

S210-SJ Series Injection Machine Special Purpose

AC Drive Operation Manual

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S210-SJ Series ac drive has the following characteristics:

- ◆ The structure design is more reasonable, and the hardware circuit board is highly protected;
- ◆ Both the fans and contactors are DC power supply, which meets the environmental requirements of the plastic machine industry, and the system is more reliable.
- ◆ Strong overload capacity, mixing system: 150% rated current for 80s, 180% rated current for 8s; extrusion system: 150% rated current for 60s, 180% rated current for 5s;
- ◆ Adaptive current-limiting operation in the plastics machine industry. When the output current exceeds the current-limiting value, it will automatically reduce the frequency to prevent the tripping.

Shandong Chinsc Drive Technology Co., Ltd. provides customers with a full range of technical support, users can contact the nearest office or customer service center, or contact the us directly.

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Chapter 1 Safety and Notes

1.1 Safety Notes

1. The AC drive should be installed and adjusted by professional electrical technicians, otherwise there is a danger of electric shock!
2. Make sure the power is off before wiring, otherwise there is a danger of electric shock!
3. Ground terminal must be reliably grounded, ground resistance should be less than 0.1Ω !
4. Do not connect the input power to the output U, V, W, otherwise the AC drive will be damaged!
5. Make sure wires diameter be accord with technical standards, otherwise fault will happen.
6. No voltage test is required for AC drive, this item has been tested when leave the factory.
7. Do not touch the AC drive terminal (Includes control terminal) after power on, otherwise there is a danger of electric shock!
8. If you want to do parameter self-learning, please be aware of the risk of injury during motor rotation, otherwise it may cause an accident!
9. Do not control the start and stop of the ac drive by the contactor on or off, otherwise the equipment will be damaged!
10. AC drive cannot be repaired or maintained immediately because there is still high voltage on the filter capacity after the power off. It needs to wait for more than 5 minutes before using a multimeter to measure the bus voltage (the voltage between (+) and (-)) should not exceed 36V.
11. Do not share the ground terminal PE with the power line terminal N!

1.2 Notes

1. Insulation checking of motors

Make sure to separate the motor connection from the AC drive during insulation test(checking), It is recommended to use 500V voltage megohm meter and should guarantee the measured insulation resistance is not less than $5\text{ m}\Omega$.

2. About motor thermal and noise

The output voltage of the AC drive is PWM wave, which contains certain harmonics, so the temperature rise, noise and vibration of the motor will increase slightly compared with the operation of power frequency.

3. The output side cannot connect to the pressure sensitive device or improved the power factor of capacity.

4. Protection against lightning strike

This series AC drive is equipped with lightning overcurrent protection device, which has certain self-protection ability for inductive lightning. For frequent lightning, users should also install lightning protection at the front of the AC drive.

5. Disposing unwanted drive

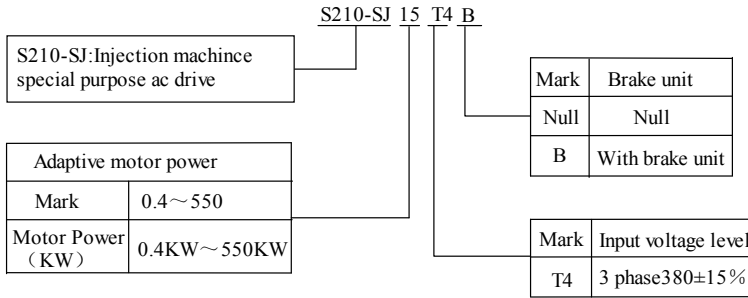
The electrolytic capacitor of the main circuit and the electrolytic capacitor on the printed board may explode during incineration. The incineration of plastic will produce poisonous gas, please deal with it as industrial waste.

6. Pay attention when the cable length is too long

When the motor cable length is longer than 50m, it is recommended to install an output reactor or output filter. If the motor cable length exceeds 100m, An output reactor or output filter must be installed, otherwise the motor insulation is easily damage.

Chapter 2 Specifications and Selection

2.1 Naming Rules



Note: 1) For 22KW and 30KW type ac drive, if braking is needed, it needs to purchase our the -B model with built-in braking.

2) For 37KW and bigger power ac drive, if braking is needed, it needs to purchase our external braking unit.

2.2 Nameplate

Specification	MODEL: S210-SJ15T4B
Input	INPUT: AC 3PH 380V ±15% 50/60Hz
Output	OUTPUT: AC 3PH 0-380V 0-3000HZ 32A
Serial NO.	S/N: Shandong Chinsc Drive Technology Co., Ltd.

2.3 Model and Technical Parameters

S210 Model and technical parameters

VFD Model	Input V	Power Capacity KVA	Input Current A	Output Current A	Adaptive Motor KW
S210-SJ0.4T4B	3 phase 380V Range: ±15%	1.0	2.4	1.2	0.4
S210-SJ0.75T4B		1.5	3.4	2.5	0.75
S210-SJ1.5T4B		3.0	5.0	3.7	1.5
S210-SJ2.2T4B		4.0	5.8	5.0	2.2
S210-SJ3.0T4B		5.0	8.0	7	3.0
S210-SJ3.7T4B		5.9	10.5	9	3.7
S210-SJ5.5T4B		8.9	14.6	13	5.5
S210-SJ7.5T4B		11.0	20.5	17	7.5
S210-SJ11T4B		17.0	26.0	25	11
S210-SJ15T4B		21.0	35.0	32	15
S210-SJ18.5T4B		24.0	38.5	37	18.5

S210-SJ22T4B		30.0	46.5	45	22
S210-SJ30T4B		40.0	62.0	60	30
S210-SJ37T4		57.0	76.0	75	37
S210-SJ45T4		69.0	92.0	90	45
S210-SJ55T4		85.0	113.0	110	55
S210-SJ75T4		114.0	157.0	150	75
S210-SJ93T4		134.0	180.0	176	93
S210-SJ110T4		160.0	214.0	210	110
S210-SJ132T4		192.0	256.0	253	132
S210-SJ160T4		231.0	307.0	300	160
S210-SJ185T4		242.0	350.0	340	185
S210-SJ200T4		250.0	385.0	380	200
S210-SJ220T4		280.0	430.0	420	220
S210-SJ250T4		355.0	468.0	470	250
S210-SJ280T4		396.0	525.0	520	280
S210-SJ315T4		445.0	590.0	600	315
S210-SJ350T4		500.0	665.0	640	350
S210-SJ400T4		565.0	785.0	690	400
S210-SJ450T4		650.0	825.0	800	450
S210-SJ500T4		700.0	883.0	860	500
S210-SJ550T4		770.0	975.0	950	550

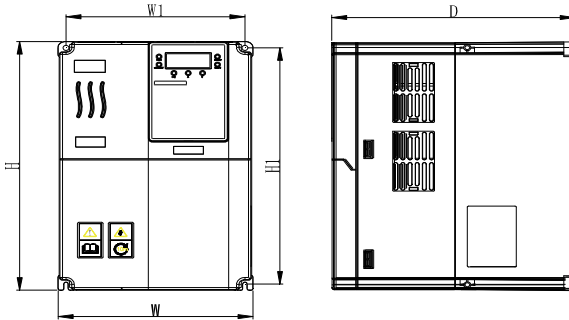
2.4 Technical specification

Item		Specification
Input	Rated voltage	T4 series: 3 phase 380V, $\pm 15\%$
	Frequency	50/60Hz $\pm 5\%$
Output	Voltage	T4 series : 3 phase 0~380V
	Frequency	0~3000Hz
	Overload ability	150% rated current for 1 minute, 180% rated current for 3 seconds;
Control performance	Control mode	Open-loop vector control, V/F control, Torque Control
	Start torque	Open-loop vector control: 0.5Hz 180%, VF control: 0.5Hz 150%
	Speed range	Open-loop vector control: 1:200, VF control: 1:100
	Speed control precision	Open-loop vector control: $\pm 0.2\%$, VF control: $\pm 0.5\%$
	Torque control	precision: $\pm 5\%$, time: $< 20\text{ms}$

Protection function	25 types protection function	Including over-voltage, over-current, overheat, overload, under-voltage, short circuit, ground fault, input and output default phase, protect the frequency AC Drive running reliably all-round
Installation environment requirement	Ambient temperature	-10℃~+40℃(ambient temperature is within 40℃~50℃, derating use is required), not allow to contact direct sunlight.
	Humidity	Less than 90%RH, without condensation
	Application environment	Non (corrosive, flammable, explosive, dust absorbent material),all kinds of lint does not accumulate.
	Vibration	Less than0.6G
	Elevation	0~1000m, reduce the rated specification 10% when lift 1000m for each.
	Storage temperature	-20~60℃

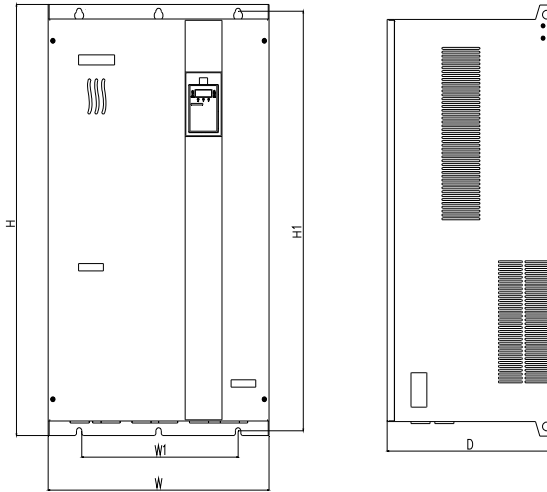
2.5 S210 Product Outline and Installation Aperture Size

2.5.1 S210-SJ 0.4~18.5KW Outline and Outer Size of Hang Machine Plastic Casing AC Drive



VFD Model	H	W	D	H1	W1	Installation aperture	Weight (Kg)
S210-SJ0.4T4B	170	100	140	160	90	Φ5	1.8
S210-SJ0.75T4B							
S210-SJ1.5T4B							
S210-SJ2.2T4B							
S210-SJ3.0T4B	187	125	166	177	115	Φ5	2.5
S210-SJ3.7T4B							
S210-SJ5.5T4B	248	160	184	239	150	Φ5	4
S210-SJ7.5T4B							
S210-SJ11T4B	320	208	190	307	193	Φ6	7.2
S210-SJ15T4B							
S210-SJ18.5T4B							

2.5.2 S210-SJ 22~550KW Outline and Outer Size of Hang Machine Metal Casing AC Drive

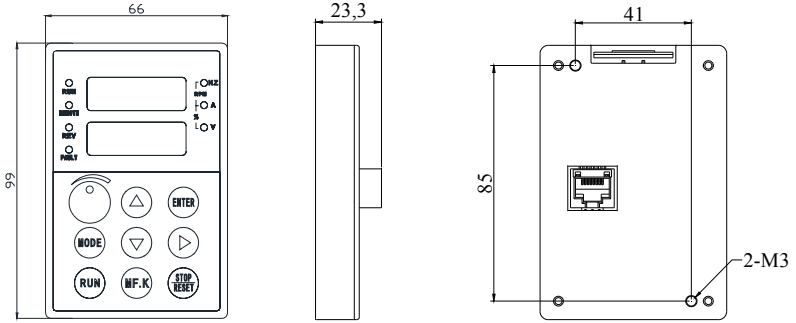


VFD Model	H	W	D	H1	W1	Installation aperture	Weight (Kg)
S210-SJ22T4B	420	270	215	404	160	Φ7	15
S210-SJ30T4B							
S21037T4							
S210-SJ45T4	605	300	290	582	200	Φ8	48
S210-SJ55T4							
S210-SJ75T4	650	340	330	630	200	Φ10	52
S210-SJ93T4							
S210-SJ110T4							
S210-SJ132T4	830	500	376	806	180+	Φ12	107
S210-SJ160T4							
S210-SJ185T4	890	500	376	866	180+	Φ12	126
S210-SJ200T4							
S210-SJ220T4							
S210-SJ250T4	1080	683	396	1050	250+	Φ12	177
S210-SJ280T4							
S210-SJ315T4							
S210-SJ350T4	1320	810	450	1290	280+	Φ14	262
S210-SJ400T4							
S210-SJ450T4							

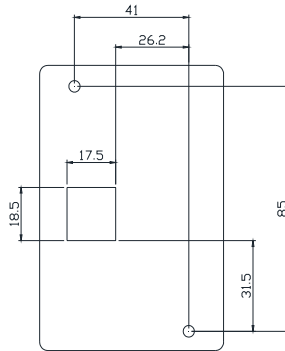
S210-SJ500T4						
S210-SJ550T4						

2.6 Keyboard Outline Size

1、Keyboard Outline Size(mm)

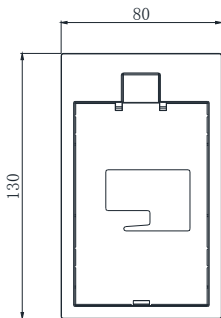


2、Keyboard Back Fixed Opening Size Without Keyboard Tray(mm)

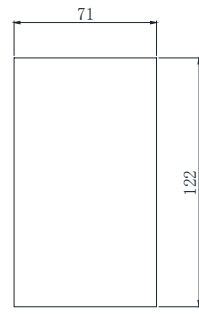


3、Keyboard Tray Outline Size

When it needs to pull the keyboard to other cabinet door or operation floor, it needs to select configuration this group TJ500-X2.0. The keyboard tray open size as below:



Keyboard Tray Outline Size

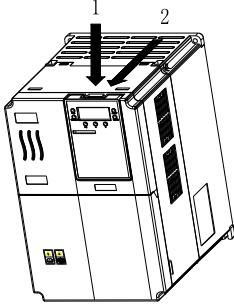


Keyboard Tray Open Size

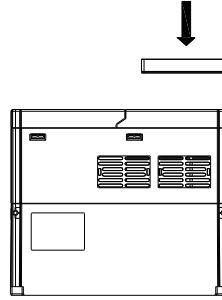
2.7 The Disassembly and Installation of the Keyboard

Disassembly the Keyboard: According to the indication of Figure 1, please press the operation panel clip down with the index finger, then put up the operation panel as the direction of the Figure 2.

