Preface

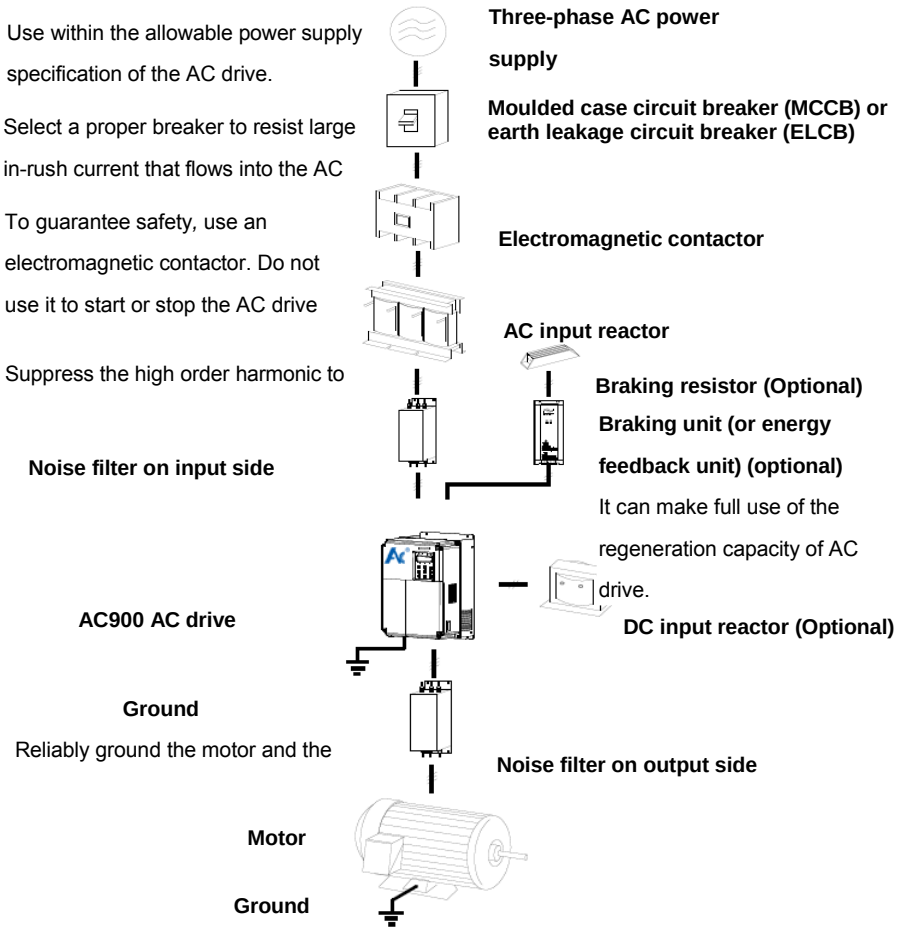
Thank you for purchasing the AC900 series AC drive.

The AC900 series AC drive is a general-purpose high-performance current vector control AC drive. It is used to drive various automation production equipment involving textile, paper-making, wiredrawing, machine tool, packing, food, fan and pump.

This manual describes the correct use of the AC900 series AC drive, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

Notes
• The drawings in the manual are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. • The drawings in the manual are shown for description only and may not match the product you purchased. • The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. • Contact our agents or customer service center if you have problems during the use. Phone number:400-886-9116

Connection to peripheral devices



Notice:

- Do not install the capacitor or surge suppressor on the output side of the AC drive. Otherwise, it may cause faults to the AC drive or damage to the capacitor and surge suppressor.
- Inputs/Outputs (main circuit) of the AC drive contain harmonics, which may interfere with the communication device connected to the AC drive. Therefore, install an anti-interference filter to minimize the interference.
- For more details on peripheral devices, refer to related selection manual.

Contents

1 Product Information

Safety Information and Precautions

In this manual, the notices are graded based on the degree of danger:

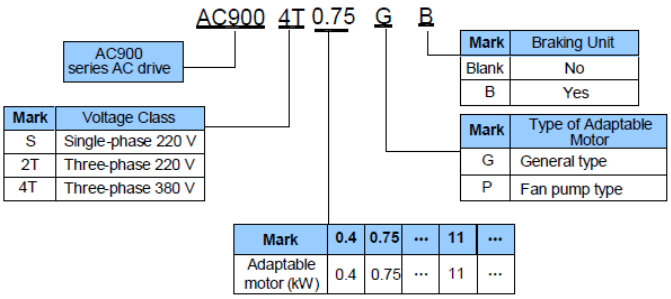
DANGER indicates that failure to comply with the notice will result in severe personal injury or even death.

WARNING indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. Our company will assume no liability or responsibility for any injury or loss caused by improper operation.

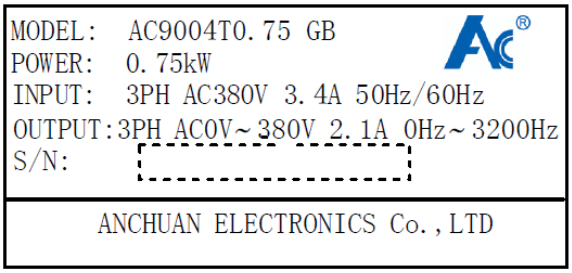
1.1 Designation Rules

Figure 1-1 Designation rules



1.2 Nameplate

Figure1-2 Nameplate



1.3 AC900 AC Drive Series Index

Table 1-1 AC drive model and technical data

AC drive model	Power capacity(kVA)	Input current A	Output current A	Adaptable Motor	
				kW	HP
Single-phase power: 220V, 50/60Hz					
AC900-S0.75GB	1.5	8.2	4.0	0.75	1
AC900-S1.5GB	3.0	14.0	7.0	1.5	2
AC900-S2.2GB	4.0	23.0	9.6	2.2	3
Three-phase power:220V，50/60Hz					
AC900-2T0.75GB	3	5	3.8	0.75	1
AC900-2T1.5GB	4	5.8	5.1	1.5	2
AC900-2T2.2GB	5.9	10.5	9	2.2	3
AC900-2T3.7GB	8.9	14.6	13	3.7	5
AC900-2T5.5GB	17	26	25	5.5	7.5
AC900-2T7.5GB	21	35	32	7.5	10
AC900-2T11G	30	46.5	45	11	15
AC900-2T15G	40	62	60	15	20
AC900-2T18.5G	57	76	75	18.5	25
AC900-2T22G	69	92	91	22	30
AC900-2T30G	85	113	112	30	40
AC900-2T37G	114	157	150	37	50
AC900-2T45G	134	180	176	45	60
AC900-2T55G	160	214	210	55	75
AC900-2T75G	231	307	304	75	100
Three-phase power: 380V, 50/60Hz					
AC900-4T0.75GB	1.5	3.4	2.1	0.75	1
AC900-4T1.5GB	3.0	5.0	3.8	1.5	2
AC900-4T2.2GB	4.0	5.8	5.1	2.2	3
AC900-4T3.0GB	5.0	8.0	7.0	3.0	4
AC900-4T4.0GB	5.9	10.5	9.0	4.0	5
AC900-4T5.5GB	8.9	14.6	13.0	5.5	7.5
AC900-4T7.5GB	11.0	20.5	17.0	7.5	10
AC900-4T11GB	17.0	26.0	25.0	11.0	15
AC900-4T15GB	21.0	35.0	32.0	15.0	20
AC900-4T18.5GB	24.0	38.5	37.0	18.5	25
AC900-4T22G	30.0	46.5	45.0	22	30

AC900-4T30G	40.0	62.0	60.0	30	40
AC900-4T37G	57.0	76.0	75.0	37	50
AC900-4T45G	69.0	92.0	91.0	45	60
AC900-4T55G	85.0	113.0	112.0	55	70
AC900-4T75G	114.0	157.0	150.0	75	100
AC9004T90G	134	180	176	90	125
AC9004T110G	160	214	210	110	150
AC9004T132G	192	256	253	132	175
AC9004T160G	231	307	304	160	250
AC9004T200G	250	385	377	200	300
AC9004T220G	280	430	426	220	300
AC9004T250G	355	468	465	250	400
AC9004T280G	396	525	520	280	370
AC9004T315G	445	590	585	315	500
AC9004T355G	500	665	650	355	420
AC9004T400G	565	785	725	400	530

Table 1-2 Housing type of AC900 series are as below:

Type	Housing type
Single-phase 220V	
0.75kW～2.2kW	Plastic housing
Three-phase 220V	
0.75kW ～ 11kW	Plastic housing
15kW ～ 75kW	Sheet metal housing
Three-phase 380V	
0.75kW～18.5kW	Plastic housing
22kW～400kW	Sheet metal housing

1.4 Physical Appearance and Overall Dimensions

1.4.1 Physical Appearance

Figure 1-3 Physical appearance and overall dimensions of AC900 (plastic housing)

