Preface

Thank you for purchasing the Basic drive developed and produced by Himel

The Basic series drive is a universal high-performance drive with advanced control performance such as large low-frequency torque, self-identification of motor parameters, and optimal acceleration and deceleration control; it has functions to meet different process requirements, such as multi-step control and simple PLC control , PI control, fixed-length control, droop control, automatic energy-saving operation, flexible frequency setting method, diversified frequency combination methods and combination algorithms, and other practical functions. It can be used to drive machine tools, cables, textiles, papermaking, food, packaging, chemicals, municipal engineering and other automated production equipment to meet the performance and function requirements of different industrial equipment.

Before using this drive, the users and relevant technicians shall read this manual carefully to ensure that the drive can be properly installed and operated, so that the drive can perform its best performance.

If there is any change to this user manual, please refer to the new version without notice.

High-performance Drive
User Manual

Version: V1.2

This product implements standards:

The design and production of this product refer to the latest national standards (GB or GB/T), International Electrotechnical Commission Standards (IEC) and International System of Units (SI). The technical parameters of the relevant parts can meet the requirements of national standards (GB or GB/T) and International Electrotechnical Commission Standards (IEC). Main standards:

GB/T 12668.2-2002 Adjustable Speed Electrical Power Drive Systems - Part 2: General Requirements - Rating Specifications for Low Voltage Adjustable Frequency AC Power Drive Systems

GB 12668.3-2012 Adjustable Speed Electrical Power Drive Systems - Part 3: EMC Requirements and Specific Test Methods

GB 12668.501-2013 Adjustable Speed Electrical Power Drive Systems - Part 5: Safety Requirements - Electrical, Thermal and Energy

GB/T 2423.1-2008 Environmental Testing for Electric and Electronic Products - Part 1: Test Methods Tests A: Cold

GB/T 2423.2-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods Tests B: Dry Heat

GB/T 2423.3-2016 Environmental Testing - Part 2: Testing Method - Test Cab: Damp Test, Steady State

GB/T 2423.4-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test method - Test Db: Damp heat, cyclic (12h+12h Cycle)

GB/T 2423.22-2012 Environmental Testing - Part 2: Test Methods - Test N: Change of Temperature

GB/T 2423.7-2018 Environmental Testing - Part 2: Test Methods - Test Ec: Rough Handling Shocks, Primarily for Equipment-type Specimens

GB/T4798.1-2005 Environmental Conditions Existing in the Application of Electric and Electronic Products Section 1: Storage

GB/T4798.2-2008 Environmental Conditions Existing in the Application of Electric and Electronic Products - Part 2: Transportation

GB/T4798.3-2007 Environmental Conditions Existing in the Application of Electric and Electronic Products - Part 3: Stationary Use at Weather-protected Locations

Danger

The drive must be reliably grounded. If the drive is not reliably grounded, there may be a potential danger of personal injury in the device.

Readers

This user manual is suitable for the following readers.

Driveinstallers, engineering technicians (electrical engineers, electrical operator s, etc.), designers, etc. Please ensure that this user manual reaches the end users.

Notational conventions in this manual

 **Caution:** Moderate or minor injuries may occur due to failure to operate as required.

 **Danger:** Deaths or serious injuries may occur due to failure to operate as required.

Table of Contents

Chapter I Product Specification and Ordering Instructions

1.1 Drive series models

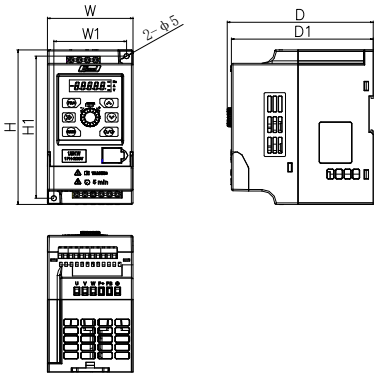
This drive has two voltage levels of 220V and 380V. The applicable motor power range is: 380V: 0.4kW-5.5kW; 220V: 0.4kW-2.2kW. The models of this series drives are shown in Table 1-1.

Table 1-1 Drive Models

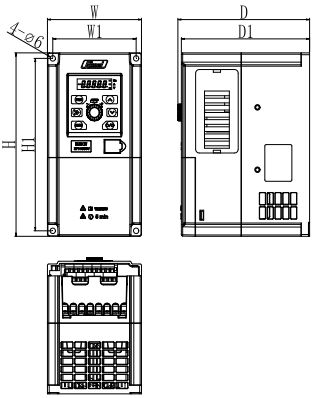
Drive model (G: Constant torque load)		Rated capacity (kVA)	Rated output current (A)	Adaptable motor (kW)
220V single phase	HAV-BA-2S0004G	0.75	2.4	0.4
	HAV-BA-2S0007G	1.5	4.5	0.75
	HAV-BA-2S0015G	2.7	7.1	1.5
	HAV-BA-2S0022G	3.7	9.8	2.2
380V three-phase	HAV-BA-4T0004G	0.75	1.5	0.4
	HAV-BA-4T0007G	1.5	2.3	0.75
	HAV-BA-4T0015G	2.7	3.7	1.5
	HAV-BA-4T0022G	3.7	5.0	2.2
	HAV-BA-4T0040G	7.5	8.8	4.0
	HAV-BA-4T0055G	9.0	13.0	5.5

Note: For other power stage models of 220V voltage level, please consult the manufacturer before ordering.

1.2 Product appearance and installation dimensions



(a) Specifications



(b) Specifications

Table 1-2 Drive Appearance and Installation Dimensions
(Unit: mm)

Specification	W	W1	H	H1	D	D1	Mounting hole diameter (Φ)	Reference diagram
HAV-BA-4T0004G	80	68	150	138	136.5	133	5	(a)
HAV-BA-2S0004G								
HAV-BA-4T0007G								
HAV-BA-2S0007G								
HAV-BA-4T0015G								
HAV-BA-2S0015G								
HAV-BA-4T0022G								
HAV-BA-4T0055G	106	94	200	188	148.5	144.6	6	(b)
HAV-BA-4T0040G								
HAV-BA-2S0022G								

1.3 Optional parts

1.3.1 Remote control Keypad

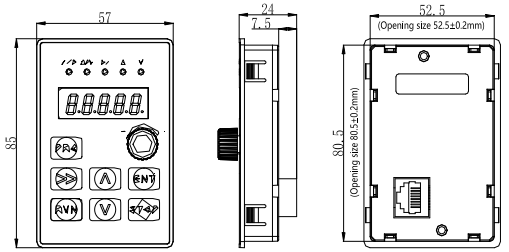


Figure 1-1 Remote Control Keypad 1 (HAV-BA-LKD)

Note: The standard available lengths of optional network cables are 2m and 5m. If you need network cables of other specifications, please order separately.

1.3.2 Dustproof sticker (cover plate)

Figure 1-2 Dustproof Sticker

Table 1-3 Dustproof Sticker Table

Dustproof sticker model	Adaptable models

HAV-BA-4T0022	HAV-BA-4T0004G, HAV-BA-2S0004G, HAV-BA-4T0007G, HAV-BA-2S0007G, HAV-BA-4T0015G, HAV-BA-2S0015G, HAV-BA-4T0022G

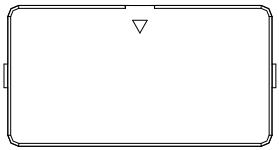


Figure 1-3 Dustproof Cover Plate

Table 1-4 Dustproof Cover Plate Table

Dustproof cover plate model	Adaptable models
HAV-BA-4T0040 (black)	HAV-BA-4T0055G, HAV-BA-4T0040G, HAV-BA-2S0022G,

1.4 Braking resistors

Please select energy consumption braking resistors according to Table 1-5 and Table 1-6. The wiring of the braking resistors is shown in Figure 1-4.

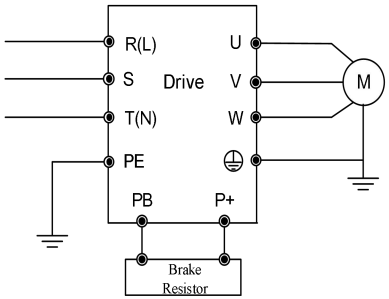


Figure 1-4 Drive and Braking Resistor Connection Diagram

Note:

1. The power derating of the braking resistor shall not exceed 30%, otherwise there is a risk of fire;
2. The length ot the wire for braking resistor shall be less than 5m. During the braking process, the braking resistor will cause temperature rise due to energy consumption. During

installation, pay attention to safety protection and sound ventilation.

The braking resistor resistance and the power are selected according to the actual situation. The greater the system inertia, the shorter the deceleration time required, the more frequent the braking, the greater the power required by the braking resistor and the smaller the resistance required. Table 1-5 and Table 1-6 are recommended based on general applications (braking usage rate is 10%).

Table 1-5 Braking Resistor Selection Table (380V Voltage Level)

Specification	Suitable motor power (kW)	Braking resistor recommended Resistance (Ω)	Braking resistor recommended Power (W)
HAV-BA-4T0004G	0.4	≥750	75
HAV-BA-4T0007G	0.75	≥500	100
HAV-BA-4T0015G	1.5	≥300	200
HAV-BA-4T0022G	2.2	≥200	200
HAV-BA-4T0040G	4.0	≥200	300
HAV-BA-4T0055G	5.5	≥80	750

Table 1-6 Braking Resistor Selection Table (220V Voltage Level)

Specification	Suitable motor power (kW)	Braking resistor recommended Resistance (Ω)	Braking resistor recommended Power (W)
HAV-BA-2S0004G	0.4	≥200	75
HAV-BA-2S0007G	0.75	≥150	100
HAV-BA-2S0015G	1.5	≥100	200
HAV-BA-2S0022G	2.2	≥75	300

Chapter II Installation and Wiring of Drive

2.1 Drive installation environment

2.1.1 Installation environment requirements

(1) Install in a well-ventilated indoor place. The ambient temperature is required to be within the range of -10ºC-40ºC. If the temperature exceeds 40ºC, external forced cooling or derating is required.

(2) Avoid installing in places with direct sunlight, dusty, floating fibers and metal powder.

(3) Do not install in places with corrosive or explosive gases.

(4) The humidity is required to be lower than 90%RH, without condensation of water droplets.

(5) Install in places where the plane fixed vibration is less than 5.9 m/s^2.

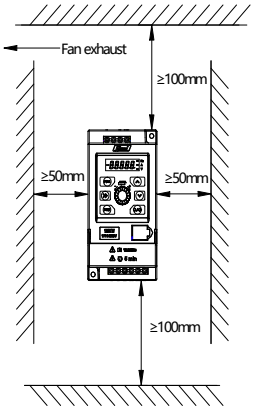
(6) Try to keep away from electromagnetic interference sources and other electronic instruments and equipment that are sensitive to electromagnetic interference.

2.1.2 Installation direction and space

(1) Generally, vertical installation shall be adopted.

(2) Minimum installation gaps and distances are shown in Figure 2-1.

(3) When multiple drives are installed up and down, the BAffle applied in the middle is shown in Figure 2-2.



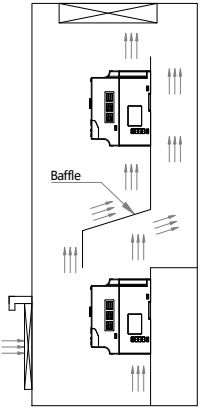


Figure 2-1 Installation Gap Diagram Figure 2-2 Installation Diagram ofMultiple Drives

2.1.3Mechanical installation methods and steps(wall-mounted installation and guide rail installation are supported)

1. Wall-mounted screw installation

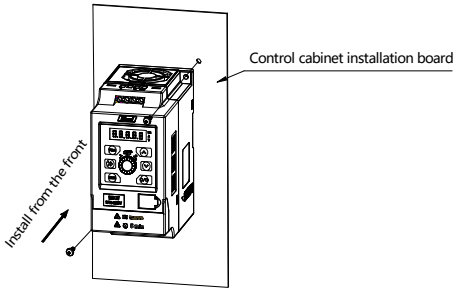


Figure 2-3 Wall-mounted Installation Diagram

2. Guide rail installation

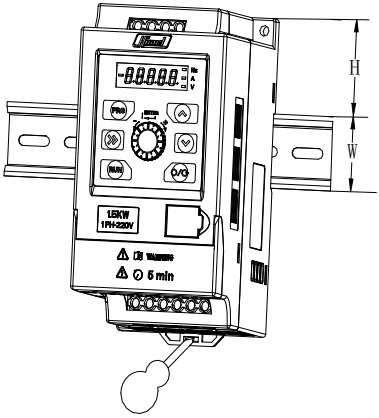


Figure 2-4 Guide Rail Installation Diagram

(1) Use a slotted screwdriver to insert into the slide block groove at the bottom, to move the slide block out;

(2) Install the machine onto the guide rail support, push the guide rail slide block up to the original place and clamp.

Note: H is 45mm, W is 35mm

Table 2-1 Guide Rail Installation Table

Specification	Whether supported
HAV-BA-4T0004G	Supported
HAV-BA-2S0004G	
HAV-BA-4T0007G	
HAV-BA-2S0007G	
HAV-BA-4T0015G	
HAV-BA-2S0015G	
HAV-BA-4T0022G	
HAV-BA-4T0055G	Not supported
HAV-BA-4T0040G	
HAV-BA-2S0022G	

2.2. Removal and installation of keypad

1. RJ45 flip shell

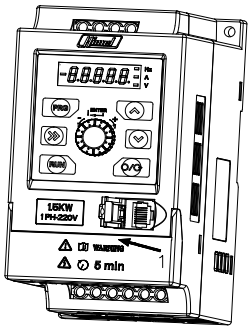


Figure 2-5 RJ45 Flip Shell's Open-Connect External Keypad

2. Wiring flip shell

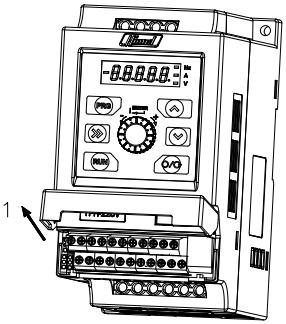


Figure 2-6 Wiring Flip Shell's Open-Control Terminal Wiring

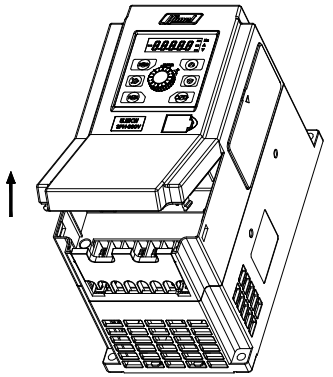
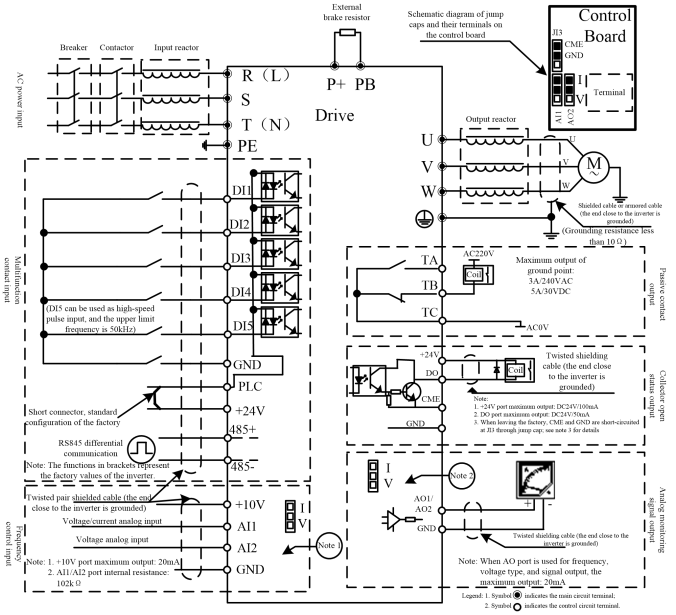


Figure2-7 Wiring Flip Shell's Open-Control Terminal Wiring

2.3 Standard wiring diagram



Note 1: The AI1 port can receive both voltage signals and current signals; AI1 (three-PIN needle on corresponding control board, the bottom left one is for AI1) in the corresponding wiring diagram (as shown in the upper right corner of the above figure); short the middle and the upper pin

for current signal input; short the middle and bottom pin for voltage signal input; the AI2 port can only receive voltage signals.

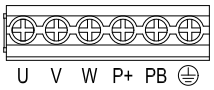
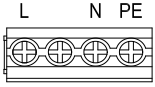
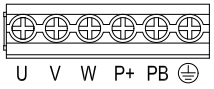
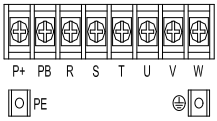
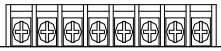
Note 2: The AO2 port can output both voltage signals and current signals; AO2 (three-PIN needle on corresponding control board, the bottom right one is for AO2) in the corresponding wiring diagram (as shown in the upper right corner of the above figure); short the middle and the upper pin for current signal input; short the middle and bottom pin for voltage signal input; the AO1 port can only output voltage signals.

Note 3: The standard factory configuration of CME and GND is that the middle pin of JI3 is short-circuited to its upper pin (under standard factory configuration, DO port uses the internal +24V as the pull-up power supply, and its ground system is drive GND), that is, CME is short circuited to GND; when GND interfaces are insufficient, the CME interfaces can be used as GND interfaces;

When DO port uses the external +24V power supply as pull-up (DO port is pulled up to +24V through 4.7K resistance), just remove the jump cap of JI3 port (just place the short-circuited cap to the JI3 middle pin and the lower pin, to avoid loosing jump cap), in this case, CME is short-circuited to the ground system of external +24V power supply.

2.3.1 Wiring of main circuit terminals

(1)The main circuit input and output terminals are shown in Table 2-2.

Applicable models	Main circuit terminals	Terminal name	Function description
HAV-BA-4T0004G HAV-BA-4T0007G HAV-BA-4T0015G HAV-BA-4T0022G		R, S, T	Three-phase AC 380V input terminal
		PE	Protective ground terminal
		U, V, W	Three-phase AC output terminal
		P+, PB	Braking resistor wiring terminal
		⏚	Motor ground terminal
HAV-BA-2S0004G HAV-BA-2S0007G HAV-BA-2S0015G		L, N	Single-phase AC input terminal
		PE	Protective ground terminal
		U, V, W	Three-phase AC output terminal
		P+, PB	Braking resistor wiring terminal
		⏚	Motor ground terminal
Applicable models	**Main circuit terminals**	**Terminal name**	**Function description**
HAV-BA-4T0040G HAV-BA-4T0055G		R, S, T	Three-phase AC 380V input terminal
		U, V, W	Three-phase AC output terminal
		P+, PB	Braking resistor wiring terminal
		PE	Protective ground terminal
		⏚	Motor ground terminal
HAV-BA-2S0022G		L, N	Single-phase AC input terminal

		U, V, W	Three-phase AC output terminal
		P+, PB	Braking resistor wiring terminal
		PE	Protective ground terminal
		⏚	Motor ground terminal

(2) The selection of main circuit cable diameter and protection circuit breaker QF or fuse at VSD input in show in Table 2-3:

Specification	Circuit breaker (A)	Fuse (A)	Recommendedinput and outputpower wires(mm^2)	Control wire (mm^2)
HAV-BA-4T0004G	10	10	1.5	1
HAV-BA-2S0004G	10	10	1.5	1
HAV-BA-4T0007G	10	10	1.5	1
HAV-BA-2S0007G	10	10	1.5	1
HAV-BA-4T0015G	10	10	1.5	1
HAV-BA-2S0015G	20	16	2.5	1
HAV-BA-4T0022G	16	10	2.5	1
HAV-BA-4T0040G	20	16	2.5	1
HAV-BA-4T0055G	25	25	4.0	1

2.4 Control circuit configuration and wiring

2.4.1 Control circuit terminal arrangement is as follows

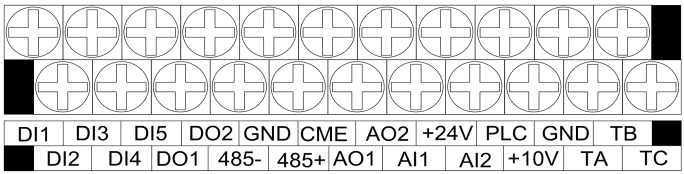


Figure 2-8 Arrangement Sequence of Control Plate Terminals

2.4.2 Control terminal function description is shown in Table 2-4.

Table 2-4 Control Terminal Function Table

Category	Terminal Label	Name	Terminal function description	Specification
Communication	485+	RS485 communication interface	RS485 differential signal positive terminal	For standard RS485 communication interface, please use twisted pair or shielded wire.
	485-		RS485 differential signal negative terminal	
Multifunctional output terminal	DO1	Open collector output terminal	It can be programmed and defined as switch output terminal with multiple functions, see terminal function parameter F6.11 for details/output terminal function introduction (common port CME)	Optocoupler isolated output; Working voltage range 9-30V; Maximum output current: 50mA
Multifunctional output terminal	DO2	Open collector output terminal	It can be programmed and defined as switch output terminal with multiple functions, see terminal function parameter F6.12 for details/output terminal function introduction (common port CME)	Optocoupler isolated output; Working voltage range 9-30V; Maximum output current: 50mA; Maximum output frequency: 50kHZ;
Analog Input	AI1	Analog input AI1	AI1 terminal receiving analog current, and voltage input (selected and switched through jump cap)	Input voltage range: 0～10V (input impedance: 102kΩ) Resolution: 1/1000 Input current range: 0～20mA (input impedance: 255Ω) Resolution: 1/1000
	AI2	Analog input AI2	Receives analog voltage input	
Analog output	AO1	Analog output	Provides analog voltage output, which can correspond to 12 physical quantities (see F5.25 for details)	Voltage output range: 0~10V
	AO2	Analog output	Provides analog voltage output, and current output (AO2 terminal can be realized by jump cap) can correspond to 12 physical quantities (see F5.26 for details)	Voltage output range: 0~10V Current output range: 0~20mA

Multifunctional input terminal	DI1	Multifunctional input terminal 1	It can be programmed and defined as switch input terminal with multiple functions, see Chapter VI for terminal function parameters (switch input and output) input terminal function introduction. (See F6.00-6.04 for details)	The forward and reverse functions can be configured for the terminal; DI5 can be used as a high-speed pulse input terminal, and the upper limit of the input frequency is 50kHZ;
	DI2	Multifunctional input terminal 2		
	DI3	Multifunctional input terminal 3		
	DI4	Multifunctional input terminal 4		
	DI5	Multifunctional input terminal 5		
Power supply	+10V	+10V power supply	Provides +10V power supply for external use	Maximum output current: 20mA
	+24V	+24V power supply	Digital signal power supply	Maximum output current: 100mA
	GND	Power supply common port	Power reference ground (including +10V and +24V)	It is the only ground system on the control board.
	PLC	Multifunctional input common port	Common port of DI1-DI5	Shot-circuited to +24V as factory default.
	CME	Digital output common port	Common port of multifunctional DO1 and DO2.	Short-circuited to GND as factory default.
Relay output terminal	TA TB TC	Programmable relay output	Usually, TA-TB is normally open, and TA-TC is normally close; during operating, TA-TB is normally close, and TA-TC is normally open.	NO: 5A 250VAC NC: 3A 250VAC

2.4.3 Wiring of communication terminal

PLC or PC is used for master control, with the drive as the slave, which are connected through RS485. It can realize single master and single slave communication or single master and multiple

slaves communication. With the increasing connection units, the communication system becomes more susceptible tothe interference, so it is suggested to connect wires as follows (see Annex for communication protocol):

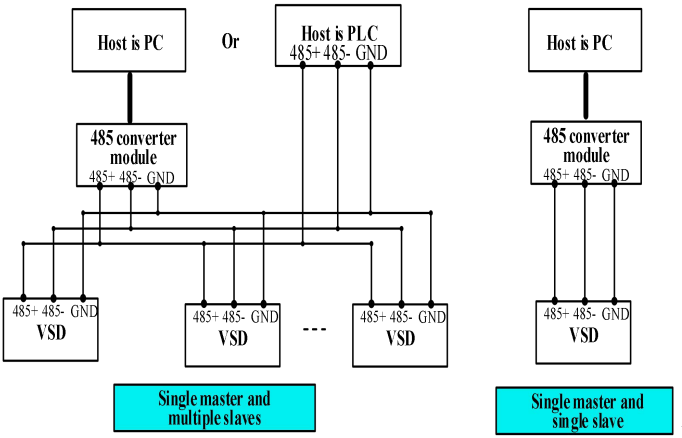
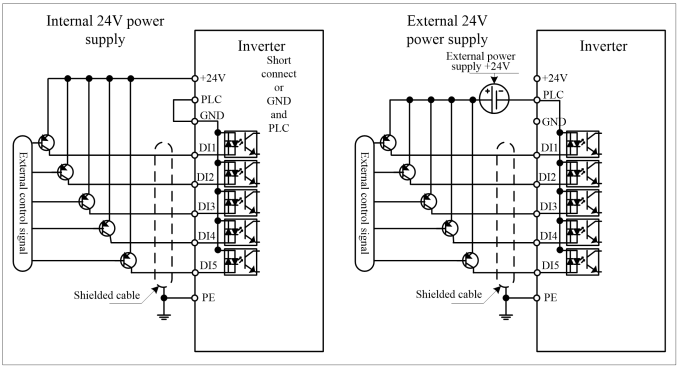


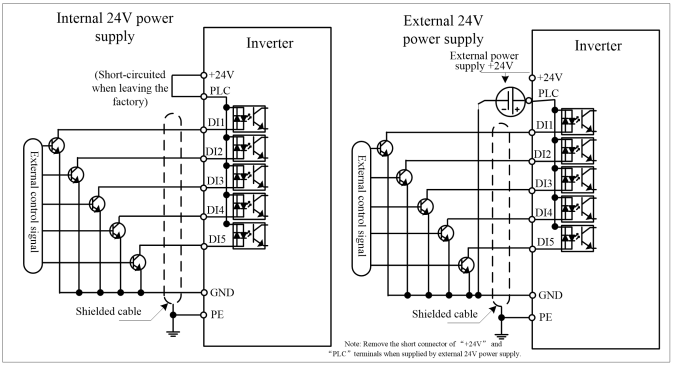
Figure 2-9 Wiring of Communication Terminal

2.4.4 Multifunctional contact input wiring

(1) Wiring method of PNP characteristic transistor



(2) Wiring method of NPN characteristic transistor



Chapter III Operation Instructions of Drive

3.1 Key function description

The drive operation panel is provided with 7 keys and 1 rotary encoder. The functions are defined in Table 3-1.

