.17 Pulse output(Equipped with standard expansion I/O board, and this group of parameters are effective when DO3 terminal selects the frequency output function)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F3.3.46	Type of output pulse signal DO3/Fout	0: Frequency signal (0.25~100.00KHz) 1: Frequency signal 2: Pulse width modulation (PWM) signal (reference frequency 0.25~100.00KHz)	1	0	
F3.3.47	Minimum output frequency DO3/Fout	0.25~100.00KHz	0.01	0.25	
F3.3.48	Maximum output frequency DO3/Fout	0.25~100.00KHz (PWM signal reference frequency)	0.01	10.0	
F3.3.49	Pulse output mapping variable	0~45(Monitor Variable Comparison Table)	1	0	
F3.3.50	DO3/Fout assignment lower limit	0.0~[F3.3.51]	0.1	0.0	
F3.3.51	DO3/Fout assignment upper limit	[F3.3.50]~100.0 (%)	0.1	100.0	

6.18 Analog input

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F4.0.00	AI1 min. value (0~10V)	0.00~[F4.0.01]	0.01	0.0	
F4.0.01	AI1 max. value (0~10V)	[F4.0.00]~10.00V	0.01	10.00	
F4.0.02	AI2 min. value (4~20mA)	0.00~[F4.0.03]	0.01	4.00	
F4.0.03	AI2 max. value (4~20mA)	[F4.0.02]~20.00mA	0.01	20.00	
F4.0.04	AI3 min. value (-10V~10V)/ standard expansion card	-10.00~[F4.0.05]	0.01	0.00	
F4.0.05	AI3 max. value (-10V~10V)/ standard expansion card	[F4.0.04]~10.00V	0.01	10.00	
F4.0.06	AI1 filtering time coefficient	1~1000ms	1	10ms	
F4.0.07	AI2 filtering time coefficient	1~1000ms	1	10ms	
F4.0.08	AI3 filtering time coefficient/ standard expansion card	1~1000ms	1	10ms	

6.19 Analog input curve correction

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F4.1.09	AI1 curve correction point 1	[F4.0.00]~[F4.0.01]	0.01	0.0	
F4.1.10	AI1 curve correction value1	[F4.0.00]~[F4.0.01]	0.01	0.0	
F4.1.11	AI1 curve correction point 2	[F4.0.00]~[F4.0.01]	0.01	10.00	
F4.1.12	AI1 curve correction value 2	[F4.0.00]~[F4.0.01]	0.01	10.00	
F4.1.13	AI2 curve correction point 1	[F4.0.02]~[F4.0.03]	0.01	4.00	
F4.1.14	AI2 curve correction value 1	[F4.0.02]~[F4.0.03]	0.01	4.00	
F4.1.15	AI2 curve correction point 2	[F4.0.02]~[F4.0.03]	0.01	20.00	
F4.1.16	AI2 curve correction value 2	[F4.0.02]~[F4.0.03]	0.01	20.00	
F4.1.17	AI3 zero hysteresis/ standard expansion card	0.0~2.00	0.01	0.10	
F4.1.18	AI3 curve correction point 1/ standard expansion card	[F4.0.04]~[F4.0.05]	0.01	0.0	
F4.1.19	AI3 curve correction value 1/ standard expansion card	[F4.0.04]~[F4.0.05]	0.01	0.0	
F4.1.20	AI3 curve correction point 2/ standard expansion card	[F4.0.04]~[F4.0.05]	0.01	10.00	
F4.1.21	AI3 curve correction value 2/ standard expansion card	[F4.0.04]~[F4.0.05]	0.01	10.00	

6.20 Analog output

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F4.2.22	AO1 mapping variable(subjecting to F5.4.44 exceeding function)	0~45(monitor variable comparison table)	1	0	
F4.2.23	AO2 mapping variable/standard expansion card	0~45 (monitor variable comparison table)	1	2	
F4.2.24	AO1 mini value	0.00~10.00V	0.01	0.0	
F4.2.25	AO1 max value	0.00~10.00V	0.01	10.00	
F4.2.26	AO1 lower limiting value	0.0~[F4.2.27]	0.1	0.0	
F4.2.27	AO1 upper limiting value	[F4.2.26]~100.0 (%)	0.1	100.0	
F4.2.28	AO1 filtering time coefficient	0.01~10.00Sec.	0.01	0.10	
F4.2.29	AO1 fixed output value (at the time of fixed output value)	0.0~20.00mA (0.0~10.00V)	0.01	0.0	
F4.2.30	AO2 min value	0.00~10.00V	0.01	0.0	
F4.2.31	AO2 max value	0.00~10.00V	0.01	10.00	
F4.2.32	AO2 lower limiting value	0.0~[F4.2.33]	0.1	0.0	
F4.2.33	AO2 upper limiting value	[F4.2.32]~100.0 (%)	0.1	100.0	
F4.2.34	AO2 filtering time coefficient	0.01~10.00Sec.	0.01	0.10	
F4.2.35	AO2 fixed output value (at the time of fixed output value)	0.0~20.00mA (0.0~10.00V)	0.01	0.0	

6.21 Analog input power failure detection

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F4.3.36	Analog input power failure detection function	**Units: AI1power failure detection** 0: Void 1: Effective **Tens: AI2 power failure detection** 0: Void 1: Effective **Hundreds: AI3 power failure detection** 0: Void 1: Effective	1	0000	×
F4.3.37	AI1 power failure detection threshold	0.00~10.00V	0.01	0.25	
F4.3.38	AI1 power failure detection delay time	0.01~50.00Sec.	0.01	2.00	
F4.3.39	AI1 power failure detection response	0: No action (for non-stop alarm) 1: Forcedly set to the minimum 2: Forcedly set to the maximum 3: Forcedly set to the defaults value (F4.3.40) 4: Inverter forced trip stop	1	0	×
F4.3.40	AI1 power failure default value	0.00~10.00V	0.01	0.0	
F4.3.41	AI2 power failure detection threshold	0.00~20.00mA	0.01	4.00	
F4.3.42	AI2 power failure detection delay time	0.01~50.00Sec.	0.01	2.00	
F4.3.43	Action selection after AI2 power failure	0: No action(for non-stop alarm) 1: Forcedly set to the minimum 2: Forcedly set to the maximum 3: Forcedly set to the defaults value (F4.3.44) 4: Inverter forced trip stop	1	0	×
F4.3.44	AI2 power failure default value	0.00~20.00mA	0.01	4.00	
F4.3.45	AI3 power failure detection upper threshold	-10.00~10.00V	0.01	0.25	
F4.3.46	AI3 power failure detection lower threshold	-10.00~10.00V	0.01	-0.25	
F4.3.47	AI3 power failure detection delay time	0.01~50.00Sec.	0.01	2.00	
F4.3.48	AI3 power failure detection response	0: No action(for non-stop alarm) 1: Forcedly set to the minimum 2: Forcedly set to the maximum 3: Forcedly set to the defaults value (F4.3.49) 4: Inverter forced trip stop	1	0	×
F4.3.49	AI3 power failure default value	-10.00~10.00V	0.01	0.0	

6.22 Virtual analog input

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F4.4.50	Virtual analog input SAI1	0: Void (0 value) 1: SAI_COF1*AI1	1	0	×
F4.4.51	Virtual analog input SAI2	2: SAI_COF1*AI2 3: SAI_COF1*AI3 4: SAI_COF1*AO1 5: SAI_COF1*AO2 6: SAI_COF1*AI1+SAI_COF2*AI2+SAI_CST 7: SAI_COF1*AI1+SAI_COF2*AI3+SAI_CST 8: SAI_COF1*AO1+SAI_COF2*AO2+SAI_CST 9: SAI_COF1*AI1+SAI_COF2*AO1+SAI_CST 10: SAI_COF1*AI2+SAI_COF2*AO2+SAI_CST 11: SAI_COF1*AI1+SAI_COF2*AO1 12: SAI_COF1*AI3+SAI_COF2*AO2 13: SAI1_COF*AI1/AI2+ SAI_ CST 14: SAI2_COF*AI2/AI3+ SAI_CST 15: SAI1_COF*AI1/AI3+ SAI_CST	1	0	×
F4.4.52	Virtual input combination coefficient 1 (SAI_COF1)	0.01~500.00	0.01	1.00	×
F4.4.53	Virtual input combination coefficient 2 (SAI_COF2)	0.01~500.00	0.01	1.00	×
F4.4.54	Virtual input combination constant (SAI_CST)	-4080~4080	1	0	×

6.23 Hopping frequency

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.0.00	Hopping frequency 1	0.0~[F0.1.21]	0.01	0.0	×
F5.0.01	Range of hopping frequency 1	0.0~10.00Hz	0.01	0.0	×
F5.0.02	Hopping frequency 2	0.0~[F0.1.21]	0.01	0.0	×
F5.0.03	Range of hopping frequency 2	0.0~10.00Hz	0.01	0.0	×
F5.0.04	Hopping frequency 3	0.0~[F0.1.21]	0.01	0.0	×
F5.0.05	Range of hopping frequency 3	0.0~10.00Hz	0.01	0.0	×

6.24 Built-in auxiliary timer

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.1.06	Timer 1 (UT1) operating mode (H)	**Units: Clock selection** 0: 1ms 1: 1Sec. 2: 1min. 3: Timer 1 cycle reaching pulse (effective for UT2, UT3) 4: Timer 2 cycle reach pulse (only effective for UT3) **Tens: Start and stop** 0: Multifunctional terminal triggering start (Edge triggering/ Function No. 52~54) 1: Stop→Run status change triggering (edge triggering) 2: Run→Stop status change triggering (edge triggering) 3: Synchronously started with timer 1 (effective for UT2, UT3) 4: Timer 1cycle reach pulse (effective for UT2, UT3) 5: Timer 2 cycle reach pulse (effective for UT3) **Hundreds: Timer status resetting (timer value and status)** 0: Multifunctional terminal (Function No. 55~57) 1: Automatic resetting when the cycle is reached 2: Automatic resetting when timer is stopped **Kilobit: Timing cycle** 0: Single-cycle timing (resetting and retriggering required) 1: Multi-cycle timing (start again after auto clearing)	1	0000	×
F5.1.07	Timer 2 (UT2) operating mode (H)				
F5.1.08	Timer 3 (UT3) operating mode(H)				
F5.1.09	Timer 1 timing cycle	0~65535 (clock cycle)	1	30000	
F5.1.10	Timer 1 comparative threshold value	0~[F5.1.09]	1	10000	
F5.1.11	Timer 2 timing cycle	0~65535 (clock cycle)	1	30000	
F5.1.12	Timer 2 comparative threshold value	0~[F5.1.11]	1	10000	
F5.1.13	Timer 3 timing cycle	0~65535 (clock cycle)	1	30000	
F5.1.14	Timer 3 comparative threshold value	0~[F5.1.13]	1	10000	
F5.1.15	Timer door control signal selection	**Units: Timer 1(UT1) gated signal** 0: No gating function 1: Multifunctional terminal (Function No. 58) 2: Timer 1 comparative value reached (effective for UT2, UT3) 3: Timer 1 cycle reached (effective for UT2, UT3) 4: Timer 2 comparative value reached (effective for UT3) 5: Timer 2 cycle reached (effective for UT3) **Tens: Timer 2 (UT2) gated signal selection** The same as above, 1: Multifunctional terminal (Function No. 59) **Hundreds: Timer 3 (UT3) gated signal selection** The same as above, 1: Multifunctional terminal (Function No. 60)	1	0000	
F5.1.16	Timer 1 output signal (H)	**Units: Output signal1** 0: Comparative value reached (0.5s pulse) 1: Comparative value reached (level) 2: Comparative value reached and reversed	1	0041	
F5.1.17	Timer 2 output signal (H)		1	0041	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.1.18	Timer 3 output signal (H)	3: Cycle reached (0.5s pulse) 4: Cycle reached (level) 5: Cycle reached and reversed 6: Comparative value or cycle reached and reversed **Tens: Output signal 2** The same as above **Hundreds: Reserved** **Kilobit: Reserved**	1	0041	
F5.1.19	Timer value display unit(H)	**Units: Timer 1** 0: Clock unit (original value) 1: Sec. 2: Min. 3: H. **Tens: Timer 2** The same as above **Hundreds: Timer 3** The same as above	1	0000	

6.25 Built-in auxiliary counter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.2.20	Counter 1 operating mode (H)	**Units: Counter pulse selection (Function No. 44, 45)** 0: Multifunctional terminal "Void→effective" 1: Multifunctional terminal "effective→void" 2: Aforesaid two conditions are both effective **Tens: Starting mode** 0: Start immediately after power-on (no trigger start) 1: Multifunctional terminal trigger (Function No. 46-47) 2: Stop→Run status change triggering (edge triggering) 3: Run→Stop Status change triggering (edge triggering) **Hundreds: Counter resetting source** 0: Multifunctional terminal (Function No.48~49) 1: Set value 1 reaches auto resetting 2: Set value 2 reaches auto resetting **Kilobit：Counter save data when power off** 0：Counter not save data when power off 1：Counter save data when power off	1	0000	
F5.2.21	Counter 2 operating mode (differed from timer: in case of no resetting, continue counting until overflow, and then continue to count from 0) (H)		1	0000	
F5.2.22	Set value 1 of counter 1	0~65535	1	1000	
F5.2.23	Set value 2 of counter 1	0~65535	1	2000	
F5.2.24	Set value 1 of counter 2	0~65535	1	1000	
F5.2.25	Set value 2 of counter 2	0~65535	1	2000	
F5.2.26	Counter 1 output signal(H)	**Units: Output signal1** 0: Reach set value 1 (0.5 Sec.pulse) 1: Reach set value 2 (level) 2: Set value 1 reached and reversed 3: Reach set value 2 (0.5 Sec.pulse) 4: Reach set value 5 (level) 5: Set value 1reached and reversed 6: Set value 1 or set value 2 reached and reversed	1	0000	
F5.2.27	Counter 2 output signal(H)		1	0000	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		Tens: Output signal 2 The same as above **Hundreds: Reserved** **Kilobit: Reserved**			

6.26 Auxiliary functions

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.3.28	Priority selection of frequency (revolution) command source	**Units: 1st priority (highest)** 0: No definition 1: Process PID output 2: Compensation PID output 3: Swing frequency running command 4: Automatic multi-stage frequency running command 5: Multi-stage operating frequency selected by external terminals 6: Revolution setting channel (F8.0.00) 7: Frequency Setting channel (F0.1.16) **Tens: 2nd priority** The same as above **Hundreds: 3rd priority** The same as above **Kilobit: 4th priority** The same as above	1	0000	×
F5.3.29	Lower limiting frequency action mode	0: Output 0 frequency when it is below the lower limiting frequency 1: Output the lower limiting frequency when it is below the lower limiting frequency	1	0	
F5.3.30	Automatic voltage regulation(effective in V/F mode)	0: Closed 1: Effective 2: Deceleration process void	1	0	
F5.3.31	Automatic energy -saving operation	0: Void 1: Effective (effective for asynchronous motors)	1	0	
F5.3.32	Magnetic flux brake	0: Void 1: Effective 2: Multifunctional terminal effective (Function No. 65)	1	0	
F5.3.33	Magnetic flux braking strength	0~100%	1	☆	
F5.3.34	Voltage over modulation	0: Void 1: Effective	1	1	
F5.3.35	Use ratio of dynamic braking	50~100(%)	1	100	
F5.3.36	Level of dynamic braking starting action	700~760V	1	720	
F5.3.37	Retention parameter	Retention parameter	-	-	
F5.3.38	Load dynamic balance function	0: Void 1: Effective 2: Multifunctional terminal effective (Function No. 38)	1	0	
F5.3.39	Reference source for dynamic balance load	0: Digital setting (F5.3.40) 1: AI1 input 2: AI2 input 3: AI3 input 4: Fieldbus set value 1 5: Compensation PID output	1	0	
F5.3.40	Reference value for dynamic balance load	0.0~ 200.0 (%)	0.1	100.0	
F5.3.41	Dynamic balance adjustment gain	0.00~100.00	0.01	50.00	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.3.42	Dynamic balance adjustment limit	0.00~100.00 (%)	0.01	1.00	

6.27 Motor temperature detection

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F5.4.43	Motor temperature sensor	0: None 1: 1 X PT100 2: 2 X PT100 3: 3 X PT100 4: PTC sensor 5: Thermal switch (normally closed) 6: Thermal switch (normally open)	1	0	
F5.4.44	Sensor current source providing terminal (exceeding parameter)	0: None 1: AO1 2: AO2	1	0	
F5.4.45	Temperature input channel	0: None 1: AI1 input (PT100 or PTC) 2: AI3 input (PT100 or PTC) 3: DI1~DI9 (thermal switch)	1	0	
F5.4.46	Alarm action threshold value	-10.0~500.0 (0~5000 Ω/PTC)	0.1	110.0	
F5.4.47	Protection action threshold value	-10.0~500.0 (0~5000 Ω/PTC)	0.1	130.0	

6.28 Multi-stage frequency setting

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F6.0.00	1st operating frequency	[F0.1.22]~[F0.1.21]	0.01	5.00	
F6.0.01	2nd operating frequency	[F0.1.22]~[F0.1.21]	0.01	10.00	
F6.0.02	3rd operating frequency	[F0.1.22]~[F0.1.21]	0.01	15.00	
F6.0.03	4th operating frequency	[F0.1.22]~[F0.1.21]	0.01	20.00	
F6.0.04	5th operating frequency	[F0.1.22]~[F0.1.21]	0.01	25.00	
F6.0.05	6th operating frequency	[F0.1.22]~[F0.1.21]	0.01	30.00	
F6.0.06	7th operating frequency	[F0.1.22]~[F0.1.21]	0.01	35.00	
F6.0.07	8th operating frequency	[F0.1.22]~[F0.1.21]	0.01	40.00	
F6.0.08	9th operating frequency	[F0.1.22]~[F0.1.21]	0.01	45.00	
F6.0.09	10th operating frequency	[F0.1.22]~[F0.1.21]	0.01	50.00	
F6.0.10	11th operating frequency	[F0.1.22]~[F0.1.21]	0.01	25.00	
F6.0.11	12th operating frequency	[F0.1.22]~[F0.1.21]	0.01	5.00	
F6.0.12	13th operating frequency	[F0.1.22]~[F0.1.21]	0.01	15.00	
F6.0.13	14th operating frequency	[F0.1.22]~[F0.1.21]	0.01	35.00	
F6.0.14	15th operating frequency	[F0.1.22]~[F0.1.21]	0.01	50.00	

6.29 Simple programmable multi-stage operation

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F6.1.15	Selection of programmable multi-stage speed operation mode (H)	**Units: Function selection** 0: Function closed 1: Multi-stage frequency/revolution operation effective 2: Multi-stage frequency/revolution operation condition effective (Function No. 23) 3: Multi-stage PID setting operation effective 4: Multi-stage PID setting operation condition effective (Function No. 23) **Tens: Operation mode** 0: Single cycle 1: Single cycle stop mode 2: Continuous cycle 3: Continuous cycle stop mode 4: Keeping the final value 5: Keeping the final value stop mode **Hundreds: Selection of break point/stop recovery mode** 0: Restore running at the first stage 1: Start running at the interruption time (effective for multi-stage frequency/ revolution operation) 2: Start running at the stage of interruption **Kilobit: Power-off status storage** 0: Not stored 1: Stored	1	0000	×
F6.1.16	Stage 1 setting (H)	**Units: Hz of each stage** 0: Multi-stage frequency setting 1~15/ Process PID multi-stage setting 1~7 1: Frequency command (F0.1.16)/ Process PID setting (F7.0.01) **Tens: Direction setting** 0: FWD 1: REV 2: Determined by the running command channel **Hundreds: Accelerate/decelerate of each stage** 0: Acceleration and deceleration time 1 1: Acceleration and deceleration time 2 2: Acceleration and deceleration time 3 3: Acceleration and deceleration time 4 **Kilobit: Each stage time unit** 0: Sec. 1: Min.	1	0000	
F6.1.17	Stage 2 setting (H)		1	0000	
F6.1.18	Stage 3 setting (H)		1	0000	
F6.1.19	Stage 4 setting (H)		1	0000	
F6.1.20	Stage 5 setting (H)		1	0000	
F6.1.21	Stage 6 setting (H)		1	0000	
F6.1.22	Stage 7 setting (H)		1	0000	
F6.1.23	Stage 8 setting (H)		1	0000	
F6.1.24	Stage 9 setting (H)		1	0000	
F6.1.25	Stage 10 setting (H)		1	0000	
F6.1.26	Stage 11 setting (H)		1	0000	
F6.1.27	Stage 12 setting (H)		1	0000	
F6.1.28	Stage 13 setting (H)		1	0000	
F6.1.29	Stage 14 setting (H)		1	0000	
F6.1.30	Stage 15 setting (H)		1	0000	
F6.1.31	Stage 1 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.32	Stage 2 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.33	Stage 3 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.34	Stage 4 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.35	Stage 5 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.36	Stage 6 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.37	Stage 7 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.38	Stage 8 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.39	Stage 9 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.40	Stage 10 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.41	Stage 11 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.42	Stage 12 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.43	Stage 13 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.44	Stage 14 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	
F6.1.45	Stage 15 running time	0.0~6500.0(Sec./Min.)	0.1	0.0	

6.30 Swing frequency operation

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F6.2.46	Function selection (H)	**Units: Function Setting** 0: Function closed 1: Function effective 2: Terminal selectivity effective (Function No.24) **Tens: Stop restart mode** 0: Start with the memory status before stop 1: Restart **Hundreds: Swing control** 0: Fixed swing (relative maximum frequency) 1: Variable swing (relative central frequency) **Kilobit: Status storage** 0: Not saved after power-off, and run again after restart 1: Save the status after power-off,and run again from the saved status	1	0000	×
F6.2.47	Swing frequency preset frequency	0.0~[F0.1.21]	0.01	10.00	
F6.2.48	Preset frequency waiting time	0.0~6000.0Sec.	0.1	0.0	
F6.2.49	Swing frequency amplitude	0.0~50.0(%)	0.1	10.0	
F6.2.50	Sudden jump frequency	0.0~50.0(%)	0.1	10.0	
F6.2.51	Triangular wave rising time	0.1~1000.0Sec.	0.1	10.0	
F6.2.52	Triangular wave decreasing time	0.1~1000.0Sec.	0.1	10.0	
F6.2.53	Frequency setting in the center of the swing frequency	0.0~[F0.1.21]	0.01	10.00	

6.31 Process PID (4ms control cycle)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F7.0.00	Process PID function selection	**Units: Process PID controller selection** 0: Process PID closed 1: Unconditionally effective 2: External multifunctional terminal selectivity effective (Function No. 22) **Tens: Reserved** **Hundreds: Process PID controller output** 0: Frequency/revolution set value 1: Independent PID (created by AO terminal output or as a torque) **Kilobit: Superposition mode of main and auxiliary, consult the frequency benchmark** 0: Upper limit of frequency channel 1: Set value of superposition channel 2: Set value of superposition channel/ upper limit frequency-superposition channel set	1	0000	×

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F7.0.01	Process PID set value selection	0: PID Reference Channel 1 1: PID Reference Channel 2 2: Select Channel Via Terminal (Function No. 31) 3: Channel 1 + Channel 2 4: Channel 1 - Channel 2 5: Channel 1 * (1+ Channel 2/100.0) 6: Channel 1 * (1- Channel 2/100.0) 7: Channel 1 * Channel 2/100.0	1	0	
F7.0.02	Process PID setting channel 1	0: PID Internal Reference (F7.0.08) (power-off save) 1: Keypad Potentiometer 2: Analog input AI1 3: Analog input AI2 4: Analog input AI3 5: Remote UP/DW 1 (clear after stop) 6: Remote UP/DW 2 (maintained after stop and saved after power-off) 7: Analog input AI3 8: Remote UP/DW 3(clear after stop) 9: U Remote UP/DW 4 (maintained after stop and saved after power-off) 10: MODBUS value 1 11: MODBUS value 2	1	0	×
F7.0.03	Process PID setting channel 2		1	0	×
F7.0.04	Analog input quantity corresponding to 0% setting (Channel 1)	0.0V~[F7.0.05]/ AI2: 0.0mA~[F7.0.05]	0.01	0.0	
F7.0.05	Analog input quantity corresponding to 100% setting (Channel 1)	[F7.0.04]~10.00/AI2: [F7.0.04]~20.00mA	0.01	10.00	
F7.0.06	Analog input quantity corresponding to 0% setting (Channel 2)	0.0V~[F7.0.07]/ AI2: 0.0mA~[F7.0.07]	0.01	0.0	
F7.0.07	Analog input quantity corresponding to 100% setting (Channel 2)	[F7.0.06]~10.00/AI2: [F7.0.06]~20.00mA	0.01	10.00	
F7.0.08	Process PID internal digital preset	-100.0~100.0(%)	0.1	0.0	
F7.0.09	Process PID feedback value selection	0: PID Actual Value 1 1: PID Actual Value 2 2: Select Via Remote Input (Function No. 32) 3: Actual Value 1+ Actual Value 2 4: Actual Value 1- Actual Value 2 5: Actual Value 1* Actual Value 2/100.0 6: 100.0* Actual Value 1/ Actual Value 2 7: Min. { Actual Value 1, Actual Value 2} 8: Max. { Actual Value 1, Actual Value 2} 9: √ (|Actual Value 1- Actual Value 2|) 10: √ (|Actual Value 1|) + √ (|Actual Value 2|)	1	0	
F7.0.10	Process PID feedback channel 1	0: Analog input AI1 1: Analog input AI2 2: Analog input AI3 3: Analog input AI3 dual polarity PID feedback 4: Fin pulse input	1	0	
F7.0.11	Process PID feedback channel 2		1	0	
F7.0.12	Analog feedback quantity	0.0~[F7.0.13] /AI2: 0.0mA~[F7.0.13]	0.01	0.0	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
	corresponding to 0% feedback (feedback channel 1)				
F7.0.13	Analog feedback quantity corresponding to 100% feedback (feedback channel 1)	[F7.0.12]~10.00V /AI2: [F7.0.12]~20.00mA	0.01	5.00	
F7.0.14	Analog feedback quantity corresponding to 0% feedback (feedback channel 2)	0.0~[F7.0.15]/AI2: 0.0mA~[F7.0.15]	0.01	0.0	
F7.0.15	Analog feedback quantity corresponding to 100% feedback (feedback channel 2)	[F7.0.14]~10.00V /AI2: [F7.0.14]~20.00mA	0.01	5.00	
F7.0.16	Feedback multiplication factor (e.g. differential voltage calculate flow rate with differential voltage)	0.01~100.00	0.01	1.00	
F7.0.17	Proportional gain	0.0~100.00	0.01	2.00	
F7.0.18	Integration time	0.0~1000.0Sec.	0.1	20.0	
F7.0.19	Differential coefficient	0.0~10.00	0.01	0.0	
F7.0.20	Differential inertia filtering time	0.01~100.00Sec.	0.01	10.00	
F7.0.21	PID controller characteristics configuration	**Units: Deviation polarity** 0: Positive deviation 1: Negative deviation (negation) **Tens: Output polarity** 0: Single polarity 1: Dual polarity (the symbol can be reversed) **Hundreds: Action when PID removed** 0: PID control closed 1: PID output held up and current setting status is maintained.	1	0000	
F7.0.22	Permitted static deviation (relative 100% setting)	0.0~20.0%	0.1	5.0	
F7.0.23	PID output preset (at the time of output frequency as compared to the upper limiting frequency)	0.0~100.0 (%)	0.01	0.0	
F7.0.24	Preset hold time before PID starting	0.0~3600.0Sec.	0.1	0.0	
F7.0.25	Actual sensor value (range)corresponding to 100% feedback	0.01~100.00	0.01	1.00	
F7.0.26	Actual sensor value corresponding to 0% feedback	-100.00~100.00	0.01	0.0	

6.32 Process PID multi-stage setting

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F7.1.27	Process PID multi-stage preset 1	-100.0~100.0 (%)	0.1	0.0	
F7.1.28	Process PID multi-stage preset 2	-100.0~100.0 (%)	0.1	0.0	
F7.1.29	Process PID multi-stage preset 3	-100.0~100.0 (%)	0.1	0.0	
F7.1.30	Process PID multi-stage preset 4	-100.0~100.0 (%)	0.1	0.0	
F7.1.31	Process PID multi-stage preset 5	-100.0~100.0 (%)	0.1	0.0	
F7.1.32	Process PID multi-stage preset 6	-100.0~100.0 (%)	0.1	0.0	
F7.1.33	Process PID multi-stage preset 7	-100.0~100.0 (%)	0.1	0.0	

6.33 Process PID sleep function (Effective when PID output is used as the frequency command)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F7.2.34	Sleep function	0: Closed 1: Enabled 2: Enabled when the multifunctional input selection is effective (Function No. 33)	1	0	
F7.2.35	Sleep frequency	0.0~[F0.1.21]	0.01	0.0	
F7.2.36	Sleep delay	0.1~3600.0Sec.	0.1	60.0	
F7.2.37	Awakening deviation (compared with the set value)	0.0~100.0(%)	0.1	25.0	
F7.2.38	Awakening delay	0.1~3600.0Sec.	0.1	60.0	

6.34 Revolution setting and feedback

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F8.0.00	Revolution setting channel (only applicable to VC and SVC mode)	0: Set by frequency setting parameter (F0.1.16) 1: Digital setting (F8.0.03) (maintained after stop and saved after power-off) 2: Keypad potentiometer 3: Analog inputAI1 4: Analog inputAI2 5: Analog inputAI3 (dual polarity) 6: Frequency input (Fin) 7: MODBUS Fieldbus set value 1 8: MODBUS Fieldbus set value 2 9: Virtual analog input SAI1 10: Virtual mode input SAI2	1	0	
F8.0.01	Minimum set signal corresponding revolution	0~60*[F0.1.21] / pairs of motor poles (rpm)	1	0	
F8.0.02	Maximum set signal corresponding revolution	0~60*[F0.1.21] / pairs of motor poles (rpm)	1	1500	
F8.0.03	Revolution Digital setting	0~60*[F0.1.21] / pairs of motor poles (rpm)	1	0	
F8.0.04	Revolution feedback channel	0: Decoder (PG card needs to be equipped) 1: Single pulse input (Fin port) 2: Analog input AI1 3: Analog input AI2 4: Analog input AI3 (dual polarity)	1	0	×
F8.0.05	Pulse of decoder per revolution (PG)	1~8192	1	1024	×

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F8.0.06	PG rotation direction (Effective for PG card)	0: Phase A leads 1: Phase B leads	1	0	×
F8.0.07	PG zero pulse (Z pulse)	0: Void 1: Effective	1	0	×
F8.0.08	Decoder type	0: ABZ incremental decoder 1: ABZUVW incremental type 2: SINCOS type 3: Rotary transformer	1	0	×
F8.0.09	PG revolution check cycle	**Units: PG revolution detection period 1~5ms** **Tens:Reserved** **Hundreds: Revolution close-loop period （*0.25ms） 1~8**	1	0402	
F8.0.10	Missing detection and action of speed detection signal	**Units: Speed signal detection** 0: Not detect 1: Detect and treat **Tens: Speed signal detection action** 0: Fault alarm and free stop 1: Continue running after switching to SVC control mode and then display the alarm information (reserved) 2: DC bind-type brake (reserved)	1	0001	×
F8.0.11	Judging time for speed detection signal missing	0.01~5 .00Sec.	0.01	2.00	
F8.0.12	Wire breakage zero speed signal level (as compared to the maximum set speed)	0~20.0 (%)	0.1	0.0	
F8.0.13	Speed measuring loop wire breakage detection flexibility (as compared to the maximum set speed)	0.1~100.0	0.1	5.0	
F8.0.14	Detection revolution filtering time coefficient	0(Closed), 1~50ms	1	2ms	
F8.0.15	The minimum revolution corresponding to the feedback signal (not PG)	0~30000rpm	1	0	
F8.0.16	The maximum revolution corresponding to the feedback signal (not PG)	0~30000rpm	1	1500	
F8.0.17	Feedback revolution ratio (motor shaft speed: measured shaft speed)	0.010~50.000	0.001	1.000	×

6.35 Revolution closed-loop parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F8.1.18	Controller PID selection	0: Single PID parameter (the second group of parameters are effective separately) 1: Dual PID parameter (hysteresis switching) 2: Dual PID parameter (continuous switching)	1	2	
F8.1.19	PID parameter switching lower limiting revolution (ASR1 group parameter low revolution effective)	0~[F8.1.20]	1	100	
F8.1.20	PID parameter switching upper limiting revolution (ASR2 group parameter high revolution effective)	[F8.1.19]~60*[F0.1.21]/ pairs of motor poles (rpm)	1	300	
F8.1.21	Proportional gain 1 (ASR-P1)	0.10~5.00	0.01	1.00	
F8.1.22	Integration time 1 (ASR-I1)	0.0~50.00 Sec.	0.01	1.00	
F8.1.23	Differential coefficient 1 (ASR-D1)	0.0~10.00	0.01	0.0	
F8.1.24	Differential output filtering constant 1 (ASR-DT1)	0.1~5.00 Sec.	0.01	1.00	
F8.1.25	Proportional gain 2 (ASR-P2)	0.5~2.00	0.01	0.80	
F8.1.26	Integration time 2 (ASR-I2)	0.0, 0.01~50.00 Sec.	0.01	2.50	
F8.1.27	Differential coefficient 2 (ASR-D2)	0.00~10.00	0.01	0.0	
F8.1.28	Differential output filtering constant 2 (ASR-DT2)	0.10~10.00 Sec.	0.01	1.00	
F8.1.29	Adjuster output upper limit amplitude	0.0~250.0%	0.1	190.0%	
F8.1.30	Adjuster output lower limit amplitude	-250.0~0.0%	0.1	-190.0%	
F8.1.31	Time span of regulator export filtering	0，0.1~50.0ms	0.1	0	

6.36 Protection parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F8.2.32	Excessive rotation(DEV)	0: No action 1: Alarm free stop 2: Alarm deceleration stop 3: Alarm continuing running	1	0	×
F8.2.33	Over speed (OS) protection		1	1	×
F8.2.34	Over speed protection limit (DEV)	0.0~50.0% (as compared to upper limiting frequency)	0.1	20.0%	
F8.2.35	Over speed protection period (DEV)	0.0~10.00Sec.	0.01	10.00	
F8.2.36	Over speed protection value (OS)	0.0~150.0% (as compared to upper limiting frequency)	0.1	120.0%	
F8.2.37	Over speed protection time (OS)	0.0~2.00Sec.	0.01	0.10	
F8.2.38	SVC rotating speed estimate gain factor	0.10 ~ 10.00	0.01	1.00	

6.37 Torque control

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F8.3.39	Torque control activation	0: Void 1: Effective 2: Multifunctional terminal selection effective (Function No. 34)	1	0	×
F8.3.40	Torque control reference (selecting the command direction)	0: Digital setting (F8.3.41) 1: Panel shuttle potentiometer setting 2: Analog inputAI1 3: Analog inputAI2 4: Analog inputAI3 5: Analog inputAI3 (dual polarity) 6: Frequency signal input (Fin) 7: Process PID output 8: Compensation PID output 9: MODBUS Fieldbus set value 1 10: MODBUS Fieldbus set value 2 11: Virtual analog input SAI1 12: Virtual mode input SAI2	1	0	
F8.3.41	Torque digital setting	-250.0~250.0 (%)	0.1	0.0	
F8.3.42	Torque digital rise time	0.0~50.000Sec.	0.001	0.010	
F8.3.43	Torque digital fall time	0.0~50.000Sec.	0.001	0.010	
F8.3.44	Revolution limiting setting	**Units: FWD revolution limiting setting source** 0: Setting of FWD revolution limiting value (F8.3.45) 1: Determination of frequency Setting channel 1 (F0.2.25) **Tens: Reserved** **Hundreds: REV Revolution limiting setting source** 0: Setting of REV revolution limiting value (F8.3.46) 1: Determination of frequency Setting channel 2 (F0.2.26)	1	0000	
F8.3.45	FWD revolution limiting value	0~60*[F0.1.21]/pairs of motor poles (rpm)	1	1500	
F8.3.46	REV revolution limiting value	0~60*[F0.1.21]/pairs of motor poles (rpm)	1	1500	
F8.3.47	Setting of torque set value limit	**Units: Minimum torque selection source (negative torque limit)** 0: Minimum torque set value 1 (F8.3.48) 1: Minimum torque set value 2 (F8.3.49) 2: Multifunctional selection terminal setting 1 or 2 3: AI1 set value 4: AI2 set value 5: MODBUS Fieldbus set value 1 6: MODBUS Fieldbus set value 2 **Tens: Reserved** **Hundreds: Maximum torque selection source** 0: Maximum torque set value 1 (F8.3.50) 1: Maximum torque set value 2 (F8.3.51) 2: Multifunctional selection terminal setting 1 or 2 (Function No. 36) 3: AI1 set value 4: AI2 set value	1	0000	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		5: MODBUS Fieldbus set value 1 6: MODBUS Fieldbus set value 2			
F8.3.48	Minimum torque limit 1	-250.0~0.0%	0.1	-200.0	
F8.3.49	Minimum torque limit 2	-250.0~0.0%	0.1	-200.0	
F8.3.50	Maximum torque limit 1	0.0~250.0%	0.1	200.0	
F8.3.51	Maximum torque limit 2	0.0~250.0%	0.1	200.0	
F8.3.52	Torque zero offset	-25.0~25.0%	0.1	0.0	
F8.3.53	Oscillation damping coefficient	0~100	1	100	

6.38 Compensation PID (Running cycle: 1ms)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F9.0.00	Compensation PID function	**Units: Controller input** 0: Closed 1: Synchronously effective with inverter running command 2: Activated when the Multifunctional terminal is effective (Function No. 25) 3: Immediately effective after the inverter is powered on **Tens: Reserved** **Hundreds: Controller output** 0: Feed FWD compensation-added with the frequency integrator output, and the complementation ratio is set by parameter F9.0.01 1: Independent PID the output can be set by the AO terminal output/torque. 2: Set PID–output used as frequency/ revolution command **Kilobit: feed forward compensate frequency benchmark** 0: Relative to the upper frequency 1: Relative to the frequency integrator output	1	0100	×
F9.0.01	Compensation proportion (as compared to upper limiting frequency)	0.0~100.0(%)	0.1	50.0	
F9.0.02	Compensation PID controller feature configuration	**Units: Deviation polarity** 0: Positive deviation 1: Negative deviation (negation) **Tens: Output polarity** 0: Single polarity 1: Dual polarity **Hundreds:Loss of signal response** 0: PID control closed 1: PID output held on (maintaining current running setting)	1	0010	
F9.0.03	Proportional gain 1	0.0~100.00	0.01	2.00	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F9.0.04	Integration time 1	0.0~100.00Sec.	0.01	2.00	
F9.0.05	Differential coefficient 1	0.0~10.00	0.01	0.0	
F9.0.06	Differential inertia filtering time 1	0.01~25.00Sec.	0.01	5.00	
F9.0.07	Compensation PID output inertia filtering time coefficient1	0.0, 0.01 ~ 20.00Sec.	0.01	1.00	
F9.0.08	Selection of compensation PID set value	0: Internal digital setting (F9.0.11) (auto save after power off) 1: Panel shuttle potentiometer preset value 2: Analog input AI1 3: Analog input AI2 4: Analog input AI3 5: UP/DW terminal (clear after stop) 6: UP/DW terminal (maintaining after stop and save after power-off) 7: MODBUS Fieldbus set value 1 8: MODBUS Fieldbus set value 2 9: Expansion communication set 1 10: Expansion communication set 1	1	0	
F9.0.09	Analog input minimum value	0.0V~[F9.0.10]/AI2: 0.0mA~[F9.0.10]	0.01	0.0	
F9.0.10	Analog input maximum value	[F9.0.09]~10.00/AI2: [F9.0.09]~20.00mA	0.01	10.00	
F9.0.11	PID internal reference	0.0~100.0 (%)	0.1	0.0	
F9.0.12	Selection of compensation PID feedback value	0: Analog input AI1 1: Analog input AI2 2: Analog input AI3 3: Output current 4: Output torque 5: Output power	1	0	
F9.0.13	Actual value analog input minimum	0.0V~[F9.0.14]/AI2: 0.0mA~[F9.0.14]	0.01	0.0	
F9.0.14	Actual value analog input maximum	[F9.0.13]~10.00/AI2: [F9.0.13]~20.00mA	0.01	10.00	
F9.0.15	Actual value multiplication factor	0.01~100.00	0.01	1.00	
F9.0.16	Sensor value when actual value is 100%	0.01~100.00	0.01	1.00	
F9.0.17 ~ F9.0.20	Reserved				

6.39 Compensation PID controller parameter selection

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
F9.1.21	Selection and switching of controller parameters	**Units: PID parameters** 0: Single PID parameter 1: Dual PID parameters 2: Three PID parameters 3: Four PID parameters **Tens: PID parameter switching mode** 0: As per set value 1: As per feedback value 2: As per output frequency 3: Selected by multifunctional terminal (Function No.63 and 64)	1	0020	
F9.1.22	Controller parameter switching transition coefficient	0.01 ~ 50.00	0.01	1.00	
F9.1.23	Lower limit for group 1/2 parameter switching	0.0~[F9.1.24]	0.1	0.0	
F9.1.24	Upper limit for group 1/2 parameter switching	[F9.1.23]~100.0 (%)	0.1	0.0	
F9.1.25	Lower limit for group 2/3 parameter switching	[F9.1.24]~[F9.1.26]	0.1	100.0	
F9.1.26	Upper limit for group 2/3 parameter switching	[F9.1.25]~100.0 (%)	0.1	100.0	
F9.1.27	Lower limit for group 3/4 parameter switching	[F9.1.26]~[F9.1.28]	0.1	100.0	
F9.1.28	Upper limit for group 3/4 parameter switching	[F9.1.27]~100.0 (%)	0.1	100.0	
F9.1.29	Proportional gain 2	0.0~100.00	0.01	2.00	
F9.1.30	Integration time 2	0.0, 0.01~100.00Sec.	0.01	2.00	
F9.1.31	Differential coefficient2	0.0, 0.01~10.00	0.01	0.0	
F9.1.32	Differential output filtering constant 2	0.01~25.00Sec.	0.01	5.00	
F9.1.33	Adjuster output filtering time coefficient 2	0.0, 0.01~20.00Sec.	0.01	1.00	
F9.1.34	Proportional gain 3	0.0~100.00	0.01	2.00	
F9.1.35	Integration time 3	0.0, 0.01~100.00Sec.	0.01	2.00	
F9.1.36	Differential coefficient3	0.0, 0.01~10.00	0.01	0.0	
F9.1.37	Differential output filtering constant 3	0.01~25.00Sec.	0.01	5.00	
F9.1.38	Compensation PID output filtering time coefficient 3	0.0, 0.01~20.00Sec.	0.01	1.00	
F9.1.39	Proportional gain 4	0.0~100.00	0.01	2.00	
F9.1.40	Integration time 4	0.0, 0.01~100.00Sec.	0.01	2.00	
F9.1.41	Differential coefficient4	0.0, 0.01~10.00	0.01	0.0	
F9.1.42	Differential output filtering constant 4	0.01~25.00Sec.	0.01	5.00	
F9.1.43	Compensation PID output filtering time coefficient 4	0.0, 0.01~20.00Sec.	0.01	1.00	
F9.1.44 ~F9.1.55	reserve				

- 100% PID setting corresponds to 100% rated output current of the equipment, motor rated torque and rated power, so it needs to appropriately set up the feedback factor, output torque and power to be values with symbols according to actual application.