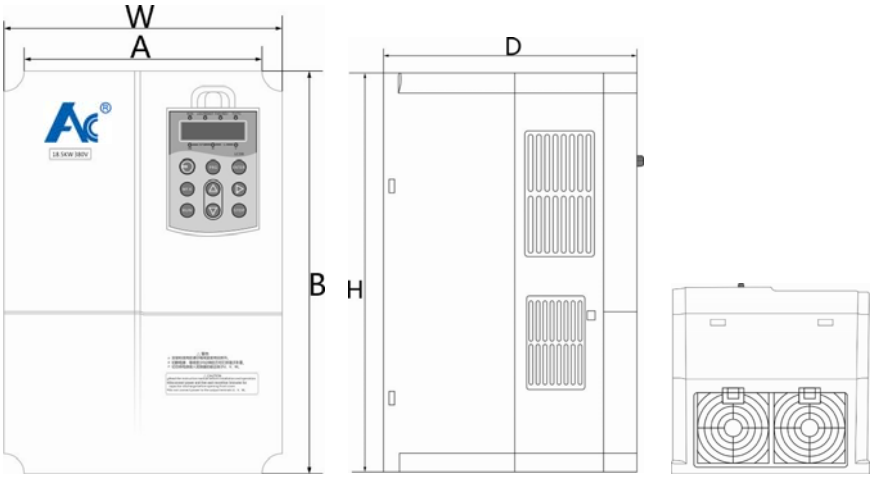
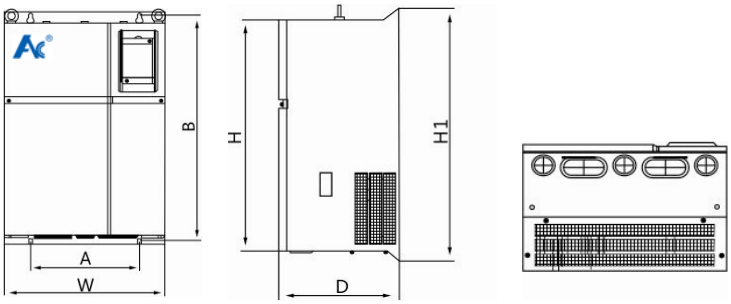


Figure 1-4 Physical appearance and overall dimensions of AC900 (sheet metal housing)



1.4.2 Physical Appearance and Mounting Hole Dimensions of AC900 (mm)

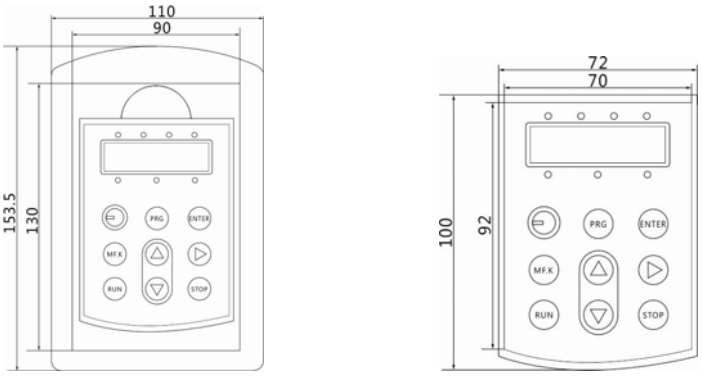
Table 1-3 Appearance and Mounting Hole Dimensions of AC900

Model	Mounting hole		Overall dimension (mm)				Mounting Hole Diameter (mm)	Weight (kg)
	A	B	H	H1	W	D		
Single-phase 220V Structure A/B								
AC900-2S0.4GB	94	152	160	/	105	135	Ø 5.0	1.1
AC900-2S0.7GB	115	174	185	/	125	160	Ø 5.0	1.1
AC900-2S1.5GB	These four models support A, B structures. Dimensions of these two structures are as above.							
AC900-2S2.2GB								
Three-phase 220V Structure A/B								
AC9002T0.75GB	115	174	185	/	125	160	Ø5.0	1.1
AC9002T1.5GB	148	232	245	/	150	176	Ø5.0	2.5
AC9002T2.2GB								
AC9002T3.7GB								
AC9002T5.5GB	205	308	320	/	216	202	Ø6	6.5
AC9002T7.5GB								
AC9002T11G								
AC9002T15G	235	447	432	463	285	228	Ø8	20
AC9002T18.5G								
AC9002T22G								
AC9002T30G	260	580	549	600	385	265	Ø10	32
AC9002T37G								
AC9002T45G								
AC9002T55G	343	678	660	700	473	307	Ø10	47
AC9002T75G								
Three-phase 380V Structure A/B								
AC900-4T0.7GB	94	152	160	/	105	135	Ø 5.0	1.1
AC900-4T1.5GB	115	174	185	/	125	160	Ø 5.0	1.1
AC900-4T2.2GB	These three models support A, B structures. Dimensions of these two structures are as above.							

AC900-4T3.7GB	148	232	245	/	150	176	Ø 5.0	2.5
AC900-4T5.5GB								
AC900-4T7.5GB								
AC900-4T11GB	205	308	320	/	216	202	Ø 6	6.5
AC900-4T15GB								
AC900-4T18.5GB								
AC900-4T22GB	235	447	432	463	285	228	Ø 8	20
AC900-4T30GB								
AC900-4T37GB								
AC900-4T45GB	260	580	549	600	385	265	Ø 10	32
AC900-4T55GB								
AC900-4T75GB								
AC9004T90G	343	678	660	700	473	307	Ø10	47
AC9004T110G								
AC9004T132G	449	903	880	930	579	380	Ø10	90
AC9004T160G								
AC9004T185G								
AC9004T200G	420	1030	983	1060	650	377	Ø12	130
AC9004T220G								
AC9004T250G								
AC9004T280G								
AC9004T315G	520	1300	1203	1358	800	400	Ø16	200
AC9004T355G								
AC9004T400G								

1.4.3 Dimensions of Operation Panel

Figure1-5 Dimensions of operation panel



1.5 Main Circuit Terminals and Wiring

1) Description of main circuit terminals of single-phase AC drive

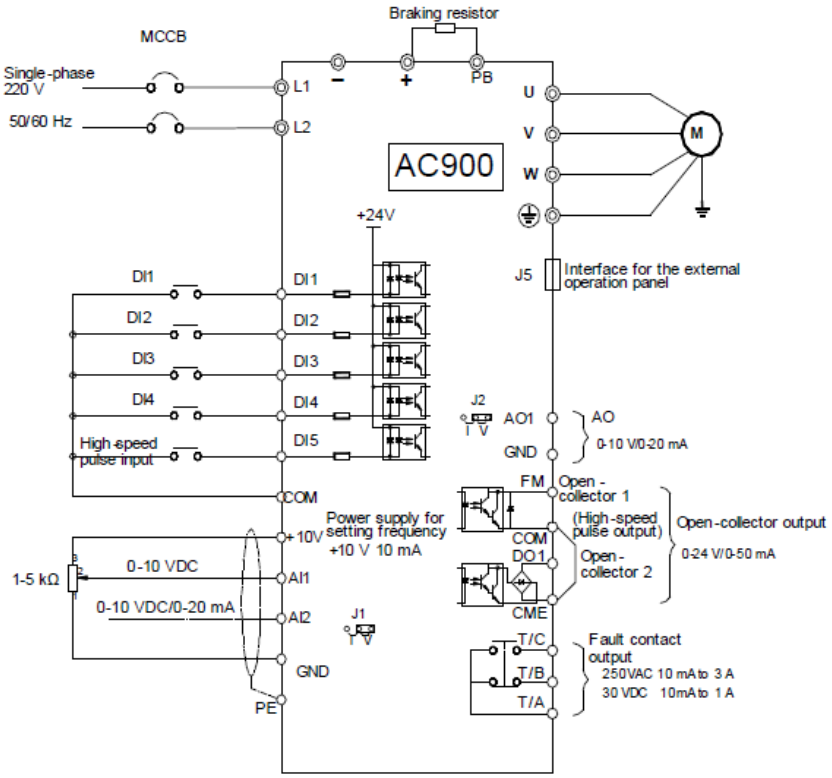
Terminal	Name	Description
L、N	Single-phase power supply input terminals	Connect to the single-phase 220 VAC power supply
（+）、（-）	Positive and negative	Common DC bus input point
P+、PB	Connecting terminals of braking	Connect to a braking resistor
U、V、W	AC drive output terminals	Connect to a three-phase motor
PE ⏚	Grounding terminal	Must be grounded

2) Description of main circuit terminals of three-phase AC drive

Terminal	Name	Description
R、S、T	Three-phase power supply input terminals	Connect to the three-phase AC power supply
（P+）、（P-）	Positive and negative terminals of DC bus	Common DC bus input point Connect the external braking unit to the AC drive of18.5 kW and above (220 V) and 37 kW and above (other voltage classes).
P+、PB	Connecting terminals of braking resistor	Connect to the braking resistor for the AC drive of 15 kW and below (220 V) and 30 kW and below (other voltage classes).
P、（P+）	Connecting terminals of external reactor	Connect to an external reactor.
U、V、W	AC drive output terminals	Connect to a three-phase motor.
PE ⏚	Grounding terminal	Must be grounded.

1.6 Wiring Mode of the AC Drive Control Circuit

Figure 1-6 Wiring mode of the AC drive control circuit



▪ Note: All AC900 series AC drives have the same wiring mode. The figure here shows the wiring of three-phase 380 V AC drive. ◎ indicates main circuit terminal, while ○ indicates control circuit terminal.