Install the Keyboard: According to the direction, please push down the panel vertically after aiming at the panel tray during the installation, when you hear the sound “ka” it means the installation is finished.



Remove the Operation Panel



Install the Operation Panel

2.8 Selection of Braking Package

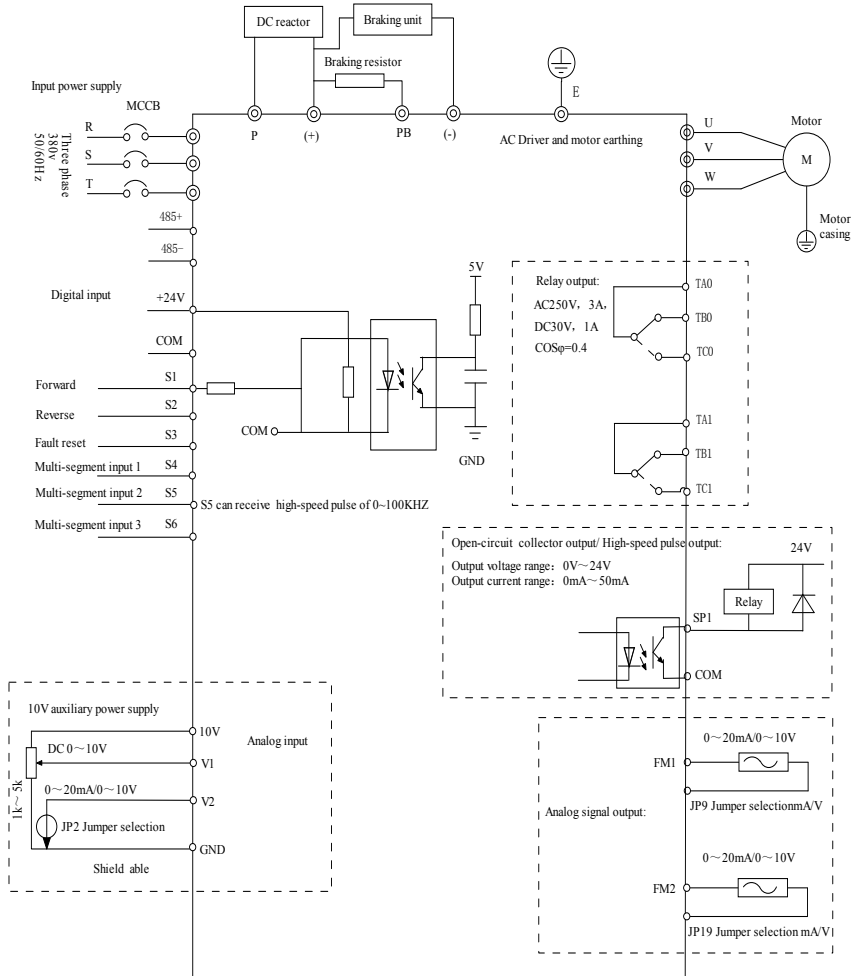
Model (KW)	Recommended Braking Resistor Power (KW)	Recommended Braking Resistor Resistance (Ω)	Braking Unit	Remark
0.4~0.75KW	0.2KW	$\geq 300\Omega$	Standard built-in	
1.5~2.2KW	0.5KW	$\geq 220\Omega$		
3.0~3.7KW	1.0KW	$\geq 130\Omega$		
5.5KW	1.0KW	$\geq 90\Omega$		
7.5KW	2.0KW	$\geq 65\Omega$		
11、15KW	2.0KW	$\geq 40\Omega$		
18.5、22KW	3.0KW	$\geq 22\Omega$		
30KW	6.0KW	$\geq 16\Omega$		
37~550KW	Selection according to braking unit requirement and recommendation	Selection according to braking unit requirement and recommendation	Optional built-in	Selection configuration with brake unit

Chapter 3 Mechanical and Electrical Installation

3.1 External Electrical Components Selection Guide


Power (KW)	Air Switch (MCCB)	Recommended Contactor(A)	Recommended Input Side Main Circuit Guide Line(mm ²)	Recommended Output Side Main Circuit Guide Line (mm ²)	Recommended Control Circuit Guide Line (mm ²)
0.4	6	9	0.75	0.75	0.5
0.75	6	9	0.75	0.75	0.5
1.5	10	9	0.75	0.75	0.5
2.2	10	9	0.75	0.75	0.5
3.0	16	12	1.5	1.5	0.5
3.7	16	12	1.5	1.5	0.5
5.5	20	18	2.5	2.5	0.75
7.5	32	25	4.0	4.0	0.75
11	40	32	4.0	4.0	0.75
15	50	38	6.0	6.0	0.75
18.5	50	40	10	10	1.0
22	63	50	10	10	1.0
30	100	65	16	16	1.0
37	100	80	25	25	1.0
45	123	95	35	35	1.0
55	160	115	50	50	1.0
75	225	170	70	70	1.0
93	250	205	95	95	1.0
110	315	245	95	95	1.0
132	350	300	120	120	1.0
160	400	300	150	150	1.0
185	500	410	150	150	1.0
200	500	410	185	185	1.0
220	630	475	240	240	1.0
250	630	475	2*120	2*120	1.0
280	700	620	2*120	2*120	1.0
315	800	800	2*150	2*150	1.0
350	1000	1000	2*185	2*185	1.0
400	1250	1000	2*240	2*240	1.0
450	1250	1290	2*240	2*240	1.0
500	1600	1290	4*150	4*150	1.0
550	1600	1600	4*150	4*150	1.0

3.2 Main Circuit Terminal and Wiring



1、Introduction of Main Circuit Terminals of the 3-phase AC Drive:

Sign	Name	Description
R、S、T	3-phase power supply input terminals	AC 3-phase 380V power connections points
(+)、(-)	DC bus wire(+,-) terminals	Common DC bus input point (30KW and smaller power ac drive without (-) terminal and cannot be connected to the braking unit. If braking is used, it needs to purchase the -B model with built-in braking provided by our company)
(+)、PB	Brake resistor wiring terminals	30kW and smaller power, the brake resistor connected points

P、(+)	External reactor wiring terminals outside	132KWand bigger power, the add external reactor connect point.
U、V、W	The AC Drive output terminals	Connect 3-phase motor
	Grounding terminal	Grounding terminal

2、 Main control circuit terminals drawing

485-	485+	10V	FM2	S1	S2	S3	S4	S5
V1	V2	GND	FM1	COM	COM	S6	SP1	24V

TA0	TB0	TC0
TA1	TB1	TC1

1) Function of the control terminals

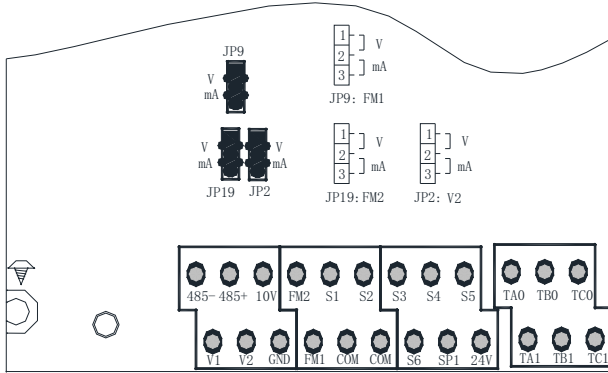
The Main Control Circuit Terminals			
Type	Terminal Symbol	Terminal Name	Function
Power	10V—GND	External connection+10v power	Provide +10V power for outside, Normally used as working power of the external potentiometer, potentiometer resistance range: 1K Ω ~ 5K Ω
	24V—COM	External connection+24v power	Provide +24 V power for outside, generally used as the power of digital input and output terminals and external transducers. Max output current: 200mA
Analog input	V1—GND	Analog input terminal 1	1、 Input voltage range: DC 0V~10V 2、 Input resistance: 20K Ω
	V2—GND	Analog input terminal 2	1、 Input range: DC 0V~10V or 4~20mA Selected by jumper "JP2" on the control board. ; 2、 Input resistance: put voltage 20K Ω , input current 500 Ω .
Digit input	S1—COM	Multi-function digital input terminal 1	1、 Opto-coupler isolation; 2、 Input resistance: 3.3K Ω 3、 Electrical level input voltage range: 9V~30V 4、 Programmable multi-function input.
	S2—COM	Multi-function digital input terminal 2	
	S3—COM	Multi-function digital input terminal 4	
	S4—COM	Multi-function digital input terminal 4	
	S5—COM	Multi-function digital input terminal 5	
	S6—COM	Multi-function digital input terminal 6	

Analog output	FM1—GND	Analog output 1	Output voltage or current could be selected by the JP9 jumper of the control board. Output voltage range: DC 0V~10V; Output current range: DC 0~20mA.
	FM2—GND	Analog output 2	Output voltage or current could be selected by the JP19 jumper of the control board. Output voltage range: DC 0V~10V; Output current range: DC 0~20mA.
Digital output	SP1—24V	Digital output	Open collector output Output voltage range: DC 0V~24V Max output current is 50mA
Relay output	TA0-TB0 TA0-TC0	Normal closed/ open terminals	Relay output, TA0-TB0 normal closed,TA0-TC0 normal open. Contact capacity: AC 250V/3A,DC 30V/1A
	TA1-TB1 TA1-TC1	Normal closed/open terminals	Relay output, TA1-TB1 normal closed,TA1-TC1 normal open. Contact capacity: AC 250V/3A,DC 30V/1A Note:(CPU360A V1.5 and future version, relay T1 has normal closed terminals)
Communication terminal	485- 485+	RS485 hardware circuit	Support standard MODBUS communication

2) Explain of jumper

Jumper No.	Description
JP2	Analog input V2 signals type selection Select DC 0V~10V or 4~20mA input
JP9	Analog output FM1 signals type selection Select DC 0V~10V or 0~20mA output
JP19	Analog output FM2 signals type selection Selection DC 0V~10V or 0~20mA output

3)Diagram of jumper position:

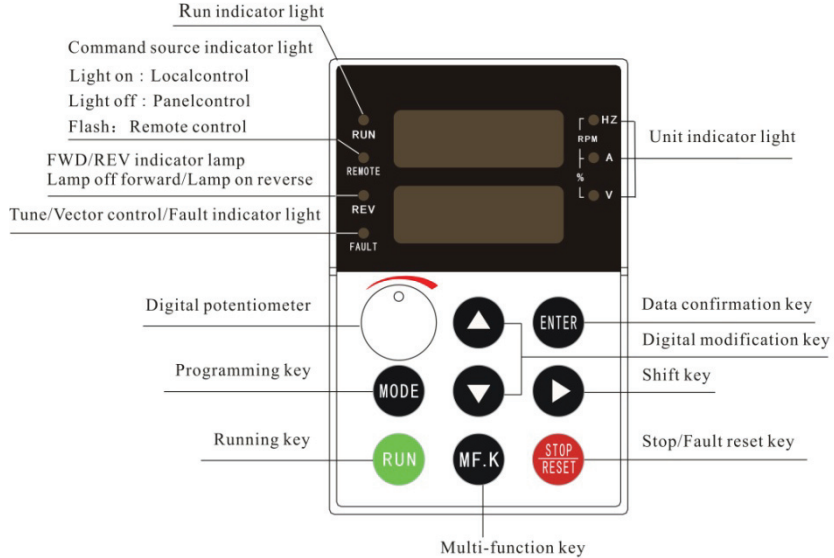


Chapter 4 Keyboard Operation and Display

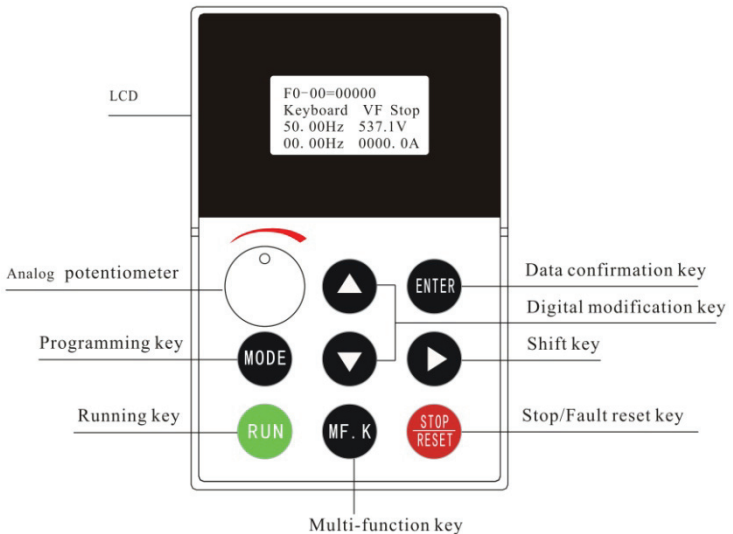
4.1 Introduction Of Keyboard Operation and Display Interface

Through the keyboard operation panel, we could modify the functional parameter to the AC Drive, monitor the working condition and perform the operational control (start, stop) of AC Drive, its outline and functional zone are as follows.

1. LED Digital tube keyboard: Specification JP300-1,digit potentiometer.



2. LCD keyboard: Specification JPOLED, analog potentiometer.



4.2 Descriptions of Function Indicators

RUN: When light off, the ac drive is in stop status, when light on, the drive is in running status.

REMOT: Keyboard operation, terminal operation and remote operations (communication control) indicator lights, light-off indicates keyboard control, light-on indicates terminal operation control, lights flash is in a state of remote communication control

REV: Forward and reverse indicator, light-on means the reverse state.

FAULT: Tuning/torque control/fault indicator light, light-on indicates the torque control mode, the light slowly-flash indicates the state of tuning, light fast-flash indicates that it is in a state of faulty.

Hz: Frequency unit.

