SUNFAR 四方电气

V220 Series

Low Power Closed-loop Vector Inverter User Manual

(3.0KW-11KW)

✧ PREFACE

Thanks for choosing V220 Series Low Power closed-Loop Vector Inverter produced by Shenzhen Sunfar Electric Technologies Co, Ltd.

This Manual is the operating manual for V220 Series Low Power Closed-Loop Vector Inverter. It provides all relevant instructions and precautions for installation, wiring, functional parameters, daily care and maintenance, fault diagnosis and troubleshooting of V220 series inverter.

In order to use this series of inverters correctly, guarantee product's best performance and ensure safety of users and equipment, be sure to read this manual carefully before using V220 series inverters. Improper use may cause abnormity and malfunction of the inverter, reduce its service life and even damage equipments and lead to personal injury and death, etc.

This user manual is delivered with the device. Please keep it property for future overhaul and maintenance.

Owing to constant improvement of products, all data may be changed without further notice.

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V220 Series Low Power Closed-Loop Vector Inverter User Manual

Version: V1.0

Revision Date: Aug. 2011

✧ CATALOG

1. PRODUCT CONFIRMATION AND OPERATION CAUTIONS

1.1 PRODUCT CONFIRMATION

After the arrivel of the product, please carefully observe outer packing, confirm if there is any breakage; if there is a label on the outer packing, please confirm the model and specification of it to see if they are in accordance with your order. If any damage or discrepancy is found, please contact the supplier promptly for solution.

1.1.1 CONFIRMATION OF FREQUENCY INVERTER BODY AND ACCESSORIES

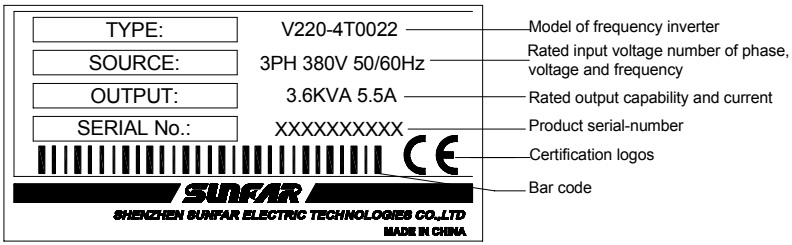
Confirm the frequency inverter nameplate details, and check for any damage that may have occurred during the transit, if any parts and components have sustained damage, and that the frequency inverter is complete with the following accessories:

- Operation instruction;
- Certification;
- Product list;
- Other ordered accessories

If there is any omission or damage, please contact the supplier promptly for solution.

1.1.2 NAMEPLATE OF FREQUENCY INVERTER

On the frequency inverter, there is a nameplate marked with model number, input and output ratings, product serial-number and bar code of frequency inverter. The content of nameplate is shown as below:



1.2 SAFETY CAUTIONS

Read this instruction carefully prior to installation, wiring, operation and maintenance, to ensure proper operation of this product.

"Tips", "Attention", " Warning " and " Danger " in this operation manual are defined as follow.

- Tips: Tips for some useful information.

- Attention: Matter requires careful attention to ensure correct operation.

- Warning: These requirements must be followed to avoid the risk of injuries to personnel and the loss of material

- Danger: Without operation according to the requirements, serious damage to equipment or injuries to personnel may result.

1.2.1 NOTICES DURING INSTALLATION

1. The frequency inverter shall not be installed on combustibles, material that may induce the risk of fire.
2. The frequency inverter shall not be installed at places with direct sunlight, in case of danger.
3. The frequency inverter of this series shall not be installed in the environment of explosive gases, in case of the danger of explosion.
4. Do not install the Frequency inverter if damaged or If components are missing. Installation may lead to personal injury, fire or other accidents.
5. It is not allowed to dismount or modified the frequency inverter without authorization.
6. No foreign matter is allowed to be dropped into the frequency inverter, in case of breakdown of the frequency inverter.
7. During installation, the frequency inverter shall be installed at the place able to bear its weight, otherwise, it may fall down.

1.2.2 SAFETY CAUTION FOR WIRING

1. Please authorize the professional staff to conduct wiring. If the wiring operation is not proper, it may damage to the equipment and the individuals.
2. Please start to wire after the panel digital tube of frequency inverter is out for ten minutes, otherwise, there can be electric shock.
3. The grounding terminal of frequency inverter must be reliably grounded; otherwise, there can be electric shock risk.
4. No alternating current power supply is allowed to be connected onto the U, V and W of frequency inverter; otherwise, the frequency inverter can be damaged.
5. Confirm that the input voltage and frequency converter are in consistent with rated voltage value; otherwise, the frequency inverter may be damaged.
6. Confirm that the motor and frequency converter are adaptive with each other, otherwise, the motor can be damaged or frequency converter protection can be caused.
7. Brake resistor can not be connected onto the (+), (-) of DC bus directly, otherwise, there can be fire risk.

1.2.3 SAFETY CAUTION FOR RUNNING OPERATION

1. Do not operate the frequency inverter with wet hands. To do so may result in electric shock.
2. Please install the front cover prior to plugging in, and shall not demount the cover while power is on; otherwise, here can be electric shock.
3. During the frequency converter is with power on, even the motor is stopped, do not touch the terminals of frequency converter, otherwise, here can be electric shock.
4. If you apply the function of restart, do not approach the load equipment, for it may restart suddenly after alarm removed, otherwise, personal injuries may caused. Please set the system as ensuring personal and property safety even when restarting.
5. Please set additional emergency stop switch; otherwise, personal injuries may be caused.
6. The temperature of cooling fin and direct current reactor can be very high, therefore, do not touch them, in case of the danger of burns.

1.2.4 SAFETY CAUTION FOR MAINTENANCE CHECK

1. Maintenance operations and device replacement only can be done by trained professional maintenance staff. During operation use only insulated tools. It is strictly prohibited to leave debris and metal in the frequency inverter. Doing so will increase the likely hood of electric shock, fire, and personal and property damage.
2. After replacement of control board, corresponding parameters must be set before operation, otherwise, there can be danger of property damage.

1.3 GENERAL OPERATION INFORMATION

1.3.1 APPLICATION KNOWLEDGE OF GENERAL MOTOR DRIVE

1. The temperature when driving general motor applied with frequency converter can be a little higher than that of industrial frequency power. With long-term operation at low speed, the operation life of motor can be affected due to the poorer heat dissipation effect. In this case, special frequency converter shall be selected or lighten the motor load.
2. If when the equipment is installed with frequency converter drive, sometimes, there can be resonance due to the natural vibration frequency of mechanical system, please consider about applying flexible coupling and insulation rubber, or applying the function of hopping frequency of the frequency converter, to avoid the resonance point for operation.
3. There can be larger noise when driving general motor applied with frequency converter than that of industrial frequency power. In order to reduce the noise, the carrier frequency of frequency converter can be increased properly.

1.3.2 APPLICATION KNOWLEDGE OF DRIVING SPECIAL MOTOR

1. For high-speed motors, if the set frequency of frequency inverter is above 120Hz, please conduct combination test with the motor to make sure it can be operated safely.
2. For synchronous motor, there must be correspondences according to the types of motor. Please contract the manufacturer for consultation.
3. Operation of single-phase motors can not be achieved with this model frequency inverter. Even when input with single phase, there is three-phase output, please apply with three-phase motor.

1.3.3 AMBIENT ENVIRONMENT

Application shall be applied in the indoor range with environment temperature of -10 to +45°C, humidity below 95% (without condensation of moisture), no dust, no direct sunlight, no corrosive gas, no combustible gas, no oil mist, no steam, no water or floating fiber or mental particles; if special requirements beyond these are required, please contract the manufacturer for consultation.

1.3.4 CONNECTION KNOWLEDGE OF PERIPHERAL EQUIPMENT

1. For the protection of wirings, please configure breaker for wirings on the input side of frequency converter. Please do not apply device with larger capacity than recommendation.
2. If it needs to switch to industrial frequency power and others, when installing electromagnetic contactor on the output side of frequency converter, please switch after frequency converter and motor stop running.
3. When applying with motor thermal relay, if the wiring of motor is too long, sometimes it is affected with the high-frequency current flowing through capacitance distributed with wiring, current below the set value of thermal relay may also cause trip. In this case, please lower the carrier frequency, or apply with output filter.
4. For noise interference, connection filter, magnet ring and shielded wire can be applied as corresponding measures.

1.3.5 TRANSPORTATION AND STORAGE

1. During product handling, please capture the both sides of the bottom of the entity, rather than the cover or parts only.
2. Please do not make the parts of plastic excessive forced, otherwise, there can be falling down or damage.
3. When it is for temporary storage and long-term storage, pay attention to the followings:
   - Try to be packaged in the packing case of our company as the original package for storage.
   - Long-term of storage will lead to the characteristics of electrolytic capacitor worsen, therefore, it shall be powered on every half year at least, and with conduction time more than half an hour, and the input voltage must be risen to the rated value gradually with voltage regulator.

1.4 ABANDON CAUTION

1. Explosion of the electrolytic capacitor: electrolytic capacitor in the frequency converter may cause explosion while burning.
2. Waste gas of plastic burning: harmful and toxic gas may be produces while burning the plastic and rubber product of the frequency converter.
3. Disposal methods: please deal with the frequency converter as industrial waste.

1.5 OTHER CAUTIONS

1. This product shall not be applied for life support device and other application concerning directly with human body safety, otherwise, there can be accident.
2. If serious accident or serious losses caused due to the failure of this product, please install safety device for this product, otherwise, there can be accident.

2. PRODUCTION INTRODUCTION

2.1 INVERTER MODEL

V220 – 4 T 0090

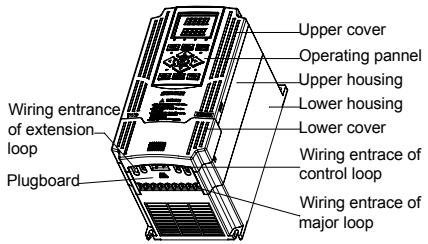
Product Series Number	
V220	Low-power closed-loop vector inverter
V260	High-performance closed-loop vector inverter
A310	Heavy-duty closed-loop vector inverter
E300/E310	Low-power universal inverter
E380	Universal inverter

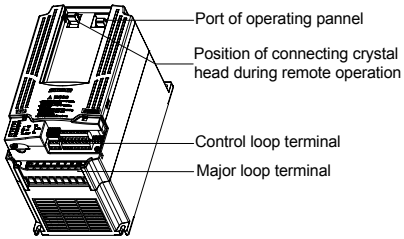
Power Class (KW)	
0004	0.4
0007	0.75
0011	1.1
0015	1.5
0022	2.2
0030	3.0
0040	4.0
0055	5.5
0075	7.5
0090	9.0
0110	11

Voltage Class	
2	220V
4	380V

Power Supply Phase	
T	Three-phase
S	Single-phase

2.2 PRODUCT APPEARANCE





2.3 MODEL TABLE

Voltage	Model	Rated capacity (KVA)	Adaptive motor (KW)	Rated current (A)
Single Phase 220V	V220-2S0004	1.1	0.4	3.0
	V220-2S0007	1.9	0.75	5.0
	V220-2S0011	2.5	1.1	6.5
	V220-2S0015	2.9	1.5	7.5
	V220-2S0022	3.8	2.2	10.0
	V220-2S0030	4.3	3.0	14.0
	V220-2S0040	6.3	4.0	16.5

Voltage	Model	Rated capacity (KVA)	Adaptive motor (KW)	Rated current (A)
Three Phase 380V	V220-4T0007	1.5	0.75	2.3
	V220-4T0011	2.0	1.1	3.0
	V220-4T0015	2.4	1.5	3.7
	V220-4T0022	3.6	2.2	5.5
	V220-4T0030	4.9	3.0	7.5
	V220-4T0040	6.3	4.0	9.5
	V220-4T0055	8.6	5.5	13.0
	V220-4T0075	11.2	7.5	17.0
	V220-4T0090	13.8	9.0	21
	V220-4T0110	16.5	11	25

2.4 PRODUCT TECHNICAL INDEX AND SPECIFICATIONS

Input	Rated voltage & Frequency	Three phase (4T# series) 380V 50/60Hz	Single phase (2T# series) 220V 50/60Hz
	Output voltage	4T# series: 0 ~ 380 V	2T# series: 0 ~ 220 V
	Output frequency	0.0 - 300.00Hz	
	Digital input	Standard configuration: 6-circuit digital input (DI), extensible to 16-circuit (optional extension components)	
	Digital output	Standard configuration: 2-circuit digital output (DO)	
	Pulse in and out	0~100.0KHz pulse input, can receive OC or 0~24V level signal (optional)	
Output	Pulse output	0~100.0KHz pulse output (optional), PWM output mode can be selected to extend analog output terminal.	
	Analog input	Standard configuration: 0~10V voltage output (AI1); 0~20mA current output (AI2); Standard I/O board: -10V~10V voltage input	
	Analog output	Two-circuit 0~10V analog output signal (can be set to 0~20mA current output mode)	
	Contact output	Standard one group of AC 250V/2A normally open and closed contacts, 1~6 groups normally open and closed contacts extensible	

Control Characteristics	Control Mode	Closed-loop vector control	Open-loop vector control	V/F control
	Starting torque	0 speed 200%	0 speed 180%	0 speed 180%
	Speed adjustable range	1 : 1000	1 : 200	1 : 100
	Steady speed precision	±0.02%	±0.2%	±0.5%
	Torque control precision	±5%	±5%	--
	Torque response time	≦5ms	≦25ms	--
	Frequency resolution	Low-frequency running mode: 0.01Hz		
	Frequency precision	Low-frequency operation mode: digital setting-0.01 Hz, analog setting-highest frequency×0.1%		
Typical Function	Load capacity	110% - long-term; 150% - 60s; 180% - 5s		
	Carrier frequency	Three-phase voltage vector composition mode: 1.5~10.0KHz Two-phase voltage vector composition mode: 1.5~12.5KHz		
	Deceleration and acceleration time	0.01 - 600.00Sec. / 0.01 - 600.0Min		
	Magnetic flux brake	Achieve rapid brake of the motor by increasing the motor's magnetic flux (30-120% allowed)		
	DC brake / band-type brake	DC brake/band-type brake initial frequency: 0.0~upper limiting frequency, brake/band-type brake injection current: 0.0~100.0%		
	Start frequency	0.0 - 50.00Hz		
	Multi-segment running	16-segment frequency/speed running, independent setting of the running direction, time and acceleration and deceleration of each segment; 7-segment process PID setting		
	Built-in PID	Built-in PID controller can be used by external equipments independently		
	Waking & sleeping	Process PID has simple sleeping and wakening functions.		
	MODBUS communication	Standard MODBUS communication protocol (optional) allowing for flexible parameter reading and mapping		
	Dynamic braking	Actuating voltage: 700 ~ 760V, braking ratio: 50 ~100%		
	General Functions	Power cut restart, fault self-recovery, motor parameter dynamic/ static self-identification. Start enabling, operation enabling, start delay, over current suppression, over voltage/under voltage suppression, V/F custom curve, analog input curve correction, line brake detection, textile machinery disturbance (frequency swing) operation		

Function Features	Virtual I/O terminal	8-circuit one-to-one virtual output and input terminals, allowing for complicated engineering onsite application in an easy way
	Communication linkage synchronization	Achieve synchronized drive of multiple rotation easily, and free selection of linkage balance of multiple machines based on current, torque and power
	Load dynamic balance	Also allows for dynamic balance of multi-machine load (not limited to communication linkage) and able to achieve torque motor characteristics
	Strong starting torque	For load featuring high inertia and high static friction, super strong starting torque for certain period can be set
	Setting priority	Users can freely select the priority of various frequency/revolution setting channel; Suitable for combined application for various occasions
	Setting combinations	Up to hundreds of setting combinations of frequency, revolution and torque
	Timer	3 built-in timers: 5 kinds of clocks, 5 kinds of trigger modes, multiple door access signals and working modes, and 7 kinds of output signals
	Counter	2 built-in counters: clock margin selection, 4 kinds of trigger modes and 7 kinds of output signal
	Macro parameter	Application macro: allowing for conveniently setting and partially curing multiple common group parameters and simplifying parameter setting for common applications
		System macro: Allowing for conveniently switching equipment's working mode (eg. switching between high and low frequency running modes), and automatically redefining local parameters
	Parameter testing	Any un-stored parameter tested on site can be stored with one key or abandoned and restored to original value
	Parameter display	Allowing for automatically shielding parameters of unused functional modules or selectively displaying modified, stored or changed parameters
Protection Function	Power supply	Under voltage protection and three-phase power supply unbalancing protection
	Running protection	Over current protection, over voltage protection, inverter over temperature protection, inverter overload protection, motor overload protection, output phase lack protection, and IGBT drive protection
	Equipment abnormity	Current detected abnormity, EEPROM memory abnormity, and abnormal control unit, motor over temperature, and temperature acquisition loop fault
	Motor connection	Motor not connected, motor's three-phased parameters unbalanced and parameter misidentification
	Extension card	Detect and protect the extension card for compatibility or conflict
Environment	Installation environment	Indoor vertical installation, not subjecting to direct sunshine, free of dust, corrosive and flammable gas, oil mist, vapor and free of drips or salt
	Altitude	0~1000m. The output current capability drops by 10% for every rise of 1000 m
	Ambient temperature	Working ambient temperature: -10°C ~ +45°C Storage ambient temperature: -20°C ~ +60°C
	Humidity	Blow 95%, no condensed water
	Vibration	< 6m/s^2

3. INSTALLATION OF FREQUENCY INVERTER

3.1 INSTALLATION OF FREQUENCY INVERTER

This series of frequency inverters are wall-mounted or cabinet frequency inverters, which should be installed vertically. Please install the frequency inverter within an appropriate enclosure with sufficient ventilation.

Please refer to 1.3.3 for installation environment. If there is special installation requirement from customer, please contact with manufacturer in advance.

3.1.1 MOUNTING SURFACE

Sometimes, the temperature of cooling fan may rise to around 90℃, so please install the mounting surface at the place which can stand for this temperature rise.

3.1.2 INSTALLATION SPACE

Requirements for installation spacing distance of single frequency inverter are as shown in Figure 3-1. Reserve enough space around the frequency inverter.

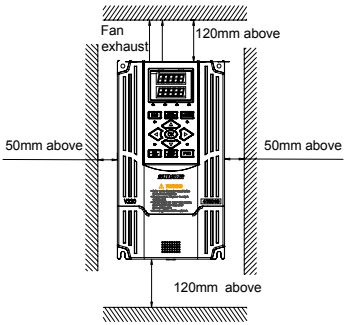


Figure 3-1
Installation spacing distance

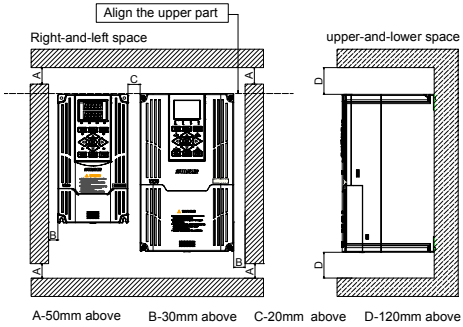


Figure 3-2 Installation sizes of right and left frequency inverters (3.7KW above)

3.1.3 MULTIPLE INSTALLATIONS

If install more than 2 sets of frequency inverters in device or control cabinet, please conduct parallel installation in principle as shown in Figure 3-2. If there is no choice but vertical installation, please consider using partition plate, to make no influence on upper frequency inverter from lower frequency inverter.

- Horizontally close installation is only for 3.7KW below, and -10°C ~ 45°C environmental temperature.
- For parallel installation of frequency inverters with different sizes, please carry out installation after aligning the upper parts of all the frequency inverters, thus to be in favor of changing cooling fan.
- Please don't install frequency inverter in the environment with tattered cotton yarn and damp dust which may cause blockage of cooling fin. If necessary to operate in such environment, please install in the control cabinet which can keep tattered cotton yarn out.
- If necessary to install at the place with more than 1000m height above sea level, please de-rate operation. See 2.4 product technical indexes and specifications for details.

3.2 SIZE AND ASSEMBLY OF OPERATION PANEL

It is standard LED Wheel Panel for V220 models as Figure 3-3.

3.2.1 DISASSEMBLY

Operator put middle finger in the finger hole site above operation panel, slightly presses down the top and pulls outward, then can dismantle the operation panel, as shown in Figure 3-4.

3.2.2 INSTALLATION

Joint the fixed mouth of hook at the bottom of operation panel and spring plate under panel base, then only push the panel inward, as shown in Figure 3-5.

3.2.3 EXTENSION OF EXTERNAL CONNECTION

When need to extend external connection, disassemble the operation panel as Figure 3-4, take crystal head down and place it on designated position so as not to loss, then use extension cable as Figure 3-6 below to connect frequency inverter and operation panel.

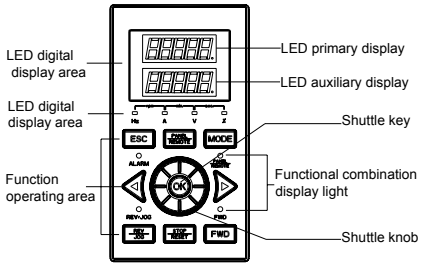


Figure 3-3 Standard double LED panel (Model DPNL360EA/code 050M007360003)

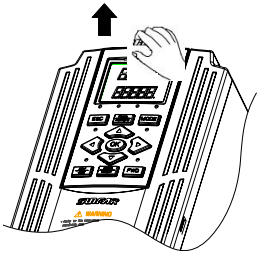


Figure 3-4 Disassembly schematic diagram of operation panel

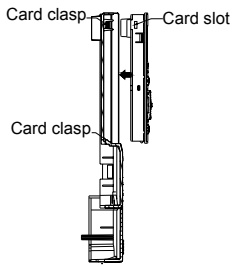


Figure 3-5
Installation schematic diagram of operation panel

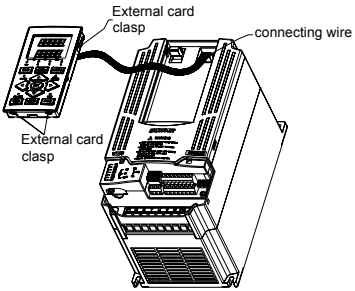


Figure 3-6
Connection diagram of extension keyboard

- It shall employ extension cable or LAN cable available (straight cable) in the market.
- Extension cable shall not exceed 15m; shielding layer is connected with ground terminal of frequency inverter. Please select fittings of remote operation panel for more than 15m.
- Do not carry out wiring horizontally close to power line.
- Panel shall be fastened on stable fixed surface or work bench. Avoiding any damage.

3.3 DISASSEMBLY OF TERMINAL COVER

- Disassembly:

Put finger on the handle slot at the bottom of cover plate (the position of clasp as Figure 3-7), and forcibly lift it upward until the card clasps between cover plate and shell break away, then pull the cover plate down can disassemble the shell. Show as Figure 3-7.

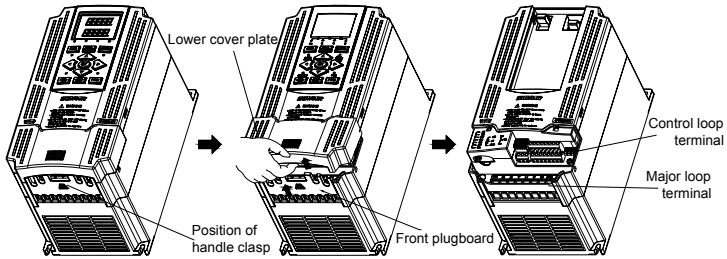


Figure 3-7 Disassembly and installation schematic diagram of plastic cover plate

- Installation:

Slant cover plate into about 15°, then insert the fixed stator at the top of cover plate into fixed slot on shell. Forcibly press the cover plate down until heard a click, which means the cover plate has been in place.

3.4 INSTALLATION SIZE OF PANEL

1. When remote mounting the keypad directly onto a panel or cabinet door, refer to Figure 3-10-C for the size of the hole.

2. When remote mounting the keypad using a remote door mount kit, refer to Figure 3-10-B for the size of the hole.

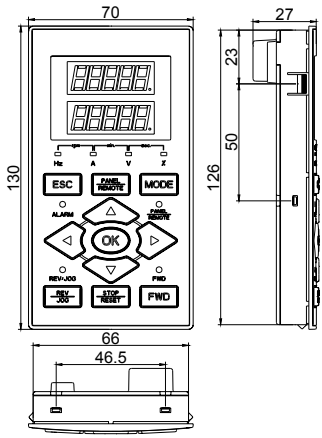


Figure 3-8-A
Installation size 1 of operation panel

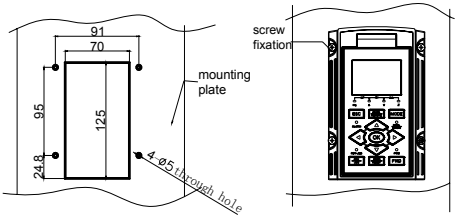


Figure 3-8-B Installation size 2 of operation panel

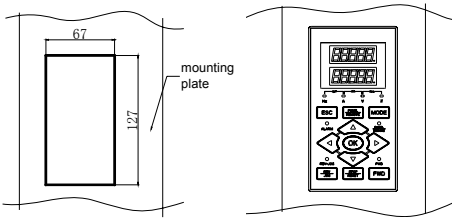


Figure 3-8-C Installation size 3 of operation panel

3.5 DISASSEMBLY AND INSTALLATION OF EXPANSION BOARD

Please refer to Figure 3-9 for disassembly and installation of expansion board.

- Installation:

① Place expansion board in direction as shown in figure, press down until good connection between expansion board and socket of control panel;

② Get two M3 screws on after aligning the screw hole on the left of expansion board.

- Disassembly:

① Dismantle the two screws on the left of expansion board;

② Pull expansion board up (as shown in Figure 3-9) out from the socket of control panel.

3.6 INSTALLATION AND DISASSEMBLY OF FUNCTION BOARD

Function board is installed on control panel with utilization of extension cord. As shown in Figure 3-9.

- Installation:

① After making the triangle mark on cylindrical cover plate direct to “open”, put index finger or middle finger into the hole to push upward, then can take the circular cover plate out;

② Make the socket of function board direct to the pin of control board, and then slightly press it down until good contact;

③ Get cylinder cover plate on and rotate clockwise to make the triangle on it direct to “lock”.

- Disassembly:

① Clockwise rotate cylinder to make the triangle on it direct to “open”, put index finger or middle finger into the whole, push up then can take the cylindrical cover plate out.

② Slightly pull the pin of control board up out from function board then can take it out.

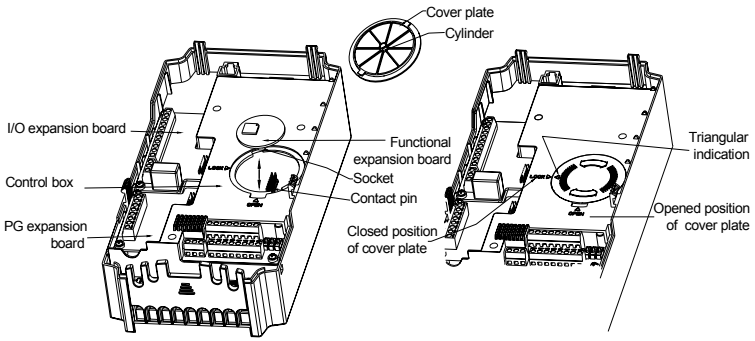
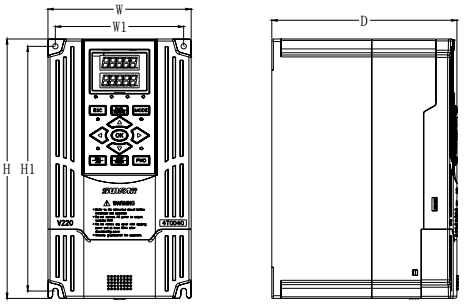


Figure 3-9 Diagram for installation and disassembly of extension card and function board

3.7 INSTALLATION SIZE OF FREQUENCY INVERTER



Specific installation sizes of V220 series frequency inverters as listed below:

Model of frequency inverter (Three phase 380V)	Model of frequency inverter (Single phase 220V)	W1 (mm)	W (mm)	H1 (mm)	H (mm)	D (mm)	Specification of screw
V220-4T0007	V220-2S0004	--	--	--	--	--	--
V220-4T0011	V220-2S0007						
V220-4T0015	V220-2S0011						
V220-4T0022	V220-2S0015						
V220-4T0030	V220-2S0022	121	135	234	248	174.5	M4
V220-4T0040	V220-2S0030						
V220-4T0055	V220-2S0040						
V220-4T0075	--	169	180	290	305	179	M5
V220-4T0090	--						
V220-4T0110	--						

4. WIRING OF FREQUENCY INVERTER

4.1 CAUTIONS OF WIRING

1) Make sure middle circuit breaker is connected between the frequency inverter and power supply to avoid expanded accident when the frequency inverter is faulty.