1.7 Description of Control Circuit Terminals

Terminal Arrangement of Control Circuit Terminal is as below:

Figure 1-7 Terminal Arrangement of Control Circuit

+10V	AI1	AI2	GND	DI1	DI2	DI3	DI4	DI5	COM		T/A
GND	AO1	A+	B-	DO1	FM	COM	COM	+24V		T/B	T/C

1.8 Function Description of Control Circuit Terminals

Table 1-4 Function Description of control circuit terminals of AC900

Type	Terminal	Name	Function Description
Power supply	+10V-GND	External +10 V power supply	Provide +10 V power supply to external unit. Generally, it provides power supply to external potentiometer with resistance range of 1-5kΩ. Maximum output current:10mA
	+24V-COM	External +24 V power supply	Provide +24 V power supply to external unit. Generally, it provides power supply to DI/DO terminals and external sensors. Maximum output current:200mA
Analog input	AI1-GND	Analog input 1	Input voltage range: 0-10 VDC Impedance: 22kΩ
	AI2-GND	Analog input 2	Input range: 0-10 VDC/0-20mA, decided by jumper J1 on the control board Impedance: 22kΩ (voltage input),500 Ω (current input)
Digital input	DI1- COM	Digital input 1	Optical coupling isolation Impedance: 2.4kΩ Voltage range for level input: 9-30V
	DI2- COM	Digital input 2	
	DI3- COM	Digital input 3	
	DI4- COM	Digital input 4	
	DI5- COM	High-speed pulse input	Besides features of DI1-DI4, it can be used for high-speed pulse input. Maximum input frequency: 100 kHz
Analog output	AO1-GND	Analog output 1	Voltage or current output is decided by jumper J2. Output voltage range: 0-10V Output current range: 0-20mA
Digital output	DO1-COM	Digital output 1	Optical coupling isolation, dual polarity open collector output Output voltage range: 0-24V Output current range: 0-50mA
	FM- COM	High-speed pulse output	It is limited by P5-00 (FM terminal output mode selection). As high-speed pulse output, the maximum frequency hits 100 kHz. As open-collector output, its specification is the same as that of DO1
Relay output	T/A-T/B	NC terminal	Contact driving capacity: 250VAC, 3A, COS ø=0.4 30VDC, 1A Applying to Overvoltage Category II circuit
	T/A-T/C	NO terminal	
Auxiliary interface	J3	485 communication	Jumper selection to decide whether to connect 330Ω matched resistor to make 485 communication
	J5	External operation panel interface	Connect to external operation panel.

Description of Wiring of Signal Terminals:

Wiring of AI terminals:

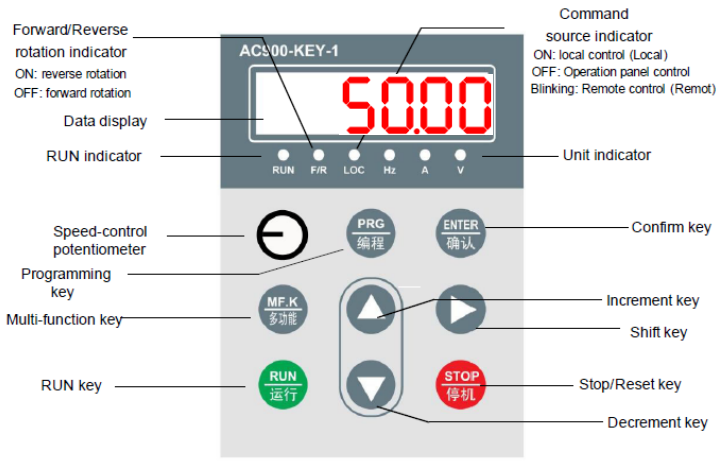
Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20 m. In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source.

2 Operation, Display and Application Examples

2.1 Operation and Display Panel

You can modify the parameters, monitor the working status and start or stop the AC900 by operating the operation panel, as shown in the following figure.

Figure 2-1 operation panel



1) Description of Indicators

- RUN: ON indicates that the AC drive is in the running state, and OFF indicates that the AC drive is in the stop state.
- LOCAL/REMOT: It indicates whether the AC drive is operated by means of operation panel, terminals or communication.

○ LOCAL/REMOT: OFF	Operation panel control
● LOCAL/REMOT: ON	Terminal control
◒ LOCAL/REMOT: blinking	Communication control

- FWD/REV: ON indicates reverse rotation, and OFF indicates forward rotation.
- TUNE/TC: When the indicator is ON, it indicates torque control mode. When the indicator is blinking slowly, it indicates the auto-tuning state. When the indicator is blinking quickly, it indicates the fault state.

2) Unit Indicators

● means that the indicator is ON, and ○ means that the indicator is OFF.

: Hz(unit of frequency)

: A (unit of current)

: V(unit of voltage)

: RMP(unit of rotational speed)

: %(percentage)

3) Data Display

The 5-digit LED display is able to display the set frequency, output frequency, monitoring data and fault codes.

4) Description of keys on the operation panel

Table 2-1 Description of keys on the operation panel

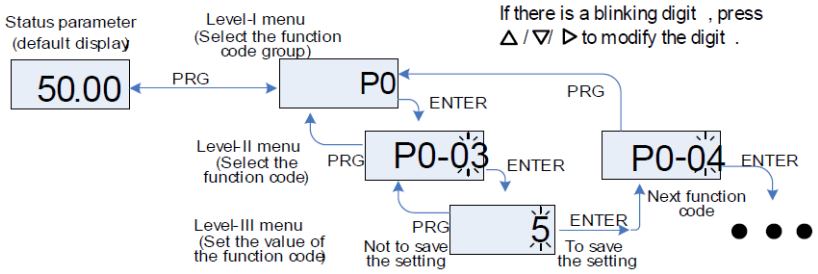
Key	Name	Function
PRG	Programming	Enter or exit Level I menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
△	Increment	Increase data or function code
▽	Decrement	Decrease data or function code
▷	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
RUN	RUN	Start the AC drive in the operation panel control mode.
STOP/RES	Stop/Reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the fault state. The functions of this key are restricted in P7-02.
MF.K	Multifunction	Perform function switchover according to the setting of P7-01.
RVI	Keyboard potentiometer	Speed-control potentiometer

2.2 Viewing and Modifying Function Codes

The operation panel of the AC900 adopts three-level menu.

The three-level menu consists of function code group (Level I), function code (Level II), and function code setting value (level III), as shown in the following figure.

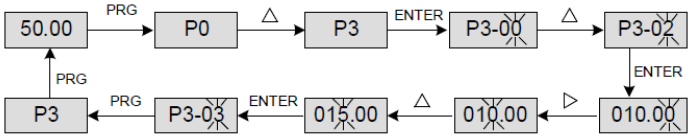
Figure 2-2 Operation procedure on the operation panel



You can return to Level II menu from Level III menu by pressing PRG or ENTER. After you press ENTER, the system saves the parameter setting first, and then goes back to Level II menu and shifts to the next function code. After you press PRG, the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

Here is an example of changing the value of P3-02 to 15.00 Hz

Figure 2-3 Example of changing the parameter value



In Level III menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This may be because:

1) Such a function code is only readable, such as, AC drive model, actually detected parameter and running record parameter.
2) Such a function code cannot be modified in the running state and can only be changed at stop.

2.3 Structure of Function Codes

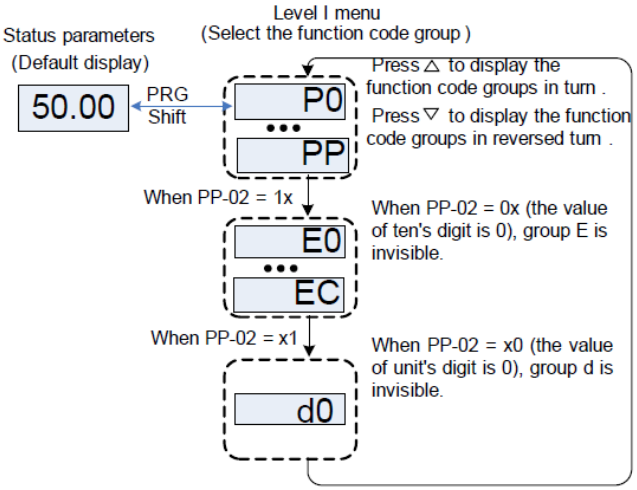
AC900 AC drive is new series vector type with good performance and strong function.

Table 2-2 Structure of Function Codes

Function Code Group	Function	Description
P0-PP	Standard AC drive function code group	Standard function code of AC drive, which can set most of functions of AC drive
E0 -EC	Advanced function code group	Multi-motor parameters,AI/AO correction, optimization control
d0	Running state function code group	Display of AC drive basic parameters

In the function code display state, select the required function code by pressing the key △ or ▽ , as shown in the following figure.

Figure 2-4 Selecting the required function code



PP-02 is used to determine whether group E and group d are displayed.

Function Code	Parameter Name	Setting Range	Default
PP-02	AC drive parameter display property	Unit's digit (group d display selection) 0: Not display 1: Display Ten's digit (group E display selection) 0: Not display 1: Display	11

2.4 Definition and Operation of the Multifunction Key (MF.K)

You can define the function (command source switchover or rotation direction switchover) of the multifunction key in P7-01. For details, see the description of P7-01.

2.5 Viewing Status Parameters

In the stop or running state, you can press on the operation panel to display status parameters. Whether parameters are displayed is determined by the binary bits of values converted from the values of P7-03, P7-04, and P7-05 in the hexadecimal format.

In stop state, a total of 16 status parameters can be displayed, as listed in the following table.

P7-05	LED display stop parameters	Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: DI input status Bit03: DO output status Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: Reserved	Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: Pulse setting frequency (kHz)	33	☆

In running state, five running status parameters are displayed by default, and you can set whether other parameters are displayed by setting P7-03 and P7-04, as listed in the following table.

P7-03	LED display running parameters 1	Bit00: Running frequency1 (Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (% Bit07: DI input status (V)	Bit08: DO output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: Reserved Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F	☆

P7-04	LED display running parameters 2	Bit00: PID feedback Bit01: PLC stage Bit02: Pulse setting frequency (kHz) Bit03: Running frequency2 Bit04: Remaining running time Bit05: AI1 voltage before correction Bit06: AI2 voltage before correction Bit07: Reserved	Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Minute) Bit11: Pulse setting frequency (Hz) Bit12: Communication setting value Bit13: Encoder feedback speed (Hz) Bit14: Main frequency X display (Hz) Bit15: Auxiliary frequency Y display (Hz)	0	☆

When the AC drive is powered on again after power failure, the parameters that are selected before power failure are displayed.