6.40 Modbus fieldbus (Standard expansion card configuration)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FA.0.00	Communication card connection and bus status	0: The communication card not connected 1: Standard MODBUS communication card connected 2: Listen only status 3: Communication interrupted	1	—	R
FA.0.01	Configuration parameter	**Units: Baud rate selection** 0: 1200kbit/s 1: 2400kbit/s 2: 4800kbit/s 3: 9600kbit/s 4: 19200kbit/s 5: 38400kbit/s 6: 76800kbit/s **Tens: Data format** 0: 1-8-1-N, RTU 1: 1-8-1-E, RTU 2: 1-8-1-O, RTU 3: 1-8-2-N, RTU	1	0003	×
FA.0.02	The device station address	0~247(0 stands for broadcasting address)	1	1	×
FA.0.03	The device response delay	0~1000ms	1	5ms	
FA.0.04	Communication failure judging time	0.01~10.00Sec.	0.01	1.00	×
FA.0.05	Communication failure action	0: Deceleration stop 1: Run as per last received command	1	0	
FA.0.06	Selection of communication configuration files	0: SUNFAR standard configuration file 1 1: SUNFAR standard configuration file 2 (Reserved)	1	0	
FA.0.07	Extended communication configuration parameters	0~4:19200bit/s 5：38400bit/s 6：76800bit/s 7：250000bit/s	1	7	

6.41 Mapping access parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FA.1.08	Mapping application parameter 1 (H)	F0.00 ~ FF.55	1	F0.29	×
FA.1.09	Mapping application parameter 2 (H)	F0.00 ~ FF.55	1	F0.29	×
FA.1.10	Mapping application parameter 3 (H)	F0.00 ~ FF.55	1	F0.29	×
FA.1.11	Mapping application parameter 4 (H)	F0.00 ~ FF.55	1	F0.32	×
FA.1.12	Mapping application parameter 5 (H)	F0.00 ~ FF.55	1	F0.32	×
FA.1.13	Mapping application parameter 6 (H)	F0.00 ~ FF.55	1	F0.32	×
FA.1.14	Mapping status parameter 1 (H)	d0.00 ~ d1.55	1	d0.00	
FA.1.15	Mapping status parameter 2 (H)	d0.00 ~ d1.55	1	d0.01	
FA.1.16	Mapping status parameter 3 (H)	d0.00 ~ d1.55	1	d0.02	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FA.1.17	Mapping status parameter 4 (H)	d0.00 ~ d1.55	1	d0.03	
FA.1.18	Mapping status parameter 5 (H)	d0.00 ~ d1.55	1	d0.04	
FA.1.19	Mapping status parameter 6 (H)	d0.00 ~ d1.55	1	d0.05	
FA.1.20	Mapping status parameter 7 (H)	d0.00 ~ d1.55	1	d0.06	
FA.1.21	Mapping status parameter 8 (H)	d0.00 ~ d1.55	1	d0.07	
FA.1.22	Mapping status parameter 9 (H)	d0.00 ~ d1.55	1	d0.08	
FA.1.23	Mapping status parameter 10 (H)	d0.00 ~ d1.55	1	d0.09	
FA.1.24	—	—	—	—	

6.42 Communication linkage synchronous control

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FA.2.25	Coupling synchronous control options	**Units: Selection of coupling function** 0: Void 1: The device is the salve device 2: The device is the master device **Tens: Linkage target value (Master device parameter)** 0: Proportional linkage of frequency /revolution set value 1: Proportional linkage of frequency /revolution integrator output value **Hundreds: Coupling command (slave device parameter)** 0: Independent control of slave device(start and stop not linked) 1: Start and stop command linked 2: Start-stop/jog linked 3: Start-stop/jog/excitation linked 4: Start-stop/jog/excitation/DC bind-type brake/DC braking linked **Kilobit: linkage set choice** 0: Unit digit of the parameter confirm 1: The input of external terminal (function No.39)	1	0310	×
FA.2.26	Linkage setting proportion coefficient	0.010~10.000	0.001	1.000	
FA.2.27	Fine adjustment source for linkage proportion coefficient	0: No fine adjustment 1: Analog inputAI1 2: Analog inputAI2 3: Analog inputAI3	1	0	
FA.2.28	Slave device offset frequency/ Revolution	0: No offset 1: Determined by frequency setting source 1 2: Determined by frequency setting source 2	1	0	
FA.2.29	Linkage balancing function	0: Void 1: Current balancing 2: Torque balancing 3: Power balancing 4: Position synchronous balancing	1	0	
FA.2.30	Linkage balancing gain	0.001~10.000	0.001	1.000	
FA.2.31	Amplitude limiting of position synchronous	0.10~10.00Hz	—	1.00	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
	balancing				
FA.2.32	Reserved	—	—	—	

6.43 Expansion multifunctional input terminal (EDI1~ EDI8)/ Effective after connecting expanding accessories

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
Fb.0.00	Expand multifunctional input terminal EDI1	0~96	1	0	×
Fb.0.01	Expand multifunctional input terminal EDI2	0~96	1	0	×
Fb.0.02	Expand multifunctional input terminal EDI3	0~96	1	0	×
Fb.0.03	Expand multifunctional input terminal EDI4	0~96	1	0	×
Fb.0.04	Expand multifunctional input terminal EDI5	0~96	1	0	×
Fb.0.05	Expand multifunctional input terminal EDI6	0~96	1	0	×
Fb.0.06	Expand multifunctional input terminal EDI7	0~96	1	0	×
Fb.0.07	Expand multifunctional input terminal EDI8	0~96	1	0	×
Fb.0.08	Expand multifunctional terminal filtering time	1~50ms	1	5ms	
Fb.0.09	Expand multi function input terminal active level	**Units: EDI1~EDI4 terminal** 0~F: 4-bit binary system, bit=0 power-on effective, 1 Disconnection Effective LED **Tens: EDI5~EDI8 terminal** The same as above **Hundreds: Reserved** **Kilobit: Reserved**	1	0000	×

6.44 Expansion multifunctional output terminal (ED01/ ERO1~ ED04/ ERO4)/ Effective after connecting expanding accessories

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
Fb.1.10	Expand multifunctional input terminal EDO1	0~62	1	0	
Fb.1.11	Expand multifunctional input terminal EDO2	0~62	1	0	
Fb.1.12	Expand multifunctional input terminal EDO3	0~62	1	0	
Fb.1.13	Expand multifunctional input terminal EDO4	0~62	1	0	
Fb.1.14	Expand multifunctional input terminal ERO1	0~62	1	0	
Fb.1.15	Expand multifunctional input terminal ERO2	0~62	1	0	
Fb.1.16	Expand multifunctional input terminal ERO3	0~62	1	0	
Fb.1.17	Expand multifunctional input terminal ERO4	0~62	1	0	

6.45 Virtual input and output

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.0.00	FF configuration parameter locking function (H)	**Units: FF parameter modification forbidden** 0: Modification forbidden 1: Modification permitted **Tens: Reserved** **Hundreds: Reserved** **Kilobit: Initialization of FF parameter group** 0: Forbidden 1: Permitted	1	0000	
FF.0.01	Definition of virtual output node (SDO1)	0~71	1	0	
FF.0.02	Definition of virtual output node (SDO2)	0~71	1	0	
FF.0.03	Definition of virtual output node (SDO3)	0~71	1	0	
FF.0.04	Definition of virtual output node (SDO4)	0~71	1	0	
FF.0.05	Definition of virtual output node (SDO5)	0~71	1	0	
FF.0.06	Definition of virtual output node (SDO6)	0~71	1	0	
FF.0.07	Definition of virtual output node (SDO7)	0~71	1	0	
FF.0.08	Definition of virtual output node (SDO8)	0~71	1	0	
FF.0.09	Definition of virtual input function (SDI1)	0~96	1	0	×
FF.0.10	Definition of virtual input function (SDI2)	0~96	1	0	×
FF.0.11	Definition of virtual input function (SDI3)	0~96	1	0	×
FF.0.12	Definition of virtual input function (SDI4)	0~96	1	0	×
FF.0.13	Definition of virtual input function (SDI5)	0~96	1	0	×
FF.0.14	Definition of virtual input function (SDI6)	0~96	1	0	×
FF.0.15	Definition of virtual input function (SDI7)	0~96	1	0	×
FF.0.16	Definition of virtual input function (SDI8)	0~96	1	0	×
FF.0.17	Virtual output- input connection polarity	**Units: SDO1-SDI1** 0: Homopolar connection 1: Antipolar connection **Tens: SDO2-SDI2** 0: Homopolar connection 1: Antipolar connection **Hundreds: SDO3-SDI3** 0: Homopolar connection 1: Antipolar connection **Kilobit: SDO4-SDI4**	1	0000	×

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		0: Homopolar connection 1: Antipolar connection			
FF.0.18	Virtual output- input connection polarity	**Units: SDO5-SDI5** 0: Homopolar connection 1: Antipolar connection **Tens: SDO6-SDI6** 0: Homopolar connection 1: Antipolar connection **Hundreds: SDO7-SDI7** 0: Homopolar connection 1: Antipolar connection **Kilobit: SDO8-SDI8** 0: Homopolar connection 1: Antipolar connection	1	0000	×

6.46 Protection function configuration parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.1.19	Protection action configuration 1 (H)	**Units: Operation under voltage protection** 0: No action 1: Act **Tens: Output grounding protection** 0: No action 1: Act **Hundreds: Input Voltage lack of phase protection** 0: No action 1: Trip and stop 2: Nonstop alarm **Kilobit: Output current phase shortage or unbalancing protection** 0: No action 1: Trip and stop 2: Nonstop alarm	1	1001	
FF.1.20	Protection action configuration 2 (H)	**Units: Temperature sensor fault** 0: No action 1: Trip and stop 2: Nonstop alarm **Tens: Inverter overheat alarm** 0: Closed 1: Act **Hundreds: Input voltage unbalancing protection (Void for single camera)** 0: No action 1: Trip and stop 2: Nonstop alarm **Kilobit: Motor over temperature protection** 0: No action 1: Trip and stop 2: Nonstop alarm	1	0100	
FF.1.21	Protection action configuration 3 (H)	**Units: Relay action fault protection** 0: No action 1: Act **Tens: Internal data memory abnormal protection** 0: No action 1: Act **Hundreds: Inverter under voltage operation alarm** 0: Closed 1: Act **Kilobit: Per-cycle current limiting switch**	1	0111	

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		0: Closed 1: Act alarm 2:Act without alarm			
FF.1.22	Protection action configuration 4 (H)	**Units: Drive protection action** 0: Closed 1: Act **Tens: Reserved** **Hundreds: A. B impulse anti-receive protection** 0: Closed 1: Act	1	0001	
FF.1.23	Protective action configuration 5 (H)	**Units: warning the message shielded** 0: Closed 1: Act (no warning) **Tens: Output supply power protection of phase sequence (reversed)LED** 0: Closed 1: Trip out when phase sequence goes wrong 2: The warning of no shutdown when phase sequence goes wrong	1	0000	
FF.1.24	Reserved	——	——	——	

6.47 Correction parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.2.25	AI1 zero offset adjustment	-0.500~0.500V	0.001	0.0	
FF.2.26	AI1 gain correction	0.950~1.050	0.001	1.000	
FF.2.27	4mA offset adjustment for AI2	-0.500~0.500mA	0.001	0.0	
FF.2.28	AI2 gain correction	0.950~1.050	0.001	1.000	
FF.2.29	AI3 zero offset adjustment	-0.500~0.500V	0.001	0.0	
FF.2.30	AI3 gain correction	0.950~1.050	0.001	1.000	
FF.2.31	AO1 zero offset correction	-0.500~0.500V	0.001	0.0	
FF.2.32	AO1 gain correction	0.950~1.050	0.001	1.000	
FF.2.33	AO2 zero offset correction	-0.500~0.500V	0.001	0.0	
FF.2.34	AO2 gain correction	0.950~1.050	0.001	1.000	
FF.2.35	under voltage action level	320~450V	1	350	×
FF.2.36	Correction coefficient of DC side voltage detection value	0.950~1.050	0.001	1.000	

6.48 Special functional parameters

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.3.37	Torque limit configuration (H)	**Units: Constant torque area torque limitation** 0: Only limited by torque limiting parameter (including Revolution PID output limit) 1: Also limited by acceleration and deceleration current level and maximum permitted current **Tens: Reserved** **Hundreds: Constant power area torque limitation** 0: Treated the same as the constant torque area 1: Simultaneously adjusted as per constant power algorithm	1	0101	
FF.3.38	Current closed-loop proportional gain	0.10 ~ 10.00	0.01	1.00	
FF.3.39	Current closed-loop integration time constant	0.10 ~ 10.00 (Sec.)	0.01	1.00	
FF.3.40	Total leakage inductance compensation constant	0.10 ~ 10.00	0.01	1.00	

6.49 Other configuration parameters

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.4.41	Cooling fan control	**Units: Soft start function (effective for model 4T0370 and below)** 0: No action 1: Act **Tens: Air volume auto adjustment (effective for model 4T0370 and below)** 0: No action 1: Act **Hundreds: Start time** 0: Start immediately after power- on 1: Start after running **Kilobit: Reserved**	1	0101	
FF.4.42	Operating panel control options	**Units: Panel REV/JOG key function selection** 0: REV (REV running key) 1: JOG (FWD jog key) **Tens: Reserved** **Hundreds: Reserved** **Kilobit: Panel control selection (except STOP key)** 0: Standard panel interface control (can be connected to monitoring panel via RS485) 1: RS485 port external panel control (standard panel, only for monitoring) 2: Multifunctional terminal switching (Function No. 40)	1	0000	×

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
FF.4.43	Special function configuration	**Units: Motor parameter identification auto-start** 0: Forbidden 1: Permitted **Tens: Voltage vector composition mode** 0: Three-phase composition 1: Two-phase composition **Hundreds: Voltage small pulse shielding** 0: Void 1: Effective **Kilobit: SVC Revolution identification mode** 0: Current open-loop mode 1: Current closed-loop mode (Reserved)	1	0001	
FF.4.44	Asynchronous motor parameter adaptive correction	**LED Units: Stator resistance** 0: Forbidden 1: Permitted **LED Tens: Total leakage inductance** 0: Forbidden 1: Permitted **LED Hundreds: Rotor time constant** 0: Forbidden 1: Permitted **LED Kilobit: Torque increasing function** 0: Void 1~5: Effective	1	0011	
FF.4.45	Random reference value	0~65535	1		R

6.50 Historical fault recording

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
dE.0.00	Last time fault recording	-	-	-	R/I
dE.0.01	Historical fault 1	-	-	-	R/I
dE.0.02	Historical fault 2	-	-	-	R/I
dE.0.03	Historical fault 3	-	-	-	R/I
dE.0.04	Historical fault 4	-	-	-	R/I
dE.0.05	Historical fault 5	-	-	-	R/I
dE.0.06	Historical fault 6	-	-	-	R/I
dE.0.07	Historical fault 7	-	-	-	R/I

6.51 Operation status at the last fault

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
dE.0.08	Operating frequency (rotor synchronous frequency)	-300.00~300.00Hz	0.01	0	R/I
dE.0.09	Output current	0.0~3000.0A	0.1	0	R/I
dE.0.10	Output voltage	0~1000V	1	0	R/I
dE.0.11	Detection motor revolution	0~30000rpm	1	0	R/I
dE.0.12	Voltage at the DC side	0~1000V	1	0	R/I
dE.0.13	Output torque	-300.0~ 300.0%	0.1%	0	R/I
dE.0.14	Target frequency	0.0~300.00Hz	0.01	0	R/I
dE.0.15	Equipment maximum temperature	0.0~150.0	0.1°C	0	R/I
dE.0.16	Command status	**Units:** 0: Stop command 1: Running command **Tens: Reserved** **Hundreds: Reserved** **Kilobit: Reserved**	1	0000	R/I

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
dE.0.17	Inverter operation status	**Units: Operation mode** 0: V/F mode 1: Open-loop vector speed 2: Closed-loop vector speed 3: Open-loop torque control 4: Closed-loop torque control **Tens: Operation status** 0: Stop 1: Start acceleration 2: Stop deceleration 3: Decreasing frequency and deceleration 4: Steady operation **Hundreds: Electric/braking status** 0: Electric operation 1: Power generation operation **Kilobit: Limit suppression** 0: No action 1: Over current suppression action 2: Over voltage suppressor action 3: under voltage suppression action	1	0000	R/I
dE.0.18	Accumulative startup running time at the last fault	0~65535	1h	65535	R/I
dE.0.19	Startup running interval between the last two faults	0~65535	1h	65535	R/I
dE.0.20	Actual output frequency	-300.00~300.00Hz	0.01	0	R/I

6.52 Basic status parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d0.0.00	Output frequency and direction (rotor synchronous frequency)	-300.0Hz ~ 300.00Hz	0.01Hz		R
d0.0.01	Motor revolution and direction	-30000~30000rpm	1rpm		R
d0.0.02	Output current	0.0~ 6000.0A	0.1A		R
d0.0.03	Output torque	-300.0~300.0%	0.1%		R
d0.0.04	Output voltage	0~500V	1V		R
d0.0.05	Output power	-1000.0~1000.0KW	0.1KW		R
d0.0.06	Device body maximum temperature	0~150.0°C	0.1°C		R
d0.0.07	Voltage at DC side	0~1000V	1V		R
d0.0.08	Inverter running status	**Units: Operation mode** 0: V/F mode 1: Open-loop vector speed 2: Closed-loop vector speed 3: Open-loop torque control 4: Closed-loop torque control 5: V/F separated control **Tens: Operation status** 0: Stop 1: Start acceleration 2: Stop deceleration 3: Decreasing frequency and deceleration 4: Steady operation **Hundreds: Electric/ braking status**	1		R

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
		0: Electric operation 1: Power generation operation **Kilobit: Limit suppression** 0: No action 1: Over current suppression action 2: Over voltage suppressor action 3: under voltage suppression action			
d0.0.09	Frequency setting channel command (frequency)	-300.00Hz ~ 300.00Hz	0.01Hz		R
d0.0.10	Revolution Setting channel command (Revolution)	-30000~30000rpm	1rpm		R
d0.0.11	Torque command value (set input)	-300.0~300.0%	0.1%		R
d0.0.12	Target operating frequency (integrator input)	-300.0Hz ~ 300.00Hz	0.01Hz		R
d0.0.13	Target running revolution (integrator input)	-30000~30000rpm	1rpm		
d0.0.14	Speed adjuster deviation	-3200~3200rpm	1rpm		
d0.0.15	Speed adjuster output	-300.0~300.0(%)	0.1%		
d0.0.16	Process PID setting	-100.0~100.0(%)	0.1%		
d0.0.17	Process PID feedback	-200.0~200.0(%)	0.1%		
d0.0.18	Process PID deviation	-100.0~100.0(%)	0.1%		
d0.0.19	Process PID output	-100.0~100.0(%)	0.1%		
d0.0.20	Compensation PID setting	-200.0~200.0(%)	0.1%		
d0.0.21	Compensation PID feedback	-100.0~100.0(%)	0.1%		
d0.0.22	Compensation PID deviation	-100.0~100.0(%)	0.1%		
d0.0.23	Compensation PID output	-100.0~100.0(%)	0.1%		
d0.0.24	Accumulative running time (H)	0~65535h	1h		
d0.0.25	Accumulative power-on time (H)	0~65535h	1h		
d0.0.26	Power-on (hh.mm.s) cycling timing	00.00.0~23.59.9	1		
d0.0.27	Kilowatt-hour counter (low)	0~1000.0KWh	0.1KWh		
d0.0.28	Kilowatt-hour counter (high)	0~60000KKWh	1KKWh		
d0.0.29	Megawatt hour counter	0~60000MW	1 MW		

6.53 Auxiliary status parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d0.1.30	Frequency setting source 1 set value	0.0~300.00Hz	0.01Hz	-	R
d0.1.31	Frequency setting source 2 set value	0.0~300.00Hz	0.01Hz	-	R
d0.1.32	Frequency/revolution integrator output	-300.0Hz~300.00Hz	0.01Hz	-	R
d0.1.33	Stator synchronous frequency	-300.0Hz~300.00Hz	0.01Hz	-	R
d0.1.34	Actually measured revolution value	-30000~30000rpm	1rpm	-	R
d0.1.35	Inverter overload integrator value	0 ~ 1020	1	-	
d0.1.36	Process PID set variable (physical quantity)	0.01~60000	0.01	-	R
d0.1.37	Process PID feedback variable (physical quantity)	0.01~60000	0.01	-	R
d0.1.38	Compensation PID set variable (physical quantity)	0.01~60000	0.01	-	R
d0.1.39	Compensation PID feedback variable (physical quantity)	0.01~60000	0.01	-	R
d0.1.40	Torque current	-3000.0~3000.0A	0.1A	-	R
d0.1.41	Excitation current	0.0~3000.0A	0.1A	-	R
d0.1.42	Device body temperature detection 1	0~150.0°C	0.1°C	-	R

d0.1.43	Device body temperature detection 2	0~150.0°C	0.1°C	-	R
d0.1.44	Device body temperature detection 3	0~150.0°C	0.1°C	-	R
d0.1.45	Motor temperature	0~250.0°C	0.1°C	-	R

6.54 Modbus fieldbus status parameter (Standard expansion card)

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d0.2.46	Bus communication set value 1	-10000~10000	1		R
d0.2.47	Bus communication set value 2	-30000~30000	1		R
d0.2.48	Bus command word 1 (HEX)	0~0FFFFH	1		R
d0.2.49	Bus command word 2 (HEX)	0~0FFFFH	1		R
d0.2.50	Bus status word 1 (HEX)	0~0FFFFH	1		R
d0.2.51	Bus status word 2 (HEX)	0~0FFFFH	1		R
d0.2.52	Total quantity of bus information	0~65535	1		R
d0.2.53	Number of bus CRC check errors	0~65535	1		R
d0.2.54	Number of error data accepted by bus	0~65535	1		R
d0.2.55	Number of effective data of bus	0~65535	1		R

6.55 Terminal status and variable

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d1.0.00	Terminal input (DI1~DI10)	Segment marker	-	-	R
d1.0.01	Terminal input (EDI1~EDI10)	Segment marker	-	-	R
d1.0.02	Pulse input (Fin)	0.0~100.00KHz	0.01		R
d1.0.03	Analog input AI1	0.00~10.00V	0.01		R
d1.0.04	Analog input AI2	0.00~20.00mA	0.01		R
d1.0.05	Analog input AI3	-10.00~10.00V	0.01		R
d1.0.06	Digital signal output (DO1~DO4, EDO1~ EDO6)	Segment marker	-	-	R
d1.0.07	Relay contact output (RO1~RO4, ERO1~ERO6)	Segment marker	-	-	R
d1.0.08	Frequency output Fout (indicating the duty ratio in the case of PWM signal output)	0.0~100.0KHz	0.01		R
d1.0.09	Analog output AO1	0.00~10.00V	0.01		R
d1.0.10	Analog output AO2	0.00~10.00V	0.01		R

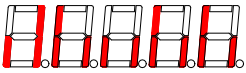


Figure 6-1 Terminal effective sketch

- As shown in Figure 6-1, DI2, DI3, DI7, DI9 terminal input is in effective status, and other terminals are at void status.

6.56 Counter timer value

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d1.1.11	Counter 1 current value	0~65535	1		R
d1.1.12	Counter 2 current value	0~65535	1		R
d1.1.13	Timer 1 current value	0~65535	1		R

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d1.1.14	Timer 2 current value	0~65535	1		R
d1.1.15	Timer 3 current value	0~65535	1		R

6.57 Spindle control and scale positioning status parameter

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d1.2.16	Spindle (PG installation shaft) position angle	0~359.9			R
d1.2.17	Spindle (PG installation shaft) traveling circle number	0~65535			R
d1.2.18	Accumulative number of position pulse (low)	0~65535			R
d1.2.19	Accumulative number of position pulse (middle)	0~65535			R
d1.2.20	Progressive distance	0.0~5000.0mm			R
d1.2.21	Set position pulse(low)	0~65535			R
d1.2.22	Set position pulse(middle)	0~65535			R
d1.2.23	Set position pulse(high)	0~65535			R

6.58 Equipment information

Function Code	Name	Setting Range and Description	Minimum Unit	Factory Default	Change Limit
d1.4.40	Expansion module connection information	**Units: Reserved** **Tens: Standard expansion board** 0: Not connected 1: Connected **Hundreds: Functional expansion board 1** 0: Not connected 1~F: Connected (the value stands for the type of expansion board) **Kilobit: Functional expansion board 2** 0: Not connected 1~F: Connected (the value stands for the type of expansion board)	1	—	R
d1.4.41	Total quantity of panel communication information	0~65535	1	—	R
d1.4.42	Number of panel communication CRC check errors + number of errors accepted	0~65535	1	—	R
d1.4.43	Number of effective data of panel communication	0~65535	1	—	R
d1.4.44	Equipment model	Reserved	1	—	R
d1.4.45	Equipment capacity	0.1~1000.0KW	0.1KW	—	R
d1.4.46	Motherboard program version (H)	6000~6999	1	—	R
d1.4.47	Reserved		1	—	R
d1.4.48	Motherboard check date(H)	2009~2100	1	—	R
d1.4.49	Motherboard check date(H)	0101~1231	1	—	R
d1.4.50	Motherboard check serial number	0 ~ 50000	1	—	R

Table 1: Comparison table of multifunctional input terminal (DI/EDI/SDI) functions

S/N	Function	S/N	Function
0	No function	1	Multi-speed control 1
2	Multi-speed control 2	3	Multi-speed control 3
4	Multi-speed control 4	5	FWD jog
6	REV jog	7	Forward (FWD) running command terminal
8	Reverse (REV)running command terminal	9	Acceleration and deceleration time selection 1
10	Acceleration and deceleration time selection 2	11	Running command switching
12	Frequency command switching	13	Fault resetting input (RESET)
14	Emergency stop (EMS)	15	Frequency or Process PID set value ascending (UP)
16	Frequency or Process PID set value descending (DW)	17	UP/DW set frequency clear
18	External equipment fault	19	Three-line running control
20	Stop DC braking command	21	Acceleration and deceleration forbidden
22	Process PID effective	23	Simple PLC multi-stage running effective
24	Swing frequency running effective	25	Compensation PID effective
26	Simple PLC multi-stage running status (when stopping) resetting	27	Swing frequency status resetting (effective when stopping)
28	Multi-stage process PID giving terminal 1	29	Multi-stage Process PID giving terminal 2
30	Multi-stage process PID giving terminal 3	31	Process PID setting selection (switching)
32	Process PID feedback selection (switching)	33	Process PID sleep activation
34	Torque/speed control mode switching	35	Minimum torque limiting set value selection
36	Maximum torque limiting set value selection	37	Overvoltage suppression input
38	Load dynamic balancing effective	39	Reserved
40	RS485 external/Standard operation panel control switching	41	Load motor switching
42	Start permission	43	Running permitted
44	Counter 1 clock terminal	45	Counter 2 clock terminal
46	Counter 1 trigger signal	47	Counter 2 trigger signal
48	Counter 1 resetting terminal	49	Counter 2 resetting terminal
50	Counter 1 gated signal	51	Counter 2 gated signal
52	Timer 1 trigger signal	53	Timer 2 trigger signal
54	Timer 3 trigger signal	55	Timer 1 resetting
56	Timer 2 resetting	57	Timer 3 resetting
58	Timer 1 gated signal	59	Timer 2 gated signal
60	Timer 3 gated signal	61	Single pulse accumulative length value resetting
62	Motor temperature detection contact input	63	Compensation PID parameter selection1
64	Compensation PID parameter selection 2	65	Magnetic flux brake
66	Position pulse counting (PG pulse counting accumulation) resetting	67	Automatic shifting (Spindle shifting jog running)
68	Servo pulse command direction (Fin)	69	Servo control effective
70	Spindle positioning origin photoelectric signal input	71	Spindle origin homing
72	Spindle positioning selection 1	73	Spindle positioning selection 2
74	Spindle positioning selection 3	75	Position gain selection
76	Reserved	77	Servo command pulse value clear
78	Tapping input	79~96	Reserved
97	0.1Hz~100.00KHz pulse input(DI9/Fin Effective)	98	Pulse input(DI9/Fin Effective)

Table 2: Comparison table of multifunctional output terminal (DO/EDO/SDO) variables

S/N	Function	S/N	Function
0	No definition	1	Inverter running ready (normal voltage, no emergency stop input)
2	Inverter is running	3	Equipment normal (fault-free running)
4	Equipment fault (trip)	5	Equipment alarm
6	Equipment fault or alarm	7	REV running
8	Running command input (irrelevant with start or running signal)	9	Running at zero speed
10	Speed not at zero	11	Inverter under voltage stop
12	Terminal control effective	13	In the process of acceleration running
14	In the process of deceleration running	15	Braking power generation running status
16	Determined by standard MODBUS Fieldbus	17	Determined by Extended communication module
18	Frequency arrival	19	Completion of current stage of multi-stage running (0.5s pulse)
20	Multi-stage running completed (0.5s pulse)	21	Multi-stage running completed (continuous level output)
22	Multi-stage running cycle completed (0.5s pulse)	23	Swing frequency upper and lower limit
24	Encoder direction positive (A pulse surpassing B pulse)	25	Encoder direction negative (A behind B)
26	Monitor 1 input variable below the lower limit (Void when above the upper limit)	27	Monitor 1 input variable above the upper limit(void when below the lower limit)
28	Monitor 1 input variable between the upper limit and the lower limit	29	Monitor 2 variable below the lower limit (void when above the upper limit)
30	Monitor 2 input variable above the upper limit(void when below the lower limit)	31	Monitor 2 input variable between the upper limit and the lower limit
32	Monitor 3 input variable below the lower limit(void when above the upper limit)	33	Monitor 3 input variable above the upper limit (void when below the lower limit)
34	Monitor 3 input variable between the upper limit and the lower limit	35	Position reached (Servo or spindle control)
36	Analog input AI1 wire breakage detection effective	37	Analog input AI2 wire breakage detection effective
38	Analog input AI3 wire breakage detection effective	39	Reserved
40	Counter 1 output signal 1	41	Counter 1 output signal 2
42	Counter 2 output model 1	43	Counter 2 output signal 2
44	Timer 1 output signal 1	45	Timer 1 output signal 2
46	Timer 2 output signal 1	47	Timer 2 output signal 2
48	Timer 3 output signal 1	49	Timer 3 output signal 2
50	Extension modules retained	51	Extension modules retained
52	Extension modules retained	53	Extension modules retained
54	Extension modules retained	55	DI1 terminal status effective
56	DI2 terminal status effective	57	DI3 terminal status effective
58	DI4 terminal status effective	59	DI5 terminal status effective
60	DI6 terminal status effective	61	DI7 terminal status effective
62	DI8 terminal status effective	63	Terminal as frequency output (only applicable to DO3/FO terminal)
64	SDO1 LDI	65	SDO2 LDI
66	SDO1⊙SDO2 AND	67	SDO3⊙SDO4 AND
68	SDO5⊙SDO6 AND	69	SDO3⊕SDO4 OR
70	SDO5⊕SDO6 OR	71	SDO7⊕SDO8 OR

- Direction will not be considered for comparison of monitor variables

Table 3: Comparison table of monitor variables

S/N	Monitoring Parameter Variable	100% full-scale output
0	Output frequency (rotor synchronous frequency)	Upper limiting frequency
1	Motor Revolution	Upper limiting frequency*60/pairs of motor poles
2	Output current	250%*Inverter rated current
3	Output torque	300% rated torque
4	Output voltage	Motor rated voltage (reference voltage in V/F mode)
5	Output power	2* motor rated power
6	Maximum temperature of the equipment	150.0°C
7	Voltage at the DC side	1000V (single phase 500V)
8	Motor temperature/ PTC resistance	500.0°C / 5000Ω
9	Frequency setting channel set value	Upper limiting frequency
10	Speed command	Upper limiting frequency*60/pairs of motor poles
11	Torque command	300% rated torque
12	Target operating frequency	Upper limiting frequency
13	Reserved	——
14	Speed adjuster deviation	Upper limiting frequency*60/pairs of motor poles
15	Speed adjuster output	300.0%
16	Process PID setting	100.0%
17	Process PID feedback	100.0%
18	Process PID deviation value	200.0%
19	Process PID output	100.0%
20	Compensation PID setting	100.0%
21	Compensation PID feedback	100.0%
22	Compensation PID deviation	200.0%
23	Compensation PID output	100.0%
24	AI1 input (0.00~10.00)	10.00 V
25	AI2 input (0.00~20.00)	20.00mA
26	AI3 input (-10.00~10.00)	10.00V
27	Fin input	Maximum input frequency
28	Current liner speed (Fin calculation)	Maximum permitted liner speed
29	Accumulative counted length (liner speed accumulation)	Maximum counted length
30	Counter 1 value	Counter 1 set value 2
31	Counter 2 value	Counter 2 set value 2
32	Timer 1 value	Timer 1 timing cycle
33	Timer 2 value	Timer 2 timing cycle
34	Timer 3 value	Timer 3 timing cycle
35	Built-in Fieldbus set value 1	10000
36	Extended communication module set value 1	10000
37	Built-in Fieldbus set value 2	30000
38	Extended communication module set value 2	30000
39~44	Reserve	
45	Fixed output (current or voltage)	20.00mA (10.00V)

Chapter 7 Description of specific functions

Remark: Unless otherwise especially instructed, the status of terminals will be defined under positive logic conditions (“ON” terminals effective, and “OFF” terminals void).

7.1 System management (group F0.0)

Group **F0.0** parameters are especially used to define system control parameters, e.g. locking, initializing, motor type and control mode as well as display of monitoring parameters, etc.

F0.0.00 Macro parameters	**Setting range: 0000~2006**	**Factory default: 0000**

Macro parameters include application macro, system macro and special macro; The application macro allows for conveniently setting and curing multiple common parameters and simplifying parameter setting for general applications; the system macro allows for conveniently switching equipment’s work mode and automatically defining partial parameters; The special macro allows for internal integration and settings for special functions or parameters with one key according to typical industrial applications.

Macro parameters are not influenced by the initializing parameter **F0.0.07** and partial macro-related parameters are locked at specific value or within specific range.

_ _ _ X : Application macro

0: Void

Customized settings, all parameters can be customized without being influenced by the application macro parameters.

1: Digital setting of keypad control

Refer to Figure 7-1 for the application wiring diagram, and refer to Table 7-1 for macro- related parameters.

2: Shuttle setting keypad control

Refer to Figure 7-1 for the application wiring diagram, and refer to Table 7-1 for macro- related parameters.

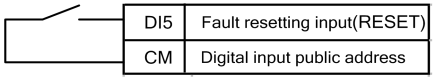


Figure 7-1 Wiring diagram forpanel operation digital/shuttle setting

3: 2 wire Control 1/AI1 setting

Refer to Figure 7-2-A for the application wiring diagram, and refer to Table 7-1 for macro- related parameters.

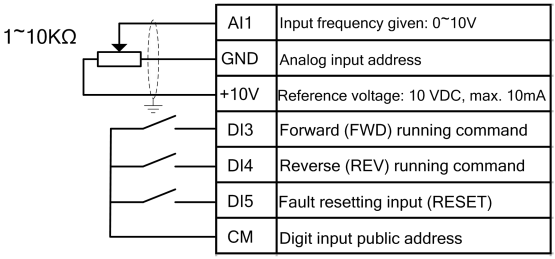


Figure 7-2-A 2 wire control 1/AI1 setting wiring diagram

4: 2 wire Control 2/AI1 setting

Refer to Figure 7-2-B for the application wiring diagram, and refer to Table 7-1 for macro- related parameters.

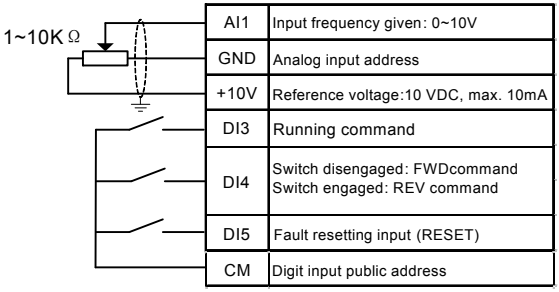


Figure 7-2-B 2 wire control 2/AI1 setting wiring diagram

5: 3 wire control 1/AI1 setting

Refer to Figure 7-3 for the application wiring diagram, and refer to Table 7-1 for macro- related parameters.

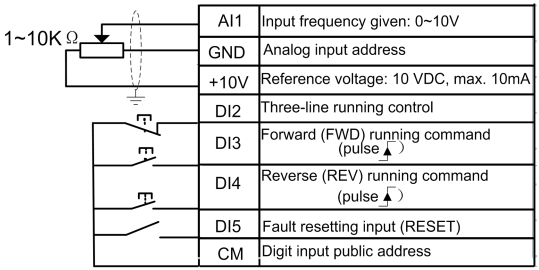


Figure 7-3 3 wire control 1/AI1 setting wiring diagram

Table 7-1: Table Application Macro Association Self-Setting Parameters

Parameters	Application Macro 1	Application Macro 2	Application Macro 3	Application Macro 4	Application Macro 5	Remarks
F0.1.15	0	0	0	0	0	Locked
F0.1.16	0	0	0	0	0	Locked
F0.1.18	1.00	1.00	1.00	1.00	1.00	Locked
F0.2.25	2 (0~2)	3	9	9	9	Locked
F0.3.33	0	0	1	1	1	Locked
F0.3.35	—	—	0	1	2	Locked
F0.4.37	0	0	0	0	0	Locked
F0.4.38	0	0	0	0	0	Locked
F3.0.01	—	—	—	—	19	Locked
F3.0.02	—	—	7	7	7	Locked
F3.0.03	—	—	8	8	8	Locked
F3.0.04	13	13	13	13	13	Locked
F6.1.15	0	0	0	0	0	Relocatable
F6.2.46	0	0	0	0	0	Relocatable
F7.0.00	0	0	0	0	0	Relocatable
F8.0.00	0	0	0	0	0	Relocatable
F9.0.00	0	0	0	0	0	Relocatable
FA.2.25	0	0	0	0	0	Relocatable

6: Machine tool spindle drive/AI1 setting

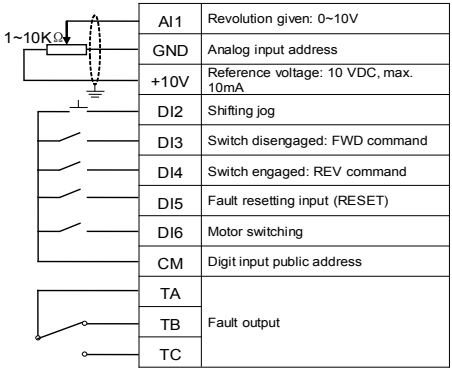


Figure 7-4 Machine tool spindle driving macro AI1 setting wiring diagram

Associated macro parameters

Associated parameters	F0.0.09	F0.2.25	F0.3.33	F0.3.35	F0.4.37	F0.4.38	F3.0.01	F3.0.02	F3.0.03
Macro set value	0000	9	1	0	0	0	67	7	8
Value locking	N	Y	Y	Y	Y	Y	Y	Y	Y
Associated parameters	F3.0.04	F3.0.05	F3.1.21	F5.3.32	F6.1.15	F6.2.46	F7.0.00	F8.0.00	F8.3.39
Macro set value	13	41	4	1	0	0	0	0	0
Value locking	Y	Y	Y	Y	N	N	N	N	N

X _ _ _ : System macro (0~F)

The system macro cannot be modified unless correct modification password [F0.0.02] is set. Refer to the instructions of **F0.0.02** parameter for details. Modification of system macro will automatically lead to initialization of all functional parameters (Group **FF** parameters will not be initialized unless **FF.0.00** allows for initialization).

0: Standard operation mode

1: Steady load operation

Applicable to steady load (e.g. fan and pump load). In this mode, the load capacity of the equipment will be automatically increased by one power grade, and the initialization value of motor parameters will be also automatically increased by one function grade.

F0.0.01 Parameter display and modification (H)	**Setting range: 0000~9014**	**Factory default: 0001**

_ _ _ X : Parameter display mode

0: Display all parameters

1: Display effective configuration parameters

To automatically hide the parameters irrelevant with current command or hardware according to different parameter setting commands or different current hardware configuration (e.g. various expansion boards), so as to simplify field commissioning.

- F0.0.00 and F0.0.01 are not limited by the parameter display mode, and will not be concealed in any display mode. The panel displaying parameters concealed due to parameter display mode will not influence the access to the concealed parameter via communication port.

2: Display parameters different from factory default

3: Display modified and stored parameters after power-on this time

4: Display modified and un-stored parameters after power-on this time

_ _ X _ : Parameter modification mode

The macro parameter **F0.0.00** is also limited by this function.

0: Effective and permanently stored after modification

Parameters modified will be immediately stored in the memory and permanent saved, and will not lose after power-off.

1: Effective after modification but not stored, and getting lost after power-off

Parameters modified are effective but are not saved in the memory. And parameters modified will automatically restore to the values saved in the memory after completion of relevant operation or power-off. This function is used for tentative modification of undetermined parameters for field commissioning; After commissioning, all modified and unsaved parameters can be displayed for view separately (when the unit of this parameter is set to 4), and batch recovery or batch storage will be conducted (when the kilobit of this parameter is set to 2 or 5).

X _ _ _ : Batch recovery or batch storage of parameters

The macro parameter **F0.0.00** is not subject to the influence of this function.

2: Abandon modifying all unsaved parameters (restoring to original value)

All unsaved parameters will be rapidly restored to the values stored in the memory with one key.

This function can only be used when the device is stopped. If this function is activated when the device is running, the inverter will send alarm **aL.058** and give up operation.

5: Batch storing all modified and unsaved parameters

All modified and unsaved parameters will be saved in the memory.

9: Resume all parameters to the initial values at the last power-on

To restore all parameters to the initial values at the last power-on. Even after initialization, all parameters can be restored to the preliminary power-on values with this function. This function is used to make correction during field commissioning when the system works abnormally because no one knows which parameter is modified incorrectly at the current power-on.

This function can only be used when the device is stopped. If this function is activated when the device is running, the inverter will send alarm **aL.059** and give up operation.

F0.0.02 Macro-call parameter modification password	**Setting range: 0~65535**	**Factory default: 0**

For modifying the system macro setting (kilobit) of the macro parameter **F0.0.00**, the modification password 1580 must be entered. This password will automatically disappear after 30 seconds. The macro parameter cannot be modified once within 30 seconds upon input of the password. If it is intended to make modification once again, the password should be entered again.

F0.0.04 LCD display setting (H)	**Setting range: 0000~0037**	**Factory default: 0023**

This function is only effective for the operating panel equipped with LCD.

_ _ X _: Normal display mode

0: Steady mode

1: Single parameter display

The **LCD** panel will only display the status parameters set for **F0.0.12** in the normal monitoring mode.

2: Dual parameter display

The **LCD** panel will display the status parameters set for **F0.0.12** and **F0.0.13** in the normal monitoring mode.

3: Three parameter display

The **LCD** panel will display the status parameters set for **F0.0.12, F0.0.13** and **F0.0.14** in the normal monitoring mode.

F0.0.05 Parameter locking (H)	**Setting range: 0000~0012**	**Factory default: 0000**
F0.0.06 Parameter locking password	**Setting range: 0~65535**	**Factory default: 0**

After the parameter locking is effective, during modification of the locked parameter, **LED** panel will display "----"; **LCD** panel will prompt "password locked and modification forbidden". This function is used to forbid modification of functional parameters by unauthorized personnel.

The password setting will take effect if **OK** key is pressed down within 30 seconds. If no confirmation (**OK** key) is conducted beyond 30 seconds or any other key is pressed down within 30 seconds, the password setting will be given up. The sketch of locking operation is as below:

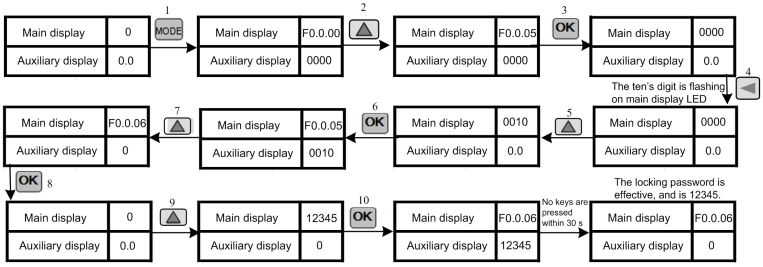


Figure 7-5 Parameter locking flow

Enter preset password and then press **OK**, and then the parameter locking status will be relieved. The sketch of unlocking operation is as below:

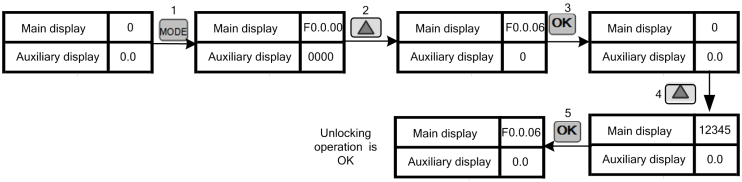


Figure 7-6 Parameter unlocking flow

F0.0.07 Parameter initialization	**Setting range: 0~8**	**Factory default: 0**

When the macro parameter **F0.0.00** is effective, the self-setting parameter relevant with the macro will not be influenced by the initialization. Refer to the function description of **F0.0.00.**

FF group parameters will not be initialized by this parameter until the kilobit of **FF.0.00** parameter is set to 1.

F0.0.08 Parameter copying (H)	Setting range: 0000~0013	Factory default: 0000

_ _ _ X : Upload and download

0: No action

1: Parameter upload

The inverter will upload parameter values in the control board memory to the panel memory.

2: Parameter download

The parameter values in the panel memory will be downloaded to the control board memory.

3: Parameter download (except for motor parameters/F2 Group)

The parameter values in the panel memory will be downloaded to the control board memory (motor parameters will not be downloaded).

Note: when the inverter is running, the action of upload and download is forbidden, and the setting for this parameter will not take effect.

During parameter upload and download, all keys except for **STOP** key on the panel are temporarily locked. Press **STOP** key to forcedly terminate upload and download; when the unload operation is forcedly terminated, the parameters uploaded will be stored in the panel memory, and the parameters not unloaded will be kept unchanged; when the download operation is forcedly terminated, the inverter will give up all parameters already downloaded into the control board memory, and automatically restore to the values before download.

The alarm signal relevant with this parameter is as below:

aL.071 – Parameter unload failed. Uploaded parameters will be saved in the panel memory, and parameters not uploaded will be kept unchanged.

aL.072 – Uploaded parameter storage failed. The panel memory is damaged or the memory is unavailable.

aL.074 – Parameter download failed. Terminate the parameter download process, and all parameters downloaded will be automatically restored to the values before download.

aL.075 – The board memory parameters are not consistent with the frequency inverter parameters in terms of the version.

aL.076 – There are no effective parameters in the board memory.

aL.077 – Some set values among the panel parameters are out of the allowable range. Terminate the parameter download process, and all parameters downloaded will be automatically restored to the values before download.

F0.0.09 Selection of motor type and control mode (H)	Setting range: 0000~2121	Factory default: 0000

_ _ _ X/_ X _ _ : Motor type selection

0: Induction asynchronous motor 1

1: Induction asynchronous motor 2

V/F Control mode with torque compensation

_ _ X _/X _ _ _ : Control Mode

0: SVC (open-loop vector control) mode

The vector control operation mode without the speed sensor features low frequency, high torque, steady speed and high precision. It can precisely control the motor's speed and torque, and is often used in the occasion in which **V/F** control mode cannot meet the requirements of high-performance universal variable speed drive.

1: VC (closed-loop vector control) mode

The vector control operation mode with the speed sensor is applicable to the accusation in which the torque response is faster and the control precision of torque and speed is higher. It enables for certain precision of position control so as to achieve control over simple servo positioning in the process of dragging the asynchronous motor. When dragging the synchronous motor,

high precision of position service control (optional function) can be achieved.

2: V/F control

It refers to the constant control voltage/frequency ratio. It can be used to the occasion in which the performance is not required to be very high, and is also applicable to the occasion in which single inverter drives several motors.

3: V/F separated control

It is used for special application occasions, and is also applicable to V/F separated control for torque motors. In this mode, the output voltage and output frequency of the inverter have no connection with each other, and are set separately by users.

In the case of V/F separated control, F0.0.25 is forced set to the frequency preset channel, and F0.2.26 is forcedly set to the voltage giving channel.

Note: This control mode cannot be used for common asynchronous motors and synchronous motors. The equipment may be damaged if this mode is mistakenly set.

F0.0.11 Keypad operation (H)	Setting range: 0000~0224	Factory default: 0000

_ _ _ X : Locking of panel keys

After the key locking function is set with this function, the locking will not take effect until **ESC** key is pressed to back to the normal control mode. For details, please refer to ***5.2 Basic Functions and Operating Methods of the Panel.***

0: Not locked

All keys are effective on the operating panel.

1: All keys except for UP/DW (shuttle), STOP and RUN are locked.

Only **UP/DW** (shuttle), **STOP** and **RUN** keys on the operating panel are effective.

2: All keys except STOP and RUN are locked.

Only the **STOP** and **RUN** keys on the operating panel are effective.

3: All keys except STOP are locked.

Only the **STOP** key on the operating panel is effective.

4: Locking all keys

All keys are void on the operating panel.

_ _ X _ : STOP button function

0: The modes other than the panel control are void.

Only when the running command channel is the operating panel is it effective to press down the **STOP** key.

1: Press STOP key in any control mode for deceleration stop.

No matter the running command preset channel is the operating panel, external terminals or the communication port, when **STOP** key is pressed, the inverter will control the motor to achieve deceleration stop according to the current effective deceleration time. The priority of this stop mode is higher than that of parameter **F0.4.38**.

2: Press STOP key in any control mode for free stop.

No matter the running command preset channel is the operating panel, external terminals or the communication port, when **STOP** key is pressed, the inverter will stop output, and the motor stop in free sliding mode. The priority of this stop mode is higher than that of parameter **F0.4.38**.

_ X _ _ : Function of PANEL/REMOTE keys

When the functional setting of **PANEL/REMOTE** keys is effective, and in the normal monitoring mode, the **PANEL/REMOTE** keys can be used to switch the running command channel. The switching status is not saved, and will get lost after power-off. The running command channel for the inverter is still the operating panel after power-on once again.