2) In order to reduce electromagnetic interference, please connect surge absorber on the coil of electromagnetic contactor, relay and etc. in the surrounding circuit of the frequency inverter.

3) Please use shielded wire of above 0.3mm² for the wiring of such analog signals as frequency setting terminal and instrument loop, etc. The shielding layer shall be connected on the grounding terminal of the frequency inverter (keep single-end- earthed shielding layer) with wiring length of less than 30m.

4) The stranded wire or shielded wire of above 0.75mm² shall be selected for the wiring of input and output loop of relay.

5) The control wire shall be separated from the power line of major loop; it shall be at a distance of above 10cm for parallel wiring and vertical for cross wiring.

6) All the leading wires shall be completely fastened with the terminal to ensure good contact. The leading wires of major loop shall be adopted cables or copper bar. When using cables, wiring must not be carried out until they are cold pressed or welded well by lug plate with corresponding section.

7) The pressurization of all the leading wires shall be in compliance with the voltage class of the frequency inverter.

8) Please reliably ground the frequency inverter and motor locally.

- Absorption capacitor or other RC absorbers shall not be installed at U, V and W output end of the frequency inverter, as shown in Figure 4-1.

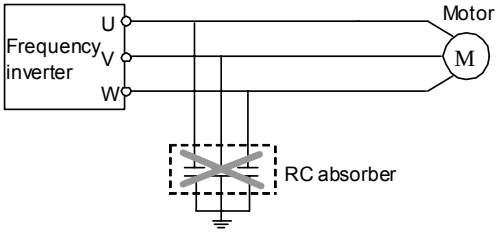


Figure 4-1 Schematic diagram of RC absorbers shall not be connected at output end.

4.2 CONNECTION OF OPTIONAL FITTINGS AND FREQUENCY INVERTER

1) Power supply: The power supply shall be in accordance with the specification of input power supply designated by this operating manual.

2) Air switch:

- When the frequency inverter is maintained or not in use for a long time, the air switch will separate the frequency inverter from the power supply;
- When the input side of the frequency inverter has failures like short circuit, the air switch can protect.

3) AC input reactor: When the interaction of higher harmonic between the frequency inverter and power supply can not meet the requirements after serious wave form distortion of power grid or the frequency inverter is equipped with DC reactor, the AC input reactor can be added. The AC input reactor can improve the power factors at input side of the inverter and reduce the influence caused by unbalanced voltage of three-phase power supply.

4) Filter at input side: EMI filter can be selected to restrict the high-frequency noise interference from the power cord of the frequency inverter.

5) Contactor: It can cut off the power supply when the system protective function acts to prevent failure expanding.

6) DC reactor: In order to defend the influence of power supply to frequency inverter, protect the inverter and restrict higher harmonic, DC reactor shall be equipped under the following conditions:

- When the power supply of frequency inverter has switch LBMJ on the node or with silicon controlled phase control load, the voltage jump of the grid resulted from reactive transient caused by capacitor switching and harmonic and grid wave form gap caused by phase control load may damage the input rectifying circuit of the frequency inverter.
- When the three-phase power supply of the frequency inverter is unbalanced;
- When the power factors at the input end of the frequency inverter are required to improve.

7) Filter at output side: EMI filter can be selected to restrict the interference noise generated at the output side of the inverter and wire leakage current.

8) AC output reactor: When the wiring from the frequency inverter to the motor is longer (exceeding 20m), it can restrict radio interference and leakage current.

9) Braking resistor: Improve the braking capacity of frequency inverter to avoid over voltage failure when slowing down.

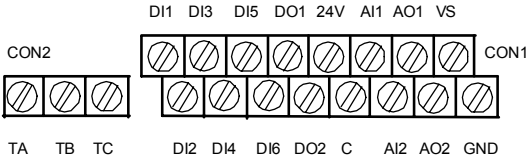
The specification of recommended electric appliances is as follows:

Inverter Model	Adaptive motor (KW)	Wire Spec (main loop) (mm^2)	Air circuit breaker (A)	Electromagnetic contactor (A)
V220-2S0004	0.4	1.5	10	6
V220-2S0007	0.75	1.5	10	9
V220-2S0011	1.1	2.5	16	12
V220-2S0015	1.5	4	20	16
V220-2S0022	2.2	6	32	22
V220-2S0030	3.0	6	40	32
V220-2S0040	4.0	6	40	32
V220-4T0007	0.75	1	10	9
V220-4T0011	1.1	1.5	16	12
V220-4T0015	1.5	2.5	16	12
V220-4T0022	2.2	4	16	12
V220-4T0030	3.0	4	20	16
V220-4T0040	4.0	4	25	16
V220-4T0055	5.5	6	32	22
V220-4T0075	7.5	6	40	32
V220-4T0090	9.0	10	50	32
V220-4T0110	11	10	63	32

4.3 WIRING OF CONTROL TERMINAL

4.3.1 WIRING OF CONTROL PANEL STANDARD TERMINAL CON1 AND CON 2

CON1 and CON2 terminals are arranged as follows:



4.3.2 FUNCTION DESCRIPTION OF CONTROL TERMINAL

Type	Label of terminal	Name	Function description of terminal	Specification
Control terminal	DI1—CM	Multifunctional input terminal DI1	6-circuit of programmable switching value input terminal can be selected 98 kinds of operational control commands by function code in F3.0 group by programming. See Reference Table for Function Selection of Multifunctional Terminal for detail.	Optical coupler isolated input 24Vdc / 5mA
	DI2—CM	Multifunctional input terminal DI2		
	DI3—CM	Multifunctional input terminal DI3		
	DI4—CM	Multifunctional input terminal DI4		

Type	Label of terminal	Name	Function description of terminal	Specification
	DI5—CM	Multifunctional input terminal DI5		
	DI6—CM	Multifunctional input terminal DI6		
Operating status output	CM	Common terminal of input/output terminal	2-circuit of programmable open collector output and 1-circuit of programmable relay output terminal can be selected 62 kinds of operating status output by the function code in F3.1 group by programming. See Reference Table for Status Variables for detail.	Maximum load current is 150mA; the highest withstand voltage is 24V.
	DO1—CM	Multifunctional output terminal DO1		
	DO2—CM	Multifunctional output terminal DO2		
	TA	Multifunctional relay output RO1 TA-TB normally closed TA-TC normally open		Contact capacity: AC250V/2A
	TB			
	TC			
Power supply	CM	+24V power supply reference place	Power supply of switching value terminal	Maximum output current:100mA
	24V	+24V power supply		
Analog input	AI1—GND	Analog input AI1	Select input voltage range, polarity and other functions with function code in F4 group.	Input voltage: 0~10V, Input current: 0~20mA
	AI2—GND	Analog input AI2		
Analog output	AO1—GND	Multifunctional analog output AO1	The programmable voltage/ current signal output terminal has 44 kinds of monitoring status to be selected by programming. See Reference Table for Monitor Variables for detail. JP1 and JP2 (see DIP Switch Jumper Selection in 4.3.6 for detail) are selected current / voltage output	Current output: 0~20mA Voltage output: 0~10V
	AO2—GND	Multifunctional analog output AO2		
Power supply	GND	Common terminal of analog signal		
	VS—GND	+10V/5V power supply	Supply +10V/10mA or +5V/50mA power outward	Selection of JP3 (see DIP Switch Jumper Selection in 4.3.6 for detail)

4.3.3 DESCRIPTION OF DIP SWITCH ON CONTROL PANEL

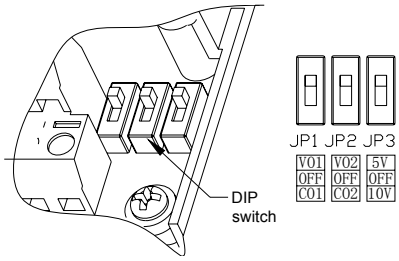
Three DIP switches have 3 grades

1) JP1

VO1 grade: AO1 terminal output voltage signal
OFF grade: AO1 terminal is in suspended status
CO1 grade: AO1 terminal output current signal

2) JP2

VO2 grade: AO2 terminal output voltage signal
OFF grade: AO2 terminal is in suspended status
CO1 grade: AO2 terminal output current signal



3) JP3

5V grade: VS terminal provides 5V voltage signal outward
OFF grade: VS terminal is in suspended status
10V grade: VS terminal provides 10V voltage signal outward

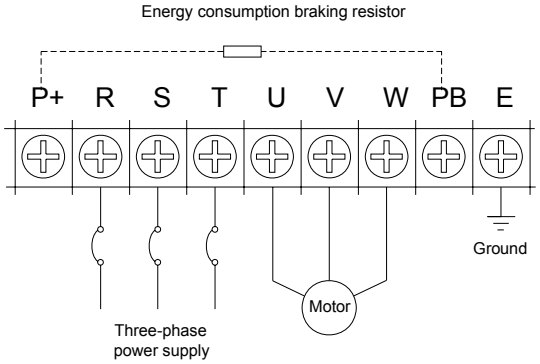
4.4 WIRING OF MAJOR LOOP TERMINAL

4.4.1 DESCRIPTION OF TERMINAL FUNCTIONS

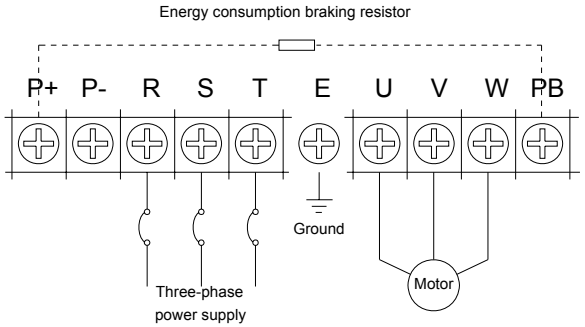
Terminal symbols	Functions	Terminal symbols	Functions
P+	DC side voltage positive terminal	P	DC reactor can be connected between P and P+
P-	DC side voltage negative terminal, Bus voltage input terminal of DC braking unit can be connected between P+ and P-.	PB	DC braking resistor can be connected between P+ and PB
R,S,T	Connect three-phase AC power supply of grid	U,V,W	Connect three-phase AC motor
E	Grounding terminal	--	--

4.4.2 MAIN LOOP TERMINAL DIAGRAM

Class I Applicable type: V220-4T0007 ~ V220-4T0055



Class II Applicable type: V220-4T0075 ~ V220-4T0110



4.5 WIRING CONNECTION OF BASIC OPERATION

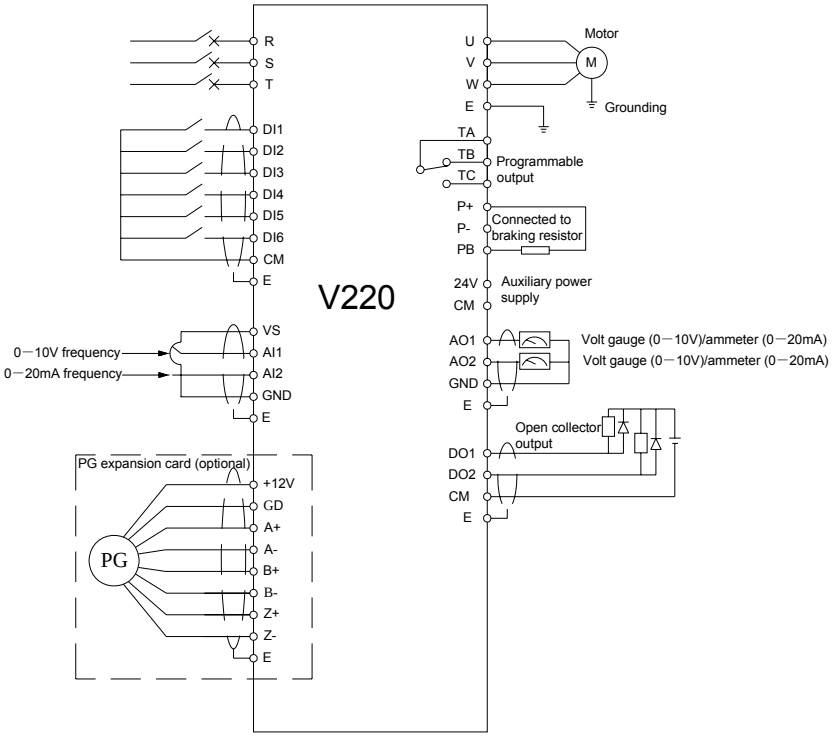


Figure 4-2 Basic wring diagram for V220 series inverter

5. OPERATIONS AND SIMPLE RUNNING OF FREQUENCY INVERTER

5.1 BASIC FUNCTION OF PANEL

The panel of the frequency inverter mainly has two functions apart of basic starting and stopping control: monitoring of parameters for operating status and query and modification of internal parameters. Accordingly, the operation panel is divided into two operating modes: monitoring mode and parameter modification/query mode.

At the beginning of energizing, the main display column presets “sunfr” static display characters and shifts out “sunfr” characters from right to left and recovers normal display about 3 seconds later. At the same time, the auxiliary display column displays the serial number of the frequency inverter statically such as “V-120” and displays the model information of the frequency inverter except “T、S” 3 seconds later such as “4.0040” and displays normally 3 seconds later. At this time, the operating parameters displayed in the operation panel are determined by the internal parameters of the frequency inverter [F0.0.12]、[F0.0.13]. The operation panel will return normal monitoring mode at any status if there is no keying operation within 1 minute. (See Chapter 3 for the appearance of the operation panel).

Table 5-1 Functions of Keys

Items		Functions
Display Function	Main digital display	Display the current operating status parameters and setting parameters of the frequency inverter
	Auxiliary digital display	Display the current operating status parameters and setting parameters of the frequency inverter
	A, Hz, V, %	A, Hz, V displays the corresponding measurement unit of the data of the main digital display. % displays compound unit. The compound unit indicator is defined as follows: Hz + A = RPM ； V + % = Sec. ； A + V = Min.
	FWD、REV	Indicator for operating status, its flicker shows the frequency inverter is in F/R operation and has voltage output.
	PANEL/REMOTE	The indicator is off: the external terminal command is valid; the indicator is on: the operation panel command is valid; the indicator is flashing: the communication interface (or expanded communication board or expanded function board) command is valid.
	ALARM	The indicator is on: the frequency inverter is in warning status. It shall check up and eliminate abnormalities; otherwise, the frequency inverter may be faulty and shut down.
	FWD	**Forward operation command key**. Press this key to send forward operation command when the operation command channel of the frequency inverter is set as operation panel control ([F0.3.33] or [F0.3.34]=0).
	REV JOG	**Reverse/Inching operation command key**. Press this key to send reverse operation command when the reverse function ([FF.4.42=###0]) is selected and the operation command channel of the frequency inverter is set as operation panel control ([F0.3.33] or [F0.3.34]=0); and press this key to send inching operation command when inching function ([FF.4.42=###1]) is selected.

Items		Functions
Keyboard Function	STOP RESET	**Stop/Reset key**. When this key is pressed in operating status, the frequency inverter will shut down as per set mode; and when pressing this key in fault conditions, the frequency inverter will reset and return to normal stopped status. SHIFT Keys can be locked or functions can be changed by users (refer to Functional Parameter F0.0.11).
	ESC	**Return key.** At any status, it will return to the status of last level till normal monitoring mode by pressing this key.
	MODE	**Mode key.** Switch display function parameter set and monitoring parameter set in parameter modification status. The corresponding “EROM stored value”, “value at this time of energizing” and “panel backup value” of the current function code will be displayed at auxiliary display column in turn by pressing this key.
	◄	**Left shift key**. The modified data bit can be selected from right to left by pressing this key and the modified bit has flicker display.
	►	**Right shift key**. The modified data bit can be selected from left to right by pressing this key and the modified bit has flicker display.
	PANEL REMOTE	**Local, terminal and communication control function switch key.** The keyboard control, external terminal control and communication control functinos can be swithced with each other through setting [F0.0.11]=##1## (the switch status is not stored and lost after power down).
		Shuttle selection key. Adjust data after addition in clockwise rotation and adjust data after subtraction in counterclockwise rotation. When [F0.0.25]=3, select panel shuttle setting.
	OK	**Ok key.** Confirm the current status and parameters (the parameters are stored in the internal memory) and enter into next-level function menu.

5.2 BASIC FUNCTIONS AND OPERATING METHODS OF PANEL

5.2.1 BASIC FUNCTIONS OF PANEL

The operation panel also has the following special functions except such basic functions as forward operation, reverse operation, inching operation, shut down, fault reset, parameter modification and inquiry and operating status parameter monitoring, etc.

1. Parameter copy and read/backup (parameter upload)

This operation panel allows for copying the internal parameters of the frequency inverter to the operation panel (only the internal parameters opened to users) and storing permanently. Therefore, users can backup their typical setting parameters to the operation panel for emergency. The backup parameters in the operation panel do not influence the operation of the frequency inverter and can be checked and modified separately.

When [F0.0.08]=####1, the keyboard will begin to read the internal parameters of the frequency inverter and the operation panel will display the process of reading parameters in real time. After the completion of parameter backup, the display mode will recover to normal monitoring automatically. During parameter backup, the operation can be stopped at any time by pressing SHIFT key and the display will switch to normal monitoring mode. If alarm information is occurred, please refer to Chapter 8.

2. Parameter copy/write in (parameter download)

This operation panel allows copying of the backup parameters to the internal memory of the frequency inverter (only the internal parameters opened to users) and users can write in their typical setting parameters

backed up in the operation panel into the frequency inverter at one time without separate modification.

When the frequency inverter set F0.0.08 as # # 1 2 or # # 1 3 in stopped mode, the keyboard will begin to copy the backup parameters to frequency inverter and the operation panel will display the process in real time. After the completion of copying, the display mode will recover to normal monitoring automatically.

During parameter copying, the operation can be stopped at any time to abandon the copied parameters by pressing [ESC/QUICK] key and the display mode will switch to normal monitoring mode. If alarm information is occurred, please refer to Chapter 8.

3. Check and modification of internal parameters

In normal monitoring mode, the internal parameters of the frequency inverter can be checked and modified as per general methods by pressing [MODE] key.

4. Check and modification of panel backup parameters

In normal monitoring mode, the backup parameters in the operation panel can be checked and modified by pressing [ESC] and [MODE] key simultaneously (double key compound use) and the high-order code “F” will display flickeringly when function code is displayed. The modification methods of backup parameters are the same as that of internal parameters.

5. Locking and unlocking of panel

- Locking: part of or all the keying functions of the panel can be locked through setting the application parameter F0.0.11. If the parameter is set as panel locking mode, the panel will be locked immediately after the frequency inverter is energized.
- Unlocking: the panel will be unlocked for 5 minutes temporarily by pressing [OK] and maintaining and pressing [◁][▷] twice in order within 5 seconds and it will automatically recover to locking if there’s no keying within 5 minutes.

- To unlock the panel thoroughly, the panel locking parameter [F0.0.11] should be modified into “unlocked” status during the temporary unlock of the panel.

6. [QUICK] Key function

[QUICK] Key function is limited by the application parameter F0.0.11. In function enabling and “normal monitoring mode”, press [QUICK] key to switch the operation command channel in order “operation panel⟶local terminal ⟶communication interface ⟶operation panel”. [QUICK] indicator displays the selected command channel which will be valid by pressing [OK] within 3 seconds. It will abandon the switch and return to original status by pressing [ESC] or without pressing [OK] within 3 seconds.

- When switching command channel, if the original setting is “operation panel” or “local terminal”, the “communication interface” will be defaulted as local MODBUS field bus.

The operation command channel switched by this function is not stored permanently. It will recover to original setting after the frequency inverter is power down and restarted. Relevant application parameters of the frequency inverter should be modified to permanently change the command channel.

5.2.2 OPERATING METHODS OF PANEL

1) Query for parameter status (e.g.)

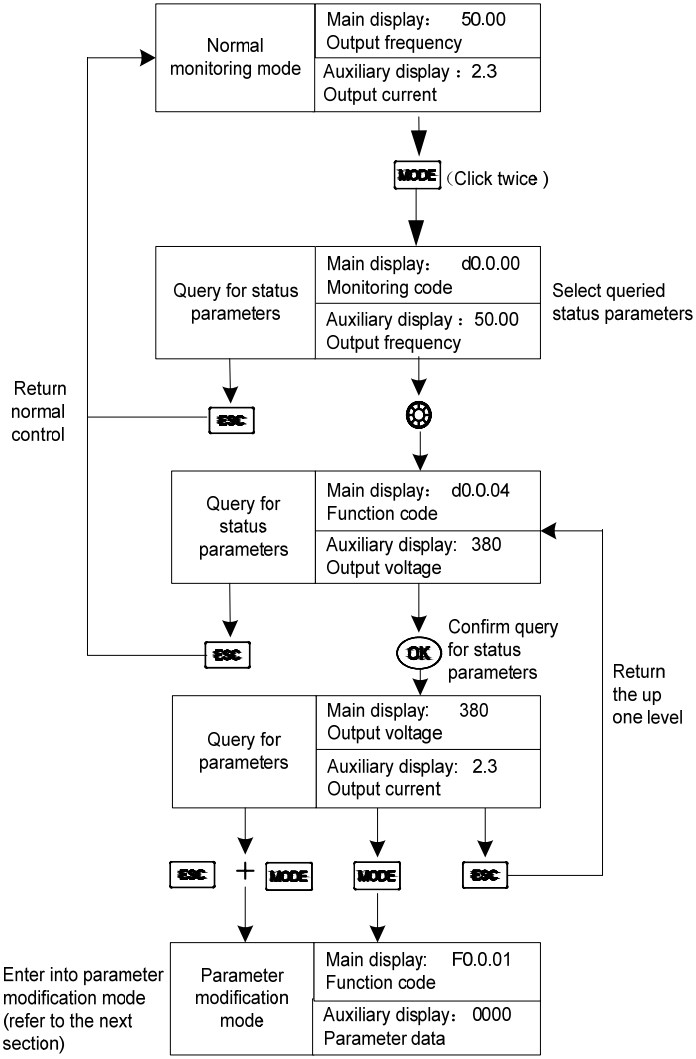


Figure 5-1 Schematic diagram of query for status parameters

2) Parameter query and modification (e.g.)

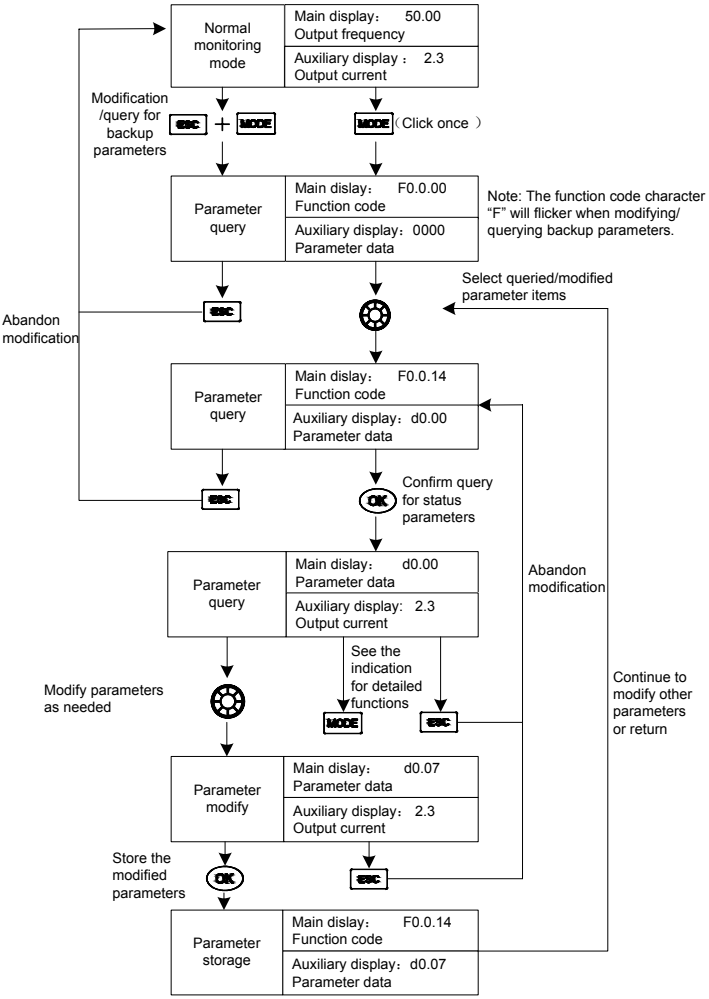


Figure 5-2 Schematic diagram of parameter check and modification

Remark: in this status, the auxiliary display column will display the following in turn by pressing MODE key repeatedly.

Default auxiliary monitoring parameters (original state) ⟶ EROM regional numerical value ⟶ parameter values at initial energizing ⟶ backup parameters in operation panel, the numerical value will flicker when "EROM regional numerical value", "parameter values at initial energizing" and " backup parameters in operation panel" are displayed.

5.3 SIMPLE RUNNING OF FREQUENCY INVERTER

5.3.1 INITIAL SETTING OF FREQUENCY INVERTER

1. Selection of control mode

V220 frequency inverter has three control modes: vector control without PG, vector control with PG and V/F control. The operation control mode is selected by the application parameter F0.0.09.

Mode 0: Vector control without PG, i.e. vector control without velocity sensor, also called open loop vector control. It is applicable to the place where encoder is not installed, has higher requirement to starting torque and speed control precision and the normal V/F control mode can not satisfied.

Mode 1: Vector control with PG, i.e. vector control with velocity sensor, also called closed loop vector control. It is applicable to the place where faster response of torque and higher control precision is required.

Mode 2: **V/F** control mode. Except normal V/F control application, it can also be applied to the place where the frequency inverter drives more than one motor.

The control modes of frequency inverter vary from the type and control requirements of motor and set by parameter **F0.0.09=####**. For instance, the field where three-phase asynchronous motor is used can be selected through setting **F0.0.09=###0** and the field where the control precision is highly required with velocity sensor can be set **F0.0.09=##1#** speed closed loop vector control mode.

2. Selection of frequency input channel (F0.2.25, F0.2.29)

V220 series frequency channel has **27** kinds of setting modes.

3. Operation command input channel [F0.3.33]

5.3.2 SIMPLE OPERATION

- It is absolutely forbidden to connect the power cord to the output U, V and W of the frequency inverter.