A: Current unit

V: Voltage unit

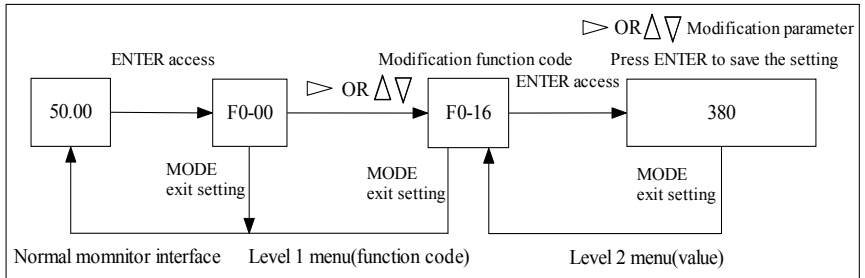
RMP(Hz+A): Rotating speed unit

%(A+V): Percentage.

4.3 Basic Function Code Inspection and Modification Method Description

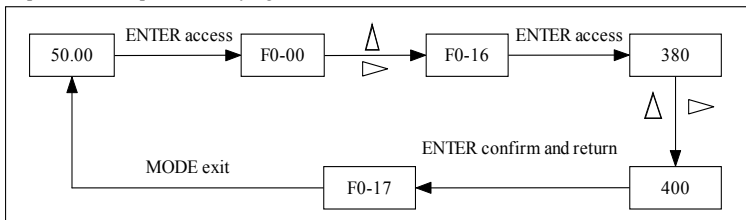
The operation panel of S210-SJ type AC Drive adopts two-level menu structure to set the parameter. Press ENTER to access the function code is the first-level menu, and then press ENTER to access the parameter group is the second-level menu.

The operation procedure is as the follow Fig.:



Note: When performing parameter modification operations in the second-level menu, it needs to press ENTER to save the setting parameters; if press MODE to return to first-level menu directly, this modified parameters are not saved.

For example : An example of modifying the function code H0-16 from 380V to 400V.



In the second level menu state, if the parameter is without flash bit, it indicates that the function code couldn't be modified, it may be caused by the following reasons:

- 1) The function code is non-modifiable parameters, such as actual monitoring parameters and run recording parameters and so on.
- 2) The function code is in the process of running, it couldn't be modified and only could be modified after stop.

Chapter 5 Function Parameter Simple List

The function parameters of S210-SJ series AC Drive are organized in groups by functions. And there are 16 groups from F0-FF. Each function group consists of several function codes that are identified by "Function Group No. + Internal Code Number". For example, "F2-01" indicates group 2 and its function code is 1.

☞Notice 1: It could be used to any load and it should be setup F0-16、F0-17、F3-00、F3-01、F3-02. according to the motor's nameplate.

☞Notice 2:S210-SJ type AC Drive factory default is V/F control. If it needs a big torque on site, F0-14 can be set to 0 , but F3-00 to F3-02 must be setup according to the motor's nameplate. Then set F3-08 for motor parameter auto-learning in the keyboard control channel.

☞Notice 3: "√" Indicates the parameter can be modified, no matter the drive runs or stops; "×" means the parameter cannot be modified while the drive is running. "○" indicates the parameter can be read only.

"*": Remarks with * indicates that there are parameter explanations in Chapter 6.

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify
Group F0: Basic Running Parameters Group				
F0-00	The main frequency source selection	0: Digital setting, memory after power off 1: Analog V1 setting	0	√
F0-01	The auxiliary frequency source B selection	2: Analog V2 setting 3: Keyboard potentiometer setting (only for LCD Keyboard) 4: Multi-segment speed running setting 5: PID control setting 6: Remote communication setting(communication address 2000H) 7: PLC program running setting 8: HDI high-speed pulse setting(S5)	1	√
F0-02	Auxiliary frequency source standard selection when superimposed	0: Relative to maximum frequency 1: Relative to main frequency source	0	√
F0-03	Auxiliary frequency scope when superimposed	00~150%	100%	√
F0-04	Main and auxiliary frequency combination mode	0: Only main frequency setting 1: Only auxiliary frequency setting 2: MF.K or terminal switching selection 3: Main frequency + auxiliary frequency (the direction is decided by main frequency) 4: Main frequency - auxiliary frequency (the direction is decided by main frequency)	2	√

		5: The maximum of both the direction is decided by main frequency) 6: The minimum of both (the direction is decided by main frequency)		
F0-05	Maximum output frequency	F0-06(minimum 1.00Hz)~300.00Hz F0-06(minimum 10.0Hz)~3000.0Hz	50.00 Hz	×
F0-06	Running frequency upper limit	F0-07~F0-05	50.00 Hz	√
F0-07	Running frequency lower limit	0.00~F0-06	0.00 Hz	√
F0-08	Keypad digital frequency setting	0.00~F0-05	50.00 Hz	√
F0-09	Running direction setting	0: Forward running 1: Reverse running (Equivalent to motor wire adjustment)	0	×
F0-10	Acceleration time 0	0.1~3200.0s	Model depends	√
F0-11	Deceleration time 0	0.1~3200.0s	Model depends	√
F0-12	Operation channel selection	0: Keyboard start-stop(REMOT off) 1: Terminal start-stop(REMOT on) 2: Communication start-stop(REMOT flash)	0	√
F0-13	Terminal control running mode	0: Two wire type control 1(The forward terminal starts and stops in the forward direction, and the reverse terminal starts and stops in the reverse direction) 1: Two wire type control 2(The forward terminal starts and stops, the reverse terminal changes the direction) 2: Three wire type control 1(Forward terminal pulse start and stop, reverse terminal selection direction, three-wire terminal normally closed, stop when disconnected) 3: Three wire type control 2(Forward terminal pulse start and stop, reverse terminal pulse start and stop, three-wire terminal normally closed, stop when disconnected) 4: Three wire type 3 Forward terminal pulse starts and stops with forward rotation, reverse terminal pulse starts and stops with reverse rotation, three-wire terminal is normally open, and stops when closed.	0	×*

F0-14	Motor control mode (it needs to set F0-14=0 or3、F0-28=1、F3-18 when torque control)	0: No PG speed vector control(needs to set F3 group motor parameters and perform parameter auto-learning) 1: VF control (See F2 group VF parameters) 3: SVC3 vector control (It needs to set F3 group motor parameters and perform parameter auto-learning)	1	×
F0-15	Reversed			
F0-16	Motor rated voltage	10~1000V	380V	×*
F0-17	Motor rated frequency	1.00~F0-05	50.00Hz	×*
F0-18	Expansion cards type	0: No expansion cards 1: Isolated communication card (welding RGLK resistance, remove the U8 and RGLK resistors on main board) 2: IO card (welding RKZK resistance, remove RGLK resistors) 3: Injection card (welding RKZK resistance, remove RGLK resistors)	0	×
F0-19	UP/DOWN setting	0: Zero clearing when stop 1: Without zero clearing when stop	1	√
F0-20	UP/DOWN change rate	0.01~100.00Hz/s	2.00Hz/s	√
F0-21	Modulation function selection	Unit : VF automatic stable voltage Decade: VC automatic stable voltage 0: Invalid 1: Valid for whole process 2: Invalid only when decelerating Hundred: PWM selection 0: Asynchronous modulation 1: Synchronous modulation	0000	√
F0-22	Carrier frequency	0.600~16.000 kHz(The maximum carrier is related to the model) By increasing the carrier frequency, the noise of the motor can be reduced, and the leakage current of the line to the ground can be reduced. But it will increase the heating and affect the life of the ac drive.	Model depends	√
F0-23	Voltage of energy consumption brake valve	110~150%(standard busbar voltage) 220V series,100% corresponds to 311V 380V series,100% corresponds to 537V 690V series , 100%corresponds to975V	123%	√
F0-24	Frequency is less than frequency lower Limit selection	0: Run at lower limit frequency (F0-07) 1: Run at zero frequency (With output voltage, controlled by F2-01 torque boost)	0	√

		2: Standby state (without output voltage)		
F0-25	Minimum frequency of deceleration to stop	0.00~5.00Hz(Free stop after deceleration to this value)	0.00Hz	√
F0-26	Frequency resolution	1: 0.1Hz 2: 0.01Hz When modifying this function parameter, the decimal places of all frequency-related parameters will change.	2	×
F0-27	Parameter initialization	0: No operation 1: Initialize all parameters (include motor parameters) 2: Clear fault record	0	×
F0-28	Torque control enable	0: Speed control mode 1: Torque control mode(it is valid when F0-14 is set to 0 or 3)	0	×
F0-29	Droop control rate	0.00~10.00Hz This function is generally used for load distribution when multiple motors are driving the same load. The droop control means that as the load increases, the output frequency of the ac drive is reduced, and the load of multiple motors is evenly realized. This parameter refers to the output frequency drop value when the ac drive outputs the rated load.	0.00Hz	√
F0-30	Main frequency adjustment V1 low gain	0.0~F0-31(FA-13=1 is valid)	30.0%	√
F0-31	Main frequency adjustment V1 high gain	F0-30~500.0%(FA-13=1 is valid)	320.0%	√
F0-35	Zero drift calibration (V2698 and future version)	0: No action 1: Zero drift calibration	0	×
Group F1: Start/Stop Control Parameter Group				
F1-00	Start function selection	Unit: start mode selection 0: Direct-on starting (F1-01、 F1-02、 F1-17) 1: DC braking first, then start(F1-03、 F1-04) 2: Hardware speed tracking and restart (only available for G7.5KW and bigger power,FA-15~FA-18) 3: Software tracking restart(F1-18、 FA-18) Ten digit: Terminal start protection selection after normal power-on 0: Protection (It needs to open the terminal and	0000	√

		<p>then close the terminal to run in stop state) 1: No protection(Run when the terminal is closed if there is no fault) Hundred: Power-on terminal start protection selection 0: Protection(The terminal is closed before power-on and operation is not allowed) 1: No protection(The terminal is closed before power-on to allow operation) Thousand: Restart selection after power off in keyboard control(F1-10) 0: Restart banned (It indicates that the AC drive won't start automatically when power on once again after the frequency inverter power down.) 1: Allow auto-restart(It indicates that the AC drive would be back to the running state before power cut automatically when the AC drive power on after the power cut. That is, if it is in running state before power cut, after the power is on again, the restart waiting time set by F1-10 will be delayed and it will start to run automatically, if it is in stop state before power cut, the frequency inverter won't start automatically after power on.</p> <p>Notes: The user should select allowed restart function cautiously, otherwise, serious consequence would be caused.)</p>		
F1-01	Directly start frequency	0.00~10.00Hz	0.00Hz	√
F1-02	Start frequency holding time	0.000s~32.000s	0.000s	×
F1-03	Start DC brake current	0~150%	0%	×
F1-04	Start DC brake time	0.000s~32.000s	0.000s	×
F1-05	Stop function selection	<p>The single digit : Normal stop mode selection 0: Decelerate to stop 1: Free stop Ten digits: Reserved Hundred digits: Jog stop mode selection 0: Decelerate to stop 1: Free stop</p>	0000	√
F1-06	Stop braking start frequency	0.00Hz~F0-05	0.00Hz	√*
F1-07	Deceleration stop brake waiting time	0.000s~32.000s	0.000s	√*

F1-08	Deceleration stop DC braking current	0~150%	0%	√*
F1-09	Deceleration stop DC braking time	0.0s~32.000s(When it is 0.0s, no DC braking)	0.000s	√*
F1-10	Power-off restart waiting time	0.0s~32.000s	2.000s	√
F1-11	Momentary stop power generation judgment voltage	70.0%~110.0%(standard bus voltage)	90.0%	√
F1-12	Momentary stop power generation deceleration enable	0: Disable 1: Enable	0	√
F1-13	Momentary stop restart enable	0: Disable 1: Enable	0	√
F1-14	Reverse rotation control prohibited (invalid during torque control)	0: Reversion allowed 1: Reversion forbidden	0	×
F1-15	Carrier association adjustment selection	Unit: Carrier adjustment related temperature 0: Disabled 1: Enabled Ten units: Carrier adjustment associated load 0: Disabled 1: Enabled Hundred units: Carrier adjustment associated frequency 0: Disabled 1: Enabled	001	√
F1-16	Automatic reset operation enable	0: Disable 1: Enable	1	√
F1-17	Start frequency acceleration time	0.01s~320.00s	0.01s	√
F1-18	Software tracking frequency setting	0.00Hz~50.00Hz	20.00Hz	√
F1-19	Pause deceleration delay time	0.000s~3.000s	0.000s	√
F1-20	Pause deceleration voltage point	50.0%~140.0%	115%	√
F1-21	Momentary stop recovery action voltage	60.0%~100.0%	80.0%	√
F1-22	Momentary stop power generation recovery time	0.0s~100.0s	0.5s	√
F1-23	Momentary stop restart	0.000s~10.000s	1.000s	√

	waiting time			
F1-24	Momentary stop power generation deceleration time	0.1s~3200.0s	3.0	√
Group F2: VF Control Parameter Group				
F2-00	V/F curve setting	0: Linear V/F curve(Constant torque situation) 1: 2.0 times power drop torque V/F curve(Light load occasions such as fans and water pumps) 3: Multi-point VF curve(F2-03~F2-08,(Used in industrial washing machines, high-frequency motors, centrifugal fans or special motors)	0	×*
F2-01	Torque boost	0.0:Auto-torque boost 0.1%~50.0%	Model depends	√*
F2-02	Torque boost cut-off frequency	0.00Hz~F0-17	20.00Hz	×*
F2-03	Multi point VF frequency point 1	0.00~F0-05	5.00Hz	√*
F2-04	Multi-point VF voltage point 1	0.0%~100.0%	15.0%	√*
F2-05	Multipoint VF frequency point 2	0.00~F0-05	17.50Hz	√*
F2-06	Multi-point VF voltage point 2	0.0%~100.0%	45.0%	√*
F2-07	Multipoint VF frequency point 3	0.00~F0-05	35.00Hz	√*
F2-08	Multi-point VF voltage point 3	0.0%~100.0%	80.0%	√*
F2-10	V/F Slip compensation gain	0.0%~200.0%	0.0%	√
F2-11	VF Oscillation suppression gain	0~100 It is necessary to increase the gain appropriately only when the motor oscillates obviously, the larger the gain, the more obvious the suppression of oscillation.	25	√
F2-12	Load loss detection level (Ball mill broken shaft detection current)	0.0%~150.0%	60.0%	√
F2-13	Load loss detection time (judgment time for ball mill shaft broken)	0.0s(no detection)~60.0s it sets to 30.0s special for ball mill	0.0s	√
F2-14	VF overvoltage	0~200	32	√

	excitation gain	During the deceleration of the ac drive, this parameter can suppress the rise of bus voltage and avoid over-voltage faults. The larger the over excitation gain, the stronger the suppression effect, but it is easy to cause the output current to increase or the speed to fluctuate, which needs to be weighed in the application. For occasions where the inertia is small, it is recommended to set the over excitation gain to 0; if there is a braking resistor, the over excitation gain needs to be set to 0.		
F2-16	Output current reached setting	0~3200.0A(No judgment when it is 0)	0.0A	√
F2-17	Output current reached judgment time	0~320.00s	0.00s	√
F2-20	The overvoltage frequency rise mode is enabled	0: Disabled 1:Enabled	1	√
F2-21	The overvoltage frequency rise action voltage	200.0V~1500.0V	750.0V	√
F2-22	The overvoltage frequency rise maximum frequency	0.00Hz~50.00HZ	6.00HZ	√
F2-23	The overvoltage frequency rise frequency gain	0~100	30	√
F2-24	The overvoltage frequency rise voltage gain	0~100	30	√
Group F3: Vector And Torque Control Parameter Group				
F3-00	Motor rated power	0.4~1000.0kW	Model depends	×*
F3-01	Motor rated current	0.1A~3200.0A	Model depends	×*
F3-02	Motor rated rotating speed	10~32000RPM	Model depends	×*
F3-03	Motor resistance of stator	0.001Ω~32.000Ω(ac drive power<=55kW) 0.0001Ω~3.2000Ω(ac drive power>55kW)	Tuning parameters	×*
F3-04	Motor resistance of rotor	0.001Ω~32.000Ω(ac drive power<=55kW) 0.0001Ω~3.2000Ω(ac drive power>55kW)	Tuning parameters	×*