If **PANEL/REMOTE** keys are used to circularly switch to desired running command channel, it is required to press "**OK**" key for confirmation within 5s. Otherwise, it will not get effective.

The switching sequence of the running command channel: Operating panel running command channel (**PANEL/REMOTE** light on)→external terminal operating running command channel (**PANEL/REMOTE** light off) → communication port running command channel (**PANEL/REMOTE** light off) → operating panel running command channel (**PANEL/REMOTE** light on).

0: Void

The running command channel cannot be switched with **PANEL/REMOTE** key.

1: Effective at stop

PANEL/REMOTE key is effective at the stop status, but it is void to switch the running command channel with this key when the device is running.

2: Continuous effective

PANEL/REMOTE keys can be used to switch the running command channel both at the stop and running status.

- The command channel switching at the running status of the inverter should be used carefully. Be sure the safety before operation. If the running command (FWD/REV/JOG) after switching is inconsistent with that before switching, the inverter will change its current running status (stop, run or REV), which may cause accident.

F0.0.12 Principal monitoring parameter (H)	**Setting range: d0.00~d0.55 / d1.00~d1.55**	**Factory default: d0.00**
F0.0.13 Auxiliary monitoring parameter 1 (H)	**Setting range: d0.00~d0.55 / d1.00~d1.55**	**Factory default: d0.02**
F0.0.14 Auxiliary monitoring parameter 2 (H)	**Setting range: d0.00~d0.55 / d1.00~d1.55**	**Factory default: d0.09**

This group of parameters is used to determine display contents on the operating panel at the status monitoring mode, and bitwise operation must be followed for setting.

The Principal monitoring parameter is used to determine display contents on the main display column of the **LED** panel, or the first display parameter on the **LCD** panel (signal parameter display).

The auxiliary monitoring parameter 1 is used to determine display contents on the auxiliary display column of the **LED** panel, or the second display parameter on the **LCD** panel (dual parameter display) when the inverter is running.

The auxiliary monitoring parameter 2 is used to determine display contents on the auxiliary display column of the **LED** panel, or the third display parameter on the **LCD** panel (three parameter display) when the inverter is stopped.

The corresponding physical quantity of the display data can be referred to the status monitoring parameter table. When the inverter is conducting detection of motor parameters, the auxiliary display will display the value of the current output current, which is not restricted by the parameter **F0.0.13.**

7.2 Running command selection (group f0.1)

F0.1.15 Control place selection	Setting range: 0, 1, 2	Factory default: 0

This function defines three kinds of modes for selecting the control command source, as shown in Figure 7-7:

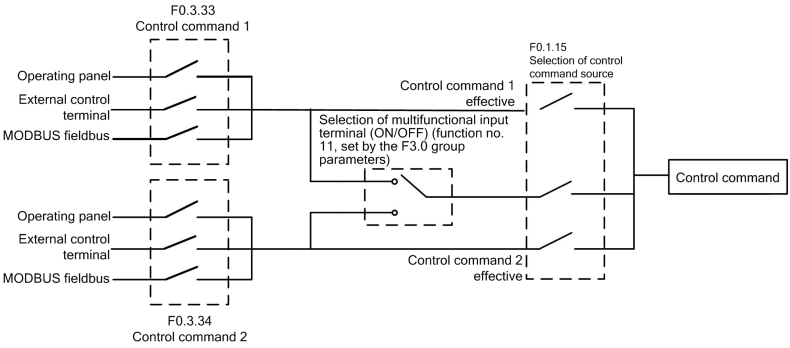


Figure 7-7 Sketch of selecting the control command sources

F0.1.16 Selection of frequency set value	Setting range: 0~14	Factory default: 0

The **DL500** series inverter has two frequency setting sources (corresponding parameters **F0.2.25**, **F0.2.26**). This parameter determines 14 kinds of combined calculation methods for the two frequency setting sources. Figure 7-8 shows the structure sketch of the frequency setting channel.

The actual running direction of the inverter is the result of "XOR" between the set value direction (always being FWD direction for single polarity setting) and the running command direction.

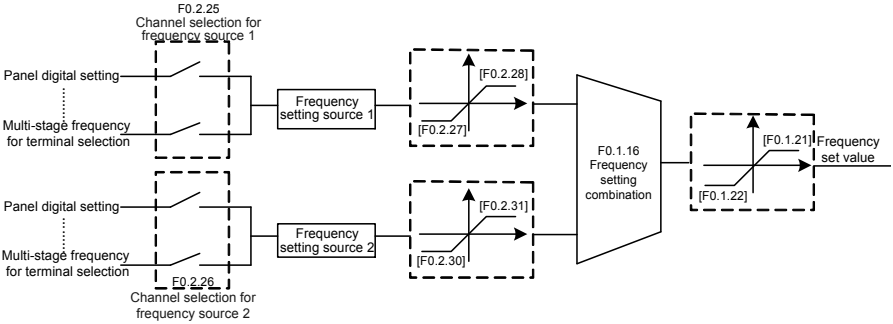


Figure 7-8 Structure sketch of frequency setting channel

0: Channel 1 Hz setting

The frequency setting source 1 is independently effective. In this case, the frequency set value is solely determined by the frequency setting source 1 and is named as the set value 1.

1: Channel 2 Hz setting

The frequency setting source 2 is independently effective. In this case, the frequency set value is solely determined by the frequency setting source 2 and is named as the set value 2.

2: Select Channel 1 or 2 Hz via input terminal (Function No. 12)

The frequency setting source is selected by the functional input terminal (Function No. 12) and the terminal function is set with F3.0 group parameters.

3: Selected via control place selection

The selection of frequency setting source is bound with the start-stop command. In this case, the running command source is bound with the frequency setting source. That is to say, if the running command source 1 is effective, the frequency setting source 1 is also effective; and if the running command source 2 is effective, the frequency setting source 2 is effective as well.

4: Channel 1 + Channel 2

Frequency set value = set value 1 + set value 2

The frequency combination curves under different status are shown as below:

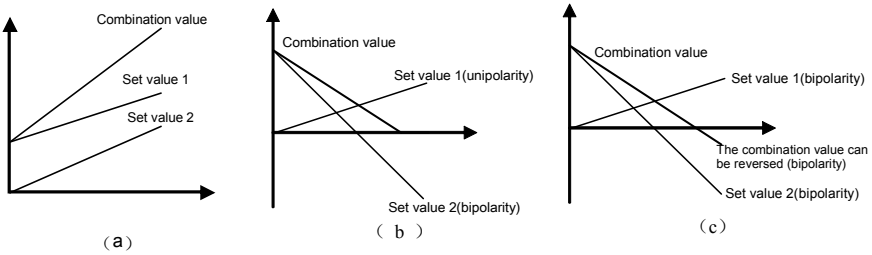


Figure 7-9-A Frequency combination sketch 1

- The combination result will only be in bipolarity when only two setting sources are set in bipolarity way. (Figure c)

5: Channel 1 amplified by Channel 2

Frequency set value = set value 1* (1+set value 2 /[F0.2.31])

The sketch of frequency combination setting is shown as below:

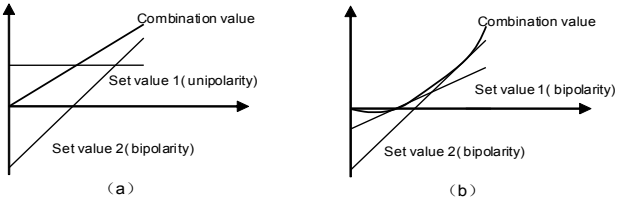


Figure 7-9-B Frequency combination sketch 2

- The combination results will only be in bipolarity when the setting source 1 is set in bipolarity way. (Figure b)

6: Channel 1 - Channel

Frequency set value = setting 1 - set value 2

The sketch of frequency combination setting is shown as below:

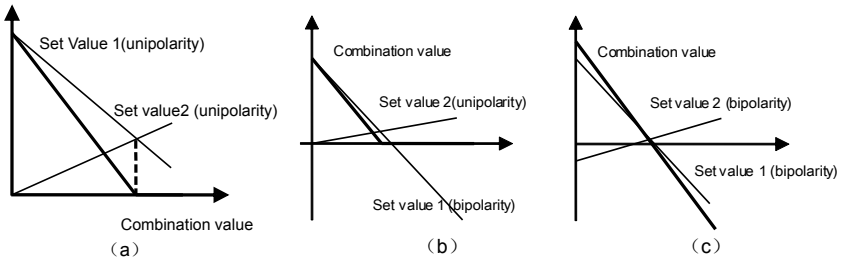


Figure 7-9-C Frequency combination sketch 3

- The combination result will only be in bipolarity when only two setting sources are set in bipolarity way. (Figure c)

7: Channel 1 reduced by Channel 2

Frequency set value = set value 1* (1-set value 2 /[F0.2.31])

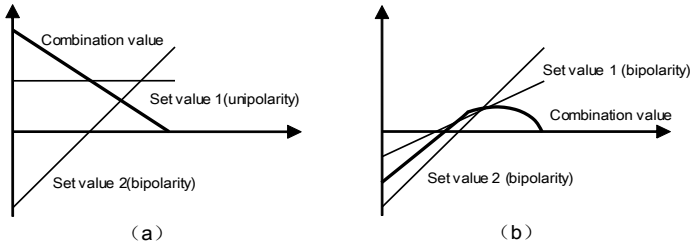


Figure 7-9-D Frequency combination sketch 4

- The combination results will only be in bipolarity when the setting source 1 is set in bipolarity way. (Figure b)

8: Channel 1 reduced by Channel 2

Frequency set value = set value 1 * set value 2 /[F0.2.31]

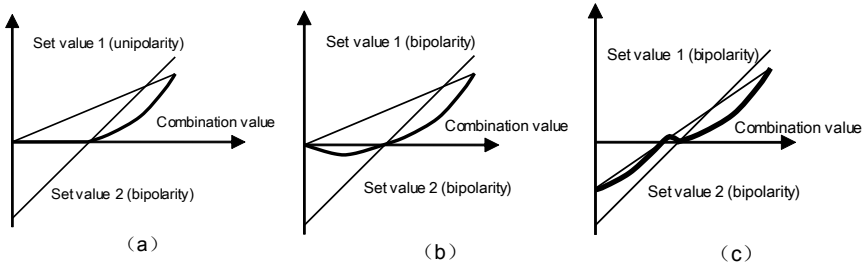


Figure 7-9-E Frequency combination sketch 5

- The combination results will only be in bipolarity when the setting source 1 is set in bipolarity way. (Figure b, Figure c)

9: Highest value Channel 1 or Channel 2

Frequency set value = **Max** (|set value 1|, |set value 2|)

The maximum value between the absolute values of set value 1 and set value 2 is taken as the frequency set value, and the combination value must be unipolar.

10: Lowest value Channel 1 or Channel 2

Frequency set value = **Min** (|set value 1|, |set value 2|)

The minimum value between the absolute values of set value 1 and set value 2 is taken as the frequency set value, and the combination value must be unipolar.

11: √(Channel 1) + √(Channel 2)

Frequency set value = √ |set value 1|+sqrt|set value 2|

The frequency set value is the total of the square root of the absolute value of set value 1 and set value 2, and the combination value must be unipolar.

12: √(Channel 1 + Channel 2)

Frequency set value = √ |set value 1+set value 2|

The frequency set value is square root of the absolute value of the total of set value 1 and set value 2, and the combination value must be unipolar.

13: (Channel1 x Scaling 1) + (Channel 2 x Scaling 2)

Frequency set value=set value 1*[F0.1.18]+set value 2*[F0.1.19]

Only when the two setting channels are both in the mode of bipolar setting, the combination results will show the characteristics of the bipolar setting.

14: (Channel1 x Scaling 1) + (Channel 2 x Scaling 2)

Set value 1*[F0.1.18]- set value 2*[F0.1.19]

Only when the two setting channels are both in the mode of bipolar setting, the combination results will show the characteristics of the bipolar setting.

Remarks: after selecting the combination way of the frequency set value, the following aspects must be considered in order to get correct frequency set value

- To set **F0.2.25** (channel selection for the frequency setting source 1) and **F0.2.26** (channel selection for the frequency setting source 2) to determine the given channel of the frequency setting source;
- To set **F0.1.18** (action coefficient of the frequency setting source 1) and **F0.1.19** (action coefficient of the frequency setting source 2) to determine the weighting coefficient of the frequency setting source;
- To Set **F0.2.27** (minimum set value of frequency source 1) and **F0.2.28** (maximum set value of frequency source 1) to limit the range of frequency set value of the frequency source 1, and to set F0.2.30 (minimum set value of frequency source 2) and **F0.2.31** (maximum set value of frequency source 2) to limit the range of frequency set value of the frequency source 2;
- To set **F0.1.21** (upper limiting frequency) and **F0.1.22** (lower limiting frequency) to limit the range of the frequency set value.

F0.1.17 Running direction (H)	Setting range: 0000~0021	Factory default: 0000

_ _ _ X : Direction switching

0: Void

The running direction is controlled by the direction command.

1: Negate

The running direction is opposite to that directed by the direction command.

_ _ X _ : Direction locking

0: Void

The running direction is controlled by the direction command.

1: FWD locking

The motor will run in FWD direction No matter the FWD running command or REV running command is given.

2: REV locking

The motor will run in REV direction no matter the FWD running command or REV running command is given.

- The function of "Direction locking" (__x_) has precedence over the function of "Direction switching" (_ _ _X).
- It can be set when the inverter is running. Be sure that the operation is safe.

F0.1.20 Maximum output frequency	Setting range: 10.00~300.00Hz/100.0~400.0Hz	Factory default: 60.00
F0.1.21 Upper limit frequency	Setting range: [F0.1.22]~Min (300.00Hz,[F0.1.20])	Factory default: 50.00
F0.1.22 Lower limit frequency	Setting range: 0.0Hz~[F0.1.21]	Factory default: 0.0

The maximum output frequency is the allowable output maximum frequency of the inverter as set by users (maximum stator synchronous frequency of the asynchronous motor); The upper limiting frequency is the maximum frequency allowed for running of the asynchronous motor as set by users (the maximum frequency corresponding to the mechanical rotor of the asynchronous motor). The maximum output frequency must be higher than the upper limiting frequency; The lower limiting frequency is the minimum frequency allowed for running of the motor as set by users.

The maximum output frequency, upper limiting frequency and lower limiting frequency shall carefully set according to the actual nameplate parameters and operating status of the controlled motor and. The relationship among the three kinds of frequency is shown in Figure 7-10.

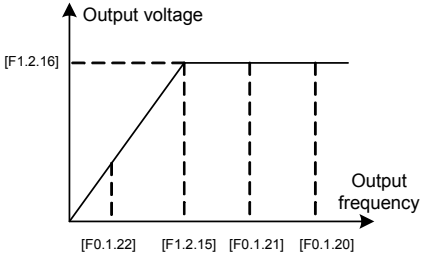


Figure 7-10 Frequency parameter definition sketch

- [F1.2.15] in Figure 7-10 represents the motor's reference frequency, and [F1.2.16] represents the motor's reference voltage.

F0.1.23 FWD jog frequency	**Setting range: 0.0Hz~[F0.1.21]**	**Factory default: 10.00**
F0.1.24 REV jog frequency	**Setting range: 0.0Hz~[F0.1.21]**	**Factory default: 10.00**

Jog running is a special running mode of the inverter. No matter the inverter is initially stopped or running, as long as the jog command is inputted, the inverter will transit to the jog frequency according to the preset jog acceleration and deceleration time. However, it is also influenced by the startup frequency and startup frequency duration as well as the functions of DC band-type braking, startup delay and startup pre-excitation.

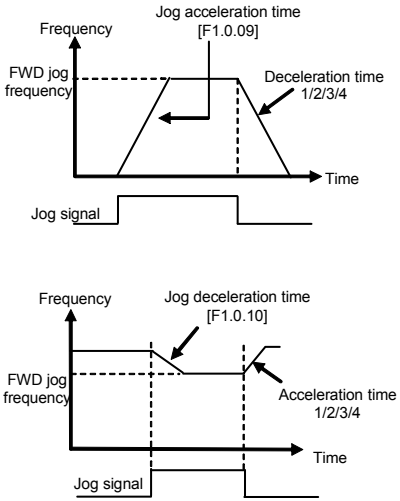


Figure 7-11 FWD jog running curve

7.3 Frequency setup (group f0.2)

F0.2.25 Frequency setting channel 1	**Setting range: 00~29**	**Factory default: 2**
F0.2.26 Frequency setting channel 2	**Setting range: 00~29**	**Factory default: 0**

The frequency set value determined via the frequency setting source 1 is named as the set value 1; And the frequency set value determined via the frequency setting source 2 is named as the set value 2.

0: Keypad entry 1 (keep value when stopped)

The frequency set value is determined by the value of the parameter **F0.2.29** (or **F0.3.32**). In the normal monitoring mode, it is applicable to make direct modification with the ∧ and ∨ keys (or shuttle) on the panel. The modified values will not be saved and will get lost after power-on.

1: Keypad entry 2 (go to zero when stopped)

Similar to the case of "0" as above, the inverter will automatically clear current set value after stop.

2: Keypad entry 3 (keep value at power off)

Similar to the case of "0,1" as above, the inverter will automatically save the current set value after power-off, and take the saved value as the initial set value after power-on once again.

3: Setting of wheel potentiometer

Its function is equivalent to the high-precision panel potentiometer. The set resolution is the minimum quantitative value (e.g. 0.01 Hz), and data are saved in the internal memory of the panel.

4: Remote UP/DW 1 (keep value at power off)

Multifunctional terminals are used to directly increase, decrease (Function No. 15, 16) or clear (Function No. 17) the set frequency. The terminal function is selected by parameters **F3.0.00** ~ **F3.0.08.**The set data will not be saved and will get lost after power-off.

The relationship between the status setting combination of the three external switches and the current frequency set value of the inverter is shown in Figure 7-2.

Preconditions for below instruction: multifunctional terminal **DI1** frequency or process **PID** setting **UP** function ([**F3.0.00**]=**15**), **DI2** sets frequency or process **PID DW** function ([**F3.0.01**]=**16**), and **DI5** sets **UP/DW** with frequency clear function ([**F3.0.04**]=**17**).

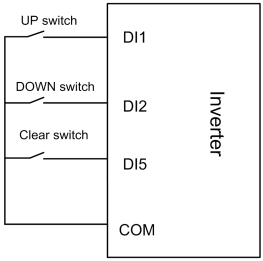


Figure 7-12 Terminal UP/DW wiring sketch

Table 7-2 External Switch Status and Current Frequency Set Value of the Inverter

Terminal Status			Set frequency
DI5	DI2	DI1	
OFF	OFF	OFF	Maintained
OFF	OFF	ON	Increased
OFF	ON	OFF	Deceased
OFF	ON	ON	Maintained
ON	Any	Any	Zero

5: Remote UP/DW 2 (go to zero when stopped)

Similar to the case of "4" as above, the inverter will automatically clear current set value after stop.

6: Remote UP/DW 3 (keep value at power-off)

Similar to the case of "4" as above, the set value will be saved automatically after power-off, and the initial set data will be the set value at the last power-off when the inverter is powered on once again.

7: Remote UP/DW bipolar setting 1 (keep bipolar when stopped)

The basic operation is slimier to that as stated in "the" and the difference is that: in the mode of "4", the set frequency is unsigned values (not containing direction information), and the setting range of the frequency is: 0~upper limiting frequency; while in the mode of "7", the set frequency is signed values (containing direction changing information), and the setting range of the frequency is: - upper limiting frequency upper limiting frequency.

The inverter's actual running direction is according to "XOR" calculation of the command direction (**FWD**, **REV**) and the set frequency direction.

8: Remote UP/DW bipolar setting 2 (keep at power-off)

The basic operation is similar to the case of "7" as above. The set value will be saved automatically after power-off, and the initial set data will be the set value at the last power-off when the inverter is powered on once again.

9: Analog input AI1

The frequency set value is given via the analog input AI1; For relevant characteristics please see the instructions of the parameters F4.0.00 and F4.0.01.

10: Analog input AI2

The frequency set value is given via the analog input AI2; For relevant characteristics please see the instructions of the parameters F4.0.02 and F4.0.03.

11: Analog input AI3

The frequency set value is given via the analog input AI3; For relevant characteristics please see the instructions of the parameters F4.0.04 and F4.0.05.

12: AI1 bipolar setting

The frequency set value is given by the bipolarity of the analog AI1 ([F4.0.00]~[F4.0.01]), and AI1 contains the direction changing information. For relevant characteristics please see the instructions of the parameters F4.0.00 and F4.0.01.

13: AI3 bipolar setting

The frequency set value is given by the bipolarity of the analog AI3 ([F4.0.04]~[F4.0.05]), and AI3 contains the direction changing information. For relevant characteristics please see the instructions of the parameters F4.00.04 and F4.00.05.

14: Pulse follower input

The frequency set value is given by the pulse input **Fin**.

15: Pulse follower bipolar input

The frequency set value is given by the pulse input Fin bipolarity, and the pulse signal contains the direction changing information.

16: MODBUS communications 1 relative (relative set value)

The frequency set value is given by the principal computer through **MODBUS** fieldbus (**RS485** communication port), and the set value (**-10000** ~ **10000**) is relative data and is corresponding to the upper limiting frequency.

17: MODBUS communication 2 absolute (absolute set value)

The frequency set value is given by the principal computer through **MODBUS** fieldbus (**RS485** communication port), and the set value (**-30000** ~ **30000**) is absolute value neglecting the decimal point) (e.g. the value 1500 corresponds to the set frequency **150.00Hz** in general mode.)

18: AI1+AI2

The frequency set value = the frequency value corresponding to the analog input AI1 + the frequency value corresponding to the analog input AI2

19: AI2+AI3

The frequency set value = the frequency value corresponding to the analog input AI2 + the frequency value corresponding to the analog input AI3

20: AI2+pulse input Fin

The frequency set value = the frequency value corresponding to the analog input AI2 + the frequency value corresponding to the pulse input Fin

21: AI1*AI2/full scale of AI2 (10V)

The frequency set value = the frequency value corresponding to AI1 *the frequency value corresponding to AI2/the frequency corresponding to the maximum input of AI2.

22: AI1/AI2

The frequency set value= the frequency value corresponding to AI1/the frequency value corresponding to AI2.

23: Process PID output

The frequency set value is given by the process **PID** output. This option is mainly for the system in which the **PID** running output needs to be combined with other setting channel for running. In general running system, this value does not need to be selected. **PID** output will automatically participate in setting competition according to the frequency setting priority.

24: Compensation PID output

The frequency set value is given by the compensation **PID** output. This option is mainly for the system in which compensation **PID** running output needs to be combined with other setting channel for running. In general running system, this value does not need to be selected. The compensation **PID** output will automatically participate in setting competition according to the frequency setting priority.

25: Disturbance running frequency

The frequency set value is given by the disturbance running frequency. This option is mainly for the system in which the disturbance running output needs to be combined with other setting channel for running. In general running system, this value does not need to be selected. The disturbance output will automatically participate in setting competition according to the frequency setting priority.

26: Auto preset speeds

The frequency set value is given by the multi-stage running frequency. This option is mainly for the system in which the multi-stage running output needs to be combined with other setting channel for running. In general running system, this value does not need to be selected. The multi-stage running output will automatically participate in setting competition according to the frequency setting priority.

27: Preset speeds via terminals

The frequency set value is determined by the combination status of the four multifunctional input terminals (Function No. 1, 2, 3, 4), and the terminal function is set by the parameters **F3.0.00~F3.0.08**.This way allows for multi-stage frequency running.

28: Simulated analog input SAI1

29: Simulated analog input SAI2

The frequency setting source and set value are determined by the virtual input parameter Group F4.4.50 ~ F4.4.54.

F0.2.27 Min frequency channel 1	**Setting range: 0.0Hz~[F0.2.28]**	**Factory default: 0.0**
F0.2.28 Max frequency channel1	**Setting range: [F0.2.27]~[F0.1.20]**	**Factory default: 50.00**
F0.2.30 Min frequency channel 2	**Setting range: 0.0Hz~[F0.2.31]**	**Factory default: 0.0**
F0.2.31 Max frequency channel 2	**Setting range: [F0.2.30]~[F0.1.20]**	**Factory default: 50.00**

This group of parameters confines the range of frequency allowed to be set for two frequency setting sources.

F0.2.29 Keypad incremental value channel 1	**Setting range: 0.0Hz~[F0.2.28]**	**Factory default: 0.0**
F0.2.32 Keypad incremental value channel 2	**Setting range: 0.0Hz~[F0.2.31]**	**Factory default: 0.0**

The frequency command value at the time of panel digital setting can be directly modified with the ▲, ▼ keys (or shuttle) on the panel in the normal monitoring mode, and the set frequency can be also modified by means of parameter modification.

7.4 Control command source (group f0.3)

F0.3.33 Control command 1	**Setting range: 0~2**	**Factory default: 0**
F0.3.34 Control command 2	**Setting range: 0~2**	**Factory default: 0**

To select the input physical channel of the inverter control commands (start, stop, forward, reverse, jog and reset, etc).

0: Operating panel

The running control command is given via the operating panel. Please see Chapter 5 for the use of the operating panel.

1: External control terminal

The running control command is given via external control commands, and the terminal function is set by the parameter **F3.0.**

2: MODBUS fieldbus/standard expansion card configuration

The running control command is given via **MODBUS** fieldbus.

F0.3.35 External control quick setup (H)	**Setting range: 0000~0013**	**Factory default: 0000**

_ _ _ X : Control command action mode

Preconditions for below instructions: the multifunctional terminal **DI3** is for **FWD** command function ([**F3.0.02**]=**7**), **DI4** is for **REV** function ([**F3.0.03**]=**8**), and **DI5** is for three-line running control function ([**F3.0.04**]=**19**).

0: Two wire mode 1

DI4	DI3	Running command
OFF	OFF	Stop
OFF	ON	FWD
ON	OFF	REV
ON	ON	Stop

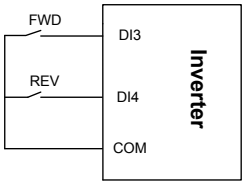


Figure 7-13-A Two wire running mode 1

1: Two wire mode 2

DI4	DI3	Running command
OFF	OFF	Stop
OFF	ON	FWD
ON	OFF	Stop
ON	ON	REV

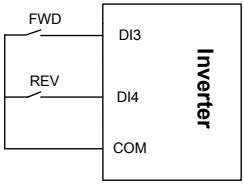


Figure 7-13-B Two wire running mode 2

2: Three wire mode 1

When **K0** is engaged, **FWD** and **REV** control is effective; and when **K0** is unengaged, **FWD** and **REV** control is void, and the inverter will stop.

DI3 terminal ascending edge indicates FWD running command and **DI4** terminal ascending edge indicates REV running command.

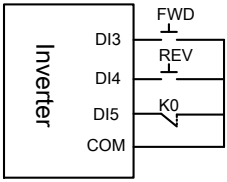


Figure 7-14-A Three wire running mode 1

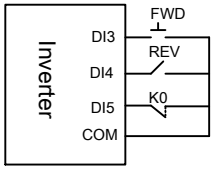


Figure 7-14-B Three wire running mode 2

3: Three wire mode 2

When **K0** is engaged, **FWD** and **REV** control is effective; and when **K0** is unengaged, **FWD** and **REV** control is void, and the inverter will stop.

DI3 terminal ascending edge indicates running command; **DI4** terminal disconnection indicates FWD running command, and **DI4** terminal engagement indicates REV running command.

_ _ X _: Control first starting mode

0: Running signal level starting

1: Running signal rising edge starting

Note : The signal given by two-line mode running command is level signal, and when the terminal is at effective status, the inverter will automatically start after power-one. In the system in which power-on auto start is not expected, it is applicable to select the way of rising edge start.

7.5 Start and stop (group f0.4)

F0.4.37 Start/Running permission(H)	Setting range: 0000~1202	Factory default: 0000

_ _ _ X : Start permission

0: Function closed

The inverter can start without start permission signal.

1: Permitted when the multifunctional terminal is effective

The inverter will not start until it is defined that the multifunctional input terminal (Group **F3.0**) of the start permission (Function No.42) is continuously effective; Start is forbidden when it is void, and the inverter which is running will stop freely (alarm code: **aL.031**). The inverter will not start again until the rising edge of the starting signal is detected.

2: Command word from standard fieldbus (effective when standard expansion card is equipped)

The start permission signal is from the bus command word.

_ X _ _ : Running permission

0: Function closed

The inverter can run without running permission signal.

1: Permitted when the multifunctional terminal is effective (Function No. 43)

The inverter will not start until the multifunctional input terminal (Group **F3.0**) which is defined to be running permissible (Function No.43) is effective; If it is void, the inverter will stop in the way defined by the kilometer of this parameter, and will then automatically run again after signal recovery.

2: Command word from standard fieldbus (effective when standard expansion card is equipped)

The start permission signal is from the bus command word.

X _ _ _ : The action mode when the running permission signal is void

0: Free stop

The inverter stops outputting, and the motor stops freely.

1: Deceleration stop

The inverter will stop at deceleration mode according to preset deceleration time.

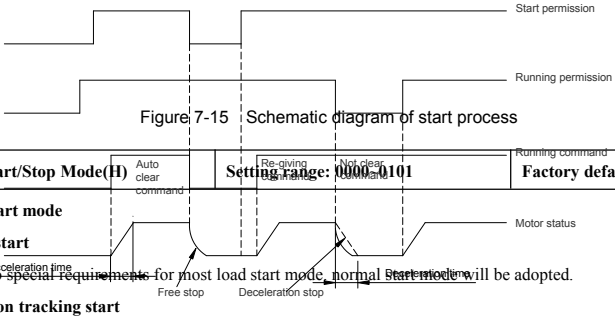


Figure 7-15 Schematic diagram of start process

F0.4.38 Start/Stop Mode(H)	Setting range: 0000–0101	Factory default: 0000

_ _ _ X : Start mode

0: Normal start

There are no special requirements for most load start mode, normal start mode will be adopted.

1: Revolution tracking start

It is applicable to the occasion of fault resetting and restart and restart after power-off. The inverter will automatically judge the running speed and direction of the motor, and starts the rotating motor in a smooth and impact-free way according to the detection and judge results; See below figure for the revolution tracking start sketch.

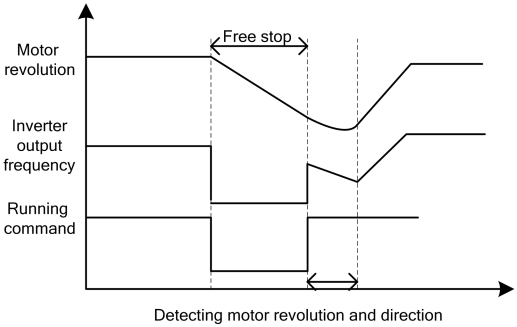


Figure 7-16 Revolution tracking start sketch

_ X _ _: Stop mode

0: Deceleration stop

In the case of deceleration stop, the inverter will gradually reduce the output frequency according to the preset deceleration time until it stops.

1: Free stop

At stop, the inverter outputs zero frequency and clocks output signals, and the motor will stop in a free sliding way according to inertia.

At free stop, if it is needed to restart the motor before the motor stops running completely, it is necessary to appropriately configure the revolution tracking start function; Otherwise, it will leads to overcurrent or overvoltage fault protection.

If the motor has not stopped completely in deceleration way, because of high load inertia of the field work and short deceleration time, it is then applicable to start DC band-type braking control. See the instructions of the parameter **F0.4.44** for details.

F0.4.39 Start frequency	**Setting range: 0.0Hz~50.00Hz**	**Factory default: 0.50**
F0.4.40 Start frequency hold time	**Setting range: 0.00~10.00Sec.**	**Factory default: 0.0**

The start frequency means the initial frequency when the inverter starts up, and is not limited by the lower limiting frequency **F0.1.22**.

The start frequency holding time means the duration of operation at the start frequency, and can be set according to actual needs. When it is set to 0, the start frequency is void.

For the system with high inertia, heavy load and high requirement of start torque, the start frequency can effectively overcome the difficult of start, and the start frequency is also effective in each acceleration process when the inverter switches between forward and reverse running.

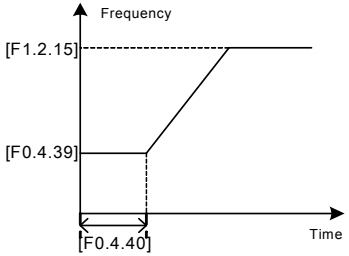


Figure 7-17 Start frequency sketch

F0.4.41 Start pre-excitation current	**Setting range: 0.0~100%**	**Factory default: 35.0**
F0.4.42 Start pre-excitation time	**Setting range: 0.00~10.00Sec.**	**Factory default: 0.10**

It costs some time to develop air gap flux for asynchronous motor (approaching to the constant of the rotor time). When it is at stop status before the motor is started, in order to get enough start torque, it is a must to develop the air gap flux. Therefore, it is needed to start pre-excitation for the asynchronous motor. See Figure 7-18 for the pre-excitation process.

The set value of start pre-excitation current is the percentage with respect to the inverter rated output current.

The start pre-excitation time means the duration in which the inverter inputs start pre-excitation current for the motor.

- When the rated current of the adapter motor differs greatly from the rated current of the inverter, please carefully set the pre-excitation current (F0.4.41), as excessive setting may damage the motor.

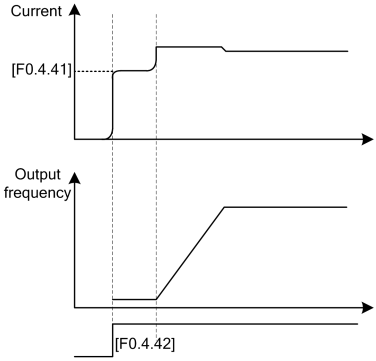


Figure 7-18 Start pre-excitation output

F0.4.43 Start delay	Setting range: 0.00~10.00Sec.	Factory default: 0.0

Start delay means the waiting time before the inverter starts after receiving the running command.

F0.4.44 DC band-type brake control	Setting range: 0000~0001	Factory default: 0

_ _ _ X : DC band-type brake control

The DC band-type brake means to lead DC current into the motor rotor so as to generate braking torque. The DC band-type braking function cannot be used when synchronous motor is driven.

When both the set value and the actual speed of the motor has decreased below [**F0.4.45**], the inverter will stop generating sine current but will inject direct current to the motor, and the current value is to be set by the parameter [**F0.4.47**]. When the given speed or the motor speed has surpassed the parameter [**F0.4.45**], the inverter will stop DC power supply and restore to the normal running status.

If it is started, the permission signal will be disconnected, and the DC band-type brake will be void.

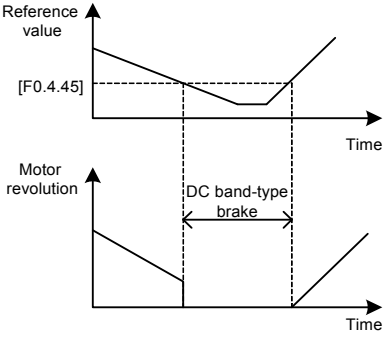


Figure 7-19 DC band-type brake sketch

- Injecting current to the moor may lead over-temperature of the motor. In the circumstances where long-time DC band-type brake is needed, forced air-cooling motor should be used. During the long time of band-type braking, if there is constant load in the motor band-type brake, DC band-type brake will not guarantee that the motor shaft will not rotate.

F0.4.45 DC injection brake application frequency	Setting range: 0.0Hz~[F0.1.21]	Factory default: 2.00

In the deceleration and stop process of the inverter, when the output frequency is lower than the DC band-type brake/brake start frequency/speed, the DC band-type brake/brake function will be started.

F0.4.46 DC brake action time	Setting range: 0.00~10.00Sec.	Factory default: 0.0
F0.4.47 DC injection brake current level	Setting range: 0.0~100%	Factory default: 50.0

The DC brake time is the duration of the output DC braking current. If it is selected that the external terminal stop DC braking is effective, the parameter of DC braking action time will be void.

The DC band-tape brake/brake injection current means the brake current outputted at the time of inverter DC band-type brake/brake. Its set value is the percentage with respect to the rated current.

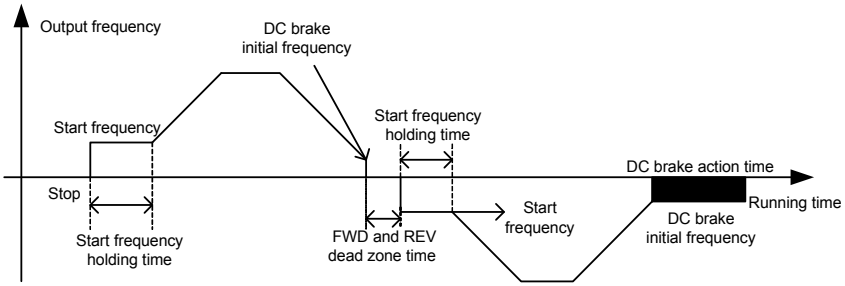


Figure 7-20 Stop DC brake sketch

F0.4.48 Restart after power-off	Setting range: 0, 1	Factory default: 0

It is mainly for the trigger starting modes including “panel control, bus control and three-line control”. If the function of restart after power-off is set to be effective, when the inverter is powered off, the running command/status before power-off will be automatically saved, and it will automatically restore to the running status before power-off after the waiting time after power-on again.

In case of the restart after power-off, it will resume running in the mode of restart at detected speed.

F0.4.49 Restart delay time	Setting range: 0.1~10.0Sec.	Factory default: 0.5

It means the time of waiting status before the inverter automatically executes the function of restart after power-off.

F0.4.50 Direction change delay time	Setting range: 0.00~5.00Sec.	Factory default: 0.00

The forward and reverse transition dead time is used to set the waiting time for the motor to shift from FWD to REV or from REV to FWD. This function is used to overcome reversal current compact caused by mechanical dead zone, as shown in Figure 7-21.

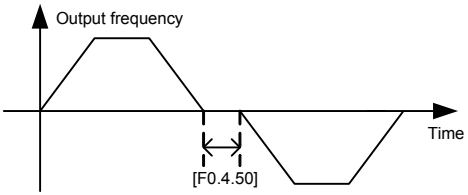


Figure 7-21 FWD and REV transition dead zone Sketch

F0.4.51 Forward and reverse switch mode	Setting range: 0, 1	Factory default: 0

0: Switch at zero point

To switch between FWD and REV at the zero point.

1: Start frequency switch

To switch between the FWD and REV at the start frequency. See the following figure:

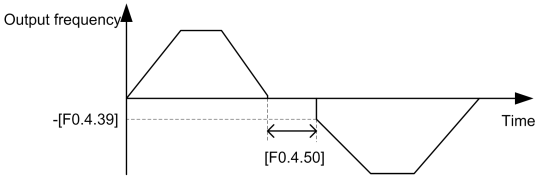


Figure 7-22 Sketch of start frequency FWD and REV switching

F0.4.52 Zero speed (frequency) detection level	Setting range: 0.00~100.00Hz	Factory default: 0.25Hz
F0.4.53 Zero speed delay time	Setting range: 0.00~10.00Sec.	Factory default: 0.1

When the inverter output frequency is lowered to zero, it will immediately lock the output. At this time, the motor revolution may not at zero, but the motor is completely at the free stop status, and will slide to stop.

Within the delay time, when the inverter output frequency is lower than the zero speed (frequency) detected level [**F0.4.52**], within the zero speed delay time [**F0.4.53**], the inverter will keep working and output a DC current, and the motor will keep excitation. The inverter may rapidly restart at any time.

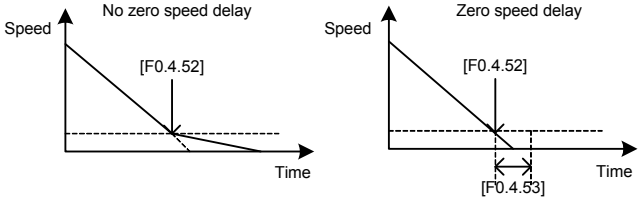


Figure 7-23 Comparison diagram when with or without zero speed delay

F0.4.54 Emergency stop mode (EMS)	Setting range: 0, 1	Factory default: 0

This parameter defines the stop mode after the inverter has received an emergency command (Function No. 14, to be set by the Group F3.0 parameters).

7.6 Accel and decel characteristics (group f1.0)

F1.0.00 Acceleration and deceleration modes	Setting range: 0000~0011	Factory default: 0000

_ _ _ X : Accel and decel mode

0: Liner acceleration and deceleration

The output frequency of the inverter increases or decreases according to fixed speed. The output frequency has liner relationship with the acceleration and deceleration time, and steadily increases or decreases according to constant gradient.

1: S curve acceleration and deceleration

The output frequency of the inverter increases or decreases according to grading speed, and the characteristics of S curve is determined by the parameter **[F1.0.01]** and **[F1.0.02]**. This function is mainly to reduce noise and ventilation during acceleration and deceleration, and decrease impact of the starting and stop load. When the load inertia is excessive, leading to overload fault during deceleration, it can be improved by adjusting the parameter setting ([**F1.0.01**] and [**F1.0.02**]) of S deceleration curve, so as to reasonably adjust the deceleration rate at different frequency.

_ _ X _: Accel and decel unit

0: Sec. (Second)

The acceleration and deceleration time is in the unit of second, and is at factory default value.

1: Min. (Minute)

The acceleration and deceleration time is in the unit of minute.

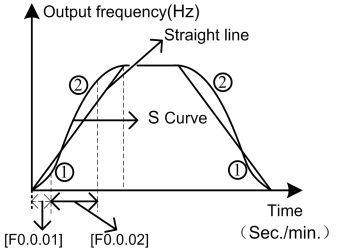


Figure 7-24 Acceleration and deceleration curve

F1.0.01 % of S curve at the bottom	Setting range: 5.0~100.0-[F1.0.02]	Factory default: 15.0
F1.0.02 % of S curve at mid secion	Setting range: 20.0~100.0-[F1.0.01]	Factory default: 70.0

Define the curve parameters of acceleration and deceleration of S curve.

As shown in item ① in Figure 7-24, the acceleration starting/deceleration ending period of S curve is indicated by the percentage of the total acceleration and decoration time.

As shown in item ② in Figure 7-24, the acceleration rising/deceleration decreasing period of S curve is indicated by the percentage of the total acceleration and decoration time.

F1.0.03~F1.0.08 Acceleration/ deceleration time 1/2/3	**Setting range: 0.01~600.00**	**Factory default: ☆**
F1.0.09 Acceleration 4/jog acceleration time	**Setting range: 0.01~600.00**	**Factory default: ☆**
F1.0.10 Deceleration 4/jog deceleration time	**Setting range: 0.01~600.00**	**Factory default: ☆**

The acceleration time means the time required for the inverter to accelerate from 0.00Hz to maximum output frequency [F0.1.20].

The deceleration time means the time required for the inverter to decelerate from the maximum output frequency [F0.1.20] to 0.00Hz.

DL500 series inverters are defined with 4 kinds of acceleration/deceleration time. The acceleration/ deceleration time 1~4 during the running process of the inverter can be selected through different combinations of external terminals. During simple PLC running, it is also applicable to use them as the acceleration and deceleration time at the time of switching among different running frequency at each stage. See instructions of F6.1 group parameters for detail.

The acceleration/deceleration time 4/jog acceleration/deceleration time are also used as the acceleration and declaration running time at the status of jog running. The jog frequency has the highest priority. At any state, the inverter will immediately transit to the jog frequency running state according to the preset jog acceleration and deceleration time as long as the jog command is inputted. (See the instructions of the functional parameter F0.1.23 and F0.1.24) The unit (Sec., Min.) of the acceleration and deceleration time is determined by the tens' digit of the parameter F1.0.11.

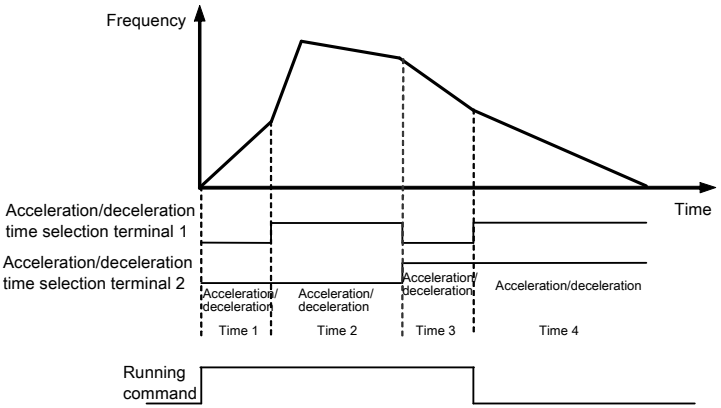


Figure 7-25 External terminal selection mode for acceleration and deceleration time

F1.0.11 EMS emergency stop and deceleration time	**Setting range: 0.01~600.00**	**Factory default: ☆**

The time for decelerating from the upper limit frequency [**F0.1.21**] to the zero frequency will only function when the inverter stops in deceleration way(**F0.4.54** is set to 0) after receiving **EMS** emergency stop command (Function No. 14).

7.7 Carrier frequency (group f1.1)

F1.1.13 Carrier frequency	**Setting range: 1.5~12.0KHz(FF.4.43=##0#) 1.5~15.0KHz(FF.4.43=##1#)**	**Factory default: ☆**

It is the switch frequency determining the inverter's internal power module. The allowable maximum carrier frequency is relevant with the inverter model. The carrier frequency mainly influences the audio noise and heat effect during running. When mute running is required, it is applicable to appropriately increase the value of the carrier frequency, but the maximum load allowable for the inverter may be somewhat reduced, accompanied by somewhat increase of interference of the inverter to the outside world.

For the circumstances where the motor wire is too long, it may lead to leaking current between motor wires and between the wire and the ground. When the ambient temperature is too high and the motor load is too high, or the inverter is failed due to above reasons, it is suggested to appropriately decrease the carrier frequency to improve thermal characteristics of the inverter.

F1.1.14 Carrier characteristics	**Setting range: 0000~2111**	**Factory default: 0011**

This parameter is used to set some characteristics relevant with the carrier (binary system setting), and usually needs not be modified.

_ _ _ X : Load linkage adjustment

When this function is effective, if the load current is excessive, the carrier frequency will be automatically decreased in order to ensure safe running of the inverter.

_ _ X_ : Temperature linkage adjustment

When this function is effective, the inverter will automatically decrease the carrier frequency if the ambient temperature is too high.

_ X _ _ : Reference frequency linkage adjustment

When this function is effective, the inverter will appropriately decrease the carrier frequency if the output frequency is too low.

X _ _ _ : Modulation mode

0: Asynchronous modulation

1: Synchronous modulation

When the ratio between the carrier frequency and inverter output frequency is below 20, it is suggested to set to the synchronous modulation mode so as to promote stability.