1) Simple wiring diagram

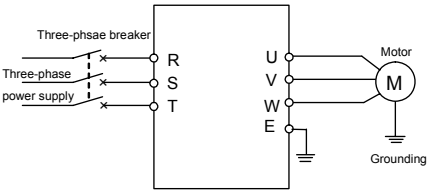


Figure 5-3 Wiring for the operation of SVC

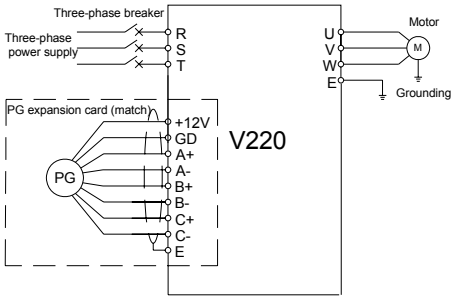


Figure 5-4 Wiring for the operation of VC

2) SVC (non-inductive vector) operation

Take 7.5KW frequency inverter which drives 7.5KW three-phase AC asynchronous motor as the example to indicate the operation process. The name plate parameters of the motor are:

Rated power: 7.5KW	Rated voltage: 380V	Rated current: 15.4A
Rated frequency: 50.00Hz	Rated speed: 1440rpm	Pulse of encoder: 1000PPR

Use operation panel to conduct digital frequency setting and start-stop control.

1) Connect as per Figure 5-3;

2) Power on after making sure the wiring is correct;

3) Set parameters as follows:

[F0.0.09]=0000 (no inductive vector control)

[F0.0.00]=0001(apply macro parameters, set as panel operation digital setting for shortcut)

[F2.0.00]=7.5 (rated power of motor) [F2.0.01]=380 (rated voltage of motor)

[F2.0.02]=15.4 (rated current of motor) [F2.0.03]=50.00 (rated frequency of motor)

[F2.0.04]=1440 (rated speed of motor)

4) Press  key to start frequency inverter. If the name plate parameters (F2.0.00 ~ F2.0.04) of the motor are modified in ③, the primary static parameter identification will be started automatically, the frequency inverter will output 0 frequency and the auxiliary display column will display the current output current (not limited by F0.0.13 at this time). When the display current is stable as 0.0, the automatic learning is finished and operation is started;

5) Press  key to increase set frequency, where the output frequency of the frequency inverter will be increased and the speed of motor will accelerate;

6) Observe the operation of motor, if there are abnormalities, stop it immediately and power off and re-operate it after finding out the causes;

7) Press  key to reduce set frequency;

8) Press  key to stop operation and cut off the power supply.

3) VC (INDUCTIVE VECTOR) OPERATION

The following parameters also need to be set except the above set parameters required by SVC operation. The wiring diagram is as shown in Figure 5-4.

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

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

[F8.0.05]=1000 (pulse of encoder per revolution)

[F8.0.06] if fault Fu.020 is occurred in starting, or FWD/REV periodic vibration, this parameter shall be set as 1 (or exchange the wiring of A, B pulse); other operations are the same as that of SVC operation.

- If the motor is completely empty-load, slight oscillation may occur sometimes in the operation under high carrier frequency. At this time, please reduce the setting value of the carrier frequency. (Parameter [F1.1.13]).

6. FUNCTIONAL PARAMETER TABLE

6.1 EXPLANATIONS

1. The symbols in the Table are explained as below:

- "×" 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.

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

6.2 FUNCTION TABLE

6.2.1 SYSTEM MANAGEMENT PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.0.00	Macro parameter (H)	**_ _ _ X: Application macro (0~F)** 0: Void (customized setting) 1: Setting of keypad operation digit 2: Setting of keypad operation shuttle 3: 2 wire control 1 (AT1 setting) 4: 3 wire control 2 (AT1 setting) 5: 3 wire control macro(AT1 setting) 6: Tool device spindle drive macro (AT1 setting) **_ _ X _: Reserved** **_ X _ _: Special macro(reserved)** **X _ _ _: System macro (0~F)** 0: Standard operation 1: Void (default as standard mode) 2: Reserved	0000	1	×
F0.0.01	Parameter display and modification (H)	**_ _ _ X: 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 **_ _ X _ : Parameter modification mode** 0: Valid and permanently stored after modification 1: Valid after modification but not stored, and getting lost after power-off **_ X _ _ : Reserved** **X _ _ _ : 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	0001	1	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
		9: Resume all parameters to initial values at the last power-on			
F0.0.02	Macro calls parameter (system macro) modification key	0~65535(1580)	0	1	×
F0.0.03	LCD language selection	0:Chinese 1: English	0	1	-
F0.0.04	LCD display setting(H)	_ _ _ **X: Contrast 0~7** _ _ **X** _ **: Normal display mode** 0: Steady mode 1: Single parameter display 2: Dual parameter display 3: Three parameter display	0023	1	-
F0.0.05	Parameter Security (H)	_ _ _ **X: 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. _ _ **X** _ **: Coded lock** 0: Void 1: Valid – once the password is set, this parameter cannot be modified unless correct password is entered.	0000	1	
F0.0.06	Security Code	0~65535	0	1	
F0.0.07	Parameter Reset	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: Delete Fault Log	0	1	×
F0.0.08	Parameter Transfer(H)	_ _ _ **X: Upload and download** 0: No action 1: Parameter upload (frequency inverter ⟶ panel) 2: Parameter download (panel ⟶ frequency inverter) 3: Parameter download (except for motor parameter F2 Group) _ _ **X** _ **: Allow local upload** 0: Parameter upload forbidden 1: Parameter upload permitted	0000	1	×
F0.0.09	Control mode selection (H)	_ _ _ **X: Reserved** _ _ **X** _ **: Control mode** 0: SVC mode/open-loop vector control 1: VC mode/closed-loop vector control 2: V/F control	0000	1	×
F0.0.10	Retention parameter				

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.0.11	Keypad Operation (H)	_ _ _ **X: 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 _ _ **X** _ **: STOP key 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 _ **X** _ _ **: Function of PANEL/ REMOTE keys** 0: Void 1: Stop effective 2: Continuously effective **X** _ _ _ **: Reserved**	0000	1	×
F0.0.12	Main monitoring parameter (H)	d0.0~d0.55 / d1.0~d1.55	d0.00	1	
F0.0.13	Auxiliary monitoring parameter 1 (H)	d0.0~d0.55 / d1.0~d1.55	d0.02	1	
F0.0.14	Auxiliary monitoring parameter 2 (H)	d0.0~d0.55 / d1.0~d1.55	d0.04	1	

6.2.2 SELECTION OF RUNNING COMMANDS

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.1.15	Retention parameter				
F0.1.16	Retention parameter				
F0.1.17	Direction of Rotation(H)	_ _ _ **X: Direction switching** 0: Void 1: Negate _ _ **X** _ **: Direction locking** 0: Void(determined by the direction command) 1: FWD locking 2: REV locking	0000	1	
F0.1.18	Reserved				
F0.1.19	Reserved				
F0.1.20	Maximum output frequency	10.00~320.00Hz	60.00	0.01	
F0.1.21	Upper limiting frequency	[F0.1.22]~Min. (300.00Hz, [F0.1.20])	50.00	0.01	
F0.1.22	Lower limiting frequency	0.0Hz~[F0.1.21]	0.0	0.01	
F0.1.23	FWD jog frequency	0.0Hz~[F0.1.21]	10.00	0.01	
F0.1.24	REV jog frequency	0.0Hz~[F0.1.21]	10.00	0.01	

6.2.3 FREQUENCY SETTING

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.2.25	Frequency setting channel	0: Keypad Entry 1 (keep value when stopped) 1: Keypad Entry 2 (go to zero when stopped) 2: Keypad Entry 3 (keep value at power off) 3: Setting of Wheel 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 1 (AI1, 0-10VDC) 10: Analog input 2 (AI2, 4-20mA) 11: Analog input 3 (AI3, 0-10VDC) 12: AI1 Bipolar setting (-10V to +10V) 13: AI3 Bipolar setting (-10V to +10V) 14: Pulse Follower Input 15: Pulse Follower Bipolar Input 16: MODBUS Communications1 Relative 17: MODBUS Communications2 Absolute 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: Reserved 25: Disturbance running frequency 26: Automatic multi-sage running frequency 27: Terminal selection multi-stage frequency 28: Simulated Analog SAI1 29: Simulated Analog SAI2	0	1	
F0.2.26	Reserved				
F0.2.27	Minimum value of frequency setting	0.0~[F0.2.28]	0.0	0.01	
F0.2.28	Maximum value of frequency setting	[F0.2.27]~[F0.1.20]	50.0	0.01	
F0.2.29	Panel digital set value of frequency setting	0.0~[F0.1.28]	0.0	0.01	

6.2.4 CONTROL COMMAND SOURCE

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.3.33	Control command	0: Operating panel 1: External control terminal 2: MODBUS field bus/standard expansion card configuration	0	1	
F0.0.34	Retention parameter				
F0.3.35	External control terminal action mode (H)	**_ _ _ X: Control command 1** 0: 2-wire mode 1 1: 2-wire mode 2 2: 3-wire mode 1 3: 3-wire mode 2 **_ _ X _ : Control command 1 first starting mode** 0: Running signal level starting 1: Running signal rising edge starting (two-wire mode 1 and 2) **_ X _ _ : Reserved** **X _ _ _ : Reserved**	0000	1	
F0.3.36	Reserved				

6.2.5 START AND STOP

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.4.37	Start/Running permission(H)	**_ _ _ X: Start permission** 0: Function closed 1: Permitted when the multifunctional terminal is effective 2: Command word from standard field bus (standard expansion card) **_ _ X _ : Reserved** **_ X _ _ : Running permission** 0: Function closed 1: Permitted when the multifunctional terminal is effective 2: Command word from standard field bus (standard expansion card) **X _ _ _ : The action mode when the running permission signal is void** 0: Free stop 1: Deceleration stop	0000	1	×
F0.4.38	Start/Stop Mode (H)	**_ _ _ X: Start mode** 0: Normal start 1: Revolution tracking start **_ _ X _ : Reserved** **_ X _ _ : Stop mode** 0: Deceleration stop 1: Free stop	0000	1	×

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F0.4.39	Start frequency	0.0~50.00Hz	0.50	0.01	
F0.4.40	Start frequency holding time	0.00~10.00Sec.	0.0	0.01	
F0.4.41	Start pre-excitation current	0.0~100.0(%)	35.0	0.1	
F0.4.42	Start pre-excitation time	0.00~10.00Sec.	0.10	0.01	
F0.4.43	Start delay	0.00~10.00Sec.	0.0	0.01	
F0.4.44	DC band-type brake control	**_ _ _ X: DC band-type brake function (Effective for running command)** 0: Closed 1: Open **_ _ X _ : Reserved**	0000	1	
F0.4.45	DC band- type brake/brake initial frequency/speed	0.0~[F0.1.21]	2.00	0.01	
F0.4.46	DC brake action time	0.0~10.00Sec.	0.0	0.01	
F0.4.47	DC band-type brake/brake injection current	0.0~100.0(%)	50.0	0.1	
F0.4.48	Restart after power-off	0: Forbidden 1: Effective	0	1	
F0.4.49	Standby time for restart after power-off/free stop	0.1~10.0Sec.	0.5	0.1	
F0.4.50	FWD and REV transition dead time	0.00~5.00Sec.	0.00	0.01	
F0.4.51	FWD and REV switch mode	0: Switch at zero point 1: Start frequency switch	0	1	
F0.4.52	Zero speed (frequency) detection level	0.00~100.00Hz	0.10	0.01	
F0.4.53	Zero speed delay time	0.00~10.00Sec.	0.05	0.01	
F0.4.54	Emergency stop mode (EMS)	0: The inverter will stop in deceleration mode according to the emergency stop and deceleration time. 1: The inverter will immediately lock output and the motor will stop in free sliding mode.	0	1	

6.2.6 ACCELERATION AND DECELERATION CHARACTERISTICS PARAMETERS

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F1.0.00	Acceleration and deceleration characteristics parameters	**_ _ _ X: Acceleration and deceleration mode** 0: Liner acceleration and deceleration 1: S curve acceleration and deceleration **_ _ X _ : Unit of acceleration and deceleration time** 0: Sec. (Second) 1: Min. (Minute)	0000	1	×
F1.0.01	% of S curve At The Bottom	5.0~100.0-[F1.0.02]	15.0	0.1	
F1.0.02	% of S curve At Mid Section	20.0~100.0-[F1.0.01]	70.0	0.1	
F1.0.03	Acceleration time 1	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.04	Deceleration time 1	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.05	Acceleration time 2	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.06	Deceleration time 2	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.07	Acceleration time 3	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.08	Deceleration time 3	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.09	Acceleration Time 4 /JOG	0.01~ 600.00 (Sec. /Min.)	☆	0.01	
F1.0.10	Deceleration Time 4 /JOG	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	Reserved				

6.2.7 CARRIER FREQUENCY

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F1.1.13	Carrier frequency	Three-phase vector composition mode (FF.4.43 = _ _ 0_): 1.5 ~ 12.0KHz Two-phase vector composition mode (FF.4.43 = _ _ 1_): 1.5 ~ 12.5KHz	☆	0.1	
F1.1.14	Carrier characteristics	**_ _ _ X: Load linkage adjustment** 0: Void 1: Effective **_ _ X _ : Temperature linkage adjustment** 0: Void 1: Effective **_ X _ _ : Reference frequency linkage adjustment** 0: Void 1: Effective **X _ _ _ : Modulation mode** 0: Asynchronous modulation 1: Synchronous modulation 2: Sound smooth	0011	1	

6.2.8 V/F PARAMETERS AND OVERLOAD PROTECTION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F1.2.15	Reference frequency of motor	5.00~300.00Hz	50.00	0.01	×
F1.2.16	Reference voltage of motor	50~500V/25~250V	380/220	1	
F1.2.17	Retention parameter				×
F1.2.18	Torque increasing voltage for motor	0.0~20.0%	☆	0.1	
F1.2.19	Frequency point 1 of motor V/F curve	0.0~[F0.1.21]	0.0	0.01	×
F1.2.20	Voltage point 1 of Motor V/F curve	0~500V	0.0	0.1	
F1.2.21	Frequency point 2 of motor V/F curve	0.0~[F0.1.21]	0.0	0.01	×
F1.2.22	Voltage point 2 of Motor V/F curve	0~500V	0.0	0.1	
F1.2.23	Frequency point 3 of motor V/F curve	0.0~[F0.1.21]	0.0	0.01	×
F1.2.24	Voltage point 3 of Motor V/F curve	0~500V	0.0	0.1	
F1.2.25	Slip frequency compensation for motor	0~150(%)	0	1	
F1.2.26~ F1.3.38	Retention parameter				×

6.2.9 STEADY RUNNING

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F1.4.39	Acceleration/deceleration current limiting level	120~180(%)	150	1	
F1.4.40	Forced start current limiting level	120~200(%)	150	1	
F1.4.41	Forced start current holding time	0.0~5.00Sec.	0.0	0.01	
F1.4.42	Trip Suppression Selection	**_ _ _ X: Over voltage suppression adjustor** 0: Closed 1: Effective (Frequency increasing suppression) **_ _ X _ : Under voltage suppression adjustor** 0: Closed 1: Effective (Frequency increasing suppression) **_ X _ _ : Frequency modulation and current limiting adjustor** 0: Closed 1: Effective **X _ _ _ : Reserved**	0111	1	
F1.4.43	Overvoltage Trip level（DC BUS）	720~800V	730	1	
F1.4.44	Overvoltage Trip level gain	0.10~10.00	1.00	0.01	
F1.4.45	Undervoltage Trip level（AC Input）	[FF.2.35]~480V	400V	1	
F1.4.46	Undervoltage Trip level gain	0.10~10.00	1.00	0.01	
F1.4.47	Current Limit Trip	20~200(%)	180	1	
F1.4.48	Current Limit Trip Gain	0.10~10.00	1.00	0.01	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F1.4.49	Number of Auto Reset Attempts	0~5 (the self-recovery function is deactivated when it is set to 0)	0	1	
F1.4.50	Time Between Auto Resets	0.2~5.0 Sec.(the recovery waiting time will increase as the times increase)	1.0	0.1	
F1.4.51	Auto Reset Cycle Time	900~36000 Sec.	3600	1	
F1.4.52	Selection of self resetting fault	_ _ _ **X: Over current** 0: Self resetting forbidden 1: Self resetting permitted _ _ _ **X: Over voltage** 0: Self resetting forbidden 1: Self resetting permitted _ _ _ **X: Output grounding** 0: Self resetting forbidden 1: Self resetting permitted **X _ _ _ : Running under voltage** 0: Self resetting forbidden 1: Self resetting permitted	0000	1	
F1.4.53	Display coefficient	0.001~60.000	1.000	0.001	

6.2.10 PARAMETERS OF MOTOR 1

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F2.0.00	Rated power (self starting static test after modified)	0.1~1000.0KW	☆	0.1KW	×
F2.0.01	Rated voltage (self starting static test after modified)	30~480V	380/220	1V	×
F2.0.02	Rated current (self starting static test after modified)	0.01~650.00A	☆	0.01A	×
F2.0.03	Rated frequency (self starting static test after modified)	Max{5.00,[F2.0.04]/60}~300.00Hz	50.00	0.01Hz	×
F2.0.04	Rated revolution (self starting static test after modified)	10~Min.{30000,60*[F2.0.03]}rpm	☆	1rpm	×
F2.0.05	Current unloaded	0.15*[F2.0.02]~0.8*[F2.0.02]	☆	0.01A	×
F2.0.06	Electrical Resistance of Stator	0.01~65000mΩ	☆	0.1	×
F2.0.07	induction of Stator	0.001~6500.0mH	☆	0.01	×
F2.0.08	Total leakage inductance	0.001~6500.0mH	☆	0.01	×
F2.0.09	Rotor time constant	5.0~6500.0ms	☆	0.1ms	×
F2.0.10	Slip compensation coefficient Motor 1	0.50~1.50	1.00	0.01	
F2.0.11 ~ F2.0.23	Retention parameter				×
F2.0.24	Motor 1 Z pulse initial angle	0.0~359.9	0.0	0.1	×
F2.0.25	overload protection setting Motor 1(131- closed)	50.0~131.0(%) (131—closed)	110.0	0.1	

6.2.11 PARAMETER MEASUREMENT AND PRE-EXCITATION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F2.2.52	Excitation time for vector mode	0.02~2.50Sec.	☆	0.01	
F2.2.53	Motor Auto Tune	0: Closed 1: Static identification 2: Static + operating identification	0	1	×

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

6.2.12 MULTIFUNCTIONAL INPUT TERMINAL

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

6.2.13 MULTIFUNCTIONAL OUTPUT TERMINAL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F3.1.12	Multifunctional output DO1	0~62	1	1	
F3.1.13	Multifunctional output DO2	0~62	2	1	
F3.1.14	Multifunctional output DO3/Fout/ standard expansion card	0~63	63	1	
F3.1.15	Delay Time for DO1 Switching On	0.0~10.00Sec.	0.0	0.01	
F3.1.16	Delay Time for DO1 Switching Off	0.0~10.00Sec.	0.0	0.01	
F3.1.17	Delay Time for DO2 Switching On	0.0~10.00Sec.	0.0	0.01	
F3.1.18	Delay Time for DO2 Switching Off	0.0~10.00Sec.	0.0	0.01	
F3.1.19	Delay Time for DO3 Switching On	0.0~10.00Sec.	0.0	0.01	
F3.1.20	Delay Time for DO3 Switching Off	0.0~10.00Sec.	0.0	0.01	
F3.1.21	Multifunctional relay output (RO1A/B/C)	0~62	4	1	
F3.1.22	Multifunctional relay output (RO2A/B/C) /standard expansion card	0~62	5	1	
F3.1.23	RO1 power-on delay time	0.0~10.00Sec.	0.0	0.01	
F3.1.24	RO1 disconnection delay time	0.0~10.00Sec.	0.0	0.01	
F3.1.25	RO2power-on delay time	0.0~10.00Sec.	0.0	0.01	
F3.1.26	RO2 disconnection delay time	0.0~10.00Sec.	0.0	0.01	
F3.1.27	Input variables of monitor 1	0~45 (revering to the monitor variable comparison table)	0	1	
F3.1.28	Input variables of monitor 2	0~45 (referring to the monitor variable comparison table)	1	1	
F3.1.29	Input variables of monitor 3	0~45 (referring to the monitor variable comparison table)	2	1	
F3.1.30	Lower limiting value of monitor 1 variables (relative to full scale value)	0.0~100.0 (%)	0.0	0.1	
F3.1.31	Upper limiting value of monitor 1 variables (relative to full scale value)	0.0~100.0 (%)	100.0	0.1	
F3.1.32	Lower limiting value of monitor 2 variables (relative to full scale value)	0.0~100.0 (%)	0.0	0.1	
F3.1.33	Upper limiting value of monitor 2 variables (relative to full scale value)	0.0~100.0 (%)	100.0	0.1	
F3.1.34	Lower limiting value of monitor 3 variables (relative to full scale value)	0.0~100.0 (%)	0.0	0.1	
F3.1.35	Upper limiting value of monitor 3 variables (relative to full scale value)	0.0~100.0 (%)	100.0	0.1	

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

6.2.15 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	Factory Default	Minimum Unit	Change Limit
F3.3.46	Type of output pulse signal DO3/Fout	0: 0.25~100.00KHz Frequency signal 1: Reserved 2: Pulse width modulation (PWM) signal	0	1	
F3.3.47	Min output frequency DO3/Fout	0.25~100.00KHz	0.25	0.01	
F3.3.48	Max output frequency DO3/Fout	0.25~100.00KHz (PWM signal reference frequency)	10.0	0.01	
F3.3.49	Pulse output mapping variable	0~45 (Monitor Variable Comparison Table)	0	1	
F3.3.50	Lower limit of DO3	0.0~[F3.3.51]	0.0	0.1	
F3.3.51	Upper limit of DO3	[F3.3.50]~100.0 (%)	100.0	0.1	

6.2.16 ANALOG INPUT

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

6.2.17 ANALOG INPUT CURVE CORRECTION

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

6.2.18 ANALOG OUTPUT

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

6.2.19 ANALOG INPUT POWER FAILURE DETECTION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F4.3.36	Analog input power failure detection function	_ _ _ **X: AI1 power failure detection** 0: Void 1: Effective _ _ **X** _ **: AI2 power failure detection** 0: Void 1: Effective _ **X** _ _ **: AI3 power failure detection** 0: Void 1: Effective	0000	1	×
F4.3.37	AI1 power failure detection threshold value(value before rectified)	0.00~10.00V	0.25	0.01	
F4.3.38	AI1 power failure detection delay action time	0.01~50.00Sec.	2.00	0.01	
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	0	1	×
F4.3.40	Default input value after AI1 wire-break	0.00~10.00V	0.0	0.01	
F4.3.41	AI2 power failure detection threshold value (value before rectified)	0.00~20.00mA	4.00	0.01	
F4.3.42	AI2 power failure detection delay action time	0.01~50.00Sec.	2.00	0.01	
F4.3.43	AI2 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 (F4.3.44) 4: Inverter forced trip stop	0	1	×
F4.3.44	Default input value after AI2 power failure	0.00~20.00mA	4.00	0.01	
F4.3.45	AI3 power failure detection upper threshold value (value before rectified)	-10.00~10.00V	0.25	0.01	
F4.3.46	AI3 power failure detection lower threshold value (value before rectified)	-10.00~10.00V	-0.25	0.01	
F4.3.47	AI3 power failure detection delay action time	0.01~50.00Sec.	2.00	0.01	
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	0	1	×
F4.3.49	Default input value after AI3 power failure	-10.00~10.00V	0.0	0.01	

6.2.20 VIRTUAL ANALOG INPUT

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F4.4.50	Virtual analog input SAI1	0: Void (0 value) 1: SAI_COF1*AI1 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	0	1	×
F4.4.51	Virtual analog input SAI2		0	1	×
F4.4.52	Virtual input combination coefficient 1 (SAI_COF1)	0.01~500.00	1.00	0.01	×
F4.4.53	Virtual input combination coefficient 2 (SAI_COF2)	0.01~500.00	1.00	0.01	×
F4.4.54	Virtual input combination constant (SAI_CST)	-4080~4080	0	1	×

6.2.21 SKIPPING FREQUENCY

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

6.2.22 BUILT-IN AUXILIARY TIMER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F5.1.06	Timer 1 (UT1) operating mode(H)	**_ _ _ X: Clock selection** 0: 1ms 1: 1Sec. 2: 1Min. 3: Timer 1cycle reaching pulse (effective for UT2, UT3) 4: Timer 2 cycle reach pulse (only effective for UT3) **_ _ X _ : 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) **_ X _ _ : 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 **X _ _ _ : Timing cycle** 0: Single-cycle timing (resetting and re-triggering required) 1: Multi-cycle timing (start again after auto clearing)	0000	1	×
F5.1.07	Timer 2 (UT2) operating mode(H)				
F5.1.08	Timer 3 (UT3) operating mode(H)				
F5.1.09	Timer 1 cycle time	0~65535 (clock cycle)	30000	1	
F5.1.10	Timer 1 threshold	0~[F5.1.09]	10000	1	
F5.1.11	Timer 2 cycle time	0~65535 (clock cycle)	30000	1	
F5.1.12	Timer 2 threshold	0~[F5.1.11]	10000	1	
F5.1.13	Timer 3 cycle time	0~65535 (clock cycle)	30000	1	
F5.1.14	Timer 3 threshold	0~[F5.1.13]	10000	1	
F5.1.15	Timer door control signal selection(H)	**_ _ _ X: 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)	0000	1	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
		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) **_ _ X _ : Timer 2 (UT2) gated signal selection** The same as above **_ X _ _ : Timer 3 (UT3) gated signal selection** The same as above			
F5.1.16	Timer 1 output (H)	**_ _ _ X: Output signal1** 0: Comparative value reached (0.5s pulse) 1: Comparative value reached (level) 2: Comparative value reached and reversed 3: Cycle reached (0.5s pulse) 4: Cycle reached (level) 5: Cycle reached and reversed 6: Comparative value or cycle reached and reversed **_ _ X _ : Output signal 2** The same as above **_ X _ _ : Reserved** **X _ _ _ : Reserved**	0041	1	
F5.1.17	Timer 2 output (H)		0041	1	
F5.1.18	Timer 3 output (H)		0041	1	
F5.1.19	Timer value display unit (H)	**_ _ _ X: Timer 1** 0: Clock unit (original value) 1: Sec. 2: Min. 3: H. **_ _ X _ : Timer 2** The same as above **_ X _ _ : Timer 3** The same as above	0000	1	

6.2.23 BUILT-IN AUXILIARY COUNTER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F5.2.20	Counter 1 configuration(H)	_ _ _ **X: Counter pulse selection** (Function No. 44, 45) 0: Multifunctional terminal "Void → effective" 1: Multifunctional terminal "effective→ void" 2: Aforesaid two conditions are both effective _ _ **X** _ **: 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) 4: Running status (gated triggering) 5: Stop status (gated triggering) _ **X** _ _ **: Counter resetting source** 0: Multifunctional terminal (Function No.48, 49) 1: Set value 1 reaches auto resetting 2: Set value 2 reaches auto resetting	0000	1	
F5.2.21	Counter 2 configuration(H)		0000	1	
F5.2.22	Counter 1 value 1	0~65535	1000	1	
F5.2.23	Counter 1 value 2	0~65535	2000	1	
F5.2.24	Counter 2 value 1	0~65535	1000	1	
F5.2.25	Counter 2 value 2	0~65535	2000	1	
F5.2.26	Counter 1 output (H)	_ _ _ **X: Output signal1** 0: Reach set value 1 (0.5Sec. pulse) 1: Reach set value 2 (level) 2: Set value 1 reached and reversed 3: Reach set value 2 (0.5Sec. pulse) 4: Reach set value 5 (level) 5: Set value 1reached and reversed 6: Set value 1 or set value 2 reached and reversed _ _ **X** _ **: Output signal 2** The same as above _ **X** _ _ **: Reserved** **X** _ _ _ **: Reserved**	0000	1	
F5.2.27	Counter 2 output (H)		0000	1	