F3-05	Leakage inductance of stator and rotor	0.01mH~320.00mH(ac drive power<=55kW) 0.001mH~32.000mH(ac drive power>55kW)	Tuning parameters	×*
F3-06	Motor stator and rotor mutual inductance	0.1mH~3200.0mH(ac drive power<=55kW) 0.01mH~320.00mH(ac drive power>55kW)	Tuning parameters	×*
F3-07	Motor current without load	0.01A~F3-01(ac drive power<=55kW) 0.1A~F3-01(ac drive power>55kW)	Tuning parameters	×*
F3-08	Motor parameter auto-learning	0: No operation 1: Parameter dynamic auto-learning(The motor first auto-learning statically, then auto-learning when rotating) 2: Parameter static auto-learning (Without motor running)	0	×*
F3-09	Speed loop proportional gain 1	1~100	50	√
F3-10	Speed loop integral time 1	0.01~10.00s	1.00s	√
F3-11	The low frequency point to switch	0.0~ F3-14	5.00Hz	√
F3-12	Speed loop proportional gain 2	1~100	30	√
F3-13	Speed loop integral time 2	0.01~10.00s	1.00s	√
F3-14	The high frequency point to switch	F3-11~F0-05	10.00Hz	√
F3-15	Coefficient of VC Slip compensation	50%~200%	100%	√
F3-16	Electric torque setting(speed control)	50.0%~300.0%	200.0%	√
F3-17	Torque setting mode selection	0: Torque digit set(F3-18) 1: Analog V1 set 2: Analog V2 set 3: Remote communication setting 4: Keyboard potentiometer setting (LCD keyboard only) When it sets as 1-2,the corresponding biggest value is F3-18	0	√
F3-18	Torque digit setting (torque control)	-200.0%~200.0%	100.0%	√
F3-19	Upper limit frequency source selection	0: Upper limit frequency set by keyboard (F0-06) 1: Upper limit frequency set by analogue V1 2: Upper limit frequency set by analogue V2	0	×

F3-20	Generator torque digit setting (rotation speed control)	50.0~300.0%	140.0%	√
F3-21	Torque control forward maximum frequency	0.00Hz~Maximum frequency	50.00Hz	√
F3-22	Torque control reserve maximum frequency	0.00Hz~Maximum frequency	50.00Hz	√
F3-23	Start torque setting	-200.0%~200.0%(valid when torque control)	0.0%	√
F3-24	Starting torque holding time	0.000s~5.000s(Valid when torque control)	0.000s	√
F3-25	Torque specified acceleration time	0.00s~320.00s	0.01s	√
F3-26	Torque specified deceleration time	0.00s~320.00s	0.01s	√
F3-27	Torque frequency acceleration time	0.00s~320.00s	3.0s	√
F3-28	Torque frequency deceleration time	0.00s~320.00s	3.0s	√
F3-29	VC over voltage stall gain	0~300	10	√
F3-40	Vector maximum stop delay time	0.000~30.000s	5.000s	√
F3-45	Vector over excitation gain	80.0%~150%	125%	√
F3-46	Excitation adjustment proportional gain	1~32000	500	√
F3-47	Excitation adjustment integral gain	1~32000	250	√
F3-48	Torque adjustment proportional gain	1~32000	500	√
F3-49	Torque adjustment integral gain	1~32000	250	√
Group F4: Input Signal Group				
F4-00	S1 terminal function selection	00: No function 01: Forward running	1	×*
F4-01	S2 terminal function selection	02: Reserve running 03: 3-wire operation control	2	×*
F4-02	S3 terminal function selection	04: Jog forward 05: Jog reverse	7	×
F4-03	S4 terminal function selection	06: Free parking for all the channels 07: Fault reset	0	×
F4-04	S5 terminal function selection	08: External fault input	0	×

	selection	09: Frequency setting increment (UP) 10: Frequency setting decreasing(DOWN) 11: Frequency increase/decrease (UP/DOWN) setting clear 12: Multi-speed terminal 1 13: Multi-speed terminal 2 14: Multi-speed terminal 3 15: Multi-speed terminal 4 16: PID control pause 17: Swing frequency pause(stop at set frequency) 18: Length count input 19: Acceleration and deceleration pause, except for stop 20: Torque control forbidden(torque control, forced to switch to speed control) 21: Length count reset 22: Simple PLC process reset 23: Acceleration and deceleration time 1 selection 24: Auxiliary frequency source selection 25: Reserved 26: Terminal count input 27: Terminal count reset 28: Deceleration DC braking (first decelerate to DC braking frequency, then start DC braking, after the terminal is released, continue normal operation) 29: Lack water faulty signal input 30: S5 high speed pulse signal input 31: Running pause		
F4-05	S6 terminal function selection		0	×
F4-09	Keyboard potentiometer minimum input	0.00V~10.00V	0.50V	√
F4-10	Keyboard potentiometer max input	0.00V~10.00V	9.50V	√
F4-11	V1 lower limit	0.00~F4-13	0.10V	√
F4-12	V1 lower limit corresponds to the set percentage	-100.0%~100.0%	0.0%	√
F4-13	V1 upper limit	F4-11~10.00V	9.90V	√
F4-14	V1 upper limit corresponds to the set percentage	-100.0~100.0%	100.0%	√

F4-15	V1 input filter factor	0~20(When the PID pressure is unstable, increase appropriately; when the specified input requires quick response, decrease appropriately)	6	√
F4-16	V2 lower limit value	0.00~F4-18	0.10V	√
F4-17	V2 lower limit corresponds to the set percentage	-100.0%~100.0%	0.0%	√
F4-18	V2 upper limit value	F4-16~10.00V	9.90V	√
F4-19	V2 upper limit corresponds to the set percentage	-100.0%~100.0%	100.0%	√
F4-20	V2 Input filter factor	0~20(When PID pressure is unstable, increase appropriately; when a specified input requires quick response, decrease appropriately)	6	√
F4-21	HDI High-speed pulse frequency lower limit	0.00~F4-23	0.00kHz	√
F4-22	HDI corresponding setting of lower limit frequency	-99.99%~100.00%	0.00%	√
F4-23	HDI high pulse frequency upper limit	F4-21~100.00kHz	20.00kHz	√
F4-24	HDI upper frequency corresponding setting	-99.99%~100.00%	100.00%	√
F4-25	HDI Input filter coefficient	0~20	3	√
F4-26	Input less than lower limit selection	0: Output 0% 1: The output lower limit corresponding to the percentage	1	√
F4-27	Set length	0m~32000m	1000m	√*
F4-28	Actual length	0m~3200m	0m	√*
F4-29	Number of pulses per meter	0.1~3200.0	100.0	√*
F4-30	Set count value	1~32000	1000	√*
F4-31	Designated count value	1~32000	1000	√*
Group F5: Output Signal Group				
F5-00	SP1 output selection	00: No output	1	√
F5-01	Relay T0 output selection	01: AC Drive is running 02: AC Drive is read(no faulty in stop)	2	√
F5-02	Relay T1 output selection	03: AC Drive fault 04: Frequency level detection FDT output	3	√
F5-03	Relay T2 output selection	(F5-14、 F5-15) 05: Setting frequency arriving (F5-13)	0	√

	(Need to connect IO expansion card)	06: Zero-speed running(no output in stop) 07: Frequency upper limit arriving ($\geq F0-06$ output) 08: Frequency lower limit arriving ($\leq F0-07$ output) 09: PLC stage complete output 10: PLC cycle time complete output 11: Reserved 12: Torque level detection FDT output (F5-16、F5-17) 13: Motor overload pre-alarm 14: Run in forward(forward output) 15: Run in reverse(reverse output) 16: AC Drive overload pre-alarm 17: Set count value reached(F4-30) 18: Designated count value reached (F4-31) 19: Length arrival indication(F4-27~F4-29) 20: At least one speed input 21: Input terminal S1 status 22: Input terminal S2 status 23: Input terminal S3 status 24: Input terminal S4 status 25: Input terminal S5 status 26: Input terminal S6 status 27: Digital output specified value(F5-34) 28: Output current reached (F2-16、F2-17 control) 31: External fan start control(FA-21)		
F5-04	Reserved			
F5-05	Reserved			
F5-06	SP1_HDO output selection	0: Pulse output (HDO,F5-29~F5-32 setting) 1: Open collector output(SP1,F5-00 setting)	1	√
F5-07	SP1 closing delay time	0.0~3200.0s	0.0s	√
F5-08	SP1 cutting delay time	0.0~3200.0s	0.0s	√
F5-09	Relay T0 output closing delay time	0.0~3200.0s	0.0s	√
F5-10	Relay T0 output cutting delay time	0.0~3200.0s	0.0s	√
F5-11	Relay T1 output closing delay time	0.0~3200.0s	0.0s	√
F5-12	Relay T1 output cutting delay time	0.0~3200.0s	0.0s	√
F5-13	Frequency arrival (FAR)	0.0~100.0%(Maximum output frequency)	5.0%	√*

	detection width			
F5-14	FDT Electric Level detection value	00.00~F0-05	50.00Hz	√*
F5-15	FDT lag detection value	000.0%~100.0%(FDT Electric Level)	5.0%	√*
F5-16	FDT torque level value	0.0%~250.0%	100.0%	√
F5-17	FDT torque level detection lagged value	0.0%~100.0%(FDT Electric Level)	5.0%	√
F5-18	FM1 output selection	00: Operating frequency: 0~Maximum output frequency	0	√
F5-19	FM2 output selection	01: Setting frequency: 0~Maximum output frequency 02: Bus voltage: 0~2 times standard bus 03: Output current: 0~2 times ac drive rated current 04: Output voltage: 0~1.2 times ac drive rated voltage 05: Operating speed: 0~rotation speed corresponding to maximum frequency 06: Output power: 0~2 times motor rated power 07: Setting torque: 0~2 times ac drive setting torque 08: Output torque: 0~2 times ac drive output torque 09: PID setting: 0.0~100.0% 10: PID feedback: 0.0~100.0% 11: Analogue V1 input value: 0.00~10.00V 12: Analogue V2 input value: 0.00~10.00V/ 0 ~20mA 13: HDI high speed pulse: 0.00~20.00kHz 14: Specify output percentage F5-35: 0.0~ 100.0%	3	√
F5-20	HDO high speed pulse output selection		1	√
F5-21	FM1 output lower limit percentage	0.0~100.0%	0.0%	√
F5-22	FM1 lower limit corresponding output	0.00~10.00V	0.00V	√
F5-23	FM1 output upper limit percentage	0.0~100.0%	100.0%	√
F5-24	FM1 upper limit corresponding output	0.00~10.00V	10.00V	√
F5-25	FM2 output lower limit percentage	0.0~100.0%	0.0%	√

F5-26	FM2 lower limit corresponding output	0.00~10.00V	0.00V	√
F5-27	FM2 output upper limit percentage	0.0~100.0%	100.0%	√
F5-28	FM2 upper limit corresponding output	0.00~10.00V	10.00V	√
F5-29	HDO high-speed pulse output lower limit	0.0~100.0%	0.00%	√
F5-30	HDO low limit corresponds output	0.00~100.00kHz	0.00kHz	√
F5-31	HDO high speed pulse output upper limit	0.0~100.0%	100.0%	√
F5-32	HDO upper limit corresponds output	0.00~100.00kHz	20.00kHz	√
F5-33	FM、HDO below lower limit output selection	0: Output 0 V 1: Output low limit	1	√
F5-34	Digit output specified value	0: Cut down 1: Closed	0	√
F5-35	Analog output specified value	0.0~100.0%	0.0%	√
F5-36	Motor overload pre-alarm coefficient	20~100%	50%	√
F5-37	AC drive overload pre-alarm coefficient	20~100%	50%	√
F5-38	Relay T2 output closing delay	0.0~3200.0s	0.0s	√
F5-39	Relay T2 output off delay	0.0~3200.0s	0.0s	√
Group F6: Multi-speed and PLC Program Operation				
F6-00	PLC phase 0 /Multi-speed 0 target	-100.0~100.0%	0.0%	√
F6-01	PLC phase 1 /Multi-speed 1 target	-100.0~100.0%	0.0%	√
F6-02	PLC phase 2 /Multi-speed 2 target	-100.0~100.0%	0.0%	√
F6-03	PLC phase 3/ Multi-speed 3 target	-100.0~100.0%	0.0%	√
F6-04	PLC phase 4 /Multi-speed 4 target	-100.0~100.0%	0.0%	√
F6-05	PLC phase 5/ Multi-speed 5 target	-100.0~100.0%	0.0%	√
F6-06	PLC phase 6/ Multi-speed 6 target	-100.0~100.0%	0.0%	√