2: Noise smoothing

In this mode, the inverter's carrier frequency is uncertain random value, which is favorable for reducing audio noise and fixed frequency interference.

7.8 V/F parameters and overload protection (motor 1) (group f1.2)

F1.2.15 Reference frequency of motor 1	**Setting range: 5.00~300.00Hz/50.0~400.0Hz**	**Factory default: 50.00**
F1.2.16 Reference voltage of motor 1	**Setting range: 50~500V**	**Factory default: 380/220**

The reference frequency means the minimum frequency when the inverter outputs the maximum voltage, and generally is rated frequency of the motor.

The reference voltage means the output voltage when the inverter outputs the reference frequency, and generally is rated voltage of the motor.

This group of parameters is set according to the motor's parameters, and do no need to be modified except for special circumstances.

F1.2.17 V/F curve selection for motor1	**Setting range: 0, 1, 2, 3**	**Factory default: 0**

Set the corresponding curve between the inverter output voltage and output frequency. See the following figure.

0: Customized curve

When this mode is selected, users can set any desired V/F curve via this group of parameters (Group F1.2).

1: 1.2 times squares curve

The outputted is 1.2 times-square descending torque characteristics curve. See the curve 1 in the figure.

It is suitable for torque load of fans and pumps.

2: 1.5 times squares curve

The outputted is 1.5 times-square descending torque characteristics curve. See the curve 2 in the figure. It is suitable for torque load of fans and pumps. The energy saving effect of the descending torque curve is slightly increased compared with the constant torque curve.

3: Second square curve

The outputted is 2.5 times-square descending torque characteristics curve. See the curve 3 in the figure. It is suitable for torque load of fans and pumps. If it is not steady during light load operation, please switch to 1.5 times-square curve for operation.

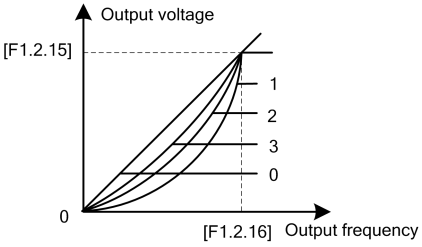


Figure 7-26 V/F curve

F1.2.18 Torque boost motor 1	**Setting range: 0.0~20.0%**	**Factory default: ☆**

It is used to improve the inverter's low frequency torque characteristics. When the inverter runs at low frequency, it will make compensation for the inverter's output voltage. Its set value is the percentage relative to the motor's reference voltage [F1.2.16]. See Figure 7-27-A and Figure 7-27-B.

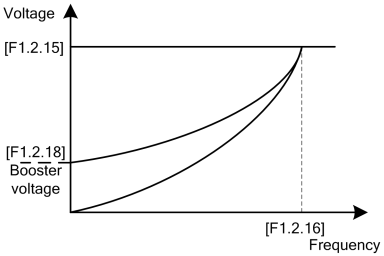


Figure 7-27-A Sketch of torque booster for descending torque curve

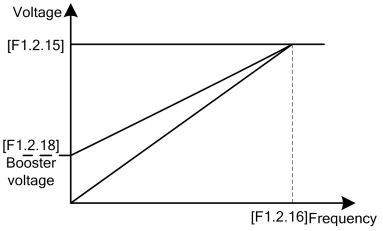


Figure 7-27-B Sketch of torque booster for constant torque curve

F1.2.19 V/F curve 1st frequency motor 1	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.20 V/F curve 1st voltage of motor 1	**Setting range: 0~500V**	**Factory default: 0.0**
F1.2.21 V/F curve 2nd frequency motor 1	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.22 V/F curve 2nd voltage of motor 1	**Setting range: 0~500V**	**Factory default: 0.0**
F1.2.23 V/F curve 3rd frequency motor 1	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.24 V/F curve 3rd voltage of motor 1	**Setting range: 0~500V**	**Factory default: 0.0**

This group of parameters is used to flexibly set **V/F** curve desired by users, as shown in Figure 7-28.

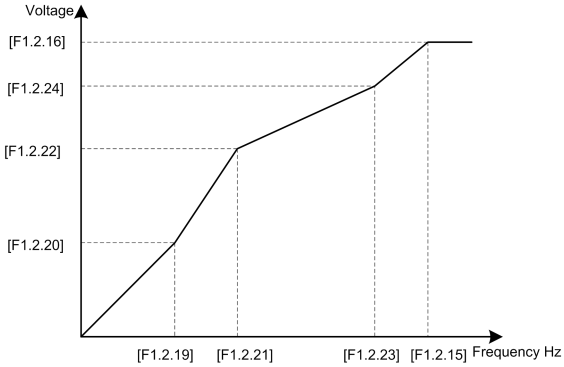


Figure 7-28 V/F customized curve

F1.2.25 Slip frequency compensation for motor 1	**Setting range: 0~150%**	**Factory default: 0**

The actual revolution difference of the motor may vary with the change of the load. Through setting of this parameters, the inverter will automatically adjust the inverter's output frequency according to the load, so as to offset the influence of the load to the motor revolution.

This parameter is only effective to **V/F** control mode.

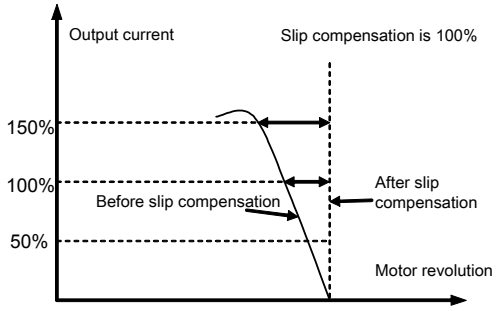


Figure 7-29 Slip frequency compensation sketch

7.9 V/F parameters and overload protection (motor 2) (group f1.3)

F1.3.27 Reference frequency of motor 2	**Setting range:5.00~300.00Hz/50.0~400.0Hz**	**Factory default: 0**
….		
F1.3.37 Reference voltage of motor 2	**Setting range: 0~150%**	**Factory default: 0**

The V/F control parameter when the motor 2 is selected is defined the same as parameters F1.2.15~ F1.2.25.

7.10 Steady running (group f1.4)

F1.4.39 Accel/decel current limit level	**Setting range:120~180%**	**Factory default: 160**

When the frequency inverter is in acceleration and deceleration running, for the acceleration and deceleration time does not match to the motor inertia or load breaks, there can be phenomenon of steep current rise. This parameter is used for setting the allowed output level when frequency inverter is in state of acceleration. Setting value is the relevant percentage of rated output current of frequency inverter.

When the output current of frequency inverter exceeds the specified level of this parameter, acceleration and deceleration time will be automatically delayed, to ensure the output current limited within the range of this level, refer to the figure below. Thus, for occasions requiring shorter acceleration time, acceleration torque level shall be properly improved.

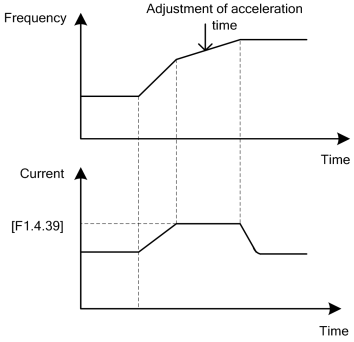


Figure 7-30 Schematic diagram of current limit for acceleration and deceleration

F1.4.40 Software overcurrent protection level	**Setting range: 120~200%**	**Factory default: 200**
F1.4.41 Strong start current holding time	**Setting range: 0.00~5.00Sec.**	**Factory default: 0.0**

Function is similar with [F1.4.39], limit the current value when frequency inverter is in acceleration and starting. For some systems with large inertia, or requires to overcome great static friction at start, large starting current can be set for a certain time ([F1.4.41]), to meet the requirement. Setting value is the relevant percentage of rated output current of frequency inverter.

- F1.4.41 is set as zero, it means the function of current limit of strong start is closed.

F1.4.42 Trip suppression selection	**Setting range: 0000~0112**	**Factory default: 0110**

_ _ _ X : Overvoltage suppression adjustor

When setting is valid, for load with energy feedback, in order to suppress overvoltage, frequency inverter may lift output frequency automatically, making it exceed selected frequency (limited by upper limiting frequency). Be attention if it is dangerous to the equipment safety when setting.

_ _ X _ : Undervoltage suppression adjustor

When setting is valid, undervoltage caused by sudden fall of grid voltage, frequency inverter may lower output frequency automatically, accessing into feedback braking state, to keep running with mechanical energy for a certain time to ensure the normal running of equipment.

_ X _ _ : Frequency modulation and current

When setting is valid, if the output current exceeds the maximum current **[F1.4.47]**, frequency inverter will lower output frequency automatically.

X _ _ _ : Failure Auto Recovery Mode

Setting effective, failure auto recovery mode is normal start, setting not effective, failure auto recovery mode is speed tracking start.

F1.4.43 Overvoltage trip level (DC BUS)	**Setting range: 720~800V**	**Factory default: 740**
F1.4.44 Overvoltage adjusting gain	**Setting range: 0.10~10.00**	**Factory default: 1.00**

When the motor is dragging overvoltage or in process of deceleration stop with large inertia, it may access into recycle braking state, causing rapid rise of direct current bus voltage of frequency inverter, leading to overvoltage protection action. When frequency inverter detects the direct current bus voltage exceeds [F1.4.43], it will adjust output frequency (extended deceleration time or increase frequency), to ensure continually safe running.

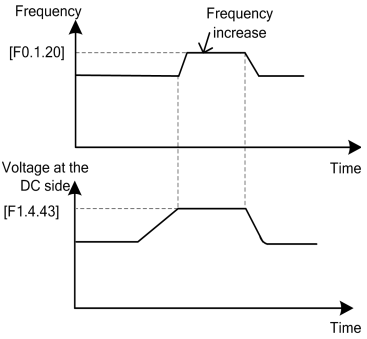


Figure 7-31-A Overvoltage suppression during steady running

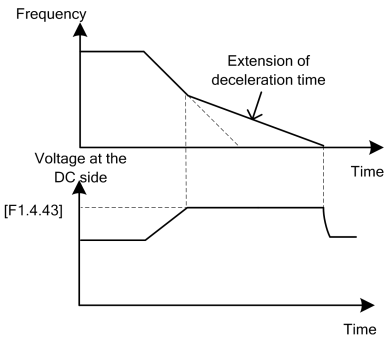


Figure 7-31-B Overvoltage suppression during deceleration process

- The larger the overvoltage adjusting gain is, the more obvious the suppression is, but it may lead to unsteady running.

F1.4.45 Undervoltage trip level (AC input)	**Setting range: [FF.2.35]~480V**	**Factory default: 400**
F1.4.46 Undervoltage trip level gain	**Setting range: 0.10~10.00**	**Factory default: 1.00**

When frequency inverter detects the direct current bus voltage is below [F1.4.45], it may lower output frequency automatically, accessing into recycle braking state, keep running with mechanical energy. The larger the undervoltage adjusting gain is, the stronger undervoltage suppression is.

This function plays very efficiently in large inertia load application occasions like centrifugal pump and draught fan.

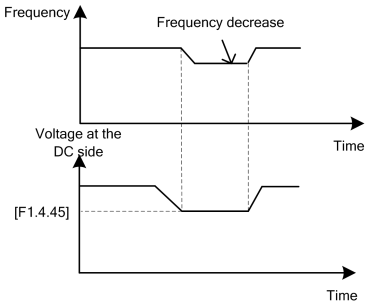


Figure 7-32-A Sketch of undervoltage

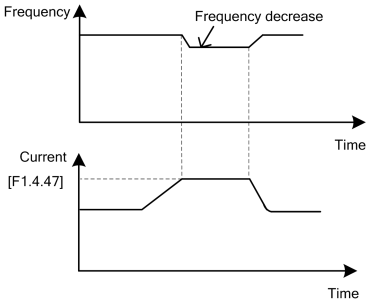


Figure 7-32-B Sketch of current-limiting adjusting and undervoltage adjusting

F1.4.47 Current limit trip level	**Setting range: 20~200%**	**Factory default: 190**
F1.4.48 Current limit trip level gain	**Setting range: 0.10~10.00**	**Factory default: 1.00**

When the output current of frequency inverter exceeds [**F1.4.47**], it may lower output frequency automatically to suppress current from further increasing, to ensure continually safe running. The bigger (F1.4.48) gain is, the stronger current suppression is. Setting value is relevant percentage of rated output current of frequency inverter.

F1.4.49 Number of auto reset attempts	**Setting range: 0~5**	**Factory default: 0**
F1.4.50 Time between auto resets	**Setting range: 0.2~100.0Sec.**	**Factory default: 1.0**
F1.4.51 Auto reset cycle time	**Setting range: 900~36000Sec.**	**Factory default: 3600**

Fault self resetting refers to that when the frequency inverter breaks down, with a period of time, fault self resetting can be operated and recover to run with starting way of speed inspection. When accumulated resetting times exceeds setting value [F1.4.49], self resetting action terminates. When self resetting time [F1.4.49] is set as zero, it means this function is banned.

Recovery waiting time of fault self resetting gets longer with resetting times: waiting time=[F1.4.50] * already reset times

Each time it passes the set parameter period [F1.4.51], or external forced fault reset, it will automatically eliminate one self resetting record.

F1.4.53 Display coefficient	**Setting range: 0.001~60.000**	**Factory default: 1.000**

It is used for correction values of monitoring parameters (d0.0.00, d0.0.01, d0.0.9, d0.0.10), to match with site parameters.

7.11 Vector running parameters (motor 1) (group f2.0)

F2.0.00~F2.0.04 Motor rated parameters	——	**Factory default: ☆**

Nameplate parameters of asynchronous motor, for ensure performance control, it must:

- Correctly set nameplate parameters;
- Power level of motor and frequency inverter shall be match with each other, generally motor only can be two levels less or one level more than frequency inverter.

Change the rated power setting (F2.0.00), it may match with later parameters automatically. Please change the settings in order.

Any one of the nameplate parameters changed, frequency inverter can set static identification of motor parameters once automatically. With motor accessed to start running, an additional static identification of parameters will be conducted prior to running (parameter FF.4.43 can shield this function).

F2.0.05 ~ F2.0.09 Motor internal parameters	—	**Factory default: ☆**

This group of parameters can be auto updated after parameter identification, generally free of necessity of setting.

F2.0.10 Slip compensation coefficient	Setting range: 0.25~2.0	Factory default: 1.00

The rotation difference compensation coefficient is used to calculate the rotational difference frequency and is effective for vector control methods.Under the SVC operating mode,the speed control static difference can be adjusted by modifying this parameter..

F2.0.11 ~ F2.0.16 Rated internal parameters of permanent magnet synchronous motor	—	Factory default: ☆

Nameplate parameters of permanent magnet synchronous motor.To ensure control performance, the nameplate parameters must be set correctly

F2.0.16 ~ F2.0.23 Internal parameters of permanent magnet synchronous motor	—	Factory default: ☆

Set F2.11-F2.16 correctly according to the motor nameplate,then start parameter identification to automatically update the remaining parameters.

F2.0.25 Overload protection setting motor1	Setting range: 50.0~131.0%	Factory default: 110.0

With dragging rated current value (parameter F2.0.02, F2.1.28) of motor, frequency inverter can automatically confirm the heat protection curve of motor. This parameter is used for setting sensitivity of heat relay protection to load motor of frequency inverter. The larger the value is, the lower the sensitivity is. Please set according to the actual load capacity of motor.

When fixed value of this parameter is 131.0%, overload protection function of motor closes.

- When a frequency inverter runs with several motors in parallel, function of heat relay protection of frequency inverter will out of action automatically. In order to protect motor efficiently, it is suggested that installation of heat protection relay in each motor.

7.12 Vector running parameters (motor 1) (group f2.0)

F2.1.26~F2.1.30 Motor rated parameters	——	Factory default: ☆

Nameplate parameters of asynchronous motor, for ensure performance control, it must:

- Correctly set nameplate parameters;
- Power level of motor and frequency inverter shall be match with each other, generally motor only can be two levels less or one level more than frequency inverter.

Change the rated power setting (F2.1.26), it may match with later parameters automatically. Please change the settings in order.

Any one of the nameplate parameters changed, frequency inverter can set static identification of motor parameters once automatically. With motor accessed to start running, an additional static identification of parameters will be conducted prior to running (parameter FF.4.43 can shield this function).

F2.1.31 ~ F2.1.35 Motor internal parameters	—	Factory default: ☆

This group of parameters can be auto updated after parameter identification, generally free of necessity of setting.

F2.1.36 Slip compensation coefficient	Setting range: 0.25~2.0	Factory default: 1.00

The rotation difference compensation coefficient is used to calculate the rotational difference frequency and is effective for vector control methods.Under the SVC operating mode,the speed control static difference can be adjusted by modifying this parameter..

F2.1.50 Overload protection setting motor1	Setting range: 50.0~131.0%	Factory default: 110.0

With dragging rated current value (parameter F2.0.02, F2.1.28) of motor, frequency inverter can automatically confirm the heat protection curve of motor. This parameter is used for setting sensitivity of heat relay protection to load motor of frequency inverter. The larger the value is, the lower the sensitivity is. Please set according to the actual load capacity of motor.

When fixed value of this parameter is 131.0%, overload protection function of motor closes.

7.13 Parameter measurement and pre-excitation (group f2.2)

F2.2.52 Excitation time for vector mode	Setting range: 0.02~2.50Sec.	Factory default: ☆

This parameter is valid with vector operation; the pre-excitation action must be conducted prior to start of motor, to build air gap flux to obtain enough starting torque. This excitation process shall be conducted after action defined of parameter F0.4.42, excitation current shall be calculated automatically as selected time. The shorter the excitation time is, the larger the current is.

F2.2.53 Motor parameter measurement	Setting range: 0, 1, 2, 3	Factory default: 0

Motor parameter measurement function must be started when vector control mode is selected (tens of F0.0.09 is set as 0 or 1).

When this function (when F2.2.53 is set as 1~3) is operated, there will be a identification operation when the frequency inverter is start. After parameter identification is over, F2.2.53 will automatically reset. Obtained motor parameters will be stored in internal storage of frequency inverter, and value of parameter F2.0.05 ~ F2.0.09 will be automatically updated.

Before identification operation, please confirm that:

- Nameplate parameter of motor (F2.0.01~F2.0.04) has been input correctly;
- The motor is in stopped condition.

0: Closed

1: Static identification

During the process of parameter measurement, motor shall be kept in stopped condition. There is no requirement for the connection relationship of motor shaft, but with lower measurement precision.

2: Static + operating parameter identification

Frequency inverter will conduct static identification previously, and then automatically start operation identification process. During operation identification process, stop order can be input to forcedly terminate identification process. It won't be eliminated of application of identification then. When restarted, identification process will be operated again.

Top operating frequency of operation identification will reach 80% of rated frequency of motor. Before identification starts, please be sure to confirm the equipment safety, and it will automatically stop operating when identification ends.

Operation identification can obtain accurate parameters, but it must be operated when the motor is complete no-load. Otherwise, unpredictable parameter value may be obtained.

3: Static + operating parameter identification + revolution ratio identification

Operation process under this setting is totally the same as that of 2, as well as identification result of motor parameters.

However, when there's no installation of PG encoder on the motor shaft, the transfer ratio of motor shaft and speed measurement shaft must be obtained to realize closed loop vector control. This setting will not only automatically identify motor parameters, but also will measure the transfer ratio of motor shaft: speed measurement shaft, and result can be stored automatically in parameter F8.0.17.

- During the process of operation identification of motor parameter, it must sure that no load of motor during the whole process, otherwise, incorrect motor parameters will be obtained.

7.14 Multifunctional input terminal (group f3.0)

F3.0.00~F3.0.05 Multifunctional input terminals DI1~DI6	**Setting range: 0~96**	——
F3.0.06 Multifunctional input terminal DI7/ standard expansion card	**Setting range: 0~96**	**Factory default: 0**
F3.0.07 Multifunctional input terminal DI8/ standard expansion card	**Setting range: 0~96**	**Factory default: 0**
F3.0.08 Multifunctional input terminal DI9/Fin/standard expansion card	**Setting range: 0~98**	**Factory default: 97**

Control terminals **DI1~DI9/Fin** are functional programmable switch input terminals; They can define the **DI1~DI9/Fin** functions respectively by way of the setup of **F3.0.00~F3.0.08** values; See their set values and relevant functions as Table 1 (Contrast Table of Multifunctional Terminals (DI/EDI/SDI) Function).

For example: Define **F3.0.00** as **23**, so the function of DI1 can be defined as "Simple **PLC** Multi-stage Operation Input"; When the DI1 terminal status validates, simple **PLC** multi-stage operation input function can be realized.

The function specifications in the table as following:

1~4: Multi-speed control terminals 1~4

By means of the **ON/OFF** status combinations of these four functional terminals, select the set frequencies relevant to **F6.0.00~F6.0.15** parameters as the current set frequencies of frequency converter. The priority of the frequency instruction is higher than frequency set channel **F0.1.16**.

Table 7-3 Multi-speed operation selection table

Multi-speed control 4	Multi-speed control 3	Multi-speed control 2	Multi-speed control 1	Frequency set
OFF	OFF	OFF	OFF	Ordinary operation frequency (F0.1.16 determined)
OFF	OFF	OFF	ON	Multi-stage operation frequency 1
OFF	OFF	ON	OFF	Multi-stage operation frequency 2
OFF	OFF	ON	ON	Multi-stage operation frequency 3
OFF	ON	OFF	OFF	Multi-stage operation frequency 4
OFF	ON	OFF	ON	Multi-stage operation frequency 5
OFF	ON	ON	OFF	Multi-stage operation frequency 6
OFF	ON	ON	ON	Multi-stage operation frequency 7
ON	OFF	OFF	OFF	Multi-stage operation frequency 8
ON	OFF	OFF	ON	Multi-stage operation frequency 9
ON	OFF	ON	OFF	Multi-stage operation frequency 10
ON	OFF	ON	ON	Multi-stage operation frequency 11
ON	ON	OFF	OFF	Multi-stage operation frequency 12
ON	ON	OFF	ON	Multi-stage operation frequency 13
ON	ON	ON	OFF	Multi-stage operation frequency 14
ON	ON	ON	ON	Multi-stage operation frequency 15

5~6: External forward/Reverse jog control

Apply to jog operation control under the external terminal control (regard **F0.3.33/F0.3.34** as 1).

7~8: FWD/ REV running command terminal

Apply to forward (FWD)/reverse (REV) running command under the external terminal control (regard **F0.3.33/F0.3.34** as 1); According to the setup of **F0.3.35**, it can jog two-line mode and three-line mode (regard another external control terminal as three-line running command function (Function No.19)).

9~10: Acceleration and deceleration time 1 and 2

By means of the acceleration and deceleration time, selecting the **ON/OFF** status combinations of terminals can realize the selection of acceleration and deceleration time 1~4 (refer to parameter specifications of **F1.0.03~F1.0.10**). If the user doesn't define this function, frequency inverter can automatically select acceleration and deceleration 1, except simple **PLC** jog. See the acceleration and deceleration time selection as following table.

Table 7-4 Contrast table of acceleration and deceleration time selection

Acceleration and deceleration time selection 2	Acceleration and deceleration time selection 1	Acceleration and deceleration time
OFF	OFF	Acceleration time 1/Deceleration time 1
OFF	ON	Acceleration time 2/Deceleration time 2
ON	OFF	Acceleration time 3/Deceleration time 3
ON	ON	Acceleration time 4/Deceleration time 4

11: Running command switching

This function is applied to switch running command of frequency inverter between control command 1 and control command 2. See the running command switching status as following table:

Table 7-5 Contrast table of jog command switching

Terminal status	Running command of frequency inverter
ON	Running command 2
OFF	Running command 1

12: Frequency command switching

This function is applied to switch frequency setting source of frequency inverter between frequency setting source 1 and frequency setting source 2. See the frequency command switching status as following table:

Table 7-6 Contrast table of frequency command switching

Terminal status	Frequency setting source of frequency inverter
ON	Frequency setting source 2
OFF	Frequency setting source 1

13: Fault resetting input (RESET)

Once frequency inverter occurs to fault alarm, reset it through external terminals and be valid to input rising edge; the function is coincident to operation board's **STOP/RESET** buttons'.

14: Emergency stop (EMS)

Whatever status frequency inverter operates, if the functional terminal is effective, frequency inverter stops in terms of set emergency stop mode (**F0.4.54**) and starts to operate with rising edge of running command.

15~16: Frequency or Process PID set value ascending (UP)/descending (DW)

DL500 frequency inverter can achieve the setup of operation frequency via external terminal and long-distance frequency set operation. If the terminal is effective, set frequency increases progressively or decreases progressively in the light of set speed; if the terminal is ineffective, set frequency keeps same. If both terminals are effective, set frequencies keep same. See 4~8 parameter functional specifications of **F0.2.25** or **F0.2.26**.

17: UP/DW set frequency zero clearing

Set frequency of external terminal can be cleared to zero through the functional terminal (set frequencies of frequency increasing progressively command **UP**/decreasing progressively command **DW**). The function invalidates frequencies set by other frequencies setting modes.

18: External equipment fault

Inputting external equipment fault signal through the terminal is easy for frequency inverter to fault supervision and communication to external equipment. Since frequency converter receives external equipment fault, displaying "**Fu.017**" is the external equipment fault and making a stop forcefully.

19: Three wire running control

When select the three-line running mode under the external terminal control (regard F0.3.33/F0.3.34 as 1), define three wire running control for input terminal. See Three wire Mode Introduction (regard F0.3.35 as 2 or 3).

20: Stop DC braking command

When frequency inverter is in the process of deceleration stop and running frequency is lower to straight flow brake or brake starting frequency or speed, the function is effective. When the terminal status is effective, execute DC brake; Only when the

terminal status is ineffective, DC brake can be stopped. When operate this function, DC braking functional time F0.4.46 is ineffective.

21: Acceleration and deceleration forbidden

When the terminal is effective, suspend acceleration and deceleration forbidden and frequency inverter keeps current frequency operation as the acceleration and deceleration achieves; if the terminal is ineffective, execute ordinary acceleration and deceleration command.

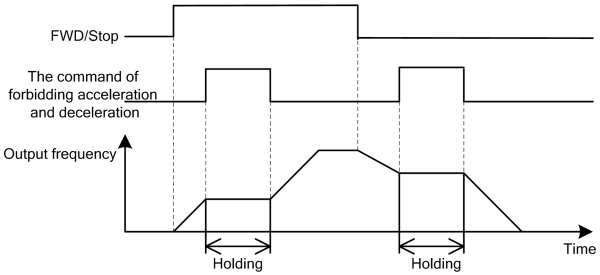


Figure 7-33 Sketch of acceleration and deceleration forbidden

22: Process PID effective

When selecting the multifunctional input terminals in the process PID, the function can achieve process PID's input and cutting off.

23: Simple PLC multi-stage running effective

When select the multi-stage frequencies or rotation running condition input in the programmable multi-stage speed operation mode (regard F6.1.15 as ###2), the functional terminal can achieve simple PLC multi-stage running's input and cutting off.

24: Swing frequency running effective

If swing frequency running selects effective terminal (set F6.2.46 as ###2), the functional terminal can input and cut off swing frequency running.

If terminal status is effective, frequency converter runs swing frequency. If terminal status is ineffective, frequency inverter can accelerate and decelerate into swing frequency preset frequency [F6.2.47] for running according to effective acceleration and deceleration time (regard acquiescent value as acceleration and deceleration time 1).

25: Compensation PID effective

When the function of compensation PID is activated from external effective terminal selection (regard F9.0.00 as _ _ _ 2), the functional terminal can input and cut off the function of compensation PID.

26: Simple PLC multi-stage running status (when stopping) resetting

Simple PLC multi-stage running status when stopping can select the automatic memorized ([F6.1.15] = _ 1_ _ / _ 2_ _). The functional terminal can reset the automatic memorized status forcefully.

27: Swing frequency status resetting (effective when stopping)

If the swing frequency's current running status is ([F6.2.46] = _ _ 0 _) when swing frequency operation selects automatic memory stop, the functional terminal can reset the status of swing frequency forcefully.

28~30: Process PID multi-stage given terminals 1~3

Using **ON/OFF** status combinations of multi-stage process PID given terminals 1~3 can achieve multi-stage process PID given terminals selection as following table.

Table 7-7 Contrast table of multi-stage process PID given terminals selection

Multi-stage process PID given terminal 3	Multi-stage process PID given terminal 2	Multi-stage process PID given terminal 1	Process PID multi-stage given selection
OFF	OFF	OFF	Ordinary process PID given (determined by F7.0.01)
OFF	OFF	ON	Process PID multi-stage given 1
OFF	ON	OFF	Process PID multi-stage given 2
OFF	ON	ON	Process PID multi-stage given 3
ON	OFF	OFF	Process PID multi-stage given 4
ON	OFF	ON	Process PID multi-stage given 5
ON	ON	OFF	Process PID multi-stage given 6
ON	ON	ON	Process PID multi-stage given 7

31: Process PID setting selection (switching)

The functional terminal is applied to switch process PID setting of frequency inverter between process PID setting 1 and process PID setting 2. See process PID setting switching status as following table:

Table 7-8 Contrast table of process PID setting switching status

Terminal status	Process PID setting of frequency inverter
ON	Process PID setting 2
OFF	Process PID setting 1

32: Process PID feedback selection (switching)

This functional terminal is applied to switch Process PID feedback of frequency inverter between process PID setting 1 and process PID setting 2. See process PID switching status as following table:

Table 7-9 Contrast table of process PID feedback switching status

Terminal status	Process PID feedback of frequency inverter
ON	Process PID feedback 2
OFF	Process PID feedback 1

33: Process PID sleep activation

When the sleep function is activated by multifunctional input terminals (set F7.2.34 as 2), the functional terminal can activate process PID sleep function.

34: Torque/speed control mode switching

The functional terminal is applied to switch closed loop control mode of frequency inverter between torque control and speed control. See the closed loop control mode of frequency inverter as following table:

Table 7-10 contrast table of closed loop control mode of frequency inverter

Terminal status	Closed loop control mode of frequency inverter
ON	Torque control mode
OFF	Speed control mode

35: Minimum torque limiting set value selection

This function is applied to switch minimum torque limiting set value of frequency inverter (negative torque limiting) between minimum torque limiting 1 and minimum torque limiting 2. See switching status as following table:

Table 7-11 Minimum torque limiting selection contrast table of frequency inverter

Terminal status	Minimum torque limiting set value of frequency inverter
ON	Minimum torque limiting 2
OFF	Minimum torque limiting 1

36: Maximum torque limiting set value selection

This function is applied to switch maximum torque limiting set value of frequency inverter between maximum torque limiting 1 and maximum torque limiting 2. See switching status as following table:

Table 7-12 Maximum torque limiting selection contrast table of frequency inverter

Terminal status	Maximum torque limiting set value of frequency inverter
ON	Maximum torque limiting 2
OFF	Maximum torque limiting 1

40: RS485 external/Standard operation panel switching

When two operation panels are inserted to frequency inverter at the same time, one is for master control panel switching, and the other is only for monitoring, and the order cannot be inputted in.

Table 7-13 Control command channel switching and selecting table for frequency inverter

Terminal state	Control command channel of frequency inverter
ON	RS485 external panel
OFF	Standard operation panel

42: Start permission

When parameter F0.4.37 is set as ###1or ###2, the function terminal is valid.

43: Running permission

When parameter F0.4.37 is set as #1## or #2##, the function terminal is valid.

44~45: Counter clock terminal

This function terminal is used for counter clock inputting.

46~47: Counter trigger signal

This terminal is used as counter trigger end.

48~49: Counter resetting terminal

This terminal is used for counter resetting signal inputting.

50~51: Counter auto control signal

This terminal is used for counter gated signal inputting.

52~54: Timer trigger signal

This terminal is used as timer trigger end.

55~57: Timer resetting

This terminal is used for timer resetting signal inputting.

58~60: Timer gated signal

This terminal is used for timer gated signal inputting.

61: Single pulse accumulative length value

This terminal is used for single pulse accumulative length value resetting.

62: Motor temperature detection contact input

When thermo switch is used as the external temperature transmitter (see parameter F5.4.43 specification), this terminal is used for external thermo switch inputting.

63~64: Compensation PID parameter selection

When [F9.1.21] = # # 3 3, this terminal is used for controller parameter of compensation PID selecting.

Table 7-14 Parameter selecting table for compensation PID

Compensation PID parameter selection 2	Compensation PID parameter selection 1	PID effective parameter group
OFF	OFF	Group 1 (F9.0.03~F9.0.07)
OFF	ON	Group 2 (F9.1.29~F9.1.33)
ON	OFF	Group 3 (F9.1.34~F9.1.38)
ON	ON	Group 4 (F9.1.39~F9.1.43)

65: Magnetic flux brake effective

It is applied to magnetic flux brake function input and removal during the deceleration halt process.

66: Position pulse counting resetting

Adjust the position pulse counting to zero, which is used for position origin preset default counting.

67: Automatic shifting jog

It is the machinery shifting dedicated function of the spindle or machinery variable speed gear. When this function is invalid, frequency drive system will operate both sides alternatively at certain period or revolving speed/moment of force so as to achieve the machinery shifting, avoiding the dead(relative function parameter: Fb.2.18, Fb.2.19).

68: Servo pulse command direction

This function is valid when pulse input port (DI9//Fin) is used as servo command pulse, and representative pulse direction is: invalid is positive (add plus), valid is negative (minus pulse).

69: Servo control effective

Switching terminal of servo control and moment of force control (relative function parameter Fb.2.23).

70: Spindle positioning origin photoelectric signal input

When reference signal of spindle positioning origin is photoelectric switch positioning (parameter Fb.2.36), this signal stands for spindle origin.

71: Spindle origin homing

When this function is valid, spindle auto positions to origin position to maintain the moment of force, and after the signal is cancelled, there is no moment of force output.

72: Spindle positioning selection 1

73: Spindle positioning selection 2

74: Spindle positioning selection 3

When the spindle positioning command selects external terminal selecting source(relative function parameter Fb.2.36), these multi-function terminal are used for spindle positioning angle selecting, when the following groups are valid, the spindle positions to the assigned angle and maintains the moment of force. When these terminals are invalid, there is no moment of force output.

Table 7-15 Selecting table for spindle positioning angle

Spindle positioning selection 3	Spindle positioning selection 2	Spindle positioning selection 1	Positioning angle values
OFF	OFF	OFF	Common operation
OFF	OFF	ON	Positioning angle1 (Fb.2.38)
OFF	ON	OFF	Positioning angle 2 (Fb.2.39)
OFF	ON	ON	Positioning angle 3 (Fb.2.40)
ON	OFF	OFF	Positioning angle 4 (Fb.2.41)
ON	OFF	ON	Positioning angle 5 (Fb.2.42)
ON	ON	OFF	Positioning angle 6 (Fb.2.43)
ON	ON	ON	Positioning angle 7 (Fb.2.44)

75: Position gain selection

Position gain of servo control or spindle positioning selecting.

76: Reserved

77: Servo command pulse value zero clearing

78~96: Reservation function

97: Pulse input (0.1~100.00 KHz)

This function is applied to multi-function input terminal DI9/Fin (F3.0.08), and 0.10~100.00 KHz signal can be received effectively.

98: Pulse input

This function is applied to multi-function input terminal DI9/Fin (F3.0.08) and 1.0~1000.0 KHz low frequency signal can be received effectively.

F3.0.09 Multifunctional terminal filtering time (DI1~DI5)	**Setting range: 1~50ms**	**Factory default: 5**
F3.0.10 Multifunctional terminal filtering time (DI6~DI9) /standard expansion card	**Setting range: 1~50ms**	**Factory default: 5**

Set the filtering time of the input terminal detection. When state of the input terminal changes, if it remains the same even after the filtering time setting, the terminal state change is effective, or otherwise it will remains the former state, thus the interference triggered false operation can be reduced.

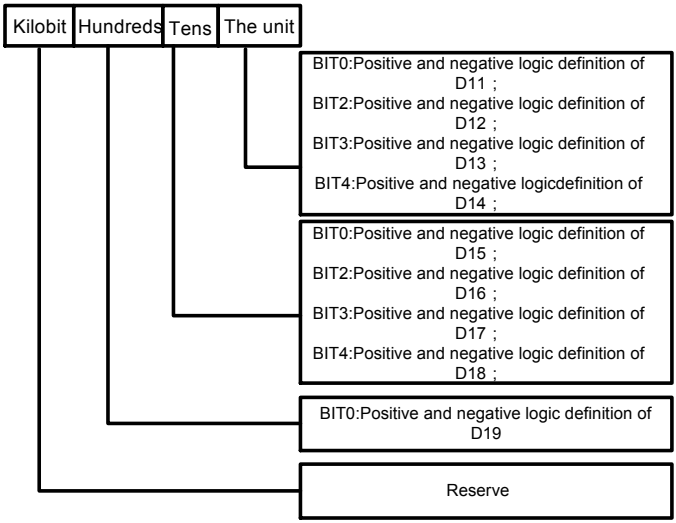
F3.0.11 Input terminal effective level (H)	**Setting range: 0000~0FFF**	**Factory default: 0000**

Define the positive and negative logic of the input terminal.

Positive logic: When DIx terminal and common port COM are connected, it is valid, or otherwise it is invalid.

Negative logic: When DIx terminal and common port COM are disconnected, it is valid, or otherwise it is invalid.

Bit place as 0 represents the positive logic; 1 represents negative logic.



Determination methods of parameter setting value are shown as following:

Table 7-16 Correspondence between Binary Number Setting and Digital Show Value

Binary number setting				Hexadecimal(digital show value)
BIT3	BIT2	BIT1	BIT0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	A
1	0	1	1	b
1	1	0	0	C
1	1	0	1	d
1	1	1	0	E
1	1	1	1	F

7.15 Multifunctional output terminal (group f3.1)

F3.1.12 Multifunctional output DO1	**Setting range: 0~71**	**Factory default: 1**
F3.1.13 Multifunctional output DO2	**Setting range: 0~71**	**Factory default: 2**
F3.1.14 Multifunctional output DO3/ Fout/standard expansion card	**Setting range: 0~71**	**Factory default: 63**
F3.1.21 Multifunctional relay output (RO1A/B/C)	**Setting range: 0~71**	**Factory default: 4**
F3.1.22 Multifunctional relay output (RO2A/B/C)/standard expansion card	**Setting range: 0~71**	**Factory default: 5**

The control terminal D01-D03 is the on-off output terminal with programmable function, and its functions can be defined by set values of F3.1.12-F3.1.14; Functions of output RO1and RO2 of relay, on-off output terminal with programmable function, can be defined by set values of F3.1.21 and F3.1.22. Please refer to the attached list for their set values and corresponding functions (Reference table of variables of multi-function output terminal (DO/EDO/SDO).

1: Inverter running ready

When inverter is in normal running ready state, terminal will output effective signal/relay will pull in (connection of TA and TC).

2: Inverter is running

When inverter is in running state, terminal will output effective signal/relay will pull in.

3: Equipment normal

When inverter is fault free, and DC busbar voltage is normal, terminal will effectively indicate signal/relay will pull in.

4: Equipment fault

When inverter goes wrong and sends fault signal, terminal will output effective signal/relay will pull in.

5: Equipment alarm

When there is exception of inverter and sending warning signal, terminal will output effective signal/relay will pull in.

6: Equipment fault or alarm

When there is fault for exception of inverter and sending fault or warning signal, terminal will output effective signal/relay will pull in.

7: Reverse running

When electric motor rotates reversely, the terminal will output the valid signal/relay will pull in.

8: Running command valid

When running instruction of inverter is valid, the terminal will output the valid signal/relay will operate.

9: Running at zero speed

When running instruction is valid but output frequency of inverter is at zero and there is current output, terminal will output effective signal/relay will pull in.

10: Speed not at zero

When the speed of rotator of electric motor is not at zero (VC mode) or output frequency is not at zero (VF or SVC mode), terminal will output the valid signal/relay will pull in.

11: Inverter undervoltage stop

When inverter is in under-voltage stop and reporting Fu.008, the terminal will output the valid signal/relay will pull in.

12: Terminal control effective

When control command of frequency converter is given not on panel, terminal will output the valid signal/relay will pull in.

14: Running at power generating status (braking)

When inverter is in regenerative braking running state, terminal will output the valid signal/relay will pull in.

19: Completion of current stage of multi-stage running (0.5s pulse)

After completion of current stage of multi-stage running, terminal will output the valid pulse signal with 0.5s width/relay will disconnect after pulling in for 0.5s.

20: Multi-stage running completed (0.5s pulse)

After completion of one cycle of multi-stage speed running, terminal will output the valid impulse signal with 0.5s width/relay will disconnect after pulling in for 0.5s.

21: Multi-stage running completed (continuous level output)

After completion of one cycle of multi-stage speed running, terminal will output continuous valid signal/relay will pull in.

22: Multi-stage running cycle completed (0.5s pulse)

After completion of one cycle of multi-stage speed running, terminal will output effective impulse signal with 0.5s width/relay will disconnect after pulling in for 0.5s.

23: Swing frequency upper and lower limit

After selection of wobbulation, if the frequency fluctuation range of wobbulation, which calculated based on center frequency, is above upper limit frequency F0.1.21 or below lower limit frequency F0.1.22, then terminal will output effective signal/relay will pull in.

24: Encoder direction

It is used to indicate the directional signal output by current encoder frequency division.

26/29/32: Monitoring parameters 1/2/3 below the lower limit

When monitoring parameters 1/2/3 are below the lower limit values, terminal will output the valid signal/relay will pull in, which keeps until monitoring parameters 1/2/3 are above the upper limit values, then output the invalid signal/relay disconnects (as shown in Figure 7-34-A).

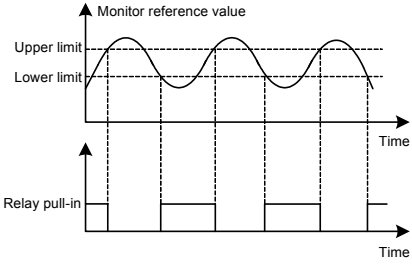


Figure 7-34-A Monitor functional sketch 1

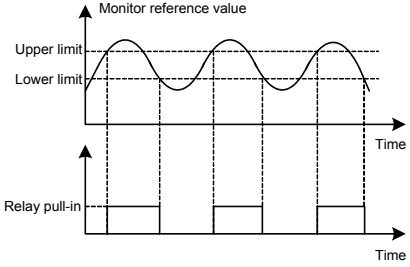


Figure 7-34-B Monitor functional sketch 2

27/30/33: Monitoring parameters 1/2/3 above the lower limit

When monitoring parameters 1/2/3 are above the upper limit values, terminal will output effective signal/relay will pull in, which keeps until monitoring parameters 1/2/3 are below the lower limit values, then output ineffective signal/relay disconnects (as shown in Figure 7-34-A)

28/31/34: Monitoring parameters 1/2/3 between the upper limit and the lower limit

When monitoring parameters 1/2/3 are between upper and lower limit values (including equal to upper and lower limit values), the terminal will output the indicator signal/relay will pull in.

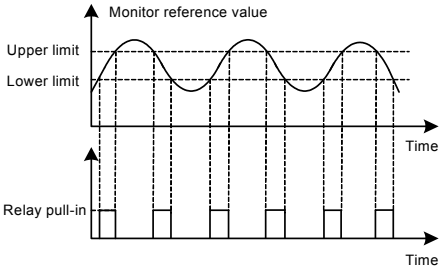


Figure 7-34-C Functional sketch 3 of monitor

36~38: Analog input AI1 wire-break detection effective

When inverter detects wire-break of analog input, it will choose to make corresponding operation according to operation after wire-break; Meanwhile terminal will output effective signal/relay will pull in.

40~43: Counter output signal

When counting of counter reaches to setting value, terminal will output effective signal/relay will pull in. Please refer to function specifications for F5.2.20~F5.2.27 parameters

44~49: Timer output signal

When comparative value /periodic value of timer reaches to setting value, terminal will output effective signal/relay will pull in. Please refer to function specifications for **F5.1.06 ~ F5.1.19** parameters

55~62: Status of multifunctional input terminal

If D10~D18 terminals are effective, terminal will output effective signal/relay will pull in.

63: DO3/Fout terminal as the frequency output terminal

As frequency output terminal, frequency range of signal output by D03/ Fout: 0.07-100.0KHz.

64~71: Please refer to chapter six"chart2：Variable table of multi-function output terminal（DO/EDO/SDO）"

F3.1.15~F3.1.20 DO1~DO3 delay time for switching signal output ON and OFF	**Setting range: 0.01~10.00Sec.**	**Factory default: 0.0**
F3.1.23~F3.1.26 RO1/RO2 delay time for switching ON/OFF	**Setting range: 0.01~10.00Sec.**	**Factory default: 0.0**

This group of parameters are used to define multi-function output terminal DO1~DO3 and time delay of change for signal state output by multi-function relay RO1/RO2. When signal output by multi-function terminal and pulled in by relay is effective, terminal will output indicator signal, and relay will pull in(connection of TA and TC) after delay time set by parameters F3.1.15~F3.1.20, F3.1.23~F3.1.26.

F3.1.27~F3.1.29 Input variables of monitor 1~3	**Setting range: 0~44**	**Factory default: 0~2**

Different state parameters can be monitored by setting the values of F3.1.27~F3.1.29.

F3.1.30~F3.1.35 Upper and lower limit of monitor 1~3 variables	**Setting range: 0.0~100.0%**	**Factory default: 0.0/100.0**

This group of parameters restricts the range of monitoring parameter variables, of which the set values are relative to the percentages of full monitoring variable output.

7.16 Pulse input (group f3.2)

F3.2.36 Min pulse input frequency DI9/Fin	**Setting range: 0.0~100.00KHz**	**Factory default: 0.0**
F3.2.37 Max pulse input frequencyDI9/Fin	**Setting range: 0.01~100.00KHz**	**Factory default: 10.0**
F3.2.38 Pulse detection cycle	**Setting range: 1~20ms**	**Factory default: 10**

This group of parameters defines multi-function input terminal **DI9/Fin** as frequency range and detection cycle of external pulse signal for pulse input (**F3.0.08** is set as 97-99), effective breadth of external pulse signal is 5-30V.

F3.2.39 Encoder pulse single channel	**Setting range: 1~4096**	**Factory default: 1024**

When input frequency signal of **DI9/Fin** terminal is used for length accumulation or speed measurement, these parameters are used to set pulse signal quantity for each rotation of encoder.

F3.2.40 Mechanical transmission ratio	**Setting range: 0.010~10.000**	**Factory default: 1.000**
F3.2.41 Driving wheel diameter (for liner speed calculation)	**Setting range: 0.1~2000.0mm**	**Factory default: 100.0**

This group of parameters is used for linear speed calculation or length accumulation.

Mechanical drive ratio=rotating speed of pulse speed measuring shaft: Rotating speed of motor shaft

F3.2.42 Max length count value	**Setting range: 10m~50000m**	**Factory default: 50000**
F3.2.43 Max liner speed	**Setting range: 0.01~500.00**	**Factory default: 10.00**

When reach or exceed limit maximum accumulative length or linear speed, warning signal can be output through multi-function output signal DOx.