6.2.24 AUXILIARY FUNCTIONS

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F5.3.28	Priority selection of frequency(revolution) command source	_ _ _ **X: 1st priority (highest)** 0: No definition 1: Process PID output 2: Reserved 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 (F0.2.25) _ _ **X _ : 2nd priority** The same as above _ **X** _ _ **: 3rd priority** The same as above **X** _ _ _ **: 4th priority** The same as above	0000	1	×
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	0	1	
F5.3.30	Automatic voltage regulation (only effective in VVV control mode)	0: Closed 1: Effective 2: Deceleration process void	0	1	
F5.3.31	Automatic energy-saving operation (only effective for asynchronous motors)	0: Void 1: Effective	0	1	
F5.3.32	Magnetic flux brake	0: Void 1: Effective 2: Multifunctional terminal effective (Function No. 65)	0	1	
F5.3.33	Magnetic flux braking strength(braking excitation current)	30~120%	☆	1	
F5.3.34	Voltage over modulation	0: Void 1: Effective	1	1	
F5.3.35	Use ratio of dynamic braking (effective for some models)	50~100(%)	100	1	
F5.3.36	Level of dynamic braking starting action	700~760V	710	1	
F5.3.37	Vibration suppression coefficient (only effective in VF control mode)	0.0, 0.01~10.00	0.0	0.01	
F5.3.38	Load dynamic balance function	0: Void 1: Effective 2: Multifunctional terminal effective (Function No. 38)	0	1	
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: Field bus set value 1	0	1	
F5.3.40	Reference value for dynamic balance load	0.0~ 200.0 (%)	100.0	0.1	
F5.3.41	Dynamic balance adjustment gain	0.00~100.00	50.00	0.01	
F5.3.42	Dynamic balance adjustment limit	0.00~100.00 (%)	1.00	0.01	

6.2.25 MULTI-STAGE FREQUENCY SETTING

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

6.2.26 SIMPLE PROGRAMMABLE MULTI-STAGE OPERATION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F6.1.15	Programmable multi-step mode(H)	**_ _ _ X: 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) **_ _ X _ : 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 **_ X _ _ : Selection of breakpoint/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 **X _ _ _ : Power-off status storage** 0: Not stored 1: Stored	0000	1	×

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F6.1.16	Stage 1 setting (H)	_ _ _ **X: Operating frequency source/ setting source at each stage** 0: Multi-stage frequency setting 1~15/ Process PID multi-stage setting 1~7 1: Frequency command (F0.2.25)/ Process PID setting (F7.0.01) _ _ **X** _ **: Direction setting** 0: FWD 1: REV 2: Determined by the running command channel _ **X** _ _ **: Accel/Decel Of Each Stage** 0: Acceleration and deceleration time1 1: Acceleration and deceleration time2 2: Acceleration and deceleration time3 3: Acceleration and deceleration time4 **X** _ _ _ **: Running time unit of each stage** 0: Sec. 1: Min.	0000	1	
F6.1.17	Stage 2 setting (H)		0000	1	
F6.1.18	Stage 3 setting (H)		0000	1	
F6.1.19	Stage 4 setting (H)		0000	1	
F6.1.20	Stage 5 setting (H)		0000	1	
F6.1.21	Stage 6 setting (H)		0000	1	
F6.1.22	Stage 7 setting (H)		0000	1	
F6.1.23	Stage 8 setting (H)		0000	1	
F6.1.24	Stage 9 setting (H)		0000	1	
F6.1.25	Stage 10 setting(H)		0000	1	
F6.1.26	Stage 11 setting(H)		0000	1	
F6.1.27	Stage 12 setting(H)		0000	1	
F6.1.28	Stage 13 setting(H)		0000	1	
F6.1.29	Stage 14 setting(H)		0000	1	
F6.1.30	Stage 15 setting(H)		0000	1	
F6.1.31	Stage 1 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.32	Stage 2 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.33	Stage 3 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.34	Stage 4 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.35	Stage 5 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.36	Stage 6 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.37	Stage 7 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.38	Stage 8 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.39	Stage 9 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.40	Stage 10 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.41	Stage 11 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.42	Stage 12 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.43	Stage 13 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.44	Stage 14 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	
F6.1.45	Stage 15 running time	0.0~6500.0(Sec. /Min.)	0.0	0.1	

6.2.27 SWING FREQUENCY OPERATION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F6.2.46	Function selection (H)	**_ _ _ X: Function Setting** 0: Function closed 1: Function effective 2: Terminal selectivity effective (Function No. 24) **_ _ X _ : Stop restart mode** 0: Start with the memory status before stop 1: Restart **_ X _ _ : Swing control** 0: Fixed swing (relative maximum frequency) 1: Variable swing (relative central frequency) **X _ _ _ : 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.	0000	1	×
F6.2.47	Swing frequency preset frequency	0.0~[F0.1.21]	10.00	0.01	
F6.2.48	Preset frequency waiting time	0.0~6000.0Sec.	0.0	0.1	
F6.2.49	Swing frequency amplitude	0.0~50.0(%)	10.0	0.1	
F6.2.50	Sudden jump frequency	0.0~50.0(%)	10.0	0.1	
F6.2.51	Triangular wave rising time	0.1~1000.0Sec.	10.0	0.1	
F6.2.52	Swing value of traverse	0.1~1000.0Sec.	10.0	0.1	
F6.2.53	Frequency setting in the center of the swing frequency	0.0~[F0.1.21]	10.00	0.01	

6.2.28 PROCESS PID (4MS CONTROL CYCLE)

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F7.0.00	Process PID function selection	**_ _ _ X: Process PID controller selection** 0: Process PID closed 1: Unconditionally effective 2: External multifunctional terminal selectivity effective (Function No. 22) **_ _ X _ : Reserved** **_ X _ _ : Process PID controller output** 0: Frequency/revolution set value 1: Independent PID (can output through AO terminal or as torque setting)	0000	1	×
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	0	1	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F7.0.02	Process PID setting channel 1	0: Internal digital setting (F7.0.08) (power-off save) 1: Panel shuttle potentiometer preset 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 Field bus set value 1 11: MODBUS Field bus set value 2	0	1	×
F7.0.03	Process PID setting channel 2		0	1	×
F7.0.04	Analog input quantity corresponding to 0% setting (Channel 1)	0.0V~[F7.0.05]/AI2: 0.0mA~[F7.0.05]	0.0	0.01	
F7.0.05	Analog input quantity corresponding to 100% setting (Channel 1)	[F7.0.04]~10.00 /AI2:[F7.0.04]~20.00mA	10.00	0.01	
F7.0.06	Analog input quantity corresponding to 0% setting (Channel 2)	0.0V~[F7.0.07]/AI2: 0.0mA~[F7.0.07]	0.0	0.01	
F7.0.07	Analog input quantity corresponding to 100% setting (Channel 2)	[F7.0.06]~10.00 /AI2:[F7.0.06]~20.00mA	10.00	0.01	
F7.0.08	Process PID internal digital preset	-100.0~100.0(%)	0.0	0.1	
F7.0.09	Process PID feedback value selection	0: Feedback channel 1 independently effective 1: Feedback channel 2 independently effective 2: Multifunctional terminal selection (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|)	0	1	
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	0	1	
F7.0.11	Process PID feedback channel 2		0	1	
F7.0.12	Analog feedback quantity corresponding to 0% feedback (feedback channel 1)	0.0~[F7.0.13]/AI2: 0.0mA~[F7.0.13]	0.0	0.01	
F7.0.13	Analog feedback quantity corresponding	[F7.0.12]~10.00V /AI2: [F7.0.12]~20.00mA	5.00	0.01	

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

6.2.29 PROCESS PID MULTI-STAGE SETTING

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

6.2.30 PROCESS PID SLEEP FUNCTION

(Effective when PID output is used as the frequency command)

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F7.2.34	Sleep function	0: Closed 1: Enabled 2: Enabled when the multifunctional input selection is effective (Function No. 33)	0	1	
F7.2.35	Sleep frequency	0.0~[F0.1.21]	0.0	0.01	
F7.2.36	Sleep delay	0.1~3600.0Sec.	60.0	0.1	
F7.2.37	Awakening deviation (compared with the 100% set value)	0.0~100.0(%)	25.0	0.1	
F7.2.38	Awakening delay	0.1~3600.0Sec.	60.0	0.1	

6.2.31 REVOLUTION SETTING AND FEEDBACK

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F8.0.00	Revolution setting channel (only applicable to VC and SVC mode)	0: Set by frequency setting parameter (F0.2.25) 1: Digital setting (F8.0.03) (maintained after stop and saved after power-off) 2: Panel shuttle potentiometer setting 3: Analog inputAI1 4: Analog inputAI2 5: Analog inputAI3 (dual polarity) 6: Frequency signal input (Fin) 7: MODBUS Field bus set value 1 8: MODBUS Field bus set value 2 9: Virtual analog input SAI1 10: Virtual mode input SAI2	0	1	
F8.0.01	Minimum set signal corresponding revolution	0~60*[F0.1.21]/ pairs of motor poles(rpm)	0	1	
F8.0.02	Maximum set signal corresponding revolution (upper frequency limitation)	0~60*[F0.1.21]/ pairs of motor poles(rpm)	1500	1	
F8.0.03	Revolution Digital setting (upper frequency limitation)	0~60*[F0.1.21]/ pairs of motor poles (rpm)	0	1	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
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)	0	1	×
F8.0.05	Per pulse quantity (PG)	1~8192	1024	1	×
F8.0.06	PG rotation direction (effective for PG card)	0: Phase A leads 1: Phase B leads	0	1	×
F8.0.07	PG zero pulse (Z pulse)	0: Void 1: Effective	0	1	×
F8.0.08	Decoder type	0: ABZ incremental decoder 1: ABZUVW incremental type 2: SINCOS type 3: Rotary transformer	0	1	×
F8.0.09	PG revolution check cycle	1~5ms	2ms	1	
F8.0.10	Missing detection and action of speed detection signal	_ _ _ **X: Speed signal detection** 0: Not detect 1: Detect and treat _ _ **X** _ **: Speed detection signal action** 0: Fault alarm and free stop 1: Reserved	0001	1	×
F8.0.11	Judging time for speed detection signal missing	0.01~5.00Sec.	2.00	0.01	
F8.0.12	Power failure zero speed signal level (as compared to the maximum set speed)	0~20.0 (%)	0.0	0.1	
F8.0.13	Speed measuring loop power failure detection flexibility (as compared to the maximum set speed)	0.1~100.0	5.0	0.1	
F8.0.14	Detection revolution filtering time coefficient	1~50ms	2ms	1	
F8.0.15	The minimum revolution corresponding to the feedback signal (not PG)	0~30000rpm	0	1	
F8.0.16	The maximum revolution corresponding to the feedback signal (not PG)	0~30000rpm	1500	1	
F8.0.17	-	-	-	-	-

6.2.32 REVOLUTION CLOSED-LOOP PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F8.1.18	Controller parameter 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)	2	1	
F8.1.19	PID parameter switching lower limiting revolution (ASR1 group parameter low revolution Effective)	0~[F8.1.20]	100	1	
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)	300	1	
F8.1.21	Proportional gain 1 (ASR-P1)	0.05~1.00	0.75	0.01	
F8.1.22	Integration time 1 (ASR-I1)	0.0, 0.01~50.00 Sec.	0.50	0.01	
F8.1.23	Differential coefficient 1 (ASR-D1)	0.0, 0.01~10.00	0.0	0.01	
F8.1.24	Differential output filtering constant 1 (ASR-DT1)	0.10~5.00 Sec.	1.00	0.01	
F8.1.25	Proportional gain 2 (ASR-P2)	0.05~1.00	0.50	0.01	
F8.1.26	Integration time 2 (ASR-I2)	0.0, 0.01~50.00 Sec.	2.00	0.01	
F8.1.27	Differential coefficient 2 (ASR-D2)	0.0, 0.01~10.00	0.0	0.01	
F8.1.28	Differential output filtering constant 2 (ASR-DT2)	0.10~10.00 Sec.	1.00	0.01	
F8.1.29	Adjustor output upper limit amplitude(transient FWD torque limit)	0.0~250.0%	200.0	0.1	
F8.1.30	Adjuster output lower limit amplitude (transient REV torque limit)	-250.0~0.0%	-200.0	0.1	
F8.1.31	Retention parameter				

6.2.33 PROTECTION PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F8.2.32	Excessive action of revolution deviation (DEV)	0: No action 1: Alarm free stop 2: Alarm deceleration stop 3: Alarm continuing running	0	1	×
F8.2.33	Over speed (OS) detection action		1	1	×
F8.2.34	Detected value of excessive revolution deviation (DEV)	0.0~50.0% (as compared to upper limiting frequency)	20.0%	0.1	
F8.2.35	Detection time of excessive revolution deviation (DEV)	0.0~10.00Sec.	10.00	0.01	
F8.2.36	Detected value of over speed (OS)	0.0~150.0% (as compared to upper limiting frequency)	120.0%	0.1	
F8.2.37	Detection time of over speed (OS)	0.0~2.00Sec.	0.10	0.01	
F8.2.38	Reserved				

6.2.34 TORQUE CONTROL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F8.3.39	Selection of torque control mode	0: Void 1: Effective 2: Multifunctional terminal selection effective (Function No. 34)	0	1	×
F8.3.40	Selection of torque command channel (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: Reserved(Reserved (default as 0) 9: MODBUS Field bus set value 1 10: MODBUS Field bus set value 2 11: Virtual analog input SAI1 12: Virtual mode input SAI2	0	1	
F8.3.41	Torque digital setting	-250.0~250.0 (%)	0.0	0.1	
F8.3.42	Torque value rising time (relative to rated torque)	0.0~50.000Sec.	0.010	0.001	
F8.3.43	Torque value decreasing time (relative to rated torque)	0.0~50.000Sec.	0.010	0.001	
F8.3.44	Revolution limiting setting(H)	**_ _ _ X: Source of FWD speed** 0: Setting of FWD revolution limiting value (F8.3.45) 1: Determination of frequency Setting channel 1 (F0.2.25) **_ _ X _ : Reserved** **_ X _ _ : Source of REV speed** 0: Setting of REV revolution limiting value (F8.3.46) 1: Reserved	0000	1	
F8.3.45	FWD revolution limiting value	0~60*[F0.1.21]/ pairs of motor poles (rpm)	1500	1	

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
F8.3.46	REV revolution limiting value	0~60*[F0.1.21]/ pairs of motor poles (rpm)	1500	1	
F8.3.47	Setting of torque set value limit(H)	**_ _ _ X: Minimum torque limit 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 Field bus set value 1 6: MODBUS Field bus set value 2 **_ _ X _ : Reserved** **_ X _ _ : Maximum torque limit 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 3: AI1 set value 4: AI2 set value 5: MODBUS Field bus set value 1 6: MODBUS Field bus set value 2	0000	1	
F8.3.48	Minimum torque limit 1	-250.0~0.0%	-200.0	0.1	
F8.3.49	Minimum torque limit 2	-250.0~0.0%	-200.0	0.1	
F8.3.50	Maximum torque limit 1	0.0~250.0%	200.0	0.1	
F8.3.51	Maximum torque limit 2	0.0~250.0%	200.0	0.1	
F8.3.52	Torque zero offset	-25.0~25.0%	0.0	0.1	

6.2.35 MODBUS FIELDBUS (STANDARD EXPANSION CARD CONFIGURATION)

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	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	Parameters Configuration	_ _ _ **X: Baud rate selection** 0: 1200kbit/s 1: 2400kbit/s 2: 4800kbit/s 3: 9600kbit/s 4: 19200kbit/s 5: 38400kbit/s 6: 76800kbit/s _ _ **X** _ **: 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	0003	1	×
FA.0.02	Equipment address	0~247(0 stands for broadcasting address)	1	1	×
FA.0.03	The device response delay	0~1000ms	5ms	1	
FA.0.04	Judging time of communication failure	0.01~10.00Sec.	1.00	0.01	×
FA.0.05	Loss of signal Response	0: Deceleration stop 1: Run as per last received command	0	1	

6.2.36 MAPPING ACCESS PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FA.1.08	Mapping application parameter 1 (H)	F0.00 ~ FF.55	F0.29	1	×
FA.1.09	Mapping application parameter 2 (H)	F0.00 ~ FF.55	F0.29	1	×
FA.1.10	Mapping application parameter 3 (H)	F0.00 ~ FF.55	F0.29	1	×
FA.1.11	Mapping application parameter 4 (H)	F0.00 ~ FF.55	F0.32	1	×
FA.1.12	Mapping application parameter 5 (H)	F0.00 ~ FF.55	F0.32	1	×
FA.1.13	Mapping application parameter 6 (H)	F0.00 ~ FF.55	F0.32	1	×
FA.1.14	Mapping status parameter 1 (H)	d0.00 ~ d1.49	d0.00	1	
FA.1.15	Mapping status parameter 2 (H)	d0.00 ~ d1.49	d0.01	1	
FA.1.16	Mapping status parameter 3 (H)	d0.00 ~ d1.49	d0.02	1	
FA.1.17	Mapping status parameter 4 (H)	d0.00 ~ d1.49	d0.03	1	
FA.1.18	Mapping status parameter 5 (H)	d0.00 ~ d1.49	d0.04	1	
FA.1.19	Mapping status parameter 6 (H)	d0.00 ~ d1.49	d0.05	1	
FA.1.20	Mapping status parameter 7 (H)	d0.00 ~ d1.49	d0.06	1	
FA.1.21	Mapping status parameter 8 (H)	d0.00 ~ d1.49	d0.07	1	
FA.1.22	Mapping status parameter 9 (H)	d0.00 ~ d1.49	d0.08	1	
FA.1.23	Mapping status parameter 10 (H)	d0.00 ~ d1.49	d0.09	1	

6.2.37 COMMUNICATION LINKAGE SYNCHRONOUS CONTROL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FA.2.25	synchronous coupling control options(H)	**_ _ _ X: Selection of linkage function** 0: Void 1: The device is the salve device 2: The device is the master device **_ _ X _ : Linkage target value** 0: Proportional linkage of frequency/ revolution set value 1: Proportional linkage of frequency/ revolution integrator output value **_ X _ _ : Linkage command (slave station valid)** 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 band-type brake/DC braking linked **X _ _ _ : Reserved**	0310	1	×
FA.2.26	Coupling proportional adjustment	0.010~10.000	1.000	0.001	
FA.2.27	Coupling fine proportional adjustment	0: No fine adjustment 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3	0	1	
FA.2.28	Slave offset frequency /Revolution speed	0: No offset 1: Determined by frequency setting source 1 2: Determined by frequency setting source 2	0	1	
FA.2.29	Coupling balancing function	0: Void 1: Current balancing 2: Torque balancing 3: Power balancing	0	1	
FA.2.30	Coupling balancing gain	0.001~10.000	1.000	0.001	

6.2.38 EXPANSION MULTIFUNCTIONAL INPUT TERMINAL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
Fb.0.00 ~ Fb.0.07	Expand multifunctional input terminal EDI1~ED8 (valid when extension kits are inserted)	0~96	0	1	×
Fb.0.09	Expansion multifunctional input terminal active level(H)	**_ _ _ X: EDI1~EDI4 terminal** 0~F: 4-bit binary system, bit=0 power-on effective, 1 Disconnection Effective **_ _ X _ : EDI5~EDI8 terminal** The same as above **_ X _ _ : Reserved** **X _ _ _ : Reserved**	0000	1	×

6.2.39 EXPANSION MULTIFUNCTIONAL OUTPUT TERMINAL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
Fb.1.10 ~ Fb.1.17	Expand multifunctional input terminal EDO1~EDO8(valid when access corresponding IO extension)	0 ~ 62	0	1	

6.2.40 ZERO-SPEED TORQUE AND POSITION CONTROL

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
Fb.2.18	Automatic step switching frequency	0 ~ 5.00Hz	1.00	0.01	
Fb.2.19	Automatic step switching cycle holing	0.10~2.00Sec	0.30	0.01	
Fb.2.20	torque at 0 Hz(DC band-type brake preferred)	0: Void 1: Band-type brake mode 2: Zero-speed position locking (PG feedback VC mode valid)	0	1	×
Fb.2.21	Position locking gain	0.10 ~ 10.00	1.00	0.01	
Fb.2.22	PG speed shaft propulsion distance per revolution	0.001 ~ 50.000mm	0.500	0.001	

6.2.41 VIRTUAL INPUT AND OUTPUT

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.0.00	Group configuration parameter locking function (H)	_ _ _ **X: FF parameter modification forbidden** 0: Forbidden (non-display valid) 1: Permitted _ _ **X** _ : **Reserved** _ **X** _ _ **: Reserved** **X** _ _ _ **: Initialization of FF parameter group** 0: Forbidden 1: Permitted	0000	1	
FF.0.01	Definition of virtual output node (SDO1)	0~62	0	1	
FF.0.02	Definition of virtual output node (SDO2)	0~62	0	1	
FF.0.03	Definition of virtual output node (SDO3)	0~62	0	1	
FF.0.04	Definition of virtual output node (SDO4)	0~62	0	1	
FF.0.05	Definition of virtual output node (SDO5)	0~62	0	1	
FF.0.06	Definition of virtual output node (SDO6)	0~62	0	1	
FF.0.07	Definition of virtual output node (SDO7)	0~62	0	1	
FF.0.08	Definition of virtual output node (SDO8)	0~62	0	1	
FF.0.09	Definition of virtual input function (SDI1)	0~96	0	1	×

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.0.10	Definition of virtual input function (SDI2)	0~96	0	1	×
FF.0.11	Definition of virtual input function (SDI3)	0~96	0	1	×
FF.0.12	Definition of virtual input function (SDI4)	0~96	0	1	×
FF.0.13	Definition of virtual input function (SDI5)	0~96	0	1	×
FF.0.14	Definition of virtual input function (SDI6)	0~96	0	1	×
FF.0.15	Definition of virtual input function (SDI7)	0~96	0	1	×
FF.0.16	Definition of virtual input function (SDI8)	0~96	0	1	×
FF.0.17	Virtual output- input connection polarity(H)	_ _ _ **X: SDO1-SDI1** 0: Hoopla connection 1: Antipolar connection _ _ **X** _**: SDO2-SDI2** 0: Homopolar connection 1: Antipolar connection _ **X** _ _**: SDO3-SDI3** 0: Homopolar connection 1: Antipolar connection **X** _ _ _ **: SDO4-SDI4** 0: Homopolar connection 1: Antipolar connection	0000	1	×
FF.0.18	Virtual output- input connection polarity(H)	_ _ _ **X: SDO5-SDI5** 0: Homopolar connection 1: Antipolar connection _ _ **X** _**: SDO6-SDI6** 0: Homopolar connection 1: Antipolar connection _ **X** _ _**: SDO7-SDI7** 0: Homopolar connection 1: Antipolar connection **X** _ _ _ **: SDO8-SDI8** 0: Homopolar connection 1: Antipolar connection	0000	1	×

6.2.42 PROTECTION FUNCTION CONFIGURATION PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.1.19	Protection action configuration 1 (H)	_ _ _ **X: Operation under voltage protection** 0: No action 1: Act _ _ **X** _ **: Output grounding protection** 0: No action 1: Act _ **X** _ _ **: Output voltage phase shortage protection (Void for single camera)** 0: No action 1: Trip and stop 2: Nonstop alarm **X** _ _ _ **: Output current phase shortage or unbalancing protection** 0: No action 1: Trip and stop 2: Nonstop alarm	1111	1	
FF.1.20	Protection action configuration 2 (H)	_ _ _ **X: Temperature sensor fault** 0: No action 1: Trip and stop 2: Nonstop alarm _ _ **X** _ **: Inverter overheat alarm** 0: Closed 1: Act _ **X** _ _ **: Input voltage unbalancing protection (Void for single camera)** 0: No action 1: Trip and stop 2: Nonstop alarm **X** _ _ _ **: Motor over temperature protection** 0: No action 1: Trip and stop 2: Nonstop alarm	1111	1	
FF.1.21	Protection action configuration 3 (H)	_ _ _ **X: Relay action fault protection** 0: No action 1: Act _ _ **X** _ **: Internal data memory abnormity protection** 0: No action 1: Act _ **X** _ _ **: Inverter under voltage operation alarm** 0: Closed 1: Act **X** _ _ _ **: Reserved**	0111	1	
FF.1.22	Protection action configuration 4 (H)	_ _ _ **X: Drive protection action** 0: Closed 1: Act _ _ **X** _ **: Reserved** _ **X** _ _ **: Reserved**	0001	1	

6.2.43 CORRECTION PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.2.25	AI1 zero offset adjustment	-0.500~0.500V	0.0	0.001	
FF.2.26	AI1 gain adjustment	0.950~1.050	1.000	0.001	
FF.2.27	4mA offset adjustement for AI2	-0.500~0.500mA	0.0	0.001	
FF.2.28	AI2 gain adjustment	0.950~1.050	1.000	0.001	
FF.2.29	AI3 zero offset adjustment	-0.500~0.500V	0.0	0.001	
FF.2.30	AI3 gain adjustment	0.950~1.050	1.000	0.001	
FF.2.31	AO1 zero offset adjustment	-0.500~0.500V	0.0	0.001	
FF.2.32	AO1 gain adjustment	0.950~1.050	1.000	0.001	
FF.2.33	AO2 zero offset adjustment	-0.500~0.500V	0.0	0.001	
FF.2.34	AO2 gain adjustment	0.950~1.050	1.000	0.001	
FF.2.35	Undervoltage protection level	320~450V	380	1	×
FF.2.36	DC Bus volts detection level gain	0.950~1.050	1.000	0.001	

6.2.44 SPECIAL FUNCTIONAL PARAMETERS

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.3.37	Setting of torque ultimate limiting mode (H)	**_ _ _ X: 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. **_ _ X _ : Reserved** **_ X _ _ : Constant power area torque limitation** 0: Treated the same as the constant torque area 1: Simultaneously adjusted as per constant power algorithm	0101	1	
FF.3.38	Current closed-loop proportional gain	0.10 ~ 10.00	1.00	0.01	
FF.3.39	Current closed-loop integration time constant	0.10 ~ 10.00 (Sec.)	1.00	0.01	
FF.3.40	Total leakage inductance compensation coefficient	0.10 ~ 10.00	1.00	0.01	

6.2.45 OTHER CONFIGURATION PARAMETERS

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
FF.4.41	Cooling fan control(H)	**_ _ _ X: Soft start function (effective for model 4T370H and below)** 0: No action 1: Act **_ _ X _ : Air volume auto adjustment (effective for model 4T370H and below)** 0: No action 1: Act **_ X _ _ : Start time** 0: Start immediately after power-on 1: Start after running **X _ _ _ : Reserved**	0101	1	
FF.4.42	Keypad control running options (H)	**_ _ _ X: Panel REV/JOG key function selection** 0: REV (REV running key) 1: JOG (FWD jog key) **_ _ X _ : Reserved** **_ X _ _ : Reserved** **X _ _ _ : 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	0000	1	×
FF.4.43	Special function configuration (H)	**_ _ _ X: Motor parameter identification auto-start** 0: Forbidden 1: Permitted **_ _ X _ : Voltage vector composition mode** 0: Three-phase modulation 1: Two-phase modulation **_ X _ _ : Voltage small pulse shielding** 0: Void 1: Effective **X _ _ _ : SVC Revolution identification mode** 0: Current open-loop mode 1: Reserved	0001	1	
FF.4.44	Asynchronous motor parameter auto tune (H)	**_ _ _ X: Stator resistance** 0: Forbidden 1: Permitted **_ _ X _ : Total leakage inductance** 0: Forbidden 1: Permitted **_ X _ _ : Rotor time constant** 0: Forbidden 1: Permitted **X _ _ _ : Reserved**	0011	1	
FF.4.45	Random reference value	0~65535		1	**R**
FF.4.46 ~ FF.4.55	Reserved				

6.2.46 HISTORICAL FAULT RECORDING

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	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**

6.2.47 OPERATION STATUS AT THE LAST FAULT

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
dE.0.08	Operating frequency (rotor synchronous)	-300.00~300.00Hz	0	0.01	R/I
dE.0.09	Output current	0.0~3000.0A	0	0.1	R/I
dE.0.10	Output voltage	0~1000V	0	1	R/I
dE.0.11	Detection motor revolution(with speed sensor)	0~30000rpm	0	1	R/I
dE.0.12	Voltage at the DC side	0~1000V	0	1	R/I
dE.0.13	Output torque	-300.0~ 300.0%	0	0.1%	R/I
dE.0.14	Target frequency	0.0~300.00Hz	0	0.01	R/I
dE.0.15	Equipment maximum temperature	0.0~150.0	0	0.1°C	R/I
dE.0.16	Command status	_ _ _ **X** 0: Stop command 1: Running command _ _ **X** _ **: Reserved** _ **X** _ _ **: Reserved** **X** _ _ _ **: Reserved**	0000	1	R/I
dE.0.17	Inverter operation status	_ _ _ **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 _ _ **X** _ **: Operation status** 0: Stop 1: Start acceleration 2: Stop deceleration 3: Decreasing frequency and deceleration 4: Steady operation _ **X** _ _ **: Electric/braking status** 0: Electric operation 1: Power generation operation **X** _ _ _ **: Limit suppression** 0: No action	0000	1	R/I

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
		1: Over current suppression action 2: Over voltage suppressor action 3: Under voltage suppression action			
dE.0.18	Accumulative startup running time at the last fault	0~65535	65535	1H	R/I
dE.0.19	Startup running interval between the last two faults	0~65535	65535	1H	R/I
dE.0.20	Synchronization output frequency	-300.00~300.00Hz	0	0.01	R/I

6.2.48 BASIC STATUS PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	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	**_ _ _ 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 **_ _ X _ : Operation status** 0: Stop 1: Start acceleration 2: Stop deceleration 3: Decreasing frequency and deceleration 4: Steady operation **_ X _ _ : Electric/braking status** 0: Electric operation 1: Power generation operation **X _ _ _ : Limit suppression** 0: No action 1: Over current suppression action 2: Over voltage suppressor action 3: Under voltage suppression action		1	R
d0.0.09	Frequency setting channel command value (frequency)	-300.00Hz~300.00Hz		0.01Hz	**R**
d0.0.10	Revolution Setting channel command value (Revolution)	-30000~30000rpm		1rpm	**R**
d0.0.11	Torque command value (set input)	-300.0~300.0%		0.1%	**R**

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
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	-100.0~100.0(%)		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 ~ d0.0.23	Reserved				
d0.0.24	Accumulative running time (H)	0~65535h		1	
d0.0.25	Accumulative power-on time(H)	0~65535h		1	
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		0.1	
d0.0.28	Kilowatt-hour counter (high)	0~60000KKWh		1	
d0.0.29	Megawatt hour counter	0~60000MWh		1	

6.2.49 AUXILIARY STATUS PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	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	R
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	Reserved		-		--
d0.1.39	Reserved		-		--
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	Reserved		-		--
d0.1.44	Reserved		-		--
d0.1.45	Reserved		-		--

6.2.50 MODBUS FIELDBUS STATUS PARAMETER (STANDARD EXPANSION I/O BOARD)

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	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

6.2.51 TERMINAL STATUS AND VARIABLE

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
d1.0.00	Terminal input (DI1~DI10)	Segment marker (see Figure 6-1)	-	-	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.