	Multi-speed 6 target			
F6-07	PLC phase 7/ Multi-speed 7 target	-100.0~100.0%	0.0%	√
F6-08	PLC phase 8/ Multi-speed 8 target	-100.0~100.0%	0.0%	√
F6-09	PLC phase 9/ Multi-speed 9 target	-100.0~100.0%	0.0%	√
F6-10	PLC phase 10/ Multi-speed 10 target	-100.0~100.0%	0.0%	√
F6-11	PLC phase 11/ Multi-speed 11 target	-100.0~100.0%	0.0%	√
F6-12	PLC phase 12/ Multi-speed 12 target	-100.0~100.0%	0.0%	√
F6-13	PLC phase 13/ Multi-speed 13 target	-100.0~100.0%	0.0%	√
F6-14	PLC phase 14/ Multi-speed 14 target	-100.0~100.0%	0.0%	√
F6-15	PLC phase 15/ Multi-speed 15 target	-100.0~100.0%	0.0%	√
F6-16	PLC phase 0 operation time	0.0~3200.0s	0.0s	√
F6-17	PLC phase 1 operation time	0.0~3200.0s	0.0s	√
F6-18	PLC phase 2 operation time	0.0~3200.0s	0.0s	√
F6-19	PLC phase 3 operation time	0.0~3200.0s	0.0s	√
F6-20	PLC phase 4 operation time	0.0~3200.0s	0.0s	√
F6-21	PLC phase 5 operation time	0.0~3200.0s	0.0s	√
F6-22	PLC phase 6 operation time	0.0~3200.0s	0.0s	√
F6-23	PLC phase 7 operation time	0.0~3200.0s	0.0s	√
F6-24	PLC phase 8 operation time	0.0~3200.0s	0.0s	√
F6-25	PLC phase 9 operation time	0.0~3200.0s	0.0s	√
F6-26	PLC phase 10 operation time	0.0~3200.0s	0.0s	√
F6-27	PLC phase 11 operation	0.0~3200.0s	0.0s	√

	time			
F6-28	PLC phase 12 operation time	0.0~3200.0s	0.0s	√
F6-29	PLC phase 13 operation time	0.0~3200.0s	0.0s	√
F6-30	PLC phase 14 operation time	0.0~3200.0s	0.0s	√
F6-31	PLC phase 15 operation time	0.0~3200.0s	0.0s	√
F6-32	PLC function selection	Unit: Cycle mode selection 0: Stop after operating for 1 cycle 1: Holding at the final value after single cycle of operation 2: Cycle continuously Ten: Breakpoint recovery selection 0: Run from phase 1 1: Continue to run from the stopping time Hundreds : Power off with stored selection 0: No store if power off 1: Store if power off Thousands: phase time unit 0: s 1: Min 2: H	0000	×
F6-33	PLC target frequency set unit	0: Percentage setting 1: Frequency HZ setting	0	×
Group F7: Process PID Parameter Group				
F7-00	PID control function selection	The unit : PID specified channel selection 0: Keypad digital frequency setting(F7-02) 1: Analog V1 setting 2: Analog V2 setting 3: Communication settings Ten: PID feedback channel selection 0: Analog V1 feedback 1: Analog V2 feedback 2: Communication settings Hundred: PID output characteristic selection 0: PID output positive characteristic(The smaller the PID feedback, the larger the frequency output) 1: PID output negative characteristic(The smaller the PID feedback, the smaller the frequency output)	0000	√

F7-01	Feedback protection function selection	Unit: Feedback disconnection detected selection 0: Invalid 1: Arm and operation in settled frequency (F7-08) 2: Faulty stop(E022) Tens: Feedback over-voltage protect selection 0: Invalid 1: Alarm and operation in settled frequency (F7-15) 2: Faulty stop(E024)	0000	√
F7-02	Digit PID specified set	0.0~100.0%(100.0% Corresponding pressure gauge range) If the pressure gauge is 1.6MPa and the target pressure is 0.2MPa (2kg), then F7-02 = $0.2\text{MPa} * 100.0\% / 1.6\text{MPa} = 12.5\%$; if the pressure gauge is 1.0MPa and the target pressure is 0.2MPa (2kg), then F7-02 = $0.2\text{MPa} * 100.0\% / 1.0\text{MPa} = 20.0\%$.	20.0%	√
F7-03	Proportional gain KP	0~32000(The larger the value, the faster the response and the greater the oscillation)	4096	√
F7-04	Integral gain KI	0~32000(The larger the value, the faster the response and the greater the overshoot)	1500	√
F7-05	PID control deviation limit	0.0~100.0% The error between specified and feedback is less than this setting, PID pause adjustment	0.0%	√
F7-06	PID feedback disconnection detected value	0.0~100.0% Feedback disconnection detection: When the feedback value is less than the feedback loss detection value F7-06, the system starts the detection timing. When the timing time exceeds F7-07, the ac drive runs according to F7-01 in priority.	0.0%	√
F7-07	Feedback disconnection detected time	0.0~200.0s	2.0s	√
F7-08	Feedback disconnection fixed output	0.0~100.0% Maximum frequency	50.0%	√
F7-09	Dormant frequency	0.00Hz(no dormant)~Maximum frequency(F0-05)	0.00Hz	√
F7-10	Dormant delay	0.0~600.0s when the running frequency is less than or equal to the dormant frequency of F7-09 in ac	10.0s	√

		drive running, after the delay time of F7-10, the drive enters the dormant state, stops automatically, and the running indicator flashes.		
F7-11	Wakeup deviation percentage	0.0~100.0% When the feedback pressure is lower than (pressure setting value * F7-11), the wake-up timer is performed. if the wake-up timer exceeds the wake-up delay time of F7-12, the ac drive exits the dormant state.	80.0%	√
F7-12	Wakeup delay	0.0~600.0s	2.0s	√
F7-13	PID feedback overpressure detection value	0.0~100.0% When the feedback value is bigger than the PID feedback excessive detection value F7-13, the system starts to detect timing. If the timing time exceeds F7-14, the ac drive selects to run according to F7-01.	100.0%	√
F7-14	PID feedback overpressure detection time	0.0~600.0s	2.0s	√
F7-15	PID feedback overpressure fixed output	0.0~100.0% Maximum frequency	50.0%	√
F7-16	PID maximum output frequency	0.0~100.0% Maximum frequency(Output frequency upper limit in PID mode running)	100.0%	√
Group F8: Communication Parameter Group				
F8-00	Local communication address	0: Broadcast address 1~247	1	√
F8-01	Communication allocation	The unit: Communication baud 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS Ten: Data parity setting 0: No parity (N, 8, 1)for RTU 1: Even parity (E, 8, 1)for RTU 2: Odd parity (O, 8, 1)for RTU 3: No parity(N, 8, 2)for RTU 4: Even parity(E, 8, 2)for RTU 5: Odd parity(O, 8, 2)for RTU	0003	√
F8-02	Communication response delay	0.000s~1.000s	0.003s	√
F8-03	The fault time of	0.0s(Invalid)	0.000s	√

	communication overtime	0.001~30.000S		
F8-04	Communication response setting	0: Respond for writing 1: No respond for writing	0000	√
Group F9: Human-computer Interface Parameter Group				
F9-00	Key function setting	The unit : MF.K key function selection 0: Jog forward operation 1: Switch between forward and reverse 2: Clear UP/DOWN set 3: Main and auxiliary frequency source switch 4: Torque control prohibit/valid switch 5: Reverse Jog operation 6: Pause running 7: Keyboard external faulty Ten: STOP/RESET key stop function selection 0: Only valid for operation keyboard 1: Valid for all channels, if terminal control, communication control, free stop 2: Failure to stop during terminal communication control(E037) Hundred: parameter keyboard lock setting 0: The parameters can be read and written 1: The parameters only can be read	0000	√
F9-01	The first line normal monitoring parameter selection when stop	00: Operating frequency(Hz light blink) 01: Setting frequency(Hz light on) 02: Output current	1	√
F9-02	The first line normal monitoring parameter selection when running	03: Bus voltage 04: Output voltage 05: Operation rotation speed 06: Output power 07: Set torque 08: Output torque 09: PID setting 10: PID feedback 11: Analogue V1 input value 12: Analogue V2 input value 13: HDI High speed pulse input frequency 14: Input terminal status 15: FM1 output voltage 16: FM2 output voltage 17: HDO High speed pulse output frequency 18: Output terminal status 19: Set main frequency 20: Auxiliary set frequency	0	√

		21: The present stage of multi-speed 22: Present PLC stage 23: Input terminal decimal 24: Output terminal decimal 25: Communication set value 26: Module temperature 27: Accumulated power-on time H 28: PLC Elapsed time 29: PLC remaining time 30: PLC Total set time 31: Cumulative power consumption KW 32: Count value 33: Length value		
F9-03	User password (used to lock the keyboard)	0~32766(After setting it up, keep in mind)	0	√
F9-05	Accumulated power-on time hours	H		○
F9-07	Cumulative power consumption KWH	KW.H		○
F9-09	Program Version			○
F9-10	Current display initial value	0.1A~10.0A It must be displayed if exceeds the current	1.0A	√
Group FA: Enhanced Functional Parameters Group				
FA-00	Jog operation frequency	0.00~F0-05	10.00Hz	√
FA-01	Jog operation frequency	0.1~3200.0s	Model depends	√
FA-02	Jog deceleration time	0.1~3200.0s	Model depend	√
FA-03	Acceleration time 1	0.1~3200.0s	Model depend	√
FA-04	Deceleration time 1	0.1~3200.0s	Model depend	√
FA-05	Forward and reverse dead time	0.000~32.000s	0.000s	√
FA-06	Hop frequency	0.00~F0-05	0.00Hz	√
FA-07	Hop frequency range	0.00~F0-05	0.00Hz	√
FA-08	Swing frequency amplitude	0.0~100.0%((Relative set frequency)	0.0%	√
FA-09	Kick frequency amplitude	0.0~50.0%(Relative swing frequency amplitude)	0.0%	√
FA-10	Swing frequency period	0.1~3000.0s	10.0s	√
FA-11	Swing frequency rise	0.1%~100.0%	50.0%	√

	time ratio			
FA-12	Speed display coefficient	0.001~32.000	1.000	√
FA-13	Main frequency adjustment enable	0: Disabled 1: Enabled Adjust V1 to set the main frequency within the range of F0-30~F0-31	0	√
FA-14	Line 2 normal monitoring parameter selection	The same as F9-01 selection	2	√
FA-15	Speed tracking DC excitation	10~200%	130%	√
FA-16	Hardware tracking excitation time	0~10.000s	0.100s	√
FA-17	Tracking frequency calculation time	0~5.000s	0.200s	√
FA-18	Speed tracking voltage soft start time	0.001~32.000s	0.500s	√
FA-19	Hardware tracking direction	0: Present measurement direction 1: Add DC excitation and judge the direction for each time 2: Memory running direction before stopping 3: Use the target frequency direction as the tracking frequency direction	2	√
FA-20	Swing frequency setting mode	0: Relative to center frequency 1: Relative to maximum frequency	0	√
FA-21	The start temperature of the external fan startup module during operation	5.0~50.0°C (The matching output terminal function is set to 31, and it is forced to start when the module temperature exceeds 50°C in stop)	5.0°C	√
FA-22	Random PWM depth	0~10	0	√
FA-23	Dead zone gain adjustment	0~200	80	√
FA-24	Over modulation factor	90.0%~130.0%	110.0%	√
FA-28	Switch frequency point between acceleration time 1 and acceleration time 2	0.00Hz~3000.0Hz	0.00Hz	√*
FA-29	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz~3000.0Hz	0.00Hz	√*
Group Fb: Protection Function Group				

Fb-00	Protection function selection 1	The unit: Over voltage at stall protect 0: Disabled 1: Enabled Tens: Current limiting action selection 0: Valid 1: Invalid Hundred: Input phase loss protection 0: Invalid 1: Valid Thousands : Output loss-Phase protection 0: Invalid 1: Valid	1101	×
Fb-01	Continuous failure rest time	1.0~600.0s	30.0s	√
Fb-02	Motor overload protection point	20.0~125.0%(motor rated current)	100.0%	√
Fb-03	Bus overvoltage stall protection point	115~150% During the deceleration of the drive, when the DC bus voltage exceeds the overvoltage stall protection voltage, the drive stops decelerating and maintains the present operating frequency, and continues to decelerate after the bus voltage drops.	133%	√
Fb-04	Over current speed loss protection point	10.0~210.0%(Motor rated current) During the acceleration and deceleration of the drive, when the output current exceeds the over-current stall protection current, the drive stops the acceleration and deceleration process, and continues to accelerate and decelerate after the output current drops.	180.0%	√*
Fb-05	Frequency decrease rate in current limiting	0.00~50.00Hz/s(Controlled by Fb-19)	2.50Hz/s	√
Fb-06	Auto reset times	0~20	0	√
Fb-07	Fault automatic reset interval time set	0.100~32.000s	1.000s	√
Fb-08	First two failure types	E000: No faulty	0	○
Fb-09	Latest fault type	E001: IGBT shorted protection	0	○
Fb-10	Present fault type	E003: Overvoltage in stop E004: Over-current in accelerating E005: Over-current in decelerating E006: Over-current in constant-speed running E007: Over-voltage in accelerating E008: Over-voltage in decelerating E009: Overvoltage in constant-speed running E010: DC Bus low-voltage fault E011: Motor overload E012: AC Drive overload	0	○