Table 3-1 Operation Panel Function Table

Key	Name	Label in the manual	Function description
PRG	Program/Exitkey	PRG	Enter or exit programming state
RUN	Run key	RUN	In the operationmode, press this key to run the drive.
STOP/RST	Stop key	STOP/RST	When the drive is in the normal running state and the drive's running instruction channel is set to the keypad, press this key to stop drive according to the set mode. When the drive is in the fault state, press this key to reset the drive and return to the normal stop state.
▲	Increase key	▲	Increase data or function code
▼	Decrease key	▼	Decrease data or function code
▶▶	Shift key	▶▶	In the edit state, you can select the modification bit of the set data
ENTER	Rotary encoder		When pressed down, it is the ENTkey, you can enter the drop-down menu or data confirmation. When the frequency channel is given by the keypad, the rotary encoder can modify the set frequency of the drive.

3.2 Keypad operation methods

You can perform various operations on the drive by keypad, as follows:

3.2.1 Shortcut monitoring parameter view

6 shortcut parameters are fixed to be displayed in the shortcut monitoring interfacewhich can be switched by the Up or Down key. When the ENT key is pressed down in this interface, it will immediately return to the first shortcut parameter. 6 shortcut parameter sequence list is in the below table:

Shortcut parameter 1	Determined by function code FC.17
Shortcut parameter 2	Output current
Shortcut parameter 3	Bus voltage
Shortcut parameter 4	Set frequency
Shortcut parameter 5	AI1
Shortcut parameter 6	Terminal state 1

The above table shows shortcuts in the general mode, which will vary with different industry code for different industrial

3.2.2 Settings of function code parameters

The function parameter system of this drive includes function code F0～FF group, monitoring parameter U0 group, and fault record parameter U1 group. Each function group includes several function codes. The function code is identified by (function code group number + function code number). For example, "F5.08" indicates the 8th function code of the 5th function group.

Function code setting example:

Example 1: Change the forward jog frequency setting from 5Hz to 10Hz (ChangeF2.20from 5.00Hz to 10.00Hz)

1) Press the PRG key to enter the programming state, thedigital display will show function parameter "**-F0-**" and press the ▲ key to make the LED display to show "**-F2-**".

2) Press ENT, you will see the digital display shows function parameter "**F2.00".**

3) Press the ▲ key to change the digital display to display function parameter "**F2.20**".

4) Press the ENT key, you will see the value (5.00) corresponding to F2.20, meanwhile, the LED labeled "Hz" lights up.

5) Press the ▶▶ key and shift to the highest bit "5", and press the ▲ key five times, to change to **10.00**.

6) Press the ENTkey.If the parameter does not flash, it indicates the modification is successful.

7) Press the PRGkey to exit the programming state.

Note: In P.off state, it is forbidden to modify the function code parameter.

3.2.3 Jog function operation

Use the keypad to perform the jog operation of the drive:

1) Press the PRG key three times to enter the jog operation state, and the digital tube displays function parameter "**JOG-".**

2) Press and hold the Up key to forwardjog.

3) Press and hold the Down key to reverse jog.

3.2.4 Parameter upload and download operations

The external keypad has the functionality of uploading and downloading the function code.

1) On the external keypad, press the ▶▶key + the ▲ key, to execute the function code uploading function. The external keypad reads all the function code values from the control board, and then writes into the keypad memory chip.

2) On the external keypad, press the ▶▶ key + the ▼ key, to execute the function code downloading function. The external keypad reads all the function code values from the memory chip, and then writes into the drive control board chip. However, when downloading, the keypad will automatically distinguish the software version, drive voltage level, and drive power level. The specific conditions are as follows:

a. If the downloaded function code is inconsistent with the drive software version of the parameter to be downloaded, it will not be downloaded and an E028 fault will be reported.

b. If the downloaded function code is inconsistent with the drive voltage level of the parameter to be downloaded (e.g. The downloaded function code is of 2S model, but the drive is of 4T model), it will not be downloaded and an E028 fault will be reported.

c. If the downloaded function code is consistent with the drive voltage level of the parameter to be downloaded but the power level is inconsistent, only F3 group motor related parameters will not be downloaded, and all the other parameters will be downloaded normally.

d. If the downloaded function code is consistent with the drive software version, voltage level, and power level of the parameter to be downloaded, all parameters will be downloaded.

Remarks:

1. The machine's standard external keypad is a short-line keypad (the length of the keypad line is 15m or less). The keypad does not support online update software;

2. The long-line keypad (the length of the keypad line is 80m or less) is an optional accessory. The long-line keypad with LCD screen supports online software update. If the customer needs a long-line keypad, special instructions are needed for special treatment of the whole machine.

Chapter IV Function Parameter Table

4.1 Function parameter table

Description of symbols in the table:

× - Indicates this parameter cannot be changed during the operation. ○ - Indicates this parameter can be changed during the operation.

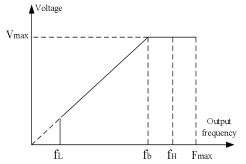
● - Indicates the actual test parameter, which cannot be changed. *- Indicates this parameter is the reserved parameter by the manufacturer, which is prohibited to be changed.

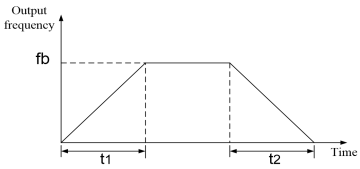
<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td colspan="6">F0 group:System management parameter</td></tr>
<tr><td>F0.00</td><td>Parameter operation protection</td><td>0: Password operation. You can view the function code value without entering a password, but you cannot change it. You need to enter the correct password in F0.05 before changing the function code.
1: Password operation. You cannot view the function code value when no password is entered, and the function code will display “-----”. You need to enter the correct password in F0.05 before viewing and changing the function code.
Note: This function will take effect only after setting the function code operation password in F0.05.</td><td>1</td><td>0</td><td>○</td></tr>
<tr><td>F0.01</td><td>Reserved</td><td>-</td><td>-</td><td>-</td><td>*</td></tr>
<tr><td>F0.02</td><td>Drive operation deadline</td><td>Set range: 0~Maximum timing 65535h
0 indicates unlimited</td><td>1h</td><td>0h</td><td>○</td></tr>
<tr><td>F0.03</td><td>Parameter initialization</td><td>0: No operation
1: Restore the factory settings (the drive model, running time, and fault records will not be restored)
2: Clear the fault memory information (clear fault memory parameters of U1 group)</td><td>1</td><td>0</td><td>×</td></tr>
<tr><td>F0.04</td><td>Industry code</td><td>0: Universal drive
1: Special drive for water supply
Note: Changing the industry code will restore other function codes to their factory settings.The factory value of part of function codes of the special drive for water supply is set according to the following list:
<table><tr><th>Function code</th><th>Factory value</th></tr><tr><td>F1.01</td><td>1</td></tr><tr><td>F1.02</td><td>8</td></tr><tr><td>F8.14</td><td>4ms</td></tr><tr><td>F8.15</td><td>5.0%</td></tr><tr><td>FC.17</td><td>14</td></tr></table></td><td>1</td><td>0</td><td>×</td></tr>
<tr><td>F0.05</td><td>Function code</td><td>Set range: 0~65535</td><td>1</td><td>0</td><td>○</td></tr>
</table>

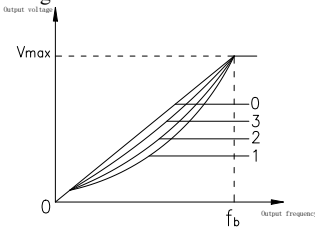
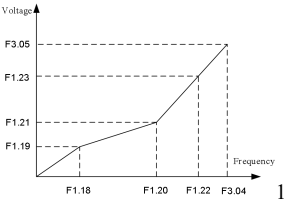
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
	operation password	0 indicates no password, set any non-zero number, the password protection function will take effect immediately, please keep the set password in mind. After setting the password, if you want to clear the password, you must enter the correct password first, and then set the password value to 0. After setting the password, if you want to change the password, you must clear the password before you can set a new password. **Note: The password protection authority is set in F0.00, which is used to prohibit unauthorized personnel from viewing/ changing the function code parameters.**			
		Basic operating parameters of F1 group			
F1.00	Control method	0: Reserved 1: V/F control: Sound versatility, and stable operation. It can effectively improve low-frequency torque and suppress current oscillation, with slip compensation and automatic voltage adjustment functions, control accuracy can be improved further.	1	1	×
F1.01	Run command channel selection	0: Operation panel run command channel: By usingtheRUN key, and the stop key, you can control the drive to run and stop. Press and hold the ▲ key and the ▼ key in the "**JOG-**" interface, you can perform forward jog and reverse jog. 1: Terminal run command channel: Control the running and stopping (forward, reverse, forward jog, reverse jog, etc) of the drive through the multifunctional input terminal.The corresponding multifunctional input terminal's function must be defined by the F6 and Fd parameter groups. 2: Serial port run command channel: Control the running and stopping of the drive through communication.	1	0	○
F1.02	Main frequency X input channel selection	0: Keypad's digital potentiometer: The frequency is set by adjusting thepotentiometer on the kepad. 1: Digital input 1:By setting frequency by modifying function code F1.05 (corresponding to auxiliary frequency Y)	1	0	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.03	Auxiliary frequency Y given channel selection	or F1.07 (corresponding to main frequency X). 2: Digital input 2: The frequency is adjusted by setting the UP/DN function through the multifunctional input terminals. 3: Digital input 3:By using communication input. The frequency is set by the serial port's frequency set command. 4: AI1:Set frequency is determined by AI1 terminal's analog voltage/current. Input range: 0～10V or 0～20mA (AI1 jumper selection), and the corresponding frequency curve is set using F5.00～F5.05 function code. 5: AI2: Set frequency is determined by AI2 terminal's analog voltage. Input range: 0～10Vand the corresponding frequency curve is set using F5.06～F5.11 function code. 6: Terminal pulse Input:The set frequency is determined by the terminal pulse frequency (input by DI5, and the function code F6.19 needs to be set to "high-frequency pulse input" function), the input pulse signal frequency range is 0~50.0kHz, and the corresponding frequency curve is set using F5.19～F5.23 function code. 7: Multistage instruction input:Select simple PLC operation or multistage speed operation through function code F9.00 to run drive in multistage instruction mode. When multistage speed operation is selected, set the multistage speed terminal combination through group F6 and Fd to set the current running stage, the current running frequency and acceleration/deceleration time through group F9 function code. When simple PLC operation is selected, determine the PLC operation mode, the number of operation stages, the phase operation frequency, the phase operation direction, and the phase operation time through group F9 function code.	1	1	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		8: PID input:The drive operation mode is process PID control, and the operation frequency is the frequency value after PID action. In this case, you need to set PID related parameters through group F8. 9: External keypad analog potentiometer input: The frequency is set by adjusting the analog potentiometer on the external keypad. 10-15: Reserved			
F1.04	Frequency source combination mode	0: X: the current frequency is set to the main frequency X. 1: Y: the current frequency is set to the auxiliary frequency Y. 2: X+Y: the current frequency is set to the main frequency X + the auxiliary frequency Y. 3: X-Y: the current frequency is set to the main frequency X - the auxiliary frequency Y. 4: Max (X,Y):The larger of the main frequency X or the auxiliary frequency Yis the set frequency. 5: Min (X,Y): The smaller of the main frequency X or the auxiliary frequency Y is the set frequency. **Note: If the X and Y directions are not the same, the frequency direction after the combination of 2 and 3 is based on the main frequency X, while 4 and 5 is based on the selected frequency direction. Beside this, it is based on the absolute value of the main and auxiliary frequencies during calculations. If the calculated value is less than 0, it will run at zero frequency.** **The combination mode can be switched using the multifunctional input terminal (group F6).**	1	0	○
F1.05	Digital setting of auxiliary frequency Y	Set range: Lower limit frequency~upper limit frequency When the auxiliary frequency Y inputchannel is selected to “digital setting 1”, this function code value is the set frequency value of the auxiliary frequency Y.	0.01Hz	50.00 Hz	○
F1.06	Maximum	Set range: Upper limit frequency～	0.01Hz	50.00	×

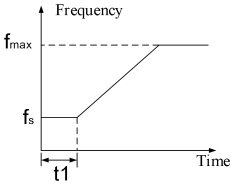
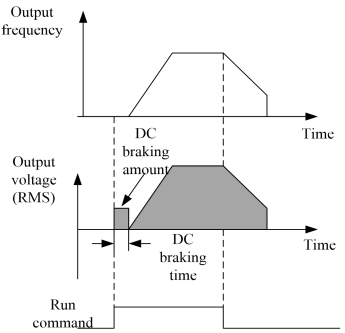
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
	output frequency	599.00HzS  1. The maximum output frequency is the highest frequency allowed by the drive, shown as Fmax in the figure. 2. The rated frequency of F3.04 is the corresponding minimum frequency when the drive outputs the highest voltage, shown as fb in the figure. 3. The maximum output voltage of F3.05 is the corresponding output voltage when the drive outputs the rated frequency, shown as Vmax in the figure. **Note: Be sure to set fmax, fb, and Vmax according to the motor parameters, otherwise the equipment may be damaged.**		Hz	
F1.07	Main frequency X digital setting	Set range: Lower limit frequency~upper limit frequency When the main frequency X input channel is selected to “digital setting 1”, this function code value is the set value of the main frequency X.	0.01Hz	50.00 Hz	○
F1.08	Reserved	-	-	-	*
F1.09	Upper limit frequency	Set range: Lower limit frequency~maximum output frequency The upper limit frequency is the upper limit value of the output frequency of the drive. This value should be less than or equal to the maximum output frequency. When the set frequency is higher than the upper limit frequency, it runs at the upper limit frequency.	0.01Hz	50.00 Hz	○
F1.10	Lower limit frequency	Set range: 0.00~upper limit frequency The lower limit frequency is the lower limit value of the drive output frequency. When the set frequency is lower than the lower limit frequency, it runs at the lower limit frequency. **Note: Maximum output frequency ≥ upper limit frequency ≥ lower limit frequency**	0.01Hz	0.00Hz	○

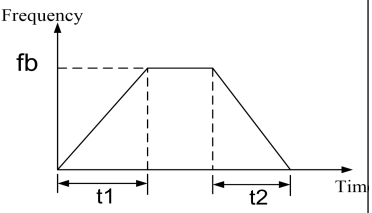
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.11	Acceleration time 1	Set range: 0.01～600.00  1. The acceleration time refers to the time required for the drive to accelerate from zero frequency to the rated frequency of the motor, shown ad t1 in the above figure. 2. The deceleration time refers to the time required for the drive to decelerate from the rated frequency to zero frequency of the motor, shown as t2 in the following figure. 3. There are four groups of acceleration and deceleration time parameters for this series of drives. Other acceleration and deceleration time (2, 3, 4) are defined in parameters F2.14～F2.19. The factory default acceleration/deceleration time is acceleration/deceleration time 1. To select other acceleration and deceleration time groups, you must select them using terminal (see group F6 parameters). The acceleration and deceleration times during the motor parameter self-learning operation are set in F3.13 separately. The acceleration and deceleration times during jog operation are set in F2.22 and F2.23 separately. 4. The acceleration time is only valid for normal acceleration process, excluding start DC braking time and start frequency hold time. The deceleration time is only valid for normal deceleration process, excluding stop DC braking time. **Note: The default unit is s. For the selection of acceleration/deceleration time unit, see FC.07.**	0.01	6.00	○
F1.12	Deceleration time 1				○
F1.13	Acceleration/deceleration filtering time	Set range: 0～1000ms (0 indicates on filter) Acceleration/deceleration filter time constant. The longer the filter time is, the longer the actual acceleration/deceleration time that set.	1ms	0ms	○
F1.14	Reserved	-	-	-	*
F1.15	Reserved	-	-	-	*
F1.16	Reserved	-	-	-	*

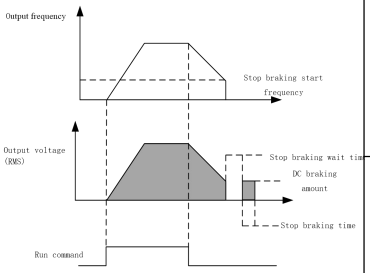
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.17	V/F curve setting	The V/F setting mode is defined in this function code, to meet the needs of different load characteristics. According to the definition, you can select 4 fixed curves and 1 custom curve. 0: Straight line VF, shown as curve 0 in the figure. 1: User-set V/F curve, see F1.18~ F1.23 function code setting for details. 2: Reduced torque characteristic curve 1 (2.0 power), shown ascurve 1 in the figure. 3: Reduced torque characteristic curve 2 (1.7 power), shown ascurve 2 in the figure. 4: Reduced torque characteristic curve 3 (1.2 power), shown ascurve 3 in the figure.  **Note: Curves 1, 2, and 3 are suitable for variable torque loads of fans and pumps. Users can adjust according to the load characteristics to achieve the best energy saving effect.**	1	0	×
F1.18	V/F frequency value F1	F1.18 set range: 0.00～F1.20 F1.19 set range: 0～F1.21 F1.20 set range: F1.18～F1.22 F1.21 set range: F1.19～F1.23 F1.22 set range: F1.20～F3.04 F1.23 set range: F1.21～100.0%  1. When the F1.17V/F curve is set to 1, the user	0.01Hz	12.50 Hz	×
F1.19	V/F voltage value V1		0.1%	25.0%	×
F1.20	V/F frequency value F2		0.01Hz	25.00 Hz	×
F1.21	V/F voltage value V2		0.1%	50.0%	×

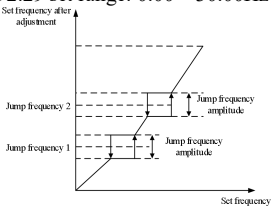
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.22	V/F frequency value F3	can customize the V/F curve by usingF1.18～F1.23, as shown in the figure. The V/F curve is defined by adding (V1, F1), (V2, F2), and (V3, F3) three-point broken line, to adapt to special load characteristics. 2. This function parameter group is used to flexibly set the V/F curve required by the user. **Note: V1<V2<V3, F1<F2<F3, setting the low-frequency voltage too high may cause the motor to overheat or even get burnt, and the drive may also incur over-loador overcurrent protection. It should be set according to the load characteristics of the motor.**	0.01Hz	37.50 Hz	×
F1.23	V/F voltage value V3		0.1%	75.0%	×
F1.24	Running direction setting	0: Forward 1: Reverse The direction of the motor can be changed by changing this function code. Its function is equivalent to changing the direction of rotation of the motor by adjusting any two lines of the motor lines U, V, and W. **Note: After the function code parameters are restored to the factory setting, the motor running direction will be restored to the factory value. Use with caution at times because it is forbidden to change the motor steering after system debugging.**	1	0	○

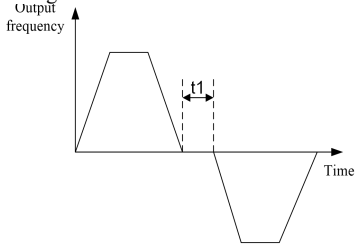
<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td>F1.25</td><td>Carrier frequency setting</td><td>Set range: 1～15kHz
<table><tr><th>Carrier frequency</th><th>Motor noise</th><th>Leakage current</th><th>Interference</th></tr><tr><td>Drop</td><td>↑</td><td>↓</td><td>↓</td></tr><tr><td>Rise</td><td>↓</td><td>↑</td><td>↑</td></tr></table>1. Advantages of high carrier frequency: Ideal current waveform, less current harmonics, and low motor noise.
2. Disadvantages of high carrier frequency: The switching loss increases, the drive temperature increases, and the output ability of the drive is affected. Under high carrier frequency, the drive needs to be derated; at the same time, the leakage current of the drive increases, and the external electromagnetic interference increases.
3. The use of low carrier frequency is contrary to the above situation. Too low carrier frequency will cause low frequency operation instability, torque decrease and vibrations.
4. By default, the manufacturer has set the carrier frequency reasonably. Generally, users do not need to change this parameter.</td><td>1kHz</td><td>4kHz</td><td>○</td></tr>
<tr><td colspan="6">F2 group:Start-stop control</td></tr>
<tr><td>F2.00</td><td>Start operation mode</td><td>LED single digit: Start mode
0: Start from the start frequency: Start at the start frequency set by F2.01and accelerate to the set frequency after running the hold time set by F2.02 at this frequency.
1: Brake first then start from the start frequency: First start with the DC braking current set in F2.03 and the DC braking time set in F2.04 for DC braking and then start from the start frequency.
2: Speed tracking and restart: Track the current speed and direction of the motorand perform smooth start without impact on the motor that is still rotating.
LED tens digit: Speed tracking mode
0: Track down the frequency before shutdown, usually this method is used.
1: Track down the maximum frequency, suitable for power</td><td>11</td><td>00</td><td>×</td></tr>
</table>

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		generation load.			
F2.01	Start frequency	F2.01 set range: 0.20～60.00Hz F2.02 set range: 0.0～10.0s  	0.01Hz	0.50Hz	○
F2.02	Start frequency hold time	1. The start frequency refers to the initial frequency of the drive at start. As shown in fs in the figure, setting a proper start frequency can increase the torque at start. 2. Within the hold time of the start frequency, as shown in t1 in the figure, the output frequency of the drive is the start frequency, and then operate from the start frequency to the target frequency. 3. The start frequency value is not limited by the lower frequency limit.	0.1s	0.0s	○
F2.03	Start DC braking current	F2.03 set range: 0.0～150.0% drive rated current F2.04 set braking is not activated  	0.1%	100.0%	○
F2.04	Start DC braking time	The process of braking first and then restarting from the start frequency, as shown in the figure: When the drive is put into operation, first perform the DC braking before starting according to the DC braking current and the DC braking time set by F2.03 and F2.04; then start from this frequency and operate the set time according to the functional code F2.01 and F2.02; then enter the normal acceleration phase according to the	0.1s	0.0s	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		parameters such as the set acceleration and deceleration times, acceleration and deceleration time methodsetc. and accelerate to the set frequency.			
F2.05	Acceleration/deceleration mode selection	Frequency change mode selection during starting and running. 0: Linear acceleration/deceleration: The output frequency increases or decreases according to a constant slope.  1: Reserved	1	0	×
F2.06	Start protection selection (only valid for two-wire control)	This function realizes whether the drive automatically starts running when the drive is powered on, the fault is cleared, or the command channel is switched to the two-wire terminal mode. 0: If the run command is valid, the drive does start, but the drive is in the running protection state. The drive will not run until the run command terminal is canceled and then the terminal is enabled. 1: If the run command is valid, the drive speed tracking starts. **Note: For safety, be cautious when setting to 1.**	1	0	×
F2.07	Start protection wait time	Set range: 0.0～10.0s	0.1s	0.0s	○
F2.08	Stop mode	0: Deceleration stop: After receiving the stop command, the drive will gradually reduce the output frequency according to the deceleration time and stop when the frequency decreases to zero. 1: Free running stop: After receiving the stop command, the drive immediately stops the output, and the load stops freely according to the mechanical inertia.	1	0	×

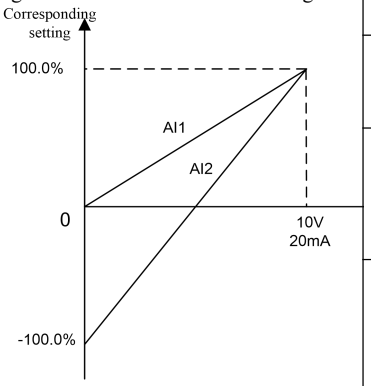
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		2: Deceleration stop + DC braking: After receiving the stop command, the drive reduces the output frequency according to the deceleration timeand starts the DC braking when reaching the stop braking start frequency.			
F2.09	DC braking start frequency at shutdown	F2.09 set range: 0.00～60.00Hz F2.10 set range: 0.00～10.00s F2.11 set range: 0.0～150.0% drive rated current F2.12 set range: 0.0～60.0S (0.0 indicates the DC braking is not activated) F2.13 set range: 0～1  1. DC braking start frequency at stop: Means that the drive starts stop DC braking when reaching this frequency during the deceleration phase of stop. 2. DC braking wait time at stop: During decelerating and stopping, the time interval from the moment the operation frequency reaches the start frequency of braking to the moment, the DC braking is applied. 3. DC braking current at stop: Refers to the strength ofDC braking applied. The larger the current, the stronger the DC braking effect. 4. DC braking time at stop: The duration of the DC braking. When the time is 0, there is no DC braking process. 5. Action selection during stop DC braking wait time: Refers to the operation status of the drive during the braking wait time. When set to 0, it indicates no output, when set to 1, it indicates to run at the braking start frequency.	0.01Hz	0.00Hz	○
F2.10	DC braking wait time at shutdown		0.01s	0.10s	○
F2.11	DC braking current at shutdown		0.1%	100.0%	○
F2.12	DC braking time at shutdown		0.1s	0.0s	○
F2.13	Action selection within DC braking wait time at shutdown		1	1	○
F2.14	Acceleration time 2	Set range: 0.01～600.00 For specific definition, see F1.11 and F1.12.	0.01	6.00	○
F2.15	Deceleration time 2				○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F2.16	Acceleration time 3	**Note: The default unit is s. For the selection of acceleration/deceleration time unit, see FC.07.**			○
F2.17	Deceleration time 3				○
F2.18	Acceleration time 4				○
F2.19	Deceleration time 4				○
F2.20	Jog run frequency	Set range: 0.10～50.00Hz Define the set frequency during jog operation.	0.01Hz	5.00Hz	○
F2.21	Jog interval time	Set range: 0.0～100.0s	0.1s	0.0s	○
F2.22	Jog acceleration time	Set range: 0.01～600.00s 1. The acceleration time refers to the time required for the drive to accelerate from zero frequency to the rated frequency of the motor. 2. The jog deceleration time refers to the time required for the drive to decelerate from the rated frequency to zero frequency of the motor.	0.01s	6.00s	○
F2.23	Jog deceleration time				○
F2.24	Jump frequency 1	F2.24 set range: 0.00～599.00Hz F2.25 set range: 0.00～30.00Hz F2.26 set range: 0.00～599.00Hz F2.27 set range: 0.00～30.00Hz F2.28 set range: 0.00～599.00Hz F2.29 set range: 0.00～30.00Hz  1. Setting the hopping frequency can make the drive avoid the mechanical resonance point of the load. When the hopping frequency is set to 0, this function is invalid. Once these hopping points are set, the drive will automatically avoid these frequency points during operation. 2. During the acceleration and deceleration, the output frequency of the drive can cross the hopping frequency zone normally.	0.01Hz	0.00Hz	×
F2.25	Jump frequency 1 range		0.01Hz	0.00Hz	×
F2.26	Jump frequency 2		0.01Hz	0.00Hz	×
F2.27	Jump frequency 2 range		0.01Hz	0.00Hz	×
F2.28	Jump frequency 3		0.01Hz	0.00Hz	×
F2.29	Jump frequency 3 range		0.01Hz	0.00Hz	×