6.2.52 COUNTER TIMER VALUE

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

6.2.53 SPINDLE CONTROL AND SCALE POSITIONING STATUS PARAMETER

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
d1.2.16	Spindle (PG installation shaft) position angle	0~359.9		0.1	R
d1.2.17	Spindle (PG installation shaft) traveling circle number	0~65536		1	R
d1.2.18	Accumulative number of position pulse (low)	0~65535		1	R
d1.2.19	Accumulative number of position pulse (middle)	0~65535		1	R
d1.2.20	Progressive distance	0.0~5000.0mm		0.1	R

6.2.54 EQUIPMENT INFORMATION

Function Code	Name	Setting Range and Description	Factory Default	Minimum Unit	Change Limit
d1.4.40	Expansion module connection information	_ _ _ **X: Reserved** _ _ **X** _ **: Standard expansion board** 0: Not connected 1: Connected _ **X** _ _ **: Functional expansion board 1** 0: Not connected 1~F: Connected(the value stands for the type of expansion board) **X** _ _ _ **: Functional expansion board** 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	Reserved		—		--
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		—		--
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 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	Reserved
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	Zero torque (zero loss) tracks free sliding
38	Load dynamic balancing effective	39	Reserved
40	RS485 external/Standard operation panel control switching	41	Reserved
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	Reserved
64	Reserved	65	Magnetic flux brake
66	Position pulse accumulator resetting	67	Automatic shifting jog (Spindle shifting special jog function)
68~80	Reserved	81~96	Reserved(used by function expansion card)
97	0.10~100.00KHz pulse input (Fin valid)	98	pulse input (Fin valid)

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 valid (irrelevant with start or running signal)	9	Running at zero speed
10	Speed not at zero	11	Inverter undervoltage stop
12	External control valid	13	In the process of acceleration running
14	In the process of decceleration running	15	Running at power generating status(braking)
16	Determined by standard MODBUS Field bus	17	Determined by Extended communication module
18	Reserved	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	27	Monitor 1 input variable above the upper 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	31	Monitor 2 input variable between the upper limit and the lower limit
32	Monitor 3 input variable below the lower limit	33	Monitor 3 input variable above the upper limit
34	Monitor 3 input variable between the upper limit and the lower limit	35	Reserved
36	Analog input AI1 power failure detection effective	37	Analog input AI2 power failure detection effective
38	Analog input AI3 power failure 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
50~54	Retained for extensions	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)

- Direction will not be considered for comparison of monitor variables.

TABLE 3 COMPARISON TABLES OF STATUS 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 VF 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 /5000 Ohm
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%
20~23	Reserved	—
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 Field bus set value 1	10000
36	Extended communication module set value 1	10000
37	Built-in Field bus set value 2	30000
38	Extended communication module set value 2	30000
39~44	Reserved	
45	Fixed output (current or voltage)	20.00mA (10.00V)

7. DETAILED FUNCTION INSTRUCTIONS

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 (H)	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~F)

0: Void

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

1: Digital setting of panel operation

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

2: Shuttle setting panel operation

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

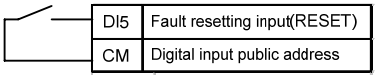


Figure 7-1 Wiring diagram for panel operation digital/shuttle setting

3: Two-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.

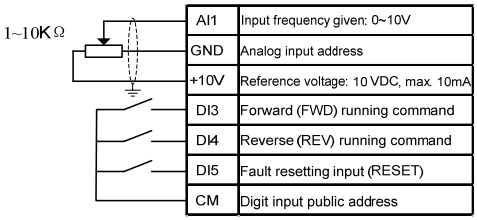


Figure 7-2-A Two-Wire control 1/AI1 setting wiring diagram

4: Two-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.

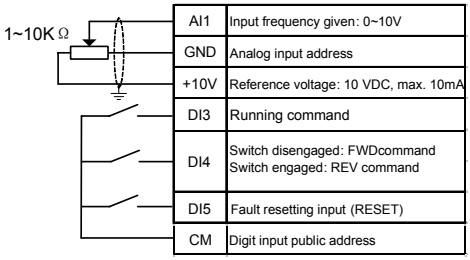


Figure 7-2-B Two-Wire control 2/AI1 setting wiring diagram

5: Three-Wire control macro/AI1 setting

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

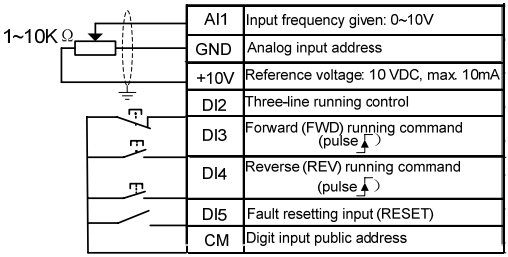


Figure 7-3 Three-Wire control macro/AI1 setting wiring diagram

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
F0.2.25	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

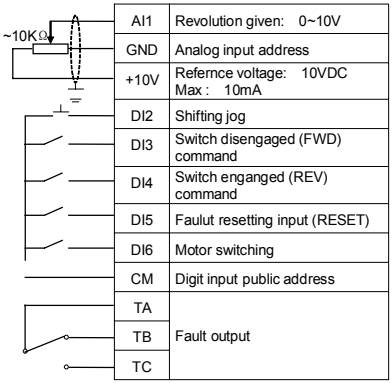


Figure 7-4 Machine tool spindle driving macro AI1 setting wiring diagram

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 _ /_ X _ _ : Reserved

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: Void (default to standard operation mode)

2: Reserved

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

_ _ _ X: Parameter display options

0: Display all parameters

1: Display effective configuration parameters

According to the difference of parameter setting commands or current hardware configuration (e.g. various expansion boards), it should automatically hide the parameters which are irrelevant to current command or hardware, 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 _ _ _ X of this parameter is set to 4), and batch recovery or batch storage will be conducted (when the X _ _ _ of this parameter is set to 2 or 5).

_ X _ _ : Reserved

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 un-saved parameters (restoring to original value)

All unsaved parameters will be restored to the original values rapidly 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 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 (system macro)modification password	**Setting range:0~65535**	**Factory default: 0**

For modifying the system macro setting (X _ _ _) 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.

F0.0.03 LCD language choosing	Setting range: 0-1	Factory default: 0

It is only valid for selecting LCD operation panel as to set LCD display language.

0:Chinese **1:English**

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: Contrast, setting range: 0-7.

_ _ 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 Security (H)	Setting range: 0000~0012	Factory default: 0000
F0.0.06 Security Code	Setting range: 00000~65535	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:

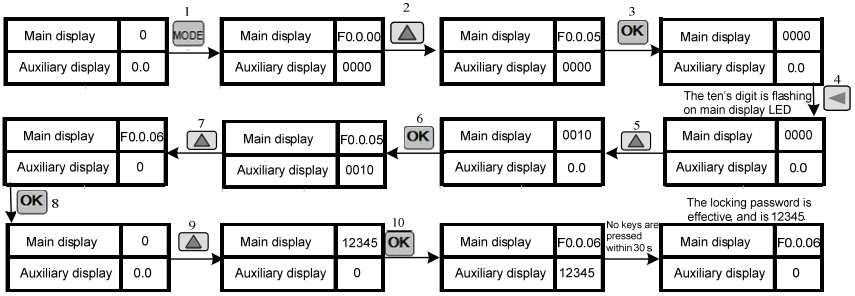


Figure 7-5 Parameter locking flow

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

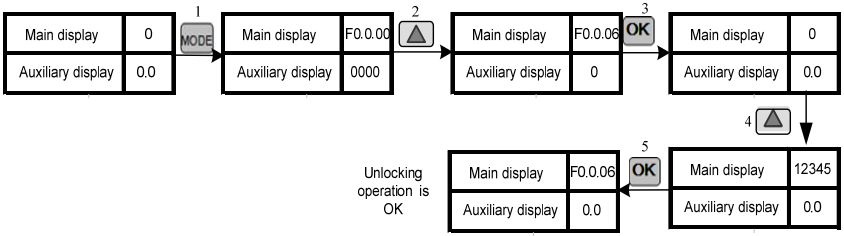


Figure 7-6 Parameter unlocking flow

F0.0.08 Parameter Transfer (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 downloads (except for motor parameter/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.

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

_ _ _ X: Keypad locking

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 locking

All keys are effective on the operating panel.

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

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 key 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 to stop the device freely

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, the **PANEL/REMOTE** keys can be used to switch the running command channel in the normal monitoring mode. 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 Main 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**
F0.00.14 Auxiliary monitoring parameter 2 (H)	**Setting range: d0.00~d0.55 / d1.00~d1.55**	**Factory default: d0.04**

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 main 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)

F0.1.17 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: 10.00~320.00Hz	Factory default: 60.00
F0.1.21 Upper limiting frequency	Setting range: [F0.1.22]~Min.(300.00Hz,F0.1.20)	Factory default: 50.00
F0.1.22 Lower limiting 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 7-7**.**

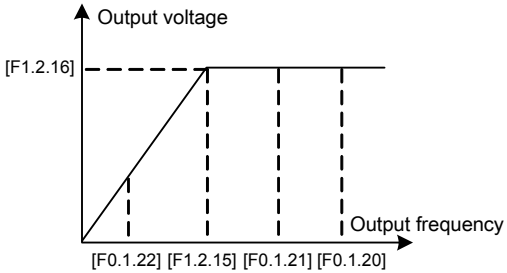


Figure 7-7 Frequency parameter definition sketch

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

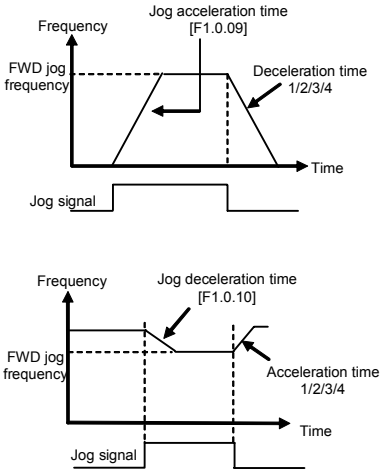


Figure 7-8 FWD jog running curve

7.3 FREQUENCY SETUP (GROUP F0.2)

F0.2.25 Frequency setting channel	Setting range: 00~29	Factory default: 0

0: Keypad entry 1 (keep value when stopped)

The frequency set value is determined by the value of the parameter **F0.2.29**. 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**).

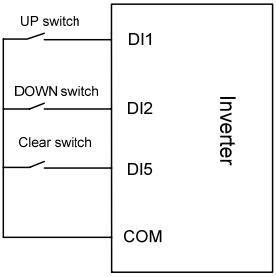


Figure 7-9 Terminal up/down wiring sketch

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 (AI1, 0-10VDC)

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 (AI2, 4-20mA)

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 (AI3, 0-10VDC)

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 (-10V ~ +10V)

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 (-10V ~ +10V)

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 **F4.0.04** and **F4.0.05**.

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 Communications1 Relative

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

17: MODBUS field bus set value 2

The frequency set value is given by the principal computer through **MODBUS** field bus (**RS485** communication port), and the set value (-**30000** ~ **30000**) is absolute value neglecting the decimal point) (e.g. the value **5000** corresponds to the set frequency **50.00Hz** 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/rail-to-rail input (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: Reserved

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: Automatic multi-sage running frequency

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: Terminal selection multi-stage frequency

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: Virtual analog input SAI1

29: Virtual analog input SAI2

The frequency set value is defined by the virtual analog input parameter **F4.4.50 ~ F4.4.54** which is same function as mapping actual physical channel.

7.4 CONTROL COMMAND SOURCE (GROUP F0.3)

F0.3.33 Control command	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(operation and simple running of frequency inverter)*** *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 field bus/standard expansion card configuration

The running control command is given via **MODBUS** field bus.

F0.3.35 External control terminal action mode (H)	Setting range: 0000~0013	Factory default: 0000

_ _ _ X: Control command

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-Wire 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

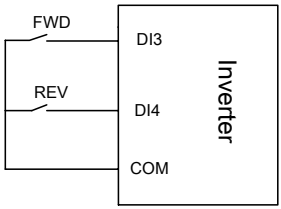


Figure 7-10-A Two-wire running mode 1

1: Two-Wire mode 2

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

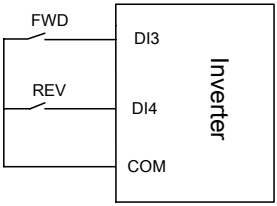


Figure 7-10-B Two-wire running mode 2

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.

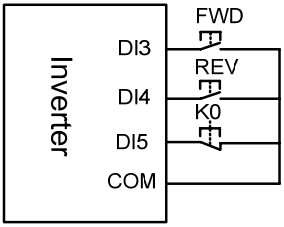


Figure 7-11-A Three-wire running mode 1

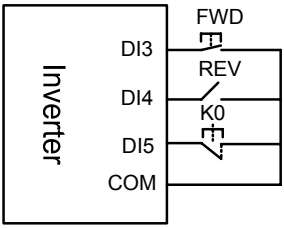


Figure 7-11-B Three-wire running mode 2

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 command power-on initial start mode

0: Running signal level starting

1: Running signal rising edge starting (Two-Wire mode 1/2)

The signal given by Two-Wire 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 field bus (standard expansion card)

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

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 field bus (standard expansion card)

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.

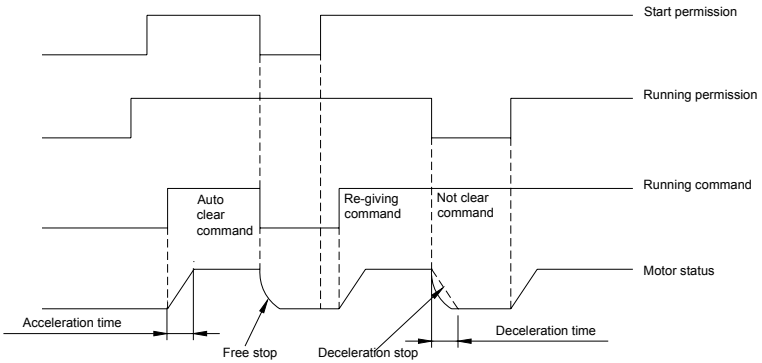


Figure 7-12 Diagram of start process

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.

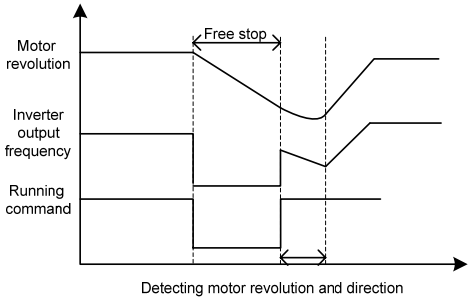


Figure 7-13 Revolution tracking start sketch

_ 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 over current or over voltage 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 holding 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.

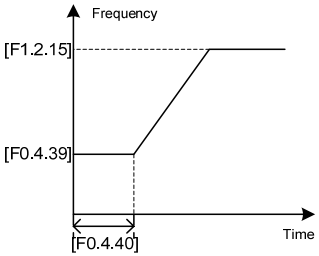


Figure 7-14 Start frequency sketch

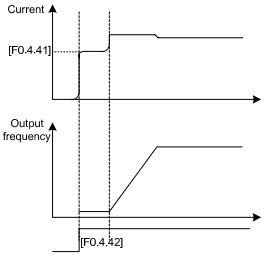


Figure 7-15 Start pre-excitation output

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 7-15 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.

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 (H)	**Setting range: 0000~0001**	**Factory default: 0000**

_ _ _ 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.

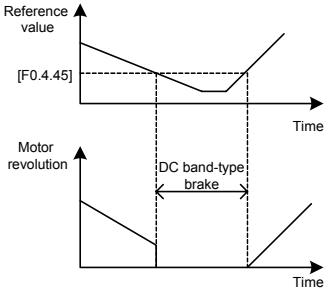


Figure 7-16 DC band-type brake sketch

- 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 band-type brake/ brake initial frequency/speed	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 band-type brake/brake injection current	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.

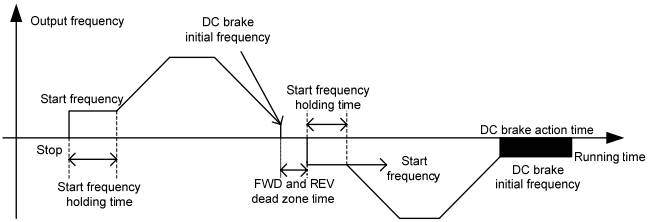


Figure 7-17 Stop DC brake sketch

F0.4.48 Restart after power-off	Setting range: 0, 1	Factory default: 0
F0.4.49 Standby time for restart after power-off/free stop	Setting range: 0.1~10.0Sec.	Factory default: 0.5

It is mainly for the trigger starting modes including “panel control, bus control and Three-Wire 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.

F0.4.50 Forward and reverse transition dead 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 7-18.

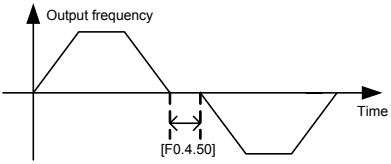


Figure 7-18

FWD and REV transition dead zone sketch

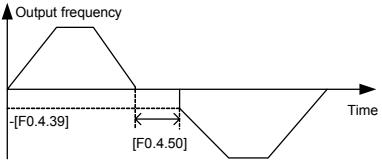


Figure 7-19 Sketch of start frequency FWD and REV switching

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:

F0.4.52 Zero speed (frequency) detection level	Setting range: 0.00~100.00Hz	Factory default: 0.10
F0.4.53 Zero speed delay time	Setting range: 0.00~10.00Sec.	Factory default: 0.05

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.

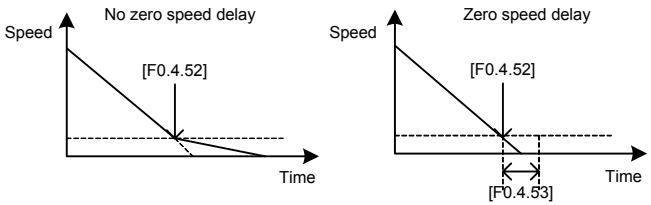


Figure 7-20 Comparison diagram when with or without zero speed delay

7.6 ACCELERATION AND DECELERATION CHARACTERISTICS (GROUP F1.0)

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

_ _ _ X: Acceleration and deceleration 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 **[FF1.0.02]**. 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.

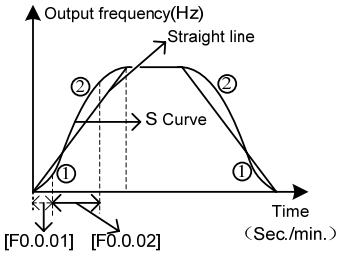


Figure 7-21 Acceleration and deceleration curve

_ _ X _ : Unit of acceleration and deceleration time

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.

F1.0.01 Time ratio of S curve acceleration starting/deceleration ending period	Setting range: 5.0~100.0-[F1.0.02]	Factory default: 15.0
F1.0.02 Time ratio of S curve acceleration rising/deceleration decreasing period	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 7-21, the acceleration starting/deceleration ending period of S curve can be indicated by the percentage of total acceleration and decoration time.

As shown in item ② in Figure 7-21, 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 (Sec. /Min.)**	**Factory default: ☆**
F1.0.09 Acceleration 4/ jog acceleration time	**Setting range: 0.01~600.00 (Sec. /Min.)**	**Factory default: ☆**
F1.0.10 Deceleration 4/ jog deceleration time	**Setting range: 0.01~600.00 (Sec. /Min.)**	**Factory default: ☆**

The acceleration time means the time required for the inverter to accelerate from **0.00Hz** to maximum output frequency [**F0.1.21**].

The deceleration time means the time required for the inverter to decelerate from the maximum output frequency [**F0.1.21**] to **0.00Hz.**

V220 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 **F1.0.00.**

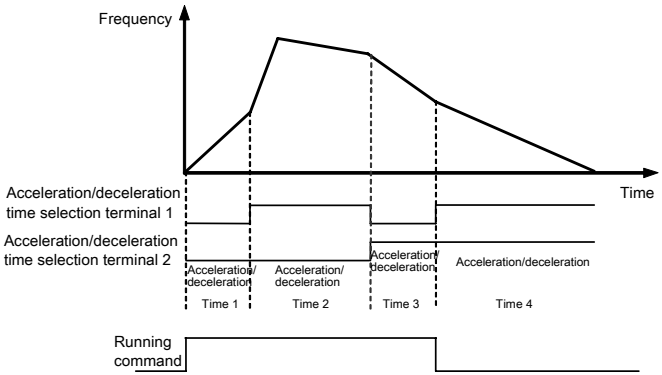


Figure 7-22 External terminal selection mode for acceleration and deceleration time

F1.0.11 EMS emergency stop and deceleration time	**Setting range: 0.01~600.00 (Sec. /Min.)**	**Factory default: ☆**

The time for decelerating from the maximum output frequency [**F0.1.20**] 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: 1.5~10.0KHz (FF.4.43=_ _ 0_) 1.5~12.5KHz (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 — This mode is suitable for most applications which output is under 300Hz.

1: Synchronous modulation — Carrier frequency keeps a constant proportion with fundamental frequency.

2: Noise smoothing — When this mode is valid, the inverter will adjust the carrier frequency to smooth audio noise automatically.

7.8 V/F PARAMETERS AND OVERLOAD PROTECTION (GROUP F1.2)

F1.2.15 Reference frequency of motor	**Setting range: 5.00~300.00Hz**	**Factory default: 50.00**
F1.2.16 Reference voltage of motor	**Setting range: 50~500V/ 25~250V**	**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 does no need to be modified except for special circumstances.

F1.2.18 Torque increasing voltage for motor	**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 **7-23-A** and Figure **7-23-B**.

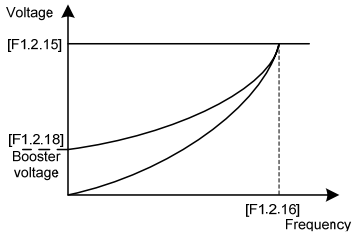


Figure 7-23-A Sketch of torque booster for descending torque curve

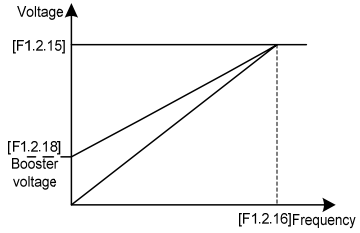


Figure 7-23-B Sketch of torque booster for constant torque curve

F1.2.19 Frequency point 1 of motor V/F curve	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.20 Voltage point 1 of Motor V/F curve	**Setting range: 0~500V**	**Factory default: 0.0**
F1.2.21 Frequency point 2 of motor V/F curve	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.22 Voltage point 2 of Motor V/F curve	**Setting range: 0~500V**	**Factory default: 0.0**
F1.2.23 Frequency point 3 of motor V/F curve	**Setting range: 0.0~[F0.1.21]**	**Factory default: 0.0**
F1.2.24 Voltage point 3 of Motor V/F curve	**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 7-24.

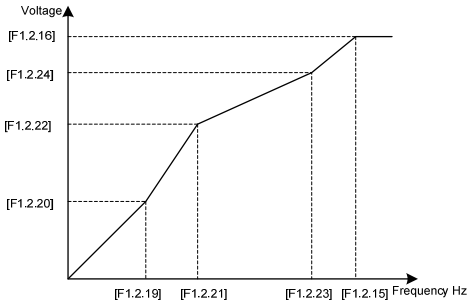


Figure 7-24 V/F customized curve

F1.2.25 Slip frequency compensation for motor	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 these 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.

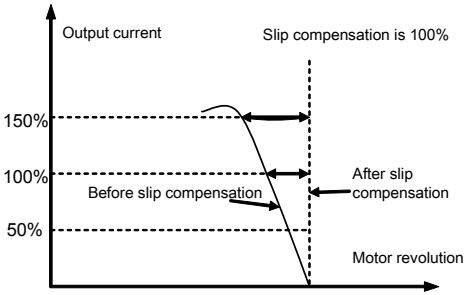


Figure 7-25 Slip frequency compensation sketch

7.9 STEADY RUNNING (GROUP F1.4)

F1.4.39 Acceleration /deceleration current limiting level	Setting range: 120~180(%)	Factory default: 150(%)

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.

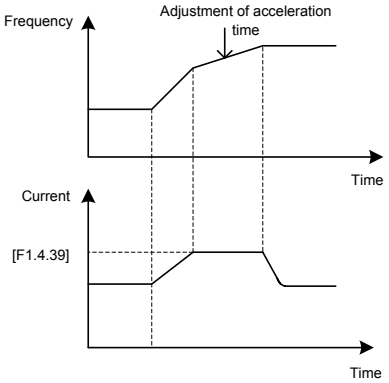


Figure 7-26 Schematic diagram of current limit for acceleration and deceleration

F1.4.40 Forced start current limiting level	Setting range: 120~200%	Factory default: 150(%)
F1.4.41 Forced 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 forced start is closed.