Set the values of the parameters by referring to the following example.

Determine the parameters to be displayed. Running frequency, Bus voltage, Output voltage, Output current, Output frequency, Output torque, PID feedback, Encoder feedback speed

Set the binary data.

P7-03: 0000 0000 0111 1101B, P7-04: 0010 0000 0000 0001B

Convert the binary data to hexadecimal data:

P7-03: 007DH, P7-04: 2001H

The values displayed on the operation panel are respectively H.1043 and H.2001 respectively for P7-03 and P7-04.

2.6 Starting or Stopping the AC Drive

2.6.1 Selecting the Start/Stop Command Source

There are three start/stop command sources, namely, operation panel control, terminal control, and communication control. You can select the command source in P0-02.

Function Code	Parameter Name	Setting Range	Description
P0-02	Command source selection	0: Operation panel control (indicator OFF)	Press Run or Stop to start or stop the AC drive.
		1: Terminal control (indicator ON)	A DI terminal needs to be defined as the run/stop terminal.
		2: Communication control (indicator blinking)	The Modbus-RTU communication protocol is used.

2.6.2 Operation Panel Control

Operation panel control is on when you make P0-02=0 through keyboard operation After you press RUN the AC drive starts running (the RUN indicator is ON). After you press STOP when the AC drive is in running state, the AC drive stops running (the RUN indicator is OFF).

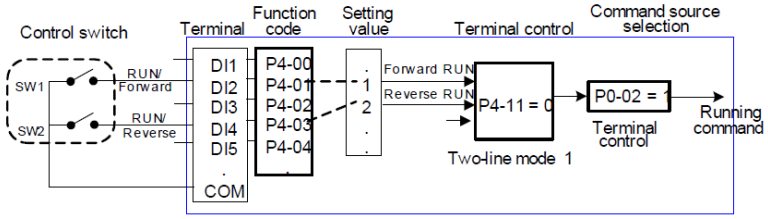
2.6.3 Terminal Control

This control mode is applicable to scenarios where the DIP switch or electromagnetic button is used to start or stop the application system or scenarios where the dry contact signal is used to start or stop the AC drive.

AC900 AC drive offers varieties of terminal controls. The switch signal mode is set in P4-11. The input terminal of the start/stop signal is set in P4-00 to P4-04. For details, see the description of P4-11 and P4-00 to P4-04.

Example 1: To use the DIP switch as the start/stop source, and allocate the forward rotation switch signal to DI2 and the reverse rotation switch signal to DI4, perform the setting as shown in the following figure.

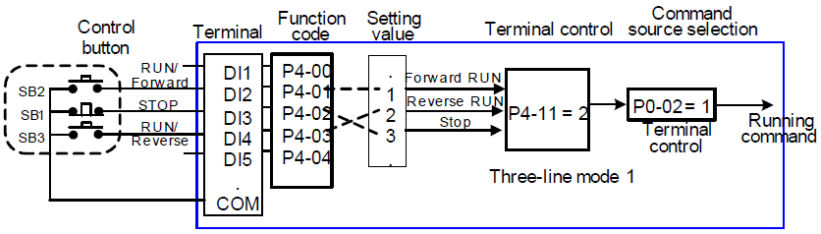
Figure 2-4 Setting of using the DIP switch for start/stop



In the preceding figure, when SW1 is ON, the AC drive instructs forward rotation; when SW1 is OFF, the AC drive stops. When SW2 is ON, the AC drive instructs reverse running; when SW2 is OFF, the AC drive stops. If SW1 and SW2 are ON or OFF simultaneously, the AC drive stops.

Example 2: To use the electromagnetic button as the start/stop source, and allocate the startup signal to DI2, stop signal to DI3 and reverse rotation signal to DI4, perform the setting as shown in the following figure.

Figure 2-5 Setting of using the electromagnetic button for start/stop

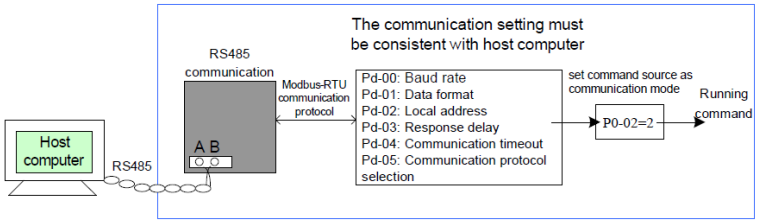


In the preceding figure, when SB1 is ON, the AC drive instructs forward rotation; when SB1 is OFF, the AC drive stops. When SB2 is ON, the AC drive instructs reverse running; when SB2 is OFF, the AC drive stops. If SB1 and SB2 are ON or OFF simultaneously, the AC drive stops.

2.6.4 Communication Control

The host computer controls the AC drive to communicate with AC900 through RS485 in communication code.

Set P0-02 to 2. Then, you can start or stop the AC drive in communication mode. The following figure shows the setting method.



When Pd-04 is set to a non-zero number, the function of automatic AC drive stop upon communication timeout is enabled. This prevents uncontrollable AC drive running due to faults of the communication cable or the host computer.

The communication port of the AC drive supports the Modbus-RTU protocol, and the communication is implemented only when the host computer supports the Modbus- RTU master station protocol.

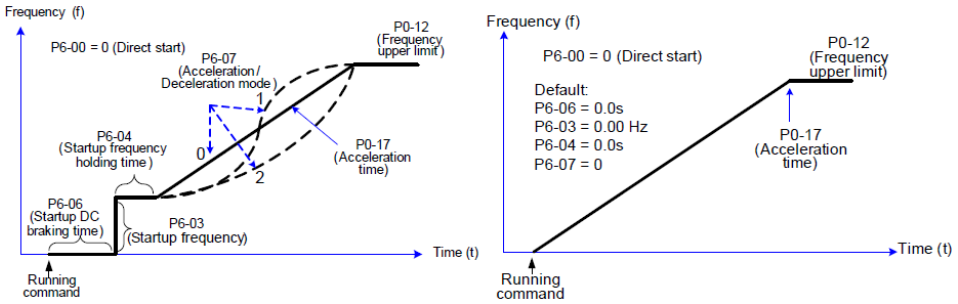
2.6.5 Start Mode

The AC900 supports three start modes, namely, direct start, rotational speed tracking restart, and pre-excited start (asynchronous motor), set in P6-00.

P6-00 = 0 (direct start). It is applicable to small-inertia load. The frequency curve in this mode is

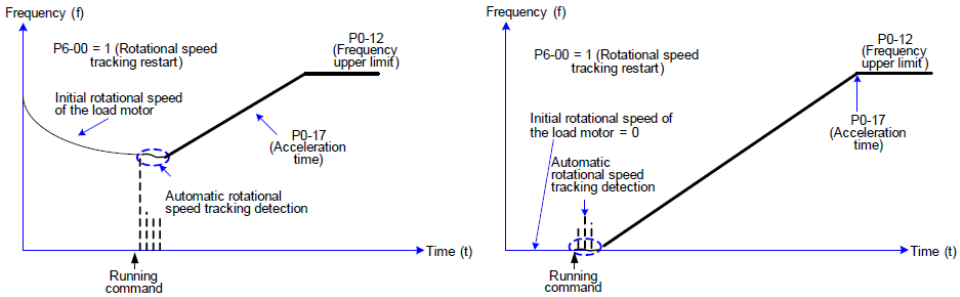
shown in the following figure. DC braking before the start is applicable to drive of load such as elevator and crane. Startup frequency is applicable to drive with burst start under start torque, such as cement mixer.

Figure 2-7 Frequency curve of direct start



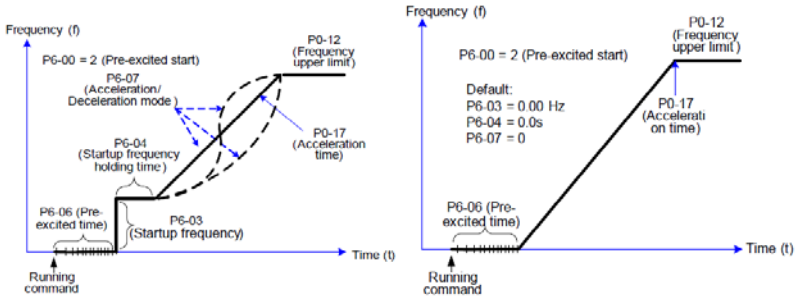
P6-00 = 1 (Rotational speed tracking restart), It is applicable to large-inertia load. The frequency curve in this mode is shown in the following figure. If the load motor is still rotating due to the inertia when the AC drive starts, this mode is used to prevent start overcurrent.

Figure 2-8 Frequency curve of rotational speed tracking restart



P6-00 = 2 (Pre-excited start). It is applicable only to inductive asynchronous motor. The AC drive performs pre- excitation before start, improving quick response of the motor and meeting the requirements of short acceleration time. The frequency curve in this mode is shown in the following figure.

Figure 2-9 Frequency curve of pre-excited start

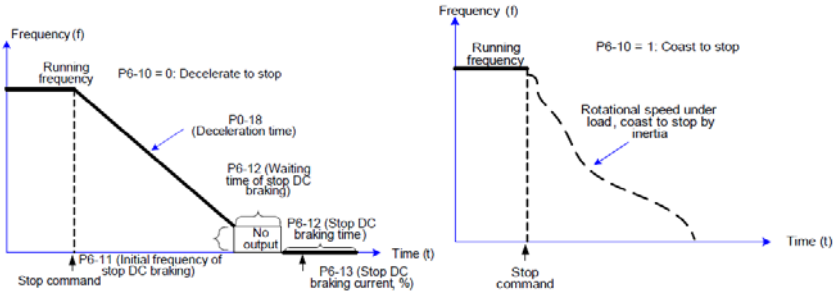


2.6.6 Stop Mode

The AC drive supports two stop modes, decelerate to stop and coast to stop, set in P6-10.