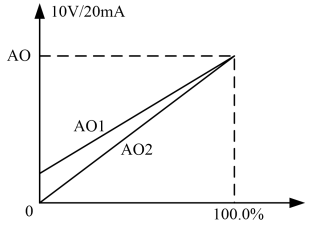
<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td>F2.30</td><td>Forward and reverse dead zone time</td><td>Set range: 0.00～360.00s
The forward and reverse dead zone time refers to the transition interval during which the drive waits at the output zero frequency during transition from the current operating direction to the opposite operating direction after receiving the reverse run command, as shown in t1 in the figure.
  </td><td>0.01s</td><td>0.01s</td><td>×</td></tr>
<tr><td colspan="6">F3 group:Motor and torque control parameters</td></tr>
<tr><td>F3.00</td><td>Motor model code</td><td>Set range: 1～10
The motor model code indicates the power code.
Partial codes are as follows:
<table><tr><th>Model code</th><th>Motor power</th></tr><tr><td>1</td><td>2T 0.4kW</td></tr><tr><td>2</td><td>2T 0.75kW</td></tr><tr><td>3</td><td>2T 1.5kW</td></tr><tr><td>4</td><td>2T 2.2kW</td></tr><tr><td>5</td><td>4T 0.4kW</td></tr><tr><td>6</td><td>4T 0.75kW</td></tr><tr><td>7</td><td>4T 1.5kW</td></tr><tr><td>8</td><td>4T 2.2kW</td></tr><tr><td>9</td><td>4T 4.0 kW</td></tr><tr><td>10</td><td>4T 5.5kW</td></tr></table>Note:
1. When the factory value is restored, this function code will be restored to the default value the same as the drive power.
2. When this function code is reset, F3.01～F3.10 motor parameters can be initialized.</td><td>1</td><td>Model determination</td><td>×</td></tr>
<tr><td>F3.01</td><td>Rated power</td><td>F3.01 set range: 0.4～999.9kW
F3.02 set range: 0.01～655.35A
F3.03 set range: 1～65535rpm</td><td>0.1kW</td><td>Model determination</td><td>×</td></tr>
</table>

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F3.02	Rated current	F3.04 set range: 1.00～599.00Hz F3.05 set range: 1～480V 1. Set the parameters of the asynchronous motor being controlled. 2. In order to ensure the control performance, make sure to set the values of F3.01～F3.05 correctly according to the nameplate parameters of the asynchronous motor. 3. This drive provides parameter self-learning function. The accurate parameter self-learning comes from the accurate settings of the motor nameplate parameters. 4. In order to ensure the control performance, please configure the motor according to the standard adapter motor of the drive. If the gap between the motor power and the standard adapter motor is too large, the control performance of the drive will decrease significantly.	0.01A		×
F3.03	Rated speed		1rpm		×
F3.04	Rated frequency		0.01Hz		×
F3.05	Rated power		1V		×
F3.06	No-load current I0	F3.06 set range: 0.01～655.35A F3.07 set range: 0.000～50.000Ω F3.08 set range: 0.0～6553.5mH F3.09 set range: 0.000～50.000Ω F3.10 set range: 0.0～6553.5mH 1. After changing the motor model code F3.00, the drive automatically sets the parameters of F3.06～F3.10 to the parameters of the corresponding motor. 2. If the parameters of the motor are known, please write the values in F3.06～F3.10 accordingly. If the motor parameter self-learning is performed, the set values of F3.06～F3.10 will be updated automatically after the self-learning operation is completed normally. 3. These parameters are the reference parameters for drive control and have direct impact on control performance. **Note: Users shall not change this group of parameters at random.**	0.01A	Model determination	×
F3.07	Stator resistance R1		0.001Ω		○
F3.08	Leakage inductance X		0.1mH		○
F3.09	Rotor resistance R2		0.001Ω		○
F3.10	Mutual inductance Xm		0.1mH		○
F3.11	Motor poles	2~14	2	4	×
F3.12	Parameter self-learning	0: No action 1: Action (motor rotation): Perform comprehensive self-learning of motor parameters. It is recommended to use rotary self-learning for occasions with high control accuracy requirements.	1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		Note: Before starting the self-learning, make sure that the motor is stopped and remove the load from the motor shaft, otherwise the self-learning will not be performed correctly. Parameter self-learning steps: 1. According to the characteristics of the motor, set the function codes “F3.01 rated power”, “F3.02 rated current”, “F3.03 rated speed”, “F3.04 rated frequency”, “F3.05 rated voltage”and “F3.11 motor poles” correctly. 2. Set F3.12 to 1, press the ENT key, and then press the RUN key to start parameter self-learning. In this case, the operation panel displays “STU--”. 3. When the operation panel no longer displays “STU--”, it indicates that the parameter self-learning is completed, and the set value of F3.12 will be set to 0 automatically.			
F3.13	Self-learning acceleration and deceleration speeds	0.01～600.00s Set acceleration/deceleration time during self-learning no-load test.	0.01s	6.00s	○
F3.14	Self-learning current	1～100% Set the current during self-learning DC test.	1%	25%	×
F5 group: Analog terminal parameters					
F5.00	AI1 minimum value	F5.00 set range: 0.00～F5.02 F5.01 set range: -100.0%～100.0% F5.02 set range: F5.00～10.00V F5.03 set range: -100.0%～100.0% F5.04 set range: 0.00～10.00V F5.05 set range: 0～1000ms F5.06 set range: 0.00～F5.08 F5.07 set range: -100.0%～100.0% F5.08 set range: F5.06～10.00V F5.09 set range: -100.0%～100.0% F5.10 set range: 0.00～10.00V F5.11 set range: 0～1000ms 1. The function code defines the relationship between the analog input voltage and the corresponding set value of the analog input. When the analog input voltage exceeds the set maximum or minimum input range, it will be calculated with the maximum or minimum input. 2. When analog input is current input, a current of 0～20mA corresponds to a	0.01V	0.00V	○
F5.01	Set value corresponding to AI1 minimum value		0.1%	0.0%	○
F5.02	AI1 maximum value		0.01V	10.00 V	○
F5.03	Set value corresponding to AI1 maximum value		0.1%	100.0 %	○
F5.04	AI1 zero drift setting		0.01V	0.00V	○
F5.05	AI1 filter time		1ms	10ms	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.06	AI2 minimum value	voltage of 0～10V. 3. In different applications, The nominal values corresponding to the analog setting 100.0% are different, please refer to the instructions of applications for details. The following legend illustrates the different settings:  	0.01V	0.00V	○
F5.07	Set value corresponding to AI2 minimum value		0.1%	0.0%	○
F5.08	AI2 maximum value		0.01V	10.00 V	○
F5.09	Set value corresponding to AI2 maximum value		0.1%	100.0 %	○
F5.10	AI2 zero drift setting		0.01V	0.00V	○
F5.11	AI2 filter time	4. Filter time of analog input: Adjust the sensitivity of the analog input. Increasing this value appropriately can enhance the anti-interference of the analog quantity but will weaken the sensitivity of the analog input. 5. Analog zero drift setting: Generally, there will be some zero drift in the analog quantity. On some occasions with high accuracy requirements, the zero drift setting will achieve a better corresponding effect. **Note: Analog AI1 supports 0～10V/0～20mA input (AI1 jump cap selection), and analog AI2 only supports 0～10V input.**	1ms	10ms	○
F5.12	Reserved	-	-	-	*
F5.13	Reserved	-	-	-	*
F5.14	Reserved	-	-	-	*
F5.15	Reserved	-	-	-	*
F5.16	Reserved	-	-	-	*
F5.17	Reserved	-	-	-	*
F5.18	Analog automatic zero drift adjustment	Set range: 0～1 When set to 1, the automatic zero drift adjustment of the analog quantity must be performed. It must be ensured that there is no external analog quantity input.	0	0	○
F5.19	PULSE minimum input	0.00～F5.21	0.01kHz	0.00k Hz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.20	Corresponding setting of PULSE minimum input	-100.0%～100.0%	0.1%	0.0%	○
F5.21	PULSE maximum input	F5.19～50.00KHz	0.01kHz	50.00kHz	○
F5.22	Corresponding setting of PULSEmaximum input	-100.0%～100.0%	0.1%	100.0%	○
F5.23	PULSE filter time	0～1000ms	1ms	10ms	○
F5.24	HDO function selection (DO2 terminal)	0: Running frequency (0～Maximum output frequency) 1: Set frequency (0～Maximum output frequency) 2: Output current (0～2 times rated current) 3: Output torque (0～2 times rated torque) 4: Output voltage (0～1.2 times rated voltage) 5: Bus voltage (0～1000V) 6: AI1 (0～10V/0～20mA) 7: AI2 (0～10V) 8: Reserved 9: Output power (0～2 times rated frequency) 10: Pulse input (0～50.0kHz) 11: Communication setting (0～1000)	1	5	○
F5.25	AO1 function selection		1	0	○
F5.26	AO2 function selection		1	1	○
F5.27	HDO (DO2 terminal) output lower limit	F5.27 set range: 0.0～F5.29 F5.28 set range: 0.00～50.00kHz F5.29 set range: F5.27～100.0% F5.30 set range: 0.00～50.00kHz F5.31 set range: 0.0～F5.33 F5.32 set range: 0.00～10.00V F5.33 set range: F5.31～100.0% F5.34 set range: 0.00～10.00V F5.35 set range: 0.0～F5.37 F5.36 set range: 0.00～10.00V F5.37 set range: F5.35～100.0% F5.38 set range: 0.00～10.00V 1. The function code defines the corresponding relationship between the output value and the analog output. When the output value exceeds the set maximum output or minimum output range, it will	0.1%	0.0%	○
F5.28	Corresponding lower limit HDO (DO2 terminal) output frequency		0.01kHz	0.00kHz	○
F5.29	HDO (DO2 terminal) output upper limit		0.1%	100.0%	○
F5.30	Corresponding upper limit HDO (DO2 terminal) output frequency		0.01kHz	50.00kHz	○
F5.31	AO1 output lower limit		0.1%	0.0%	○

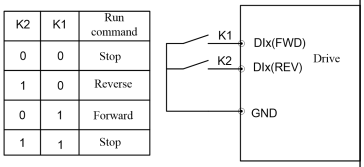
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.32	Corresponding lower limit AO1 output voltage	be calculated with the upper limit output or lower limit output. 2. When the analog output is current output, 1mA current is equivalent to 0.5V voltage. 3. In different applications, the analog output corresponding to 100% of the output value is different. The following legend illustrates the different settings:  **Note: AO1 only supports 0～10V output, and AO2 supports 0～10V/0～20mA output (AO2 jump cap selection).**	0.01V	0.00V	○
F5.33	AO1 output upper limit		0.1%	100.0 %	○
F5.34	Corresponding upper limit AO1 output voltage		0.01V	10.00 V	○
F5.35	AO2 output lower limit		0.1%	0.0%	○
F5.36	Corresponding lower limit AO2 output voltage		0.01V	0.00V	○
F5.37	AO2 output lower limit		0.1%	100.0 %	○
F5.38	Corresponding upper limit AO2 output voltage		0.01V	10.00 V	○
F5.39	External keypad analog potentiometer zero drift setting	0.00～10.00V	0.01V	0.00V	○
F5.40	External keypad analog potentiometer zero filter time	0～1000ms	1ms	10ms	○
F6 group:Digitalterminal parameters					
F6.00	Multifunctional input terminal DI1 function selection	0: No function 1: Forward running FWD (level + edge) 2: Reverse running REV (level + edge) 3: Three-wire running control Sin (level) 4: Forward jog (level) 5: Reverse jog (level) 6: Free stop (level) 7: Fault reset (edge signal) 8: Run pause (level) 9: External fault input 10: Frequency setting increase (UP) 11: Frequency setting decreases (DOWN) 12: Multistage speed terminal 1 13: Multistage speed terminal 2 14: Multistage speed terminal 3 15: Multistage speed terminal 4 16: Acceleration/deceleration time selection 1 17: Acceleration/deceleration time selection 2 18: PLC pause	1	1	×

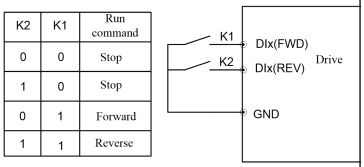
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.01	Multifunctional input terminal DI2 function selection	19: PLC operation stop and reset 20: PID control pause 21: PID parameter switching 22: Counter trigger 23: Counter reset 24: Length reset 25: Acceleration/deceleration prohibited (level) 26: Immediate DC braking 27: UP/DOWN setting cleared 28: Control command switched to keypad 29: Control command switched to terminal 30: Control command switched to communication 31: Frequency source switched to the main frequency X 32: Frequency source switched to auxiliary frequency Y 33: High-frequency pulse count reset 34-50: Reserved **Note: The function of each terminal should be different. If the functions of the two ports are set to same, the DI portranked first will work first, and the latter ones will not work.** Detailed description of terminal functions: 1～3: Forward running FWD, reverse running REV, three-wire running control Sin: For terminal two-wire and three-wire control signals, see function code F6.09 description for details. 4～5: Forward jog and reverse jog: Used for jog running control under terminal run command mode, the jog running frequency, jog interval time and jog acceleration/deceleration time are defined in F2.20～F2.23.		2	
F6.02	Multifunctional input terminal DI3 function selection			7	

<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td>F6.03</td><td>Multifunctional input terminal DI4 function selection</td><td rowspan="3">6: Free stop: If a signal is sent to the terminal set with this function, the driveterminates the output immediately, and the motor stops freely according to the mechanical inertia.
7: Fault reset: When a fault alarm occurs in the drive, the fault can be reset through this terminal. Its function is consistent with the STOP key function of the keypad.
8: Running pause: If this terminal is valid during running, the terminal will decelerate to zero frequency running according to the deceleration time. This function is invalid during jog running.
9: External fault input: The fault signals of external devices can be input through this terminal, which is convenient for the drive to monitor the faults of external devices. After receiving fault signals from external devices, the drive displays “E015”, which is the fault alarm of external devices.
10~11: Frequency setting increase UP, and frequency setting decrease DOWN: The frequency increase or decrease is realized through the control terminal, to perform remote control replacing the keypad. Effective when the main frequency F1.02 = 2 or the auxiliary frequency F1.03 = 2, the acceleration/deceleration rate is set by F6.10.
12~15: Multistage speed terminals 1~4: By selecting the terminal ON/OFF combination of these functions, you can define up to 16 stages of different speeds, the frequency of multistage instructions, the selection of acceleration/deceleration time, and the rotating direction are set in group F9.
<table><tr><td>K4</td><td>K3</td><td>K2</td><td>K1</td><td>Frequency setting</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Multistage instruction 1</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>Multistage instruction 2</td></tr></table></td><td rowspan="3"></td><td>12</td><td rowspan="3"></td></tr>
<tr><td>F6.04</td><td>Multifunctional input terminal DI5 function selection</td><td>13</td></tr>
<tr><td>F6.05</td><td>Reserved</td><td>0</td></tr>
</table>

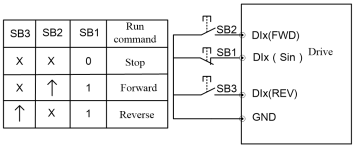
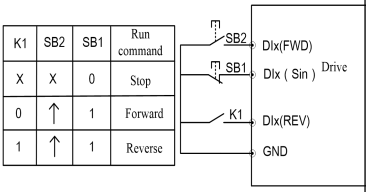
<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td>F6.06</td><td>Reserved</td><td rowspan="3">
<table>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>Multistage instruction 3</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>Multistage instruction 4</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>Multistage instruction 5</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>Multistage instruction 6</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>Multistage instruction 7</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>Multistage instruction 8</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Multistage instruction 9</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>Multistage instruction 10</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>Multistage instruction 11</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>ON</td><td>Multistage instruction 12</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>Multistage instruction 13</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>ON</td><td>Multistage instruction 14</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>Multistage instruction 15</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>Multistage instruction 16</td></tr>
</table>
16~17: Acceleration/deceleration time selection 1~2: The ON/OFF combination of acceleration/deceleration time terminals 1 and 2 can realize the selection of acceleration/deceleration time 1~4.
<table>
<tr><td>K2</td><td>K1</td><td>Acceleration/deceleration time selection</td></tr>
<tr><td>OFF</td><td>OFF</td><td>Acceleration/deceleration time 1</td></tr>
<tr><td>OFF</td><td>ON</td><td>Acceleration/deceleration time 1</td></tr>
<tr><td>ON</td><td>OFF</td><td>Acceleration/deceleration time 3</td></tr>
<tr><td>ON</td><td>ON</td><td>Acceleration/deceleration time 4</td></tr>
</table>
18: PLC pause: Used to pause the drive’s PLC running process. When this terminal is valid, it runs at zero frequency. 19: PLC running stop and reset: PLC is prohibited from starting when the terminal is valid, deceleration and stop control is implemented for the PLC running process, and the PLC is reset to the initial state.
20: PID control pause: PID is temporarily</td><td rowspan="3"></td><td>0</td><td rowspan="3"></td></tr>
<tr><td>F6.07</td><td>Reserved</td><td>0</td></tr>
<tr><td>F6.08</td><td>Reserved</td><td>0</td></tr>
</table>

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		not available, and the drive maintains the current output frequency without performing PID adjustment. 21: PID parameter switching: When the PID parameter switching condition (F8.12) is set to 1 (via terminal switching), the F8.06~F8.08 are used for PID parameters when the terminal is invalid, and F8.09~F8.11 are used when the terminal is valid. 22: Counter trigger: Count pulse input port of the built-in counter, the highest pulse frequency: 50Hz, and the current count value can be stored and memorized when power is off(See function codes F6.22 and F6.23 for details). 23: Counter reset: Clear the built-in counter of the drive and use it in conjunction with function 22 (counter trigger signal input). 24: Length reset: When the function terminal is valid, the actual length is cleared to zero. 25:Acceleration/decelerationprohibition: Keep the motor from being affected by any external signal (except stop command), drive keeps on operating at the current speed. This function is invalid during jog running. 26: Immediate DC brake: When the drive is decelerating and is in stop + DC brake mode, it applies DC brake when this terminal is valid. 27: UP/DOWN setting is cleared: When the frequency given channel is set to terminal UP/DOWN, this function terminal can directly clear the frequency set by UP/DOWN. 28: Control command switch to keypad 29: Control command switch to input terminal 30: Control command switch to communication If all three or two of the above terminals are closed at the same time, the priority is keypad> terminal> communication. **Note: When switching to terminal two-wire control, the running state**			

<table>
<tr><th>Parameter Code</th><th>Parameter name</th><th>Parameter detailed description</th><th>Minimum Unit</th><th>Factory value</th><th>Change</th></tr>
<tr><td></td><td></td><td>changes are affected by the F2.06 parameter; when switching to other control modes, the current running state is maintained.
31: Switch frequency source to the main frequency X
32: Switch frequency source to auxiliary frequency Y
If the above two terminals are closed at the same time, the priority is: switching to the main frequency X> switching to the auxiliary frequency Y.
33: High-frequency pulse count reset: The high-frequency pulse count value recorded by function code U0.16 will be cleared.</td><td></td><td></td><td></td></tr>
<tr><td>F6.09</td><td>Forward/reverse running mode setting</td><td>0: Two-wire control mode 1: This mode is the most commonly used two-wire mode. The forward and reverse of the motor are determined by the defined FWD and REV terminal commands.
 

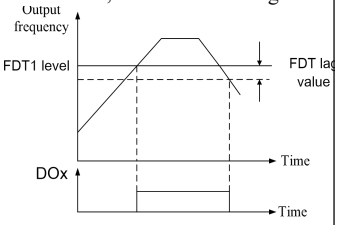
1: Two-wire control mode 2: This mode uses the defined FWD as the running terminal and the direction is determined by the defined REV terminal.
 

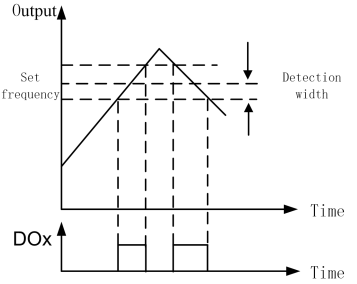
2: Three-wire operation control 1: This mode uses the defined Sin terminalto enable this mode.Terminals defined as FWD or REV are used to run and control the operation directions.Sin terminal must</td><td>1</td><td>0</td><td>×</td></tr>
</table>

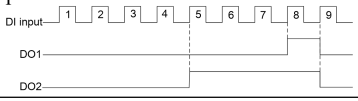
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		be closed to operate the drive in this mode. A rising edge signal should be given to FWD or REV terminal to control the operation and direction of the drive. Disconnect the Sin terminal to stop the drive.  3: Three-wire operation control 2: This mode uses the defined Sin terminalto enable this mode, the run command is generated by FWD, and the direction is controlled by REV. The terminal Sin must be closed during operation. To start the drive, give a rising edge signal to the terminal defined as FWD. Disconnect the terminal defined as Sin to stop the drive.  			
F6.10	UP/DN rate	0.01～99.99Hz/s This function code defines the change rate of the set frequency that can be modified by the UP/DN terminal.	0.01Hz/s	1.00Hz/s	○
F6.11	Open collector output terminal DO1	0: No output 1: Drive running signal (RUN) 2: Frequency reached signal (FAR) 3: Frequency level detection signal (FDT1) 4: Frequency level detection signal (FDT2) 5: Reserved 6: Undervoltage lockout stopping (LU) 7: External fault stop (EXT)	1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.12	Open collector output terminal HDO (DO2 terminal)	8: Frequency upper limit (FHL) 9: Frequency lower limit (FLL) 10: Drive running at zero frequency 11: PLC phase running completion 12: PLC cycle completion 13: Set count value reached 14: Specified count value reached 15: Set length reached 16: Drive ready to run (RDY) 17: Drive fault 18: Reserved 19: Set cumulative running time reached 20: Forward running 21: Reverse running 22: Reserved 23: Water supply sleep running indication 24: Water pipe overpressure indication 25: Water pipe underpressure indication 26: Water shortage in pipe indication 27-30: Reserved	1	1	×
F6.13	Relay output function (TA/TB/TC)	Detailed description of terminal functions: 1: Drive running signal (RUN): Outputs an indication signal if the drive is running. 2: Frequency reached signal (FAR): Refer to the function description of F6.18. 3: Frequency level detection signal (FDT1): Refer to the function description of F6.14～F6.15. 4: Frequency level detection signal (FDT2): Refer to the function description of F6.16～F6.17. 5: Reserved 6: Undervoltage lockout stopping (LU): When the DC bus voltage is lower than the undervoltage limit level, it outputs an indication signal, and the LED displays “P.oFF”. 7: External fault stop (EXT): When the drive has an external fault trip alarm (E015), it outputs an indication signal. 8: Frequency upper limit (FHL): When the set frequency ≥ the upper limit frequency and the operational frequency reaches the upper limit, it outputs an indication signal. 9: Frequency lower limit (FLL): When the set frequency ≤ the lower limit frequency and the operational frequency reaches the lower limit, it outpus an indication signal.	1	17	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		10: Drive running at zero frequency: Output frequency ≤ FC.10 zero frequency reached range, it outputs an indication signal under operation status. 11: PLC phase operation completed: After the simple PLC one stage operation is completed, it outputs an indication signal (single pulse signal, width 250ms). 12: PLC cycle completed: After the simple PLC completes one operation cycle, it outputs an indication signal (single pulse signal, width 250ms). 13: Set count value reached 14: Specified count value reached For functions 13~14, refer to F6.22~F6.23 function description. 15: Set length reached: When the actual length U0.15≥FC.11 set length, it outputs an indication. 16: Drive ready to run (RDY):When the drive has no fault, the bus voltage is normal, and no signal is given at the drive operation prohibition terminal, it outputs an indication signal. In this case, the drive indicates that the start command can be given to the drive. 17: Drive fault: If the drive fails, it outputs an indication signal. 18: Reserved 19: Set the accumulated running time reached: When the accumulated running time of the drive (U0.27) reaches the running cutoff time (F0.02) of the drive, it outputs an indication signal. 20: Forward running: When the drive is in the forward running status, it outputs an indication signal. 21: Reverse running: When the drive is in the reserve running status, it outputs an indication signal. 22: Reserved 23: Water supply sleep indication: During water supply application, if the drive is in the sleep status, it outputs an indication signal. 24: Water pipe overpressure indication: During water supply application, if the			