F3.2.44 Current length count value	**Setting range: 0~50000m**	**Factory default: ——**
F3.2.45 Current liner speed	**Setting range: 0.0~500.00**	**Factory default: ——**

Parameters in read-only state are used to display calculated results of current length and linear speed.

7.17 Pulse output (group f3.3)

F3.3.46 Type of output pulse signal DO3/Fout	**Setting range: 0, 1, 2**	**Factory default: 0**

0: Frequency signal (0.25-100.00KHz)

1: Frequency signal

2: Pulse width modulation (PWM) signal

In setting 2, the fault frequency range is 0.25 ~100.00KHz, modulation frequency is set by maximum pulse with outputting frequency parameter **F3.3.48**, which can be used to expand AO port.

F3.3.47 Min pulse output frequency DO3/Fout	**Setting range: 0.25~100.00KHz**	**Factory default: 0.25**
F3.3.48 Max pulse output frequency DO3/Fout	**Setting range: 0.25~100.00KHz**	**Factory default: 10.0**

When this group of parameters define multi-function output terminal **DO3/Fout** as pulse output (Function No. 63), its frequency range of output pulse, category settings of pulse signal output, and output frequency range are different.

F3.3.50 Lower of limit DO3/Fout	**Setting range: 0.0~[F3.3.51]**	**Factory default: 0.0**
F3.3.51 Upper of limit DO3/Fout	**Setting range: [F3.3.51]~100.0%**	**Factory default: 100.0**

This group of parameters can determine the corresponding relationship between maximum, minimum frequency and pulse output mapping variables, while the set values are the percentages of full pulse output mapping variables.

Corresponding relationship between the two is as shown in Figure 7-35:

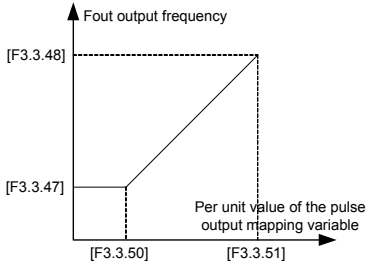


Figure 7-35 Characteristic curve of pulse output fount

7.18 Analog input (group f4.0)

F4.0.00~F4.0.05 Minimum and maximum values of analog input AI1~AI3	——	——

This group of parameters is used to define the setting range of analog input signal, which need to be set according to actual situation of access signal.

AI1 analog input port is unipolar voltage signal; AI2 analog input port is unipolar current signal; AI3 analog input signal is bipolar voltage signal.

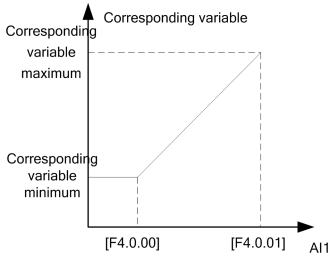


Figure 7-36-A Sketch of AI1 analog input and corresponding variables (unipolarity)

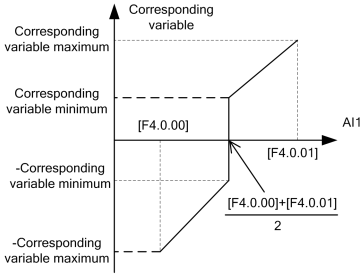


Figure 7-36-B Sketch of AI1 analog input and corresponding variables (biolarity)

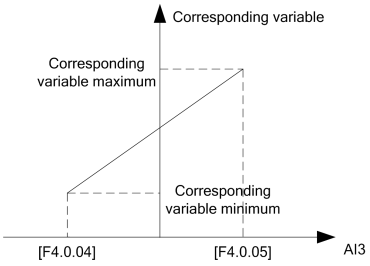


Figure 7-37-A Sketch of AI3 analog input and corresponding variables (unipolarity)

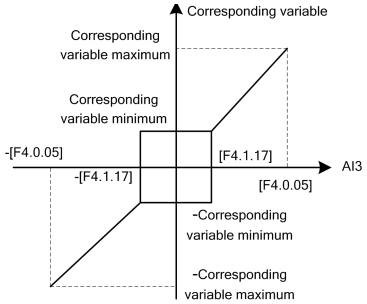


Figure 7-37-B Sketch of AI3 analog input and corresponding variables (bipolarity)

- When the unipolar input signal AI1 and AI2 are applied as bipolar signal, if input signal breaks and input value is maximum reserve setting, it may be dangerous to human and property safety. Please use in combination with broken-line fault detection function of analog input port.

F4.0.06~F4.0.08 Filtering time constant AI1~AI3	Setting range: 1~1000ms	Factory default: 10

Carry out filtering treatment to external analog input quantity to effectively eliminate interference signal. Filtering time constant (time needed for given signal rising to **63**% of stable value) should be set properly according to fluctuation range of external input signal, if set it too high, anti-interference capacity will be strong while delaying the speed of response to setting signal.

7.19 Analog input curve correction (group f4.1)

F4.1.09~F4.1.21 Analog input AI1~AI31 curve correction point/value 1~3	——	——

This group of parameters is used to conduct nonlinear correction to analog input value as required. Curve correction of analog input AI1 is as shown in figure #-##, while the curve correction methods of AI2 and AI3 are similar to analog input AI1.

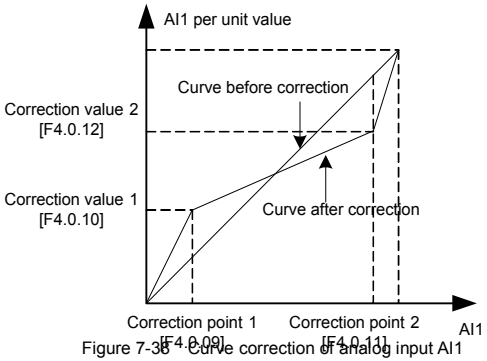


Figure 7-38 Curve correction of analog input AI1

F4.1.17 AI3 hysteresis band dead zone	**Setting range: 0.00~2.00**	**Factory default: 0.10**

Set hysteresis width of middle point between maximum value and minimum value of AI3, when it is applied as bipolar signal, forward and reverse fluctuation of zero setting value will be frequent as shown in Figure 7-38. It should be set as 0 when applied as unipolar signal.

7.20 Analog output (group f4.2)

F4.2.22 AO1 function selection	**Setting range: 0~45**	**Factory default: 0**
F4.2.23 AO2 function selection/ standard expansion card	**Setting range: 0~45**	**Factory default: 2**

Multifunction analog output AO1, AO2 can output voltage signal of 0~10V or current signal of 1~20mA, selected by the dial switch on the control board. Frequency inverter status represented by the analog output signal is set by this group of parameters. Please see Appendix 3 (comparison table of status variable).

F4.2.24 AO1 min value	**Setting range: 0.00~10.00V**	**Factory default: 0.0**
F4.2.25 AO1 maxi value	**Setting range: 0.00~10.00V**	**Factory default: 10.00**
F4.2.30 AO2 min value/standard expansion card	**Setting range: 0.00~10.00V**	**Factory default: 0.0**
F4.2.31 AO2 max value/standard expansion card	**Setting range: 0.00~10.00V**	**Factory default: 10.00**

This group of parameters defines the maximum and minimum of multifunction analog output AO1, AO2 allowed to output.

F4.2.26 AO1 lower limit scaling	**Setting range: 0.0~[F4.2.27]**	**Factory default: 0.0**

F4.2.27 AO1 upper limit scaling	**Setting range: [F4.2.26]~100.0%**	**Factory default: 100.0**
F4.2.32 AO2 lower limit sacling /standard expansion card	**Setting range: 0.0~[F4.2.33]**	**Factory default: 0.0**
F4.2.33 AO2 upper limit scaling /standard expansion card	**Setting range: [F4.2.32]~100.0%**	**Factory default: 100.0**

Corresponding relationship between maximum and minimum of **AO1**, **AO2** output given by this group of parameters and mapping variable (see figure below), whose set value is the percentage relevant to the full output of mapping variable of **AO1**, **AO2**.

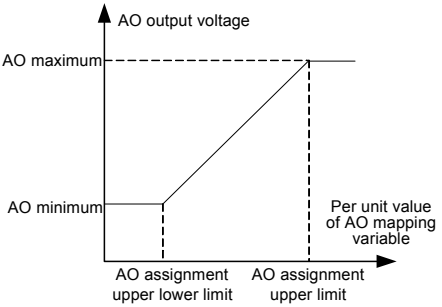


Figure 7-39 AO output characteristic curve

F4.2.28 AO1 filtering time constant	**Setting range: 0.01~10.00Sec.**	**Factory default: 0.10**
F4.2.34 AO2 filtering time constant/standard expansion card	**Setting range: 0.01~10.00Sec.**	**Factory default: 0.10**

This group of parameters is used to set the filtering time coefficient of **AOI**, **AO2** analog output signal, according to selection of requirements of the rapidity and wave character of signal. The larger the time coefficient is, the smoother the output signal is, and the slower the response is.

F4.2.29 AO1 output signal selection	**Setting range: 0.00~20.00mA (0.00~10.00V)**	**Factory default: 0.0**
F4.2.35 AO2 output signal selection/standard expansion card	**Setting range: 0.00~20.00mA (0.00~10.00V)**	**Factory default: 0.0**

When the mapping variable of multifunction analog output **AO1**, **AO2** is a fixed value (**F4.02.22, F4.2.23** is set as 24), fixed value of **AO1** output is [**F4.2.29**], and the fixed value of **AO2** output is [**F4.2.35**], which can output voltage and current signal.

7.21 Analog input wire-break detection (group f4.3)

On condition that break detection function of analog input is valid, when the value of **AI1**, **AI2** and **AI3** analog input is within the range of detection threshold level, when the frequency inverter passes the action of break detection delay, conduct corresponding action according to the selected setting after the wire-break action.

F4.3.39 Action selection after AI1 wire-break	**Setting range: 0~4**	**Factory default: 0**
F4.3.43 Action selection after AI2 wire-break	**Setting range: 0~4**	**Factory default: 0**
F4.3.48 Action selection after AI3 wire-break	**Setting range: 0~4**	**Factory default: 0**

Define corresponding actions after frequency inverter detects analog input wire-breakage.

0: No action (for non-stop alarm)

When detecting analog input wire-break, if the frequency inverter operates normally, it only reports aL.036-aL.038 warning signal. If the wire-break fault is cleared, the warning signal can be cleared automatically.

1: Forcedly set to the minimum

When detecting analog input wire-break, if the frequency inverter operates normally, it reports aL.036-aL.038 warning signal. Meanwhile, forcedly set the analog input signal to the minimum of analog input. If the wire- break fault is cleared, the warning signal can be cleared automatically, meanwhile, the analog input signal recovers to input value.

2: Forcedly set to the maximum

When detecting analog input wire-break, if the frequency inverter operates normally, it reports aL.036-aL.038 warning signal. Meanwhile, forcedly set the analog input signal to the maximum of analog input. If the wire- break fault is cleared, the warning signal can be cleared automatically, meanwhile, the analog input signal recovers to input value.

3: Forcedly set to the default value

When detecting analog input wire-break, if the frequency inverter operates normally, it reports aL.036-aL.038 warning signal. Meanwhile, forcedly set the analog input signal to the default input value of analog input. If the wire-break fault is cleared, the warning signal can be cleared automatically, meanwhile, the analog input signal recovers to input value.

4: Inverter forced trip stop

When detecting analog input wire-break, it reports aL.036 - aL.038 fault signal and lock output, and load motor freely sliding down. If the wire-break fault is cleared, fault signal shall be cleared with hand-reset.

7.22 HOPPING FREQUENCY (GROUP F5.0)

Hopping frequency function makes the output frequency of frequency inverter to avoid the mechanical resonant frequency point of machine loaded.

Setting frequency of frequency inverter can operate with hopping frequency near some frequency point as the method in the figure below, with **3** hopping ranges defined at most.

After hopping frequency parameters are set, even the setting frequency of frequency inverter is within the mechanical resonant frequency band of driving system; Output frequency of frequency inverter will still adjust out of the mechanical resonant band, operating with lower limiting value of the hopping range of this hopping frequency.

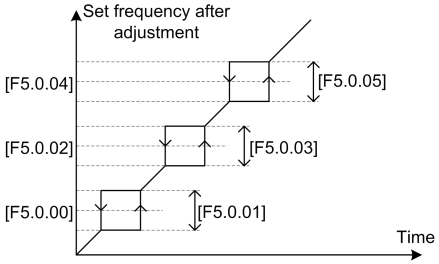


Figure 7-40 Schematic diagram of hopping frequency output

7.23 Built-in auxiliary timer (group f5.1)

This group of parameters is mainly instructed by taking example of timer 1.

7.23.1 Basic functions of the timer

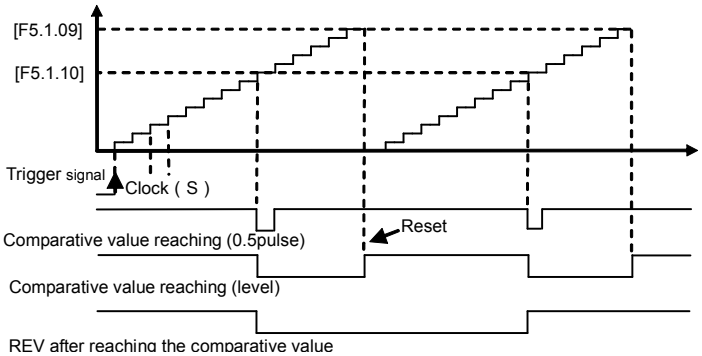


Figure 7-41-A Schematic diagram of comparison value of timer 1 reaching for the basic function (F5.1.06=11#1)

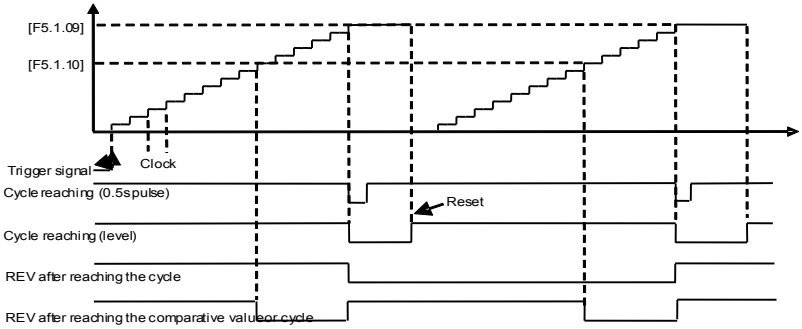


Figure 7-41-B Schematic diagram of comparison value of timer 1 reaching for the basic function (F5.1.06=10#1)

7.23.2 Trigger and gate control function setting of timer

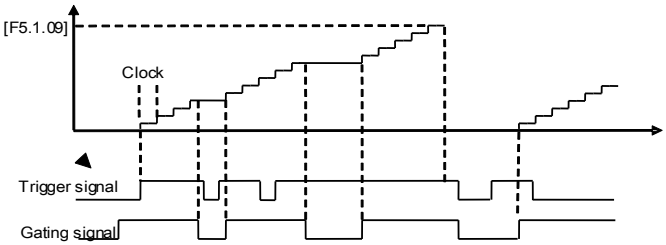


Figure 7-41-C Starting trigger and gate control signal function of timer 1 (UT1) (F5.1.06=1111; F5.1.15=0001)

7.23.3 Clock concatenation function setting of timer

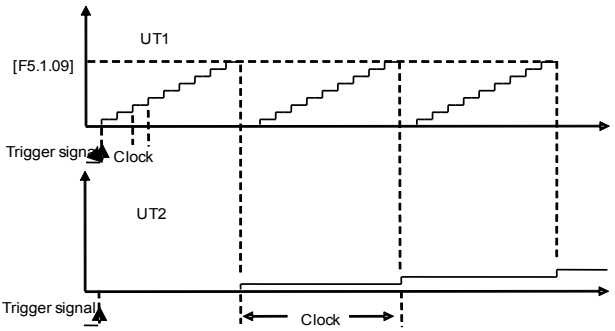


Figure 7-41-D Pulse concatenation function of timer 1(UT1) (F5.1.06=10#1; F5.1.07=###3)

7.23.4 Concatenation trigger function setting of timer

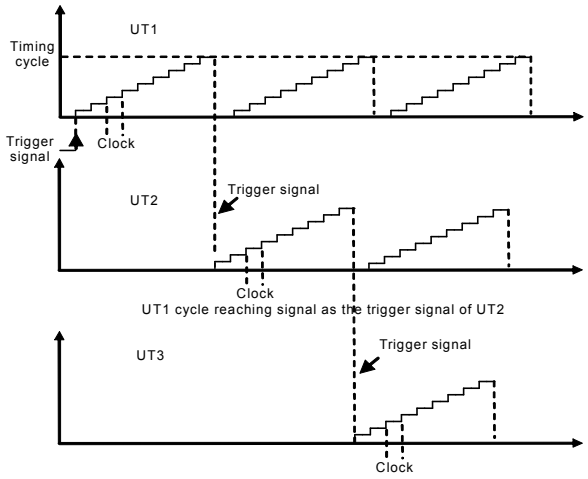


Figure 7-41-E Concatenation trigger function setting of timer (UT1, UT2, UT3)

7.24 Built-in auxiliary counter (group f5.2)

Similar to the function of timer, the counter is designed for external clock (unknown frequency variable), and timer is designed for the internal clock (known and determined frequency). With the terminal function of analog input output, it can transfer the counter into the function of timer.

Differences: Counter will continue to count upwards without reset, and start from 0 on until overflew.

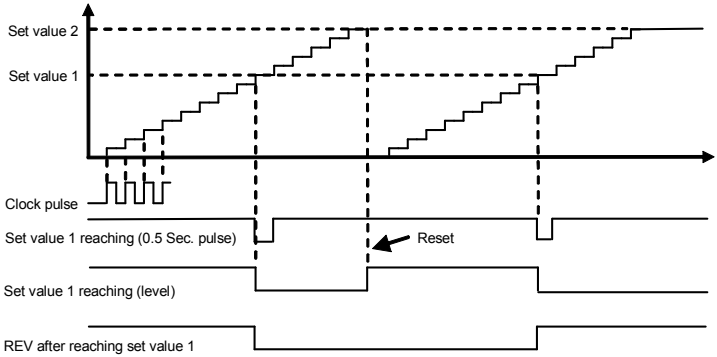


Figure 7-42-A Counter function 1

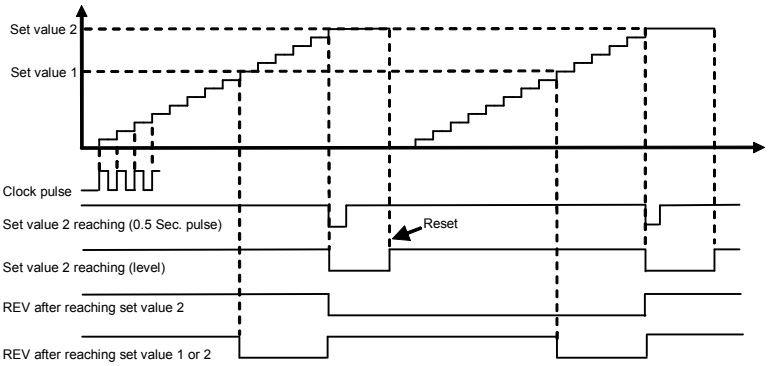


Figure 7-42-B Counter function 2

7.25 Auxiliary functions (group f5.3)

F5.3.28 Priority selection of frequency (revolution) command source	Setting range: 0000~7777	Factory default: 0000

This parameter is used to define the priority order of (revolving speed) instructions source of given frequency. When the setting channel with higher priority is invalid, frequency set value of frequency inverter will automatically set value with the frequency of next top priority.

Table 7-17 Frequency Setting Order of DL500 Frequency Inverter:

Priority	Setting	Remarks
1	Inching frequency setting	Top priority
2	Torque control method	In case of torque control method, frequency setting is invalid
3	Priority defined by this parameter (four at most)	Priority defined by this parameter shall be deleted from the list of lower priority automatically
4	process PID output	high ↑ low
5	Swing frequency Operating frequency	
6	compensation PID output	
7	Revolving speed setting channel (F8.0.00)	
8	Automatic multiple frequency operating order	
9	Multiple operating frequency of external terminal selection	
10	Frequency setting channel (F0.1.16)	Lowest priority

F5.3.29 Lower limiting frequency action mode	Setting range: 0, 1	Factory default: 0

0: Output zero frequency when it is below the lower limiting frequency

If the value is less than the lower limiting frequency, the output of the inverter frequency is zero.

1: Output the lower limiting frequency when it is below the lower limiting frequency

If the value is less than the lower limiting frequency, the output of the inverter frequency is the lower limiting frequency.

F5.3.30 Automatic voltage regulation(only effective in V/F mode)	Setting range: 0, 1, 2	Factory default: 0

This parameter applies to the situation that frequency inverter operates with **V/F** mode, forcedly operate with VC, SVC modes. Automatic voltage regulation function is used for ensuring the output voltage of frequency inverter not fluctuate as the input voltage fluctuates. In condition that grid voltage fluctuates greatly, while stable stator voltage and current of motor is required, this function shall be operated.

F5.3.31 Energy saving mode (only effective for asynchronous motors)	Setting range: 0, 1	Factory default: 0

Magnetic flux operates optimally, and valid with asynchronous machine. Automatic energy saving operation refers to frequency inverter can detect the load condition of motor automatically, and adjust output voltage timely to make the motor operate at high efficient status, to reach optimal effect of energy saving.

Automatic energy saving operation has the best effect when the load change of motor is with low frequency and wide range. The major energy saving way is to obtain additional energy saving effect from adjusting the status of motor excitation, to make the motor operate at optimal high efficient status, and greatly lower the energy consumption of motor.

Due to the specific corresponding relationship of draught fan, pump load and revolving speed, load condition can be judged according to the output frequency. It is a typical special case of automatic energy saving operation applying drop torque V/F curve. When applying drop torque **V/F** curve (**F1.2.17, F1.3.29** selection as 1, 2, 3), without necessary of operating the automatic energy saving operation function.

F5.3.32 DC injection braking	Setting range: 0, 1, 2	Factory default: 0

Frequency inverter can increase the magnetic flux when the motor slows down to stop, to make the motor stops more rapidly (see figure below).

The electric energy produced during the braking process is manly consumed in form of heat inside of the motor. Therefore, frequent braking with magnetic flow will lead to the internal temperature of the motor increase. Please be sure the motor temperature shall not over the maximum admissible value.

When input operation order during magnetic flow braking, magnetic flow will be canceled, and frequency inverter will speed up again to the selected frequency. When applying braking resistor, generally the magnetic flow braking shall be selected as invalid or lower the strength properly (F5.3.33).

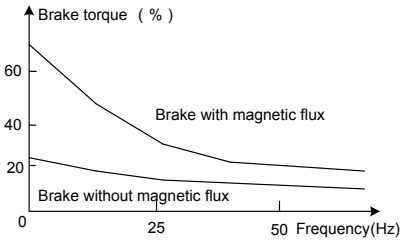


Figure 7-43 Magnetic flow braking curve

F5.3.33 DC injection braking intensity	Setting range: 30~120%	Factory default: ☆

This parameter defines the increased amplitude of motor magnetic flow when magnetic flow braking, selected value is the relevant percentage of rated magnetic flow.

F5.3.34 Voltage over modulation	Setting range: 0, 1	Factory default: 1

Voltage over modulation refers to that in condition of lasting low grid voltage or lasting heavy load operation, frequency inverter improve the output voltage with improving the utilization rate of its bus voltage. When over modulation function is valid, output current harmonic will increase slightly.

0: Void

1: Effective

F5.3.35 Use ratio of dynamic braking	Setting range: 50~100%	Factory default: 100
F5.3.36 Level of dynamic braking starting action	Setting range: 700~760V	Factory default: 720

These two parameters is valid to frequency inverters with built-in braking unit (**22KW** and models below), used to define action parameters of built-in braking unit of frequency inverters. When the voltage at internal direct current side of frequency inverter is higher than starting action level of dynamic braking [**F5.3.36**], build in braking unit action. If there is external braking resistor, it shall make the direct current voltage fall back, via releasing pumped-up voltage energy with braking resistor. When the voltage at DC side drops down to a specific value, the built-in braking unit of the frequency inverter closes, as shown in Figure 7-44.

Utilization rate of dynamic braking is used to define the average voltage value forced on braking resistor of braking unit action. Voltage on braking resistor is pulse width modulation wave. Duty ratio equals to action ratio of dynamic braking. The large the action ratio is, the faster energy releases, and the more obvious the effect is, as well as the larger power consumed on braking resistor is. Operator may consider setting the parameters comprehensively according to the resistance of braking resistor, power and required braking effect.

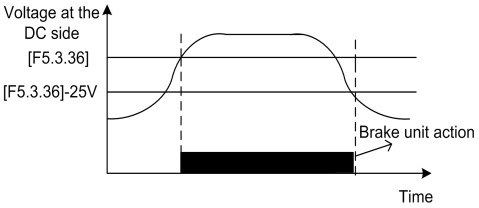


Figure 7-44 Dynamic braking

F5.3.37 Vibration suppression coefficient	Setting range: 0.0; 0.1~10.00	Factory default: 0.0

Only valid with V/F control method. Selecting this parameter can restrain the output current oscillation.

Setting 0.0 to close this function. The larger the value is, the slower restraining action is and the wider the biggest adjustment range is.

F5.3.38 Load balancing feature	**Setting range: 0, 1, 2**	**Factory default:0**
F5.3.39 Load balancing reference	**Setting range: 0~5**	**Factory default:0**
F5.3.40 Reference value for load balance load	**Setting range: 0.0~200.0%**	**Factory default:100.0**
F5.3.41 Load balancing adjustment gain	**Setting range: 0.0~100.00**	**Factory default:50.00**
F5.3.42 Load balancing adjustment limit	**Setting range:0.00~100.00(%)**	**Factory default:1.00**

Load dynamic balance function is used for balancing load with multiple motors linkage, or occasions requiring torque motor characteristics of "Frequency inverter-asynchronous electrical units".

When this function is valid, frequency inverter shall take the input value of dynamic balance load reference source (relative value of rated current) as reference, automatically amend the input of frequency/revolving speed integrator, adjusting output frequency to balance the load. The adjustment to output frequency for dynamic balance function is relatively slow, and influenced by selections of acceleration and deceleration time.

If rapid response of linkage balance operation is required, please apply with linkage operation self-balancing function (referring to instruction of parameters in FA group), or applying with compensation PID to build flexibly as necessary, which can conduct adjustment directly to the output of frequency integrator.

Adjusting gain value = [F5.3.41]*rated current of equipment/100, when the difference of output current and reference value reaches the adjusting gain value, output frequency will drop to the adjusting amplitude limit value.

Adjusting amplitude limit value = [F5.3.42]*current selected frequency/100, this value is the amplitude peak of dynamic balance adjustment.

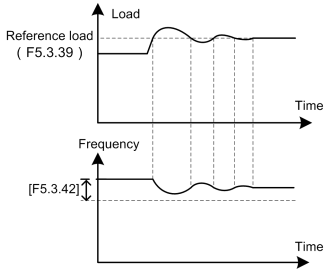


Figure 7-45 Sketch of load dynamic balance function

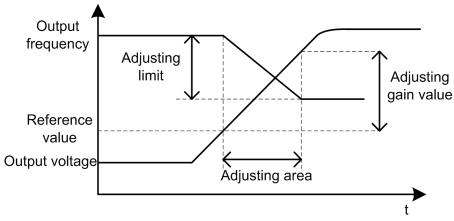


Figure 7-46 Sketch of dynamic balance variables

7.26 Motor temperature detection (group f5.4)

F5.4.43 Type 2 of motor temperature sensor	**Setting range: 0~6**	**Factory default: 0**

This parameter is referred to types of the selected motor temperature sensor; the different selected motor temperatures sensor with different internal algorithms results in corresponding changes in units of **F5.4.46** and **F5.4.47**: When the sensor is the thermoswitch/**PT100**, their units are ℃; When the sensor is **PTC**, their units are **Ω**

0: None **1: 1 X PT100**

2: 2 X PT100 **3: 3 X PT100**

4: PTC sensor **5: Thermoswitch (normally closed)**

6: Thermoswitch (normally open)

The motor temperature can be measured by connecting the PT100 or PTC sensor to the analog input and output interfaces of frequency converter. See Figure 7-47-A and Figure 7-47-B for wiring:

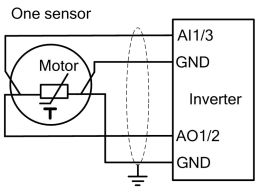


Figure 7-47-A Motor temperature measurement wiring1

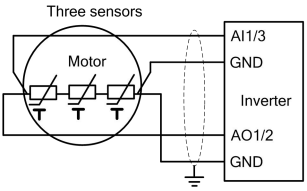


Figure7-47-B Motor temperature measurement wiring2

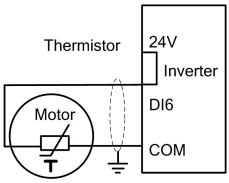


Figure 7-47-C Motor temperature measurement wiring3

The motor temperature can also be measured by connecting the thermoswitch to multifunctional input terminals of frequency inverter (Function No. 62). See Figure 7-47-C for wiring (such as Dl6 terminal, that is, F3.0.05=62)

F5.4.44 Sensor current source	Setting range: 0~2	Factory default: 0

The functional parameter is used to define the current source port of PT100 or PTC sensor.

0: None

1: AO1

Sensor current source port is the multifunctional analog output **AO1** and the signal type of output should be current signal (dial switch of control panel).

2: AO2

Sensor current source port is the multifunctional analog output **AO2** and the signal type of output should be current signal (dial switch of control panel).

- The parameter will not only modify but also lock the selected AO port's relevant parameters, and set them forcibly as fixed value output. When using PT100 sensor, the port supplies 4.00mA's constant current; When using PTC sensor, the port supplies 1.60mA's constant current.

F5.4.45 Temperature input source	Setting range: 0~3	Factory default: 0

This parameter is used to define the input channel of temperature signal.

0: None

1: AI1 input (PT100 or PTC)

The temperature signal of **PT100** or **PTC** sensor should be inputted through analogy input Channel Al1.

2: AI3 input (PT100 or PTC)

The temperature signal of **PT100** or **PTC** sensor should be inputted through analogy input Channel Al3.

3: DI1~DI9 (thermoswitch)

The temperature signal of thermoswitch should be inputted through multifunctional input terminals Channel **D1-D19** (Function No. 62).

F5.4.46 Warning action threshold value	Setting range: -10.0~500.0°C (0~5000Ω/PTC)	Factory default: 110.0
F5.4.47 Protection action threshold value	Setting range: -10.0~500.0°C (0~5000Ω/PTC)	Factory default: 130.0

This parameter is used to define the alert action point and protective action point for over-temperature detection; The unit should be determined by the motor temperature sensor used.

7.27 Multi-stage frequency setting (group f6.0)

F6.0.00~F6.0.14 Preset speed 1~15	Setting range: [F0.1.22]~[F0.1.21]	Factory default: 5.00~50.00

The parameter is for the setup of multi-stage operation's frequency and can be used to multistage velocity operation and simple programmable multi-stage operation. Refer to the detailed specifications of multi- velocity control function 1, 2, 3, 4 of multifunctional input terminals **F3.0.00-F3.0.07** and simple programm -able multistage operation in **F6.1** group parameters. Frequency inverter can transform frequency and direction automatically according to the running time to satisfy the requirement of technology, as Figure 7-48-A shown.

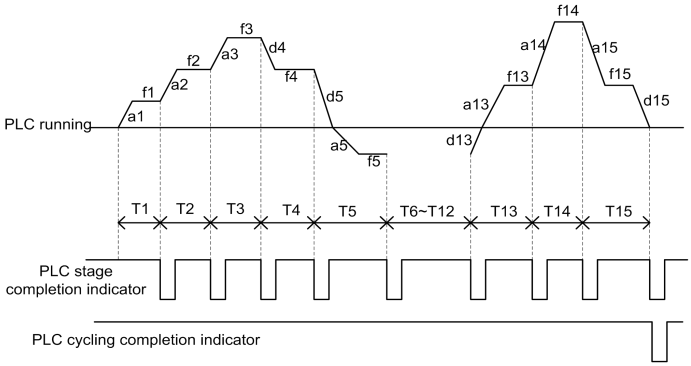


Figure 7-48-A Simple PLC operation

In the figure, **a1-a15** and **d1-d15** are current stage's time of acceleration and deceleration, while **f1-f15** and **T1-T15** are current stage's given frequency and operating time. All these will be defined in this parameter respectively.

The completion of simple programmable multi-stage operation for stage, cycle and so on can access to multifunctional output terminals or relay's output index signal. Refer to Function 20, 21 (multi-stage operation completed) and 22 (multi-stage operating cycle completed) among the **F3.1.15-F3.1.20**.

F6.0.15 Programmable multi-stage mode	Setting range: 0000~1254	Factory default: 0000

_ _ _ X : Function selection

0: Function selection

1: Multi-stage frequency/revolution operation effective

In case of frequency (revolution) instruction source allowed to the priority, the frequency converter operates in multi-stage frequency/revolution.

2: Multi-stage frequency/revolution operation condition effective

When multifunctional input terminal (Function No.23) is valid, frequency inverter operates in multi-stage frequency/revolution; when it is invalid, frequency inverter will automatically access to frequency setup mode allowed to the lower priority.

3: Multi-stage PID setting operation effective

When the process **PID** starts its function, the setup of **PID** should be set automatically according to given time cycle, at most 7 stages being set (F7.1.27 ~ F7.1.33).

4: Multi-stage PID setting operation condition effective

When multifunctional input terminal (Function No. 23) is valid, the multi-stage setting of process PID is also valid, at most 7

stages being set (F7.1.27 ~ F7.1.33).

_ _ X _: Operation mode

0: Single cycle

Frequency inverter should firstly operate with first multi-stage speed set frequency and output each velocity's frequency according to given operating time. If the given operating time of a certain velocity is of zero, jump out of the velocity; With a cycle's operation, the frequency inverter should stop outputting and input an effective operating instruction once again to run the next cycle. See as Figure 7-48-B.

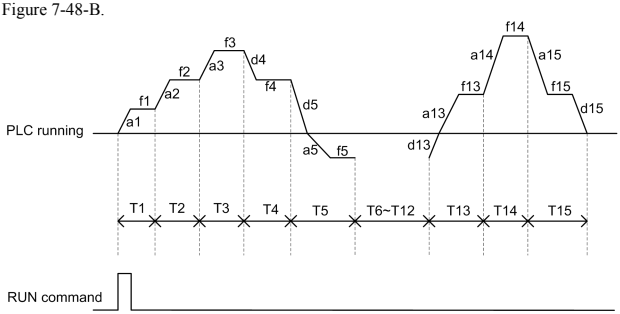


Figure 7-48-B Simple PLC operation single cycle mode

1: Single cycle stop mode

The basic operation mode is the same as mode 0 and its difference is that after frequency inverter operates a stage speed, it firstly lowers the output frequency to zero according to specified deceleration time, then outputs next stage's frequency.

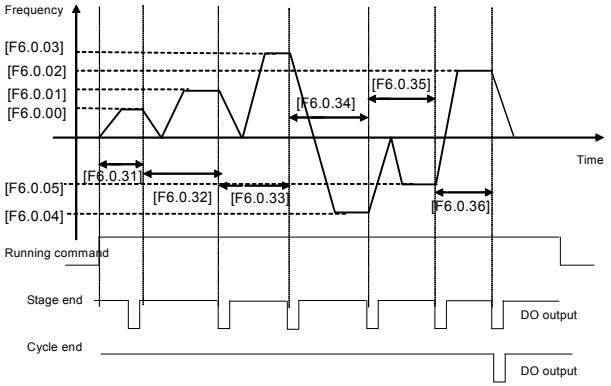


Figure 7-48-C Single cycle stop mode of simple PLC operation

2: Continuous cycling mode

As the figure shown, the frequency inverter starts next cycle after automatically after it finishes a cycle until it receives stop instruction.

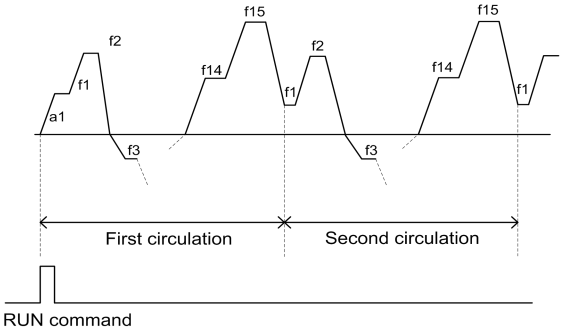


Figure 7-48-D Continuous cycling mode of simple PLC operation

3: Continuous cycle stop mode

Basic operation mode is the same as mode 2 and its difference is that after frequency inverter operates a stage speed, it firstly lowers the output frequency to zero according to specified deceleration time, then outputs next stage's frequency.

4: Keeping the final value

As the figure shown, the frequency inverter will keep the last stage's operation frequency and direction automatically after it finishes a cycle.

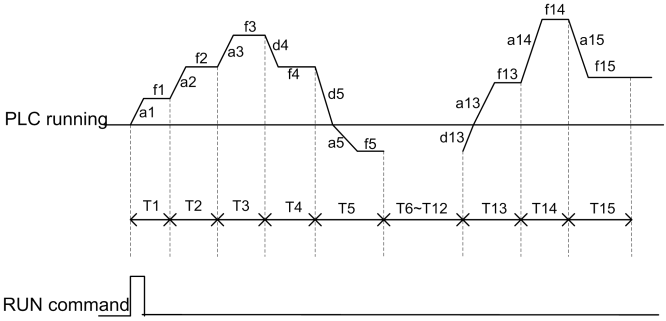


Figure 7-48-E Simple PLC operation keeping the final value mode

5: Keeping the final value stop mode

Basic operation mode is the same as mode 4 and its difference is that after frequency inverter operates a stage speed, it firstly lowers the output frequency to zero according to specified deceleration time, then outputs next stage's frequency.

_ X _ _ : Selection of breakpoint/stop recovery mode

0: Restore running at the first stage

In simple programmable multi-stage operation, frequency inverter will clear out current operation state automatically after it stops because of error stop or stop instruction; Restore running at the first stage after it starts again.

1: Start running at the interruption time (effective for multi-stage frequency/ revolution operation)

In simple programmable multi-stage operation, frequency inverter will record the stage operation time and operation frequency automatically at the interrupting time after it stops because of error stop or stop instruction; Start running at the interruption time after it starts again.

2: Start running at the stage of interruption

In simple programmable multi-stage operation, frequency inverter will record the stage operation time and operation frequency automatically at the interrupting time after it stops because of error stop or stop instruction; Start running at the stage of interruption after it starts again. The single difference between mode 1 and 2 is the different frequencies at the stage of interruption. See as Figure 7-49.

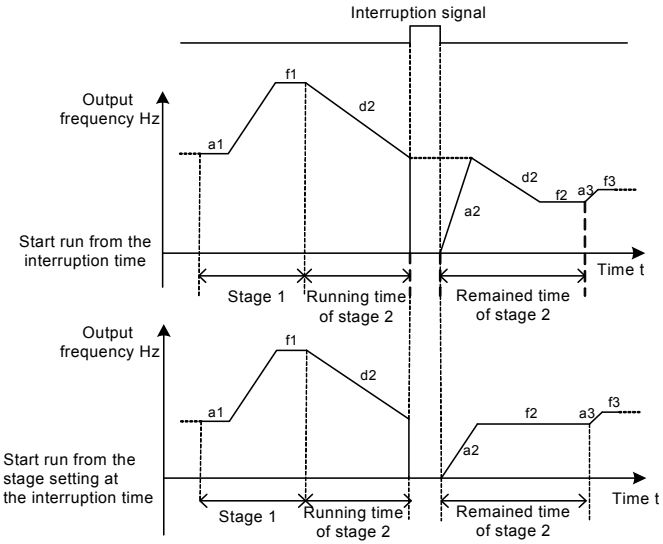


Figure 7-49 Breakpoint recovery sketch

X _ _ _ : Power-off status storage

0: Not stored

When the frequency converter fails power, it does not store the simple programmable multi-stage operation and starts operating from the first stage after power comes again.

1: Stored

When the frequency converter fails power, it stores the simple programmable multi-stage operation, including the power-off status, operation frequency, operated time, and operates according to the parameter's breakpoint/stop recovery mode of hundred definition after power comes again.

7.28 Simple programmable multi-stage operation (group f6.1)

F6.1.16~F6.1.30 Setting of stage 1~15	Setting range: 0000~1321	Factory default:0000

The unit: Operating frequency source/setting source at each stage

0: Multi-stage frequency setting 1~15/Process PID multi-stage setting 1~7 (1~7)

Stage operation frequency set values should be set by multi-stage frequency setting 1~15 (Group F6.0)/ Process **PID** multi-stage setting 1~7 (Group F7.1).

1: Frequency command (F0.1.16)/Process PID setting (F7.0.01)

Stage operation frequency set values should be set by frequency command (**F0.1.16**)/Process PID setting (**F7.0.01**).

F6.1.31~ F6.1.45 Stage 1 running time	Setting range: 0.0~6500.0	Factory default: 0.0

The parameter is used to the setting of each stage's operation time; when it occurs to a zero, it means jumping over this operation stage.

7.29 Swing frequency operation (group f6.2)

Swing frequency operation is regulated by upper and lower boundary of frequency. If the function's parameter group is improper, swing frequency operates properly.

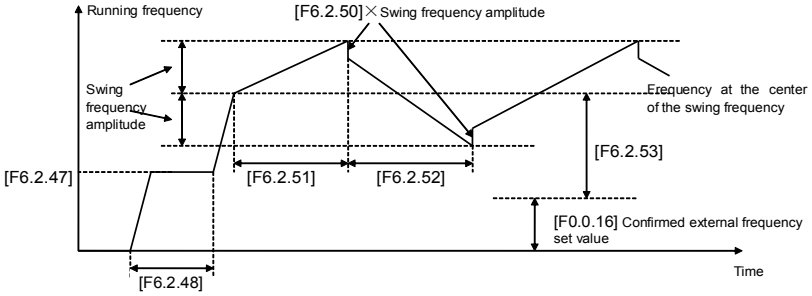


Figure 7-50 Swing frequency operation sketch

F6.2.46 Function selecting (H)	Setting range: 0000~1112	Factory default: 0000

_ _ _ X : Function Setting

0: Function closed

The functional parameter of Group F6.2 is available.

1: Function effective

In case of frequency (revolution) instruction source allowed to the priority, the frequency inverter adopts swing function.

2: Terminal selectivity effective

When the multifunctional input terminal of definition 24 (swing operation input) is valid, the frequency inverter adopts swing function In case of frequency (revolution) instruction source allowed to the priority. If it invalidates, frequency converter operates with the set value of swing frequency preset frequency **F6.2.47**. In this mode, preset frequency waiting time invalidates.

F6.2.47 Preset frequency of traverse	Setting range: 0.00~[F0.1.21]	Factory default:10.00

F6.2.48 Waiting time for preset frequency	Setting range: 0.0~6000.0Sec.	Factory default: 0.0

Preset frequency is referred to the operation frequency before frequency inverter adopts swing frequency operation or breaks away from operation frequency of swing frequency operation. Determine the operation mode of preset frequency according to the instruction of swing frequency function.

When the selected swing frequency function is valid (**[F6.2.46]=_ _ _ 1**), frequency inverter starts swing frequency preset frequency after running, then runs the swing frequency operation status via the process of preset frequency waiting time.

In case of the selected swing frequency function terminal available (**[F6.2.46]=_ _ _ 2**), when swing frequency operation input terminal is valid, frequency inverter runs the swing frequency operation status; When it invalidates, frequency converter outputs preset frequency (**[F6.2.47]**), and the preset frequency waiting time is unavailable.

F6.2.49 Swing frequency amplitude	Setting range: 0.0~50.0%	Factory default: 10.0

Swing frequency amplitude is the ratio of swing frequency amplitude.

When it occurs to fixed swing frequency amplitude (**[F6.2.46]=_ 0 _ _**), mathematics of practical swing frequency amplitude is:

Practical swing frequency amplitude= **[F6.2.49]** × maximum frequency **[F0.1.20]**

When it occurs to changeable swing frequency amplitude (**[F6.2.46]=_ 1 _ _**), mathematics of practical swing frequency amplitude is:

Practical swing frequency amplitude= [**F6.2.49**] × (preset frequency of swing frequency center [**F6.2.53**] + frequency set value **F0.1.16**)

F6.2.50 Sudden jump frequency	Setting range: 0.0~50.0%	Factory default: 10.0

Sudden jump frequency is the amplitude of frequency's fast descending after it reaches upper boundary in swing frequency cycle, that is, the amplitude of frequency's fast ascending after it reaches lower boundary. See in detail the Reference Diagram **7-50**.

Practical sudden jump frequency = **[F6.2.50]** × practical swing frequency amplitude.

F6.2.51 Rise time of triangular wave	Setting range: 0.0~1000.0Sec.	Factory default: 10.0
F6.2.52 Fall time of triangular wave	Setting range: 0.0~1000.0Sec.	Factory default: 10.0

The parameter in this group is referred to acceleration and deceleration slope in the process of swing frequency.

Triangular wave rising time is referred to the time spent from the lower boundary frequency to the upper boundary frequency in swing frequency operation, that is, the acceleration time in the cycle of swing frequency operation.

Triangular wave decreasing time is referred to the time spent from the upper boundary frequency to the lower boundary frequency in swing frequency operation, that is, the deceleration time in the cycle of swing frequency operation.

The sum of triangular wave rising time and decreasing time is the swing frequency operation cycle.

F6.2.53 Center frequency setting of traverse	Setting range: 0.00~[F0.1.21]	Factory default: 10.00

Frequency setting in the center of the swing frequency is referred to the center value of frequency converter output frequency in the process of swing frequency operation.

Center frequency of practical output = [**F6.2.53**] + **F0.1.16** certain set frequency.