F1.4.42 Trip Suppression Selection	Setting range: 0000~0111	Factory default: 0111

_ _ _ X: Over voltage suppression adjustor

When setting is valid, for load with energy feedback, in order to suppress over voltage, 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 _ : Under voltage suppression adjustor

When setting is valid, under voltage 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.

F1.4.43 Over voltage Trip Level (DC BUS)	**Setting range: 720~800V**	**Factory default: 730**
F1.4.44 Over voltage Trip Level Gain	**Setting range:0.10~10.00**	**Factory default:1.00**

When the motor is dragging over voltage 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 over voltage 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.

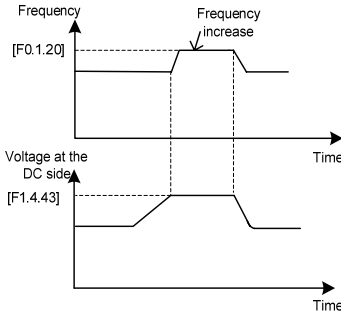


Figure 7-27-A Over voltage suppression during steady running

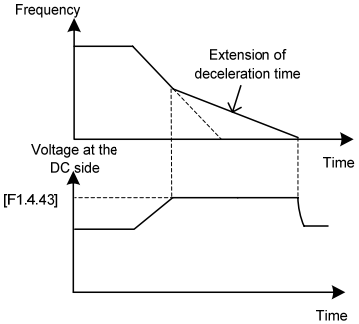


Figure 7-27-B Over voltage suppression during deceleration process

- The larger the over voltage 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 under voltage adjusting gain is, the stronger under voltage suppression is.

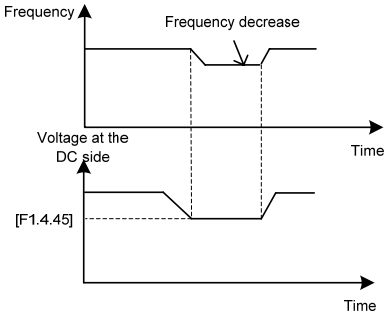


Figure 7-28-A Sketch of under voltage adjusting

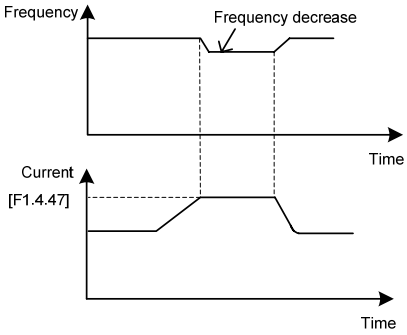


Figure 7-28-B Sketch of current-limiting adjusting and under voltage adjusting

F1.4.47 Current Limit Trip	**Setting range: 20~200(%)**	**Factory default: 180**
F1.4.48 Current Limit Trip 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: 0.2~5.0Sec**	**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.

F1.4.52 Selection of self resetting fault	**Setting range: 0000~1111**	**Factory default: 0000**

_ _ _ X: Over current

0: Self resetting forbidden 1: Self resetting permitted

_ _ X _ : Over voltage

0: Self resetting forbidden 1: Self resetting permitted

_ X _ _ : Output grounding

0: Self resetting forbidden 1: Self resetting permitted

X _ _ _ : Operating under voltage

0: Self resetting forbidden 1: Self resetting permitted

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

It is used for monitoring display correction of parameters (**d0.0.00, d0.0.01, d0.0.9, d0.0.10**). Display value= actual value* [**F1.4.53**].

7.10 MOTER PARAMETERS (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:

1) Correctly set nameplate parameters;

2) 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 (**F2.0.00~F2.0.09**) 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. The first time connection of motor running, a parameter static identification process will be added automatically (parameter **FF.4.43** can shield the function).

F2.0.10 Slip compensation coefficient	Setting range: 0.50~1.50	Factory default: 1.00

Slip compensation coefficient is used for slip frequency calculation, valid with vector control mode. With SVC running, this parameter can be amended to adjust speed for compensation control.

F2.0.24 Motor 1 Z pulse initial angle	Setting range: 0.0~359.9	Factory default: 0.0

This parameter is valid when **Z** pulse selection is valid (**[F8.0.07] = 1**), used for set corresponding mechanical rotating angle of **Z** pulse position.

F2.0.25 Overload Protection Motor Coefficient	Setting range: 50.0~131.0%	Factory default: 110.0

This parameter is used for setting sensitivity of heat relay protection for load motor by inverter. When rated current of load motor does not match inverter rated current, it can support motor correct heat protection by setting the value.

Setting value of the parameter can be determined by following formula:

[F2.0.25] = Motor rated current/ inverter rated current*100%

When the setting value of parameter is **131.0%**, the function of motor overload protection will be closed.

- 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.

7.11 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 Auto tune	Setting range: 0, 1, 2	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 **F2.2.52** is set as **1 or 2**) is operated, there will be an identification operation when the frequency inverter is start. After parameter identification is over, **F2.2.52** 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:

1) Nameplate parameter of motor (**F2.0.01~F2.0.04**) has been input correctly;

2) The motor is in stopped condition.

0: Closed

1: Static identification

During the process of parameter measurement, motor shall be kept in stopped condition (no load empty shaft motor might have a slight shaft angle deviation).

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.

- 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.

7.12 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(0~96)/ standard expansion card	**Setting range: 0~96**	**Factory default: 0**
F3.0.07 Multifunctional input terminal DI8(0~96)/ standard expansion card	**Setting range: 0~96**	**Factory default: 0**
F3.0.08 Multifunctional input terminal DI9(0~97)/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 1to 4

By combination of the four function terminals **ON/OFF** status, selecting the setting frequency by **F6.0.00 ~ F6.0.15** correspondingly which is as inverter present setting frequency.

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: Forward (FWD)/Reverse (REV) running command terminal

Apply to forward (**FWD**)/reverse (**REV**) running command under the external terminal control (regard **F0.3.33** as 1); according to the setup of **F0.3.35**, it can jog Two-Wire mode and Three-Wire mode (regard another external control terminal as Three-Wire 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 time1/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 stops (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)

V220 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**.

17: UP/DW set frequency clear

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-Wire running mode under the external terminal control (regard **F0.3.33** 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.

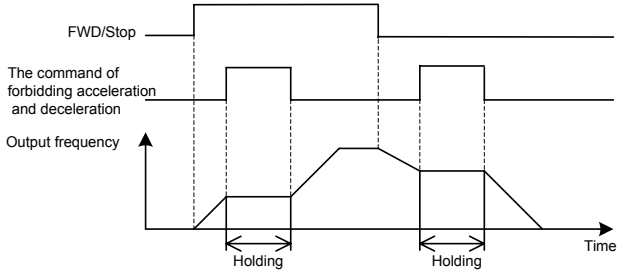


Figure 7-29 Sketches of acceleration and deceleration forbidden

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: Reserved

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 to 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 sleeps 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	Speed control mode
OFF	Torque 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 _ _ _**2**, the function terminal is valid.

43: Running permission

When parameter **F0.4.37** is set as _**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.

62~64: Retention parameter

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

There is a built-in 32 bit of PG encoder pulse counting in frequency inverter, for showing the current position(supervision parameter **d1.2.18~19**) of transmission shaft(PG mounting shaft). This function can be selected to adjust the pulse counting value to zero.

67: Automatic shifting

It is the machinery shifting dedicated function of transmission machinery (e.g. the spindle drive). When this function is valid, frequency inverter will drive the motor **FWD** and **REV** at low speed, so as to achieve the machinery shifting smoothly, avoiding the dead.

68~96: Reserved

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 **1.0~1000.0Hz** signal can be received effectively.

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

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: 0000~01FF**	**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 7-14 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

7.13 MULTIFUNCTIONAL OUTPUT TERMINAL (GROUP F3.1)

F3.1.12 Multifunctional output terminal DO1	**Setting range: 0~62**	**Factory default: 1**
F3.1.13 Multifunctional output terminal DO2	**Setting range: 0~62**	**Factory default: 2**
F3.1.14 Multifunctional output terminal DO3/ Fout/standard expansion card	**Setting range: 0~63**	**Factory default:63**
F3.1.21 Multifunctional relay output (RO1A/ B/C)	**Setting range: 0~62**	**Factory default: 4**
F3.1.22 Multifunctional relay output (RO2A /B/C) /standard expansion card	**Setting range: 0~62**	**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 **RO1**and **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 bus bar 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 (**V/F** or **SVC** mode), terminal will output the valid signal/relay will pull in.

11: Inverter under voltage stop

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

12: External control valid

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

15: 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 higher the upper limit values, then output the invalid signal/relay disconnects (as shown in Figure 7-30-A).

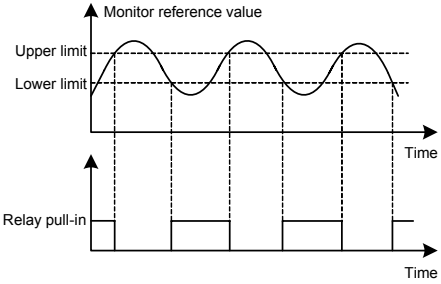


Figure 7-30-A Monitor functional sketch 1

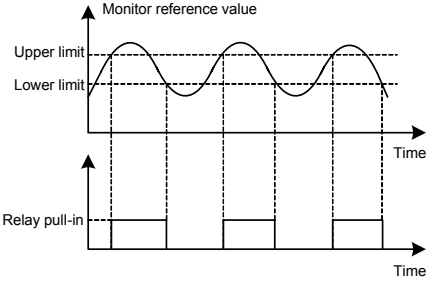


Figure 7-30-B Monitor functional sketch 2

27/30/33: Monitoring parameters 1/2/3 above the upper 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 7-30-B)

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.

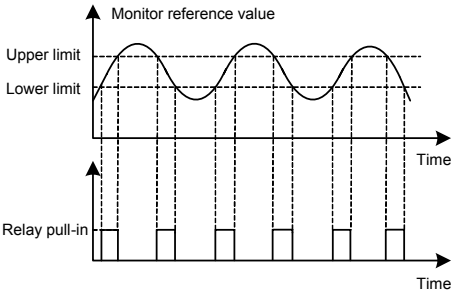


Figure 7-30-C Functional sketch 3 of monitor

36~38: Analog input AI1 power failure detection effective

When inverter detects power failure of analog input, it will choose to make corresponding operation according to operation after power failure; 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.

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.

F3.1.15~F3.1.20 DO1~DO3 delay time for terminal effective/ineffective signal output	**Setting range: 0.0~10.00Sec.**	**Factory default: 0.0**
F3.1.23~F3.1.26 RO1/RO2 power-on/ disconnection delay time	**Setting range: 0.0~10.00Sec.**	**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: 0~45**	**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.

7.14 PULSE INPUT

(The group parameter is valid when choose standard extension I/O board and d i9 selects frequency input function.) (Group F3.2)

F3.2.36 Minimum pulse input frequency DI9/Fin	**Setting range: 0.0~100.00KHz**	**Factory default: 0.0**
F3.2.37 Maximum 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, 98**), effective breadth of external pulse signal is **5-30V**.

F3.2.39 Number of single-loop pulse	**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=rotation speed of driving wheel/rotation speed of speed-testing encoder.

F3.2.42 Maximum accumulative length value	**Setting range: 10m~50000m**	**Factory default: 50000**
F3.2.43 Maximum liner speed	**Setting range: 0.01~500.00m/Sec.**	**Factory default: 10.00**

When reach or exceed limit maximum accumulative length or linear speed, terminal signal can be output.

F3.2.44 Current accumulative length value	**Setting range: 0~50000m**	**Factory default: ——**
F3.2.45 Current liner speed	**Setting range: 0.0~500.00m/Sec.**	**Factory default: ——**

Parameters in read-only state are used to display calculated results of current length and linear speed.

7.15 PULSE OUTPUT

(The group parameter is valid when choose standard extension I/O board and do3 selects frequency output function.) (Group F3.3)

F3.3.46 Type of output pulse signal DO3/Fout	Setting range: 0, 1, 2	Factory default: 0

0: 0.25~ 100.00KHz Frequency signal

1: Frequency signal

2: Pulse width modulation (PWM) signal

Modulation frequency is set by maximum pulse with outputting frequency parameter **F3.3.48**, which can be used to expand AO port.

F3.3.50 DO3/Fout assignment lower limit	Setting range: 0.0~[F3.3.51]	Factory default:0.0
F3.3.51 DO3/Fout assignment upper limit	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 7-31:

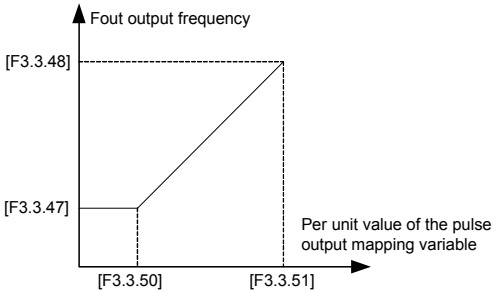


Figure 7-31 Characteristic curve of pulse output fount

7.16 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.

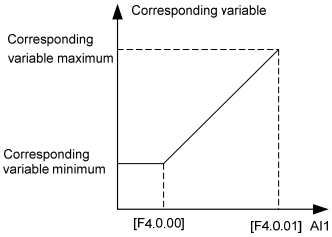


Figure 7-32-A Sketch of AI1 analog input and corresponding variables (unipolarity)

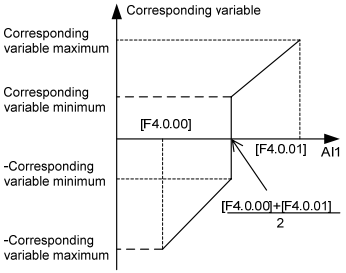


Figure 7-32-B Sketch of AI1 analog input and corresponding variables (bipolarity)

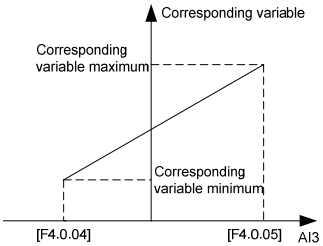


Figure 7-33-A Sketch of AI3 analog Input and corresponding variables (unipolarity)

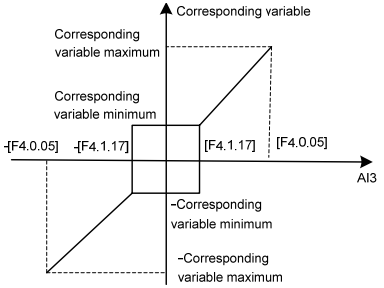


Figure 7-33-B Sketch of AI3 analog Input and corresponding variables (bipolarity)

- 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: 10ms

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.

7.17 ANALOG INPUT CURVE CORRECTION (GROUP F4.1)

F4.1.09~F4.1.16 Analog Input AI1~AI2 Curve Correction Point/Value 1~2	—	—

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 7-34, while the curve correction methods of AI2 are similar to analog input AI1.

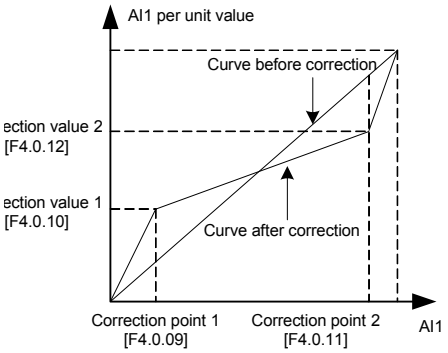


Figure 7-34 Curve correction of analog input AI1

F4.1.17 AI3 Hysteresis Band Dead Zone /Standard Expansion Card	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 7-34. It should be set as 0 when applied as unipolar signal.

F4.1.18~F4.1.21 Analog Input AI3 Curve Correct Point/Value 1~2/ Standard Expansion Card	—	—

The parameters are used for making nonlinear correcting to analog input values according to the needs. The way of correcting analog input AI3 curve is similar to the way of analog input AI1. Please refer to the correcting curve as Figure 7-34..

7.18 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 Max 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 Limiting Value	**Setting range: 0.0~[F4.2.27]**	**Factory default: 0.0**
F4.2.27 AO1 Upper Limiting Value	**Setting range: [F4.2.26]~100.0%**	**Factory default: 100.0**
F4.2.32 AO2 Lower Limiting Value /Standard Expansion Card	**Setting range: 0.0~[F4.2.33]**	**Factory default: 0.0**
F4.2.33 AO2 Upper Limiting Value /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**.

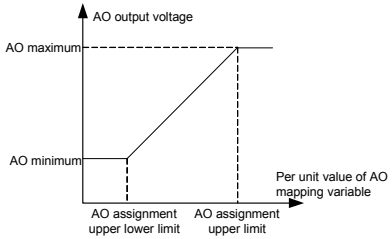


Figure 7-35 AO output characteristic curves

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 Fixed Output Value	**Setting range: 0.00~20.00mA (0.00~10.00V)**	**Factory default: 0.0**
F4.2.35 AO2 Fixed Output Value /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 (**F4.2.22, 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.

7.19 ANALOG INPUT POWER FAILURE 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 power failure action.

F4.3.39 AI1 Power Failure Detection Response	**Setting range: 0~4**	**Factory default: 0**
F4.3.43 AI2 Power Failure Detection Response	**Setting range: 0~4**	**Factory default: 0**
F4.3.48 AI3 Power Failure Detection Response	**Setting range: 0~4**	**Factory default: 0**

Define corresponding actions after frequency inverter detects analog input power failure.

0: No action (for non-stop alarm)

When detecting analog input power failure, if the frequency inverter operates normally, it only reports **aL.036-aL.038** warning signal. If the power failure fault is cleared, the warning signal can be cleared automatically.

1: Forcedly set to the minimum

When detecting analog input power failure, 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 power failure 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 power failure, 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 power failure 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 power failure, 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 power failure 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 power failure, it reports **aL.036~aL.038** fault signal and lock output, and load motor freely sliding down. If the power failure fault is cleared, fault signal shall be cleared with hand-reset.

7.20 SKIPPING FREQUENCY (GROUP F5.0)

Skipping 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 skipping frequency near some frequency point as the method in the figure below, with 3 skipping ranges defined at most.

After skipping 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 skipping range of this skipping frequency.

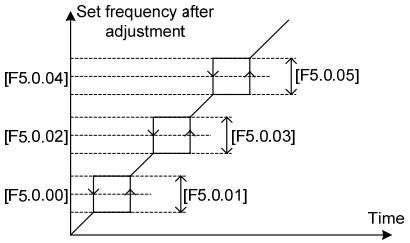


Figure 7-36 Schematic diagram of skipping frequency output

7.21 BUILT-IN AUXILIARY TIMER (GROUP F5.1)

This group of parameters is mainly instructed by taking example of timer 1.

7.21.1 BASIC FUNCTIONS OF THE TIMER

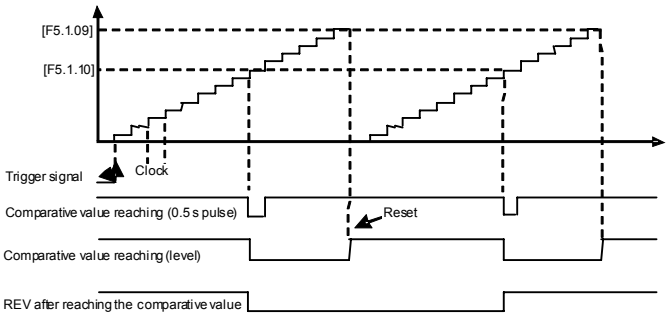


Figure 7-37-A
Schematic diagram of comparison value of timer 1 reaching for the basic function (F5.1.06=11_ 1)

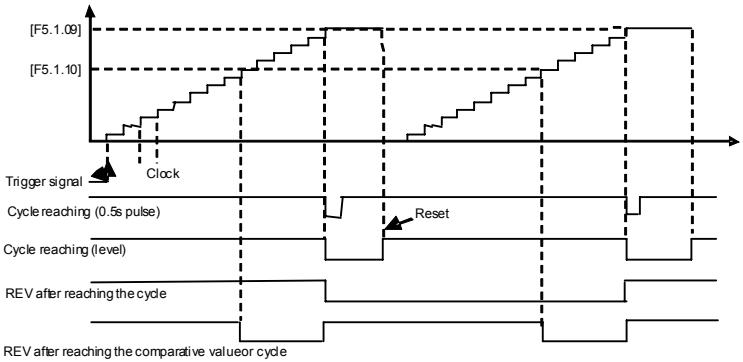


Figure 7-41-B

Schematic diagram of comparison value of timer 1 reaching for the basic function (F5.1.06=11_ 1)

7.21.2 TRIGGER AND GATE CONTROL FUNCTION SETTING OF TIMER

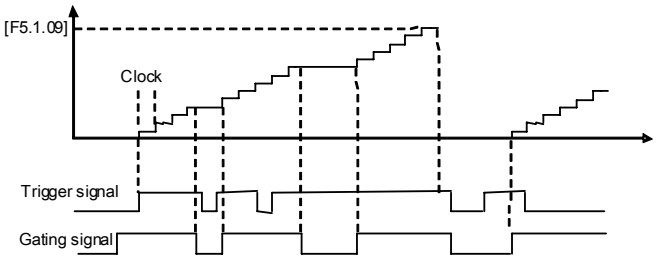


Figure 7-37-C

Starting trigger and gate control signal function of timer 1 (UT1) (F5.1.06=1111; F5.1.15=0001)

7.21.3 CLOCK CONCATENATION FUNCTION SETTING OF TIMER

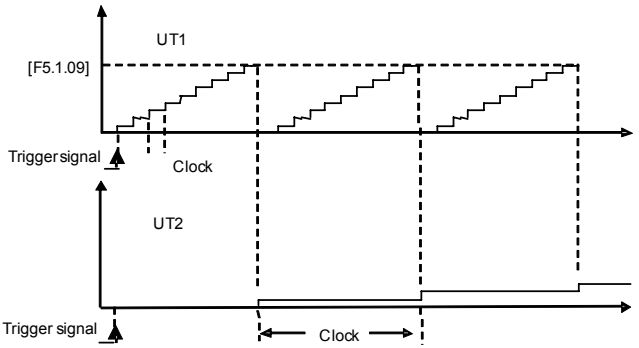


Figure 7-37-D Pulse concatenation function of timer 1(UT1) (F5.1.06=11_ 1; F5.1.07=_ _ __3)

7.21.4 CONCATENATION TRIGGERS FUNCTION SETTING OF TIMER

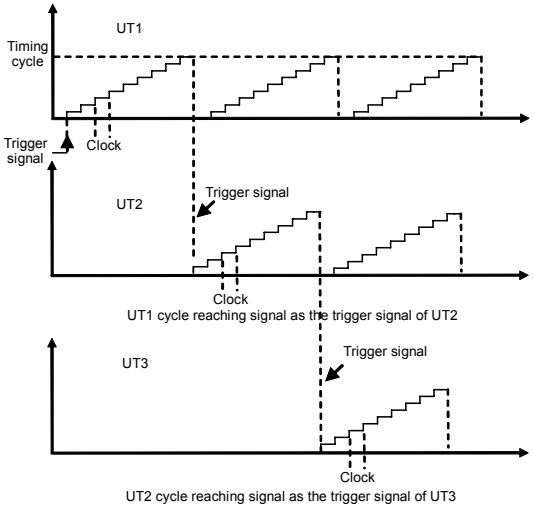


Figure 7-37-E Concatenation triggers function setting of timer (UT1, UT2, and UT3)

7.22 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 overflow.

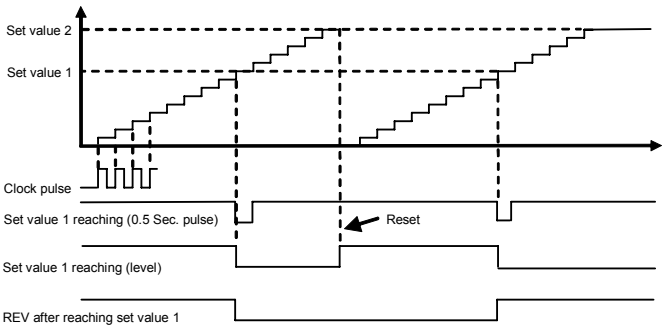


Figure 7-38-A Counter function 1

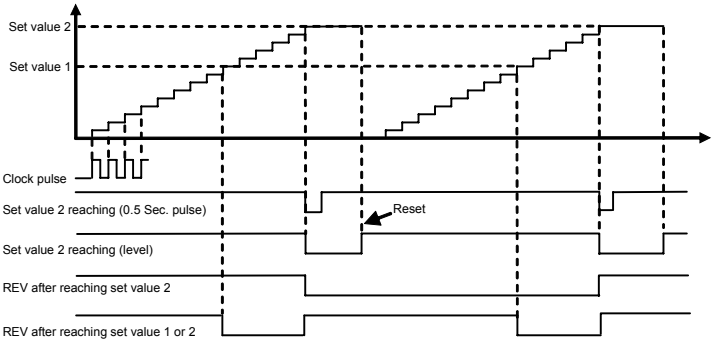


Figure 7-38-B Counter function 2

7.23 AUXILIARY FUNCTIONS (GROUP F5.3)

F5.3.28 Priority selection of frequency (revolution) command source(H)	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 7-15 Frequency Setting Order of V220 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 ↑
5	Swing frequency Operating frequency	
6	Revolving speed setting channel (**F8.0.00**)	
7	Automatic multiple frequency operating order	
8	Multiple operating frequency of external terminal selection	low
9	Frequency setting channel (**F0.2.25**)	Lowest priority

F5.3.29 Lower limiting frequency action mode	Setting range: 0, 1	Factory default: 0

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

F5.3.30 Automatic voltage regulation (only effective in VVV 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 fluctuates 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 Auto 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.

F5.3.32 Magnetic flux brake	**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.

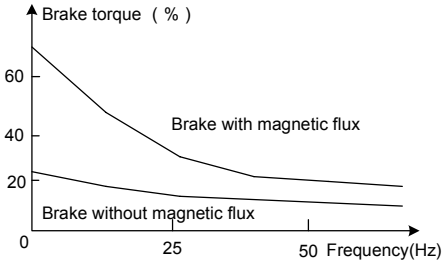


Figure 7-39 Magnetic flow braking curve

F5.3.33 Magnetic flux braking strength(braking excitation current)	**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: 710**

These two parameters is valid to frequency inverters with built-in braking unit (15KW 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.

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.

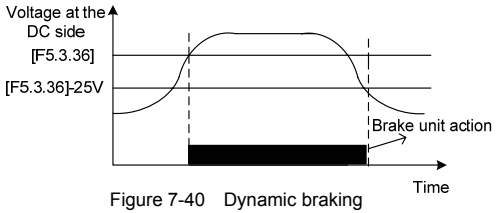


Figure 7-40 Dynamic braking

F5.3.37 Vibration suppression coefficient (only valid under V/F control mode)	**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 dynamic balance function	**Setting range: 0, 1, 2**	**Factory default: 0**
F5.3.39 Reference source for dynamic balance load	**Setting range: 0 ~ 4**	**Factory default: 0**
F5.3.40 Reference value for dynamic balance load	**Setting range: 0.0~200.0%**	**Factory default: 100.0**
F5.3.41 Dynamic balance adjustment gain	**Setting range: 0.0 ~ 100.00**	**Factory default: 50.00**
F5.3.42 Dynamic balance 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).

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.