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		drive finds that the water pipe is in overpressure at any time, it outputs an indication signal. 25: Water pipe underpressure indication: During water supply application, if the drive finds that the water pipe is in underpressure at any time, it outputs an indication signal. 26: Water pipe shortage indication: During water supply application, if the drive finds that the water pipe is in short of water at any time, it outputs an indication signal.			
F6.14	FDT1 level	F6.14 set range: 0.00～599.00Hz F6.15 set range: 0.00～599.00Hz F6.16 set range: 0.00～599.00Hz F6.17 set range: 0.00～599.00Hz F6.14～F6.15 are supplementary definitions for No. 3 function FDT1 in the terminal output function, F6.16～F6.17 are supplementary definitions for No. 4 function FDT2 in the terminal output function. The usage of both is the same. In the below example, F6.14～F6.15 are taken as an example: When the output frequency is greater than or equal to a certain set frequency (FDT1 level), it outputs an indication signal until the output frequency drops to a certain frequency (FDT1 level - FDT1 lag) lower than FDT1 level, as shown in the figure.  	0.01Hz	50.00 Hz	○
F6.15	FDT1 lag		0.01Hz	1.00Hz	○
F6.16	FDT2 level		0.01Hz	25.00 Hz	○
F6.17	FDT2 lag		0.01Hz	1.00Hz	○

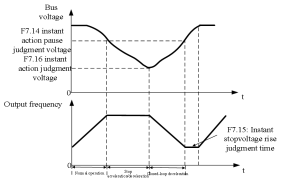
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.18	Frequency arrival (FAR) detection width	0.00～599.00Hz This parameter is a supplementary definition for No. 2 function in the terminal output function. As shown in the figure, when the output frequency of the drive is within the positive and negative detection widths of the set frequency, it outputsa pulse signal.  	0.01Hz	2.50Hz	○
F6.19	HDI terminal input mode selection (DI5)	0: Switch input 1: High-frequency pulse input (see F5.19～F5.23)	1	0	×
F6.20	HDO terminal output mode selection (DO2)	0: Switch output 1: High-frequency pulse output (see F5.27～F5.30)	1	0	×
F6.21	Reserved	-	-	-	*
F6.22	Counter reset value setting (set count value reached)	F6.22 set range: F6.23～9999 F6.23 set range: 0～F6.22 F6.22 and F6.23 are supplementary definitions for No. 13 and No. 14 functions in the terminal output function. 1. The set count value given refers to the number of input pulses from DIx (count trigger signal input function terminal), before the DOx (open collector output terminal) or the relay outputs an indication signal. As shown in the figure,	1	0	○

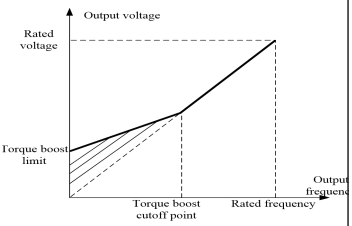
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.23	Counter detection value setting (specified count value reached)	when DIx inputs the 8th pulse, DO1 outputs an indication signal, and F6.23 = 8 in this case. 2. The specified count value given refers to the number of input pulses from DIx, before the DOx or the relay outputs an indication signal, till the set count value is reached. As shown in the figure, when DIx inputs the 5th pulse, DO2 outputs an indication signal, till the set count value 8 is reached, in this case F6.23 = 5. 3. When the specified count value is greater than the set count value, the specified count value is invalid. 	1	0	○
F6.24	DI input switch polarity 1	00000~11111 LED single digit: DI1 positive/negative logic definition LED tens digit: DI2 positive/negative logic definition LED hundreds digit: DI3 positive/negative logic definition LED thousands digit: DI4 positive/negative logic definition LED 10 thousands digit: DI5 positive/negative logic definition This function code is used to set the polarity of the input switch. When the bit is set to 1, the input switch is positive logic (valid when connected to the common port, and invalid when disconnected); when the bit is set to 0, the input switch is negative logic (invalid when connected to the common port, and valid when disconnected).	11111	11111	○
F6.25	DI input switch polarity 2	00000~11111 LED single digit: Reserved LED tens digit: Reserved LED hundreds digit: Reserved LED thousands digit: Reserved LED 10 thousands digit: Reserved	11111	11111	○
F6.26	DO output switch polarity 1	00000~11111 LED single digit: DO1 positive/negative logic definition LED tens digit: DO2 positive/negative logic definition LED hundreds digit: Relay positive/negative logic definition	11111	11111	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		LED thousands digit: Reserved LED 10 thousands digit: Reserved This function code is used to set the polarity of the output switch. When the bit is set to 1, the output switch is positive logic; when the bit is set to 0, the output switch is negative logic.			
F6.27	Reserved	-	-	-	*
F6.28	DI filter time	0～1000ms Set DI1～DI5 common terminal function input filter time. In the case of large interference, you should increase the set value of this function code to prevent misoperation.	1ms	20ms	○
F6.29	DO1 output on delay	Set range: 0.0～600.0s This function code defines the delay from the status change of the switch output terminal and the relay to the output change.	0.1s	0.0s	○
F6.30	DO1 output off delay		0.1s	0.0s	○
F6.31	DO2 output on delay		0.1s	0.0s	○
F6.32	DO2 output off delay		0.1s	0.0s	○
F6.33	Relay output on delay		0.1s	0.0s	○
F6.34	Relay output off delay		0.1s	0.0s	○
F7 group:Advanced function parameters					
F7.00	Overvoltage stall point	F7.00 set range: 100.0～160.0%Udc F7.01 set range: 0.000～10.000V F7.02 set range: 0～1000 F7.03 set range: 1～1000ms 1. The overvoltage stall protection function detects the bus voltage during the decelerating operation of the drive and compares with the overvoltage stall point defined by F7.00 (relative to the standard bus voltage) and the overvoltage control voltage defined by F7.01 (relative to the bus voltage change rate), if the bus voltage exceeds the overvoltage stall point or the bus voltage change rate exceeds the overvoltage control voltage, the drive will adjust the deceleration time to make the output frequency slow down.	0.1% Udc	Model determination	○
F7.01	Overvoltage control voltage		0.001V	5.000 V	○
F7.02	Overvoltage stall gain Kp		1	5	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F7.03	Overvoltage stall integration time	2. Overvoltage stall gain, and overvoltage stall integration time: Used to adjust the drive's ability to suppress overvoltage during deceleration. The larger the gain and longer the integration time, the stronger the ability to suppress overvoltage, and the drive's deceleration time increasesaccordingly. So, under the premise of no overvoltage, the smaller the gain and longer the integration time, the better the deceleration effect. **Note: When the set stall point is low, it is suggested that the user shall increase the deceleration time appropriately.**	1ms	200ms	○
F7.04	Overcurrent stall level	F7.04 set range: 80.0～230.0% F7.05 set range: 0～1 F7.06 set range: 0～1000 F7.07 set range: 1～1000ms 1. The overcurrent stall function is to automatically limit the overcurrent stall level (F7.04) so that it does not exceed the setting, through the real-time control of the load current, to prevent fault trips caused by current overshoot. For load occasions with large inertia or intense changes, this function is especially suitable. 2. The overcurrent stall level (F7.04) defines the current threshold of the overcurrent stall action, and its setting range is relative to the percentage of the drive rated current. When this parameter value is exceeded, the drive starts the overcurrent stall protection function. 3. Overcurrent stall gain, and overcurrent stall integration time: Used to adjust the drive's ability to suppress overcurrent during acceleration and deceleration. The larger the gain, and longer the integration time, the stronger the ability to suppress overcurrent, and the drive's acceleration/deceleration time increases accordingly. So, under the premise of no overccurent, the smaller the gain and the longer the integration time, the better the effect. 4. The overcurrent stall function is always effective under the acceleration/deceleration status. Whether the overcurrent stall function is effective during constant speed operation is determined by the overcurrent stall action selection (F7.05).	0.1%	180.0 %	○
F7.05	Overcurrent stall action selection		1	1	○
F7.06	Overcurrent stall gain Kp		1	5	○
F7.07	Overcurrent stall integration time		1ms	200ms	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		F7.05＝0 overcurrent stall is invalid during constant speed operation; F7.05＝1 overcurrent stall is valid during constant speed operation.			
F7.08	Speed tracking gain Kp	F7.08 set range: 0～100 F7.09 set range: 1～1000ms F7.10 set range: 0.1～600.0s F7.11 set range: 1～100% F7.12 set range: 1～100% 1. Speed tracking acceleration/deceleration: The faster the acceleration/deceleration, the faster the speed tracking, but too fast setting may cause the speed tracking result unreliable. 2. Speed tracking threshold: When the torque current is smaller than the F7.11 threshold (relative to the motor rated current) during speed tracking, the tracking is considered successful. 3. Threshold for speed tracking switching completion: After speed tracking has successfully tracked the current frequency, the expected output voltage is calculated based on this frequency and the output voltage is gradually increased until the difference between the applied voltage and the expected output voltage is less than F7.12 threshold, in this case, it will enter normal operation status.	1	10	○
F7.09	Speed tracking integration time		1ms	50ms	○
F7.10	Speed tracking acceleration and deceleration		0.1s	20.0s	○
F7.11	Speed tracking threshold		1%	10%	○
F7.12	Speed tracking filter time		1%	3%	○
F7.13	Instant stop/nonstop function selection	F7.13 set range: 0～1 F7.14 set range: 80.0～100.0% F7.15 set range: 0.00～100.00s F7.16 set range: 70.0～100.0% F7.17 set range: 0～1000 F7.18 set range: 1～1000ms F7.19 set range: 0～300.0s The instant stop/nonstop function is used to determine whether the drive will automatically perform low voltage compensation when the voltage drops or there is and instant undervoltage. It reducesthe output frequency appropriately and feeds back the energy to the load to maintain the drive operation without tripping. F7.13 is set to 0, no action. F7.13 is set to 1, action (deceleration). In case of a momentary outrage or a sudden	1	0	○
F7.14	Instant stop action pause judgment voltage		0.1%	90.0%	○
F7.15	Instant stop voltage rise judgment time		0.01s	0.50s	○
F7.16	Instant stop action judgment voltage		0.1%	80.0%	○
F7.17	Instant stop gain Kp		1	5	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F7.18	Instant stop integration time	drop in voltage, the drive decelerates. When the bus voltage returns to normal, the drive will normally accelerate to the set frequency.	1ms	100ms	○
F7.19	Instant stop deceleration time setting		0.1s	20.0s	○
F7.20	Overcurrent stall speed recovery time limit	Set range: 0.01～600.00s After the overcurrent stall is canceled, the drive output frequency will resume to the set frequency, but the fastest acceleration / deceleration time for recovery is limited by this function code.	0.01s	0.20s	○
F7.21	Torque boost limit	F7.21 set range: 0.1～30.0% F7.22 set range: 0.00～F3.04 F7.23 set range: 0～500 (when set to 0, it is manual torque boost) F7.24 set range: 1～10000ms F7.25 set range: 0.00～F3.04 F7.26 set range: 0～500 F7.27 set range: 1～10000ms F7.28 set range: 0～100% 1. The torque boost is to compensate the output voltage of the drive when the drive is running at low frequency. The torque boost can improve the low frequency characteristics in V/F control mode. 2. The torque boost amount shall be set appropriately according to the load. If needed the load can increase the boost amount, but the boost amount shall not be set too large. When the torque boost is too large, the motor will run in over-excitation and the drive output current will increase. The motor heats up and the efficiency decreases. 3. Torque boost cutoff point: At this frequency point, the torque boost is valid, and is invalid when the set frequency exceeds this point. 4. Torque boost gain switching frequency point: Switching frequency point during high-speed and low-speed variable gains. 5. Setting of the torque boost gain and	0.1%	10.0%	○
F7.22	Torque boost cutoff point		0.01Hz	50.00 Hz	○
F7.23	Torque boost gain 1		1	20	○
F7.24	Torque boost integration time 1		1ms	150ms	○
F7.25	Torque boost gain switching frequency point		0.01Hz	Model determination	○

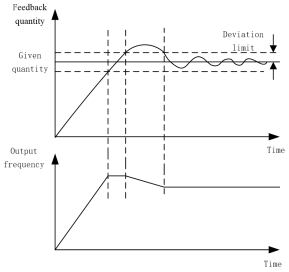
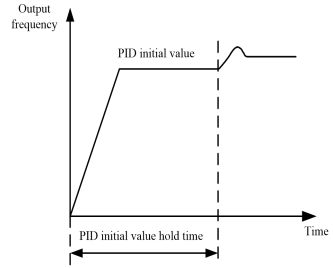
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F7.26	Torque boost gain 2	integration time: Increasing the gain can speed up the system's dynamic response, but if the gain is too large, the system easily generates oscillations; reducing the integration time can speed up the system's dynamic response, but if the integration is too small, the system overshoot is large and it easily generates oscillations. Usually, the proportional gain isadjusted to the maximum first, under the premise that the system is not oscillating; then the integration time is adjusted to make the system have a fast-dynamic response to reduce the system overshoot.	1	10	○
F7.27	Torque boost integration time 2		1ms	500ms	○
F7.28	Automatic torque boost factor		1%	30%	○
F7.29	Motor oscillation suppression methods	F7.29 set range: 0～1 F7.30 set range: 0～1000 F7.31 set range: 0～10000ms In V/F control mode, it is easy to generate current oscillation at certain frequency. In minor cases, the motor cannot have a stable operation,but in serious cases, it will cause overcurrent in the drive. The oscillation suppression function is used to suppress the natural oscillations generated when the drive cooperates with the motor. If the output current changes repeatedly during theconstant load operation, by properly adjusting the oscillation suppression parameters, based on the factory parameters,oscillation can be eliminatedand makes the motor operation stable. F7.29=0 Suppress oscillations by adjusting output frequency; F7.29=1 Suppress oscillations by adjusting output voltage.	1	0	○
F7.30	Motor oscillation suppression coefficient		1	3	○
F7.31	Motor oscillation suppression filter time		1ms	100ms	○
F8 group: PID control parameters					
F8.00	PID operation control selection	0: PID standby (not enabled) 1: PID standby (enabled)	1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.01	Target value channelselection	When the frequency given channel is selected to 8, the drive operation mode is process PID control. 0: F8.05 digital input 1: AI1 2: AI2 3: Reserved 4: PULSE setting 5: Communication setting 6: Multistage instruction setting 7: Keypad digital potentiometer input 8: Analog potentiometer input on external kepad This function code determines the target'sinput channel for PID. The set target of PID is a relative value, and the set 100% corresponds to 100% of the feedback signal of the controlled system. The system always performs calculation based on relative value (0 to 100.0%).	1	0	×
F8.02	Feedback channel selection	This function code is used to select the PID feedback channel. 0: AI1 1: AI2 2: Reserved 3: Pulse 4: Communication setting **Note: The given channel and the feedback channel cannot be the same, otherwise, the PID cannot be controlled effectively.**	1	0	×
F8.03	Target value channel filter	Set range: 0～1000ms The external signal input and feedback signal often encounter a certain interference. The channel is filtered by setting the filter time. The longer the filter time, the stronger the anti-interference ability, but the response becomes slower; the faster the filter time, the faster the response, but the anti-interference ability weakens.	1ms	10ms	○
F8.04	Feedback channel filter		1ms	10ms	○
F8.05	Target quantity digital setting	Universal drive mode setting range: 0.0～100.0% Water supply drive mode setting range: 0.0～F8.23	0.1% Or 0.1bar	0.0% Or 0.0bar	○
F8.06	Proportional gain Kp1	Set range: 0～1000 Determines the adjustment intensity of the entire PID. The larger the proportional gain, the stronger the adjustment intensity. When there is a difference between the	1	10	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		feedback and the target value, the output and the deviation are adjusted in proportion. If the difference is constant, the adjustment amount is also constant. Proportional adjustment can quickly respond to changes in feedback, but just proportional adjustment cannot achieve non-differential control. The larger the proportional gain, the faster the adjustment speed of the system, but if it is too large, oscillations will occur. Follow the following adjustment method: first set the integration time to be very long and the differential time to zero. Then use only proportional adjustment to make the system run, change the given quantity, and observe the stable deviation (static difference) between the feedback signal and the target value. If the static difference is in the direction of target value changes (for example, increasing the target value, the feedback quantity is always less than the target value after the system becomes stable), then continue to increase the proportional gain, otherwise decrease the proportional gain, and repeat the above process until the static difference is relatively small.			
F8.07	Integration time Ti1	Set range: 1～10000ms Determine how fast the PID regulator performs integral adjustment on the difference between the PID feedback value and the target value. The shorter the integration time, the greater the adjustment intensity. When there is a deviationof the feedback value from the target value, the output adjustment accumulates continuously. If the deviation persists, the adjustment increases constantly, until there is no deviation. The integral regulator can effectively eliminate static difference. If the integral regulator is too strong, there will be repeated overshoot, making the system unstable and oscillation occurs. The characteristics of the oscillation caused by excessive integration are as	1ms	500ms	○

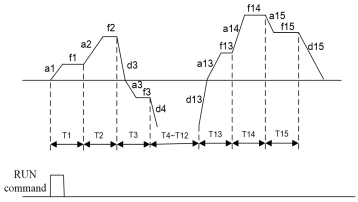
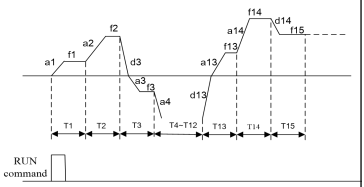
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		follows: The feedback signal swings up and down on a target value, and the swing gradually increases until it oscillates. The adjustment of the integration time parameter is generally from large to small, gradually adjust the integration time, and observe the effect of the system adjustment until the stable speed of the system reaches the requirements.			
F8.08	Differential time Td1	Set range: 0～10000ms Determines how strong the PID regulator performs adjustment on the deviation change rate between the PID feedback value and the target value. The shorter the differential time, the greater the adjustment intensity. When the difference between feedback and target changes, an adjustment proportional to the deviation's change rate is outputted. The adjustment is only related to the direction and magnitude of the deviation change and has nothing to do with the direction and magnitude of the deviation itself. The function of differential adjustment is to adjust according to the changing trend when the feedback signal changes, thus to suppress the change of the feedback signal. Please use the differential regulator with caution, because the differential regulation can easily amplify the interference of the system, especially the interference with a higher change frequency.	1ms	0ms	○
F8.09	Proportional gain Kp2	F8.09 set range: 0～1000 F8.10 set range: 1～10000ms F8.11 set range: 0～10000ms The parameter functions are the same as F8.06 ～ F8.08.When used to switch the two groups of PID parameters, the switch method is shown in F8.12 setting.	1	5	○
F8.10	Integration time Ti2		1ms	2000ms	○
F8.11	Differential time Td2		1ms	0ms	○

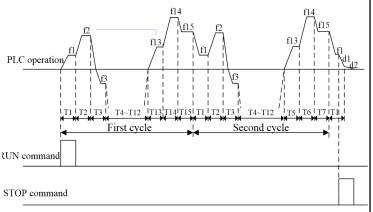
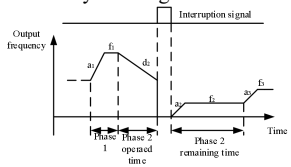
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.12	Gain switching conditions	0: Do not switch 1: Switch through the DI terminal: The function of the DI terminal is set to 21 (PID parameter switch). When the terminal is invalid, select parameter group 1 (F8.06～F8.08). When the terminal is valid,it selects parameter group 2 (F8.09～F8.11). 2: Automatic switch based on the deviation: Select the parameter group 1 (F8.06～F8.08) when the absolute value of the deviation between the target quantity and the feedback quantity is less than the switching threshold (F8.13), and select the parameter group 2 (F8.09 ~ F8.11) when greater than the switching threshold (F8.13) . 3: Switch automatically according to PID output: When the PID output (0 ～ maximum output frequency corresponds to 0.0～100.0%) is less than the switching threshold (F8.13), select parameter group 1 (F8.06～F8.08), and select parameter group 2 (F8.09~F8.11) when greater than the switching threshold (F8 .13)	1	0	○
F8.13	Gain switching threshold	Set range: 0.0～100.0% The PID parameter switching threshold is valid when the gain switching condition (F8.12) is set to 2 or 3.	0.1%	0.0%	○
F8.14	PID sampling period	Set range: 1～60000ms The sampling period T is a sampling period of the feedback quantity, and the PID regulator operates only once in each sampling period. The greater the sampling period, the slower the response.	1ms	1ms	○
F8.15	Deviation limit	Set range: 0.0～50.0% The deviation limit corresponds to a closed-loop input value. When the absolute value of the deviation between the target quantity and the feedback quantity is within this range, the PID stops adjusting, as shown in the figure. The proper setting of this function helps to consider the accuracy and stability of the system output	0.1%	0.0%	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		 .			
F8.16	Closed-loop regulation features	0: Positive action. When the feedback signal is less than the target value, the output frequency of the drive rises to make the PID reach balance. Such as rewinding tension PID control. 1: Negative action. When the feedback signal is less than the target value, the output frequency of the drive drops to make the PID reach balance. Such as unwinding tension PID control.	1	0	○
F8.17	PID initial value	F8.17 set range: 0.0～100.0% F8.18 set range: 0.00～600.00s 1. After the drive starts, drive accelerates to the initial PID value (F8.17) according to the acceleration time. After running for a period of time (F8.18) at this initial value, the PID starts the closed-loop adjustment operation. 2. This function allows the closed-loop adjustment to quickly enter the stable phase.	0.1%	0.0%	×
F8.18	PID initial value hold time		0.01s	0.00s	×
F8.19	Closed-loop output polarity selection	0: Closed-loop output is negative, run at zero-frequency 1: Closed-loop output is negative, reverse	1	0	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.20	PID reverse cutoff frequency	Set range: 0.00~upper limit frequency When the PID output frequency is negative (i.e. if the drive reverses), determine the upper limit of the reverse frequency.	0.01Hz	2.00Hz	×
F8.21	PID feedback loss detection value	F8.21 set range: 0.0～100.0% F8.22 set range: 0.0 ～ 200.0s (0.0s indicates no detection) When the feedback value is less than the feedback disconnection detection value and the feedback disconnection detection time has passed, the drive reports a PID feedback disconnection fault (E020).	0.1%	10.0%	○
F8.22	PID feedback loss detection time		0.1s	0.0s	○
F8.23	Maximum sensor range	Set range: 0.0～200.0bar The maximum range of the sensor corresponds to the maximum value of the closed-loop target value.	0.1bar	10.0bar	○
F8.24	Water supply sleep selection	0: Automatic sleep 1: Run at lower frequency	1	0	○
F8.25	Water supply sleep detection time	F8.25 set range: 0.0～3600.0s F8.26 set range: 0.01～600.00s Sleep detection pressure = (100.0%-F8.15) * set pressure value. When the drive is running, it will detect whether the feedback pressure is higher than the sleep detection pressure. If the feedback pressure is higher than the sleep detection pressure, the drive starts the sleep detection. After the water supply sleep detection delay time set by F8.25, if the feedback pressure is still greater than the sleep detection pressure, it enters the sleep mode, and the drive gradually reduces the output frequency according to the water supply sleep deceleration time defined by F8.26. If the feedback pressure becomes lower than the sleep detection pressure in the above process, the drive detects it and returns to the PID adjustmentmode.	0.1s	10.0s	○
F8.26	Water supply sleep deceleration time		0.01s	10.00s	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.27	Water supply wake-up pressure level	F8.27 set range: 0.0～100.0% (100.0% is the set pressure value) F8.28 set range: 0.0～3600.0s 1. Water supply wake-up pressure = (100.0%-F8.27) * set pressure value. 2. When the drive enters the sleep mode, if the feedback pressure is lower than the water supply wake-up pressure, the drive starts wake-up detection. After the water supply wake-up detection time set by F8.28, if the feedback pressure is still lower than the wake-up pressure, the drive wakes-up and the returns to the PID adjustment mode, otherwise the wake-up fails. Setting the wake-up pressure too high may cause the drive to start and stop frequently. Setting it too low may cause insufficient water supply pressure.	0.1%	10.0%	○
F8.28	Water supply wake detection time		0.1s	2.0s	○
F8.29	Water pressure overpressure alarm detection value	Set range: 0.0～100.0% (Do not test when set to 0, 100.0% is the maximum range of pressure sensor) When the feedback pressure is greater than or equal to this set value, and after the F8.31 pressure abnormal alarm detection time, it outputs a water pipe overpressure indication signal (the terminal outputs No. 24 function).	0.1%	90.0%	○
F8.30	Water pressure undervoltageala rm detection value	Set range: 0.0～100.0% (Do not test when set to 0, 100.0% is the maximum range of pressure sensor) When the feedback pressure is less than or equal to this set value, and after the F8.31 pressure abnormal alarm detection time, it outputs a water pipe underpressure indication signal (the terminal outputs No. 25 function).	0.1%	0.0%	○
F8.31	Water pressure abnormal alarm detection time	Set range: 0.0～3600.0s	0.1s	50.0s	○
F8.32	Water shortage alarm set value	F8.32 set range: 0.0～100.0% (100.0% is the set pressure value) F8.33 set range: 0.0～3600.0s F8.34 set range: 0 ～ 10000min (0min indicates water shortage restart function is not enabled) When the output frequency reaches the upper limit and the feedback pressure is still less than or equal to F8.32 water shortage set value and after F8.33 water	0.1%	20.0%	○
F8.33	Water shortage alarm detection time		0.1s	20.0s	○
F8.34	Water shortage restart wait time		1min	0min	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		shortage alarm detection timepasses, a water pipe water shortage indication signal (the terminal outputs No. 26 function) will be outputted and the E023 water shortage fault will be reported. When the E023 water shortage fault occurs, without resetting the fault manually, it will automatically reset and restart the operation after wating for water shortage restart wait time (F8.34).			
F9group:Multistage speed control parameters					
F9.00	Simple PLC run mode selection	LED single digit: PLC run mode 0: No action 1: Stop after a single cycle: The drive will stop automatically after completing one cycle. You need to give a run command again to start.  2: Keep the final value after a single cycle: The drive will automatically keep the frequency and direction of the last stage after completing one cycle.  3: Continuous cycle: The drive will automatically start the next cycle after completing one cycle, till there's a stop command.	1111	0000	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		 4: DI selection operation: Determine the current operation stage by selecting the ON/OFF combination of input terminal functions 12~15. For the combination method, please refer to No. 12~15 function description of group F6 multifunctional input terminals. LED tens digit: Start mode 0: Restart from the first stage: If drive stops during operation (caused by stop command, fault or power failure), thenit starts from the first stage after restart. 1: Continue operation from the stage of interruption: If drive stops during operation (caused by stop command or fault), the drive automatically records the run time of the current stage, and automatically enters this stage after restarting, and continues the operation in the remaining time at the frequency defined by this stage.  LED hundreds digit: Stage time unit selection 0: Second 1: Minute LED thousands digit: Store at power failure 0: Do not store at power failure 1: Store the stage at power failure			
F9.01	Running stages	Set range: 1～16 Number of stages in a single PLC cycle.	1	16	○
F9.02	Multistage instruction 1	Lower limit frequency~upper limit frequency	0.01Hz	20.00 Hz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.03	Stage 1 instruction setting	LED single digit: 0: Multistage instruction 1 (F9.02) 1: AI1 2: AI2 3: Pulse frequency 4: Communication 5: Keypad digital potentiometer input 6: External keypad's analog potentiometer input LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running **Note: Only the LED single digit frequency source of stage 1 instruction can be set.**	111	000	○
F9.04	Stage 1 instruction running time	Set range: 0.1～6000.0 **Note: For the time unit selection, see F9.00 hundreds digit setting.**	0.1	10.0	○
F9.05	Multistage instruction 2	Stage X instruction (F9.05, F9.08, F9.11, F9.14, F9.17, F9.20, F9.23, F9.26, F9.29, F9.32, F9.35、F9.38, F9.41, F9.44, and F9.47) setting range: Lower limit frequency~upper limit frequency Stage X instruction (F9.06, F9.09, F9.12, F9.15, F9.18, F9.21, F9.24, F9.27, F9.30, F9.33, F9.36、F9.39, F9.42, F9.45, and F9.48) setting range: LED single digit: 0: Multistage instruction x 1: Reserved LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running Stage X instruction running time (F9.07, F9.10, F9.13, F9.16, F9.19, F9.22, F9.25, F9.28, F9.31, F9.34, F9.37、F9.40, F9.43, F9.46, and F9.49) setting range: 0.1~6000.0	0.01Hz	20.00 Hz	○
F9.06	Stage 2 instruction setting		111	000	○
F9.07	Stage 2 instruction running time		0.1	10.0	○
F9.08	Multistage instruction 3		0.01Hz	20.00 Hz	○
F9.09	Stage 3 instruction setting		111	000	○
F9.10	Stage 3 instruction running time		0.1	10.0	○
F9.11	Multistage instruction 4		0.01Hz	20.00 Hz	○
F9.12	Stage 4 instruction setting		111	000	○
F9.13	Stage 4 instruction running time		0.1	10.0	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.14	Multistage instruction 5	**Note: For the time unit selection, see F9.00 hundreds digit setting.**	0.01Hz	20.00 Hz	○
F9.15	Stage 5 instruction setting		111	000	○
F9.16	Stage 5 instruction running time		0.1	10.0	○
F9.17	Multistage instruction 6		0.01Hz	20.00 Hz	○
F9.18	Stage 6 instruction setting		111	000	○
F9.19	Stage 6 instruction running time		0.1	10.0	○
F9.20	Multistage instruction 7		0.01Hz	20.00 Hz	○
F9.21	Stage 7 instruction setting		111	000	○
F9.22	Stage 7 instruction running time		0.1	10.0	○
F9.23	Multistage instruction 8		0.01Hz	20.00 Hz	○
F9.24	Stage 8 instruction setting		111	000	○
F9.25	Stage 8 instruction running time		0.1	10.0	○
F9.26	Multistage instruction 9		0.01Hz	20.00 Hz	○
F9.27	Stage 9 instruction setting		111	000	○
F9.28	Stage 9 instruction running time		0.1	10.0	○
F9.29	Multistage instruction 10		0.01Hz	20.00 Hz	○
F9.30	Stage 10 instruction setting		111	000	○