Refer to the following figure for the structure of Process PID and functions of each functional parameters:

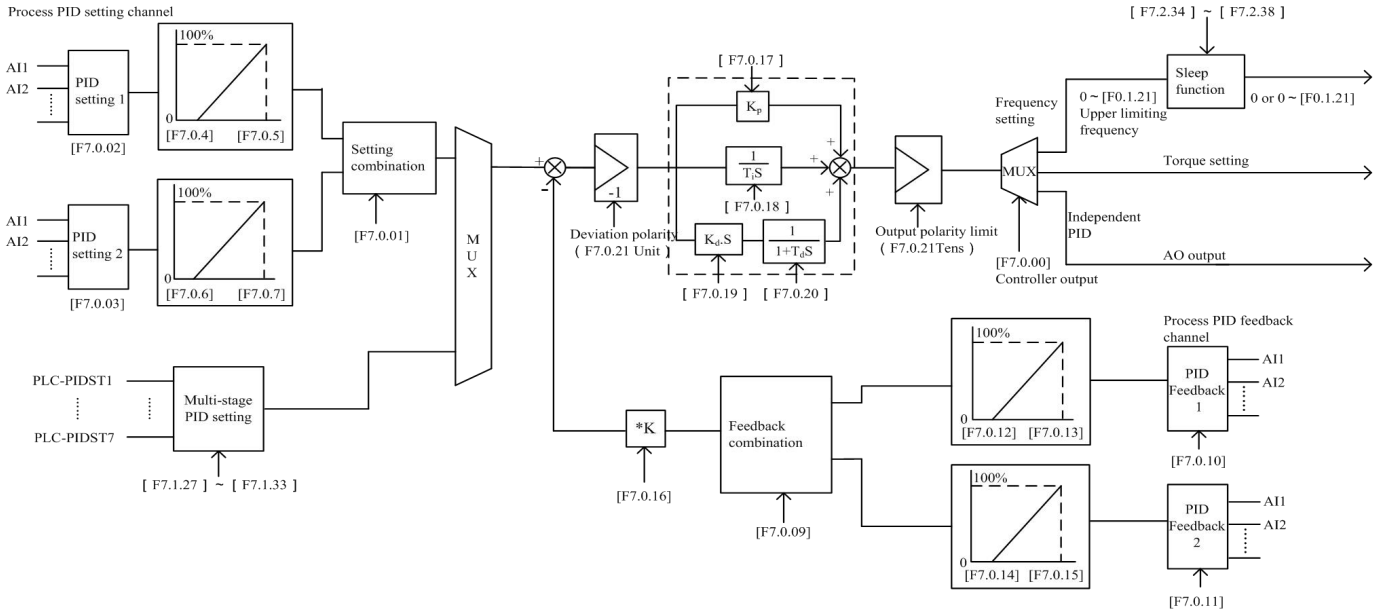


Figure 7-51 Schematic block of process PID control

7.30 Process PID (4ms control cycle) (group F7.0)

F7.0.00 Process PID function selection	Setting range：0000~2102	Factory default：0000

Process PID works when frequency setting channel (F0.2.25, F0.2.26 value 23) functional, and need set frequency reference priority selection (F5.3.28) to 0007, then the output of the process PID be as the frequency command of frequency setting channel, the upper limit of this frequency command will be chosen by the kilobit of this parameter. This function is mainly applied in occasions of PID output and external set superposition. Wake up/sleep is invalid in this mode.

X _ _ _: The main and auxiliary superposition mode refer to frequency reference

0: Upper frequency limit

The frequency reference determined by the maximum value of chosen PID function frequency setting channel。

1: superposition channel set value

The frequency reference determined by the value of unselected PID function frequency setting channel。

2: superposition channel set value/upper frequency-superposition channel setting

When the set value of PID output and superposition channel have the same sign，reference frequency will be "frequency-superposition channel setting", otherwise it will be superposition channel set value。

If want wake up/sleep of process PID functional，the priority of rated output mode must higher than frequency setting channel. (F5.3.28=0000 or 0001)

F7.0.04 Analog input minimum value (Channel 1)	**Setting range:0.0V~[F7.0.05]/ AI2: 0.0mA~[F7.0.05]**	**Factory default: 0.0**
F7.0.05 Analog input maximum value (Channel 1)	**Setting range:[F7.0.04]~10.00/ AI2: [F7.0.04] ~20.00mA**	**Factory default: 10.00**
F7.0.06 Analog input minimum value (Channel 2)	**Setting range:0.0V~[F7.0.07]/ AI2: 0.0mA~[F7.0.07]**	**Factory default: 0.0**
F7.0.07 Analog input maximum value (Channel 2)	**Setting range:[F7.0.06]~10.00/ AI2: [F7.0.06] ~20.00mA**	**Factory default: 10.00**

When analog channel input is selected for setting source of process **PID**, corresponding relationship between set value of process **PID** and analog port can be altered with this group of parameters. The corresponding relationship is shown in Figure 7-52.

F7.0.12 Actual value 1 minimum (feedback channel 1)	**Setting range: 0.0~[F7.0.13]/ AI2: 0.0mA~[F7.0.13]**	**Factory default: 0.0**
F7.0.13 Actual value 1 maximum (feedback channel 1)	**Setting range: [F7.0.12]~10.00V/ AI2:[F7.0.12] ~20.00mA**	**Factory default: 5.00**
F7.0.14 Actual value 2 minimum (feedback channel 2)	**Setting range: 0.0~[F7.0.15]/ AI2: 0.0mA~[F7.0.15]**	**Factory default: 0.0**
F7.0.15 Actual value 2 maximum (feedback channel 2)	**Setting range: [F7.0.14]~10.00V/ AI2: [F7.0.14] ~20.00mA**	**Factory default: 5.00**

When the analog channel input is selected for feedback source of process **PID**, corresponding relationship between feedback value of process **PID** and analog port can be altered with this group of parameters. The corresponding relationship is shown in Figure 7-53.

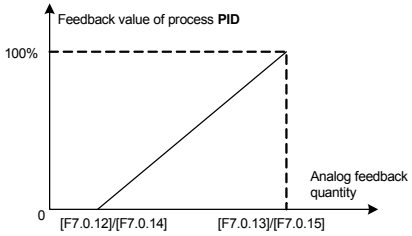


Figure 7-52 Sketch of set value of process PID

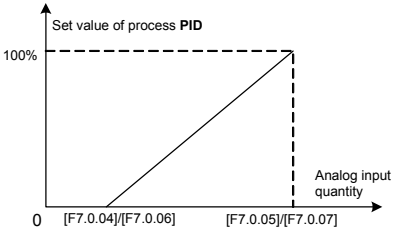


Figure 7-53 Sketch of corresponding relationship of feedback value of process PID

F7.0.16 Actual value multiplication factor	**Setting range: 0.01~100.00**	**Factory default: 1.00**

This function is mainly applied in occasions of flow calculation with differential pressure. When the feedback value is not in accordance with the given value of process **PID**, while there is a certain linear relation, this group of parameters can be selected to make it accordant of the meaning expressed by feedback value and given value of process **PID**. For example, if the given value of process **PID** means flow of the pipe, feedback value of process **PID** means flow rate of the pipe, supposing the set value of this parameter means cross sectional area (CSA) of the pipe, then the given value and feedback value of process **PID** shall be in accordance.

F7.0.17 Proportional gain	**Setting range: 0.0~100.00**	**Factory default: 2.00**
F7.0.18 Integral time	**Setting range: 0.0, 0.1~1000.0Sec.**	**Factory default: 20.0**
F7.0.19 Differential quotient	**Setting range: 0.0，0.01~10.00**	**Factory default: 0.0**
F7.0.20 Differential inertia filtering time	**Setting range: 0.01~100.00 Sec.**	**Factory default: 10.00**

Proportional gain defines the magnification of deviation. The bigger the set value is, the faster the response of system is, but oscillation can be caused when it's too big; the smaller the set value is, the slower the response is. Adjusting only with proportional gain will not eliminate the deviation completely. In order to eliminate the remained deviation, integral time shall be selected. The smaller the integral time is set, the faster the response is, but oscillation of system can be caused when it's too big or too small.

Differentiator can make response to the change rate of deviation. The larger the change is, the larger the output gain is, that is, its gain is in proportion to change rate of deviation. But it won't make response to constant deviation. When differential coefficient is 0.0, it means the differential function closing the controller. Differential function can improve the responsibility of system.

The larger the differential coefficient is set, the stronger the differential function is. In general system, there is no need to introduce differential link.

Larger differential inertia filtering time can make the differential adjustment more smoother, generally, It is set in proportion to the inertia of system.

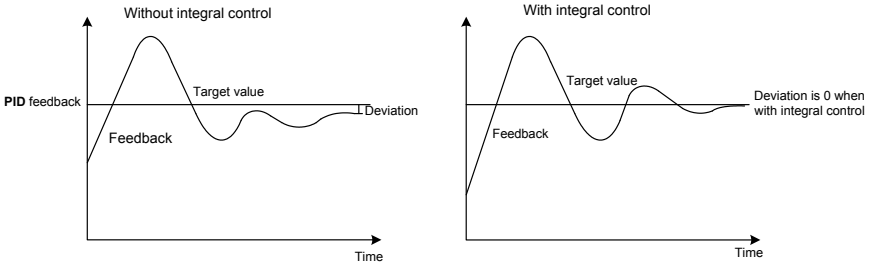


Figure 7-54 Function of integral control

F7.0.21 Configuration of standard PID controller	Setting range: 0000~0111	Factory default: 0000

_ _ _ X : Dviation polarity

0: Positive deviation

When feedback signal gets weaker, PID output is increased.

1: Negative deviation

When feedback signal gets weaker, PID output is decreased.

_ _ X _ : Output polarity

0: Single polarity **1: Dual polarity**

For single polarity of PID control mode, output of PID adjuster is always positive value, lower limit is 0. For frequency settings, operation direction of frequency inverter is determined with external control order, while PID output can't change the operation direction. Generally, it applies for devices without motor reversal for water and pressure delivery. Refer to Figure 7-55-A.

For dual polarity of PID control mode, output of PID adjuster is negative value. For frequency settings, operation direction of frequency inverter is determined with external control order and "Exclusive OR" calculation of PID output direction, and PID output can change the operation direction. If the direction lock parameter (F0.1.17) is valid, efficient PID output shall take the absolute value. Refer to Figure 7-55-A and Figure 7-55-B.

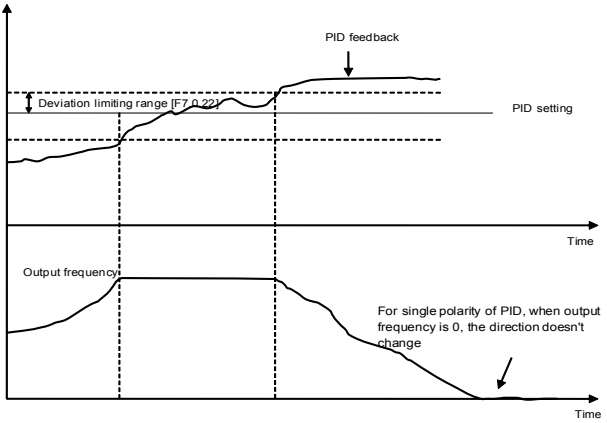


Figure 7-55-A Single polarity of PID control mode

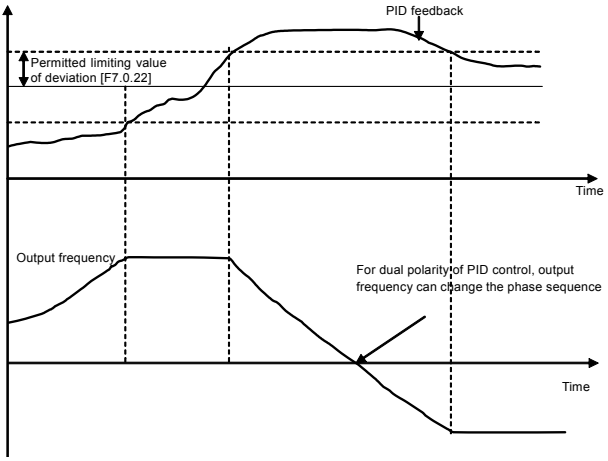


Figure 7-55-B Dual polarity of PID control mode

F7.0.22 Permitted static deviation (relative 100% setting)	**Setting range: 0.0~20.0%**	**Factory default:5.0**

Controller output value is the permitted maximum deviation amount with given value of controller. When feedback value is within the range of maximum deviation range, the controller stops adjusting. Proper setting of his function contributes to covering the accuracy and stability of output of system.

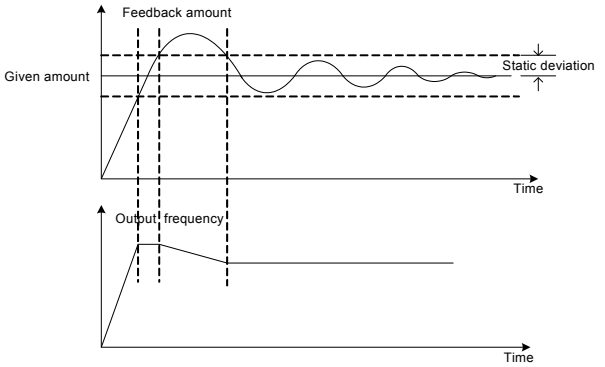


Figure 7-56 Sketch of static deviation

F7.0.23 PID output preset	**Setting range: 0.0~100.0%**	**Factory default:0.0**
F7.0.24 Preset hold time before PID starting	**Setting range: 0.0~3600.0Sec.**	**Factory default:0.0**

This function can make it earlier to access to the sable stage for PID adjustment. Preset value of PID output is the relevant percentage of upper limiting frequency [F0.1.21].

When frequency inverter start to operate, first of all, it shall be sped up to the preset frequency of PID, and operate as closed-loop characteristics after running continually for a while at this point of frequency [F7.0.24].

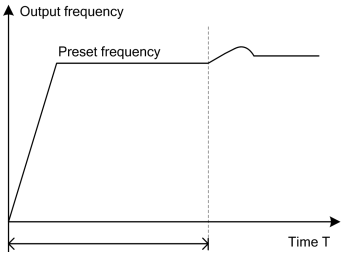


Figure 7-57 Sketch of closed-loop preset frequency operation

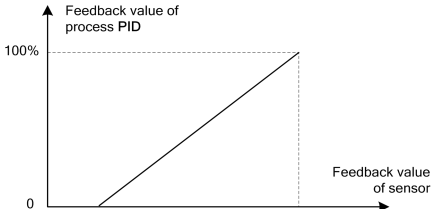


Figure 7-58 Relationship curve of feedback percentage and corresponding sensor value

F7.0.25 1Actual sensor value (range) corresponding to 100% feedback	**Setting range: 0.01~100.00**	**Factory default: 1.00**
F7.0.26 Actual sensor value corresponding to 0% feedback	**Setting range: -100.00~100.00**	**Factory default: 0.0**

This group of parameter determines the corresponding relationship between feedback percentage and feedback physical quantity, which determines monitoring the displayed dimension of parameter d0.1.36 and d0.1.37. Corresponding relationship curve is shown in Figure 7-58.

7.31 Process pid multi-stage setting (group F7.1)

F7.1.27~F7.1.33 Process PID multi-stage preset	**Setting range: -100.0~100.0%**	**Factory default: 0.0**

This group of parameter defines the set value of process **PID** multi-stage operation. Set value is the relevant percentage of process PID set value determined in **F7.0.01.**

Multi-stage operation of process **PID** can be flexibly realized with multifunction input terminal, please refer to function instruction of given terminal 1, 2, 3(28~30) of multi-stage process **PID** of terminal function **F3.0.00** ~ **F3.0.08.**

7.32 Process pid sleeping function (group F7.2)

This function is valid when PID output conducts frequency order; Sketch is shown as below:

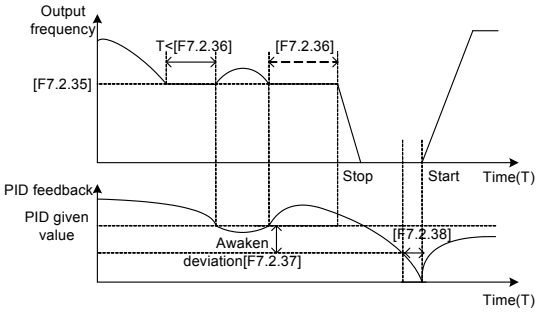


Figure 7-59 Sketch of PID sleeping function

➢ Set value of awakens deviation is the relevant percentage of PID given value.

7.33 Revolution setting and feedback (group F8.0)

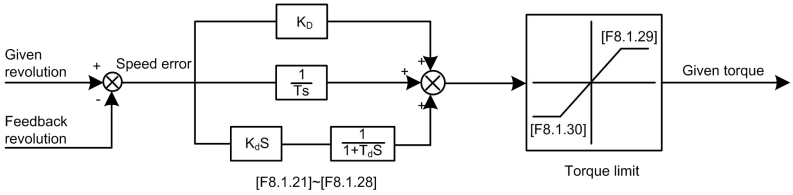


Figure 7-60 Closed-loop block diagram of revolution

This group of parameter is valid with **VC** and **SVC** modes.

F8.0.00 Revolution setting channel	**Setting range: 0~10**	**Factory default: 0**

This parameter is used to define revolution setting channel. Selecting mode of revolution setting channel is similar with that of frequency setting source channel. Refer to instruction of **F0.2.25** parameter.

0: Set by frequency setting parameter (F0.1.16)

Revolution set value is obtained from transition of frequency set value selected by F0.1.16: Revolution setting=frequency set value*60/pairs of motor polarity

1: Keypad reference (F8.0.03)

Value of **F8.0.03** is set as revolution set value, automatically preserved when outage.

2: Keypad potentiometer

Revolution set value is given by revolving panel shuttle potentiometer.

3: Analog input AI1

4: Analog input AI2

5: Analog input AI3 (Bipolarity)

6: Frequency signal input (Fin)

Take the pulse signal input by pulse input port **Fin** as revolution set value.

7: MODBUS Fieldbus set value 1 (relative setting)

8: MODBUS Fieldbus set value 2 (absolute setting)

9: Virtual analog input SAI1

10: Virtual analog input SAI2

Note: Select revolution setting channels 3~7, upper and lower limiting parameters shall be correctly selected F8.0.01 and F8.0.02.

F8.0.01 Rotational speed minimum	**Setting range: 0~60*[F0.1.21]/ pairs of motor poles (rpm)**	**Factory default: 0**
F8.0.02 Rotational speed maximum	**Setting range: 0~60*[F0.1.21]/ pairs of motor poles (rpm)**	**Factory default: 1500**

This parameter is used to set the relationship curve of set value and corresponding motor revolution when revolution channel is analog input port of this parameter.

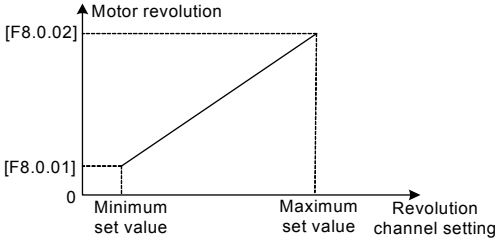


Figure 7-61 Corresponding relation of revolution set value and motor revolution

F8.0.06 PG rotation direction	**Setting range: 0, 1**	**Factory default: 0**

In the system of inductive vector controlling, frequency inverter output phase sequence (depending on the connection order between the motor and frequency inverter U, V, W) and the connection order between pulses of encoder Phase A and Phase B should keep uniform. Or it can't function normally and cause the **Fu.020** fault or 0 speed shock when starting. Then it can be solved with modifying the parameter.

- Systems of tension control or hoisting equipment, etc, which may lead to motor shaft side-pulling, may result in Fu.020 fault and at this moment please shield the protective function (FF.1.22 = # 0 # #).

F8.0.09 Revolution check cycle	**Setting range: 1~5ms**	**Factory default: 2ms**

When revolution feedback channel selects an encoder, the parameter sets speed check cycle.

The parameter should set smaller values; Overlarge revolution check cycle may lead to unstable closed-loop running and decelerate response. When use larger check cycle for ensuring the exactness of measuring speed, please lower the proportionality factors F8.1.21, F8.1.25 of revolution closed-loop regulator and enlarge integral time constants F8.1.22, F8.1.26 moderately.

F8.0.11 Loss of rotational feedback signal delay	**Setting range: 0.01~5.00Sec.**	**Factory default: 2.00**
F8.0.12 Power failure speed	**Setting range: 0~20.0%**	**Factory default: 0.0**

When set revolution is bigger than the wire breakage zero speed signal level (its set value is relative to the percentage of the largest set speed [**F8.0.02**]), while feedback speed is smaller than wire breakage zero speed signal level, and revolution of frequency inverter checks wire breakage protective function after keeping the set time of **F8.0.11**.

F8.0.13 Rotational feedback sensitivity	Setting range: 0.1~100.0	Factory default: 5.0

If speed measuring loop interference is great, it can enlarge **[F8.0.13]** to prevent wrong judgments from interference; otherwise decrease the set value to strengthen the response speed of the system to wire breakage check.

F8.0.14 Rotational feedback filter time	Setting range: 1~50ms	Factory default: 2ms

Filtering time coefficient of set revolution feedback in this parameter is available to all of the speed measuring modes (channels). When use encoder for speed measuring, the function is similar to check cycle parameter (**F8.0.09**), therefore there is a need to set smaller values for the system of fast-speed response.

F8.0.15 Rotational feedback minimum value (not PG)	Setting range: 0~30000rpm	Factory default: 0
F8.0.16 Rotational feedback maximum value (not PG)	Setting range: 0~30000rpm	Factory default: 1500

The parameter is used to set relations between revolution feedback signal (feedback channel 1~4) and the corresponding to the motor feedback.

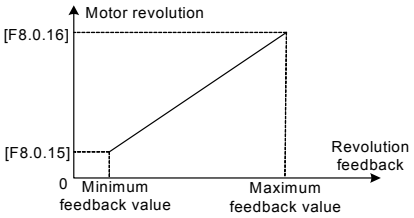


Figure 7-62 Corresponding Relation of Revolution Feedback Value and Motor Revolution

7.34 Revolution closed-loop parameter (group F8.1)

F8.1.18 Controller parameter selection	Setting range: 0, 1, 2	Factory default: 2

0: Single PID parameter (the second group of parameters is effective by default)

1: Dual PID parameter (hysteresis switching)

2: Dual PID parameter (continuous switching)

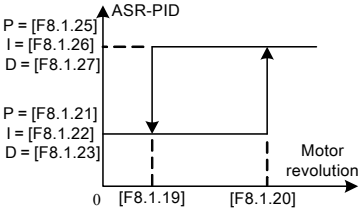


Figure 7-63-A Double PID parameter (hysteresis switching)

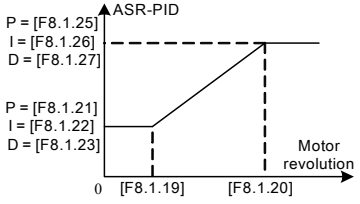


Figure 7-63-B Double PID parameter (continuous switching)

F8.1.19 PID revolution with parameter switching	Setting range: 0~[F8.1.20]	Factory default: 100

F8.1.20 PID parameter switching upper limiting revolution	**Setting range: [F8.1.19]~60* [F0.1.21] Motor pole pairs (rpm)**	**Factory default: 300**

The parameters are effective in the condition of double PID parameter hysteresis switching; the first group parameter is effective when it is lower to switching lower revolution **[F8.1.18]**; The second group parameter is effective when it is higher than switching upper revolution.

F8.1.21 Proportional gain 1 (ASR-P1)	**Setting range: 0.1~2.00**	**Factory default: 1.00**
F8.1.22 Integral time 1 (ASR-I1)	**Setting range:0.0,0.01~50.00Sec.**	**Factory default: 1.00**
F8.1.23 Differential coefficient 1 (ASR-D1)	**Setting range: 0.0, 0.01~10.00**	**Factory default: 0.0**
F8.1.24 Differential output filtering constant 1 (ASR-DT1)	**Setting range:0.10~5.00Sec.**	**Factory default: 1.00**
F8.1.25 Proportional gain 2 (ASR-P2)	**Setting range: 0.1~2.00**	**Factory default: 0.80**
F8.1.26 Integral time 2 (ASR-I2)	**Setting range:0.0,0.01~50.00Sec.**	**Factory default: 2.50**
F8.1.27 Differential coefficient 2(ASR-D2)	**Setting range: 0.0, 0.01~10.00**	**Factory default: 0.0**
F8.1.28 Differential output filtering constant 2(ASR-DT2)	**Setting range: 0.10~10.00 Sec.**	**Factory default: 1.00**

The parameters are applied to adjust proportional gain of speed adjuster, integral time and differential coefficient. Each parameter should be set as following:

1) Proportional gain P: As value is bigger, the response id faster, however the stability of system is worse and overlarge gain can lead to revolution shock.

2) Integral time coefficient I: As value is greater, the response id faster, and the revolution over-adjusting is greater, while the stability is worse. In general, the parameters are direct proportional to system inertia. When inertia is great, the parameter also set with great value.

3) Differential coefficient D: it is the reverse to differential time constant; there is no need in general system and it should be set to be zero. Differential adjusting in reality is a kind of trend forecasting adjustment; The parameter set is bigger, the differential function is stronger. Proper differential set can fast the response speed, improve the stability, and it is used to the system with requirements of less inertia and fast response.

4) Differential output filtering time constant DT: Differential output to the adjuster for a stage of inertia filtering time constant is generally set direct proportion to system inertia.

F8.1.29 Maximum torque output	**Setting range: 0.0~250.0%**	**Factory default: 190.0**
F8.1.30 Minimum torque output	**Setting range: -250.0~0.0%**	**Factory default: -190.0**

The parameter is applied to set adjuster output amplitude and limit system's transient forward and backward torque. Its set value is the percentage corresponding to rated torque.

- Actual output torque is also limited by adjuster output lower limit amplitude [F1.4.47] and should pick up the lower among the two. When running acceleration and deceleration, it is mainly limited by electricity limit level.

7.35 Protective parameters (group F8.2)

F8.2.32 Excessive action of revolution deviation (DEV)	**Setting range: 0~3**	**Factory default: 0**
F8.2.33 Over speed (OS) detection action	**Setting range: 0~3**	**Factory default: 1**

The parameter is used to set excessive action of revolution deviation **(DEV)** and over speed **(OS)** detection action.

0: No action

Inverter keeps on running without reporting any fault or warning message.

1: Alarm free stop

Inverter immediately blockades output and reports overlarge deviation of rotating speed **(Fu.018)** or over- speed fault **(Fu.019)**, while electric motor freely coasts to stop

2: Alarm deceleration stop

Inverter slows down to stop according to effective time of deceleration, and reports overlarge deviation of rotating speed **(Fu.018)** or over-speed fault **(Fu.019)**.

3: Alarm continuing running

Inverter keeps on running, whereas reports overlarge deviation of rotating speed **(aL.018)** or over-speed warning **(aL.019)** at the same time.

F8.2.34 Detected value of excessive revolution deviation (DEV)	**Setting range: 0.0~50.0%**	**Factory default: 20.0%**
F8.2.35 Detection time of excessive revolution deviation (DEV)	**Setting range: 0.0~10.00Sec.**	**Factory default: 10.00**

These parameters are used to set detecting value and time for overlarge deviation of rotating speed **(DEV)**.

Provided that deviation of rotating speed is continuously greater than given **DEV** detecting value within given **DEV** detecting time **[F8.2.35]**, then inverter shall be in line with the setting action of **F8.2.32**. Set value of **F8.2.34** is corresponding to the percentage of upper limit frequency **[F0.1.21]**.

F8.2.36 Detected value of over speed (OS)	**Setting range: 0.0~150.0%**	**Factory default: 120.0%**
F8.2.37 Detection time of over speed (OS)	**Setting range: 0.0~2.00Sec.**	**Factory default: 0.10**

These parameters are used to set detecting value and time of over-speed **(OS)**.

Provided that feedback rotating speed is continuously faster than given **OS** detecting value within given **OS** detecting time [**F8.2.37**], then inverter shall be in line with the setting action of **F8.2.33**. Set value of **F8.2.36** is corresponding to the percentage of upper limit frequency [**F0.1.21**].

7.36 Torque control (group F8.3)

F8.3.40 Selection of torque command channel	Setting range: 0~12	Factory default: 0

0: Digital setting (F8.3.41)

Take the set value of F8.3.41 as given value of torque, and conduct power failure storage.

1: Panel shuttle potentiometer setting

Set value of torque is given by rotational shuttle potentiometer.

2: Analog input AI1

AI1 input voltage value of 0~10V is corresponding to 0~250% of rated torque.

3: Analog input AI2

AI2 input current value of 4~20mA is corresponding to 0~250% of rated torque.

4: Analog input AI3

AI3 input voltage value of -10~10V are corresponding to 0~250**%** of rated torque.

5: Analog input AI3 (bipolarity)

AI3 input voltage value of -10~10V is corresponding to -250%~250% of rated torque; positive and negative input of AI3 are corresponding to positive and negative instruction value of torque.

6: Frequency signal input (Fin)

Maximum value of input frequency of Fin terminal is corresponding to 250% of rated torque.

7: Process PID output

For process PID output that given as torque instruction, F7.0.00 parameter needs to be set as #1## for matching.

8: Compensation PID output

For compensation PID output that given as torque instruction, F9.0.00 parameter needs to be set as #1## for matching.

9: MODBUS Fieldbus set value 1 (relative set value)

Current torque instruction of inverter is set by principal computer through built-in standard RS485 communication interface of inverter.

10: MODBUS Fieldbus set value 2 (absolute set value)

11: Virtual analog input SAI1

12: Virtual analog input SAI2

F8.3.41 Torque digital setting	Setting range: -250~250%	Factory default: 0.0

Its set value, the setting with symbols (Direction), is corresponding to the percentage of rated torque; Actual given direction of torque is “Exclusive OR” of control command direction and set value direction.

7.37 Compensation pid (1ms control cycle) (group F9.0)

F9.0.09 Analog input minimum value is 0%	**Setting range: 0.0V~[F9.0.10]/ AI2:0.0mA~[F9.0.10]**	**Factory default: 0.0**
F9.0.10 Analog input maximum value is 100%	**Setting range: [F9.0.09]~10.00V/ AI2:[F9.0.09] ~20.00mA**	**Factory default: 10.00**

When the compensation PID setting source channel selects the analog channel input, this group of parameters can be used to modify the correspondence relationship between the compensation **PID** set value and the analog pot. The correspondence relationship is shown in Figure 7-65.

F9.0.13 Feedback input actual value is 0%	**Setting range: 0.0V~[F9.0.14]/ AI2:0.0mA~[F9.0.14]**	**Factory default: 0.0**
F9.0.14 Feedback input actual value is 100%	**Setting range: [F9.0.13]~10.00V/ AI2:[F9.0.13] ~20.00mA**	**Factory default: 10.00**

This group of parameters can be used to modify the correspondence relationship between the compensation **PID** feedback value and the analogy port.The correspondence relationship is shown in Figure 7-66.

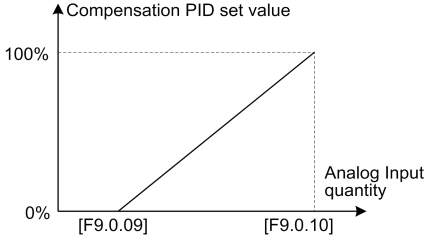


Figure 7-65 Sketch of compensation PID set value definition

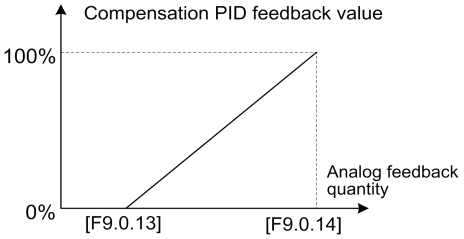


Figure 7-66 Sketch of compensation PID feedback value definition

7.38 Parameter selection of compensation pid controller (group F9.1)

There are 4 groups of compensation **PID** controller parameters, and their switching means are shown in Figure 7-67 ([9.1.21=0023]):

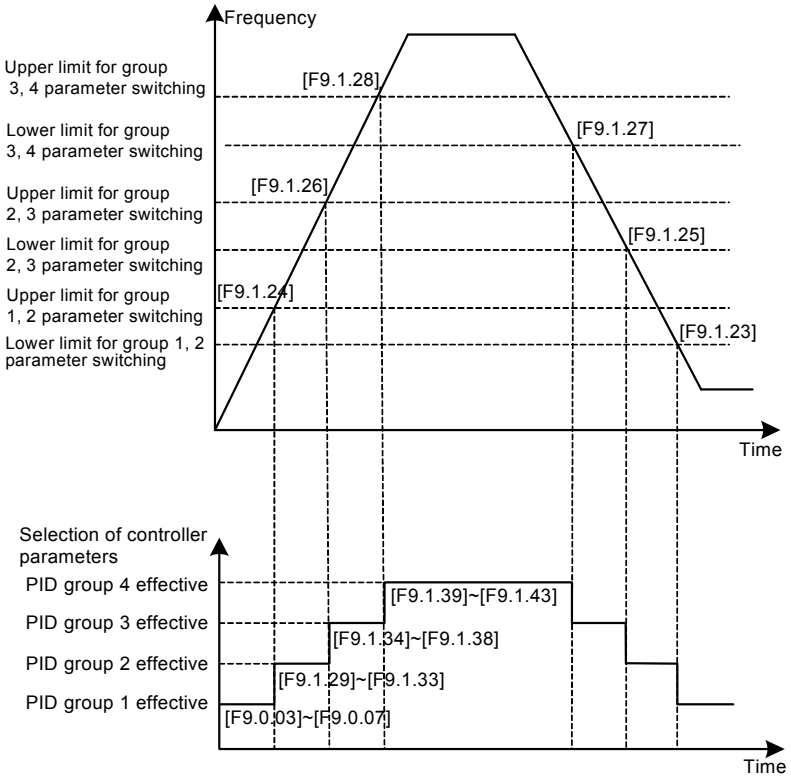


Figure 7-67 Sketch of compensation PID parameter switching

7.39 Modbus fieldbus (Standard expansion card configuration) (group FA.0)

FA.0.02 The inverter station address	Setting range: 0~247	Factory default: 1

This parameter is used to set the address of the local inverter in the case of serial port communication. It is only effective when the inverter is a slave one. During communication, the local device only receives commands for the data frames consistent with the address of this device, and then sends back response frames.

- 0 is the broadcasting address. When it is set to the broadcasting address, the device will only receive and execute broadcasting commands and will not respond to the master device.

FA.0.03 The device response delay	Setting range: 0~1000ms	Factory default: 5ms

The response delay of the inverter refers to the waiting time since the inverter serial port has received and explained the command sent from the slave device till the response frames are sent.

FA.0.04 Communication failure judging time	Setting range: 0.01~10.00Sec.	Factory default: 1.00

If the local inverter has not received correct data signal beyond the time interval defined by this parameter, then the communication is judged to be failed for the local inverter. The inverter will report **Fu.071** fault, and will act as set by **FA.0.05.**

7.40 Mapping parameter access (group FA.1)

FA.1.08~FA.1.13 Mapping application parameter 1~6 (H)	Setting range: F0.00~FF.55	Factory default: F0.29/F0.32
FA.1.14~FA.1.23 Mapping status parameter 1~10 (H)	Setting range: d0.00~d1.49	Factory default: d0.00~d0.09

When DL500 series inverter makes access to functional parameters or monitoring parameters via the buss, corresponding address can be predicted directly with the functional code. However, when it is needed to access multiple functional parameters or monitoring parameters with discontinuous address, multiple-frame data are needed in this method.

The mapping parameter access is actually a needle access mode. When accessing (reading or writing) several functional parameters or status parameters with discontinuous address, these parameters can be mapped into an area with continuous address (bus-control parameter area) for accessing.

See the following table for the bus-control parameters (compatible with A510 and V320 series).

Register Name	Access address	Remarks
Control word	0x1300	Can be read as per the loops (1~16)
Set value 1	0x1301	Setting of relative values
Set value 2	0x1302	Setting of absolute values
Mapping application parameter 1	0x1303	The access parameter is set by FA.1.08.
Mapping application parameter 2	0x1304	The access parameter is set by FA.1.09.
Mapping application parameter 3	0x1305	The access parameter is set by FA.1.10
Mapping application parameter 4	0x1306	The access parameter is set by FA.1.11.
Mapping application parameter 5	0x1307	The access parameter is set by FA.1.12.

Register Name	Access address	Remarks
Mapping application parameter 6	0x1308	The access parameter is set by FA.1.13.
Status word	0x1309	Can be read as per the discrete quantity (1~16)
Mapping status parameter 1	0x130A	The access parameter is set by FA.1.14.
Mapping status parameter 2	0x130B	The access parameter is set by FA.1.15.
Mapping status parameter 3	0x130C	The access parameter is set by FA.1.16.
Mapping status parameter 4	0x130D	The access parameter is set by FA.1.17.
Mapping status parameter 5	0x130E	The access parameter is set by FA.1.18.
Mapping status parameter 6	0x130F	The access parameter is set by FA.1.19.
Mapping status parameter 7	0x1310	The access parameter is set by FA.1.20.
Mapping status parameter 8	0x1311	The access parameter is set by FA.1.21.
Mapping status parameter 9	0x1312	The access parameter is set by FA.1.22.
Mapping status parameter 10	0x1313	The access parameter is set by FA.1.23.

The mapping parameters are determined by **FA.1** group of parameters.

For example, in one frame of standard **MODBUS** protocol data, it's impossible to read the status parameters **d0.0.02**, **d0.0.05**, **d1.0.01** and **d1.1.31** and status word once and for all with a common method. To map status parameters into the bus-controlled parameter area with continuous address, set with the following method:

[**FA.1.14**] = **d0.02**

[**FA.1.15**] = **d0.05**

[**FA.1.16**] = **d1.01**

[**FA.1.17**] = **d1.31**

Then you it just needs to read the data in the continuous address **0x130A** ~ **0x130D.**

7.41 Communication linkage synchronous control (group FA.2)

FA.2.26 Linkage setting proportion coefficient	Setting Range: 0.010~10.000	Factory Default: 1.000

During linkage control, this parameter defines the proportion between the output frequency of the master machine and the slave machine; the parameter of the master inverter does not function.

FA.2.27 Coupling fine proportion adjustment	Setting range: 0~3	Factory default: 0

0: No fine adjustment

If the fine adjustment source for linkage proportion coefficient is void, then: Slave frequency command = master frequency command * **[FA.2.26]** of the salve machine.

1: Analog input AI1

If **AI1** is selected for the fine adjustment source for linkage proportion coefficient, then:

Slave frequency command = master frequency command * **[FA.2.26]** of the salve machine ***AI1/AI1** maximum.

2: Analog input AI2

If **AI2 i**s selected for the fine adjustment source for linkage proportion coefficient, then:

Slave frequency command = master frequency command * **[FA.2.26]** of the salve machine ***AI2/AI2** maximum.

3: Analog input AI3

If **AI3** is selected for the fine adjustment source for linkage proportion coefficient, then: Slave frequency command =

master frequency command * **[FA.2.26]** of the salve machine ***AI3/AI3** maximum.

FA.2.28 Slave machine offset frequency/revolution	**Setting range: 0, 1, 2**	**Factory default: 0**

This parameter of the master inverter does not function, and it is used to select the auxiliary frequency of the slave machine:

Actual output frequency of the salve machine=master machine frequency command * slave machine linkage proportion (including fine adjustment) + offset frequency

0: No offset

No offset frequency/revolution; the frequency set value of the slave machine is determined by the frequency command of the master device and the setting of **FA.2.26** and **FA.2.27.**

1: Determined by frequency setting source 1

The frequency set value of the slave machine frequency setting source 1 is regarded as the offset frequency/revolution of the slave machine.

2: Determined by frequency setting source 2

The frequency set value of the slave machine frequency setting source 2 is regarded as the offset frequency/revolution of the slave machine.

FA.2.29 Coupling balance function	**Setting range: 0~4**	**Factory default: 0**

0: Void

1: Current balance

With reference to the load current of the master device, each slave device will automatically conduct fine adjustment to the output of local device so as to keep consistency with the master device's current.

2: Torque balance

With reference to the torque of the master device, each slave device will automatically 7.

3: Power balance

Each slave motor refers to the main motor power，automatic self-adjustment it's output to ensure the relatively consistent with the main motor power。

4: position synchronous balance

In the multi-motor linkage system with PG close loop vector control, to use the position synchronous balance is able to eliminate the accrued displacement deviation caused by the minor deviation of driver rotate speed. This method requires the motor that runs with linkage has the same parameter in the PG speed detector .

Position synchronous balance can only revise the minor rotate speed deviation. Adjust the synchronous rotate speed function before use the function.

The accrued pulse of subordinate motor in this mode is required to reset simultaneously with the master motor. Thus, only need to operate in the master motor, or make use of the reset terminal of subordinate motor.

FA.2.30 Coupling balancing gain	**Setting range: 0.001~10.000**	**Factory default: 1.000**

When the linkage balancing function is effective, this parameter is used to set the adjusting gain output by this device, and it is only effective for the slave device. The higher the gain is, the higher the amplitude of the self-balancing adjustment is.

7.42 Expansion multifunctional input terminal (group FB.0 AND FB.1)

The parameters in the access the corresponding extensions to take effect, its function and F3.Group the same parameters.

7.43 Servo control and scale positioning (group FB.2)

Fb.2.18 Automatic shift switching frequency	**Setting range: 0~5.00Hz**	**Factory default: 1.00**
Fb.2.19 Automatic shift switching cycle	**Setting Range: 0.10~2.00Sec.**	**Factory default: 0.3**

For equipments with mechanical speed change gear like the spindle, during mechanical shifting, shift jogging can be adopted to avoid mechanical dead. This group of parameters defines the running parameters for shift jogging.

Fb.2.20 Torque at 0 Hz (DC bind-type brake preferred)	**Setting range: 0~3**	**Factory default: 0**
Fb.2.21 Position lock gain1(location gain)	**Setting range: 0.10~10.00**	**Factory default: 1.0**

0: Void

1: Bind-type brake torque effective

2: Position locking (PG feedback VC mode)

In the running mode of V/F and SVC, the function of zero frequency torque holdup is similar with that of the DC braking function. It cannot guarantee that the motor shaft is absolutely static when it is dragged by the load, and the position gain is void.

In the PG feedback VC control mode, if the zero frequency torque holdup 2 is selected, the drive will automatically memorize the shaft position at stop, and shift to the position serve running mode, so as to guarantee that the shaft will not rotate even under the load dragging.

The higher the position gain is, the stronger the locking torque is.

3: Lock in the designated stop angle

It is used to the spindle drive of machine tool to ensure the constant angle in the spindle off. The stop angle is set by Fb 2.45.

Fb.2.22 PG speed shaft propulsion distance per revolution	**Setting range: 0.001~50.000mm**	**Factory default: 0.500**

This parameter is set the liner displacement of the transmission structure for each revolution of PG speed shaft. The accumulative displacement is shown in the monitoring parameter d1.2.20.

Fb.2.23 Servo control function	**Setting range: 0000~0012**	**Factory default: 0000**

_ _ _ X: Function selection

0: Void – servo control void, and running in the speed or torque control mode.

1: Effective – must be in the closed-loop vector control mode.

2: External terminal selection (Function No. 69).

The closed-loop vector control mode must be selected for this function, and the selection will not be effective until the inverter has completely stopped.

_ _ X _ : Action mode

0: Common mode

1: Spindle orientation

Fb.2.24 Position setting source in common mode	**Setting range: 0~5**	**Factory default: 1**
Fb.2.25 Position digit setting (lower)	**Setting range: 0~65535**	**Factory default: 0**
Fb.2.26 Position digit setting (upper)	**Setting range: 0~500**	**Factory default: 0**

This group of parameters is used to define the position command source in the mode of common serve control.

When the analog setting is used to set the position, the maximum analog input is corresponding to 5000 pulse commands.

When digital setting ([Fb.2.24] = 2) is selected as the position setting source, Fb.2.25 and Fb.2.26 are used to set the command position.

Fb.2.27 Electronic gear (numerator)	**Setting range: 0~65535**	**Factory default: 1000**
Fb.2.28 Electronic gear (denominator)	**Setting range: 0~65535**	**Factory default: 1000**

The electronic gear is used to transform the command pulse to the amount of movement. If the encoder is set to A (pulse per revolution), the displacement per revolution of the motor is B, and the pulse command unit is C, then the electronic gear can be calculated as below:

Electronic gear = 4AC/B

The numerator and denominator can be figured out after approximating the common divider.

For example, the encoder of a certain transmission is 1000 lines (A=1000), and motor displacement per revolution is 2 mm (B=2), and the pulse command unit is 1 um (C=0.001m), then the electronic gear is 4AC/B = 4000*0.001/2 = 2/1. Hence, the numerator and the denominator for the electronic gear is respectively 2 and 1.

Fb.2.30 Position gain 2	**Setting range: 0.01~100.00**	**Factory default: 1.00**
Fb.2.31 Position gain selection mode	**Setting range: 0~3**	**Factory default: 0**
Fb.2.32 Position gain selection position deviation	**Setting range: 0~30000**	**Factory default: 100**

In the position gain selection mode, the position gain 1 (Fb. 2.21) is effective when the gain ([Fb.2.31]=3) is selected according to the position deviation, and the position deviation is lower than the set pulse value (Fb.2.32). Otherwise, the position gain 2 (Fb.2.30) will be effective.

Fb.2.33 Speed feed-forward gain	**Setting range: 0.0~200.0(%)**	**Factory default: 100.0**

The higher the position speed feed-forward gain is set, the faster the tracking speed is. However, excessive set value may worsen the stability.

Fb.2.36 Spindle orientation mode	**Setting range: 0000~0111**	**Factory default: 0000**

_ _ _ X: Selection of positioning zero point reference signals

0: Z Pulse positioning

Z pulse is used to be the reference signal for spindle 0 point (any offset angle can be set according to usual practice). In this

mode, the encoder should be installed on the spindle.

1: Photoelectric switch positioning

The photo electricity (or other sensor signal) on the spindle is used as the zero point reference signal.

_ _ X _: Positioning command

0: External terminal selection

The value (**Fb.2.38~Fb.2.44**) preset by the external functional terminal (**Function No. 72~74**) selection is used as the current positioning command. It is required to correctly set the transmission ratio (**Fb.2.46**) of the spindle, and when the encoder is installed on the spindle, this vale is set to be **1.000**.

1: Pulse command setting

The positioning angle will be determined according to received command pulse. In this mode, it is applicable to adjust the transmission gear with the electronic gear or directly change the command pulse number. Please note that the direction of command pulse should be consistent with the spindle rotation direction, and the spindle transmission ratio (**Fb.2.46**) should be correctly set.

_ x _ _: locating running direction

0: agreement with the order direction

1: fast locate with the minimum deflection angle

Fb.2.37 Spindle orientation frequency/speed	**Setting range: 0.01~100.00Hz**	**Factory default: 5.00Hz**

To define the maximum search frequency at the time of spindle positioning.

Fb.2.38~ Fb.2.44 Spindle positioning angle 1~7	**Setting range: 0~359.9**	**Factory default: 0.0~315.0**
Fb.2.45 Spindle stop angle	**Setting range: 0~359.9**	**Factory default: 0.0**

Setting for multi-stage spindle positioning angle and stop angle.

Fb.2.46 Spindle transmission ratio	**Setting range: 0.010~50.000**	**Factory default: 1.000**

When the encoder is not directly installed on the spindle, this parameter needs need to be set to achieve correct spindle orientation. This parameter only functions for the spindle orientation function.

Spindle transmission ratio = revolution of the speed shaft: spindle revolution.