Figure 2-10 Diagram of two stop modes (decelerate to stop and coast to stop)

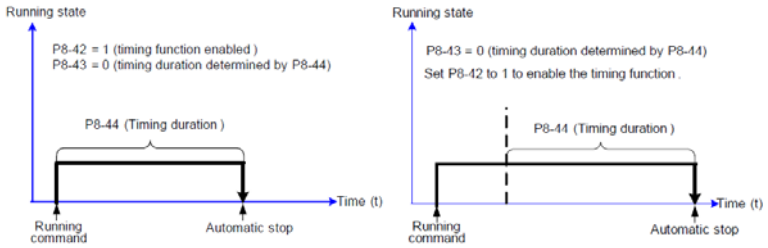
Figure 2-10 Stop Modes



2.6.7 Timing Stop

The AC900 supports timing stop. This function is enabled by P8-42 and the timing duration is determined by P8-43 and P8-44.

Figure 2-11 Setting of the timing stop function

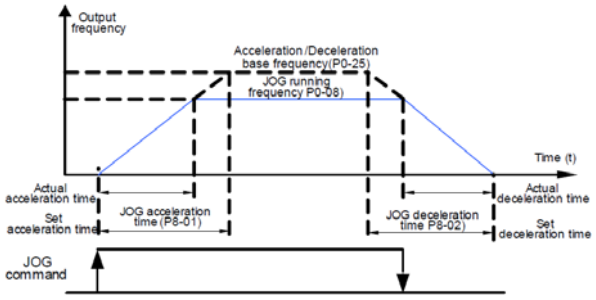


You can set the timing duration by means of analog input (such as potentiometer signal). For details, see the description of P8-43.

2.6.8 JOG Running

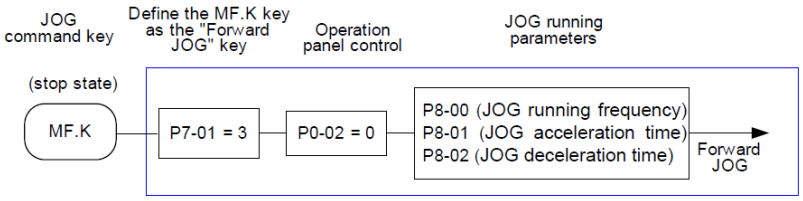
In certain applications, the AC drive needs to run in low speed temporarily to facilitate equipment test or other commissioning operations. In this case, you can set the AC drive to perform JOG running.

Figure 2-12 JOG running



2.6.9 JOG Running in Operation Control

Figure 2-13 JOG running in operation panel control



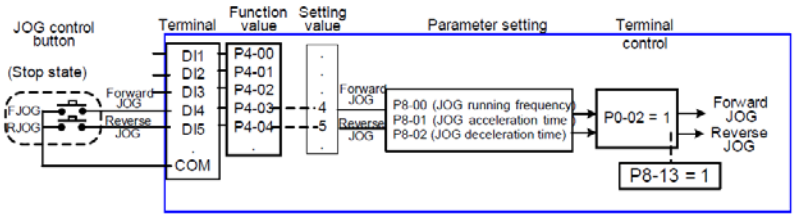
Set the parameters according to the preceding figure. In stop state of the AC drive, hold down MF.K, and the AC drive starts JOG running. After you release MF.K, the AC drive decelerates to stop.

To perform reverse JOG, set P7-01 to 4 and P8-13 to 1. Hold down MF.K, and the AC drive starts reverse JOG running.

2.6.10 Parameter Setting and Operation of JOG Running in DI Terminal Control

For equipment that requires frequent JOG operations, such as textile machine, it is more convenient to control JOG running by using keys or buttons. To achieve convenient control, perform the setting according to the following figure.

Figure 2-14 JOG running in DI terminal control



After performing the setting according to the preceding figure, press the FJOG button in stop state of the AC drive. Then, the AC drive starts forward JOG. After you press the FJOG button again, the AC drive decelerates to stop.

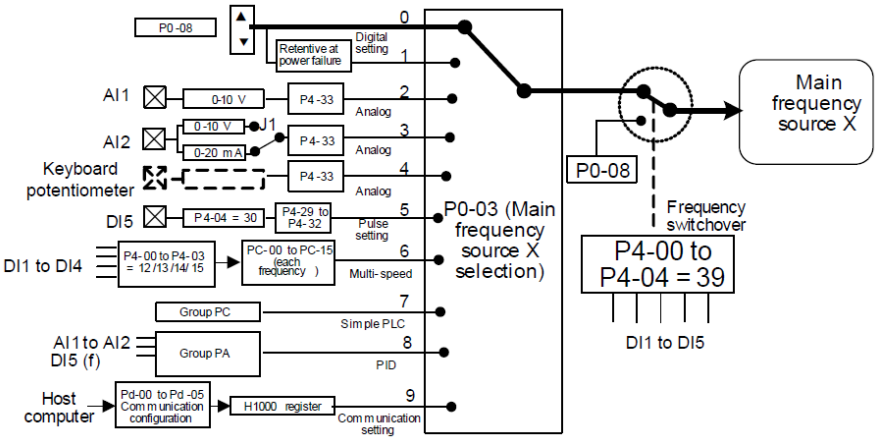
2.7 Setting the Running Frequency

The AC drive provides two frequency sources, namely, main frequency source X and auxiliary frequency source Y. You can select one frequency source and switch over between the two sources. You can also perform superposition on the two sources by setting the calculation formula to meet different control requirements of different scenarios.

2.7.1 Frequency Setting by the Main Frequency Source

There are nine setting modes of main frequency sources, digital setting (UP/DOWN modification, non-retentive at power failure), digital setting (UP/DOWN modification, retentive at power failure), AI1, AI2, Keyboard potentiometer, pulse setting, multi-reference, simple PLC, and communication setting. You can select one in P0-03.

Figure 2-15 Frequency set by the main frequency source



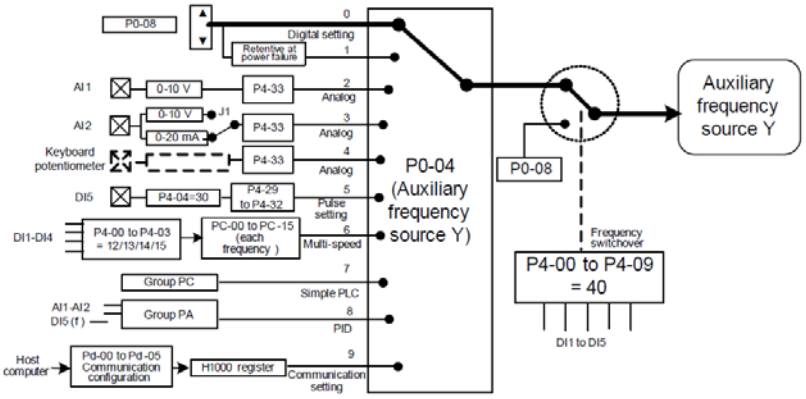
According to the preceding figure, the running frequency of the AC drive can be set by means of function codes, manual adjustment, analog input, multi-speed terminal, external feedback signal, internal PID regulator, or the host computer.

Set the corresponding function codes of each frequency setting mode, as shown in the preceding figure.

2.7.2 Frequency Setting by the Auxiliary Frequency Source

The frequency setting by the auxiliary frequency source is the same as the frequency setting by the main frequency source. You can set the auxiliary frequency source in P0-04.

Figure 2-16 Frequency set by the auxiliary frequency source

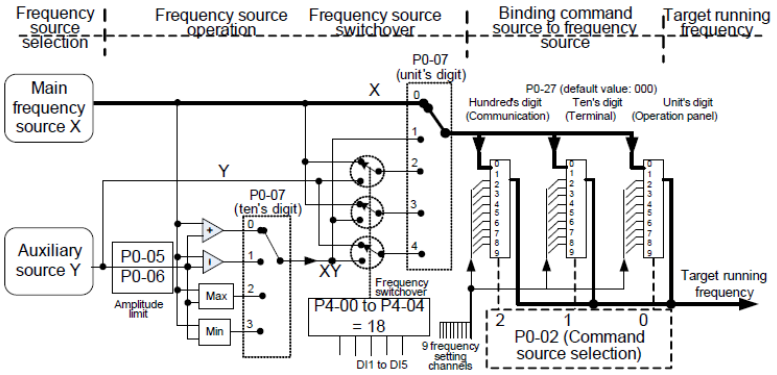


The relationship between the target running frequency and the main frequency source and auxiliary frequency source is set in P0-07, as follows:

1. Main frequency source X: The main frequency source is directly used to set the target running frequency.
2. Auxiliary frequency source Y: The auxiliary frequency source is directly used to set the target running frequency.
3. X and Y operation: There are four operation methods, namely, X+Y, X-Y, maximum of X and Y, and minimum of X and Y.
4. Frequency switchover: A DI terminal is used to switch over between the preceding three frequency setting channels.

The following figure shows how to set the relationship in P0-07, in which the bold line indicates the default setting.

Figure 2-17 Relationship between the target running frequency and main and auxiliary frequency sources



The operation between the main frequency source and the auxiliary frequency source can be used for closed-loop speed control. For example, using the main frequency source for setting the required frequency and the auxiliary frequency source for automatic adjustment, in conjunction with switchover performed by the external DI terminal signal, the required closed-loop control can be implemented.