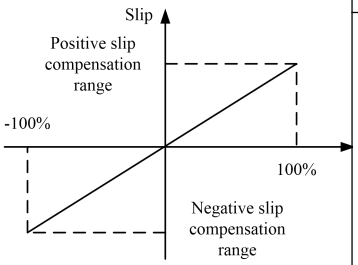
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.31	Stage 10 instruction running time		0.1	10.0	○
F9.32	Multistage instruction 11		0.01Hz	20.00 Hz	○
F9.33	Stage 11 instruction setting		111	000	○
F9.34	Stage 11 instruction running time		0.1	10.0	○
F9.35	Multistage instruction 12		0.01Hz	20.00 Hz	○
F9.36	Stage 12 instruction setting		111	000	○
F9.37	Stage 12 instruction running time		0.1	10.0	○
F9.38	Multistage instruction 13		0.01Hz	20.00 Hz	○
F9.39	Stage 13 instruction setting		111	000	○
F9.40	Stage 13 instruction running time		0.1	10.0	○
F9.41	Multistage instruction 14		0.01Hz	20.00 Hz	○
F9.42	Stage 14 instruction setting		111	000	○
F9.43	Stage 14 instruction running time		0.1	10.0	○
F9.44	Multistage instruction 15		0.01Hz	20.00 Hz	○
F9.45	Stage 15 instruction setting		111	000	○

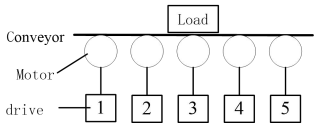
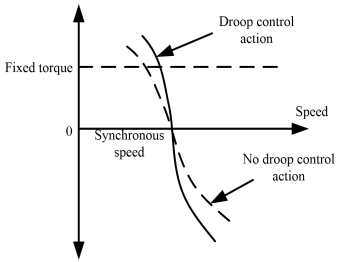
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.46	Stage 15 instruction running time		0.1	10.0	○
F9.47	Multistage instruction 16		0.01Hz	20.00 Hz	○
F9.48	Stage 16 instruction setting		111	000	○
F9.49	Stage 16 instruction running time		0.1	10.0	○
FA group:Protection function parameters					
FA.00	DC bus undervoltage protection limit	Set range: 50～999V This function code specifies the allowed lower limit voltage of the DC bus under drive's normal operation. **Note: When the grid voltage is too low, the output torque of the motor will decrease. So, the drive needs to be derated for long-term operation at low grid voltage.**	1V	Model determination	×
FA.01	Undervoltage fault action selection	0: During running, if the voltage is lower than the undervoltage limit, an undervoltage fault E007 is reported. 1: During running, if the voltage is lower than the undervoltage limit, P.oFF is reported.	1	0	×
FA.02	Motor overload protection action selection	0: Disabled 1: Enabled, E008 fault is reported when the motor is overloaded.	1	0	×
FA.03	Reserved	-	-	-	*
FA.04	Reserved	-	-	-	*
FA.05	Reserved	-	-	-	*
FA.06	Output phase loss protection delay time	Set range: 0.0～6000.0s (0.0s indicates no detection for output phase loss)	0.1s	0.0s	×
FA.07	485 communication fault protection action selection	0: Disabled 1: Enabled, E016 fault is reported when 485 communication is abnormal.	1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
FA.08	Number of automatic resets	FA.08 set range: 0～100 (0 indicates no automatic reset function) FA.09 set range: 0.1～1000.0s 1. Number of automatic resets: When the drive resets automatically after faults, it is used to set the number of automatic resets. When the number of continuous resets exceeds this value, the drive will report a fault and stops and will not reset automatically. 2. Fault automatic reset interval time: Set the time interval from the fault occurrence to the automatic reset action. 3. Within 2 minutes after the drive operates, if there is no fault, it will automatically clear the number of resets, and starts counmting the number of resets from the beginning. 4. When the number of automatic resets is set to 0, it indicates that automatic reset is disabled, and fault protection is performed immediately. **Note: The drive module protection (E010) and external equipment failure (E015) have no automatic reset function. After the automatic reset is completed, it will automatically start and run at the speed tracking. Use the automatic fault reset function with caution, otherwise, it may cause personal injuries and property losses.**	1	0	×
FA.09	Automatic reset interval time		0.1s	5.0s	×
FA.10	Reserved	-	-	-	*
FA.11	Reserved	-	-	-	*
FA.12	Reserved	-	-	-	*
Fbgroup:Serial communication parameters					
Fb.00	Local address	Set range: 0～247 The local address is unique in the communication network, which is the basis for the point-to-point communication between the host computer and the drive. **Note: 0 is the broadcast address**	1	1	×
Fb.01	Communication configuration	LED single digit: Baud rate selection 0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS	11	03	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		4: 19200BPS 5: 38400BPS LED tens digit: Data format 0: 1-8-2-N format, RTU 1: 1-8-1-E format, RTU 2: 1-8-1-O format, RTU 3: 1-7-2-N format, ASCII 4: 1-7-1-E format, ASCII 5: 1-7-1-O format, ASCII 6: 1-8-1-N format, RTU			
Fb.02	Reserved	-	-	-	*
Fb.03	Local response delay	Set range: 0～1000ms The local response delay refers to the interval between the complete data receiving and the sending of response data to the host computer. If the response delay is less than the system processing time, the response delay is will be the same as system processing time. If the response delay is greater than the system processing time then after the system has processed the data, it must wait until the response delay time is reached before sending data to the host computer.	1ms	5ms	×
Fb.04	Communication timeout detection time	Set range: 0.0～100.0s If the communication timeout fault time is set to 0, this function is disabled. If the time interval between two communications exceeds the communication timeout fault time, the system reports a communication fault E016, and the communication condition can be monitored. Usually, this function is disabled. If this parameter is set in a continuous communication system, the communication condition can be monitored.	0.1s	0.0s	×
Fb.05	Host send selection	LED single digit: Current host running status 0: Invalid 1: Valid LED tens digit: Current host running frequency 0: Invalid 1: Valid 1. When the drive is set as the communication master (Fb.00 is set to 0), it can send data to the slave. In this case,	11	11	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		the master drive sends a broadcast command, and all slaves will receive the command sent by the master. 2. The master can send up to 2 frames of data in a polling manner. When set to invalid, no data is sent. **Note: Only RTU communication mode supports host sending.**			
C group:Auxiliary function parameters					
FC.00	Energy consumption braking threshold	FC.00 set range: 350～800V FC.01 set range: 0～100% 1. Energy consumption braking function. If the drive bus voltage is higher than the energy consumption braking threshold, the built-in braking unit will act. In this case, if a braking resistor is connected, the internal energy of the drive will be released through the braking resistor to make the bus voltage drop. 2. The energy consumption braking duty cycle is used to adjust the duty cycle of the braking unit. If the braking utilization rate is high, the braking unit action duty cycle is high and the braking effect is strong, but the drive bus voltage fluctuates greatly during the braking process. **Note: The setting of this function shall consider the resistance and power of the braking resistor. Be sure to set the function parameters correctly according to the actual use.**	1V	Model determination	×
FC.01	Energy consumption braking duty cycle		1%	50%	×
FC.02	AVR function	0: Disable 1: Always enabled 2: Disable only during deceleration When the input voltage deviates from the rated value, this function can keep the output voltage constant, so generally the AVR shall operate, especially when the input voltage is higher than the rated value. **Note: When decelerating and stopping, the AVR does not act, the deceleration time is short, but the running current is slightly larger; when the AVR acts all the time, the motor decelerates smoothly and the running current is small, but the deceleration time becomes longer.**	1	2	×
FC.03	Automatic energy-saving operation	0: Disable 1: Enable During the no-load or light-load operation, the motor detects the load	1	0	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		current and adjusts the output voltage appropriately to achieve the purpose of energy saving.			
FC.04	Slip compensation gain	FC.04 set range: 0～1000 (0 indicates no compensation) FC.05 set range: 0.1～20.0ms 1. The change of the motor load torque will affect the motor slip and cause the motor speed to change. Through slip compensation, the output frequency of the drive is automatically adjusted according to the load torque of the motor, which can reduce the speed change of the motor caused by load changes, as shown in the figure.	1	0	○
FC.05	Slip compensation filter time	 2. Electric status: When the actual speed is lower than the given speed, gradually increase the compensation gain (FC.04). 3. Generation status: When the actual speed is higher than the given speed, gradually increase the compensation gain (FC.04). 4. The filter time constant of slip compensation. The shorter the filter time, the faster the response, but too short will cause oscillation and speed instability.	0.1ms	10.0ms	○
FC.06	Cooling fan control	0: Run in automatic mode Note: The fan is turned off at least 3 minutes after stop and when the temperature is lower than 40 degrees. 1: The fan keeps rotating during power-on	1	0	×
FC.07	Acceleration/deceleration time unit	0: Second 1: Minute	1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
FC.08	Droop control frequency	Set range: 0.00～10.00Hz 1. The droop control is suitable for the occasions where multiple drives drive the same load. By setting this function, multiple drives can reach a uniform distribution of power when driving the same load. Transmission gears are shown in the following figure (5 drives drive the conveyors of 5 motors)  2. When the load of a certain drive is heavy, the drive will automatically reduce the output frequency appropriately according to the parameters set by this function to unload part of the load. This value can be adjusted gradually from small to large during debugging. The relationship between load and output frequency is shown in the following figure: 	0.01Hz	0.00Hz	○
FC.09	Deceleration factor	Set range: 50.0%～180.0% For the coefficient of voltage-frequency ratio during deceleration, increase the voltage-frequency ratio during deceleration.In this case, the output voltage increases and the deceleration will be faster, which is good for quick stop without reporting overvoltage.	0.1%	100.0%	○
FC.10	Zero frequency reached range	Set range: 0.00～10.00Hz When the output frequency is less than or equal to the set value of this function code, an indication signal is output (the terminal outputs No. 10 function).	0.01Hz	0.00Hz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
FC.11	Set length	FC.11 set range: 0～65535m (0 indicates the fixed-length stop function is invalid) FC.12 set range: 0.001～10.000m FC.13 set range: 1～9999 1. This group of functions is used to realize the fixed-length stop function. 2. The drive inputs counting pulses from DI5 (F6.19 needs to be set to 1), and obtains the actual length according to the number of pulses per revolution of the speed measuring shaft (FC.13) and the shaft circumference (FC.12). 3. Actual length = Number of counting pulses/number of pulses per revolution × circumference of the measuring shaft. 4. When the actual length (U0.15) ≥ the set length (FC.11), the drive will automatically send a stop command to stop. You need to clear the actual length before running again, otherwise it will not start. **Note: The multifunctional input terminal can be used to clear the actual length (DIx is defined to No. 24 function), the normal counting and the actual length calculation can be performed only after the terminal is disconnected.** **The actual length is U0.15, and it is automatically stored during power failure.**	1m	0m	○
FC.12	Measuring shaft circumference		0.001m	0.100 m	○
FC.13	Pulse per revolution		1	1	○
FC.14	Dead zone compensation coefficient	Set range: 0～20	1	Model determination	×
FC.15	STOP key stop function selection	0: Only valid for keypad control 1: Valid for all control modes except two-wire control mode	1	0	○
FC.16	Digital potentiometer power failure save selection	0: The digital potentiometer frequency is not saved during power failureand will start from 0.00Hz after power-on. 1: The digital potentiometer frequency is saved during power failureand will start from the power failure frequency after power-on.	1	1	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
FC.17	The first shortcut parameter display selection	Set range: 0～29 When set to 0 ～ 28, it corresponds to group U0 parameter number; when set to 29, it displays the operation frequency during fixed operation, and displays the instruction frequency during standby; when set to 4, it displays the operation speed during fixed operation, and displays the instruction speed during standby; when set to 5, it displays the operating linear speed during fixed operation, and displays the instruction linear speed during standby.	1	29	○
FC.18	Speed display factor	Set range: 0.01～100.00 This function code is used to correct the display error of the rotation speed and has no effect on the actual rotation speed. **Note: Speed = 120*frequency*FC.18/number of motor poles (F3.11)**	0.01	1.00	○
FC.19	Linear speed display factor	Set range: 0.01～100.00 This function code is used to correct the display error of the linear speed and has no effect on the actual linear speed. **Note: Linear speed = speed*FC.19**	0.01	1.00	○
FC.20	Frequency linkage selection	0: No linkage ratio 1: FC.21 is the coefficient linkage instruction frequency and acceleration/deceleration 1 2: FC.21 is used as the factor linkage instruction frequency 3: AI1 voltage value is the coefficient linkage instruction frequency and acceleration/deceleration 1 4: AI1 voltage value is used as the factor linkage instruction frequency	1	0	○
FC.21	Linkage ratio factor	Set range: 0.000～10.000	0.001	1.000	○
FC.22	PI deviation limit	0.0～100.0%	0.1%	0.0%	
FC.23	PI output upper frequency	The PI output target frequency shall not be greater than this upper limit frequency	0.01Hz	50Hz	
FC.24	PI output lower frequency	The PI output target frequency shall not be less than this lower limit frequency	0.01Hz	50Hz	
FC.25	KP1	KP1,KP2:Proportionalcoefficient of target frequency.Thebigger value is, the faster adjustment is.	1	300	
FC.26	KI1	KI1,KI2:Integral coefficient of the target frequency	1	300	

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
FC.27	KP2	KP1, KI1 and KP2 ,KI2 are switched by FE-10 Note:1.Built-in PID control parameters should be set by system characteristics and actual requirements 2.Proportional gain Kp: determines the regulating strength of PID,the bigger the Kp is, the stronger the adjustment is 3.Integral time Ti:determines how fast the PID adjusts the deviation of the feedback quantity and the given quantity	1	100	
FC.28	KI2		1	1000	
FC.29	PI Switching point	If the absolute value of bus voltage minus the reference value is bigger than this value, it will switch to KP2 、 KI2; otherwise it is KP1、KI1	1v	30v	
FC.30	MPPT search interval	The shorter the time is, the faster the tracking is, but also the faster the solar voltage fluctuations	0.1s	2.0s	
Fdgroup:Virtualterminal parameter function					
Fd.00	VDI1 terminal function selection	Same as F6.00～F6.08 function code setting. Note: The VDI virtual terminal is an extension of the physical input terminal. The communication sends instructions to simulate the actual terminal. Each bit in the communication data represents a terminal, and the value of each bit represents the status of the corresponding terminal. For specific bit definition, please refer to the communication address 0x1206 description. **The function of each terminal cannot be the same. If the functions of the two terminals are set to the same, the physical terminal will act prior to the virtual terminal in order. In this case, the DI ports ranked first will work and the latter ones will not work.**	1	0	×
Fd.01	VDI2 terminal function selection		1	0	×
Fd.02	VDI3 terminal function selection		1	0	×
Fd.03	VDI4 terminal function selection		1	0	×
Fd.04	VDI5 terminal function selection		1	0	×
Fd.05	VDI6 terminal function selection		1	0	×
Fd.06	VDI7 terminal function selection		1	0	×
Fd.07	VDI8 terminal function selection		1	0	×
Fd.08	VDI9 terminal function selection		1	0	×
Fd.09	VDI10 terminal function selection		1	0	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
Fd.10	VDO1 terminal function selection	Same as F6.11 ～ F6.13 function code setting. Note: The VDO virtual terminal is an extension of the physical output terminal. The virtual terminal status can be read only through communication. Each bit in the communication data represents a terminal, and the value of each bit represents the status of the corresponding terminal. For specific bit definition, please refer to the communication address 0x1207 description.	1	0	×
Fd.11	VDO2 terminal function selection		1	0	×
Fd.12	VDO3 terminal function selection		1	0	×
Fd.13	VDO4 terminal function selection		1	0	×
Fd.14	VDO5 terminal function selection		1	0	×
Fd.15	VDO1 output on delay	Same as F6.29～F6.34 function code setting.	0.1s	0.0s	○
Fd.16	VDO2 output on delay		0.1s	0.0s	○
Fd.17	VDO3 output on delay		0.1s	0.0s	○
Fd.18	VDO4 output on delay		0.1s	0.0s	○
Fd.19	VDO5 output on delay		0.1s	0.0s	○

4.2 Monitoring parameter group U0

aramete Code	Parameter name	Parameter detailed description
U0.00	Output frequency	Displays thecurrent output frequency of the current drive
U0.01	Set frequency	Displays the set frequency of the current drive
U0.02	Output current	Displays the output current of the current drive
U0.03	Bus voltage	Displays the bus voltage of the current drive
U0.04	Running speed	Displays the running speed of the current drive **Note: Speed = 120*frequency*speed display factor (FC.18)/number of motor poles (F3.11)**
U0.05	Linear running speed	Displays the linear running speed of the current drive **Note: Linear speed = speed*linear speed display factor (FC.19)**
U0.06	Output power	Displays the output power of the current drive
U0.07	Output torque	Displays the output torque of the current drive
U0.08	Output voltage	Displays the output voltage of the current drive
U0.09	AI1	Displays the actual input voltage/current of AI1 of the current drive (when the input is of current type, 1mA current corresponds to 0.5V

aramete Code	Parameter name	Parameter detailed description
		voltage display)
U0.10	AI2	Displays the actual input voltage of AI2 of the current drive
U0.11	PID setting	Displays the PID target value of the current drive
U0.12	PID feedback	Displays the PID feedback value of the current drive
U0.13	Counter value	Displays the counter value of the current drive
U0.14	Closed-loop pressure display	Displays the closed-loop pressure value of the current drive **Note: Closed-loop pressure = PID feedback value*pressure sensor range (F8.23)**
U0.15	Actual length	Displays the actual length accumulated by the fixed length control function of the current drive
U0.16	High-frequency pulse count value	Displays the accumulated pulse count value of the DI5 high-speed input signal of the current drive (not saved after power failure)
U0.17	Pulse frequency display	Displays the pulse frequency of the DI5 high-speed input signal of the current drive
U0.18	Drive rated power	Displays the rated power of the drive
U0.19	Drive rated voltage	Displays the rated voltage of the drive
U0.20	Drive rated current	Displays the rated current of the drive
U0.21	Reserved	-
U0.22	IGBT temperature	Displays the IGBT temperature of the current drive
U0.23	DI terminal status 1	Displays current input terminal function status (defined by bit, 0 indicates that the current terminal input function is invalid, and 1 indicates that the current terminal input function is valid): LED single digit: DI1 input status LED tens digit: DI2 input status LED hundreds digit: DI3 input status LED thousands digit: DI4 input status LED ten thousands digit: DI5 input status
U0.24	Reserved	-
U0.25	DO terminal status	Displays current output terminal function status (defined by bit, 0 indicates that the current terminal output function is invalid, and 1 indicates that the current terminal output function is valid): LED single digit: DO1 output status LED tens digit: DO2 output status LED hundreds digit: Relay output status LED thousands digit: Reserved LED 10 thousands digit: Reserved
U0.26	Reserved	-
U0.27	Running time accumulation	Displays the accumulated running time of the current drive
U0.28	Software version number	Displays the software version of the current drive

aramete Code	Parameter name	Parameter detailed description
U0.29	Operating state of solar pump	0 :Normal 1 :Empty water state 2 :Full water state 3 :Weak light state

4.3 Fault record parameter group U1

aramete Code	Parameter name	Parameter detailed description	Factory value	Chang
U1.00	Historical fault number	Set range: 0～9 According to the setting of this function code, you can view the fault record information of the last 10 times. By setting different values within U1.01～U1.06, the corresponding fault record will display.	0	○
U1.01	Fault code during fault	Fault record information at the xth fault (x is the set value of U1.00)	-	●
U1.02	Bus voltage during fault		-	●
U1.03	Output current during fault		-	●
U1.04	Running frequency during fault		-	●
U1.05	Running temperature during fault		-	●
U1.06	Fault occurrence time		-	●

4.4 Fault code table

Fault code	Fault type	Fault code	Fault type
E001	Drive overcurrent during acceleration	E016	485 communication error alarm
E002	Drive overcurrent during deceleration	E017	Current detection circuit fault alarm
E003	Drive overcurrent during constant-speed running	E018	Reserved
E004	Drive overvoltage during acceleration	E019	Reserved
E005	Drive overvoltage during deceleration	E020	Closed-loop feedback loss alarm
E006	Drive overvoltage during constant-speed running	E021	Water pressure overpressure alarm
E007	Undervoltagealarm during running	E022	Reserved

Fault code	Fault type	Fault code	Fault type
E008	Motor overload alarm	E023	Water shortage alarm
E009	Drive overload alarm	E024	Reserved
E010	Reserved	E025	Underload alarm
E011	Reserved	E026	Hydraulic probe damage of empty water
E012	Output phase loss alarm	E027	Hydraulic probe damage of full water
E013	Drive module radiator overheat alarm	E028	Keypad parameter copy error alarm
E014	Rectifier module radiator overheat alarm	E029	Reserved
E015	External fault alarm	E099	Reserved

Chapter V Basic Operation Instructions

5.1 Start operation mode

The HAV-BA series drive's start operation control includes three different ways as follows:

1. Start when the drive gives a run command normally;

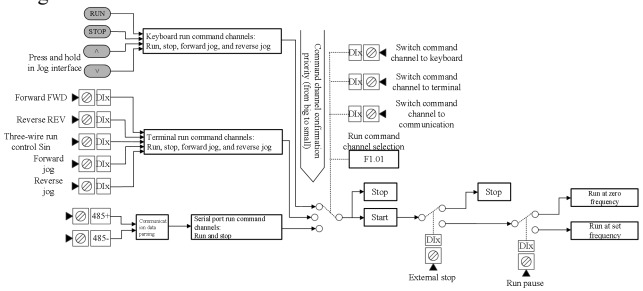
2. Start after an automatic fault reset of the drive;

3. Start under the two-wire terminal start protection (the drive starts automatically when the drive is powered on, the fault is cleared or the command channel is switched to the terminal two-wire mode, which is only valid to two-wire terminal control).