		<p>E013: Input phase loss E014: Output phase loss or unbalance current E015: Terminal water lack input faulty E016: IGBT module overheat fault E017: External fault E018: Communication over time fault E019: Current detection t fault E020: Motor's parameter auto-learning fault E021: EEPROM w/r error E022: PID feedback disconnected fault E023: Too large AD zero drift E024: PID feedback over pressure fault E025: Reserved E026: Motor load loss protection E029: Temperature sensor disconnection fault E030: Clear hardware latch timeout E033: Software over current in accelerating E034: Software over current in decelerating E035: Software over current in constant speed E036: Software current limit timeout E037: Keyboard stop faulty E040: Hardware current limit timeout E041: Automatic reset times over limit</p>		
Fb-11	Latest faulty running frequency		0.00Hz	○
Fb-12	Latest fault output current		0.0A	○
Fb-13	Latest fault DC voltage		0.0V	○
Fb-14	Latest faulty temperature		0.0°C	○
Fb-15	Cumulative power-on time of latest fault		0H	○
Fb-16	VF over voltage speed loss gain	<p>0~100 The larger the value, the stronger the ability to suppress overvoltage, but the actual deceleration time will be longer. Under the premise of no overvoltage, for the gain setting, the smaller ,the better.</p>	0	√
Fb-17	VF over current speed loss gain	<p>0~100(When it is 0, cancel the over-current stall function) The larger the value, the stronger the ability to suppress over-current. For the load with small inertia, the over-current stall gain should be small, otherwise the dynamic response of the</p>	5	√*

		system will slow down. For loads with large inertia, this value should be large, otherwise the suppression effect is not good, and overcurrent faults may occur.		
Fb-18	Software current limit decrease frequency level	120.0%~220.0%(Motor rated current) During operation, if the output current exceeds the software frequency reduction and current limit level when the load is overloaded, the drive output frequency will be reduced according to Fb-05. After the output current is lower than the current limit level, normal operation will be resumed.	170.0%	√
Fb-19	Software current limit cut off frequency	0: Disable 1: Enable	0	√
Fb-20	Current limiting cut off frequency	0.00Hz~50.00Hz	10.00Hz	√
Fb-21	Hardware current limit level	150.0%~210.0%	185.0%	√
FE: Factory Parameter Group				
Group FF: Monitoring Parameter Group(This parameter can only be read)				
FF-00	Operation frequency	Unit: 0.01Hz	Hz	○
FF-01	Setting frequency	Unit: 0.01Hz	Hz	○
FF-02	Output current	Unit: 0.1A	A	○
FF-03	Bus voltage	Unit: 0.1V	V	○
FF-04	Output voltage	Unit: 1V	V	○
FF-05	Operation speed	Unit: RPM	RPM	○
FF-06	Output power	100.0% corresponding motor rated power	%	○
FF-07	Setting torque	100.0% corresponding the AC Drive rated torque	%	○
FF-08	Output torque	100.0% corresponding the AC Drive rated torque	%	○
FF-09	PID setting	0.0~100.0%	%	○
FF-10	PID feedback	0.0~100.0%	%	○
FF-11	Analog V1 input value	0.00~10.00V	V	○
FF-12	Analog V2 input value	0.00~10.00V	V	○
FF-13	HDI pulse input value	0.01~100.00kHz	kHz	○
FF-14	Input terminal situation			○
FF-15	FM1 output voltage	0.00~10.00V	V	○
FF-16	FM2 output voltage	0.00~10.00V	V	○
FF-17	HDO pulse output frequency	0.00~100.00kHz	kHz	○
FF-18	Output terminal situation			○

FF-19	Main set frequency	0.01Hz	Hz	○
FF-20	Auxiliary setting frequency	0.01Hz	Hz	○
FF-21	Multi-speed present segment numbers			○
FF-22	Present PLC stage			○
FF-23	Input terminal decimal			○
FF-24	Output terminal decimal			○
FF-25	Communication set value			○
FF-26	IGBT temperature	0.1℃	℃	○
FF-27	Cumulative running time	H	H	○
FF-28	PLC finished running time			○
FF-29	PLC remaining running time			○
FF-30	PLC total running time			○
FF-31	Cumulative power consumption		KW.H	○
FF-32	Count value			○
FF-33	Length value			○
FF-34	PLC remaining time of present period			○
FF-35	Operation status	0: Power-on 1: Forward 2: Reverse 3: Stop 4: Faulty		○
FF-36	Present faulty code			○
FF-40	Actual value of upper limit frequency	0.01Hz	Hz	○
FF-41	Sleep timing			
FF-51	U phase current valid value	0.1A	A	○
FF-52	V phase current valid value	0.1A	A	○
FF-53	W phase current valid value	0.1A	A	○

Chapter 6 Key Function Parameter Explanation In Detail

F1-06	Deceleration stop braking start frequency	Factory default: 0.00Hz	Setting Range: 0.00 Hz~F0-05
F1-07	Deceleration stop brake waiting time	Factory default: 0.000s	Setting Range: 0.000s~32.000s
F1-08	Deceleration stop DC braking current	Factory default: 0%	Setting Range: 0~150%
F1-09	Deceleration stop DC braking time	Factory default: 0.000s	Setting Range: 0.0s~32.000s(no DC braking if it is 0.0s)

Stop braking start frequency: In the process of deceleration and stop, when output frequency reaches this frequency, it begins to enter into stop braking waiting;

Stop braking waiting time: During the period of stop braking waiting, the AC Drive would block the output, DC braking will be conducted after the delay. It is used to prevent the over current fault caused by DC braking when the speed is higher.

Stop DC braking current: It refers to the added DC braking value. The bigger the value, the bigger the braking torque.

Stop DC braking time: The duration time of DC braking.

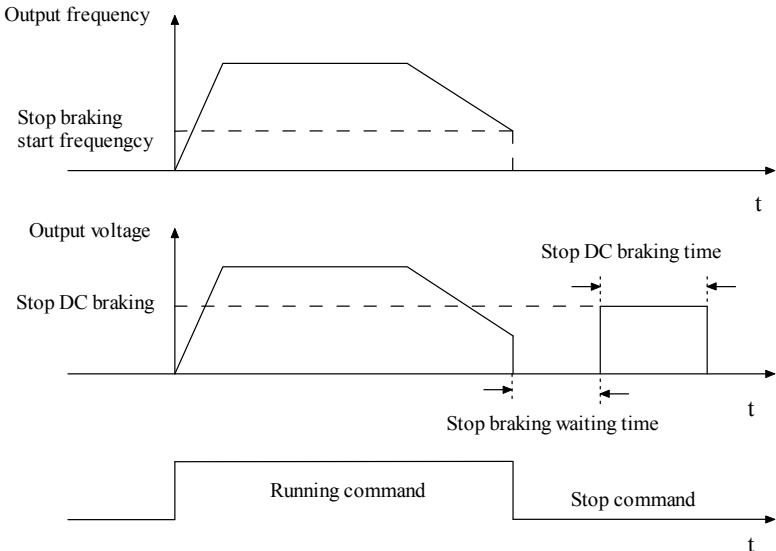


Figure 6-1 Schematic diagram of DC braking at deceleration to stop

F2-01	Torque boost	Model depends	Setting range: 0.1%~50.0%
F2-02	Cut-off frequency of torque boost	Default: 20.00Hz	Setting range: 0.00Hz~F0-17

In order to compensate the low-frequency torque characteristics of V/F control, some boost compensation is made for the output voltage at low frequency. However, if the torque boost is set too large, the motor

will easily overheat and the drive will be easily overcurrent. If the load is heavy and the motor starting torque is not enough, it is recommended to increase this parameter. The torque boost can be reduced when the load is lighter.

Cut-off frequency of torque boost: below this frequency, the torque boost torque is valid, if the set frequency is exceeded, the torque boost is invalid, as shown in Figure 6-2.

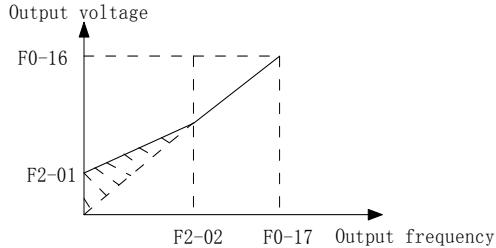


Figure 6-2 Schematic diagram of torque boost

F2-00	V/F curve setting	0:Linear V/F curve(Constant torque occasion) 1:2.0 times power drop torque V/F curve(Light load occasions such as fans and water pumps) 3:Multi-point VF curve(F2-03~F2-08,used for industrial washing machines, high frequency motors, centrifugal fans or special motors)	Factory default: 0
F2-03	Multi-point VF frequency point 1	Set range: 0.00Hz~F0-05	Factory default: 5.00Hz
F2-04	Multi-point VF voltage point 1	Set range: 0.0%~100.0%	Factory default: 15.0%
F2-05	Multi-point VF frequency point 2	Set range: 0.00Hz~F0-05	Factory default: 17.50Hz
F2-06	Multi-point VF voltage point 2	Set range: 0.0%~100.0%	Factory default: 45.0%
F2-07	Multi-point VF frequency point 3	Set range: 0.00Hz~F0-05	Factory default: 35.00Hz
F2-08	Multi-point VF voltage point 3	Set range: 0.0%~100.0%	Factory default: 80.0%

The multi-point V/F curve should be set according to the load characteristics of the motor. It should be noted that the relationship between the three voltage points and the frequency points must satisfy: $V1 < V2 < V3$, $F1 < F2 < F3$. Figure 6-3 is a schematic diagram of the multi-point VF curve setting.

Too high voltage setting at low frequency may cause the motor to overheat or even burn out, and the drive may over-current stall or indicate over-current protection.

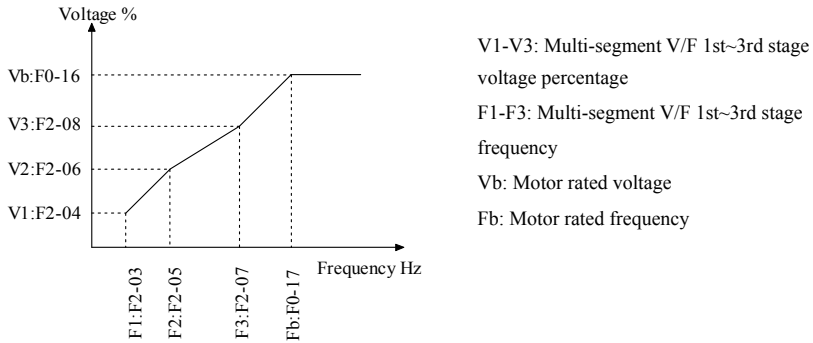


Figure 6-3 Multi-point V/F curve setting diagram

F3-00	Motor rated power	Set range: 0.4kW~1000.0kW	Model depends
F3-01	Motor rated current	Set range: 0.1A~3200.0A	Model depends
F3-02	Motor rated speed	Set range: 10rpm~32000rpm	Model depends
F0-16	Motor rated voltage	Set range: 10V~1000V	Factory default: 380V
F0-17	Motor rated frequency	Set range: 0.01Hz~F0-05	Factory default: 50.00Hz

The above function codes are motor nameplate parameters. Regardless of whether VF control or vector control is adopted, the relevant parameters need to be accurately set according to the motor nameplate.

F3-03	Motor resistance of stator	0.001Ω~32.000Ω(ac drive power≤55kW) 0.0001Ω~3.2000Ω(ac drive power>55kW)	Tuning parameters
F3-04	Motor resistance of rotor	0.001Ω~32.000Ω(ac drive power≤55kW) 0.0001Ω~3.2000Ω(ac drive power>55kW)	Tuning parameters
F3-05	Leakage inductance of stator and rotor	0.01mH~320.00mH(ac drive power≤55kW) 0.001mH~32.000mH(ac drive power>55kW)	Tuning parameters
F3-06	Motor stator and rotor mutual inductance	0.1mH~3200.0mH(ac drive power≤55kW) 0.01mH~320.00mH(ac drive power>55kW)	Tuning parameters
F3-07	Current without motor load	0.01A~F3-01(ac drive power≤55kW) 0.1A~F3-01(ac drive power>55kW)	Tuning parameters

F3-03~F3-07 are the parameters of asynchronous motors. These parameters are generally not on the motor nameplate and need to be automatically tuned by the ac drive. Among them, "Asynchronous motor static parameter auto-learning" can only obtain three parameters from F3-03 to F3-05, and "Asynchronous motor dynamic parameter auto-learning" can obtain all 5 parameters here.

When changing the rated power of the motor (F3-00), the ac drive will automatically modify the parameter values of F3-01~F3-07, and restore these 5 parameters to the commonly standard Y series motor parameters.

If it is not possible to tune the asynchronous motor on site, the corresponding function code above can be entered according to the parameters provided by the motor manufacturer.

F3-08	Motor parameter auto-learning	Set range: 0~2	Factory default::0
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In order to obtain better vector control performance, motor parameter tuning is required.

0: No operation; The auto-learning is banned.

1: Asynchronous motor dynamic parameter auto-learning

To ensure the dynamic control performance of the drive, please select complete tuning, at this time, the motor and load being disconnected, reserve the motor no-load and confirm the motor in the standstill state. During the complete tuning process, the drive performs static tuning firstly, and then accelerates to 90% of the rated motor frequency according to the acceleration time F0-10. After maintaining for a period of time, it decelerates and stops according to the deceleration time F0-11 and finishes the tuning.

Before the complete tuning of the asynchronous machine, it needs to set the motor nameplate parameters F3-00、F3-01、F3-02、F0-16、F0-17. For the complete tuning of the asynchronous motor, the ac drive can get F3-03~F3-07 five motor parameters.

Action instrument: Set the function code to 1, and then press the RUN key, the ac drive will perform dynamic parameter auto-learning.

2: Asynchronous motor static parameter auto-learning

It is suitable for the occasions where the asynchronous motor and the load are not easy to disconnect and cannot be fully tuned. Before the static tuning of the asynchronous motor, the motor nameplate parameters F3-00、F3-01、F3-02、F0-16、F0-17 must be correctly set. For asynchronous motor static tuning, the ac drive can obtain three parameters F3-03 ~ F3-05.