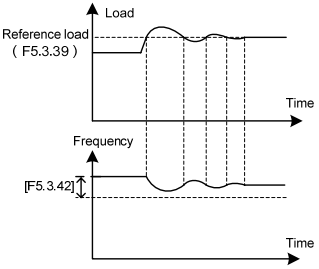


Figure 7-41 Sketch of load dynamic balance function

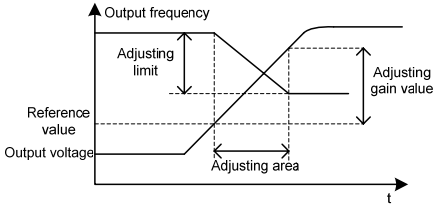


Figure 7-42 Sketches of dynamic balance variables

7.24 MULTI-STAGE FREQUENCY SETTING (GROUP F6.0)

F6.0.00~ F6.0.14 Opening frequency 1st~15th	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 7-43-A shown.

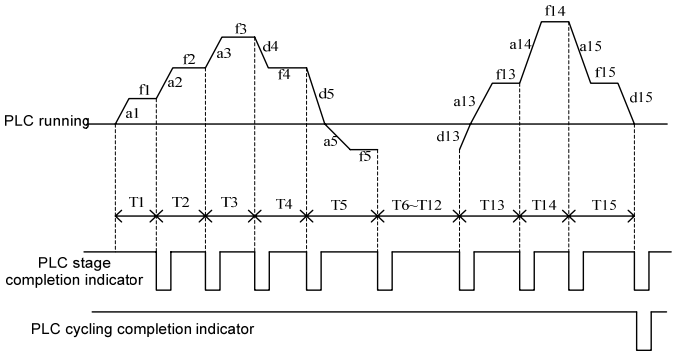


Figure 7-43-A Simple PLC operation

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**.

7.25 SIMPLE PROGRAMMABLE MULTI-STEP RUNNING (GROUP F6.1)

F6.1.15 Programmable multi-stage mode(H)	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 7-43-B.

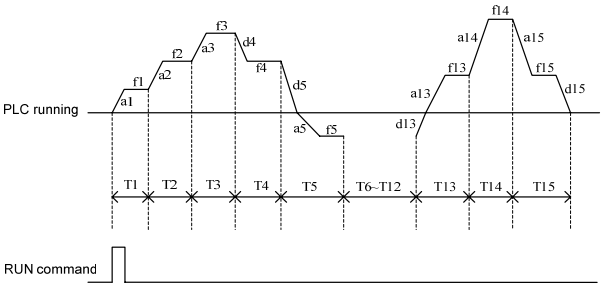


Figure 7-43-B Simple PIC operation single cycle mode

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.

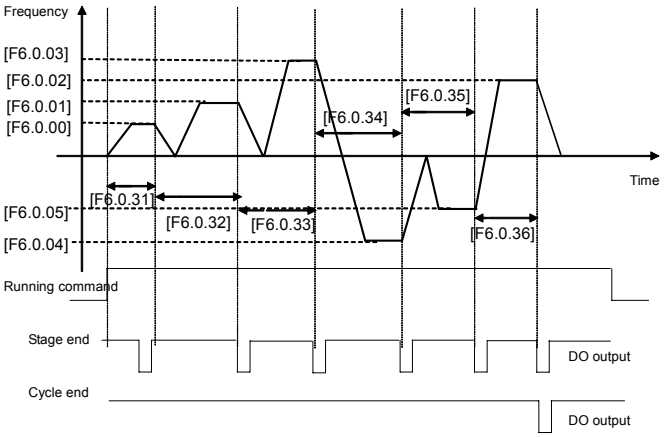


Figure 7-43-C Single cycle stop mode of simple PIC operation

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.

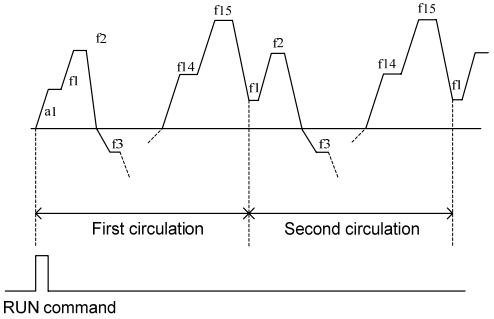


Figure 7-43-D Continuous cycling mode of simple PLC operation

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.

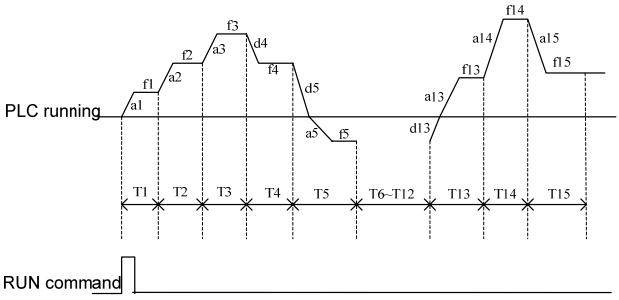


Figure 7-43-E Simple PLC operation keeping the final value mode

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 7-44.

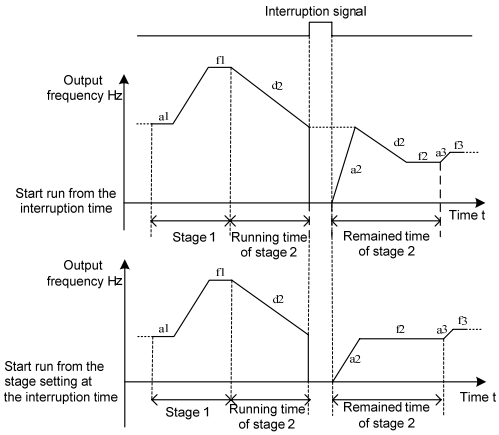


Figure 7-44 Breakpoint recovery sketch

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 come 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.

F6.1.16~F6.1.30 Setting of stage 1~15	Setting range: 0000~1321	Factory default: 0000

_ _ _ X: 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 (F0.2.25)/Process PID setting (F7.0.01)

Stage operation frequency set values should be set by frequency command **(F0.2.25)**/Process **PID** setting **(F7.0.01)**.

7.26 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.

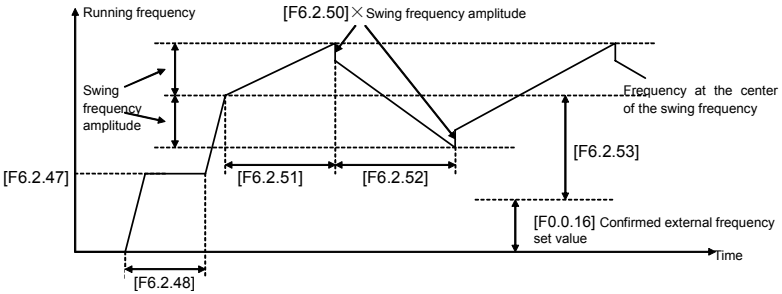


Figure 7-45 Swing frequency operation sketch

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 Swing frequency preset frequency	**Setting range: 0.00~[F0.1.21]**	**Factory default: 10.00**
F6.2.48 Preset frequency waiting time	**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 **F0.2.25**)

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 Triangular wave rising time	**Setting range: 0.1~1000.0Sec.**	**Factory default: 10.0**
F6.2.52 Triangular wave decreasing time	**Setting range: 0.1~1000.0Sec.**	**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 Frequency setting in the center of the swing frequency	**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] + [F0.2.25]** certain set frequency

Refer to the following figure for the structure of Process PID and functions of each functional parameter:

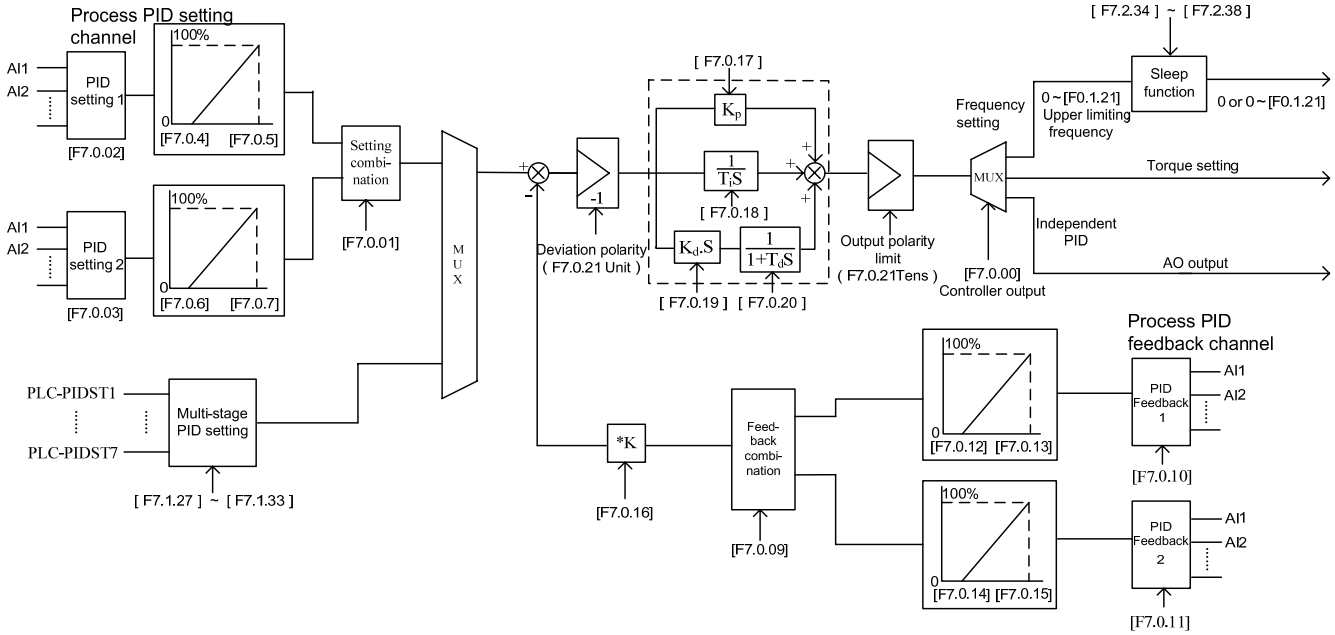


Figure 7-46 Schematic block of process PID control

7.27 PROCESS PID (4MS CONTROL CYCLE) (GROUP F7.0)

F7.0.04 Analog input quantity corresponding to 0% setting (Channel 1)	**Setting range: 0.0V~[F7.0.05]/ AI2: 0.0mA~[F7.0.05]**	**Factory default: 0.0**
F7.0.05 Analog input quantity corresponding to 100% setting (Channel 1)	**Setting range: [F7.0.04] ~10.00 /AI2: [F7.0.04] ~20.00mA**	**Factory default: 10.00**
F7.0.06 Analog input quantity corresponding to 0% setting (Channel 2)	**Setting range: 0.0V~[F7.0.07]/ AI2:0.0mA~[F7.0.07]**	**Factory default: 0.0**
F7.0.07 Analog input quantity corresponding to 100% setting (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 7-47.

F7.0.12 Analog feedback quantity corresponding to 0% feedback (feedback channel 1)	**Setting range: 0.0~[F7.0.13]/ AI2: 0.0mA~[F7.0.13]**	**Factory default: 0.0**
F7.0.13 Analog feedback quantity corresponding to 100% feedback (feedback channel 1)	**Setting range: [F7.0.12]~10.00V/ AI2:[F7.0.12] ~20.00mA**	**Factory default: 5.00**
F7.0.14 Analog feedback quantity corresponding to 0% feedback (feedback channel 2)	**Setting range: 0.0~[F7.0.15]/ AI2: 0.0mA~[F7.0.15]**	**Factory default: 0.0**
F7.0.15 Analog feedback quantity corresponding to 100% feedback (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 7-48.

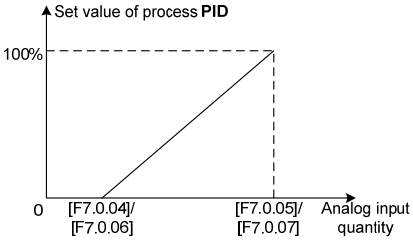


Figure 7-47 Sketch of definition of set value of process PID

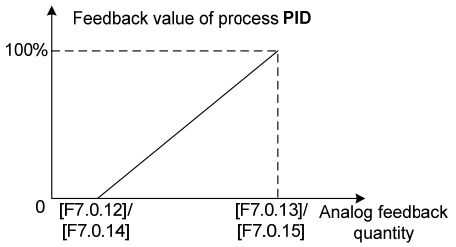


Figure 7-48 Sketch of corresponding relationship of feedback value of process PID

F7.0.16 Feedback multiplication factor (e.g. flow calculation with differential pressure)	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 coefficient	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.

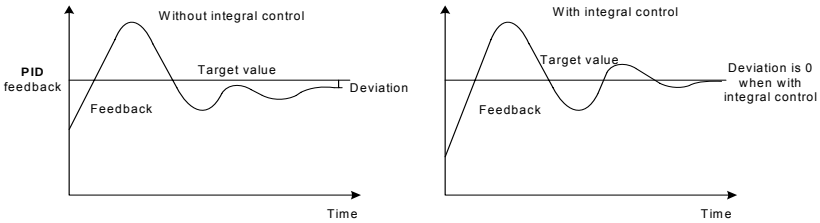


Figure 7-49 Function of integral control

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 smooth, generally, its set in proportion to the inertia of system.

F7.0.21 PID controller characteristics configuration(H)	Setting range: 0000~0111	Factory default:0000

The unit: Deviation 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.

Tens digit: 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 7-50-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 7-50-A and Figure 7-50-B.

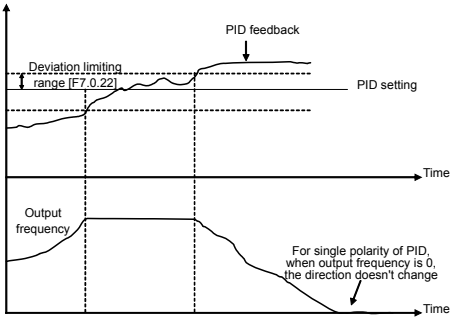


Figure 7-50-A Single polarity of PID control mode

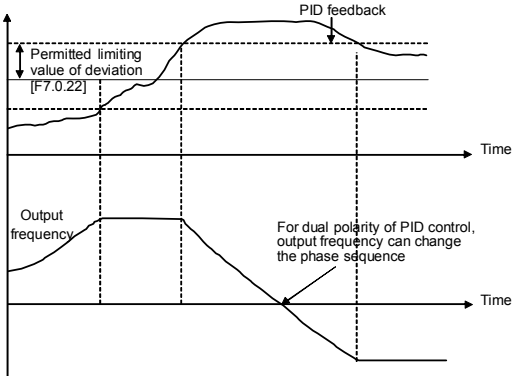


Figure 7-50-B Dual d polarity of PID control mode

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.

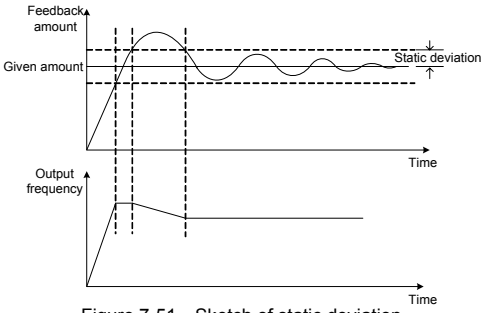


Figure 7-51 Sketch of static deviation

F7.0.23 PID output preset(relative to upper limiting frequency when outputting frequency)	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]**.

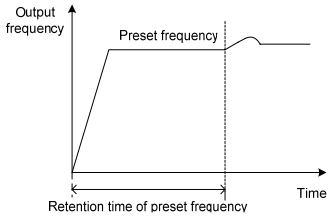


Figure 7-52 Sketch of closed-loop frequency operation

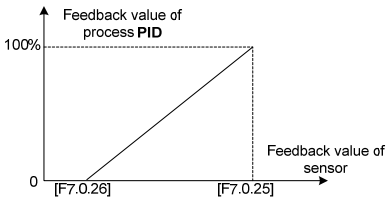


Figure 7-53 Relationship curves of feedback percentage and preset corresponding sensor value

F7.0.25 Sensor value when actual value is 100%	Setting range: 0.01~100.00	Factory default: 1.00
F7.0.26 Sensor value when actual value is 0%	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 7-53.

7.28 PROCESS PID MULTI-STAGE SETTING (GROUP F7.1)

F7.1.27~F7.1.33 Process PID preset setting 1~7	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**.

7.29 PROCESS PID SLEEPING FUNCTION (GROUP F7.2)

This function is valid when **PID** output conducts frequency order; Sketch is shown as below:

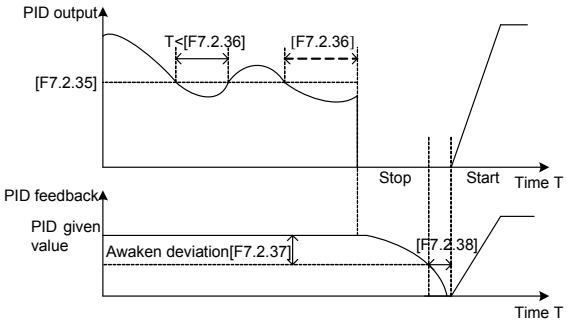


Figure 7-54 Sketch of PID sleeping function

- Set value of awakens deviation is the relevant percentage of PID given value.

7.30 REVOLUTION SETTING AND FEEDBACK (GROUP F8.0)

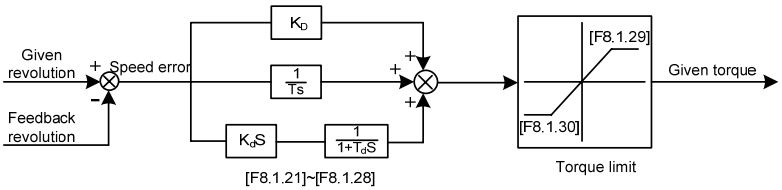


Figure 7-55 Closed-Loop Block Diagram of Revolution

This group of parameter is valid with **VC** and **SVC** modes.

F8.0.00 Revolution setting channel (only for VC and SVC modes)	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 (F0.2.25)

Revolution set value is obtained from transition of frequency set value selected by **F0.2.25**: revolution setting=frequency set value*__60__/ pairs of motor polarity

1: Digital setting (F8.0.03) (power failure storage when stop)

Value of **F8.0.03** is set as revolution set value, automatically preserved when outage.

2: Panel shuttle potentiometer setting

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 Field bus set value 1

8: MODBUS Field bus set value 2

9: Virtual analog input SAI1

10: Virtual analog inputSAI2

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 Minimum set signal corresponding revolution	Setting range: 0~60*[F0.1.21]/ pairs of motor poles (rpm)	Factory default: 0
F8.0.02 Maximum set signal corresponding revolution upper limiting frequency restrict)	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.

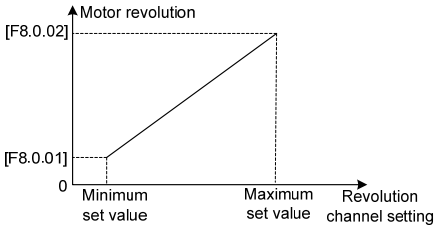


Figure 7-56 Corresponding relation of revolution set value and motor revolution

F8.0.06 PG rotation direction(PG card effective)	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** faults 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** (default parameter) of revolution closed-loop regulator and enlarge integral time constants **F8.1.22, F8.1.26** (default parameter) moderately.

F8.0.11 Missing detection and action of speed detection signal	Setting range: 0.01~5.00Sec.	Factory default:2.00
F8.0.12 Wire breakage zero speed signal level (relative to the largest set 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 Speed measuring loop wire breakage detection flexibility(relative to the largest set speed)	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 Detection revolution filtering time coefficient	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 The minimum revolution corresponding to the feedback signal (not PG)	Setting range: 0~30000rpm	Factory default: 0

F8.0.16 Corresponding revolution of the largest feedback signal (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.

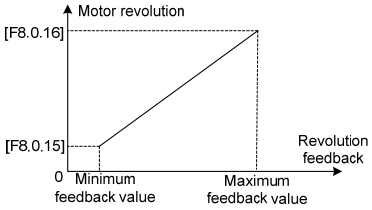


Figure 7-57 Corresponding relation of revolution feedback value and motor revolution

7.31 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)

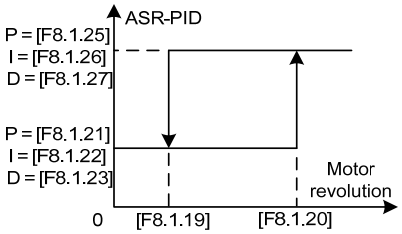


Figure 7-58-A Double PID parameter (hysteresis switching)

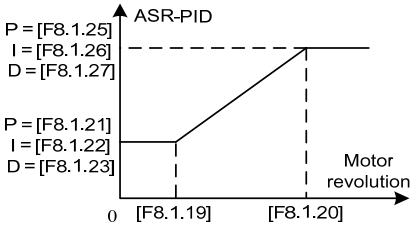


Figure 7-58-B Double PID parameter (continuous switching)

F8.1.19 PID parameter switching lower limiting revolution(effective with lower volution of group ASR1 parameter)	Setting range: 0~[F8.1.20]	Factory default: 100
F8.1.20 PID parameter switching upper limiting revolution(effective with low revolution of group ASR1 parameter)	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: 0.05~1.00**	**Factory default: 0.75**
F8.1.22 Integral time 1 (ASR-I1)	**Setting range: 0.0，0.01~50.00Sec.**	**Factory default: 0.50**
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: 0.10~5.00 Sec.**	**Factory default: 1.00**
F8.1.25 Proportional gain 2 (ASR-P2)	**Setting range: 0.05~1.00**	**Factory default: 0.50**
F8.1.26 Integral time 2 (ASR-I2)	**Setting range: 0.0，0.01~50.00Sec.**	**Factory default: 2.00**
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: 0.10~10.00Sec.**	**Factory default: 1.00**

The parameters are applied to adjust proportional gain of speed adjuster, integral and differential time. Each parameter should be set as following:

- 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.
- 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.
- 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.
- 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 Adjustor output upper limit amplitude (limit of transient positive torque)	**Setting range: 0.0~250.0%**	**Factory default: 200.0**
F8.1.30 Adjuster output lower limit amplitude (limit of transient negative torque)	**Setting range: -250.0~0.0%**	**Factory default: -200.0**

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.

7.32 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 **Fu.018** protection of overlarge deviation of rotating speed (**DEV**) or **Fu.019** over-speed fault (**OS**), while electric motor freely coasts to stop .

2: Alarm deceleration stop

Inverter slows down to stop according to effective time of deceleration, and reports **Fu.018** protection of overlarge deviation of rotating speed **(DEV)** or **Fu.019** over-speed fault (**OS**).

3: Alarm continuing running

Inverter keeps on running, whereas **Fu.018** reports overlarge deviation of rotating speed (**DEV**) or **Fu.019** over-speed (**OS**) warning.

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]**.

7.33 TORQUE CONTROL (GROUP F8.3)

F8.3.40 Selection of torque command channel (selecting the command direction)	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 **0~300%** of rated torque.

3: Analog input AI2

AI2 input current value of **4~20mA** is corresponding to **0~300%** of rated torque.

4: Analog input AI3

AI3 input voltage value of **-10~10V** are corresponding to **0~300%** of rated torque.

5: Analog input AI3 (bipolarity)

AI3 input voltage value of **-10~10V** is corresponding to **-300%~300%** 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 **300%** 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: Reserved

Default as **0** torque setting.

9: MODBUS Field bus set value 1

Current torque instruction of inverter is set by principal computer through built-in standard **RS485** communication interface of inverter. It is the relative value of the largest setting torque.

10: MODBUS Field bus set value 2

Current torque instruction of inverter is set by principal computer through built-in standard **RS485** communication interface of inverter. It is the absolute value of torque's setting percentage.

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. 34 MODBUS FIELD BUS (STANDARD EXPANSION CARD CONFIGURATION) (GROUP FA.0)

FA.0.02 Equipment 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 Judging time of Communication failure	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. 35 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 **V220** series inverter makes access to functional parameters or monitoring parameters via the buss, corresponding address can be predicted directly with the functional code（*Refer to Chapter 10. Description of Communication Protocol*）.

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 BUS control parameters address of **V220** 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.
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 0x1309 ~ 0x130D.

7. 36 COMMUNICATION LINKAGE SYNCHRONOUS CONTROL (GROUP FA.2)

FA.2.26 Coupling proportional adjustment	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 proportional 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 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 *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 offset frequency /revolution speed	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: 0~3	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 conduct fine adjustment to the output of local device so as to keep consistency with the master device's torque.

3: Power balance

With reference to the power 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 torque.

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.

7.37 ZERO-SPEED TORQUE AND POSITION CONTROL (GROUP FB.2)

Fb.2.18 Automatic step switching frequency	Setting range: 0~5.00Hz	Factory default: 1.00
Fb.2.19 Automatic step switching cycle holding	Setting Range: 0.10~2.00Sec	Factory default: 0.30

Cooperating with multi-functional terminal (Function **No.67**), it is the machinery shifting dedicated function of transmission machinery (e.g. the spindle drive). This parameter is used for setting operation frequency and **FWD/REV** switching cycles when the function is effective.

Fb.2.20 Torque at 0 Hz (DC band-type brake preferred)	Setting range: 0~3	Factory default: 0

This parameter is used for setting equipments' band-type brake at zero speed. When setting as 1, it has the same effect on DC action, and the electromagnetic band-type brake cannot guarantee that the motor shaft is absolutely not rotate when it is dragged by the load.

In the PG feedback VC control mode, it is set as 2. The equipment will output zero-speed torque by the way of position locking, so as to guarantee that the shaft will not rotate even under the load dragging.

Fb. 2.21 Position locking gain	Setting range: 0.10~100.00	Factory default: 1.00

This parameter is used for setting motor output torque and revolution deviation gain when zero frequency torque keeps setting as 2. Higher the value is higher the zero speed torque is. Overlarge value may lead to zero speed oscillation.

7. 38 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: 0~62	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 Terminals **(DI/EDI/SDI)** for functions corresponding to the set value.

FF.0.17 Virtual output - input connection polarity(H)	Setting range: 0000~1111	Factory default: 0000
FF.0.18 Virtual output - input connection polarity(H)	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 7-59.

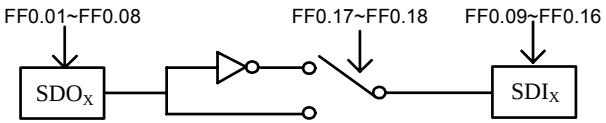


Figure 7-59 Block diagram of virtual output – input

7.39 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.

7.40 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 adjustment	**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 offset adjustment for AI2	**Setting range: -0.500~0.500mA**	**Factory default: 0.0**
FF.2.28 AI2 gain adjustment	**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 adjustment	**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 adjustment	**Setting range: 0.950~1.050**	**Factory default: 1.000**
FF.2.33 AO2zero offset adjustment	**Setting range:-0.500~0.500V**	**Factory default: 0.0**
FF.2.34 AO2 gain adjustment	**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.