The three different start-stop control modes are described below:

5.1.1 Logic block diagram of start when the drive gives a run command normally

The HAV-BA series drive's run command input can be given using three channels keypad, terminal and Modbuscommunication. It can be switched freely by input terminal and function code settings.

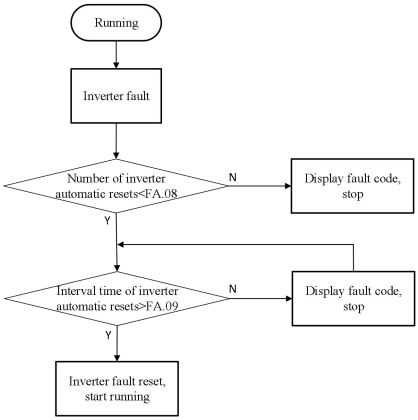


5.1. 2 Logic block diagram of start after the automatic fault reset of the drive

The automatic reset function can automatically reset the running faults according to the set times and intervals. When the number of automatic resets is set to 0, it indicates that automatic reset is prohibited, and fault protection is performed immediately. Within 2 minutes after the drive intitiates, if there is no fault, it will automatically clear the number of resets, and start counting from the beginning.

The drive module protection (E010) and external equipment failure (E015) have no automatic reset function. After the automatic reset is completed, it will automatically start and run at the speed tracking.

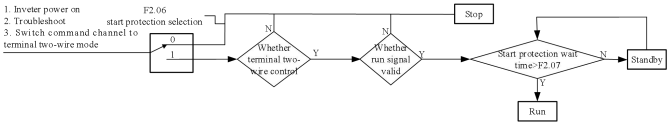
For safety's sake, use this function with caution, otherwise, it may cause personal injuries and property losses.



5.1.3 Terminal two-wire start protection and start logic block diagram

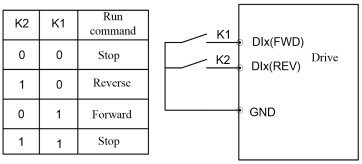
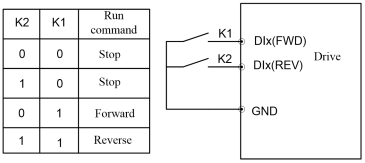
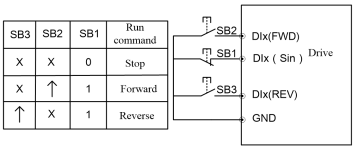
The terminal two-wire start protection start can realize that the drive automatically starts when the drive is powered on, the fault is cleared, or the command channel is switched to the terminal two-wire mode, if the terminal run command is valid.

For safety's sake, use this function with caution, otherwise, it may cause personal injuries and property losses.



Related parameter table:

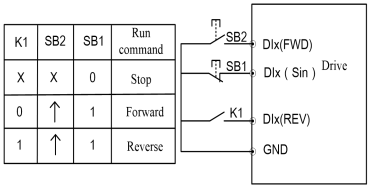
aramete Code	Parameter name	Parameter detailed description	Minimum Unit	actory val	Chang
F1.01	Run command channel selection	0: Keypad run command channel 1: Terminal run command channel 2: Serial port run command channel	1	0	○
F1.24	Rundirection setting	0: Forward 1: Reverse	1	0	○
F2.06	Start protection selection (only validfortwo-wire control)	This function realizes whether the drive automatically starts running when the drive is powered on, the fault is cleared, or the command channel is switched to the two-wire terminal mode. 0: If the run command is valid, the drive does start, but the drive is in the running protection state. The drive will not run until the run command terminal is canceled and then the terminal is enabled. 1: If the run command is valid, the drive speed tracking starts. **Note: For safety, be cautious when setting to 1.**	1	0	×
F2.07	Start protection	Set range: 0.0～10.0s	0.1s	0.0s	○

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	actory value	Change
	wait time				
F2.30	Forward and reverse dead zone time	Set range: 0.00～360.00s	0.01s	0.01s	×
F6.09	Forward/reverse running mode setting	0: Two-wire control mode 1: This mode is the most commonly used two-wire mode. The forward and reverse of the motor are determined by the defined FWD and REV terminal commands.  1: Two-wire control mode 2: This mode uses the defined FWD as the running terminal and the direction is determined by the defined REV terminal.  2: Three-wire operation control 1: This mode uses the defined Sin terminal to enable this mode. Terminals defined as FWD or REV are used to run and control the operation directions. Sin terminal must be closed to operate the drive in this mode. A rising edge signal should be given to FWD or REV terminal to control the operation and direction of the drive. Disconnect the Sin terminal to stop the drive.  3: Three-wire operation control 2: This mode uses the defined Sin terminalto enable this mode, the run command is generated by	1	0	×

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

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

SB3	SB2	SB1	Run command
X	X	0	Stop
X	↑	1	Forward
↑	X	1	Reverse

aramete Code	Parameter name	Parameter detailed description	Minimum Unit	actory val	Change
		FWD, and the direction is controlled by REV. The terminal Sin must be closed during operation. To start the drive, give a rising edge signal to the terminal defined as FWD. Disconnect the terminal defined as Sin to stop the drive. 			
FA.08	Number of automatic resets	FA.08 set range: 0～100 (0 indicates no automatic reset function)	1	0	×
FA.09	Automatic reset interval time	FA.09 set range: 0.1～1000.0s	0.1s	5.0s	×

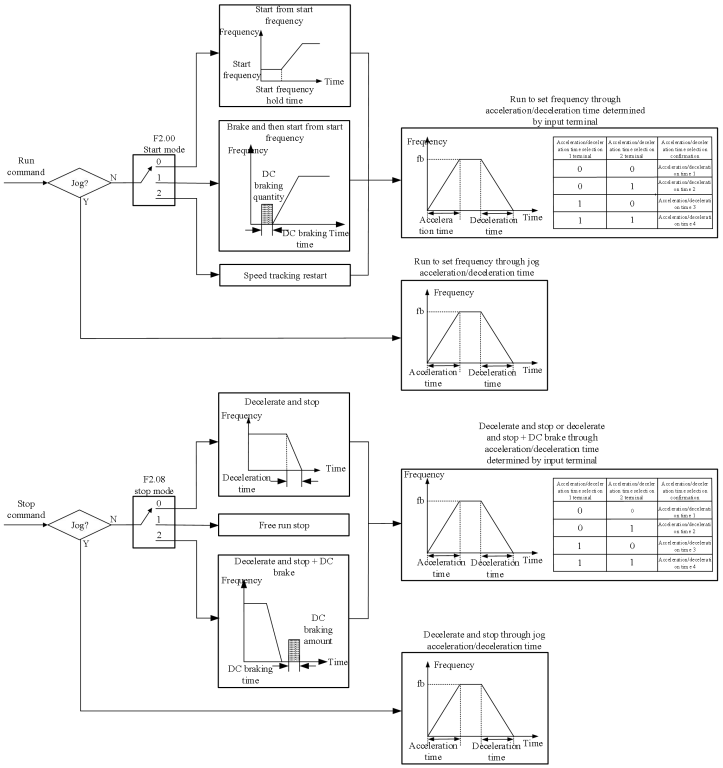
5.2 Start-stop control

There are three ways to start the HAV-BA series drive:

1. Start from the start frequency: Start at the start frequency set by F2.01, and accelerate to the set frequency after running the hold time set by F2.02 at this frequency.
2. Brake first and then start from the start frequency: First start with the DC braking current set in F2.03 and after the DC braking time set in F2.04 for DC braking and then start from the start frequency.
3. Speed tracking and restart: Track the current speed and direction of the motor, and perform smooth start without impact on the motor that is still rotating.

There are three ways to stop the HAV-BA series drive:

1. Deceleration stop: After receiving the stop command, the drive will gradually reduce the output frequency according to the deceleration time, and stop when the frequency decreases to zero.
2. Free running stop: After receiving the stop command, the drive immediately stops the output, and the load stops freely according to the mechanical inertia.
3. Deceleration stop + DC braking: After receiving the stop command, the drive reduces the output frequency according to the deceleration time, and starts the DC braking when it reaches the stop braking start frequency.



Related parameter table:

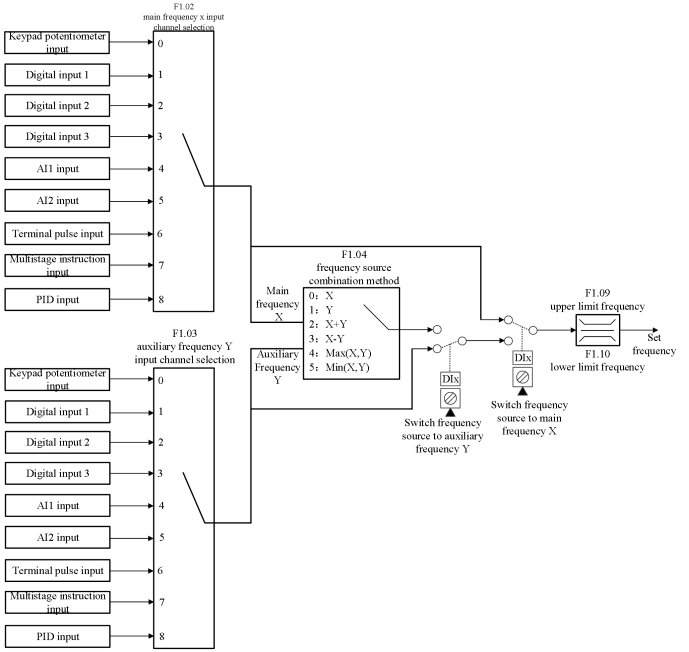
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.11	Acceleration time 1	Set range: 0.01～600.00	0.01	Model determination	○
F1.12	Deceleration time 1				○
F1.13	Acceleration/deceleration filtering time	Set range: 0～1000ms (0 indicates on filter)	1ms	0ms	○
F2.00	Start operation mode	LED single digit: Start mode 0: Start from start frequency. 1: Brake first then start from the start frequency. 2: Speed tracking restart. LED tens digit: Speed tracking mode 0: Track down the frequency before shutdown, usually this method is used. 1: Track down the maximum frequency, suitable for power generation load.	11	00	×
F2.01	Start frequency	F2.01 set range: 0.20～60.00Hz	0.01Hz	0.50Hz	○

aramete Code	Parameter name	Parameter detailed description	Minimum Unit	actory valu	Chang
F2.02	Start frequency hold time	F2.02 set range: 0.0～10.0s	0.1s	0.0s	○
F2.03	Start DC braking current	F2.03 set range: 0.0～150.0% drive rated current	0.1%	100.0%	○
F2.04	Start DC braking time	F2.04 set range: 0.0～30.0S (0.0 indicates the DC braking is not activated)	0.1s	0.0s	○
F2.05	Acceleration/deceleration mode selection	0: Linear acceleration/deceleration: The output frequency increases or decreases according to a constant slope. 1: Reserved	1	0	×
F2.08	Stop mode	0: Decelerate and stop 1: Run freely and stop 2: Decelerate and stop + DC brake	1	0	×
F2.09	DC braking start frequency at shutdown	F2.09 set range: 0.00～60.00Hz F2.10 set range: 0.00～10.00s F2.11 set range: 0.0～150.0% drive rated current F2.12 set range: 0.0～60.0S (0.0 indicates the DC braking does not act) F2.13 set range: 0～1	0.01Hz	0.00Hz	○
F2.10	DC braking wait time at shutdown		0.01s	0.10s	○
F2.11	DC braking current at shutdown		0.1%	100.0%	○
F2.12	DC braking time at shutdown		0.1s	0.0s	○
F2.13	Action selection within DC braking wait time at shutdown		1	1	○
F2.14	Acceleration time 2	Set range: 0.01～600.00	0.01	Model determination	○
F2.15	Deceleration time 2				○
F2.16	Acceleration time 3				○
F2.17	Deceleration time 3				○
F2.18	Acceleration time 4				○
F2.19	Deceleration time 4				○
F2.20	Jog run frequency	Set range: 0.10～50.00Hz	0.01Hz	5.00Hz	○
F2.21	Jog interval time	Set range: 0.0～100.0s	0.1s	0.0s	○
F2.22	Jog acceleration time	Set range: 0.01～600.00s	0.01s	6.00s	○
F2.23	Jog deceleration time				○

aramete Code	Parameter name	Parameter detailed description	Minimum Unit	actory valu	Chang
F7.08	Speed tracking gain Kp	F7.08 set range: 0～100 F7.09 set range: 1～1000ms F7.10 set range: 0.1～600.0s F7.11 set range: 1～100% F7.12 set range: 1～100%	1	10	○
F7.09	Speed tracking integration time		1ms	50ms	○
F7.10	Speed tracking acceleration and deceleration		0.1s	20.0s	○
F7.11	Speed tracking threshold		1%	10%	○
F7.12	Speed tracking filter time		1%	3%	○

5.3 Frequency setting

There’re many ways for the HAV-BA series drive for frequency input, and its input channels can be divided into three types: the main frequency X, the auxiliary frequency Y, and the combination of main and auxiliary frequency. It can be switched freely by setting the terminal function.

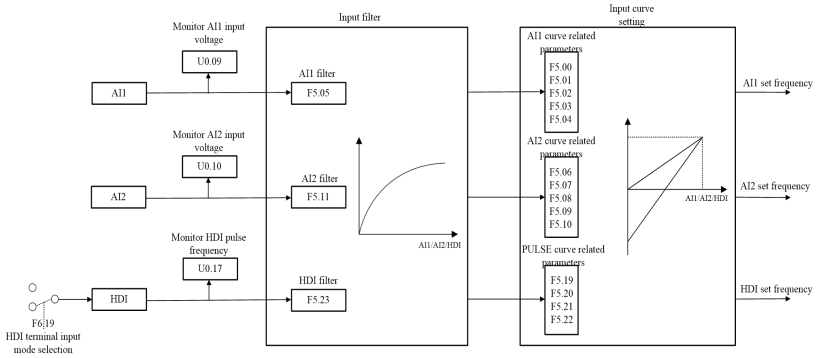


Related parameter table:

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F1.02	Main frequency x given channel selection	0: Keypad digital potentiometer given 1: Digital Input 1 2: Digital Input 2 3: Digital Input 3 4: AI1 5: AI2 6: Terminal pulse input 7: Multistage instruction input 8: PID input 9: External keypad analog potentiometer 10-15: Reserved	1	0	○
F1.03	Auxiliary frequency Y given channel selection		1	1	○
F1.04	Frequency source combination mode	0: X 1: Y 2: X+Y 3: X-Y 4: Max(X,Y) 5: Min(X,Y)	1	0	○
F1.05	Digital setting of auxiliary frequency Y	Lower limit frequency~upper limit frequency	0.01Hz	50.00Hz	○
F1.06	Maximum output frequency	Upper limit frequency～599.00Hz	0.01Hz	50.00Hz	×
F1.07	Main frequency X digital setting	Lower limit frequency~upper limit frequency	0.01Hz	50.00Hz	○
F1.09	Upper limit frequency	Lower limit frequency~maximum output frequency	0.01Hz	50.00Hz	○
F1.10	Lower limit frequency	0.00~upper limit frequency	0.01Hz	0.00Hz	○

5.4 Analog input

The HAV-BA series is equipped with two analog input terminals (the analog inputAI1 supports 0～10V/0～20mA input and can be selected through the AI1 jump cap; the analog AI2 only supports 0～10V input) and one high-speed pulse input terminal. Each input can be filtered and adjusted independently. The corresponding curve can be set by setting the input corresponding to the maximum and minimum values.



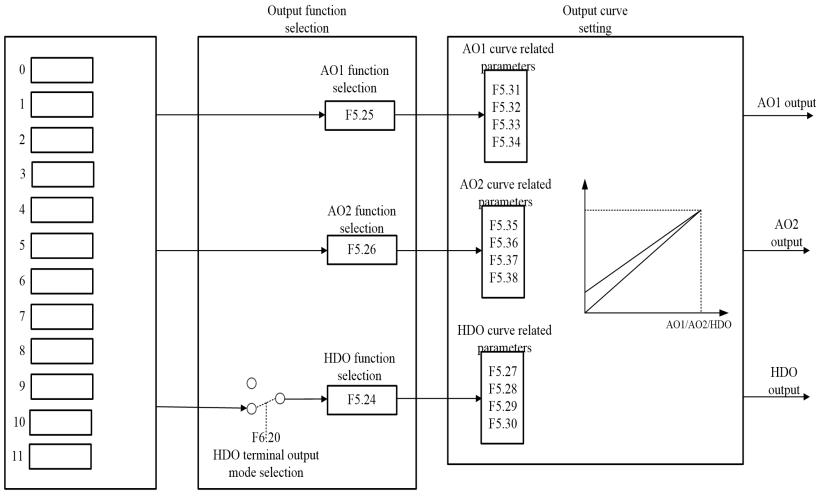
Related parameter table:

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.00	AI1 minimum value	0.00～F5.02	0.01V	0.00V	○
F5.01	Set value corresponding to AI1 minimum value	-100.0%～100.0%	0.1%	0.0%	○
F5.02	AI1 maximum value	F5.00～10.00V	0.01V	10.00V	○
F5.03	Set value corresponding to AI1 maximum value	-100.0%～100.0%	0.1%	100.0%	○
F5.04	AI1 zero drift setting	0.00～10.00V	0.01V	0.00V	○
F5.05	AI1 filter time	0～1000ms	1ms	10ms	○
F5.06	AI2 minimum value	0.00～F5.08	0.01V	0.00V	○
F5.07	Set value corresponding to AI2 minimum value	-100.0%～100.0%	0.1%	0.0%	○
F5.08	AI2 maximum value	F5.06～10.00V	0.01V	10.00V	○
F5.09	Set value corresponding to AI2 maximum value	-100.0%～100.0%	0.1%	100.0%	○
F5.10	AI2 zero drift setting	0.00～10.00V	0.01V	0.00V	○
F5.11	AI2 filter time	0～1000ms	1ms	10ms	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.18	Analog automatic zero drift adjustment	0~1	0	0	○
F5.19	PULSE minimum input	0.00～F5.21	0.01kHz	0.00kHz	○
F5.20	Corresponding setting of PULSE minimum input	-100.0%～100.0%	0.1%	0.0%	○
F5.21	PULSE maximum input	F5.19～50.00kHz	0.01kHz	50.00kHz	○
F5.22	Corresponding setting of PULSE maximum input	-100.0%～100.0%	0.1%	100.0%	○
F5.23	PULSE filter time	0～1000ms	1ms	10ms	○
F6.19	HDI terminal input mode selection (DI5)	0: Switch input 1: High-frequency pulse input (see F5.19～F5.23)	1	0	×

5.5 Analog output

The HAV-BA series is equipped with two analog output terminals (the analog AO1 supports 0～10V output; the analog AO2 supports 0～10V/0～20mA outputand is switched using AO2 jump cap) and one high-speed pulse output terminal. The proportional relationship can be adjusted by setting the maximum and minimum values and their corresponding output percentages. The analog output signal can output the operation frequency, output current, output torque, output voltage and output power in a certain proportion.



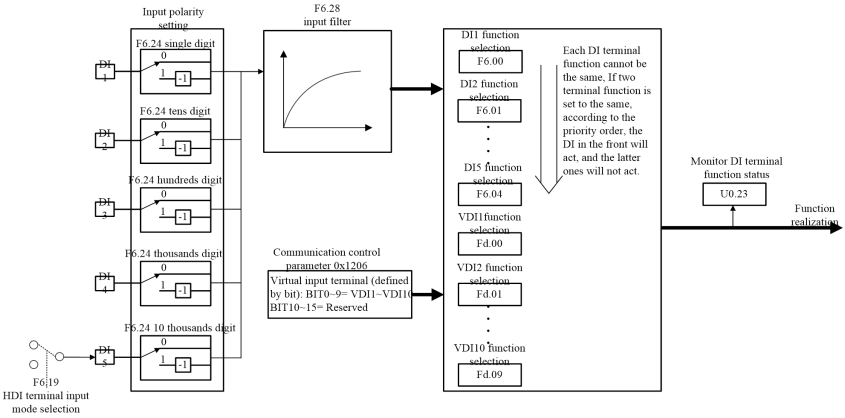
Related parameter table:

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F5.24	HDO function selection (DO2 terminal)	0: Running frequency (0～Maximum output frequency) 1: Set frequency (0～Maximum output frequency) 2: Output current (0～2 times rated current) 3: Output torque (0～2 times rated torque) 4: Output voltage (0～1.2 times rated voltage) 5: Bus voltage (0～1000V) 6: AI1 (0～10V/0～20mA) 7: AI2 (0～10V) 8: Reserved 9: Output power (0～2 times rated frequency) 10: Pulse input (0～50.00kHz) 11: Communication setting (0～1000)	1	5	○
F5.25	AO1 function selection		1	0	○
F5.26	AO2 function selection		1	1	○
F5.27	HDO output lower limit	0.0～F5.29	0.1%	0.0%	○
F5.28	HDO output frequency corresponding to lower limit	0.00～50.00kHz	0.01kHz	0.00kHz	○
F5.29	HDO output upper limit	F5.27～100.0%	0.1%	100.0%	○
F5.30	HDO output frequency corresponding	0.00～50.00kHz	0.01kHz	50.00kHz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
	to upper limit				
F5.31	AO1 output lower limit	0.0～F5.33	0.1%	0.0%	○
F5.32	Corresponding lower limit AO1 output voltage	0.00～10.00V	0.01V	0.00V	○
F5.33	AO1 output upper limit	F5.31～100.0%	0.1%	100.0%	○
F5.34	Corresponding upper limit AO1 output voltage	0.00～10.00V	0.01V	10.00V	○
F5.35	AO2 output lower limit	0.0～F5.37	0.1%	0.0%	○
F5.36	Corresponding lower limit AO2 output voltage	0.00～10.00V	0.01V	0.00V	○
F5.37	AO2 output lower limit	F5.35～100.0%	0.1%	100.0%	○
F5.38	Corresponding upper limit AO2 output voltage	0.00～10.00V	0.01V	10.00V	○
F6.20	HDO terminal output mode selection (DO2)	0: Switch output 1: High-frequency pulse output (see F5.27～F5.30)	1	0	×

5.6 Digital input

The HAV-BA series is equipped with 5 DI input terminals and 10 VDI virtual input terminals. All input terminal functions can be programmed through function codes. Among them, DI5 can be selected as a high-frequency pulse input terminal or an ordinary switch input terminal through function code.When it is selected as a high-speed pulse input terminal (HDI), the user can also use the HDI high-speed pulse input as frequency input, count input, or length pulse input.