Action instrument: Set this function code as 2, then press RUN key, the ac drive starts the static tuning auto-learning.

Function code	Name	Setting	Function description
F0-13	Terminal command mode	0	Two-wire 1
F4-00	S1 terminal function selection	1	Forward running(FWD)
F4-01	S2 terminal function selection	2	Reverse running(REV)

This parameter defines 5 different modes to control the running of AC Drive through external terminals.

Note: For the convenience of explanation, the following three terminals S1, S2, and S3 among the multi-function input terminals of S1~S6 are arbitrarily selected as external terminals. That is, the functions of the three terminals S1, S2, and S3 can be selected by setting the values of F4-00~F4-02.

Terminal command mode 0: Two-wire mode 1. This mode is the most commonly used two-wire mode. Terminals S1 and S2 determine the forward and reverse running of the motor. The function code is set as follows:

K1	K2	Running command
1	0	Forward
0	1	Reverse
1	1	Stop
0	0	Stop

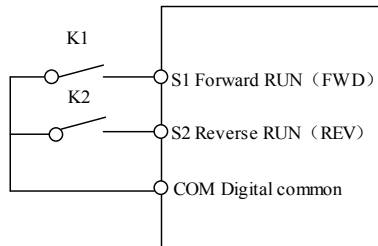


Figure 6-4 Two-wire mode 1

As shown in the figure above, in this control mode, the ac drive forward running when K1 is closed and reverse running when K2 is closed . K1 and K2 are closed or open at the same time, and the ac drive stops running.

Terminal command mode 1: Two-wire mode 2,With this mode, the S1 terminal function is the running enable terminal, and the S2 terminal function determines the running direction. The function code is set as follows:

Function code	Name	Set value	Function description
F0-13	Terminal command mode	1	Two-wire 2
F4-00	S1 terminal function selection	1	Running enable
F4-01	S2 terminal function selection	2	Forward and reverse running direction

K1	K2	Running command
1	0	Forward
1	1	Reverse
0	0	Stop
0	1	Stop

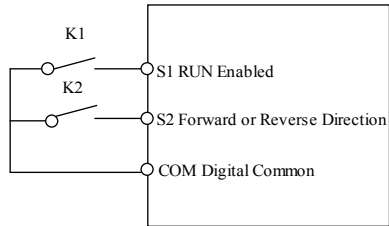


Figure 6-5 Two-wire mode 2

As shown in the figure above, in this control mode, the drive for forward rotation when K1 is closed and K2 disconnects , if K2 is closed, the drive reverse running; if K1 is disconnected, the drive stops running.

Terminal command mode 2: three wire control mode 1, In this mode, S3 is the enable terminal, the running command is specified by S1, and the direction is determined by the state of S2.

The function code is set as follows:

Function code	Name	Set value	Function description
F0-13	Terminal command mode	2	Three-wire 1
F4-00	S1 terminal function selection	1	Running enable
F4-01	S2 terminal function selection	2	Forward and reverse running direction
F4-02	S3 terminal function selection	3	Three-wire running control

K	Running direction
0	Forward running
1	Reverse running

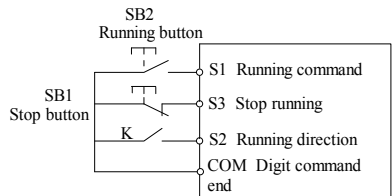


Figure 6-6 Three wire control 1

As shown in the figure above, in this control mode, when the SB1 button is closed, press the SB2 button and the drive starts to run . K disconnects the drive for forward rotation, K closes the drive for reverse rotation; the drive stops when the SB1 button is disconnected. During normal startup and operation, the SB1 button must be kept in the closed state, and the command of the SB2 button will take effect at the edge of the closing action.

Terminal command mode 3: three- wire control 2, in this mode , S3 is the enable terminal, and the start command is controlled by S1 and S2 respectively.

The function code set is as below:

Function code	Name	Set value	Function description
F0-13	Terminal command mode	3	Three- wire 2
F4-00	S1 terminal function selection	1	Forward running(FWD)
F4-01	S2 terminal function selection	2	Reverse running(REV)
F4-02	S3 terminal function selection	3	Three-wire running control

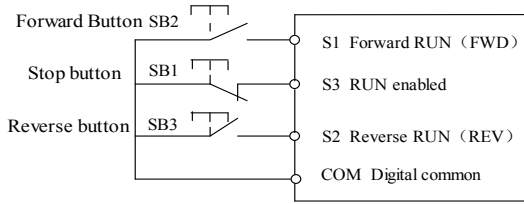


Figure 6-7 Three-wire control Mode 2

As shown in the figure above, in this control mode, when the SB1 button is closed, press the SB2 button, the drive will forward running, press the SB3 button and the drive will reverse running. When the SB1 button is disconnected, the drive will stop immediately. During normal startup and operation, the SB1 button must be kept in the closed state. The SB2 and SB3 button commands will take effect at the edge of the closing action. The running state of the drive is subject to the last key action of the 3 buttons.

Terminal command mode 4: three-wire control mode 3, The function is the same as the three-wire control mode 2, except that the three-wire running terminal is normally open (stop when closed).

F4-27	Set length	Set range: 0m~32000m	Factory default: 1000m
F4-28	Actual length	Set range: 0m~3200m	Factory default: 0m
F4-29	Number of pulses per meter	Set range: 0.1~3200.0	Factory default: 100.0

The above function codes are used for fixed-length control. The length information needs to be collected by the multifunctional digital input terminal. The number of pulses sampled by the terminal is divided by the number of pulses per meter F4-29, and the actual length F4-28 can be calculated. When the actual length exceeds the set length F4-27, the multifunctional digital DO outputs the "length reached" ON signal.

In the process of fixed length control, the length count reset operation can be performed by the multi-function input terminal (S function selection is 21). For details, please refer to the settings of H4-00~H4-05. In the application, the corresponding input terminal function needs to be set to "length

counting input" (function 18). When the pulse frequency is high, the S5 port must be used.

F4-30	Set count value	Set range: 1~32000	Factory default: 1000
F4-31	Designated count value	Set range: 1~32000	Factory default: 1000

The count value needs to be collected by the multi-function digital input terminal. In the application, the corresponding input terminal function needs to be set to "terminal count input" (function 26). When the pulse frequency is high, the S5 port must be used.

When the count value reaches the set count value F4-30, "set count value reached" ON signal is output by the multifunctional digital , and then the counter stops counting.

When the count value reaches the designated count value F4-31, the multifunctional digital output "designated count value reached" ON signal, at this time the counter continues to count, and the counter stops until the "set count value" reached.

The designated count value F4-31 should not be bigger than the set count value F4-30. Figure 6-8 is a schematic diagram of the set count value arrival and designated count value arrival function.

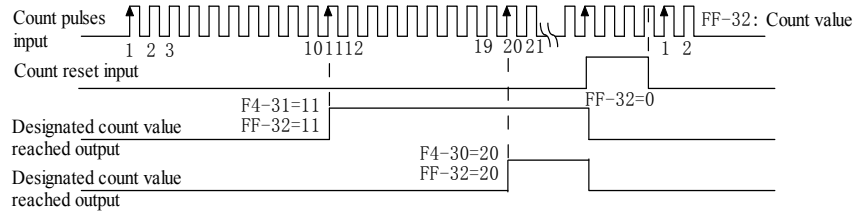


Figure 6-8 Schematic diagram of setting count value specified and designated count value specified

F5-13	Frequency arrival (FAR) detection width	Factory default: 5.0%	Setting range: 0.0~100.0% (Maximum output frequency)
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The output frequency of AC Drive output pulse signal in the positive and negative detection width of setting frequency, the detail is as the following figure 6-9.

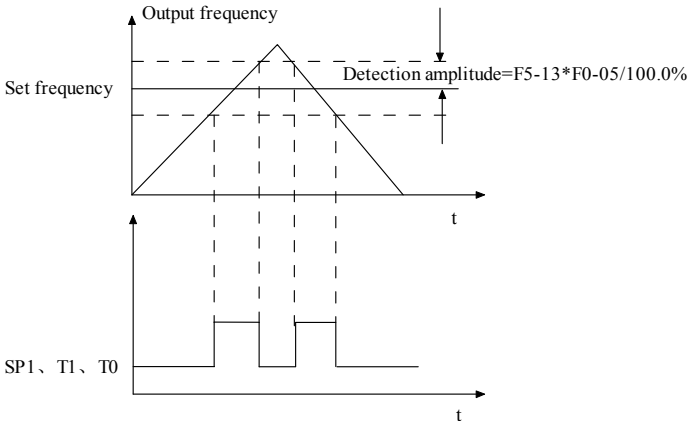


Figure 6-9 Frequency arrival diagram

F5-14	FDT electrical detection value	Factory default: 50.00Hz	Set Range: 00.00~F0-05
F5-15	FDT lag detection value	Factory default: 5.0%	Set Range: 000.0~100.0% (FDT electrical level)

ON signal is output when output frequency exceeds a setting frequency FDT electrical level until the output frequency is lower than F5-14*(1000- F5-15), the detail wave form is as the following Fig.

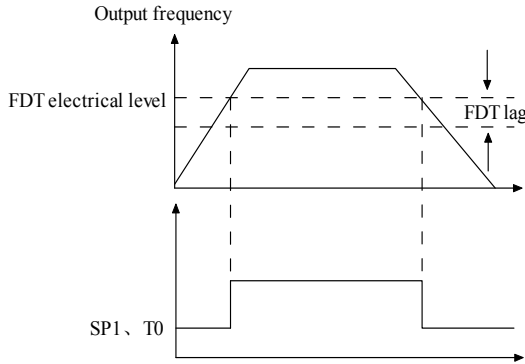


Figure 6-10 FDT diagram

Relationship list between multi-stage speed terminal and stage speed:

The relation between the state that multi-function input terminal select multi-speed terminal 4,3,2,1 and segments number of multi-speed and selected goal setting is as the following table. 0 represents the terminal disconnect of the corresponding function, 1 represents the closed terminal of the corresponding function.

Terminal 4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Terminal 3	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
Terminal 2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Terminal 1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Stage numbers	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Target set	F6-00	F6-01	F6-02	F6-03	F6-04	F6-05	F6-06	F6-07	F6-08	F6-09	F6-10	F6-11	F6-12	F6-13	F6-14	F6-15

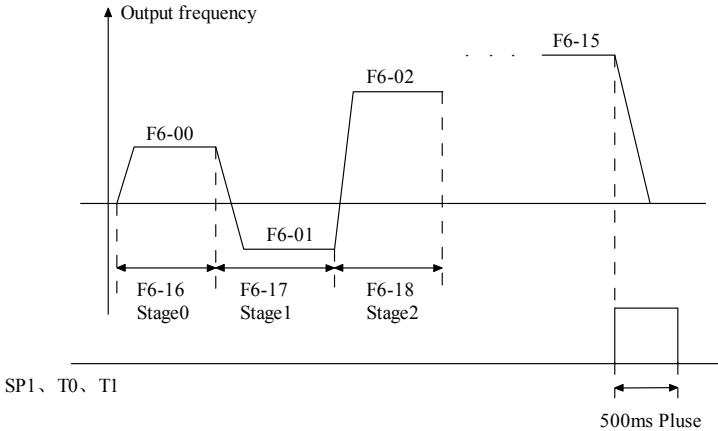


Figure 6-11 Simple PLC running diagram

FA-28	Switch frequency point between acceleration time 1 and acceleration time 2	Factory default: 0.00Hz	Set range: 0.00Hz~3000.0Hz
FA-29	Switching frequency point between deceleration time 1 and deceleration time 2	Factory default : 0.00Hz	Set range: 0.00Hz~3000.0Hz

This function is valid when the acceleration and deceleration time is not selected by the input terminal switch. It is used to select different acceleration and deceleration times according to the operating frequency range instead of by the S input terminal during the operation of the drive.

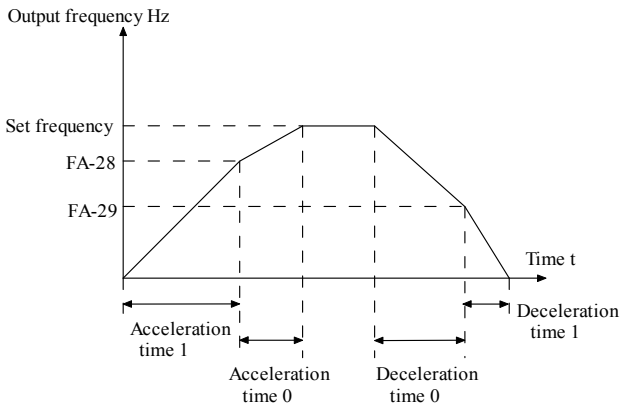


Figure 6-12 Schematic diagram of acceleration and deceleration time switching

During acceleration, if the operating frequency is less than FA-28, then select acceleration time 1; if the operating frequency is bigger than FA-28, then select acceleration time 0. In the deceleration process, if the running frequency is bigger than FA-29, the deceleration time 0 is selected, and if the running

frequency is less than FA-29, the deceleration time 1 is selected.

Fb-04	VF over current speed loss protection point	Factory default: 180.0%	Set range: 10.0%~210.0%
Fb-17	VF over current speed loss gain	Factory default: 5	Set range: 0~200

During the acceleration and deceleration of the drive, when the output current exceeds the over-current stall protection current, the drive stops the acceleration and deceleration process and maintains the current operating frequency, and then continues to accelerate and decelerate after the output current drops.

Over-current stall gain is used to adjust the ability of the drive to suppress over-current during acceleration and deceleration. The larger the value, the stronger the ability to suppress over-current. Under the premise of no overcurrent, the smaller the gain setting, the better. For the load with small inertia, the over-current stall gain should be small, otherwise the dynamic response of the system will slow down. For loads with large inertia, this value should be large, otherwise the suppression effect is not good, and overcurrent faults may occur. When the over-current stall gain is set to 0, the over-current stall function is canceled.