7.44 Virtual input and output (group FF.0)

FF.0.00 FF configuration parameter locking function (H)	**Setting range: 0000~1001**	**Factory default: 0000**

FF group parameters include special and internal function parameters, and their setting and initialization are confined. This group of parameters is used to set the user's authority for operating FF parameters.

FF.0.01~FF.0.08 Definition of virtual output node (SDO1~SDO8)	**Setting range: 0~71**	**Factory default: 0**

The virtual output nodes **SDO1~SDO8** are functionally the same as the multifunctional output terminals **DO1~DO3**, but do not output any signal. They are directly connected in the controller of the inverter to the virtual input nodes **SDI1~SDI8** one to one.

Using virtual nodes can not only help simplify wiring but can also avoid interference. The function of **SDO1~ SDO8** can be defined by setting the value of **FF.0.01~FF.0.08**. Please refer to Table 2 (Comparison Table for Variables of Multifunctional Output Terminals (DO/EDO/SDO) for the variables corresponding to the set value.

FF.0.09~FF.0.16 Definition of virtual input node (SDI1~ SDI8)	**Setting range: 0~96**	**Factory default: 0**

The virtual input nodes **SDI1~SDI8** are functionally the same as the multifunctional input terminals **DI1~DI9.** But there are no actual physical input nodes. They are connected to the virtual output **SDO1~SDO8** one to one, and are directly taken from the virtual output signal.

The virtual input nodes **SDI1~SDI8** are functionally programmable, and their function can be defined by setting the values of **FF.0.09~FF.0.16**. Please refer to Table 1 (Comparison Table for Functions of Multifunctional Input Terminals (DI/EDI/SDI) for functions corresponding to the set value.

FF.0.17 Virtual output - input connection polarity	**Setting range: 0000~1111**	**Factory default: 0000**
FF.0.18 Virtual output - input connection polarity	**Setting range: 0000~1111**	**Factory default: 0000**

The parameters are used to set the connection logic status of the virtual output nodes **SDO1~SDO8** and virtual input nodes **SDI1~SDI8**. When it is set to be reverse polarity connection, the virtual output signal will be negated before being inputted to the virtual input port, as shown in Figure 7-67.

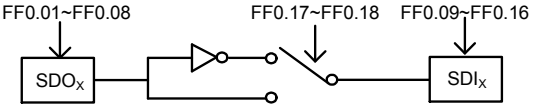


Figure 7-67 Block diagram of virtual output – input

7.45 Protecting function configuration parameters (group FF.1)

This group of parameters is used to define if the protecting function needs to be activated or not. Generally no modification is required.

7.46 Correction parameters (group FF.2)

FF.2.25 AI1 Zero offset adjustment	**Setting range: -0.500~0.500V**	**Factory default: 0.0**
FF.2.26 AI1 gain correction	**Setting range: 0.950~1.050**	**Factory default: 1.000**

This group of parameters is sued to make fine adjustment to **AI1** zero point and **AI1**. The relationship before and after adjustment:

AI1 input value= **AI1** gain correction* **AI1** value before adjustment +**AI1** zero offset

FF.2.27 4mA deviation adjustment for AI2	**Setting range: -0.500~0.500mA**	**Factory default: 0.0**

FF.2.28 AI2 gain correction	**Setting range: 0.950~1.050**	**Factory default: 1.000**
FF.2.29 AI3 Zero offset adjustment	**Setting range: -0.500~0.500V**	**Factory default: 0.0**
FF.2.30 AI3 gain correction	**Setting range: 0.950~1.050**	**Factory default: 1.000**
FF.2.31 AO1 zero offset correction	**Setting range: -0.500~0.500V**	**Factory default: 0.0**
FF.2.32 AO1 gain correction	**Setting range: 0.950~1.050**	**Factory default: 1.000**
FF.2.33 AO2zero offset correction	**Setting range: -0.500~0.500V**	**Factory default: 0.0**
FF.2.34 AO2 gain correction	**Setting range: 0.950~1.050**	**Factory default: 1.000**

The correction principle for each analog input/output port is the same as **AI1**. The relationship curves with zero offset adjustment and gain correction are respectively as below. Generally, users do not need to set these parameters.

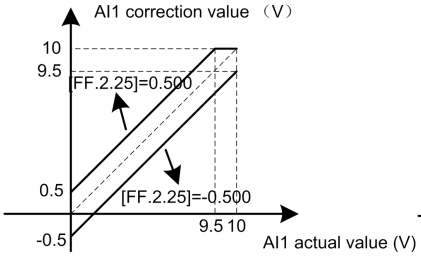


Figure 7-68-A AI1 zero offset correction curve

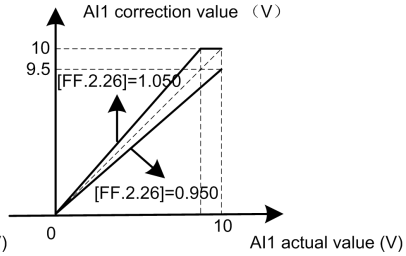


Figure 7-68-B AI1 gain correction curve

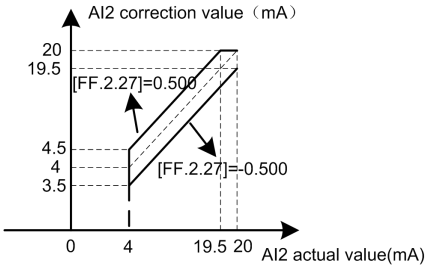


Figure 7-69-A AI2 zero offset correction curve

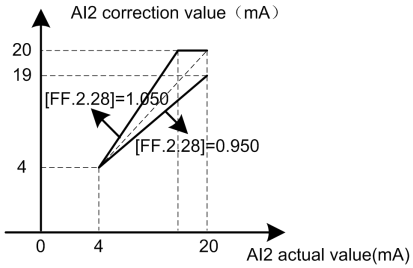


Figure 7-69-B AI2 gain correction curve

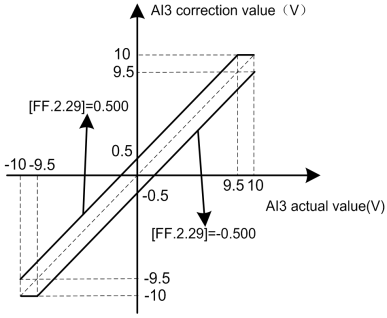


Figure 7-70-A AI3 zero offset correction curve

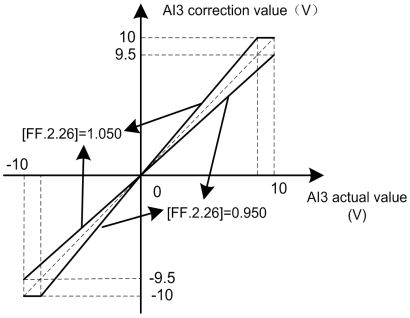


Figure 7-70-B AI3 gain correction curve

FF.2.35 Under voltage protection action level	Setting range: 320~450V	Factory default: 350V

This parameter sets the allowable lower limiting voltage at the DC side during normal operation of the inverter. For some occasions with lower power grid, it is applicable to appropriately reduce the under voltage protection level, so as to ensure normal operation of the inverter.

- When the power grid is under excessive low voltage, the output torque of the motor will decrease. In the occasion of constant power load and constant torque load, excessive low voltage of the power grid will lead to increase of the inverter's input current, hence reducing the reliability of inverter operation.

The set value for this parameter [**FF.2.35**] must be no more than the under voltage adjustment action level [**F1.4.45**].

FF.2.36 DC bus volts detection level gain	Setting range: 0.950~1.050	Factory default: 1.000

When the actual bus of the inverter is deviated from the value of the DC side voltage monitoring parameter **d0.0.07**, it is applicable to set this parameter combined with the correction of potentiometer in the bus voltage detection circuit.

7.47 SPecial functional parameters (group FF.3)

The modification of this group of parameters should be conducted under the guidance of professionals, and no modification is needed generally.

7.48 Other configuration parameters (group FF.4)

FF.4.41 Cooling fan control	Setting range: 0000~0111	Factory default: 0101

_ _ _ X: Soft start function (effective for model 4T0370 below)

This function helps effectively reducing the instantaneous power required for starting the fan, hence guarantee stable and reliable operation of the switch power supply.

_ _ X _: Air volume auto adjustment (effective for model 4T0370 below)

The revolution of the cooling fan can be automatically adjusted according to the ambient temperature and operation status of the inverter, so as to maximize service life of the cooling fan.

_ X _ _: Start time

0: Start immediately after power-on

The fan will run according to the settings in the unit and ten's digit of this parameter immediately after the inverter is powered on.

1: Start during running

The fan will run according to the settings in the unit and ten's digit of this parameter after the inverter is powered on and has received the running command.

FF.4.42 Operating panel control options	Setting range: 0000~2001	Factory default: 0000

X _ _ _ : Panel control selection (except STOP key)

0: Standard panel interface control

The control command can only be given through the standard operating panel, and external monitoring panel can be connected via **RS485**.

1: RS485 port external panel control

The control command can only be given via **RS485** port, and the standard panel is only used for monitoring.

2: Multifunctional terminal switching

The master control panel is selected by the multifunctional input terminal (Function No. 40) and the terminal function is set with the parameters **F3.0.00** ~ **F3.0.08**.

FF.4.43 Special function configuration	Setting range: 0000~1111	Factory default: 0001

_ _ _ X: Motor parameter identification auto-start

0: Forbidden

1: Permitted

After modifying the motor nameplate parameters, the inverter will automatically set static self identification of motor parameters once.

_ _ X _ : Voltage vector composition mode

0: Three-phase composition

1: Two-phase composition

Another modulation method for space voltage vector. This method can help appropriately reduce heating of the inverter, but audio noise may somewhat increase.

_ X _ _: Small pulse shielding

0: Void

1: Effective

When "Effective" is selected, the heating of the drive can be reduced under full-output voltage.

X _ _ _ : SVC Revolution identification mode/synchro control mode

0: SVC Revolution identification mode 1/synchro id = 0 control mode

1: SVC Revolution identification mode 2 (reserved) effecctive/synchro minimum current control mode

Chapter 8 Warning, Alarm Diagnosis And Counter Measures

When the frequency inverter sends warning signals, the auxiliary display column displays warning code. Some warnings have no influence on the operation of the inverter. Those warnings which may influence the operation of the frequency inverter should be limited as much as possible; otherwise, more serious failures may be caused. When the frequency inverter fails to alarm, its protective function will act and display fault code and the inverter will stop outputting with the motor freely sliding and shutting down.

8.1 Troubleshooting with warning or alarm display

8.1.1 Alarm display and troubleshooting

Fault code	Fault description	Possible causes	Solutions
Fu.001	Over current during acceleration	1. The acceleration time is too short. 2. V/F curve or torque boosting is set improperly. 3. After it is re-energized upon transient stop, the rotating motor is restarted. 4. The frequency inverter has smaller capacity. 5. The encoder is faulty or disconnected during the operation and acceleration with PG.	1. Adjust acceleration time. 2. Adjust V/F curve or torque boosting parameters. 3. It is valid to set [F0.4.38] as 1; Recover operation in the mode of deceleration and restart after power off. 4. Select frequency inverter with matched capacity level. 5. Inspect encoder and its connection
Fu.002	Over current during deceleration	1. The deceleration time is too short. 2. The potential energy load or load inertia is too large. 3. The frequency inverter has smaller capacity. 4. The encoder is faulty or disconnected during the operation and deceleration with PG.	1. Adjust deceleration time. 2. Connect braking resistor or unit externally. 3. Select frequency inverter with matched capacity level. 4. Inspect encoder and its connection.
Fu.003	Over current during operation	1. The load changes suddenly. 2. The grid has over-low voltage. 3. The frequency inverter has smaller capacity. 4. The load is overweight. 5. After it is re-energized upon transient stop, the rotating motor is restarted. 6. The output line of the frequency inverter has interphase short circuit or phase line short circuit to ground. 7. The encoder is faulty or disconnected during operation with PG.	1. Reduce load sudden change. 2. Inspect voltage of power supply. 3. Select frequency inverter with matched capacity level. 4. Inspect load or replace a frequency inverter with larger capacity. 5. It is valid to set [F0.4.38] as 1; Recover operation in the mode of deceleration and restart after power off. 6. Eliminate short circuit failure. 7. Inspect the connection of encoder.
Fu.004	Over voltage during acceleration	1. The input voltage is abnormal. 2. The rotating speed closed loop parameters are set improperly during vector control operation. 3. Start the rotating motor (without rotating speed tracking).	1. Inspect input power supply. 2. Adjust rotating speed closed loop parameters. Please refer to the description of F8.1 parameter set. 3. It is valid to set [F0.4.38] as 1; Recover operation in the mode of deceleration and restart after power off.
Fu.005	Over voltage during deceleration	1. The deceleration period is too short. 2. The load potential energy or inertia is too large. 3. The input voltage is abnormal.	1. Adjust deceleration time. 2. Connect braking resistor or unit externally. 3. Inspect input power supply.

Fault code	Fault description	Possible causes	Solutions
Fu.006	Over voltage during operation	1. The input voltage is abnormal. 2. The parameters of regulator are set improperly during vector control operation.	1. Install input reactor. 2. For adjusting parameters of regulator, please refer to the description of parameter set in F8.1.
Fu.007	Over voltage when shutting down	The voltage of the power supply is abnormal.	Inspect voltage of power supply.
Fu.008	Under voltage during operation (can be shielded)	1. The voltage of the power supply is abnormal. 2. Large load is started in the grid.	1. Inspect voltage of power supply 2. Supply power separately
Fu.009	Dive protection action	Main circuit fault or interference.	1. Check the main circuit. 2 .Shield the protection.. 3. Please consult the manufacturer before operation.
Fu.010	Earth fault protection	The motor has a ground short circuit before operation.	Check the motor wiring.
Fu.011	Electromagnetic interference	False operation caused by the surrounding electromagnetic interference.	Seek for technical service
Fu.012	Overload of frequency inverter	1. The load is overweight. 2. The acceleration period is too short. 3. The booster voltage of torque is too high or V/F curve is set improperly. 4. The grid has over-low voltage. 5. Do not start rotating speed tracking restart function and directly start the rotating motor. 6. In closed loop vector mode, the direction of pulse of the encoder is opposite to that of the motor.	1. Reduce load or replace a frequency inverter with larger capacity. 2. Prolong acceleration time. 3. Reduce torque lifting voltage and adjust V/F curve. 4. Inspect the voltage of grid 5. Set the starting/stopping mode ([F0.4.38]) as rotating speed tracking restarting mode. 6. Check whether the encoder is reverse.
Fu.013	Overload protection action of motor	1. V/F curve is set improperly. 2. The grid has over-low voltage. 3. The motor is operated for long time with low speed and large load. 4. The overload protection coefficient of the motor is too small. 5. Locked-rotor operation of motor or overlarge load. 6. In closed loop vector mode, the direction of pulse of the encoder is opposite to that of the motor.	1. Adjust V/F curve. 2. Inspect the input voltage of grid. 3. Select special motor for frequency conversion for long-term low speed operation. 4. Increase the overload protection coefficient of the motor ([F2.0.25]). 5. Adjust the working conditions of the load or select frequency inverter with matched capacity level. 6. Adjust the connection of encoder or change the function setting for direction of the encoder.
Fu.014	Overheating of frequency inverter (sensor 1)	1. The air duct is blocked. 2. The ambient temperature is over high. 3. The fan is abnormal. 4. The temperature detecting circuit or power module is abnormal.	1. Clean the air duct or improve ventilation conditions. 2. Improve ventilation conditions and reduce carrier frequency 3. Replace the fan. 4. Seek for the manufacturer's support.
Fu.015	Overheating of frequency inverter (sensor 2)	Same with above.	Same with above.
Fu.016	Overheating of frequency inverter (sensor 3)	Same with above.	Same with above.
Fu.017	External equipment is faulty or the panel	The external equipment of the frequency inverter is faulty, the input terminal has signal input.	Inspect signal source and relevant equipment and find the root leading to

Fault code	Fault description	Possible causes	Solutions
	has forced stoppage		the stoppage of the panel.
Fu.018	Excessive protection of rotating speed deviation	1. The load is too large. 2. The acceleration time is too short. 3. The load is locked. 4. The detection value ([F8.2.34]) and time ([F8.2.35]) for DEV is set improperly.	1. Reduce load. 2. Prolong acceleration and deceleration time. 3. Confirm the mechanical system of the load. 4. Reset the detection value ([F8.2.34]) and time ([F8.2.35]) for DEV.
Fu.019	Over speed failure (OS)	1. Overshoot or undershoot is occurred. 2. The frequency is too high. 3. The detection value ([F8.2.36]) and time ([F8.2.37]) for over speed is set improperly.	1. Adjust the gain. 2. Adjust the set value of frequency. 3. Reset the set value of the detection value ([F8.2.36]) and time ([F8.2.37]) of OS.
Fu.020	Reverse connection of A, B pulse	Mistaken connection of A, B pulse of PG card.	1. Change the connection order of A, B pulse, or, 2. Modify the setting of parameter F8.0.06, or, 3. Exchange any two wires from U, V, W
Fu.021	The master contactor is not actuated well. Or the thruster of major loop is not conducted.	1. The DC side master contactor in the frequency inverter is not actuated well. 2. The power supply voltage is unstable with frequent sudden change.	1. Clean the dust on the contact of the master contactor. 2. Replace the master contactor 3. Close this protective function (FF.1.21)
Fu.022	Internal data memory is faulty	1. There is intense noise around in the process of writing in function code data. 2. The internal memory is damaged.	1. Retry after reset. 2. Seek for manufacturer's service.
Fu.026 Fu.027 Fu.028	The output current of U phase is deficient/smaller The output current of V phase is deficient/smaller The output current of W phase is deficient/smaller	1. The lead from frequency inverter to motor is disconnected. 2. The driving or control panel of the frequency inverter is faulty. 3. The three-phase winding of the motor is faulty.	1. Eliminate peripheral failures. 2. Seek for manufacturer's support. 3. Eliminate the failure of motor.
Fu.032	The three-phase input voltage is unbalanced (can be shielded)	The imbalance rate of three-phase voltage is larger.	1. Add AC or DC reactor. 2. Increase the capacity of frequency inverter.
Fu.034	Per-cycle current limiting alarm	The load is too heavy.	1. Reduce the load.
Fu.035	Program overcurrent protection	Three-phase imbalance	1:check power grid and working situation 2:Seek for manufacturer's support.
Fu.036 Fu.037 Fu.038	AI1 input is disconnected A12 input is disconnected A13 input is disconnected	1. The wiring of input analog signal is disconnected or analog input signal source is inexistent. 2. Parameters related to disconnection detection are configured improperly.	1. Inspect the wiring of analog input signal and the analog input signal source. 2. Modify the configuration parameters.
Fu.039	Fin input is disconnected	1. The wiring of pulse input signal is disconnected or analog input signal source is inexistent.	1. Inspect the wiring of pulse input signal and analog input signal source. 2. Modify the configuration parameters.

Fault code	Fault description	Possible causes	Solutions
		2. Parameters related to disconnection detection are configured improperly.	
Fu.040	The rotating speed detection loop is disconnected	1. The speed measuring module is incorrectly connected. 2. The wiring of speed measuring module is disconnected. 3. The output of speed measuring module is abnormal. 4. Relevant function codes are set improperly.	1. Inspect the connection of speed measuring module. 2. Modify the parameter setting. 3. Seek for manufacturer's support.
Fu.041	The motor fails to be connected when the motor parameters are identified.	The motor fails to be connected when the motor parameters are identified.	Connect motor.
Fu.042	U phase output is disconnected or the parameters are seriously unbalanced during motor identification.	1. The lead from frequency inverter to motor is disconnected. 2. The driving or control panel of the frequency inverter is faulty. 3. The three-phase winding of the motor is faulty.	1. Eliminate peripheral failures. 2. Seek for manufacturer's support. 3. Eliminate the failure of motor.
Fu.043	V phase output is disconnected or the parameters are seriously unbalanced during motor identification.	1. The lead from frequency inverter to motor is disconnected. 2. The driving or control panel of the frequency inverter is faulty. 3. The three-phase winding of the motor is faulty.	1. Eliminate peripheral failures. 2. Seek for manufacturer's support. 3. Eliminate the failure of motor.
Fu.044	W phase output is disconnected or the parameters are seriously unbalanced during motor identification.	1. The lead from frequency inverter to motor is disconnected. 2. The driving or control panel of the frequency inverter is faulty. 3. The three-phase winding of the motor is faulty.	1. Eliminate peripheral failures. 2. Seek for manufacturer's support. 3. Eliminate the failure of motor.
Fu.045	Over temperature of motor	The motor temperature exceeds the setting scope	1. Reduce motor load. 2. Improve operating environment. 3. Modify protective threshold.
Fu.051	U phase current is detected faulty (sensor or circuit)	1. The current sensor or circuit is damaged. 2. The auxiliary power supply is faulty. 3. The control and driving panel are bad connected.	Seek for manufacturer's support.
Fu.052	V phase current is detected faulty (sensor or circuit)	1. The current sensor or circuit is damaged. 2. The auxiliary power supply is faulty 3. The control and driving panel are bad connected.	Seek for manufacturer's support.
Fu.054	The temperature sensor 1 is faulty (can be shielded)	The temperature detecting circuit is abnormal.	Seek for manufacturer's support.
Fu.055	The temperature sensor 2 is faulty (can be shielded)	The temperature detecting circuit is abnormal.	Seek for manufacturer's support.
Fu.056	The temperature sensor 3 is faulty (can be shielded)	The temperature detecting circuit is abnormal.	Seek for manufacturer's support.
Fu.067	Expansion card 1 communication	Poor connection or damage of expansion card 1.	Reinstall or replace expansion card 1.

Fault code	Fault description	Possible causes	Solutions
	interruption		
Fu.068	Expansion card 2 communication interruption	Poor connection or damage of expansion card 2	Reinstall or replace expansion card 2.
Fu.070	Dynamic identification frequency abnormality	Upper limit frequency is lower than dynamic identification frequency.	Modify maximum output frequency(F0.1.20)and upper limit frequency(F0.1.21).
Fu.072	The connection of accessories is abnormal	1. The extended components are not inserted well. 2. The extended components are damaged.	1. Reinstall the extended components. 2. Replace the extended components.
Fu.201	Conflicting parameter setting		Please contact the direct supplier.
Fu.300	Alarm not reset aftre power rating modification	Operation continued without power-off after power rating modification.	Power off and restart after modifying the power rating.
Fu.301 ~ Fu.311	Control panel is faulty		Seek for manufacturer's support.

8.1.2 Warning display and troubleshooting

Display	Warnings	Can be shielded or not	Solutions other than shielding
aL.003	Over high power supply voltage		Inspect input power supply
aL.008	Lower input voltage (under voltage early warning)		Inspect input power supply
aL.011	Bad electromagnetic environment		Improve working environment or seek for manufacturer's support
aL.012	The load is overweight and protection maybe occurred		Reduce load, or replace a frequency inverter with larger power
aL.014	INV overheating early warning		Improve ventilation conditions and reduce carrier
aL.018	Overlarge DEV		1. Reduce load 2. Prolong acceleration and deceleration time 3. Confirm mechanical system of load 4. Confirm the detection value ([F8.2.34]) and time ([F8.2.35]) for DEV
aL.019	Over speed (OS)		1. Adjust frequency setting loop 2. Inspect the setting value of detection value [F8.2.36]) and time ([F8.2.37]) for OS
aL.026 aL.027 aL.028	The output current of U phase is deficient/smaller The output current of V phase is deficient/smaller The output current of W phase is deficient/smaller	Can be shielded	Inspect the connecting wire between frequency inverter and motor or the winding of motor
aL.031	The starting enabling signal is deficient		1. Inspect the enabling connection (42) in multifunctional input terminal and the status of the terminal (ON/OFF) 2. Inspect whether the starting enabling signal in bus command word is effective or not
aL.032	Early warning of unbalanced three-phase input voltage	Can be shielded	Measure the input voltage of all the phases, install ACR and reduce imbalance rate among phases

Display	Warnings	Can be shielded or not	Solutions other than shielding
aL.036 aL.037 aL.038	AI1 input is disconnected AI2 input is disconnected AI3 input is disconnected	Can be shielded	1. Inspect the connection of analog input signal 2. Inspect whether there're signals in the signal source
aL.039	Fin input is disconnected (retained)	Can be shielded	
aL.040	The rotating speed detecting loop is disconnected	Can be shielded	1. Inspect the connection of speed measuring module 2. Seek for manufacturer's support
aL.041	No-load operation fails to identify the parameters of motor		
aL.042 aL.043 aL.044	The parameters of U phase of motor is abnormal The parameters of V phase of motor is abnormal The parameters of W phase of motor is abnormal		Inspect whether the winding of motor is faulty
aL.045	Over temperature of motor		Select special motor for frequency conversion for long-term low speed operation
aL.049	The driving circuit is abnormal and unbalanced		
aL.050	The communication of MODBUS bus is interrupted		
aL.054 aL.055 aL.056	The temperature sensor 1 is faulty The temperature sensor 2 is faulty The temperature sensor 3 is faulty	Can be shielded	1. Increase the action point for over temperature warning 2. Replace the temperature sensor 1,2,3
aL.058	The parameters can not be recovered in batch during operation		
aL.059	The numerical value when energized can not be recovered during operation		
aL.061	The connection between expanded communication module and master control board is interrupted abnormally		
aL.062	The function expansion unit 1 has a hardware conflict		1. The expansion unit selected is inappropriate and can not be used with such type of frequency inverter 2. The function expansion unit has a internal fault
aL.063	The function expansion unit 2 has a hardware conflict		1. The expansion unit selected is inappropriate and can not be used with such type of frequency inverter 2. The function expansion unit has a internal fault
aL.064	The function expansion unit has a resource conflict		This expansion unit can not be used with other expansion units
aL.065	Fail to establish communications with function expansion unit 1		
aL.066	Fail to establish communications with function expansion unit 2		
aL.067	The communication links of function expansion unit 1 is interrupted abnormally		

Display	Warnings	Can be shielded or not	Solutions other than shielding
aL.068	The communication links of function expansion unit 2 is interrupted abnormally		
aL.071	The parameter download is failed (Note: download is from operation panel to control panel of frequency inverter; upload is from control panel to operation panel)		Inspect whether the communication interface between operation panel and control panel is normal or not
aL.072	The memory of panel fails to be operated		
aL.073	The memory of panel inhibits write and can not download parameters		
aL.074	The upload of parameters is failed (automatically recover to the numerical value before uploading)		1. Inspect whether the communication interface between panel and control panel is normal or not. 2. In the parameter F0.0.08, parameter upload is forbidden in terms of local upload.
aL.075	The version of panel parameters is different from that of equipment parameters; it can not be uploaded		Re-upload panel parameters same as the version of equipment parameters
aL.076	The panel has no effective parameters and can not be uploaded		The panel parameters are not modified effectively and need not to be uploaded
aL.077	The panel parameters exceed the setting scope INV allowed and fail to be uploaded		Confirm the allowed parameter scope, reset and upload
aL.099	The operation panel is abnormally connected		After power off, reinsert and pull out of the panel or replace the panel
aL.100	The control program is failed resulted from electromagnetic interference		Improve electromagnetic environment
aL.101	The setting parameters are conflicted		Reset the parameters correctly
aL.102	The setting parameters fail to connect the corresponding expansion card		Reset the parameters or inspect the connection of expansion card
aL.103	The setting motor parameters are conflicted(rated frequency, rotating speed conflict)		Reset the motor parameters
aL.104	The setting motor parameters are conflicted (No-load current, rated current, rated rotating speed, rated frequency and rotor time constant)		Reset the motor parameters
aL.105	The inductance parameters of motor stator overflow		Reset the inductance parameters of motors stator
aL.201	The setting parameters are conflicted and it's about to shut down		Immediately contact the direct supplier

8.2 Abnormal operation without prompts and the solutions

1. The motor is not rotated:

Possible causes	Solutions
The operation command channel is wrongly selected	Switch the operation command channel into correct one via **PANEL/REMOTE** key in operation panel or remote terminal
The operation command source is wrongly selected	According to the need on the site, reset the selection of operation command source ([F0.1.15]), control command 1([F0.3.33]) and control command 2 ([F0.3.34])
The setting frequency is below the starting frequency	1. Set the setting frequency to be above the starting frequency ([F0.4.39]) 2. Inspect whether the frequency setting channel is normal or not, eliminate possible analog input frequency setting failures and shuttle potentiometer failures, etc. 3. Correctly connect the external terminals related to frequency setting
Other frequency command sources with higher priority are valid	According to the need on the site, reset the frequency (rotating speed) setting priority ([F5.3.28])
The upper and lower frequency limit is set improperly.	Inspect the data of upper ([F0.1.21]) and lower ([F0.1.22]) frequency limit and reset
The motor has insufficient torque	In V/F control mode: · Increase the torque of motor and boost voltage · Adjust V/F curve In SVC/VC control mode: · Re-measure the parameters of motor ([F2.2.53]) · Adjust vector mode and start pre-excitation time ([F2.2.52])

2. The motor is rotating but the speed can not be increased:

Possible causes	Solutions
The setting value of maximum output frequency is too low.	Increase the value of maximum output frequency ([F0.1.20]).
The setting value of upper frequency limit is too low.	1. Increase the data of upper frequency limit ([F0.1.21]). 2. Increase the maximum value of frequency setting channel 1([F0.2.28]) and 2 ([F0.2.31]).
The set frequency is too low.	Inspect whether the setting of selection of frequency setting channel ([F0.1.16]) is correct or not; the set frequency value is lower or the frequency setting channel is faulty.
The acceleration period is too long.	Set appropriate acceleration time ([F1.0.03], [F1.0.05], [F1.0.07], [F1.0.09]).
The parameter values of motor are set improperly	1. Confirm whether ([F2.0.00] ~ [F2.0.09]) is compatible with the parameters of motor. 2. In vector control mode, make the motor re-self measured and get correct internal motor parameters.
The output frequency is not rising resulted from current limit protection	1. According to the requirements on the site, reasonably configure the acceleration/deceleration current limit level ([F1.4.39]), strong starting current limit level (F1.4.40) and maintenance time ([F1.4.41]). 2. Restart after reducing torque and boosting voltage (F1.2.18) and observe whether the output frequency is rising or not. 3. Confirm whether V/F setting ([F1.2.15], [F1.2.16], and [F1.2.17]) is appropriate or not. Adjust V/F setting into rated value of motor.
The output frequency is not rising resulted from torque setting limit	Confirm the torque setting limit ([F8.3.47], [F8.3.48]~[F8.3.51])sets correct value.

3. The direction of rotation of the motor is opposite to the command

Possible causes	Solutions
Operation direction	Inspect the setting of operation direction ([F0.1.17]).
The F/R function code in multifunctional input terminal is wrongly selected	Inspect whether the multifunctional input terminal ([F3.0.00]~[F3.0.08]) correctly selects the function code of FWD operation command terminal, REV operation command terminal and three wire operation control.
The action mode of external control terminal is wrongly selected	Inspect the action mode of external control terminal (F0.3.35).
Inspect the wiring connecting with the motor	Exchange the connection of any two phases of U, V, and W of frequency inverter or motor.
Inspect the connection of F/R control terminal	Inspect the connection of multifunctional input terminal set as FWD operation command terminal, REV operation command terminal and three wire operation control.

4. Rotating speed variation and current fluctuation occurs in constant speed operation

Possible causes	Solutions
The frequency setting varies	When the frequency is set by adopting analog input terminal, the analog input filtering time constant can be increased. ([F4.0.06], [F4.0.07], [F4.0.08])
The carrier frequency is set lower	Increase the carrier frequency of the frequency inverter ([F1.1.13]), change the carrier characteristics ([F1.1.14]) and observe whether the oscillation is disappeared.
The load type is set improperly	Set steady load operation in macro parameter ([F0.0.0]) and confirm whether there's vibration or not.
The motor parameters are set inaccurately	1. Make sure the motor parameters ([F2.0.00~F2.0.09]) are set correctly or re-self adjust the internal parameters of the motor. 2. Adjust motor speed closed loop PID parameter ([F8.2.25~F8.2.27]).
The wiring between frequency inverter and motor is long	Shorten the output wiring as much as possible or install AC reactor.
Vibration is caused due to the vibration system with lower rigidity at the side of the load	Cancel the increasing of automatic torque, automatic energy-saving operation, anti-overload control, current limit, torque limit and confirm whether the vibration is disappeared.

5. The motor roars or has abnormal sound

Possible causes	Solutions
The carrier is lower	Increase the carrier frequency of the frequency inverter ([F1.1.13]).
The surrounding temperature of the frequency inverter is higher	1. If the temperature exceeds 40℃, it shall strengthen Ventilation and reduce temperature. 2. Reduce load and the temperature of frequency inverter (reduce upper frequency limit for fan and pump ([F0.1.21])). 3. Select temperature associated adjustment function in carrier characteristics ([F1.1.14]).
Mechanical resonance	1. Operate the motor separately, find the reasons of resonance and improve the characteristics at one side of the motor 2. Adjust hopping frequency ([F5.0.00]~[F5.0.05]) and avoid continuous operation in the frequency area where resonance occurs.
Input phase failure	1. Inspect the connection between frequency inverter and motor. 2. Inspect whether the three-phase winding of the motor is faulty or damaged.
The motor parameters are set improperly	Adjust motor speed closed loop PID parameter ([F8.2.25~F8.2.27]).

6. The motor does not accelerate or decelerate within the setting acceleration and deceleration time

Possible causes	Solutions
Operate in the form of S acceleration and deceleration curve	1. Set the acceleration and deceleration characteristic parameter ([F1.0.00]) into linear acceleration and deceleration mode and observe the acceleration and deceleration conditions. 2. Shorten the acceleration and deceleration time ([F1.0.03]~[F1.0.10]) and observe the acceleration and deceleration conditions.
Current limit action, the frequency rising is restricted (in acceleration)	1. Increase the data of acceleration current limit level ([F1.4.39]) and strong starting current limit level ([F1.4.40]). 2. Prolong acceleration time ([F1.0.03], [F1.0.05], [F1.0.07], and [F1.0.09]).
The motor has insufficient torque	Increase torque and boost voltage ([F1.2.18]) and confirm whether it is started.
The acceleration and deceleration of frequency is limited due to the limitation of torque	1. Reset the torque setting limit ([F8.3.47]) and maximum and minimum torque limit value. ([F8.3.48]~[F8.3.51]). 2. Prolong acceleration and deceleration time ([F1.0.03]~[F1.0.10]).
Wrongly select the acceleration and deceleration time	Inspect whether the selection signal for acceleration and deceleration time of multifunctional input terminal ([F3.0.00]~[F3.0.08]) is correct or not.

7. After transient powered off, the motor can not be started even it is powered on.

Possible causes	Solutions
Restart function after power off (F0.4.48) is prohibited	Set the restart function after transient power off ([F0.4.48]) as valid.
The operation command is maintained in OFF status when it is power on.	Confirm the reset sequence of external circuit, if necessary; discuss whether to adopt the holding relay of operation command.

8. The parameters are set improperly and the original value or delivery value needs to be recovered.

Possible causes	Solutions
The function code is conducted unnecessary parameter setting	Recover the parameters not necessary to be set into default.
The function code is conducted wrong parameter setting	Reset necessary function codes after initialization of parameter set as needed and confirm actions.

8.3 Failures in setting operation of frequency inverter

1. No display in the operation panel

Possible causes	solutions
The operation panel is not correctly connected to the frequency inverter	1. Confirm whether the operation panel is correctly connected to the frequency inverter, take it down and reinstall. 2. Replace other operation panels and confirm display.

2. The function code can not be changed

Possible causes	Solutions
Some codes can not be changed during operation	Confirm whether it is operating and whether the function code to be changed in the function code list can be changed during operation.
The parameters are locked	Confirm the locking conditions of parameters ([F0.0.05]), ([F0.0.06]); if the parameters are subject to be modified, the locking password with corresponding modification permissions shall be input first.
Did not press OK key	Confirm whether the OK key is pressed after the modification of function code data.
There's failure in the connection between operation panel and frequency inverter	Remove the operation panel and reinstall or replace a new operation panel.

8.4 Inquiry for failure record

This series of frequency inverter records the failure code for the recent 8 times and the output parameters of frequency inverter for the last failure. Looking up such information can help find the reasons of failure.

The failure information and status monitoring parameters are stored uniformly. Please look up the information referring to operating methods of keyboard.

Monitoring items	Content	Monitoring items	Content	Monitoring items	Content
dE.0.00	The last failure	dE.0.09	The output current in the last failure	dE.0.18	The accumulative running time (h) in the last failure.
dE.0.01	Historical failure 1	dE.0.10	The output voltage in the last failure.	dE.0.19	The interval time (h) of running between the recent two failures.
dE.0.02	Historical failure 2	dE.0.11	Detected motor speed (with speed sensor) in the last failure.	dE.0.20	The sync output frequency in the last failure.
dE.0.03	Historical failure 3	dE.0.12	DC side voltage in the last failure.	dE.0.21	
dE.0.04	Historical failure 4	dE.0.13	The output torque in the last failure.	dE.0.22	
dE.0.05	Historical failure 5	dE.0.14	The target frequency in the last failure.	dE.0.23	
dE.0.06	Historical failure 6	dE.0.15	The highest temperature of the equipment in the last failure.	dE.0.24	
dE.0.07	Historical failure 7	dE.0.16	Command status in the last failure (see the following table for detail).	dE.0.25	
dE.0.08	The operation frequency in the last failure(rotor sync)	dE.0.17	The operating conditions of frequency inverter in the last failure (see the following table for detail).		

Description of command and operation status:

dE.0.16	LED _ _ _ X : 0: Stop command 1: Operation command LED _ _ X _ , _ X _ _ , X _ _ _ : Retained
dE.0.17	LED _ _ _ X : Operation mode 0: V/F mode 1: Open loop vector speed 2. Closed loop vector speed 3: Open loop torque control 4: Closed loop torque control 5: V/F separation control LED _ _ X _ : Operation status 0: Shut down 1: Start and accelerate 2: Stop and decelerate 3: Reduce frequency and decelerate 4: Stable operation LED _ X _ _ : Electric/braking status 0: Electric operation 1: Power generation operation LED X _ _ _ : Limit suppression 0: No action 1: Over current suppression action 2: Over voltage suppressor action 3: Under voltage suppressor action

8.5 Reset of warning or alarm failure

When warning or alarm failure appears, the following operations can be selected:

1. When failure code displays, press **STOP/RESET** key.
2. When external terminal operation command channel is adopted and the terminal for failure reset is defined as valid in multifunctional input terminal Dix, the failures are reset.
3. When the field bus operation command channel is adopted, the upper computer can send fault reset command to frequency inverter through RS485 interface.
4. Power off.

- The failures causes must be checked thoroughly and eliminated before reset, otherwise, the frequency inverter may be damaged permanently.
- If it can not reset or failures reoccur after reset, it should check the causes; continuous reset will damage the frequency inverter.
- The reset shall be conducted 5 minutes later in overload and overheating protection action.
- When external terminals control, the fault reset shall be conducted after the removal of terminal operation command.

Chapter 9 Maintenance and Upkeep

Due to the influence of various factors such as ambient temperature, humidity, dust, vibration, and aging or wear of internal components of the inverter, the inverter may have potential faults. To ensure long-term, stable operation of the inverter, regular maintenance and upkeep must be performed during storage and use.

If the inverter has undergone long-distance transportation, check whether components are intact and screws are tightened before use. During normal use, regularly clean dust inside the inverter and check for loose screws, etc.

- Inspections must be performed by professional technical personnel, and the inverter's power supply must be cut off.
- For inverters stored for more than half a year, when powering on, the voltage should be slowly increased via a voltage regulator, otherwise there is a risk of electric shock and explosion (of internal electrolytic capacitors).

High voltage is present during inverter operation, and incorrect operations may lead to serious personal injury. Reliably cut off the inverter's power supply. Maintenance operations can only be performed after the inverter panel's digital display extinguishes (after ten minutes).

9.1 Daily Maintenance and Upkeep

Through daily inspections and maintenance, various abnormal situations can be discovered promptly, their causes identified in time, and potential faults eliminated early, ensuring normal equipment operation and extending the service life of the inverter. Please refer to the table below for daily inspections and maintenance.

Table 9-1 Table for Inspection and Maintenance Tips

Inspection Subject	Inspection Cycle	Inspection Items	Judgment Criteria
Operating Environment	Any time	• Temperature, Humidity • Dust, Moisture • Gas	1. Derating should be used when temperature > 45℃. 2. Humidity < 95%, no frost 2. No abnormal odor, no flammable or explosive gases
Cooling System	Regular	• Installation Environment • Inverter Body Fan	1. Good ventilation in the installation environment, no obstruction in the air duct 2. Body fan operates normally, no abnormal noise
Inverter	Any time	• Vibration, Temperature Rise • Noise • Wires, Terminals	1. Stable vibration, normal air outlet temperature 2. No abnormal noise, no abnormal odor 3. Tightened screws are not loose
Motor	Any time	• Vibration, Temperature Rise • Noise	1. Stable operation, normal temperature 2. No abnormal, uneven noise
Input or Output Parameters	Any time	• Voltage Input • Output Current	1. Input voltage within specified range 2. Output current below rated value

- The inverter has undergone electrical insulation tests before leaving the factory. Users do not need to perform withstand voltage tests again, otherwise internal components may be damaged.
- If insulation testing of the inverter is necessary, all input and output terminals must be reliably short-circuited. Insulation tests on individual terminals are strictly prohibited; use a 500V megohmmeter for testing.
- Control circuits cannot be measured with a megohmmeter. Inverters contain electrostatic sensitive components; direct touching is prohibited.
- When performing insulation tests on the inverter, the connection between the inverter and the motor must be removed.

9.2 Inspection and Replacement of Vulnerable Parts

Some components inside the inverter may wear out or degrade in performance during use. To ensure stable and reliable operation of the inverter, preventive maintenance should be performed, and components replaced when necessary.

9.2.1 Filter Capacitors

Possible causes of damage: High ambient temperature, large pulsating current, electrolyte aging.

Judgment criteria: Does the inverter frequently experience faults like overcurrent or overvoltage during loaded operation? Is there any liquid leakage? Is the safety valve protruding? Are the measurements of static capacitance and insulation resistance abnormal?

The pulsating current in the main circuit will affect the performance of aluminum electrolytic filter capacitors. The extent of the effect is related to ambient temperature and usage conditions. Inverters used under normal conditions should have their electrolytic capacitors replaced every 3 - 4 years.

Electrolytic capacitors should be replaced immediately if electrolyte leaks, the safety valve protrudes, or the capacitor body expands.

9.2.2 Cooling Fan

Possible causes of damage: Bearing wear, blade aging, etc.

Judgment criteria: When the inverter is powered off, check for cracks or other abnormalities in the fan blades and other parts. When the inverter is powered on, check if the fan operation is normal, if there is abnormal vibration, noise, etc.

The service life of all cooling fans inside the inverter is approximately 15,000 hours (i.e., approximately two years of continuous use of the inverter). If the fan produces abnormal sound or vibration, it should be replaced immediately.

9.3 Storage

If the inverter is purchased but not used immediately or stored for a long time, the following precautions should be observed:

1) The storage environment should comply with the table below:

Environmental Characteristics	Requirements	Remarks
Ambient Temperature	-20 °C - +60 °C	Long-term storage temperature should not exceed 60℃ to prevent capacitor characteristics from deteriorating. Environments where condensation or freezing may occur due to sudden temperature changes should be avoided.
Relative Humidity	5-95%	Measures such as sealing with plastic film and desiccants can be adopted.
Storage Environment	Not exposed to direct sunlight, free from dust, No corrosive or flammable gases, No oil, steam, gas, dripping water, vibration, low salt content.	

2) If the inverter is not used for a long time, it should be powered on once every six months to restore the characteristics of the filter capacitors, and at the same time, check the other functions of the inverter. When powering on, the voltage should be gradually increased via an autotransformer, and the power-on time should be more than half an hour.

If the inverter is not used for a long time, the characteristics of the internal filter capacitors will degrade.

9.4 Warranty

The manufacturer will provide warranty service for the inverter body under the following conditions:

1) Free repair is provided for failures or damages occurring under normal use within the warranty period (18 months from the date of ex-factory date). Beyond 18 months, a reasonable repair fee will be charged.

2) Even within the warranty period, a certain repair fee will be charged for faults caused by the following reasons:

① Faults caused by not following the operation manual or exceeding standard specifications;

② Faults caused by unauthorized self-repair or modification;

③ Faults caused by improper storage;

④ Faults caused by improper storage; Faults caused by using the inverter for abnormal functions;

⑤ Machine damage caused by fire, salt corrosion, gas corrosion, earthquake, storm, flood, lightning, abnormal voltage, or other force majeure.

3) Even beyond the warranty period, the manufacturer also provides lifelong paid repair services.

Chapter 10 Communication Protocol Description

10.1 Protocol Overview

Modbus protocol is a general-purpose protocol applied to industrial controllers. Due to its ease of use, it has become an industrial universal standard, widely used in the integration of master controllers and slave devices. Devices of different brands can be connected into an industrial network through this protocol.

Modbus defines three transmission modes: ASCII, RTU, and TCP. The DL500 inverter only supports RTU mode.

10.2 Interface and Transmission Method

Terminal Identification	Terminal Usage	Function
RS+	Data Transmit/Receive Terminal (+)	When connecting to a PC/PLC using an RS485 communication interface, please connect to the (+) signal
RS-	Data Transmit/Receive Terminal (-)	When connecting to a PC/PLC using an RS458 communication interface, please connect to the (-) signal

10.3 Data Structure

The DL500 uses RS485 (RS232 optional, but level conversion is required) as its Modbus physical interface. One master controls one or more (up to 247) inverters.

It uses asynchronous serial, half-duplex transmission, where only one party (master or slave) can send data at a time, and the other can only receive data.

1) 4 data transmission formats are optional:

① 1 start bit, 8 data bits, 1 stop bit, no parity (factory setting)

② 1 start bit, 8 data bits, 1 stop bit, even parity

③ 1 start bit, 8 data bits, 1 stop bit, odd parity

④ 1 start bit, 8 data bits, 2 stop bits, no parity

2) Baud Rate

Seven baud rates are optional: 1200bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400bps, 79600 bps

3) Communication Rules

The silent interval between data frames must be greater than 3.5 character transmission cycles (standard), but the minimum interval must not be less than 0.5ms.

10.4 Inverter Parameter Configuration

FA.0.00 is a read-only parameter, displaying communication card connection and bus status;

FA.0.01 = 00XX, the units digit is used to select the baud rate, and the tens digit is used to select the data format;

FA.0.02 = X, it selects the station address;

FA.0.03-FA.0.06, it configures communication auxiliary parameters. For detailed functions, please refer to the function parameter table.

X indicates that this bit can be any value within the allowed range.