Input function description:

Set value	Function	Description
0	No function	The drive does not operate even if there is a signal input. Unused terminals can be set to “0” to prevent malfunction.
1	Forward running FWD (level + edge)	For terminal two-wire and three-wire control signals (see function code F6.09 description for details).
2	Reverse running REV (level + edge)	
3	Three-wire running control Sin (level)	
4	Forward jog (level)	Used for jog running control under terminal run command mode.The jog running frequency, jog interval time and jog acceleration/deceleration time are defined in F2.20～F2.23.
5	Reverse jog (level)	
6	Free stop (level)	If the function of this terminal is valid, the drive immediately terminates the output, and the load stops freely according to the mechanical inertia.
7	Fault reset (edge signal)	When a fault alarm occurs in the drive, the fault can be reset through this terminal. Its function is consistent with the STOP key function of the keypad.
8	Run pause (level)	If this terminal is valid during running, the terminal will decelerate to zero frequency running according to the deceleration time. This function is invalid during jog running.
9	External fault input	The fault signals of external devices can be input through this terminal, which is convenient for the drive to monitor the faults of external devices. After receiving fault signals from external devices, the drive displays “E015”, which is the fault alarm of external devices.
10	Frequency setting increase (UP)	The frequency increase or decrease is realized through the control terminal, to perform remote control

<table>
<tr><th>Set value</th><th>Function</th><th>Description</th></tr>
<tr><td>11</td><td>Frequency setting decreases (DOWN)</td><td>replacing the keypad. Effective when the main frequency F1.02 = 2 or the auxiliary frequency F1.03 = 2, the acceleration/deceleration rate is set by F6.10.</td></tr>
<tr><td>12</td><td>Multistage speed terminal 1</td><td rowspan="4">By selecting the terminal ON/OFF combination of these functions, you can define up to 16 stages of different speeds, the frequency of multistage instructions, the selection of acceleration/deceleration time, and the rotating direction are set in group F9.
<table>
<tr><th>K4</th><th>K3</th><th>K2</th><th>K1</th><th>Frequency setting</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Multistage instruction 1</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>Multistage instruction 2</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>Multistage instruction 3</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>Multistage instruction 4</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>Multistage instruction 5</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>Multistage instruction 6</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>Multistage instruction 7</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>Multistage instruction 8</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Multistage instruction 9</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>Multistage instruction 10</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>Multistage instruction 11</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>ON</td><td>Multistage instruction 12</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>Multistage instruction 13</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>ON</td><td>Multistage instruction 14</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>Multistage instruction 15</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>Multistage instruction 16</td></tr>
</table></td></tr>
<tr><td>13</td><td>Multistage speed terminal 2</td></tr>
<tr><td>14</td><td>Multistage speed terminal 3</td></tr>
<tr><td>15</td><td>Multistage speed terminal 4</td></tr>
<tr><td>16</td><td>Acceleration/deceleration time selection 1</td><td rowspan="2">The ON/OFF combination of acceleration/deceleration time terminals 1 and 2 can realize the selection of acceleration/deceleration time 1~4.
<table>
<tr><th>K2</th><th>K1</th><th>Acceleration/deceleration time selection</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Acceleration/deceleration time 1</td></tr>
<tr><td>OFF</td><td>ON</td><td>Acceleration/deceleration time 1</td></tr>
<tr><td>ON</td><td>OFF</td><td>Acceleration/deceleration time 3</td></tr>
<tr><td>ON</td><td>ON</td><td>Acceleration/deceleration time 4</td></tr>
</table></td></tr>
<tr><td>17</td><td>Acceleration/deceleration time selection 2</td></tr>
</table>

Set value	Function	Description
18	PLC pause	Used to pause the drive's PLC running process. When this terminal is valid, it runs at zero frequency.
19	PLC operation stop and reset	PLC is prohibited from starting when the terminal is valid, deceleration and stop control is implemented for the PLC running process, and the PLC is reset to the initial state.
20	PID control pause	PID is temporarily not available, and the drive maintains the current output frequency without performing PID adjustment.
21	PID parameter switching	When the PID parameter switching condition (F8.12) is set to 1 (via terminal switching), the F8.06~F8.08 are used for PID parameters when the terminal is invalid, and F8.09~F8.11 are used when the terminal is valid.
22	Counter trigger	Count pulse input port of the built-in counter, the highest pulse frequency: 50Hz, and the current count value can be stored and memorized when power is off (See function codes F6.22 and F6.23 for details).
23	Counter reset	Clear the built-in counter of the drive and use it in conjunction with function 22 (counter trigger signal input).
24	Length reset	When the function terminal is valid, the actual length is cleared to zero.
25	Acceleration/deceleration prohibited (level)	Keep the motor from being affected by any external signal (except stop command), drive keeps on operating at the current speed. This function is invalid during jog running.
26	Immediate DC braking	When the drive is decelerating and is in stop + DC brake mode, it applies DC brake when this terminal is valid.
27	UP/DOWN setting cleared	When the frequency given channel is set to terminal UP/DOWN, this function terminal can directly clear the frequency set by UP/DOWN.
28	Control command switch to keypad	If all three or two of the above terminals are closed at the same time, the priority is keypad> terminal>communication. **Note: When switching to terminal two-wire control, the running state changes are affected by the F2.06 parameter; when switching to other control modes, the current running state is maintained.**
29	Control command switch to input terminal	
30	Control command switch to communication	
31	Switch frequency source to the main frequency X	If the above two terminals are closed at the same time, the priority is switching to the main frequency X> switching to the auxiliary frequency Y
32	Switch frequency source to auxiliary frequency Y	
33	High-frequency pulse count reset	When the function terminal is valid, the high-frequency pulse count value recorded by function code U0.16 will be cleared.
34~50	Reserved	Reserved function

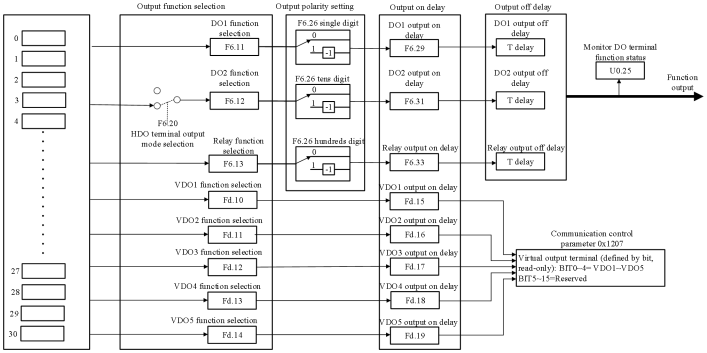
Related parameter table:

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.00	Multifunctional input terminal DI1 function selection	0: No function 1: Forward running FWD (level + edge) 2: Reverse running REV (level + edge) 3: Three-wire running control Sin (level) 4: Forward jog (level) 5: Reverse jog (level) 6: Free stop (level) 7: Fault reset (edge signal) 8: Run pause (level) 9: External fault input 10: Frequency setting increase (UP) 11: Frequency setting decreases (DOWN) 12: Multistage speed terminal 1 13: Multistage speed terminal 2 14: Multistage speed terminal 3 15: Multistage speed terminal 4 16: Acceleration/deceleration time selection 1 17: Acceleration/deceleration time selection 2 18: PLC pause 19: PLC operation stop and reset 20: PID control pause 21: PID parameter switching 22: Counter trigger 23: Counter reset 24: Length reset 25: Acceleration/deceleration prohibited (level) 26: Immediate DC braking 27: UP/DOWN setting cleared 28: Control command switched to keypad 29: Control command switched to terminal 30: Control command switched to communication 31: Frequency source switched to the main frequency X 32: Frequency source switched to auxiliary frequency Y 33: High-frequency pulse count reset 34-50: Reserved	1	1	×
F6.01	Multifunctional input terminal DI2 function selection			2	
F6.02	Multifunctional input terminal DI3 function selection			7	
F6.03	Multifunctional input terminal DI4 function selection			12	
F6.04	Multifunctional input terminal DI5 function selection			13	
F6.19	HDI terminal input mode selection (DI5)	0: Switch input 1: High-frequency pulse input (see F5.19～F5.23)	1	0	×
F6.24	DI input switch polarity 1	00000~11111 LED single digit: DI1 positive/negative logic definition LED tens digit: DI2 positive/negative logic definition LED hundreds digit: DI3 positive/negative logic definition LED thousands digit: DI4 positive/negative logic definition LED 10 thousands digit: DI5	11111	11111	○

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		positive/negative logic definition			
F6.28	DI filter time	0～1000ms	1ms	20ms	○
Fd.00	VDI1 terminal function selection	Same as F6.00～F6.08 function code setting.	1	0	×
Fd.01	VDI2 terminal function selection		1	0	×
Fd.02	VDI3 terminal function selection		1	0	×
Fd.03	VDI4 terminal function selection		1	0	×
Fd.04	VDI5 terminal function selection		1	0	×
Fd.05	VDI6 terminal function selection		1	0	×
Fd.06	VDI7 terminal function selection		1	0	×
Fd.07	VDI8 terminal function selection		1	0	×
Fd.08	VDI9 terminal function selection		1	0	×
Fd.09	VDI10 terminal function selection		1	0	×

5.7 Digital output

The HAV-BA series is equipped with two open collector output terminals, one relay output terminal, and five VDO virtual output terminals. All digital output terminal functions can be programmed through function codes. Among them, the high-speed pulse output terminal HDO can also be set to high-speed pulse output or switch output through function code selection.



Output function description:

Set value	Function	Description
0	No output	The output terminal has no function.
1	Drive running signal (RUN)	Outputs an indication signal if the drive is running.
2	Frequency reached signal (FAR)	Refer to the function description of F6.18.
3	Frequency level detection signal (FDT1)	Refer to the function description of F6.14～F6.15.
4	Frequency level detection signal (FDT2)	Refer to the function description of F6.16～F6.17.
5	Reserved	Reserved function.
6	Undervoltage lockout stopping (LU)	When the DC bus voltage is lower than the undervoltage limit level, it outputs an indication signal, and the LED displays “P.oFF”.
7	External fault stop (EXT)	When the drive has an external fault trip alarm (E015), it outputs an indication signal.
8	Frequency upper limit (FHL)	When the set frequency ≥ the upper limit frequency and the operational frequency reaches the upper limit, it outputs an indication signal.
9	Frequency lower limit (FLL)	When the set frequency ≤ the lower limit frequency and the operational frequency reaches the lower limit, it outpus an indication signal.
10	Drive running at zero frequency	Output frequency ≤ FC.10 zero frequency reached range, it outputs an indication signal under operation status.
11	PLC phase running completion	After the simple PLC one stage operation is completed, it outputs an indication signal (single pulse signal, width 250ms).
12	PLC cycle completion	PLC cycle completed: After the simple PLC completes one operation cycle, it outputs an indication signal (single pulse signal, width 250ms).
13	Set count value reached	Refer to F6.22～F6.23 function description.
14	Specified count value reached	
15	Set length reached	When the actual length U0.15 ≥ FC.11 set length, it outputs an indication.

Set value	Function	Description
16	Drive ready to run	When the drive has no fault, the bus voltage is normal, and no signal is given at the drive operation prohibition terminal, it outputs an indication signal. In this case, the drive indicates that the start command can be given to the drive.
17	Drive fault	If the drive fails, it outputs an indication signal.
18	Reserved	Reserved function.
19	Set cumulative running time reached	When the accumulated running time of the drive (U0.27) reaches the running cutoff time (F0.02) of the drive, it outputs an indication signal.
20	Forward running	When the drive is in the forward running status, it outputs an indication signal.
21	Reverse running	When the drive is in the reserve running status, it outputs an indication signal.
22	Reserved	Reserved function.
23	Water supply sleep running indication	During water supply application, if the drive is in the sleep status, it outputs an indication signal.
24	Water pipe overpressure indication	During water supply application, if the drive finds that the water pipe is in overpressure at any time, it outputs an indication signal.
25	Water pipe underpressureindication	During water supply application, if the drive finds that the water pipe is in underpressure at any time, it outputs an indication signal.
26	Water shortage in pipe indication	Water shortage in pipe indication: During water supply application, if the drive finds that the water pipe is in short of water at any time, it outputs an indication signal.
27~30	Reserved	Reserved function.

Related parameter table:

aramete Code	arameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.11	Open collector output terminal DO1	0: No output 1: Drive running signal (RUN) 2: Frequency reached signal (FAR) 3: Frequency level detection signal (FDT1) 4: Frequency level detection signal (FDT2) 5: Reserved 6: Undervoltagelockout stopping (LU) 7: External fault stop (EXT) 8: Frequency upper limit (FHL) 9: Frequency lower limit (FLL) 10: Drive running at zero frequency 11: PLC phase running completion 12: PLC cycle completion 13: Set count value reached 14: Specified count value reached 15: Set length reached	1	0	×
F6.12	Open collector output terminal DO (HDO terminal)		1	1	×

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F6.13	Relay output function (TA/TB/TC)	16: Drive ready to run (RDY) 17: Drive fault 18: Reserved 19: Set cumulative running time reached 20: Forward running 21: Reverse running 22: Reserved 23: Water supply sleep running indication 24: Water pipe overpressure indication 25: Water pipe underpressure indication 26: Water shortage in pipe indication 27-30: Reserved	1	17	×
F6.26	DO output switch polarity 1	00000~11111	11111	11111	○
F6.29	DO1 output on delay	Set range: 0.0～600.0s This function code defines the delay from the status change of the switch output terminal and the relay to the output change.	0.1s	0.0s	○
F6.30	DO1 output off delay		0.1s	0.0s	○
F6.31	DO2 output on delay		0.1s	0.0s	○
F6.32	DO2 output off delay		0.1s	0.0s	○
F6.33	Relay output on delay		0.1s	0.0s	○
F6.34	Relay output off delay		0.1s	0.0s	○
Fd.10	VDO1 terminal function	Same as F6.11～F6.13 function code setting.	1	0	×
Fd.11	VDO2 terminal function		1	0	×
Fd.12	VDO3 terminal function		1	0	×
Fd.13	VDO4 terminal function		1	0	×
Fd.14	VDO5 terminal function		1	0	×
Fd.15	VDO1 output on delay	Same as F6.29～F6.34 function code setting.	0.1s	0.0s	○

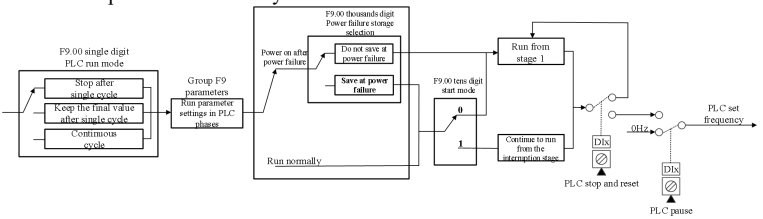
arameter Code	arameter name	Parameter detailed description	Minimum Unit	Factory value	Change
Fd.16	VDO2 output on delay		0.1s	0.0s	○
Fd.17	VDO3 output on delay		0.1s	0.0s	○
Fd.18	VDO4 output on delay		0.1s	0.0s	○
Fd.19	VDO5 output on delay		0.1s	0.0s	○

5.8 Simple PLC

The simple PLC function is a multistage speed generator. The drive can automatically change the operation frequency and direction according to the run time to meet the process requirements. This function used to be completed under the assistance of an external PLC. Now it can be realized by the drive itself.

This series of drives can realize 16-stage speed control, and there are 4 groups of acceleration/deceleration time for selection.

When the set PLC completes a cycle (or a stage), an ON signal can be output from the open collector output terminal or relay.



Related parameter table:

arameter Code	arameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.00	Simple PLC run mode selection	LED single digit: PLC run mode 0: No action 1: Stop after a single cycle 2: Keep the final value after a single cycle 3: Continuous cycle 4: DI selective operation LED tens digit: Start mode 0: Start running from the first stage 1: Continue running from the stage of interruption LED hundreds digit: Stage time unit selection 0: Second 1: Minute LED thousands digit: Store at power failure 0: Do not store at power failure	1111	0000	×

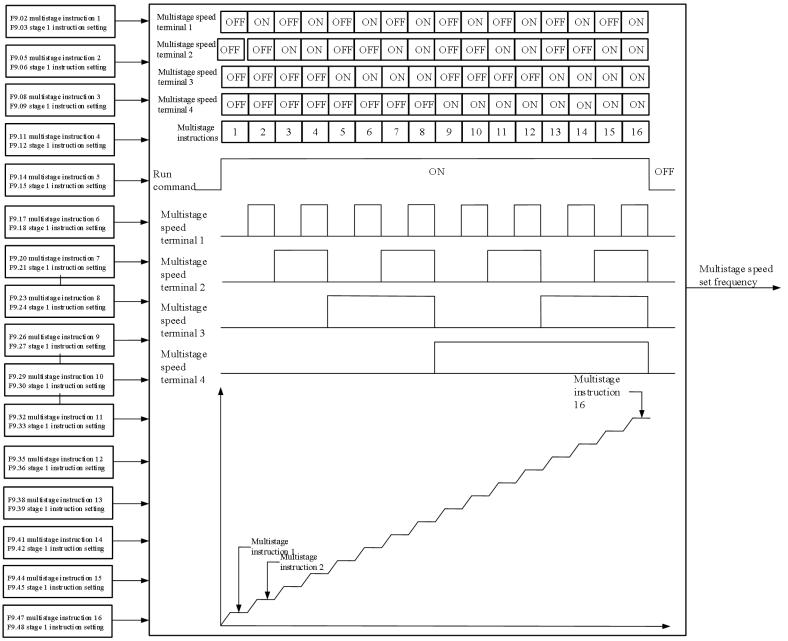
arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		1: Store the stage at power failure			
F9.01	Running stages	1~16	1	16	○
F9.02	Multistage instruction 1	Lower limit frequency~upper limit frequency	0.01Hz	20.00Hz	○
F9.03	Stage 1 instruction setting	LED single digit: 0: Multistage instruction 1 (F9.02) 1: AI1 2: AI2 3: Pulse frequency 4: Communication 5: Keypad digital potentiometer input 6: External keypad's analog potentiometer input LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running **Note: Only the LED single digit frequency source of stage 1 instruction can be set.**	111	000	○
F9.04	Stage 1 instruction running time	Set range: 0.1～6000.0 **Note: For the time unit selection, see F9.00 hundreds digit setting.**	0.1	10.0	○
F9.05	Multistage instruction 2	Stage X instruction (F9.05, F9.08, F9.11, F9.14, F9.17, F9.20, F9.23, F9.26, F9.29, F9.32, F9.35、F9.38, F9.41, F9.44, and F9.47) setting range: Lower limit frequency~upper limit frequency	0.01Hz	20.00Hz	○
F9.06	Stage 2 instruction setting		111	000	○
F9.07	Stage 2 instruction running time	Stage X instruction (F9.06, F9.09, F9.12, F9.15, F9.18, F9.21, F9.24, F9.27, F9.30,	0.1	10.0	○

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.08	Multistage instruction 3	F9.33, F9.36、F9.39, F9.42, F9.45, and F9.48) setting range: LED single digit: 0: Multistage instruction x 1: Reserved LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running Stage X instruction running time (F9.07, F9.10, F9.13, F9.16, F9.19, F9.22, F9.25, F9.28, F9.31, F9.34, F9.37、F9.40, F9.43, F9.46, and F9.49) setting range: 0.1~6000.0 **Note: For the time unit selection, see F9.00 hundreds digit setting.**	0.01Hz	20.00Hz	○
F9.09	Stage 3 instruction setting		111	000	○
F9.10	Stage 3 instruction running time		0.1	10.0	○
F9.11	Multistage instruction 4		0.01Hz	20.00Hz	○
F9.12	Stage 4 instruction setting		111	000	○
F9.13	Stage 4 instruction running time		0.1	10.0	○
F9.14	Multistage instruction 5		0.01Hz	20.00Hz	○
F9.15	Stage 5 instruction setting		111	000	○
F9.16	Stage 5 instruction running time		0.1	10.0	○
F9.17	Multistage instruction 6		0.01Hz	20.00Hz	○
F9.18	Stage 6 instruction setting		111	000	○
F9.19	Stage 6 instruction running time		0.1	10.0	○
F9.20	Multistage instruction 7		0.01Hz	20.00Hz	○
F9.21	Stage 7 instruction setting		111	000	○
F9.22	Stage 7 instruction running time		0.1	10.0	○
F9.23	Multistage instruction 8		0.01Hz	20.00Hz	○
F9.24	Stage 8 instruction setting		111	000	○
F9.25	Stage 8 instruction running time		0.1	10.0	○
F9.26	Multistage instruction 9		0.01Hz	20.00Hz	○
F9.27	Stage 9 instruction setting		111	000	○

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.28	Stage 9 instruction		0.1	10.0	○
F9.29	Multistage instruction 10		0.01Hz	20.00Hz	○
F9.30	Stage 10 instruction		111	000	○
F9.31	Stage 10 instruction		0.1	10.0	○
F9.32	Multistage instruction 11		0.01Hz	20.00Hz	○
F9.33	Stage 11 instruction		111	000	○
F9.34	Stage 11 instruction		0.1	10.0	○
F9.35	Multistage instruction 12		0.01Hz	20.00Hz	○
F9.36	Stage 12 instruction		111	000	○
F9.37	Stage 12 instruction		0.1	10.0	○
F9.38	Multistage instruction 13		0.01Hz	20.00Hz	○
F9.39	Stage 13 instruction		111	000	○
F9.40	Stage 13 instruction		0.1	10.0	○
F9.41	Multistage instruction 14		0.01Hz	20.00Hz	○
F9.42	Stage 14 instruction		111	000	○
F9.43	Stage 14 instruction		0.1	10.0	○
F9.44	Multistage instruction 15		0.01Hz	20.00Hz	○
F9.45	Stage 15 instruction		111	000	○
F9.46	Stage 15 instruction		0.1	10.0	○
F9.47	Multistage instruction 16		0.01Hz	20.00Hz	○
F9.48	Stage 16 instruction		111	000	○
F9.49	Stage 16 instruction		0.1	10.0	○

5.9 Multistage speed operation

Set the parameters when using the drive for multistage speed operation. The HAV-BA drive can set 16-stage speed, each stage can be selected by the combination code of multistage speed terminals 1～4.



Related parameter table:

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.00	Simple PLC run mode selection	LED single digit: PLC run mode 0: No action 1: Stop after a single cycle 2: Keep the final value after a single cycle 3: Continuous cycle 4: DI selective operation LED tens digit: Start mode 0: Start running from the first stage 1: Continue running from the stage of interruption LED hundreds digit: Stage time unit selection 0: Second 1: Minute LED thousands digit: Store at power failure 0: Do not store at power failure	1111	0000	×

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
		1: Store the stage at power failure			
F9.01	Running stages	1~16	1	16	○
F9.02	Multistage instruction 1	Lower limit frequency~upper limit frequency	0.01Hz	20.00Hz	○
F9.03	Stage 1 instruction setting	LED single digit: 0: Multistage instruction 1 (F9.02) 1: AI1 2: AI2 3: Pulse frequency 4: Communication 5: Keypad digital potentiometer input 6: External keypad's analog potentiometer input LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running **Note: Only the LED single digit frequency source of stage 1 instruction can be set.**	111	000	○
F9.04	Stage 1 instruction running time	Set range: 0.1～6000.0 **Note: For the time unit selection, see F9.00 hundreds digit setting.**	0.1	10.0	○
F9.05	Multistage instruction 2	Stage X instruction (F9.05, F9.08, F9.11, F9.14, F9.17, F9.20, F9.23,	0.01Hz	20.00Hz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.06	Stage 2 instruction setting	F9.26, F9.29, F9.32, F9.35、F9.38, F9.41, F9.44, and F9.47) setting range: Lower limit frequency~upper limit frequency Stage X instruction (F9.06, F9.09, F9.12, F9.15, F9.18, F9.21, F9.24, F9.27, F9.30, F9.33, F9.36、F9.39, F9.42, F9.45, and F9.48) setting range: LED single digit: 0: Multistage instruction x 1: Reserved LED tens digit: 0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4 LED hundreds digit: 0: Forward running 1: Reverse running Stage X instruction running time (F9.07, F9.10, F9.13, F9.16, F9.19, F9.22, F9.25, F9.28, F9.31, F9.34, F9.37、F9.40, F9.43, F9.46, and F9.49) setting range: 0.1~6000.0 **Note: For the time unit selection, see F9.00 hundreds digit setting.**	111	000	○
F9.07	Stage 2 instruction running time		0.1	10.0	○
F9.08	Multistage instruction 3		0.01Hz	20.00Hz	○
F9.09	Stage 3 instruction setting		111	000	○
F9.10	Stage 3 instruction running time		0.1	10.0	○
F9.11	Multistage instruction 4		0.01Hz	20.00Hz	○
F9.12	Stage 4 instruction setting		111	000	○
F9.13	Stage 4 instruction running time		0.1	10.0	○
F9.14	Multistage instruction 5		0.01Hz	20.00Hz	○
F9.15	Stage 5 instruction setting		111	000	○
F9.16	Stage 5 instruction running time		0.1	10.0	○
F9.17	Multistage instruction 6		0.01Hz	20.00Hz	○
F9.18	Stage 6 instruction setting		111	000	○
F9.19	Stage 6 instruction running time		0.1	10.0	○
F9.20	Multistage instruction 7		0.01Hz	20.00Hz	○
F9.21	Stage 7 instruction setting		111	000	○
F9.22	Stage 7 instruction running time		0.1	10.0	○
F9.23	Multistage instruction 8		0.01Hz	20.00Hz	○

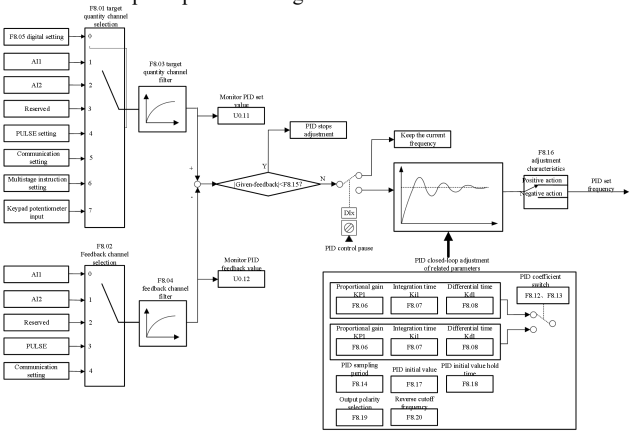
Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.24	Stage 8 instruction setting		111	000	○
F9.25	Stage 8 instruction running time		0.1	10.0	○
F9.26	Multistage instruction 9		0.01Hz	20.00Hz	○
F9.27	Stage 9 instruction setting		111	000	○
F9.28	Stage 9 instruction running time		0.1	10.0	○
F9.29	Multistage instruction 10		0.01Hz	20.00Hz	○
F9.30	Stage 10 instruction setting		111	000	○
F9.31	Stage 10 instruction running time		0.1	10.0	○
F9.32	Multistage instruction 11		0.01Hz	20.00Hz	○
F9.33	Stage 11 instruction setting		111	000	○
F9.34	Stage 11 instruction running time		0.1	10.0	○
F9.35	Multistage instruction 12		0.01Hz	20.00Hz	○
F9.36	Stage 12 instruction setting		111	000	○
F9.37	Stage 12 instruction running time		0.1	10.0	○
F9.38	Multistage instruction 13		0.01Hz	20.00Hz	○
F9.39	Stage 13 instruction setting		111	000	○
F9.40	Stage 13 instruction running time		0.1	10.0	○
F9.41	Multistage instruction 14		0.01Hz	20.00Hz	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F9.42	Stage 14 instruction setting		111	000	○
F9.43	Stage 14 instruction running time		0.1	10.0	○
F9.44	Multistage instruction 15		0.01Hz	20.00Hz	○
F9.45	Stage 15 instruction setting		111	000	○
F9.46	Stage 15 instruction running time		0.1	10.0	○
F9.47	Multistage instruction 16		0.01Hz	20.00Hz	○
F9.48	Stage 16 instruction setting		111	000	○
F9.49	Stage 16 instruction running time		0.1	10.0	○

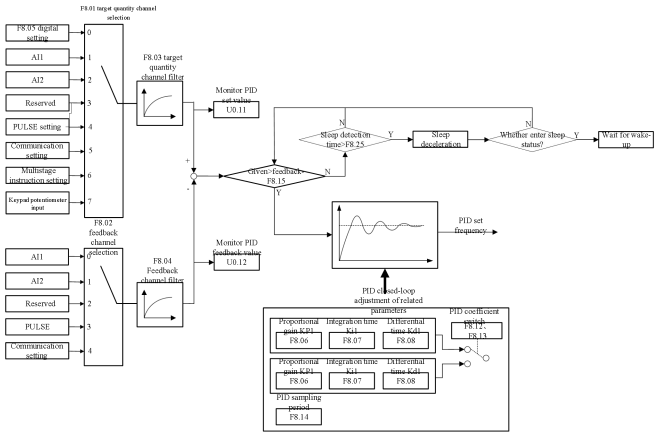
5.10 PID control

The PID control is a commonly used method for process control. By performing proportional, integral, and differential operations on the feedback signal of the controlled quantity and the quantity of the target quantity signal, the output frequency of the drive is adjusted to form a negative feedback system, so that the controlled quantity is stable on the target quantity. This function is suitable for process control such as flow control, pressure control and temperature control.