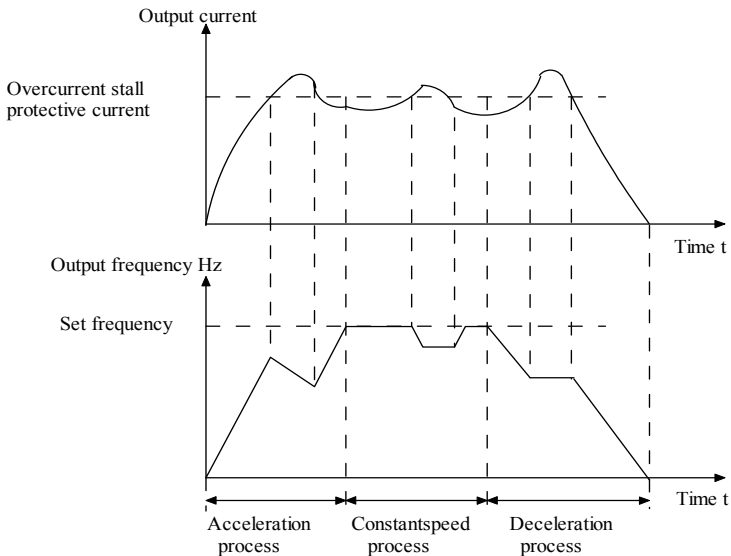


Figure 6-13 Schematic diagram of over current speed loss protection point

Chapter 7 Communication Protocol

7.1 Communication Allocation

Set baud rate and parity bit through F8-01.

7.2 Salve Machine Address

The address of AC Drive should be set through F8-00, 0 is broadcast address, slave address could be set to 1~247.

7.3 Function Code 03: Present Reading the Variant the Function Code

1、 Readable Parameter Address Scatter:

Function	Address	Data and meaning
Operation status	1001H	0001H: Running forward
		0002H: Running reverse
		0003H: Standby status
		0004H: Fault status
Monitoring parameters	3000H	Operating frequency 0.01HZ
	3001H	Setting frequency 0.01HZ
	3002H	Bus voltage 0.1V
	3003H	Output voltage 1V
	3004H	Output current 0.1A
	3005H	Rotating speed 1RPM
	3006H	Output power 0.1%
	3007H	Output torque 0.1%
	3008H	Reference PID 0.1%
	3009H	Feedback PID 0.1%
	300AH	Terminal input remark state
	300BH	Terminal output remark state
	300CH	Analog V1 value 0.1V
	300DH	Analog V2 value 0.1V
	300EH	Power consumption
	300FH	Reserve
	3010H	High frequency pulse HDI 0.01kHz
3011H	Multi-stage speed present phase	
3012H	PLC present phase	
Fault	5000H	0: No fault
		1: IGBT Short-circuits protection

		3: Over-voltage during stop
		4: Over-current during acceleration
		5: Over-current during deceleration
		6: Over-current in constant speed operation
		7: Over-voltage during acceleration
		8: Over-voltage during deceleration
		9: Over-voltage in constant speed
		10: DC Bus under-voltage fault
		11: Motor over-load
		12: AC Drive over-load
		13: Input side loss-phase
		14: Output side loss-phase
		15: Terminal input faulty due to lack water
		16: IGBT module's heatsink overheat
		17: External equipment fails
		18: Communication fault
		19: Current detection circuit has fault
		20: Auto-learning fails
		21: EEPROM operation fault
		22: PID feedback disconnected fault
		23: Braking kit fault
		24: PID feedback stress fault
		26: Motor loss protection
		29: Temperature sensor disconnect fault
		30: Clear the hardware latch timeout
		33: Software over-current during acceleration
		34: Software over-current during deceleration
		35: Software over-current in constant speed
		36: Software current-limiting timeout
		37: Keyboard "STOP" stop fault
		40: Hardware current-limit timeout
		41: Number of automatic reset exceeds the limit
Function parameter	Function code 16 system is FX.YZ	High address: FX Low address: YZ

☞Note: The function parameter of AC Drive divides into two part, one is high byte and another is low

byte; the high byte presents the group serial number of function parameter; the low byte presents function parameter within the group number and need witch to 16 system.

2、For Example

The upper machine read two data from the AC Drive, and the two data is setting frequency and DC bus voltage, the address is 3001H, 3002H, and the upper machine should send the data to AC Drive as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Read number high byte	Read number low byte	CRC Parity bit high byte	CRC Parity bit low byte
01	003	30	01	00	02	9A	CB

☞Note: The setting frequency of AC Drive is 50.00Hz(corresponding 16 system data is 1388H). Bus voltage is 540.0v (corresponding 16 system data is 1518H).The AC Drive feedback to the data to upper machine: $n=2$ is the number of variable quantity.

Slave address	Function code	Read number of byte($2*n$)	The first data high byte	The first data low byte	The second data high byte	The second data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	03	04	13	88	15	18	70	07

7.4 Function Code 06: Stands for the Function Code of Writing Variable

1、The address distribution of writing parameter

Function	Address	Data and meaning
Communication control command	1000H	0001H: Run forward
		0002H: Run reverse
		0003H:Jog forward
		0004H: Jog reverse
		0005H: Deceleration to Stop
		0006H:Coast to stop
		0007H: Fault reset
Address of communication setting frequency value	2000H	0.00%~100.00%, when setting 10000 (corresponding 16 system: 2710H), the specified frequency value is the maximum frequency.
PID setting address	2001H	0.0%~100.0%
PID feedback address	2002H	0.0%~100.0%
Torques setting value	2003H	-200.0%~200.0%
Function parameter	Function code 16 system is FX.YZ	High address: FX Low address: YZ

☞Note: When writing the RAM value of parameter, you could just change the register high address from F to O. If writing the RAM of F1-11, the register address is 010B. But the express method of register

address could not use to read the AC Drive function parameter.

2、 Examples of communication frame content

Examples 1:

The dec. time of AC Drive should change to 30.0s through upper machine, corresponding 16 system data is 012CH, and store this setting when power-off. Dec time F0-11 responds the address of 16 system is F00BH.

And the upper machine sends the data to AC Drive as follows

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit low byte
01	06	F0	0B	01	2C	CB	45

And the AC Drive feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit low byte
01	06	F0	0B	01	2C	CB	45

Examples 2:

The dec. time of AC Drive should change to 30.0s through upper machine, corresponding 16 system data is 012CH, and clear this setting when power-off. Dec time F0-11 responds the address of 16 system is 000BH.

And the upper machine sends the data to AC Drive as follows

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit low byte
01	06	00	0B	01	2C	CB	45

And the AC Drive feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit low byte
01	06	00	0B	01	2C	CB	45

Chapter 8 Troubleshooting

The possible faults of S210-SJ is listed below , and the fault code indicate range is from E001 and E003 ~ E041. Once a fault occurs, you may check it according to the table and record detailed phenomena before seeking service from the supplier.

8.1 Faults and Actions

Fault code	Fault categories	Possible reasons of fault	Actions
E001	IGBT module's shorted	Too short Acc time	Prolong the Acc time
		Inside IGBT is damaged	Seek service
		Interference causes the malfunction	Check peripheral equipment whether has strong interference
		Grounded is not good	Seeking service
E003	Over-voltage during stop	Bus voltage detection disconnect and bus voltage detection circuit fault	Detect bus voltage connection and replace the driving plate
E004	Over-current during acceleration	Too short Acc time	Prolong the Acc time
		Low AC supply voltage	Check the input power supply
		Drive power is too small	Select a higher power drive
E005	Over-current during deceleration	Too short Dec time	Prolong the Dec time
		Low AC supply voltage	Use suitable dynamic braking kit
		Drive power is too small	Select a higher power drive
E006	Over-current in constant speed operation	Sudden change of load or abnormal	Check the load or reduce the Sudden change of load
		Low AC supply voltage	Check the AC input power supply
		Drive power is too small	Select a higher power drive
E007	Over-voltage during acceleration	Abnormal input voltage	Check the input power supply
		The rotating motor re-starts after the drive stops instantly.	Avoid re-start after the drive stops instantly
E008	Over-voltage during deceleration	Too short Dec time	Prolong the Dec time
		Too big load inertia	Use big dynamic braking group
		Abnormal input voltage	Check the AC supply voltage
E009	Over-voltage in constant speed operation	Abnormal change of input voltage	Install input reactor
		Too big load inertia	Use suitable dynamic braking group
E010	DC Bus under-voltage	Low AC supply voltage	Check the AC supply voltage
E011	Motor over-load	Low AC supply voltage	Check the AC supply voltage
		Improper motor's rated current	Modify motor's rated current
		Load increases suddenly	Check the load, adjust the value of torque boost

Fault code	Fault categories	Possible reasons of fault	Actions
		The drive's and motor's power not matched with each other	Use suitable motor
E012	Drive over-load	Too short Acc time	Prolong the Acc time
		The rotating motor re-start	Avoid re-start after the drive stops instantly
		Low AC supply voltage	Check the AC supply voltage
		Too heavy load	Select a high power drive
E013	Input phase loss	Any of phase R, S and T cannot be detected	Check the input power supply Check the drive's output wiring
E014	Output phase failure	U, V, W output loss (or the 3-phase loads are serious asymmetry)	Check the drive's output wiring Check the cable and the motor
E015	Terminal input lack water	The Lack water terminal input signal is valid	Check for water shortages
			Check input terminal signals
E016	IGBT module's heatsink overheat	Vent is obstructed or fan does not work	Clean the vent or replace the fan
		Over-temperature	Lower the ambient temperature
		Wires or connectors of control board are loose	Check and rewiring
		Auxiliary power supply is damaged or IGBT driving voltage is too low	Seek service
		Short-circuit of IGBT bridge	Seek service
		Control board is abnormal	Seek service
E017	External equipment fails	Terminal SI used for inputting external faults acts	Check the input of the external device
E018	RS485 communication failure	Wrong baud rate setting	Set the baud rate correctly
		Serial port communication error	Press STOP/RST to reset, Seek service
		Communication break for long time	Check the wiring of serial port
E019	Current detection circuit has fault	Wires or connectors of control board are loose	Check and re-wire
		Auxiliary power supply is damaged	Seek service
		Hall sensor is damaged	Seek service
		Amplifying circuit is abnormal	Seek service
E020	Auto-learning fails	Motor's and drive's capacity doesn't match each other.	Replace the drive with another model
		Improper settings of parameters on the nameplate	Set the parameters correctly according to the nameplate
		Auto-learned and standard parameters have large deviations	Let the motor no load, re-identify

Fault code	Fault categories	Possible reasons of fault	Actions
		Overtime of auto-learning	Check the motor's wiring, parameters' settings
E021	EEPROM R/W fault	R/W fault of control parameters	Press STOP/RST to reset Seek service
		EEPROM damaged	Seek service
E022	PID feedback disconnected fault	PID feedback disconnected	Check PID feedback signal line
		The source of PID feedback disappears	Check the PID feedback source
E023	AD Zero drift is too large	Check Hall device abnormal	Change the hall devices
		Powerboard abnormal	Change the powerboard
E024	PID feedback bigger fault	PID feedback bigger	Check PID feedback signal wire, if the PID parameter setting too bigger
E025	Reserve		
E026	Motor drop protection	Load is too small or detached	Check the connection between motor bearing and load; Drop protection point set correctly or not.
E029	Temperature sensor disconnect fault	Poor contact of temperature sensor	Check the temperature sensor wiring
E030	Clear the hardware latch timeout	1: Over-voltage 2: Over-current	1. Over-voltage fault treatment 2. Over-current fault treatment
E037	Keyboard STOP failure	Press the stop key on the keyboard when the terminal operation channel or communication operation channel is running	Check whether it is manually operated
E040	Hardware current-limiting timeout	1. Whether the load is too large or the motor is blocked 2. Small Ac Drive selection	1. Reduce load and check motor and mechanical condition 2. Select a ac drive with higher power level
E041	The automatic reset times exceed the limit	External failure or Ac Drive failure	Check the fault record for troubleshooting

8.2 Common Fault and Handling Methods

During using the drive, the following faults may occur, please refer to methods in the simply analyzing the faults.

Phenomena	Possible reasons of fault	Actions
The drive doesn't	Drive's input supply is inconsistent with the	Check with a multi-meter and

display after power-on	rated voltage	troubleshoot the issue.
	3-phase rectifier bridge blasted	Seek service
	The drive cannot charge, CHARGE is OFF.	Seek service
The MCCB trips after power-on	Earth connecting between input power supplys or there is circuit short Troubleshoot the issue Rectifier breakdown, power and	Troubleshoot the issue
	Rectifier breakdown, power and motor wires connect wrongly	Seek service
The motor is standstill after the drive running	The 3-phase outputs among U, V, and W are unbalance.	Check if damaged or obstructed Set the parameters correctly according to the nameplate
	No output voltage	Seek service
The drive display is normal, after power-on, the MCCB of the power trips after operating	Phases shorted between output modules	Seek service
	Between the motor's lines are shorted or grounded	Troubleshoot the issue
	The distance between the motor and drive is far, Occasionally trips	Install output AC reactor

Guarantee Agreement

Warranty of the company products executes in accordance with "the quality assurance" in instructions.

1. Warranty period is 12 months from the date of purchasing the product

2. Even within 12 months, maintenance will also be charged in the following situations:

2.1. Incorrect operation (according to the manual) or the problems are caused by unauthorized repair or transformation.

2.2. The problems are caused by exceeding the requirements of standards specifications to use the drive.

2.3 After purchase, loss is caused by falling damage or improper transportation.

2.4 The devices' aging or failure is caused by bad environment (corrosive gas or liquid).

2.5 Earthquake, fire wind disaster, lightning, abnormal voltage or other accompanied natural disasters cause the damage.

2.6 Damage is caused during transport (note: the mode of transportation is determined by customers, the company helps to handle the transferring procedures of goods).

2.7 Unauthorized tearing up the product identification (e.g.: Nameplate, etc.); the serial number does not match the warranty card.

2.8 Failing to pay the money according purchase agreement.

2.9 Cannot objectively describe the installation, wiring, operation, maintenance or other using situation to the company's service units.