10.5 Function Overview

DL500 supports the following Modbus function codes:

Function	Code (Hexadecimal)	Function Description
Read Coil Status	0x01	Read coil status bit by bit. Each bit of the control word maps to coil 0-15 respectively.
Read Discrete Input Status	0x02	Read discrete input status. Each bit of the status word maps to coil 0-15 respectively.
Read Multiple Holding Registers	0x03	Read multiple holding registers. All DL500 application parameters, status parameters, control words, status words, and setting values can be read.
Read Multiple Input Registers	0x04	Read multiple input registers. Analog input register addresses start from 0x1200.
Force Single Coil	0x05	Write to a single output bit. Each bit of the control word maps to coil 1-16 respectively.
Write Single Holding Register	0x06	Write to a single holding register. All DL500 parameters, control words, status words, and setting values are mapped to holding registers.
Query Exception Status	0x07	Query exception status information. In DL500, inverter fault information can be queried.
Fault Diagnosis	0x08	Execute Fieldbus fault diagnostics. Support sub-codes such as query (0x00), restart (0x01), listen (0x04), clear (0x0A).
Force Multiple Coils	0x0F	Write to multiple output bits separately. Each bit of the control word maps to coil 1-16 respectively.
Write Multiple Holding Registers	0x10	Write to multiple holding registers. All DL500 parameters, control words, status words, and setting values are mapped to holding registers.
Read/Write Multiple Holding Registers	0x17	Equivalent to function codes 0x03 and 0x10 combined into one command.

10.6 Access Address Summary

DL500	Access Address	Supported Function Codes (Hexadecimal)
Control Bit Multi-function Terminal Output Relay Output	Coil (0x1000-0x1100)	0x01-Read Coil Status 0x05-Force Single Coil 0x0F-Force Multiple Coils
Status Bit Multi-function Terminal Input	Discrete Inputs (0x1100-0x1200)	0x02-Read Input Status
Analog Input	Input Registers (0x1200-0x1300)	0x04-Read Input Registers
Application Parameters Status Parameters Control Word, Status Word Set Value Mapped Status Parameters Mapped Application Parameters	Holding Registers (Application Parameter Area, Status Parameter Area, 0x1300-0x1400)	0x03-Read Multiple Registers 0x06-Write Single Register 0x10-Write Multiple Registers 0x17-Read/Write Multiple Registers

For detailed address distribution, please refer to the Modbus detailed addressing distribution section below.

10.7 Modbus Detailed Addressing Distribution

1) Coil Address Set (0x1000-0x1100)

Related Modbus Function Codes: 0x01 (Read), 0x05 (Single Coil Write), 0x0F (Multiple Coils Write)

Register Name	Function Description	Access Address
Control Word - Bit 0	Reserved	0x1000
Control Word - Bit 1	Run Enable 0: Run Prohibited 1: Run Allowed	0x1001
Control Word - Bit 2	Start Enable 0: Start Prohibited 1: Start Allowed	0x1002
Control Word - Bit 3	Reserved	0x1003
Control Word - Bit 4	Run Command 0: Stop 1: Run	0x1004
Control Word - Bit 5	Reserved	0x1005
Control Word - Bit 6	Emergency Stop 0: Invalid 1: Valid	0x1006
Control Word - Bit 7	Coast to Stop 0: Invalid 1: Valid	0x1007
Control Word - Bit 8	Reserved	0x1008
Control Word - Bit 9	Reserved	0x1009
Control Word - Bit 10	Reserved	0x100A
Control Word - Bit 11	Reserved	0x100B
Control Word - Bit 12	Acceleration/Deceleration Prohibited 0: Allowed 1: Prohibited	0x100C
Control Word - Bit 13	Integrator Input Clear to Zero 0: Invalid 1: Valid	0x100D
Control Word - Bit 14	Remote Control 0: Invalid 1: Valid	0x100E
Control Word - Bit 15	Fault Reset 0->1 Reset	0x100F
DO1	Multi-function Output Terminal 1	0x1020
DO2	Multi-function Output Terminal 2	0x1021
EDO1	Multi-function Output Terminal 3 (Expansion Card)	0x1030
RO1	Multi-function Relay Output 1	0x1040
ERO1	Multi-function Relay Output 2 (Expansion Card)	0x1050
SDO1-SDO8	Virtual Output 1-8	0x1060-0x1067
Reserved		0x1068-0x107F

2) Discrete Input Address Set (1100H - 1200H)

Related Modbus Function Codes: 0x02 (Read)

Register Name	Function Description	Access Address
Status Word - Bit 0	Ready	0x1100
Status Word - Bit 1	Enable run	0x1101
Status Word - Bit 2	Enable start	0x1102
Status Word - Bit 3	Reserved	0x1103
Status Word - Bit 4	Running Status	0x1104
Status Word - Bit 5	Direction	0x1105
Status Word - Bit 6	Zero Speed	0x1106
Status Word - Bit 7	Acceleration	0x1107
Status Word - Bit 8	Deceleration	0x1108
Status Word - Bit 9	Reached	0x1109
Status Word - Bit 10	Reserved	0x110A
Status Word - Bit 11	Reserved	0x110B
Status Word - Bit 12	Command Source	0x110C
Status Word - Bit 13	Command Source	0x110D
Status Word - Bit 14	Warning	0x110E
Status Word - Bit 15	Fault	0x110F
DI1	Multi-function Input Terminal 1	0x1120
DI2	Multi-function Input Terminal 2	0x1121
DI3	Multi-function Input Terminal 3	0x1122
DI4	Multi-function Input Terminal 4	0x1123
DI5	Multi-function Input Terminal 5	0x1124
DI6	Multi-function Input Terminal 6	0x1125
EDI1	Multi-function Input Terminal 7 (Expansion Card)	0x1130
EDI2	Multi-function Input Terminal 8 (Expansion Card)	0x1131
EDI3	Multi-function Input Terminal 9 (Expansion Card)	0x1132
Reserved		0x1133-0x1199

3) Input Register Address Set (1200H - 1300H)

Related Modbus Function Codes: 0x04 (Read Input Registers)

Register Name	Function Description	Value Range	Access Address
AI1	Analog Input Value 1	0-4080	0x1200
AI2	Analog Input Value 2	0-4080	0x1201
AI3	Analog Input Value 3 (Expansion Card)	0-4080	0x1202
Fin	Pulse Input Value (Expansion Card)	0-4080	0x1203
Reserved			0x1204-0x1299

4) Holding Register Address Set

Related Modbus Function Codes: 0x03 (Read Multiple), 0x06 (Write Single), 0x10 (Write Multiple), 0x17 (Read/Write Multiple).

① Application Parameter Address

Application parameter access address can be obtained from the parameter identifier. When determining the access address, ignore the sub-category code (marked with "*" below) in the identifier: e.g., parameter identifier: HH.*.DD (like F2.0.33), directly take HHDD (16-bit hexadecimal format). The access address for F2.0.33 is: 0xF233H. The access address conversion table is as follows:

Parameter Identifier	RAM Access Address①	ROM Access Address
F0.#.00-F0.#.55	0xF000-0xF055	0xE000-0xE055
•••••• • •	• • •	• • •
F9.#.00-F9.#.55	0xF900-0xF955	0xE900-0xE955
FA.#.00 - FA.#.55	0xFA00-0xFA55	0xEA00-0xEA55
•••••• • •	• • •	• • •
FF.#.00 - FF.#.55	0xFF00-0xFF55	0xEF00-0xEF55
dE.#.00 - dE.#.55 (Read Only)	0xDE00-0xDE55	0xBE00-0xBE55
CF.#.00 - CF.#.55 (Restricted)	0xCF00-0xCF55	0xBF00-0xBF55

② Status Parameter Address (Read Only): The address conversion method for status parameters is similar to application parameters, and there is no ROM access address.

Parameter Identifier	RAM Access Address
d0.#.00-d0.#.55	0xD000-0xD055
d1.#.00-d1.#.55	0xD100-0xD155

③ Bus Control Parameter Address (1300H - 1400H)

Register Name	Value Range	Access Address
Control Word (Maps coils 0-15)②	0-0xFFFF	0x1300
Modbus Setting Value 1 (Relative Value)	-10000-10000	0x1301
Modbus Setting Value 2 (Absolute Value)	-30000-30000	0x1302
Mapped Application Parameter 1③	[F0.00 - FF.55]	0x1303
Mapped Application Parameter 2	[F0.00 - FF.55]	0x1304
Mapped Application Parameter 3	[F0.00 - FF.55]	0x1305
Mapped Application Parameter 4	[F0.00 - FF.55]	0x1306
Mapped Application Parameter 5	[F0.00 - FF.55]	0x1307
Mapped Application Parameter 6	[F0.00 - FF.55]	0x1308
Status Word (Maps discrete quantities 0-15)	0-0xFFFF	0x1309
Mapped Status Parameter 1	[d0.00 - d1.49]	0x130A
Mapped Status Parameter 2	[d0.00 - d1.49]	0x130B
Mapped Status Parameter 3	[d0.00 - d1.49]	0x130C
Mapped Status Parameter 4	[d0.00 - d1.49]	0x130D
Mapped Status Parameter 5	[d0.00 - d1.49]	0x130E
Mapped Status Parameter 6	[d0.00 - d1.49]	0x130F
Mapped Status Parameter 7	[d0.00 - d1.49]	0x1310
Mapped Status Parameter 8	[d0.00 - d1.49]	0x1311

Mapped Status Parameter 9	[d0.00 - d1.49]	0x1312
Mapped Status Parameter 10	[d0.00 - d1.49]	0x1313
Reserved	Undefined	0x1314 - 0x1400

Remarks:

Note①: When permanent saving of parameters is not required, write parameter values to the RAM area. When permanent saving is required, write parameter values to the ROM area. Frequent writing of parameter values to the ROM area will reduce its lifespan. For example, to write the value F2.1.13 and save it permanently, the write register address is 0xE213.

Note②: When reading/writing control words, you can either read/write the coils mapped to each bit of the control word, or read/write the holding register corresponding to the control word. Both methods achieve the same functionality. For example, to set run enable, you can use function code 05 to write the value 1 to bit 1 of the control word (address 0x1001), or use function code 06 to write the value 0x0002 to the control word (address 0x1300). When reading status words, similar to reading/writing control words, you can either read the discrete inputs mapped to each bit of the status word, or read the holding register corresponding to the status word. For example, to read the run direction, you can use function code 02 to read status bit 5 (address 0x1105), or use function code 03 to read the status word (address 0x1309).

Note③: When multiple non-contiguous application parameters or monitoring parameters need to be accessed, these parameters can be mapped to the bus control parameter area for access. Mapped parameter access is essentially a pointer access method, and the mapped parameters are set in the FA.1 parameter group.

5) Exception Status Information

Related Modbus function code 0x07 (Query)

- Each bit of the returned data corresponds to the inverter's fault warning status and code:
- Return Data - Bit 7: 0 - Inverter has no fault, 1 - Inverter has fault
- Return Data - Bit 6: 0 - Inverter has no warning, 1 - Inverter has warning
- Return Data - Bit 5-0: Fault information code corresponds to the number after Fu. in the inverter fault code;
- Warning information code corresponds to the number after AL. in the inverter warning code.
- For example, return data 0x8C (10001100) indicates inverter fault code Fu.012; return data 0x64 (01100100) indicates inverter warning code AL.036.

6) Fault Diagnostics

Related Modbus function code 0x08 (Diagnostics)

Sub-function Code List

Sub-function Code	Functions	Query Data	Response Data
00	Return query data as is	Any	Image Query Data
01	Restart Communication Option (restores "listen only" state for 04 subcode)	FF00/0000	FF00/0000
04	Force the slave to enter "listen only" state. The slave will no longer respond. This can be used to remove a faulty slave device from the communication link.	0000	No Response
0A	Clear all counters and diagnostic registers	0000	Image Query Data
0B	Return number of bus messages (counted by slave since last reset or clear)	0000	Total Number of Bus Messages
0C	Return number of bus communication faults (CRC error count)	0000	Number of CRC Errors
0D	Return number of bus exception faults (data exception errors)	0000	Number of Exception Data
0E	Return number of slave messages (matching slave address or broadcast messages)	0000	Number of Valid Data

Chapter 11 EMC (Electromagnetic Compatibility)

11.1 CE Mark

The CE mark on the product guarantees its free sale within the EEA (European Economic Area). It also guarantees that the product meets other requirements, such as the Low Voltage Directive (LVD) and Electromagnetic Compatibility standards (EMC).

11.2 Definition

EMC stands for Electromagnetic Compatibility. EMC refers to the ability of electrical/electronic equipment to resist electromagnetic interference. At the same time, the equipment should not emit electromagnetic interference to other local equipment or systems. EMC specifications define requirements for electromagnetic radiation and electromagnetic interference immunity for electrical equipment used in the European Community.

1) First Environment: Include power supply equipment for civil low-voltage power grids.
2) Second Environment: Include power supply equipment for non-civil low-voltage power grids.

- Class C1 Inverters: Electrical drive systems with a rated power supply below 1000V, used in the first environment.
- Class C2 Inverters: Electrical drive systems with a rated voltage below 1000V, can be plug-in or mobile devices, and must only be installed and commissioned by professionals when used in the first environment.
- Class C3 Inverters: Electrical drive systems with a rated voltage below 1000V, suitable for the second environment, not suitable for the first environment.
- Class C4 Inverters: Electrical drive systems with a rated voltage not less than 1000V, or a rated current not less than 400A, or suitable for complex systems in the second environment.

11.3 Compliance with Standard Directives

11.3.1 Compliance with EMC Directive

DL500 series inverters are suitable for both first and second environments.

11.3.2 Compliance with LVD Directive

DL500 series inverters meet the requirements of standard EN 61800-5-1.

Installation Precautions in the First Environment

1) Matching EMC filter selected for the inverter.
2) Appropriate motor and cables selected.
3) Inverter wiring is routed according to "Cable Wiring Requirements".
4) Maximum output cable length is 100 meters.

Warning: If the inverter is used in the first environment, it may cause electromagnetic interference. In addition to fulfilling CE requirements, users need to take measures to prevent such interference.

11.4 EMC Peripheral Accessory Installation and Selection Guide

Installing an external EMC input filter between the inverter and the power supply can not only suppress electromagnetic noise interference from the surrounding environment on the inverter but also prevent interference generated by the inverter from affecting surrounding equipment. An external matching EMC filter must be connected to the inverter's input to meet the Class C2 level in the standard.

11.4.1 Notes on Installing EMI Input Filter:

When using a filter, strictly adhere to the rated values. As filters are Class I electrical appliances, the filter's metal casing ground should have good contact with the metal ground of the installation cabinet over a large area, and require good conductive continuity, otherwise there is a risk of electric shock and serious impact on EMC effectiveness. The filter's ground must be connected to the inverter's PE terminal ground on the same common ground, otherwise it will seriously affect EMC effectiveness. For specific EMI filter selection and installation precautions, please contact our technical support.

11.4.2 Input Reactor

An AC input reactor installed at the input end of the inverter can suppress harmonics generated by the inverter from being transmitted to the power grid, reduce harmonic interference generated by the inverter on other components, improve power quality, increase power factor, and limit abnormal fluctuations in grid voltage and impulse currents on the grid, smooth waveforms, and reduce the impact on the inverter.

1. AC Input Reactor Performance Indicators

- Rated operating voltage: 380V/50Hz;
- Dielectric strength: Iron core-winding 3000VAC/50Hz/5mA/60S, no arcing breakdown;
- Insulation resistance: Iron core-winding 1000VDC, insulation resistance ≥100MΩ;
- Temperature rise less than 70K.

2、 AC Input Reactor Configuration Parameters

Inverter Power (KW)	Reactor Model	Overall Dimension L * W * H (mm)	Installation Dimension (mm)	Mounting Hole Diameter (mm)
1.1	ACIN-001	120*72*143	65*60	4-Φ6
1.5	ACIN-001	120*72*143	65*60	4-Φ6
2.2	ACIN-002	120*72*143	65*50	4-Φ6

3.0	ACIN-003	120*75*145	65*50	4-Φ6
4.0	ACIN-004	150*95*170	70*62	4-Φ6
5.5	ACIN-004	150*95*170	70*62	4-Φ6
7.5	ACIN-005	150*90*170	70*62	4-Φ6
9.0	ACIN-006	150*90*170	70*62	4-Φ6
11	ACIN-006	150*90*170	70*62	4-Φ6
15	ACIN-007	150*90*170	70*62	4-Φ6
18.5	ACIN-008	166*115*185	80*72	4-Φ9
22	ACIN-009	168*115*188	80*75	4-Φ9
30	ACIN-010	185*145*153	95*78	4-Φ9
37	ACIN-011	185*145*153	95*78	4-Φ9
45	ACIN-012	210*165*162	105*90	4-Φ9
55	ACIN-013	295*185*210	130*110	4-Φ10
75	ACIN-014	305*195*210	130*120	4-Φ10
90	ACIN-015	275*170*220	230*100	4-Φ10
110	ACIN-016	305*185*220	250*110	4-Φ10
132	ACIN-017	320*190*220	260*110	4-Φ10
160	ACIN-018	335*200*220	270*120	4-Φ10
185	ACIN-019	335*200*230	270*120	4-Φ10
200	ACIN-019	335*200*230	270*120	4-Φ10
220	ACIN-020	350*205*230	280*120	4-Φ10
250	ACIN-021	350*210*265	290*120	4-Φ10
280	ACIN-022	350*210*265	290*120	4-Φ10
315	ACIN-023	320*220*285	270*130	4-Φ13
350	ACIN-024	350*235*305	290*130	4-Φ13
400	ACIN-024	350*235*305	290*130	4-Φ13
450	ACIN-025	365*235*325	300*135	4-Φ13
500	ACIN-026	365*240*340	300*135	4-Φ13
560	ACIN-027	380*260*390	310*135	4-Φ13
630	ACIN-028	380*260*390	310*135	4-Φ13
700	ACIN-029	400*265*390	320*135	4-Φ13

800	ACIN-030	440*275*430	370*135	4-Φ13

11.4.3 Output Reactor

An AC output reactor installed at the output end of the inverter limits the capacitive charging current of the cable connecting the inverter to the motor and smooths the voltage rise rate of the inverter's PWM wave. It reduces leakage current, improves power factor, improves power quality, and smooths waveforms.

1. AC Output Reactor Performance Indicators

- Rated operating voltage: 380V/50Hz;
- Dielectric strength: Iron core-winding 3000VAC/50Hz/10mA/60S, no arcing breakdown;
- Insulation resistance: Iron core-winding 1000VDC, insulation resistance ≥100MΩ;

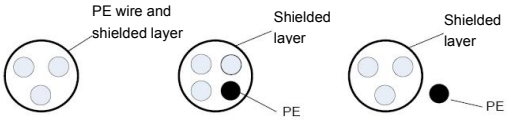
2. AC Output Reactor Configuration Parameters

Inverter Power (kW)	Reactor Model	Dimensions Length * Width * Height (mm)	Installation Dimension (mm)	Installation Aperture (mm)
1.1	ACOUT-001	120*70*140	65*52	4-Φ6
1.5	ACOUT-002	120*70*140	65*52	4-Φ6
2.2	ACOUT-002	120*70*140	65*52	4-Φ6
3	ACOUT-003	120*70*140	65*52	4-Φ6
3.7	ACOUT-003	120*70*140	65*52	4-Φ6
4	ACOUT-003	120*70*140	65*52	4-Φ6
5.5	ACOUT-004	148*80*166	70*62	4-Φ6
7.5	ACOUT-005	148*80*166	70*62	4-Φ6
9	ACOUT-006	150*82*172	70*62	4-Φ6
11	ACOUT-006	150*82*172	70*62	4-Φ6
15	ACOUT-007	150*82*172	70*62	4-Φ6
18.5	ACOUT-008	165*130*128	80*72	4-Φ9
22	ACOUT-009	165*130*128	80*72	4-Φ9
30	ACOUT-010	180*135*140	80*72	4-Φ9
37	ACOUT-011	180*135*140	80*72	4-Φ9
45	ACOUT-012	180*140*140	80*72	4-Φ9
55	ACOUT-013	260*180*210	130*115	4-Φ13
75	ACOUT-014	260*180*210	130*115	4-Φ13
90	ACOUT-015	230*155*200	200*90	4-Φ10
110	ACOUT-016	250*155*200	210*90	4-Φ10
132	ACOUT-017	260*175*200	220*110	4-Φ10

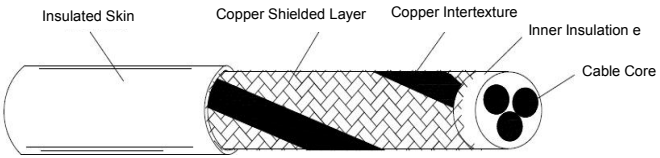
160	ACOUT-018	260*175*220	220*110	4-Φ10
185	ACOUT-019	265*175*220	220*110	4-Φ10
200	ACOUT-019	265*175*220	220*110	4-Φ10
220	ACOUT-020	275*185*220	230*110	4-Φ10
250	ACOUT-021	320*190*240	270*110	4-Φ10
280	ACOUT-021	320*190*240	270*110	4-Φ10
315	ACOUT-022	305*190*265	260*110	4-Φ13
350	ACOUT-023	335*205*285	280*110	4-Φ13
400	ACOUT-024	335*205*285	280*110	4-Φ13
450	ACOUT-025	335*205*305	280*110	4-Φ13
500	ACOUT-026	340*215*320	280*110	4-Φ13
560	ACOUT-027	365*235*340	310*120	4-Φ13
630	ACOUT-028	365*235*340	310*120	4-Φ13
700	ACOUT-029	365*235*390	310*120	4-Φ13
800	ACOUT-030	380*245*390	320*120	4-Φ13

11.5 Shielded Cables

To meet the EMC requirements of the CE mark, shielded cables with shielding layers must be used. Shielded cables include shielded cables with three phase conductors and shielded cables with four phase conductors. If the conductivity of the shielding layer cannot meet the requirements, an additional separate PE wire should be added or a four-phase conductor shielded cable should be used, with one of them being the PE wire.



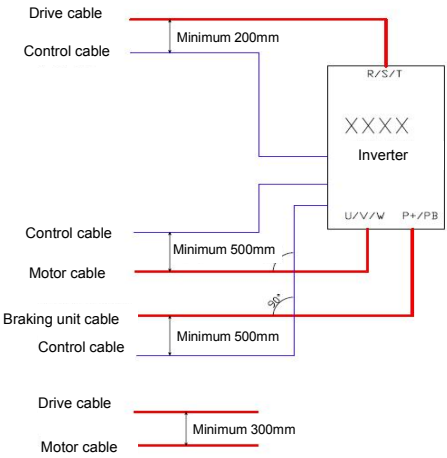
To effectively suppress the emission and conduction of radio frequency interference, the shield of the shielded wire should consist of a coaxial copper braid. To increase shielding effectiveness and conductivity, the braiding density of the shielding layer should be greater than 90%.



11.6 Cable Wiring Requirements

1) Motor cable routing should be kept away from other cable routing. Motor cables for several inverters can be routed side-by-side.
2) It is recommended to route motor cables, input power cables, and control cables in separate cable trays. To avoid electromagnetic interference generated by rapid changes in inverter output voltage, long-distance parallel routing of motor cables and other cables should be avoided.
3) When control cables must cross power cables, ensure that the angle between the two types of cables remains as close to 90 degrees as possible. Do not route other cables through the inverter.
4) The power input and output lines of the inverter and low-current signal lines (such as control lines) should be arranged as non-parallel as possible; if conditions permit, arrange them vertically.
5) Cable trays must maintain good connection and be well grounded. Aluminum cable trays can be used to improve equipotential bonding.
6) Filters, inverters, and motors should be well connected to the system (machine or device). Protective coating should be applied to installed parts, and conductive metals should be in full contact.

Cable spacing is shown in the figure below:



➢ In installation locations that comply with European CE standards and other requirements for reducing EMC emissions, cable entry should maintain a 360-degree high-frequency ground connection to suppress electromagnetic interference. In addition, the cable shield must be connected to the protective earth (PE) wire to comply with safety regulations.

11.7 Leakage Current Response Requirements

1) Due to the high-speed pulsating voltage output of the inverter, high-frequency leakage current will be generated. To prevent electric shock and induced leakage current fires, install an earth leakage circuit breaker for the inverter.

2) The leakage current generated by the inverter is relatively large. For high-power inverters, the instantaneous leakage current can be tens of milliamperes. Therefore, the sensitivity current of the earth leakage circuit breaker should be selected to be greater than 100mA.

3) High-frequency pulse interference may cause the earth leakage circuit breaker to malfunction after receiving interference. Therefore, an earth leakage circuit breaker with high-frequency filtering should be selected.

4) If several inverters are to be installed, each inverter should be provided with an earth leakage circuit breaker.

5) Factors affecting leakage current are as follows:

◆ Inverter capacity

◆ Carrier frequency

◆ Type and length of motor cable

◆ EMI filter

6) When the leakage current generated by the inverter causes the earth leakage circuit breaker to trip:

◆ Increase the sensitivity current value of the earth leakage circuit breaker

◆ Replace the earth leakage circuit breaker with one that has high-frequency suppression

◆ Reduce the carrier frequency

◆ Shorten the output cable length

◆ Install leakage suppression devices

11.8 Common EMC Interference Problem Rectification Suggestions

Inverter products are strong interference devices. When problems exist in wiring and grounding during use, interference phenomena may still occur. When mutual interference with other equipment occurs, the following methods can also be used for rectification.

Interference Type	Rectification Method
Earth Leakage Protection Switch Tripping	◆ Motor casing connected to inverter PE terminal; ◆ Inverter PE terminal connected to grid PE; ◆ Add safety capacitor box to input power line; ◆ Add ferrite ring to input power line;
Driver Operation Causes Interference	◆ Motor casing connected to inverter PE terminal; ◆ Inverter PE terminal connected to grid PE; ◆ Add safety capacitor box to input power line and wind ferrite ring; ◆ Add capacitor or ferrite ring to the interfered signal port; ◆ Common ground connection between devices;

Communication interference	◆ Motor casing connected to inverter PE terminal; ◆ Inverter PE terminal connected to grid PE; ◆ Add safety capacitor box to input power line and wind ferrite ring; ◆ Add matching resistors to communication line source and load ends; ◆ Add a common communication ground wire to the communication line; ◆ Use shielded cable for communication line, connect shield to common communication ground;
I/O Interference	◆ Increase capacitance filtering for low-speed DI, recommended maximum 0.1uF; ◆ Increase capacitance filtering for AI, recommended maximum 0.22uF; ◆ Use shielded cable for analog signals, connect shield to inverter PE terminal.

Note: For other EMC interference issues, please contact the manufacturer.

Chapter 12 Optional Accessories

12.1 Introduction to I/O Expansion Card

☐ Model: IOV-D200, PN: 050M008068201

Applicable to Type II appearance, DL500-4T0185G/4T0220P and above models. The standard I/O expansion card expanded configuration is as follows:

- -10V auxiliary voltage source;
- +24V auxiliary voltage source;
- 3-way rectified digital inputs, switchable between high-level or low-level active;
- 1-way programmable high-speed pulse input, switchable between high-level or low-level active;
- 1-way analog input terminal, switchable between 0-10V, -10V-10V voltage input;
- 1-way analog output terminal, switchable current, voltage output;
- 2 groups of relay programmable outputs with normally open and normally closed contacts; (optional)

Table 12-1 Introduction to Terminals of I/O Expansion Card IOV-D200

Type	Name	Terminal Description	Specification
Auxiliary Power Supply	-10V	-10V Auxiliary Voltage Source	Maximum load capacity: 10mA
	24V	+24V Auxiliary Voltage Source	Maximum load capacity: 100mA (Shared with main control board)
Analog Input	AI3	Analog input terminal; See applicable model manual F4 parameters for details	Analog voltage input range: JP3 set to -10: -10V-10V JP3 set to 0: 0-10V Input impedance ≥100kΩ
Digital Input	DI6	Rectified digital input; See applicable model manual F3 parameters for details	Input impedance: R= 4.7kΩ Maximum Input Frequency: 200Hz JP1 set to HIG: DI terminal active when closed with 24V JP1 set to LOW: DI terminal active when closed with CM
	DI7		
	DI8		
Analog Output	AO2	Multi-function analog output; See applicable model manual F4 parameters for details	Current output 0-20mA; Voltage output 0-10V; Output current load impedance specification: 0-300Ω JP2 set to CO: Voltage output JP2 set to VO: Current output
Digital Input	DI9	High-speed pulse input; See applicable model manual F3 parameters for details	Maximum input frequency: 100kHz JP1 set to HIG: DI terminal active when closed with 24V JP1 set to LOW: DI terminal active when closed with CM
Relay programmable output	TA2/3	TA-TB normally closed contact; TA-TC normally open contact; See applicable model manual F3 parameters for details	Contact capacity: AC 250V/3A
	TB2/3		
	TC2/3		
Common Terminal	CM	+24V, digital common terminal.	+24V, DI6-DI9 common terminal

☐ Model: IOV-D201, PN: 050M008068202

Applicable to Type II appearance, DL500-4T0185G/4T0220P and above models. The standard I/O expansion card expanded configuration is as follows:

- -10V auxiliary voltage source;
- +24V auxiliary voltage source;
- 3-way rectified digital inputs, switchable between high-level or low-level active;
- 1-way programmable high-speed OC output; (optional)
- 1-way programmable high-speed pulse input, switchable between high-level or low-level active;
- 1-way analog input terminal, switchable between 0-10V, -10V-10V voltage input;
- 1-way analog output terminal, switchable current, voltage output;

Table 12-2 Introduction to Terminals of I/O Expansion Card IOV-D201

Type	Name	Terminal Description	Specification
Auxiliary Power Supply	-10V	-10V Auxiliary Voltage Source	Maximum load capacity: 10mA
	24V	+24V Auxiliary Voltage Source	Maximum load capacity: 100mA (Shared with main control board)
Analog Input	AI3	Analog input terminal; See applicable model manual F4 parameters for details	Analog voltage input range: JP3 set to -10: -10V-10V JP3 set to 0: 0-10V Input impedance ≥100kΩ
Digital Input	DI6	Rectified digital input; See applicable model manual F3 parameters for details	Input impedance: R= 4.7kΩ Maximum Input Frequency: 200Hz JP1 set to HIG: DI terminal active when closed with 24V JP1 set to LOW: DI terminal active when closed with CM
	DI7		
	DI8		
Analog Output	AO2	Multi-function analog output; See applicable model manual F4 parameters for details	Current output 0-20mA; Voltage output 0-10V; Output current load impedance specification: 0-300Ω JP2 set to CO: Voltage output JP2 set to VO: Current output
Digital Input	DI9	High-speed pulse input; See applicable model manual F3 parameters for details	Maximum input frequency: 100kHz JP1 set to HIG: DI terminal active when closed with 24V JP1 set to LOW: DI terminal active when closed with CM
Digital Output	DO3	OC output; See applicable model manual F3 parameters for details	Maximum output frequency: 100kHz Maximum Operating Voltage: 24V Maximum Output Current: 150mA
Relay programmable output	TA2	TA-TB normally closed contact; TA-TC normally open contact; See applicable model manual F3 parameters for details	Contact capacity: AC 250V/3A
	TB2		
	TC2		
Common Terminal	CM	+24V, digital common terminal.	+24V, DO3, DI6-DI9 common terminal

☐ Model: IOV-E108, PN: 050M008063001

Applicable to DL500-4T0185G/4T0220P and above models. The standard communication I/O expansion card expanded configuration is as follows:

Table 12-4 Introduction to Terminals of Communication Adapter Card IOV-E108

Terminal Type	Terminal Name	Function
Profibus Differential Signal	DP-A	Receive/Transmit Data-N (Signal A)
	DP-B+	Receive/Transmit Data-P (Signal B)
	PGND	Communication Cable Shield Ground
Standard Profibus Bus Connector	1	Shielding layer
	3	Receive/Transmit Data-P (Signal B)
	4	Control-P
	5	5V Power Ground
	6	5V Power Supply
	8	Receive/Transmit Data-N (Signal B)
Auxiliary Power Supply	+12V	Provide +12V/Max 200mA current to external devices
Common Terminal	GD	Power Reference Ground
Differential Input	A+	Encoder A phase differential (+12V±20%) input, max frequency ≤100kHz
	A-	
	B+	Encoder B phase differential (+12V±20%) input, max frequency ≤100kHz
	B-	
	Z+	Encoder Z phase differential (+12V±20%) input, max frequency ≤100kHz
	Z-	

☐ Model: IOV-D109, PN: 050M008063101

Applicable to DL500-4T0185G/4T0220P and above models. The standard communication I/O expansion card expanded configuration is as follows:

Table 12-5 Introduction to Terminals of CANopen Communication Adapter Card IOV-D109

Terminal Type	Terminal Name	Function							
Communication Interface	CAN+	CANopen Communication Physical Interface							
	CAN-								
Communication Cable Shield Ground	EARTH	CANopen Cable Shield Ground							
Common Terminal	GND	Protective Ground							
Baud Rate Selection	Knob Position	0	1	2	3	4	5	6	7
	Baud Rate	10 kbps	20 kbps	50 kbps	125 kbps	250 kbps	500 kbps	800 kbps	1000 kbps

12.2 Introduction to PG Expansion Card

DL500 series inverters feature closed-loop vector control. When users need to use this mode, a PG card accessory must be selected.

The PG card can receive single-ended open collector output, push-pull output, and differential output encoder signals.

Precautions for PG Expansion Card Use:

1) PG expansion card signal wires and power wires must be laid out separately. Parallel routing is prohibited.

2) To avoid interference to encoder signals, please use shielded cables as PG card signal wires.

3) The shield layer of the encoder shielded cable should be connected to ground (e.g., the inverter's E terminal), and single-point grounding should be used as much as possible to avoid signal interference.

12.2.1 Standard PG Expansion Card

☐ Model: PGV-C000, PN: 050M009012002

Applicable to DL500-4T0185G/4T0220P and above models. The standard expansion card expanded configuration is as follows:

Table 12-6 Introduction to Terminals of Standard PG Expansion Card

Terminal Type	Terminal Name	Function
Auxiliary Power Supply	+12V	Provide +12V/Load capacity ≤200mA to external devices
Common Terminal	GD	Power Reference Ground
Differential Input	A+, A-	Encoder A phase differential (+12V±20%) input, max frequency ≤100 KHz
	B+, B-	Encoder B phase differential (+12V±20%) input, max frequency ≤100 KHz
	Z+, Z-	Encoder C phase differential (+12V±20%) input, max frequency ≤100KHz

☐ Model: PGV-C001, PN: 050M009062201

Applicable to DL500-4T0185G/4T0220P and above models. The standard expansion card expanded configuration is as follows:

Table 12-7 Introduction to Terminals of PG Expansion Card

Terminal Type	Terminal Name	Function
Auxiliary Power Supply	+5V	Provide +5V to external devices; load capacity ≤500mA
Common Terminal	GD	Common Terminal of 5V Power Supply
Differential Input	AO+, AO-	Encoder A phase differential (+5V±20%) output, max frequency ≤100KHz
	BO+, BO-	Encoder B phase differential (+5V±20%) output, max frequency ≤100KHz
	ZO+, ZO-	Encoder Z phase differential (+5V±20%) output, max frequency ≤100KHz
Differential Output	AI+, AI-	Encoder A phase differential (+5V±20%) output, max frequency ≤100KHz
	BI+, BI-	Encoder B phase differential (+5V±20%) output, max frequency ≤100KHz
	ZI+, ZI-	Encoder Z phase differential (+5V±20%) output, max frequency ≤100KHz

☐ Model: PGV-C005, PN: 050M009063601

Applicable to DL500-4T0185G/4T0220P and above models. The standard expansion card expanded configuration is as follows:

Table 12-8 Introduction to Terminals of PG Expansion Card

Terminal Type	Terminal Name	Function
Auxiliary Power Supply	+5V	Provide +5V max 500mA current to external devices
Common Terminal	GD	Common Terminal of 5V Power Supply
Collector Output	AO	Encoder A phase open collector output, max frequency ≤100KHz, output current ≤100mA
	BO	Encoder B phase open collector output, max frequency ≤100KHz, output current ≤100mA
	ZO	Encoder Z phase open collector output, max frequency ≤100KHz, output current ≤100mA
Differential Input	AI+, AI-	Encoder A phase differential (+5V±20%) output, max frequency ≤100KHz
	BI+, BI-	Encoder B phase differential (+5V±20%) output, max frequency ≤100KHz
	ZI+, ZI-	Encoder Z phase differential (+5V±20%) output, max frequency ≤100KHz

12.3 Tension Control Expansion Card

12.3.1 Product Basic Information

Standard Type I (Model APV-F301) is applicable to DL500-4T0185G/4T0220P and above models

12.3.2 Product Introduction

The tension control expansion card is an expansion card used with V series inverters, suitable for products in the wire drawing machine industry and applications related to winding/unwinding control.

This product can meet the requirements of highly stable tension control applications through roll diameter calculation. For wire drawing machine winding/unwinding sites, speed mode tension control with PID adjustment is achieved through external speed setting and current winding/unwinding tension swing arm signals. This ensures that the tension swing arm quickly reaches the balance position in one attempt when starting from any position, and maintains stable winding/unwinding effects even at high-speed operation.

12.3.3 Product Functions

Roll Diameter Calculation	Roll diameter thickness integration, roll diameter linear velocity estimation, roll diameter frequency ratio estimation, etc.
Zero Speed Tension Hold	Output 0-100% adjustable torque at zero speed
Wire Break Detection	Quickly detect wire breaks through feedback input
Tension Compensation	Static friction compensation, sliding friction compensation, system inertia compensation, and material inertia compensation
Motor Switching	Achieve roll change function through motor switching
Process PID	Two sets of PID parameters can smoothly transition based on roll diameter to ensure steady-state fluctuations for full and empty rolls
Metering Function	Achieved through linear velocity integration

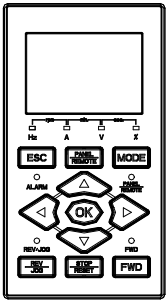
12.3.4 Technical Specifications

Starting Torque	> 180%
Smooth Start	Overshoot less than 10%
Steady-State Fluctuation	Below 5%

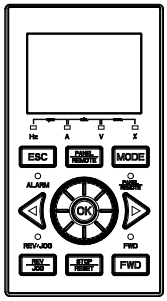
12.4 Introduction to Operation Panel

12.4.1 Outline Drawing of Operation Panel

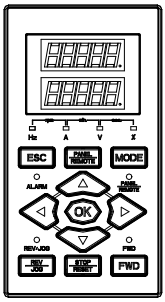
LCD Operation Panel DPNL360CA
050M007360001



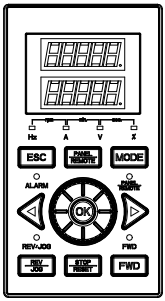
LCD Operation Panel (Shuttle Type)
DPNL360CB 050M007360002



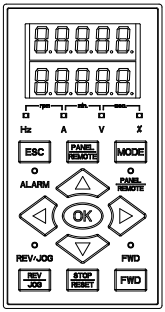
Dual-row LED Operation Panel DPNL360EA
050M007360003



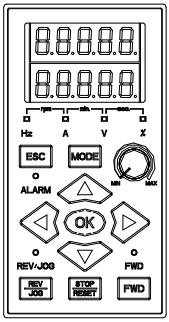
Dual-row LED Operation Panel (Shuttle Type)
DPNL360EB 050M007360004



Dual-row LED Small Panel DPNL350EM
050M007033701



Dual-row LED Small Potentiometer Panel
DPNL350EN 050M007033601



12.4.2 Key Functions

For panel key functions and operation methods, please refer to Chapter 5.

12.5 Braking Components

Working Principle: When the inverter drives the motor to decelerate or reverse, the energy feedback from the motor causes the internal DC bus voltage of the inverter to rise. To prevent the inverter from stopping due to overvoltage protection, before the DC bus voltage reaches the protection point, the braking unit automatically turns on the energy consumption circuit, releasing energy as heat through the braking resistor, thereby suppressing the continuous rise in voltage.

12.5.1 Braking Unit Model Description

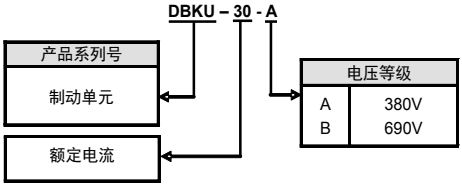


Figure 12-1 Schematic Diagram for Model Description

12.5.2 Braking Resistor Selection

Users can select different resistance values and power based on actual conditions (but the resistance value must not be less than the recommended value in the table, and the power can be higher). The selection of the braking resistor needs to be determined according to the regenerative power generated by the motor in the actual application system, and is related to system inertia, deceleration time, potential energy load, etc. Customers need to choose according to actual conditions. The larger the system inertia, the shorter the required deceleration time, and the more frequent the braking, the higher the power and smaller the resistance value the braking resistor needs to be.

1. Resistance Value Selection

During braking, most of the motor's regenerative energy is consumed by the braking resistor. It can be calculated using the formula:

$$U*U/R=Pb$$

U---- Braking voltage for stable system braking (varies for different systems, generally 700V for 380VAC systems)

Pb---- Braking power

2. Braking Resistor Power Selection

Theoretically, the power of the braking resistor should match the braking power, but a derating of 70% is considered. It can be calculated using the formula:

$$0.7*Pr=Pb*D$$

Pr---- Resistor power

D---- Braking frequency (ratio of regenerative process to the entire working process), generally taken as 10%.

Please refer to the table below:

Type	Elevator	Unwinding and Winding	Centrifuge	Accidental Braking Load
Scale	20%-30%	20%-30%	50%-60%	5%

Inverter Braking Resistor Selection Table

Frequency Converter Model	Adaptive Motor (kW)	Recommended Braking Resistor Power (KW)	Recommended Braking Resistor Resistance (Ω)	Braking Torque (100%)	Braking Unit
DL500-4T0011G/4T0015P	1.1	0.3	≥400	100	Standard Built-in
DL500-4T0015G/4T0022P	1.5	0.5	≥300	100	Standard Built-in
DL500-4T0022G/4T0030P	2.2	0.65	≥200	100	Standard Built-in
DL500-4T0030G/4T0040P	3.0	0.75	≥150	100	Standard Built-in
DL500-4T0040G/4T0055P	4.0	1.0	≥125	100	Standard Built-in
DL500-4T0055G/4T0075P	5.5	1.5	≥85	100	Standard Built-in
DL500-4T0075G/4T0110P	7.5	2.0	≥65	100	Standard Built-in
DL500-4T0110G/4T0150P	11	2.5	≥50	100	Standard Built-in
DL500-4T0150G/4T0185P	15	3.6	≥35	100	Standard Built-in
DL500-4T0185G/4T0220P	18.5	4.5	≥30	100	Standard Built-in
DL500-4T0220G/4T0300P	22	5.5	≥ 25	100	Standard Built-in
DL500-4T0300G/4T0370P	30	6.5	≥20	100	Standard Built-in

For DL500-4T0370G/4T0450P and above models requiring braking function, please refer to the braking unit manual.

12.5.3 Braking Unit Appearance

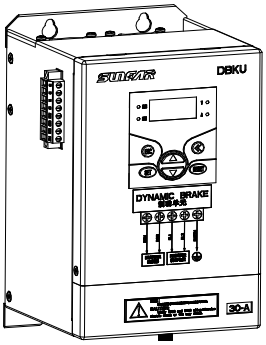


Figure 12-2 Appearance Schematic Diagram

12.5.4 Braking Unit Installation Dimensions

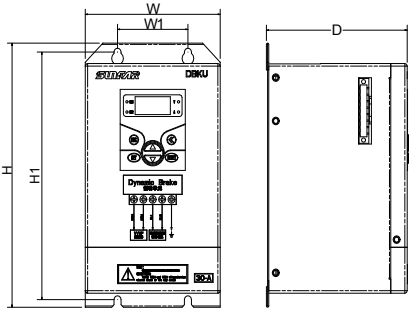


Figure 12-3 Installation Dimensions Diagram

The installation dimensions of the braking unit are shown in the table below:

Braking Unit Model (Three-phase 380V)	W1	W	H1	H	D	Screw Specifications
DBKU-30-A	60	115	194	207	120	M4
DBKU-50-A						
DBKU-110-A	——	——	——	——	——	——
DBKU-160-A						

12.5.5 Single Braking Unit and Inverter Reference Wiring Diagram

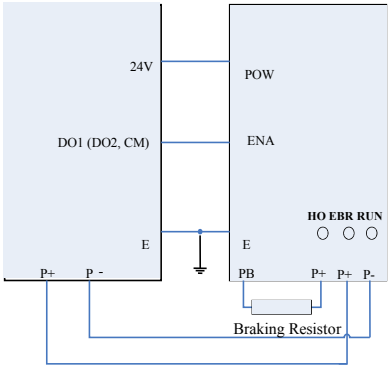


Figure 12-4 Wiring Diagram

When using the braking unit's braking enable (disable) function, the inverter's deceleration effective control terminal connected to ENA (the corresponding control port for Simphoenix inverters is DO1 or DO2) must be set to be effective during deceleration before the inverter runs. If this function is not needed, connect ENA to the 24V common terminal CM.

12.5.6 Wiring Precautions

1) When wiring the inverter to the braking unit, if P+ and P- are reversed, it will burn out the braking unit and damage the inverter. Please carefully check before powering on the inverter.
2) When installing and wiring the main circuit, the connection to the inverter must be cut off or the inverter's power disconnected, and wait for 5-10 minutes until the inverter or braking unit power indicator light extinguishes before operating. Control circuit wiring is generally not allowed to be performed while live;
3) Control circuit wiring should be kept as far away as possible from main power circuit wiring to prevent malfunctions due to interference noise. If control circuit wiring must cross main circuit wiring, it should cross perpendicularly. If the wiring distance is long, twisted pair or shielded wire should be used.

For more information on braking units, see the braking unit manual, which can be downloaded from our company's website at: http://www.simphoenix.com.cn.

For more expansion components, please refer to our company's product catalog.

产品保修卡

Warranty Card

维修单位：_____ 用　　户：_____

产品型号：_____ 购买日期：_____

发票号码：_____ 购自单位：_____

地址：广东省深圳市宝安区西乡固戍二路汇潮工业区厂房 A 栋　　邮编：518100

总机：0755-26919258　售服中心：0755-26910928

传真：0755-26919882

注意：

1、请您妥善保留此卡，在需要维修时，凭此卡连同购机发票与四方售服中心或供应商联系。

2、本公司对用户购买的四方产品保修 18 个月

深圳市四方电气技术有限公司

Shenzhen Simphoenix Electric Technology Co.,Ltd

沿此虚线剪开

合格证

Certificate of Approval

本产品按标准合格准予出厂

检验员：_____

深圳市四方电气技术有限公司

Shenzhen Simphoenix Electric Technology Co.,Ltd