The basic principle block diagram of traditional PID control is as follows:



The basic principle block diagram of PID control for water supply application is as follows (used when F0.04 industry code is the special drive for water supply):



The brief description of PID control working principle and the introduction of PIDadjustment method:

Proportional adjustment (Kp): When there is a difference between the feedback and the target value, the output and the deviation are adjusted in proportion. If the difference is constant, the adjustment amount is also constant. Proportional adjustment can quickly respond to changes in feedback, but just proportional adjustment cannot achieve non-differential control. The larger the proportional gain, the faster the adjustment speed of the system, but if it is too large, oscillations will occur.

Follow the following adjustment method: first set the integration time to be very long and the differential time to zero. Then use only proportional adjustment to make the system run, change the given quantity, and observe the stable deviation (static difference) between the feedback signal and the target value. If the static difference is in the direction of target value changes (for example, increasing the target value, the feedback quantity is always less than the target value after the system becomes stable), then continue to increase the proportional gain, otherwise decrease the proportional gain, and repeat the above process until the static difference is relatively small.

Integration time (Ti): When there is a deviation of the feedback value from the target value, the output adjustment accumulates continuously. If the deviation persists, the adjustment increases constantly, until there is no deviation. The integral regulator can effectively eliminate static difference. If the integral regulator is too strong, there will be repeated overshoot, making the system unstable and oscillation occurs. The characteristics of the oscillation caused by excessive integration are as follows: The feedback signal swings up and down on a target value, and the swing gradually increases until it oscillates.The adjustment of the integration time parameter is generally from large to small, gradually adjust the integration time, and observe the effect of the system adjustment until the stable speed of the system reaches the requirements.

Differential time (Td): When the difference between feedback and target changes, an adjustment proportional to the deviation's change rate is outputted. The adjustment is only related to the direction and magnitude of the deviation change and has nothing to do with the direction and magnitude of the deviation itself. The function of differential adjustment is to adjust according to the changing trend when the feedback signal changes, thus to suppress the change of the feedback signal. Please use the differential regulator with caution, because the differential regulation can

easily amplify the interference of the system, especially the interference with a higher change frequency.

General steps for PID parameter setting

a. Determine the proportional gain Kp

When determining the proportional gain Kp, first remove the integral and differential items of PID. Generally, assumed Ti = 0 and Td = 0 (for details, see the description of PID parameter setting), so that the PID is of pure proportional adjustment. The input is set to 60%～70% of the maximum value allowed by the system. The proportional gain Kp is increased from 0 gradually until the system oscillates; in turn, the proportional gain Kp is gradually decreased from this time until the system oscillation disappears. In this case, the proportional gain Kp is recorded, and the proportional gain Kp of PID is set to 60%～70% of the current value. This is the proportional gain Kp value.

b. Determine the integration time Ti

After the proportional gain Kp is determined, set a larger initial value of the integration time Ti, and then gradually decrease Ti until the system oscillates, and then in turn, increase Ti gradually until the system oscillation disappears. Record the Ti at this time and set the integration time constant Ti of PID to 150%～180% of the current value. This is the integration time constant Ti value.

c. Determine the differential time Td

Generally, the differential time Td needs not to be set (0). To set, the method is the same with that of determining Kp and Ti, taking 30% without oscillation.

d. The system is debugged with or without load, and then the PID parameters are fine-tuned until the requirements are met.

Related parameter table:

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.00	PID operation control selection	0: PID standby (not enabled) 1: PID standby (enabled)	1	0	×
F8.01	Target value channel selection	0: F8.05 digital input 1: AI1 2: AI2 3: Reserved 4: PULSE setting 5: Communication setting 6: Multistage instruction setting 7: Keypad digital potentiometer input 8: Analog potentiometer input on external kepad	1	0	×

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.02	Feedback channel selection	0: AI1 1: AI2 2: Reserved 3: Pulse 4: Communication setting	1	0	×
F8.03	Target value channel filter	Set range: 0～1000ms	1ms	10ms	○
F8.04	Feedback channel filter		1ms	10ms	○
F8.05	Target quantity digital setting	Universal drive mode setting range: 0.0～100.0% Water supply drive mode setting range: 0.0～F8.23	0.1% Or 0.1bar	0.0% Or 0.0bar	○
F8.06	Proportional gain Kp1	Set range: 0～1000	1	10	○
F8.07	Integration time Ti1	Set range: 1～10000ms	1ms	500ms	○
F8.08	Differential time Td1	Set range: 0～10000ms	1ms	0ms	○
F8.09	Proportional gain Kp2	F8.09 set range: 0～1000 F8.10 set range: 1～10000ms F8.11 set range: 0～10000ms	1	5	○
F8.10	Integration time Ti2		1ms	2000ms	○
F8.11	Differential time Td2		1ms	0ms	○
F8.12	Gain switching conditions	0: Do not switch 1: Switch through DI terminal 2: Switch automatically based on deviation 3: Switch automatically according to PID output	1	0	○
F8.13	Gain switching threshold	Set range: 0.0～100.0%	0.1%	0.0%	○
F8.14	PID sampling period	Set range: 1～60000ms	1ms	1ms	○
F8.15	Deviation limit	Set range: 0.0～50.0%	0.1%	0.0%	○
F8.16	Closed-loop regulation features	0: Positive action 1: Negative action	1	0	○
F8.17	PID initial value	F8.17 set range: 0.0～100.0% F8.18 set range: 0.00～600.00s	0.1%	0.0%	×

arameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.18	PID initial value hold time		0.01s	0.00s	×
F8.19	Closed-loop output polarity selection	0: Closed-loop output is negative, run at zero-frequency 1: Closed-loop output is negative, reverse	1	0	○
F8.20	PID reverse cutoff frequency	Set range: 0.00~upper limit frequency	0.01Hz	2.00Hz	×
F8.21	PID feedback loss detection value	F8.21 set range: 0.0～100.0% F8.22 set range: 0.0～200.0s (0.0s indicates no detection)	0.1%	10.0%	○
F8.22	PID feedback loss detection time		0.1s	0.0s	○
F8.23	Maximum sensor range	Set range: 0.0～200.0bar	0.1bar	10.0bar	○
F8.24	Water supply sleep selection	0: Automatic sleep 1: Run at lower frequency	1	0	○
F8.25	Water supply sleep detection time	F8.25 set range: 0.0～3600.0s F8.26 set range: 0.01～600.00s	0.1s	10.0s	○
F8.26	Water supply sleep deceleration time		0.01s	10.00s	○
F8.27	Water supply wake-up pressure level	F8.27 set range: 0.0～100.0% (100.0% is the set pressure value) F8.28 set range: 0.0～3600.0s	0.1%	10.0%	○
F8.28	Water supply wake detection time		0.1s	2.0s	○
F8.29	Water pressure overpressure alarm detection value	Set range: 0.0～100.0% (Do not test when set to 0, 100.0% is the maximum range of pressure sensor)	0.1%	90.0%	○
F8.30	Water pressure undervoltage alarm detection value	Set range: 0.0～100.0% (Do not test when set to 0, 100.0% is the maximum range of pressure sensor)	0.1%	0.0%	○
F8.31	Water pressure abnormal alarm detection time	Set range: 0.0～3600.0s	0.1s	50.0s	○

Parameter Code	Parameter name	Parameter detailed description	Minimum Unit	Factory value	Change
F8.32	Water shortage alarm set value	F8.32 set range: 0.0～100.0% (100.0% is the set pressure value) F8.33 set range: 0.0～3600.0s F8.34 set range: 0～10000min (0min indicates water shortage restart function is not enabled)	0.1%	20.0%	○
F8.33	Water shortage alarm detection time		0.1s	20.0s	○
F8.34	Water shortage restart wait time		1min	0min	○

5.11 Troubleshooting

The HAV-BA series drive provides rich fault handling information. When the drive fails, the keypad will display the fault code and stop output. The fault record parameter group U1 can record the last 10 fault information. After the fault occurs, the processing steps are as follows:

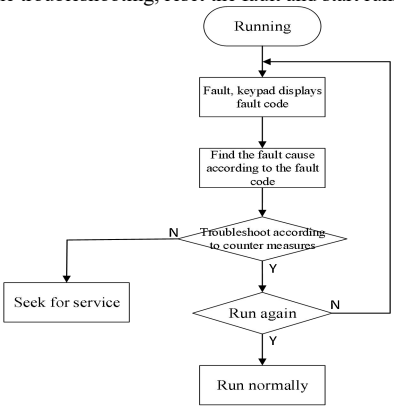
1. When the drive fails, check whether the keypad display is abnormal? If yes, seek for service.

2. If there is no abnormality, please check the group U1 function code, confirm the corresponding fault record parameters, and determine the actual status at occurrence of the current fault through all parameters;

2. Check the fault alarm content and countermeasure table, and check whether there is a corresponding abnormal status according to the specific countermeasures?

3. Do troubleshooting or ask relevant personnel for help.

4. After confirming the troubleshooting, reset the fault and start running.



Related parameter table:

Parameter Code	Parameter name	Parameter detailed description	Factory value	Change
U1.00	Historical fault number	Set range: 0～9 According to the setting of this function code, you can view the fault record information of the last 10 times. By setting different values within U1.01～U1.06, the corresponding fault record will display.	0	○

arameter Code	Parameter name	Parameter detailed description	Factory value	Change
U1.01	Fault code during fault	Fault record information at the xth fault (x is the set value of U1.00)	-	*
U1.02	Bus voltage during fault		-	*
U1.03	Output current during fault		-	*
U1.04	Running frequency during fault		-	*
U1.05	Running temperature during fault		-	*
U1.06	Fault occurrence time		-	*

Fault alarm content and countermeasure table:

Fault code	Fault type	Possible cause of failure	Countermeasures
E001	Drive overcurrent during acceleration	The acceleration time is too short.	Increase the acceleration time。
		The V/F curve is improper.	Adjust the V/F curve setting, adjust the manual torque boost or set the motor parameters correctly to ensure that the automatic torque boost is normal.
		Restarted the motor after an instant stop before letting the motor stop rotating completely.	Set the start mode F2.00 to speed tracking restart function.
		Low power grid voltage	Check the input power.
		The drive power is too small.	Use an drive with a large power level.
E002	Drive overcurrent during deceleration	The deceleration time is too short.	Extend the deceleration time.
		Load with potential energy or large inertia torque	Externally add a proper energy consumption braking component.
		The drive power is small.	Use an drive with a large power level.
E003	Drive	Sudden change of load.	Reduce the sudden change of load.

Fault code	Fault type	Possible cause of failure	Countermeasures
	overcurrent during constant-speed running	The acceleration/deceleration time is set to very short.	Increase the acceleration/deceleration time to an appropriate value.
		Abnormal load.	Perform load check.
		Low power grid voltage.	Check the input power.
		The drive power is small.	Use an drive with a large power level.
E004	Drive overvoltage during acceleration	Abnormal input voltage.	Check the input power.
		The acceleration time is set to very short.	Increase the acceleration time to an appropriate value.
		Restarted the motor after an instant stop before letting the motor stop rotating completely.	Set the start mode F2.00 to speed tracking restart function.
E005	Drive overvoltage during deceleration	The deceleration time is too short (relative to regenerative energy).	Extend the deceleration time.
		Load with potential energy or large load inertia.	Select a proper energy consuming braking component.
E006	Drive overvoltage during constant-speed running	Abnormal input voltage	Check the input power.
		The acceleration/deceleration time is set too short.	Extend the acceleration/deceleration time as appropriate.
		Abnormal change of the input voltage.	Install an input reactor.
		Large load inertia.	Consider using an energy-saving brake component.
E007	Undervoltage during running	Abnormal input voltage	Check the input power voltage.
E008	Motor overload alarm	The V/F curve is improper.	Set the V/F curve and the torque boost correctly.
		Extremely low power grid voltage	Check the power grid voltage.
		The general motor operates for a long time at a low speed with a large load.	Special motor can be selected for long-term and low-speed operation.
		Incorrect motor rated current.	Set the motor rated current correctly.
		Motor stalled or a large sudden change of load.	Check the load.

Fault code	Fault type	Possible cause of failure	Countermeasures
E009	Drive overload alarm	The acceleration time is too short.	Extend the acceleration time
		Excessive DC braking	Reduce the DC braking currentand extend the braking time.
		The V/F curve is improper.	Adjust the V/F curve and the torque boost.
		Restarted the motor after an instant stop before letting the motor stop rotating completely.	Set the start mode F2.00 to speed tracking restart function.
		Extremely low power grid voltage	Check the power grid voltage.
		Excessive load	Select an drive with a larger power.
E010	Reserved	-	-
E011	Reserved	-	-
E012	Output phase loss alarm	Phase loss of output U, Vor W	Check the output wiring.
			Check the motor and the cable.
E013	Drive module radiator overheat alarm	Too high ambient temperature	Reduce the ambient temperature.
		Blocked air duct	Clear the air duct.
		Damaged fan	Replace the fan.
		Abnormal drive module	Seek for service.
E014	Rectifier module radiator overheat alarm	Too high ambient temperature	Reduce the ambient temperature.
		Blocked air duct	Clear the air duct.
		Damaged fan	Replace the fan.
E015	External fault alarm	External fault emergency stop terminal closed	Check the external equipment input.
E016	485 communication error alarm	Improper baud rate setting	Set the baud rate properly.
		Serial port communication error	Press the STOP key to reset orseek for service.
		Improper fault alarm parameter setting	Modify the settings of Fb.04, Fb.03 and FA.07.
		The host computer doesn’t work.	Check whether the host computer works or not, and whether the wiring is correct.

Fault code	Fault type	Possible cause of failure	Countermeasures
E017	Current detection circuit fault alarm	Damaged auxiliary power supply	Seek for service.
		Damaged Hall device	Seek for service.
		Abnormal amplification circuit	Seek for service.
E018	Reserved	-	-
E019	Reserved	-	-
E020	Closed-loop feedback loss alarm	Feedback is disconnected.	Check the feedback.
E021	Water pressure overpressure alarm	Abnormal sensor feedback signal	Check the sensor wiring.
		Too low overvoltage alarm value	Modify the F8.29 setting.
		Too short alarm detection time	Modify the F8.31 setting.
E022	Reserved	-	-
E023	Water shortage alarm	Abnormal water pressure/water level	Check whether the water pressure at the pump inlet is abnormal.
		Broken line or poor contact of the sensor, system has no feedback signal.	Check the sensor installation and wiring.
		Too low water shortage alarm value.	Modify the F8.32 setting.
		Too short water shortage detection time	Modify the F8.33 setting.
E024	Reserved	-	-
E025	Underload alarm	The reservoir is empty	Check the reservoir.

Fault code	Fault type	Possible cause of failure	Countermeasures
E026	Hydraulic probe damage of empty water	Hydraulic probe damage	Hydraulic probe damage
E027	Hydraulic probe damage of full water	Hydraulic probe damage	Hydraulic probe damage
E028	Keypad parameter copy error alarm	Keypad parameters are incomplete.	Re-upload the parameters in the backup keypad.
		The keypad parameters are inconsistent with the main control board parameter software version.	The parameter software version is inconsistent, and you cannot execute the parameter downloading, please re-upload the parameters in the backup keypad.
		The keypad parameters are of 2S model, but the main control board parameters are of 4T model.	The model corresponding to the parameter is inconsistent, and you cannot execute the parameter downloading, please re-upload the parameters in the backup keypad.
E029	Reserved	-	-
E099	Reserved	-	-

Appendix I Communication Protocol

Networking mode

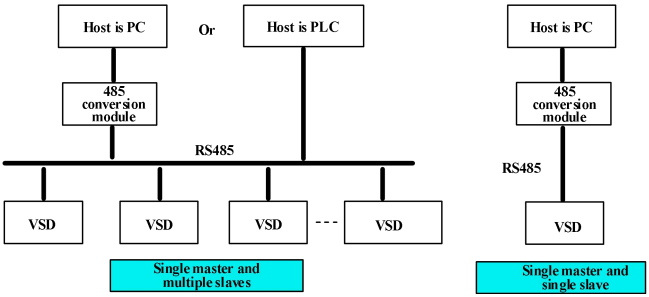


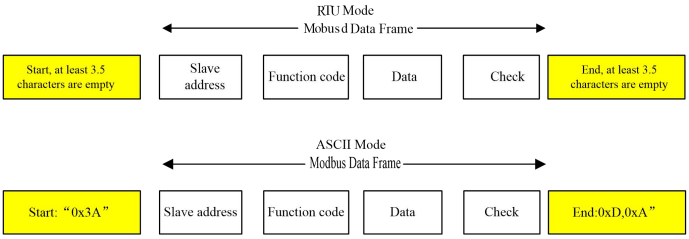
Figure 1 Schematic Diagram of Drive Networking Mode

Interface mode

RS485: asynchronous, half-duplex. Default: 8-N-2, 9600BPS. For parameter setting, please refer to group Fb description.

Protocol format

The Modbus protocol supports both RTU mode and ASCII mode. The corresponding frame format is as follows:



Protocol function:

The main function of Modbus is to read and write parameters. Different function codes determine different operation requests. The drive Modbus protocol supports the following function code operations:

Function code	Function code description
0x03	Read drive function code parameter and running status parameter
0x06	Rewrite function code or control parameter of single drive
0x10	Rewrite function code or control parameter of multiple drives

The function code parameter, control parameter and status parameter of the drive are mapped as Modbus read-write registers. The read-write characteristics and range of the function code parameters follow the instructions in the drive user manual. The group number of the drive function code is mapped to the high byte address of the register, and the index in the group is mapped to the low byte address of the register. The control parameter of the drive is virtualized to the drive function code group 18, and the status parameter of the drive is virtualized to the drive function code group 19. The correspondence between the function code group number and the high byte of its mapped register address is as follows:

Group F0: 0x00; group F1: 0x01; group F2: 0x02; group F3: 0x03; group F4: 0x04; group F5: 0x05; group F6: 0x06; group F7: 0x07; group F8: 0x08; group F9: 0x09; FA group: 0x0A; Fb group: 0x0B; FC group: 0x0C; Fd group: 0x0D; FE group: 0x0E; FF group: 0x0F; U0 group: 0x10; U1 group: 0x11; drive control parameter group: 0x12; drive status parameter group: 0x13.

For example, the register address of the drive function code parameter F3.02 is 0x0302, and the register address of the drive function code parameter FE.01 is 0x0E01.

If the operation request fails, the response is an error code and an exception code. The error code is equal to (function code + 0x80), and the exception code indicates the error reason. The exception codesare listed as follows:

Exception code	Exception code Description
0x1	Illegal function code.
0x2	Illegal register address.
0x3	Data error, that is, the data exceeds the upper or lower limit.
0x4	Slave operation failed (including errors caused by invalid data, although the data is within the upper and lower limits).
0x18	Information frame error: Including information length error and check error.
0x20	Parameters cannot be modified.
0x21	Out of the range of function group.

The drive control parameters can complete functions to start, stop, and set running frequency of the drive. By searching drive status parameters, parameters such as operating frequency, output current, and output torque of the drive can be obtained. The specific drive control parameters and status parameters are enumerated as follows (except 0x1207 virtual output terminal is read-only, other parameters are both readable and writable):

Register address	Parameter name	Whether kept saved after power failure
0x1200	Control command word 1	No
0x1201	Main frequency setting	Yes
0x1202	Reserved	-
0x1203	PID target value	Yes
0x1204	PID feedbackvalue	Yes
0x1205	Analog output AO, high-speed DO2 setting	No
0x1206	Virtual input terminal: Defined by bit: BIT0~9 = VDI1~VDI10, BIT10~15 = Reserved	No
0x1207	Virtual output terminals (read-only): Defined by bit: BIT0~4 = VDO1~VDO5, BIT5~15 = Reserved	No
0x2000	Control command word 2	No
0x2001	Main frequency setting	Yes

Basic drive status parameter index

Register address	Parameter name
0x1300	Running status word
0x1301	Drive model

Control word (bit)	Value	Significance	Function description
Bit2, 1, 0	111B	Run command	Start the drive
	110B	Stop command	Stop according to the way set by function code
	Remaining	No command	
Bit3	1	Reverse	Set the running direction when the run command is valid (invalid for jog command)
	0	Forward	
Bit8～Bit4	0	Reserved	-
Bit9	1	Fault reset valid	
	0	Fault reset invalid	
Bit15～Bit10	0	Reserved	-

The drive control command word 1 (register address 0x1200) bit is defined as follows:

The drive control word 2 (register address 0x2000) bit is defined as follows:

Control word (bit)	Value	Significance	Function description
Bit1, 0	00B	No function	
	01B	Stop	Stop according to the way set by function code F2.08
	10B	Start	Start the drive
	11B	No function	
Bit3, 2	0	Reserved	-
Bit5, 4	00B	No function	
	01B	Forward instruction	
	10B	Reverse instruction	
	11B	Fault reset	
Bit15～Bit5	0	Reserved	-

The drive status word (register address 0x1300) bit is defined as follows:

Status word (bit)	Value	Description	Remarks
Bit0	1	Drive running	
	0	Drive stop	
Bit1	1	Drive reverse	
	0	Drive forward	
Bit2	1	Reached the main setting	
	0	Not reached the main setting	
Bit7～Bit3	0	Reserved	
Bit15～Bit8	00~0xFF	Fault code	0: Indicates the drive is normal; Not 0: Indicates fault.Refer to the user manual of the drive of relevant type for detailed fault code significance. For example, the fault code for motor overload E008 is 0x08, and for undervoltage is 0x1F.

Application example

The command to start the 1# drive in the forward direction and set the speed to 50.00HZ (internally indicated as 0x1388) is as follows:

	Address	Function code	Register address	Register number	Register content bytes	Register content	Verification code
Request	0x01	0x10	0x1200	0x0002	0x04	0x0007, 0x1388	0x9B98
Response	0x01	0x10	0x1200	0x0002	None	None	0x44B0

5# drive fault reset:

Address	Function code	Register address	Register content	Verification code
0x05	0x06	0x1200	0x0200	0x8C56
0x05	0x06	0x1200	0x0200	0x8C56

Read the running frequency of the 4# drive, and the drive response running frequency is 50.00HZ:

Address	Function code	Register address	Register number or read bytes	Register content	Verification code
0x04	0x03	0x1000	0x0001	None	0x809F
0x04	0x03	None	0x02	0x1388	0x7912

Write the acceleration time 1 (i.e. function code F1.11) of 5# drive to 1.00s, and do not save after power failure.

Address	Function code	Register address	Register content	Verification code
0x05	0x06	0x010B	0x0064	0xF99B
0x05	0x06	0x010B	0x0064	0XF99B

Read the output current of 5# drive, and the drive response output current is 3.00A.

Address	Function code	Register address	Register number or read bytes	Register content	Verification code
0x05	0x03	0x1002	0x0001	None	0x208E
0x05	0x03	None	0x02	0x012C	0x49C9

Calibration relationship of the drive

A) The calibration of the frequency is 1:100

To make the drive run at 50Hz, the main setting shall be 0x1388 (5000).

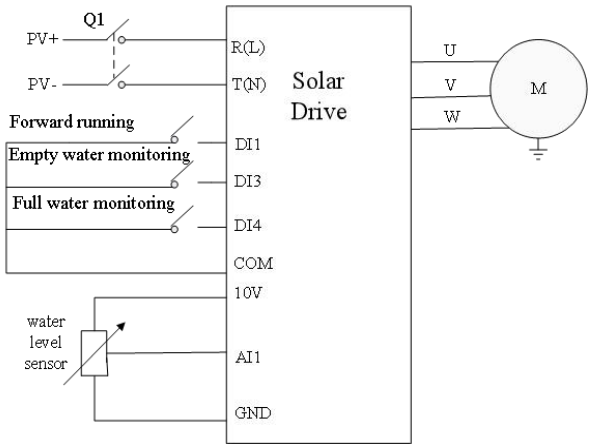
B) The calibration of the time is 1:100

To make the drive acceleration time be 3s, the function code setting shall be 0x012C (300).

C) The calibration of the current is 1:100

If the drive feedback current is 0x012C (300), the current of the drive is 3A.

Appendix II Solar Pump Drive Instruction



Solar pump drive wiring diagram

NOTE：

1)The AC power of the grid and the DC power of the PV can not be supplied to the drive at the same time,only one power supply can be chosen

2)TheDC breaker Q1 must be installed as the protection switch for PV input

3)When the distance between the PV input component and drive exceeds 10 meters, type-II surge protection devices must be configured at the DC side

When the distance between the pump and drive exceeds 50 meters, it is recommended to configure output reactors.

Product Specifications

Drive Model	2S	4T
Input voltage(AC)	220V-250V	380V-440V
Input voltage(DC)	150V-400V	250v-800V
Maximum DC voltage	400V	800V
Recommended DC input voltage range	250V-372V	460V-680V
Recommended MPP voltage	330V	550V

Selection of solar panels

Solar panel voltage Motor voltage	Solar panel connection mode 18V(vpm)	Solar panel connection mode 30V(vpm)
220V	18-20 pcs (connection in series then in parallel)	10-12pcs (connection in series then in parallel)
380V	30-33pcs (connection in series then in parallel)	18-20pcs (connection in series then in parallel)

According to the requirements of required power, each group of solar panels will be used together in parallel

The power of the solar panels is recommended to be 1.3-2.0 times of the rated power of 380v pumps or 1.6-2.0 times of 220v pumps.

Drive warranty form

User unit:	
Detailed address:	
Zip code:	Contact person:
Telephone number:	Fax:
Machine number:	
Power:	Model:
Contract number:	Date of purchase:
Service unit:	
Contact person:	Telephone number:
Repairman:	Telephone number:
Date of repair:	
User comments and evaluation: □ Excellent □ Good □ Normal □ Poor Other comments: User signature: Day Month Year Company return visit records: Others:	

Certificate

Inspector: _____

This product is qualified via inspection and is allowed to leave the factory.