2.7.3 Binding Command Source to Frequency Source

The three command sources can be separately bound to frequency sources, as shown in Figure 2-17. When the specified command source (P0-02) is bound to a frequency source (corresponding digit in the value of P0-27), the frequency is determined by the frequency setting channel set in P0-27. In this case, both main and auxiliary frequency sources are ineffective.

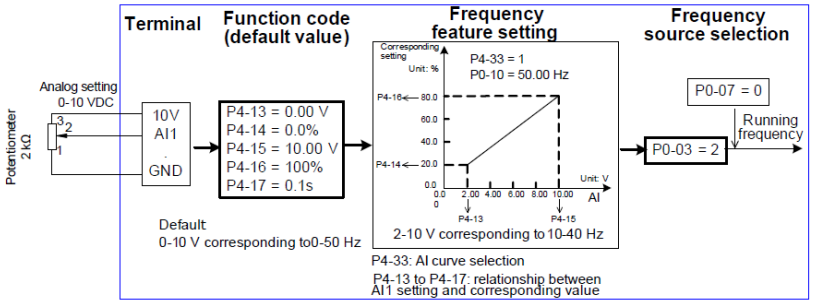
2.7.4 AI as the Frequency Source

The AI terminal can be used as the frequency source. The AC900 provides two AI terminals (AI1 and AI2) on the control board and keyboard potentiometer.

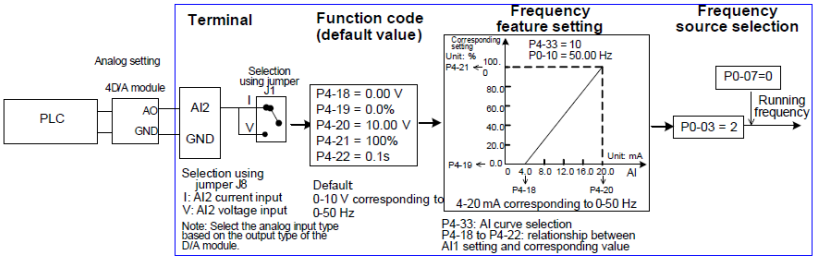
The following figures show how to use the AI as the frequency source.

1.Voltage input of AI1 connected to the potentiometer as the frequency source (2-10 V corresponding to 10-40 Hz)

Figure 2-18 AI as the Frequency Source



2.Figure 2-19 Current input of AI2 connected to 4DA module of the PLC as the frequency source (4-20mA corresponding to 0-50 Hz)



Note

1. AC900 provides two AI terminals (AI1 and AI2) on the control board.

2. AI1 provides 0-10 V voltage input. AI2 provides 0-10 V voltage input or 0-20mA current input, determined by jumper J1 on the control board.

3. When AI is used as the frequency source, 100% of the voltage or current input corresponding setting corresponds to the maximum frequency in P0-10.

4. AC900 provides five corresponding relationship curves, which can be selected in P4-33. The input values and corresponding settings of each curve are set in P4-13 to P4-22 and group E6.

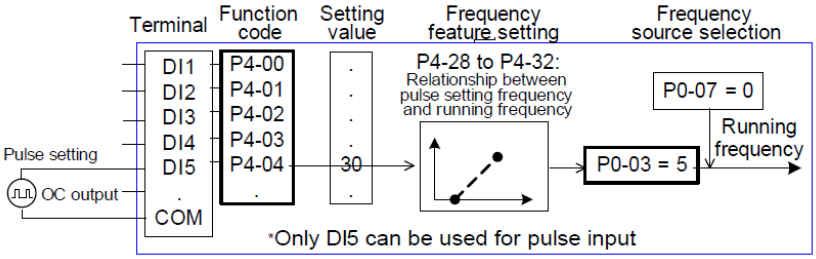
2.7.5 Pulse Setting as the Frequency Source

In many scenarios, pulse input is used as the frequency source. The specifications of pulse signals are: voltage 9-30 V, frequency 0-100 kHz.

Only DI5 can be used for pulse input. The relationship between pulse input from DI5 and the corresponding setting is set in P4-28 to P4-31. The relationship is a two-point line, and 100% of

pulse input corresponding setting corresponds to the maximum frequency of P0-10, as shown in Figure 2-20.

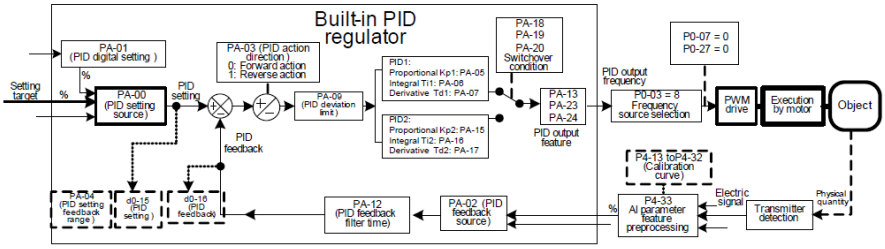
Figure 2-20 Pulse setting as the frequency source



2.7.6 Frequency Closed-Loop Control

The AC900 has a built-in PID regulator. Together with the frequency sources, the PID regulator can implement automatic adjustment of progress control, such as constant temperature, constant pressure, and tension control.

Figure 2-21 Automatic adjustment by PID regulator



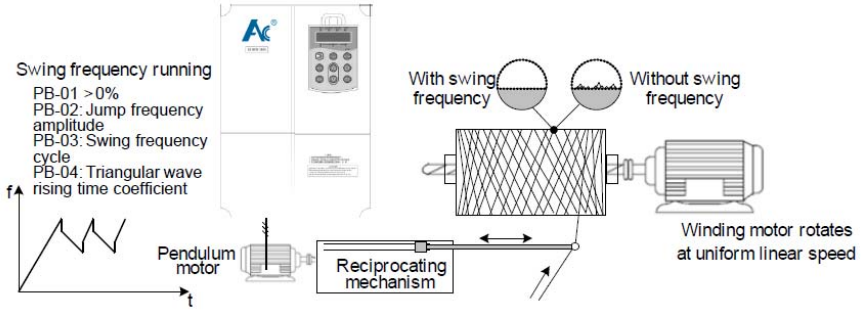
When PID frequency closed-loop control is implemented, P0-03 (Main frequency source X selection) must be set to 8 (PID). The PID-related parameters are set in group PA, as shown in Figure 2-21

The AC900 has two built-in equivalent PID calculating units. You can set the features, such as adjustment speed and accuracy, for the two units separately based on the actual conditions. Switchover between the two units can be implemented automatically or by means of an external DI terminal.

2.7.7 Swing Mode

For the textile and chemical fiber processing equipment, the swing function improves the uniform density of traversing and winding, as shown in Figure 2-22. The function is set in Pb-00 to Pb-04. For details, see the description of these function codes.

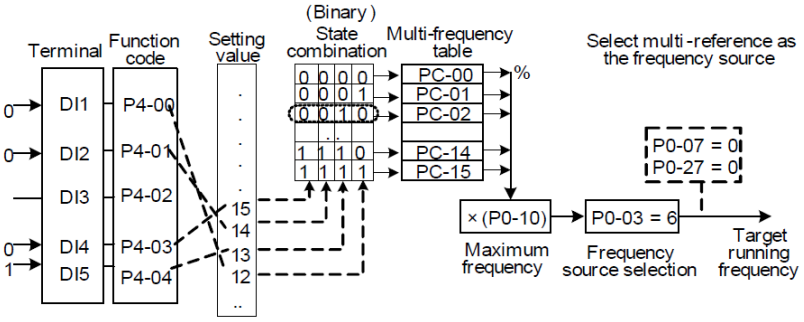
Figure 2-22 Swing function



2.7.8 Multi-Speed Mode

In scenarios where the running frequency of the AC drive need not be adjusted continuously and only several frequencies are required, the multi-speed control can be used. The AC900 supports a maximum of 16 running frequencies, which are implemented by state combinations of four DI terminals. Set the function codes corresponding to DI terminals to a value among 12 to 15, and then the DI terminals are specified as the multi-frequency input terminals. The multiple frequencies are set based on the multi-frequency table in group PC. In addition, you need to set P0-03 (Main frequency source X selection) to 6 (Multi- reference). The following figure shows how to set the multi-speed function.

Figure 2-23 Setting the multi-speed function



In the preceding figure, DI1, DI2, DI4, and DI5 are used as the multi-frequency input terminals, each of which has a bit value. The state combinations of these terminals correspond to multiple frequencies, When (DI4, DI2, DI5, DI1) = (0, 0, 1, 0), the state combination value is 2, corresponding to the value set in PC-02. The target running frequency is automatically calculated

by PC-02 x P0-10.

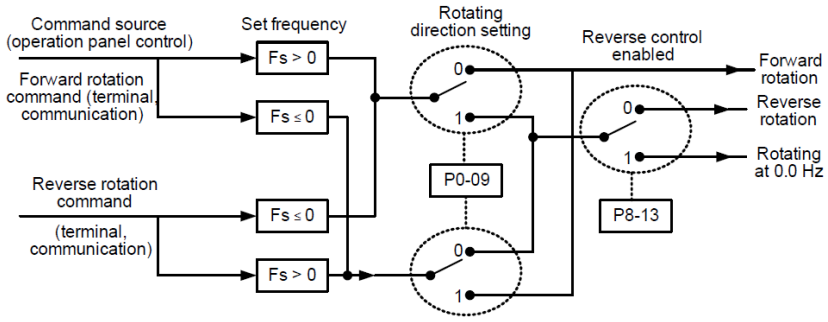
The AC900 supports a maximum of four DI terminals to be used as the multi-frequency input terminals. You can also use less than four DI terminals, and the empty bit is considered to be 0.