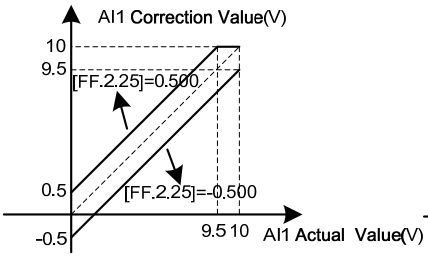


Figure 7-60-A
AI1 zero offset correction curve

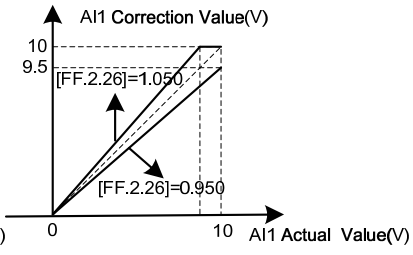


Figure 7-60-B
AI1 gain correction curve

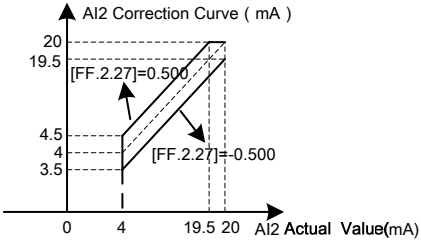


Figure 7-61-A
AI2 zero offset correction curve

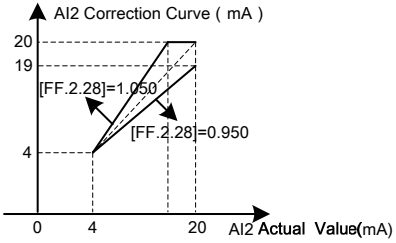


Figure 7-61-B
AI2 gain correction curve

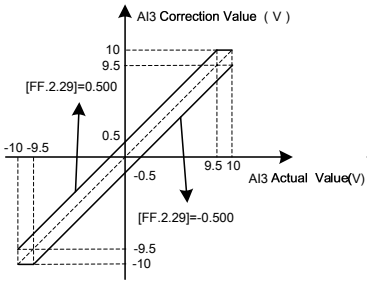


Figure 7-62-A
AI3 zero offset correction curve

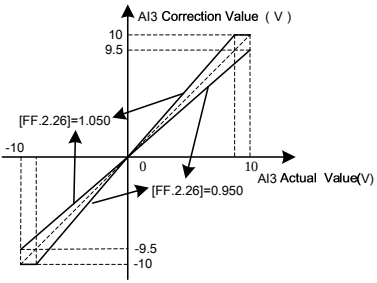


Figure 7-62-B
AI3 gain correction curve

FF.2.35 Undervoltage protection level	Setting range: 320~450V	Factory default: 380V

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. 41 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. 42 OTHER CONFIGURATION PARAMETERS (GROUP FF.4)

FF.4.41 Cooling fan control (H)	Setting range: 0000~0111	Factory default: 0101

_ _ _ X: Soft start function

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

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 tens 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 Keypad control running options (H)	Setting range: 0000~2001	Factory default: 0000

X _ _ _: Panel control selection (except STOP key)

0: Standard panel interface control (can be connected via RS485)

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 standard panel is only used for monitoring)

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 (H)	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 and current control periods, but the running of motor has bigger vibration.

_ X _ _: Small pulse shielding

0: Void

1: Effective

X _ _ _: SVC Revolution identification mode

0: Open-loop current mode

1: Reserved

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 eliminated 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

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. Upon a transient stop, restart the rotating motor. 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. Set the starting/stopping mode ([F0.4.38]) as rotating speed tracking restarting mode. 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. Upon a transient stop, restart the rotating motor.(during starting up periods) 6. The three-phase output line of the frequency inverter has interphase short circuit or short circuit to ground. 7. The encoder is disconnected during high speed running of closed-loop vector.	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. Set the starting/stopping mode ([F0.4.38]) as rotating speed tracking restarting mode. 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. Set the starting/stopping mode ([F0.4.38]) as rotating speed tracking restarting mode.

Fault code	Fault description	Possible causes	Solutions
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.
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.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. 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	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

Fault code	Fault description	Possible causes	Solutions
Fu.017	External equipment is faulty or the panel has forced stoppage	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 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. Adjust the phase sequence of U, V, W.
Fu.021	Actuation fault of major loop contactor	The contacts of major loop contactor are bad connected.	Change the major loop contactor
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.036 Fu.037 Fu.038	AI1 input is disconnected AI2 input is disconnected AI3 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. 2. Parameters related to disconnection detection are configured improperly.	1. Inspect the wiring of pulse input signal and analog input signal source 2. Modify the configuration parameters
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.	1. Inspect the connection of speed measuring module 2. Seek for manufacturer's support

Fault code	Fault description	Possible causes	Solutions
		4. Relevant function codes are set improperly.	
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	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	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	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.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.072	The connection of accessories is abnormal		
Fu.201	Conflicting parameter setting		Please contact the direct supplier
Fu.301 ~ Fu.311	Control panel is faulty		Seek for manufacturer's support

8.2 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		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
aL.036 aL.037 aL.038	AI1 input is disconnected AI2 input is disconnected AI3 input is disconnected		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)		
aL.040	The rotating speed detecting loop is disconnected		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.054	The temperature sensor is faulty	Can be shielded	Replace the temperature sensor
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		

Display	Warnings	Can be shielded or not	Solutions other than shielding
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		
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.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

9. MAINTENANCE

Many factors such as temperature, humidity, dust and vibration of the use environment, and internal components aging, wear of frequency inverter, which may lead to hidden fault of frequency inverter. In order to ensure the frequency inverter of long and steady operation, its maintenance is required in the storage and the process of use.

After long-distance transportation of the frequency inverter, users should check whether the components are in good condition, or the screws are fastened before use them. During the normal use period, users shall regularly clean the internal dust of frequency inverter and check whether the screws are loose.

Due to the high voltage of frequency inverter in service, the wrong operation can result in serious injury or death, therefore, the power supply of the frequency inverter shall be cut off, and the maintenance operation after ten minutes after the nixie tube of the frequency inverter panel extinguishing can be carried out.

9.1 ROUTINE MAINTENANCE

Through routine maintenance, all kinds of abnormal condition and abnormal cause can be found promptly, and the faults and hidden dangers can be eliminated as soon as possible. Thus, the normal operation of equipment can be guaranteed and also the service life of the frequency inverter can be prolonged. Refer to the following table for routine maintenance.

Object checked	Inspection cycle		Scope of inspection	Assessment criterion
	Irregularly	Regularly		
Operation environment	√		1. Humidity, temperature 2. Dust, moisture 3. Gas	1. Open the frequency inverter when the temperature is above 45℃, keep humidity below 95%, without frost deposit 2. Free from peculiar odor, inflammable and explosive gas
Cooling system		√	1. Installation environment 2. Frequency inverter fan	1. The installation environment shall be well ventilated and the duct has no block 2. Fan is in well operation and without abnormal noise
Frequency inverter	√		1. Vibration, temperature rise 2. Noise 3. Wire, terminal	1. Vibration is smooth and outlet temperature is normal 2. No abnormal noise and no peculiar smell 3. No loose for fastening screw
Generator	√		1.Vibration, temperature rise 2. Noise	1. Smooth operation and normal temperature 2. No abnormalities and inconsistent noise
Input and output parameter	√		1. Input voltage 2. Output current	1. The input voltage is in the specified scope 2. Output current is under the rated value

9.2 INSPECTION AND DISPLACEMENT OF THE VULNERABLE COMPONENTS

During operation, some components of frequency inverter may wear or the performance is slowed down. In order to ensure the stable reliable operation of frequency inverter, the users shall carry out preventative maintenance for frequency inverter, and replace the components when necessary.

9.2.1 FILTER CAPACITOR

Possible cause of damage: Environmental temperature and the pulsating current are high, and electrolyte is aging.

Assessment criterion: When frequency inverter operate with load, uses check whether there occur fault such as over current, over voltage; whether liquid leaks out, whether the relief valve bulge; whether the determination of electrostatic capacitive and insulation resistance are abnormal.

The pulsating current of main loop would affect the performance of the aluminum electrolysis filter capacitor, and the degree of influence depends on the environment temperature and the using conditions. Replace electrolytic capacitors of frequency inverter every three to four years under normal conditions.

Filter capacitor shall be replaced immediately if any of the following occurs: electrolyte of the electrolyte capacitor leaks, relief valve emits out, and subject of the capacitor expands.

9.2.2 COOLING FAN

Possible cause of damage: Bearing wear, leaf aging.

Assessment criterion: When the power of frequency inverter is cut out, check the fan blades and other parts to see whether there is any abnormality such as crack. With the power on, just check whether the fan operation situation is normal, and whether it has abnormal vibration and noise.

Service life of the entire cooling fan in frequency converter is about 15000 hours (i.e. frequency inverter use continuously for about two years), if the fan has unusual voice or vibration, it should be replaced immediately.

9.3 STORAGE

After purchase the frequency inverter, if the frequency inverter will be spared for a while or stored for a long time, users shall pay attention to the following items:

- Storage environment should comply with the following table:

<table>
<tr><th>Environmental characteristics</th><th>Requirements</th><th>Remarks</th></tr>
<tr><td>Ambient temperature</td><td>-10°C to 45°C</td><td>Long-term storage temperature is no more than 45 °C, so as to avoid the degradation of capacitance characteristics. It shall avoid condensation and frozen environment caused by sudden change of temperature.</td></tr>
<tr><td>Relative humidity</td><td>5 to 95%</td><td rowspan="2">It can adopt measurement like plastic film sealing and desiccant.</td></tr>
<tr><td>Storage environment</td><td>Free from direct sunlight, no dust, no corrosive, no combustible gas, no oil, no steam, no gas, no drip, no vibration, and with little salt</td></tr>
</table>

- If the frequency inverter is not in use for a long time, the current shall be applied to restore filter capacitor characteristics every half year, and at the same time other features of the frequency converter shall also be checked. When the current is applied, it shall increase the voltage gradually through autotransformer, and the conduction time should be above half an hour.

9.4 WARRANTY

If the frequency inverter body has the following cases, the company will provide guarantee service:

1) If failures or damages occur in normal use within the warranty period (within 18 months from the date of purchase), our company will provide free maintenance. Our company will charge a reasonable cost of maintenance in case of more than 18 months above.

2) Even in the guarantee period, if any failure is caused by the following cases, our company will charge some of the maintenance cost:

   - Malfunction due to that the users do not operate according to the operation manual or beyond the standard;
   - Malfunction due to repair and modification without permission;
   - Malfunction caused by poor preservation;
   - Malfunction caused by improper use;
   - Damage to the machine due to fire, corrosive salt, gas corrosion, earthquake, storms, floods, thunder, abnormal voltage or other force majeure.

3) The company will provide lifelong paid maintenance services even the warranty period expires.

10. DESCRIPTION OF COMMUNICATION PROTOCOL

10.1 PROTOCOL OVERVIEW

MODBUS protocol is a universal protocol used in the industrial control unit. Because this protocol can be conveniently applied, this protocol has been considered as the general industry standard and is widely applied to the integrated system of master controllers and slave units. By applying this protocol, units of various brands can be connected together and functioning as an industrial network.

MODBUS defines 3 types of transmission modes: ASCII, RTU and TCP. V220 Frequency inverter only supports RTU mode.

10.2 INTERFACE AND TRANSMISSION METHOD

V220 utilizes RS485 (RS232, optional, which has to be converted by a level) as the physical interface for Modbus, and one host can control one or more (maximum 247 units) frequency inverters.

Terminal Identifier	Terminal Usage	Function
RS+	Data Transceiving Terminal(+)	When connected to PC/PLC via RS 485 communication interface, connect to (+) signal
RS-	Data Transceiving Terminal(-)	When connected to PC/PLC via RS 485 communication interface, connect to (-) signal

By applying the asynchronous serial half-duplex transmission method, only master unit or slave unit can transmit data at one particular moment, and the other unit can only receive data.

10.3 DATA STRUCTURE

- 4 Optional Data Transmission Formats
  - 1 start bit, 8 data bits, 1 stop bit, without parity bit (factory setting)
  - 1 start bit, 8 data bits, 1 stop bit, even parity
  - 1 start bit, 8 data bits, 1 stop bit, odd parity
  - 1 start bit, 8 data bits, 2 stop bit, without parity bit
- Baud rate

Seven optional baud rates: 1200bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400bps, 79600 bps

- Communication rules

Starting interval between data frames is longer than 3.5 byte transmission cycle (standard), but the minimum interval should not be shorter than 0.5 ms.

10.4 PARAMETER CONFIGURATION FOR INVERTERS

FA.0.00 is a read-only parameter, and is used to display the status of the communication card connection and bus;

FA.0.01 = 00XX, unit digit is used to choose baud rate, and tens digit is used to choose data format;

FA.0.02 = X, choose the address of this station;

FA.0.03~ FA.0.06, configure supporting communication parameters; refer to functional parameter table for detailed functions.

- X indicates that this digit can be any value in the allowed range.

10.5 BRIEF INTRODUCTION OF FUNCTIONS

The Modbus functional codes supported by V220 are listed below:

Function	Code (Hexadecimal)	Description of Functions
Read coil status	0x01	Read coil status by digit. Each digit for the controlling character is mapped to coil 1~15 respectively.
Read discrete input status	0x02	Read discrete input status. Each digit for the status character is mapped to coil 1~15 respectively.
Read multiple hold registers	0x03	Read multiple hold registers. It can read all the application parameters, status parameters, controlling characters, status characters and setting values of V220.
Read multiple input registers	0x04	Read multiple input registers. The address for analog input register starts from 0x1200.
Enforce single coil	0x05	Perform writing action for a single output digit. Each digit for the controlling character is mapped to coil 1~16 respectively.
Write to a single hold register	0x06	Perform writing action for a single hold register. All the parameters, controlling characters, status characters and setting values of V220 are mapped to the hold register.
Query for the anomaly status	0x07	Query for the anomaly status information. In V220, the failure information of the frequency inverter can be queried.
Failure diagnosis	0x08	Execute field diagnosis for the bus failure. Support the sub-codes, like querying (0x00), rebooting (0x01), monitoring (0x04) and zero-clearing(0x0A) etc.
Enforce multiple coils	0x0F	Perform writing action for multiple output digits respectively. Each digit for the controlling character is mapped to coil 1~16 respectively.
Write to multiple hold registers	0x10	Perform writing action for multiple hold registers. All the parameters, controlling characters, status characters and setting values of V220 are also mapped to the hold register.
Read/write to multiple hold registers	0x17	This function equals to combining 0x03 and 0x10 into a new command.

10.6 ACCESS ADDRESS SUMMARY

V220	Access Address	Functional Codes Supported (Hexadecimal)
Controlling digit Multi-purpose terminal output Relay output	Coil (0x1000-0x1100)	0x01- Read coil status 0x05- Enforce single coil 0x0F- Enforce multiple coils
Multi-purpose terminal input for status digit	Discrete input (0x1100-0x1200)	0x02- Read input status
Analog input	Input register (0x1200-0x1300)	0x04- Read input register
Application parameters Status parameters Controlling characters, Status characters Setting values Mapping status parameters Mapping application parameters	Hold registers (application parameter area, status parameter area, 0x1300-0x1400)	0x03- Read multiple registers 0x06- Write to a single register 0x10- Write to multiple registers 0x17- Read/write to multiple registers

For detailed address distribution, please refer to below section of Modbus detailed address-finding distribution.

10.7 DETAILED MODBUS ADDRESS-FINDING DISTRIBUTION

1) Coil Address Summary (0x1000-0x1100)

Relevant Modbus functional codes：**0x01 (read), 0x05 (single coil write), 0x0F (multiple coils write)**

Register name	Function Description	Access Address
Controlling digit – digit 0	Keep	0x1000
Controlling digit – digit 1	Operation Allowed 0: Operation banned 1: Operation allowed	0x1001
Controlling digit – digit 2	Starting allowed 0: Starting banned 1: Starting allowed	0x1002
Controlling digit – digit 3	Keep	0x1003
Controlling digit – digit 4	Operation instruction 0: Stop 1: Operation	0x1004
Controlling digit – digit 5	Operation direction 0: Positive 1: Negative	0x1005
Controlling digit – digit 6	Emergency Stop 0: Invalid 1: Valid	0x1006
Controlling digit – Digit 7	Free slide stop 0: Invalid 1: Valid	0x1007
Controlling digit – digit 8	Keep	0x1008
Controlling digit – digit 9	Keep	0x1009
Controlling digit – digit 10	Keep	0x100A
Controlling digit – digit 11	Keep	0x100B
Controlling digit – digit 12	Acceleration/deceleration banned 0: Allowed 1: Banned	0x100C
Controlling digit – digit 13	Zero-clearing for integrator input 0: Invalid 1: Valid	0x100D
Controlling digit – digit 14	Remote Control 0: Invalid 1: Valid	0x01
Controlling digit – digit 15	Failure Reset 0->1 Reset	0x100F
DO1	Multi-purpose output terminal 1	0x1020
DO2	Multi-purpose output terminal 2	0x1021
EDO1	Multi-purpose output terminal 3 (extendable card)	0x1030
RO1	Multi-purpose relay output 1	0x1040
ERO1	Multi-purpose relay output 2 (extendable card)	0x1050
Keep		0x1051~0x1099

2) Discrete Input Address Summary (1100 H~ 0x1200H)

Relevant Modbus functional codes：**0x02 (read)**

Register name	Function Description	Access Address
Status character – digit 0	Ready	0x1100
Status character – digit 1	Operation allowed	0x1101
Status character – digit 2	Starting allowed	0x1102
Status character – digit 3	Keep	0x1103
Status character – digit 4	Operation status	0x1104
Status character – digit 5	Direction	0x1105
Status character – digit 6	Zero speed	0x1106
Status character – digit 7	Acceleration	0x1107
Status character – digit 8	Deceleration	0x1108
Status character – digit 9	Arrival	0x1109
Status character – digit 10	Keep	0x110A
Status character – digit 11	Keep	0x110B
Status character – digit 12	Instruction source	0x110C
Status character – digit 13	Command source	0x110D
Status character – digit 14	Warning	0x110E
Status character – digit 15	Failure	0x110F
DI1	Multi-purpose input terminal 1	0x1120
DI2	Multi-purpose input terminal 2	0x1121
DI3	Multi-purpose input terminal 3	0x1122
DI4	Multi-purpose input terminal 4	0x1123
DI5	Multi-purpose input terminal 5	0x1124
DI6	Multi-purpose input terminal 6	0x1125
EDI1	Multi-purpose input terminal 7 (extendable card)	0x1130
EDI2	Multi-purpose input terminal 8 (extendable card)	0x1131
EDI3	Multi-purpose input terminal 9 (extendable card)	0x1132
Keep		0x1133~0x1199

3) Input Register Address Summary (1200H ~ 1300H)

Relevant Modbus functional codes: **0x04 (read input register)**

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 (extendable card)	0 ~ 4080	0x1202
Fin	Pulse input value (extendable card)	0 ~ 4080	0x1203
Keep			0x1204~0x1299

4) Hold Register Address Summary

Relevant Modbus functional codes: **0x03 (read multiple), x06 (write single), 0x10 (write multiple), 0x17 (read/write to multiple).**

➢ Application parameter address

The application parameter access address can be obtained from the parameter's identifier when ascertaining the access address, the method is to ignore the sub-class code in the identifier (following referred to as "*"); let's see an example, for parameter identifier: **HH.*.DD (eg.F2.0.33)**, it will obtain HHDD directly (hexadecimal format), and the access address for **F2.0.33** is: **0xF233H**. Below attached is the table for respective conversion of access addresses:

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
dF.#.00 ~ dF.#.55 (limited)	0xCF00~0xCF55	0xBF00~0xBF55

➢ Status parameter address (read-only): The address conversion method for status parameter is similar to that for application parameter. However, there is no ROM access address.

Parameter Identifier	RAM Access Address
d0.#.00 ~ d0.#.55	0xD000~0xD055
d1.#.00 ~ d1.#.55	0xD100~0xD155

➢ **BUS** Controlling Parameter Address **(1300H ~ 1400H)**

Register Name	Value Range	Access Address
Controlling character (mapping coils 0-15)②	0 ~ 0xFFFF	0x1300
Modbus setting value 1 (Relative Value) ③	-10000 ~ 10000	0x1301
Modbus setting value 2 (Absolute Value)	-30000 ~ 30000	0x1302
Mapping application parameters 1④	[F0.00 ~FF.55]	0x1303
Mapping application parameters 2	[F0.00 ~FF.55]	0x1304
Mapping application parameters 3	[F0.00 ~FF.55]	0x1305
Mapping application parameters 4	[F0.00 ~FF.55]	0x1306
Mapping application parameters 5	[F0.00 ~FF.55]	0x1307
Mapping application parameters 6	[F0.00 ~FF.55]	0x1308
Status Character (Mapping discrete range 0-15)	0 ~ 0xFFFF	0x1309
Mapping status parameters 1	[d0.00 ~d1.49]	0x130A
Mapping status parameters 2	[d0.00 ~d1.49]	0x130B

Register Name	Value Range	Access Address
Mapping status parameters 3	[d0.00 ~d1.49]	0x130C
Mapping status parameters 4	[d0.00 ~d1.49]	0x130D
Mapping status parameters 5	[d0.00 ~d1.49]	0x130E
Mapping status parameters 6	[d0.00 ~d1.49]	0x130F
Mapping status parameters 7	[d0.00 ~d1.49]	0x1310
Mapping status parameters 8	[d0.00 ~d1.49]	0x1311
Mapping status parameters 9	[d0.00 ~d1.49]	0x1312
Mapping status parameters 10	[d0.00 ~d1.49]	0x1313
Keep	Undefined	0x1314 ~0x 1400

Notes:

- If there is no need to keep the parameters permanently, it suffices to write the parameters to the **RAM** area. However, if the parameters have to be maintained permanently, it is required to write the parameter values into the **ROM** area. The service life of **ROM** area will be shortened if parameters are frequently written to the **ROM** area. If value **F2.1.13** needs to be written and maintained permanently, the register address where it should be written to is **0xE213**.
- When reading/writing controlling characters, it can be achieved via reading/writing to the coil mapped to each digit of controlling characters, and it can also be achieved via reading/writing to the hold register corresponding to the controlling characters. Both methods can achieve identical results. If it is needed to set the value for operation allowed，we can set the value of the digit 1 for controlling character (address **0x1001**) as 1 via functional code 05, we can also set the value of controlling character (address **0x1300**) as **0x0002** via functional code **06**. When reading the status characters, the method is similar to that for reading/writing controlling characters. It can be achieved via reading the discrete input mapped to each digit of status characters, and it can also be achieved via reading the hold register corresponding to the status characters. If we need to read the operation direction, we can read the status digit 5 (address **0x1105**) via functional code **02**, we can also read the status character (address **0x1309**) via functional code **03**.
- When we need to access several application parameters or monitoring parameters of discrete addresses, we can first map these parameters to bus control parameter area, and then we access to that area instead. As a matter of fact, access for mapped parameters is a type of pointer access, and the mapping parameters can be set in the **FA.1** parameter group.

5) Anomaly Status Information: Relevant Modbus functional code **0x07** (Query)

The frequency inverter's failure warning status and code corresponding to each digit of the returned data

Returned data – digit 7: 0 — No failure on frequency inverter, 1 — Failure on frequency inverter

Returned data – digit 6: 0 — No warning on frequency inverter, 1 — Warning on frequency inverter

Returned data – digit 5~0: Each code of failure information corresponds to the identifier code following Fu in the failure code of the frequency inverter.

Each code of warning information corresponds to the identifier code following aL. in the warning code of the frequency inverter.

If data 0x8C (10001100) is returned, it indicates that the failure code of the frequency inverter is Fu. 012; if data 0x64 (01100100) is returned, it indicates that warning code of the frequency inverter is aL.036.

6) Failure Diagnosis: Relevant Modbus functional code 0x08 (Diagnosis)

Sub-function code list

Sub-function code	Function	Query Data	Response Data
00	Return the identical query data	Random	Image query data
01	Re-start communication option (restore the “listen only" status for 04 sub-code)	FF00/0000	FF00/0000
04	Enforce slave unit into “Listen Only" status and the salve unit will not reply; the failed salve unit can be removed from the communication chain.	0000	No reply
0A	Clear all calculators and diagnosing registers	0000	Image query data
0B	Return the number of bus information items	0000	Total number of bus information items
0C	Return the number of bus communication failures (CRC error calculation)	0000	CRC error calculation
0D	Return the number of bus anomaly failures	0000	Number of anomaly data items
0E	Return the number of salve unit information items (corresponding with slave unit address or the broadcasting information)	0000	Number of valid data items

11. ACCESSORIES

11.1 I/O EXPANSION CARD (STANDARD TYPE: DEB350VS, PN: 050M008003000）

Aside from providing standard I/O port on the main board, **V220** series inverter can also additionally provide more input and output ermines according to users' requirements. The standard I/O expansion card has following functions:

- One group of RS485 channel;
- ±10V power supply (load capacity≤10mA);
- Three-circuit input terminal DI;
- One-circuit digital output, with the capability of outputting high-speed;
- One-circuit analog input (-10V ~ 10V);
- One-circuit relay programmable contact output

Table 11-1 Introduction of I/O expansion card terminal

Terminal type	Terminal name	Function
485 communication	RS+,RS-	Physical port for RS485 communication; See FA parameter for details
Output power supply	+10V,-10V	Provide ±10V/10mA power supply
Analog input	AI3	Analog 0~10V input, input impedance≥100M Ohm; See F4 parameter for details.
Digital input	DI7,DI8	Effective when the Terminal and CM port is engaged. DI7 and DI8 input frequency≤1KHz
	DI9	Programmable pulse input; Effective when the Terminal and CM port is engaged. DI9 input frequency≤100 KHz; See F3 parameter for details.
Digital output	DO3	Programmable OC output; output frequency≤100KHz; See F3 parameter for details.
Programmable output	TA1	TA1-TB1 normally closed contacts; TA1-TC1 normally open contacts; See F3 parameter for the contact capacity: AC 250V/1A
	TB1	
	TC1	
Common port	GND	Common port for ±10V,AI3
Common port	CM	Common port for DO3,DI7,DI8, and DI9

11.2 PG EXPANSION CARD (STANDARD DEB3PG12VA, PN: 050M009012002)

V220 series inverter is designed with the closed-loop vector control mode. When users select this mode, PG card must be adopted. PG card can receive single-ended collector open-circuit output, push-pull output and differential output encoder signals.

- Providing one group of +12V power supply (load capacity≤200mA);
- Providing three-phase differential input standard port of incremental encoder;
- Differential voltage ≤ + 12V;
- Maximum resolution 8192 C/T;
- Response frequency≤200KHz.

Table 11-2 Introduction of PG expansion card terminal

Terminal name	Function
+12V	Externally providing +12V/200mA current
GD	Power supply reference point
A+	Encoder A-phase differential input (+12V±20%)，max frequency≤200 KHz
A-	
B+	Encoder B-phase differential input (+12V±20%)，max frequency≤200 KHz
B-	
Z+	Encoder Z-phase differential input (+12V±20%)，max frequency≤200 KHz
Z-	

PG expansion card operation cautions:

- PG expansion card's signal line shall be separated from the power line. It is forbidden to conduct parallel wiring.
- Avoiding interference to encoder signal, please select shielded cable as PG card signal wire.
- The shielding layer of encoder's shielded cable should grounding (e.g. the E-end of frequency inverter). Please use the way of single-end-earthed so as to avoid the signal being disturbed.

11.3 INTRODUCTION OF LCD OPERATING PANEL

11.3.1 OUTSIDE VIEW OF LCD OPERATING PANEL

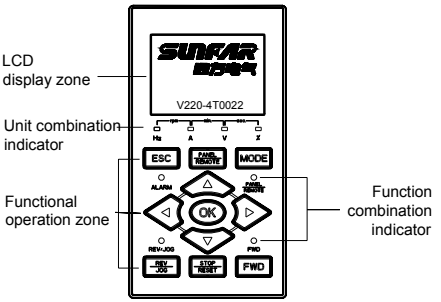


Figure 11-1 Standard type of LCD
(Model DPNL360CA /PN: 050M007360001)

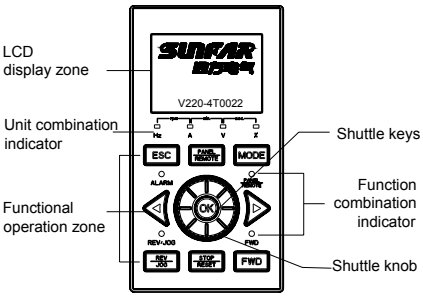


Figure 11-2 Shuttle type of LCD
(Model DPNL360CB /PN: 050M007360002)

11.3.2 FUNCTION OF KEYS

Refer to Chapter 5 for the function and operation of keys on LCD panel.

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