2.7.9 Setting the Motor Rotating Direction

After the AC drive restores the default settings, press RUN to drive the motor to rotate. In this case, the rotating direction is regarded as the forward rotation. If the rotating direction is reverse to the direction required by the equipment, power off the AC drive and exchange any two of the output UVW cables (wait until the main capacitor of the AC drive is completely discharged).

In some applications where both forward rotation and reverse rotation are required, enable the reverse control (P8-13 = 0, default value) and meanwhile reverse the rotating direction by setting P0-09 to 1. Then press RUN to make the motor rotate in the reverse direction, as shown in the following figure.

Figure 2-24 Reversing the motor rotating direction



If the command source is terminal control and reverse rotation is required, use the default value 0 of P8-13 to enable reverse control.

According to the preceding figure, when the running frequency of the AC drive is set by means of communication (P0-03 = 9) and reverse control is enabled (P8-13 = 0), the AC drive instructs the reverse direction if the set frequency Fs is a negative value.

If the give running command is reverse rotation or the set frequency is a negative value, but reverse control is disabled (P8-13 = 1), the AC drive will run at 0 Hz and has no output.

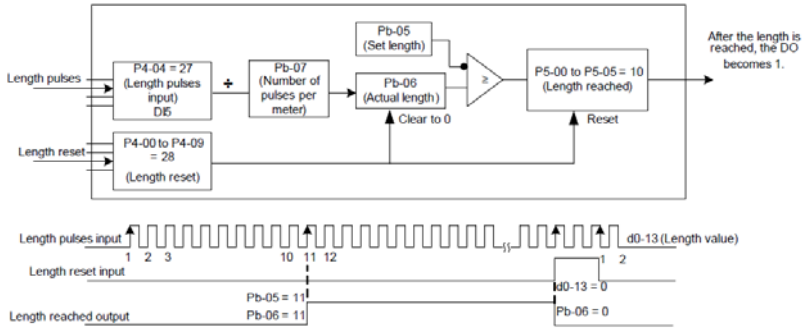
In some applications where reverse rotation is prohibited, do not change the rotating direction by modifying the function codes because the function codes will be restored once the AC drive restores the default settings.

2.7.10 Setting the Fixed Length Control Mode

The AC900 has the fixed length control function. The length pulses are sampled by the DI allocated with function 27 (Length count input). The "Actual length" (Pb-06) is obtained by dividing the number of pulses sampled by the value of Pb-07 (Number of pulses per meter). If the actual length is larger than the "Set length" (Pb-05), the multifunctional DO terminal becomes ON.

In the process of fixed length control, the length can be reset by means of the DI terminal allocated with function 28 (Length reset). The related setting is shown in the following figure.

Figure 2-25 Function code setting for fixed length control



Note

1. In the fixed length control mode, the direction cannot be identified and only the length shall be calculated based on the number of pulses.

2. Only DI5 can be allocated with the function "Length count input".

3. An automatic stop system can be implemented if the length reached signal output by the DO is fed back to the AC drive input terminal with the stop function.

Figure 2-26 Common application example of the fixed length control function

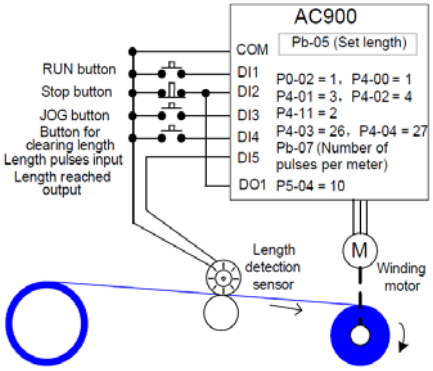
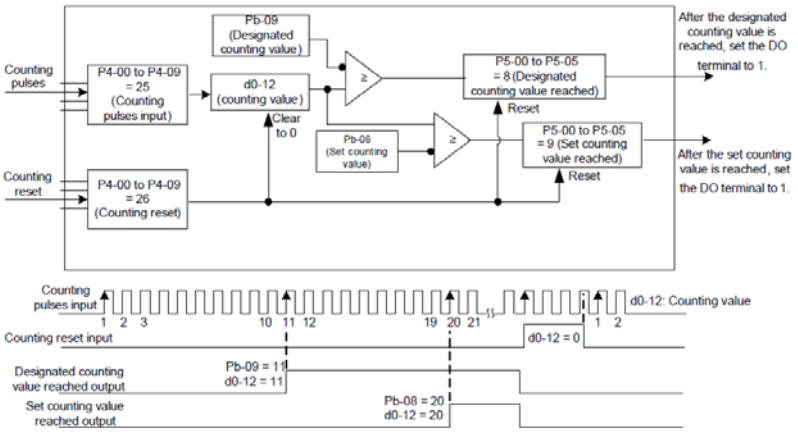


Figure 2-27 Parameter setting in the counting mode



2.7.11 Use of the Counting Function

The count value needs to be collected by the DI terminal that is allocated with function 25. When the count value reaches Pb-08 (Set count value), the DO terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the count value reaches Pb-09 (Designated count value), the DO terminal allocated with function 9 (Designated count value reached) becomes ON. The counter continues to count until "Set count value" is reached.

Note

1. Pb-09 (Designated count value) must not be greater than Pb-08 (Set count value).
2. DI5 must be used when the pulse frequency is high.
3. The DO terminal that is allocated with function 9 (Designated count value reached) and the DO terminal that is allocated with function 8 (Set count value reached) must not be the same.
4. In the RUN/STOP state of the AC drive, the counter will not stop until "Set count value" is reached.
5. The count value is retentive at power failure.
6. An automatic stop system can be implemented if the signal output by the DO terminal with the function (Count value reached) is fed back to the DI terminal of the AC drive with stop function.

2.8 Setting and Auto-tuning of Motor Parameters

2.8.1 Motor Parameters to Be Set

When the AC drive runs in the vector control mode (P0-01 = 0 or 1), accurate motor parameters are required to ensure desired driver performance and running efficiency. This is extremely different from the V/F control (P0-01 = 2).

Motor parameters that need to be set are listed in the following table.

Parameter	Description	Remark
P1-00	Motor type	Asynchronous motor, variable-frequency asynchronous motor, synchronous motor
P1-01 to P1-05	Rated motor power, Rated motor voltage, Rated motor current, Rated motor frequency, Rated motor rotational speed	Model parameters, manual input
P1-06 to P1-20	Motor internal equivalent stator resistance, inductive reactance and rotor inductance	Auto-tuning parameters

2.8.2 Motor Auto-tuning

To obtain the motor parameters, the AC drive can perform dynamic auto-tuning or static auto-tuning. For the asynchronous motor that cannot be disconnected from the load, you can input the motor parameters of the same model that was successfully auto-tuned before.

Auto-tuning	Application	Result
No-load dynamic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) can be disconnected from the load.	Best
With-load dynamic auto-tuning	It is applied to applications where the motor (synchronous motor or asynchronous motor) cannot be disconnected from the load.	OK
Static auto-tuning	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load and dynamic auto-tuning is not allowed.	Poor
Manual input	It is applied to applications where the motor (asynchronous motor only) cannot be disconnected from the load. Input the motor parameters of the same model that was successfully auto- tuned before into function codes P1-00 to P1-10.	OK

The process of motor auto-tuning is as follows:

1. If the motor can be disconnected from the load, disconnect the motor from the load mechanically after power-off so that the motor can run without load.

2. After power-on, set P0-02 (Command source selection) to 0 (Operation panel control).
3. Input the motor nameplate parameters (such as P1-00 to P1-05) correctly and input the following parameters based on the actually selected motor.

For asynchronous motor, set P1-37 (Auto-tuning selection) to 2 (Asynchronous motor complete auto-tuning). The operation panel displays:

TUNE

Then press RUN on the operation panel. The AC drive will drive the motor to accelerate/ decelerate and run in the forward/reverse direction, and the RUN indicator is ON. The auto-tuning lasts approximately 2 minutes. When the preceding display information disappears and the operation panel returns to the normal parameter display status, it indicates that the auto-tuning is complete.

The AC drive will automatically calculate the following motor parameters:

Motor	Parameter
Motor	P1-06: Stator resistance (asynchronous motor) P1-07: Rotor resistance (asynchronous motor) P1-08: Leakage inductive reactance (asynchronous motor) P1-09: Mutual inductive reactance (asynchronous motor) P1-10: No-load current (asynchronous motor)

If the motor cannot be disconnected from the load, set P1-37 (Auto-tuning selection) to 1 (Asynchronous motor static tuning) and then press RUN on the operation panel. The motor auto-tuning starts

2.9 Use of DI Terminals

The control board provides five DI terminals DI1 to DI5.

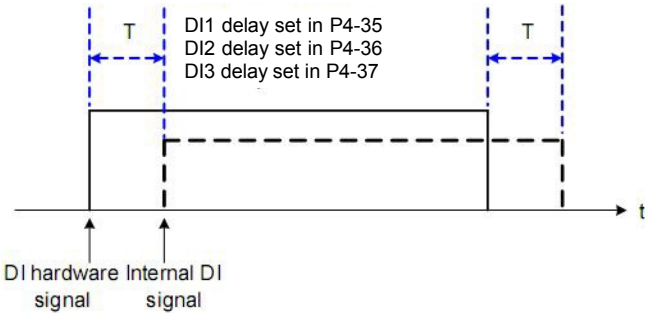
The internal hardware of DI terminals are configured with 24 VDC power supply for detection. You can input a signal to a DI terminal of the AC drive only by shorting the DI terminal and COM.

By default, P4-38 = 0000 and P4-39 = 0000. When a DI terminal is shorted to COM, it is active (logic 1). When a DI terminal is not shorted to COM, it is inactive (logic 0).

You can change the DI terminal active mode. That is, a DI terminal is inactive (logic 0) when being shorted with COM, and active (logic 1) when being not shorted to COM. In this case, it is necessary to change the corresponding bit in P4-38 (this parameter specifying the active mode setting of DI1 to DI5) to 1.

The AC drive also provides P4-10 (DI filter time) for the DI signal to improve the anti-interference level. For DI1 to DI3, the AC drive provides the DI signal delay function, convenient for some applications requiring delay.

Figure 2-28 DI delay setting



The preceding 10 DI terminals can be defined in function codes P4-00 to P4-09. Each DI can be allocated with their respective function from the 50 functions. For details, see descriptions of P4-00 to P4-09.

The hardware design allows only DI5 to receive high-speed pulse signal. If high-speed pulse count is required, use DI5.

2.10 Use of DO Terminals

The control board provides three DO terminals, namely FM, DO1 and TA/TB/TC. FM and DO1 are transistor outputs and can drive 24 VDC low-voltage circuit; TA/TB/TC is relay output, and can drive 250 VAC control circuit.

You can define the function of the DO terminals by setting P5-01 and P5-05 to indicate the running state and alarm information of the AC drive. There are a total of 40 functions. For details, see the descriptions of group P5.

Terminal	Corresponding Function Code	Output Feature Description
FM-COM	P5-06 when P5-00 = 0	Transistor, able to output high-speed pulses 10 Hz to 100 kHz; drive capacity: 24 VDC, 50mA
	P5-01 when P5-00 = 1	Transistor; drive capacity: 24 VDC, 50mA
TA-TB-TC	P5-02	Relay; drive capacity: 250 VAC, 3 A
DO1-COM	P5-04	Transistor; drive capacity: 24 VDC, 50mA

When P5-00 = 0, the FM terminal is high-speed pulse output. The frequency of output pulses indicates the value of the internal running parameters. The greater the value is, the higher the output pulse frequency is. The 100% value corresponds to 100 kHz. The property of the indicated internal parameter is defined by P5-06.

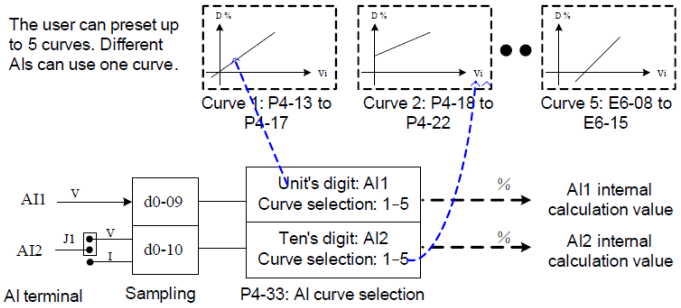
2.11 Use of AI Terminals

The AC drive supports a total of three AI terminals, among which AI1 and AI2 are provided on the control board.

Terminal	Input Signal Characteristic
AI1-GND	It receives the signal of 0-10 VDC.
AI2-GND	If J1 is connected to the position with "V" mark, it receives the signal of 0-10 VDC. If J1 is connected to the position with "I" mark, it receives the signal of 0-20mA.

As external voltage/current signal, AI is used for frequency source setting, torque setting, voltage setting at V/F separation, and PID setting or feedback. The corresponding relationship of the voltage or current and actual setting or feedback is defined by P4-13 to P4-27.

P3-29: AI curve selection



The sampling of AI terminals can be queried in d0-09 to d0-11. The calculation value is for internal subsequent calculation and cannot be directly read by the user.

2.12 Use of AO Terminals

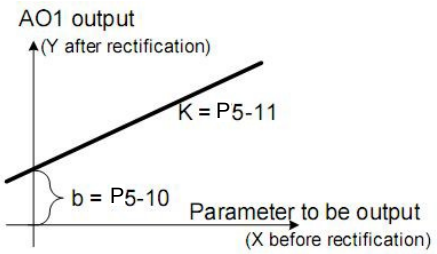
The AC drive supports one AO terminal, and AO1 is provided by the control board.

Terminal	Output Signal Characteristic
AO1-GND	If J2 is connected to the position with "V" mark, it outputs the signal of 0-10 VDC. If J2 is connected to the position with "I" mark, it outputs the signal of 0-20mA.

AO1 can be used to indicate the internal running parameters in the analog mode.

The property of indicated parameters can be defined by P5-07 and P5-08.

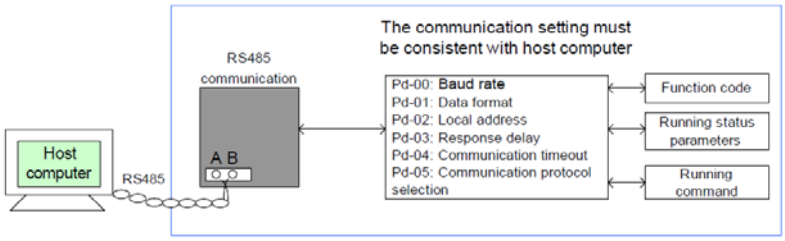
The designated running parameters can be rectified before output. The rectification feature is Y = kX + b, among which "X" indicates the running parameters to be output, and "k" and "b" of AO1 can be set by P5-10 and P5-11.



2.13 Use of Serial Communication

- For the configuration of hardware communication parameters for the communication port, see group Pd. Set the communication rate and data format to consistent with those of the host computer, which is the precondition of normal communication.
- The AC900 serial port itself supports the Modbus RTU slave communication protocol. You can query or modify the AC drive's function codes, query various running state parameters, and send running command and running frequency to the AC drive from the host computer through the serial port.

Figure 2-28 Use of Serial Communication



The AC900 arranges the function codes, running state parameters and running commands in the "register parameter address" mode. The host computer can define the protocol of communication data interaction.

2.14 Password Setting

The AC drive provides the user password protection function. When PP-00 is set to a non-zero value, the value is the user password. The password takes effect after you after exit the function code editing state. When you press PRG again, "------" will be displayed, and you must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set PP-00 to 0.

2.15 Parameter Saving and Default Setting Restoring

After a function code is modified on the operation panel, the modification will be saved in the register of the AC drive and remain effective at next power-on.

The AC drive supports backup and restoration of parameter setting, which is convenient for commissioning.

The AC drive also provides the retentive function on alarm information and accumulative running time.

You can restore the backup values or default settings of the function codes of the AC drive or clear the running data through PP-01. For details, see the description of PP-01.

3 Function Code Tables

If PP-00 is set to a non-zero number, parameter protection is enabled. You must enter the correct user password to enter the menu.

To cancel the password protection function, enter with password and set PP-00 to 0.

Group P and Group E are standard function parameters. Group d is the monitoring function parameters.

The symbols in the function code table are described as follows:

"☆": The parameter can be modified when the AC drive is in either stop or running state. "

★": The parameter cannot be modified when the AC drive is in the running state.

"●": The parameter is the actually measured value and cannot be modified.

"*": The parameter is default parameter and can be set only by the manufacturer.

3.1 Standard Function Parameters

Table 3.1 Standard Function Parameters

Function Code	Parameter Name	Setting Range	Default	Property
Group P0: Standard Function Parameters				
P0-00	G/P type display	1: G type (constant torque load) 2: P type (variable torque load e.g. fan and pump)	Model dependent	•
P0-01	Motor control mode	0: Sensorless vector control (SVC) 1: Voltage/Frequency (V/F) control	1	★
P0-02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking)	0	☆
P0-03	Main frequency source X selection	0: Digital setting (preset frequency P0-08, UP/DOWN can be modified, non-retentive at power failure) 1: Digital setting (preset frequency P0-08, UP/DOWN can be modified, retentive at power failure) 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0	★
P0-04	Auxiliary frequency source Y selection	The same as P0-03 (Main frequency source X selection)	0	★
P0-05	Range of auxiliary frequency Y for X and Y operation	0: Relative to maximum frequency 1: Relative to main frequency X	0	☆
P0-06	Range of auxiliary frequency Y for X and Y operation	0%-150%	100%	☆

Function Code	Parameter Name	Setting Range	Default	Property
P0-07	Frequency source selection	Unit's digit (Frequency source selection) 0: Main frequency source X 1: X and Y operation (operation relationship determined by ten's digit) 2: Switchover between X and Y 3: Switchover between X and "X and Y operation" 4: Switchover between Y and "X and Y operation" Ten's digit (X and Y operation relationship) 0: X+Y 1: X-Y 2: Maximum 3: Minimum	00	☆
P0-08	Preset frequency	0.00 to maximum frequency (P0-10)	50.00Hz	☆
P0-09	Rotation direction	0: Same direction 1: Reverse direction	0	☆
P0-10	Maximum frequency	50.00-320.00 Hz	50.00 Hz	★
P0-11	Source of frequency upper limit	0: Set by P0-12 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting 5: Communication setting	0	★
P0-12	Frequency upper limit	Frequency lower limit (P0-14) to maximum frequency (P0-10)	50.00 Hz	☆
P0-13	Frequency upper limit offset	0.00 Hz to maximum frequency (P0-10)	0.00 Hz	☆
P0-14	Frequency lower limit	0.00 Hz to frequency upper limit (P0-12)	0.00 Hz	☆
P0-15	Carrier frequency	0.5-16.0 kHz	Model dependent	☆
P0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	1	☆
P0-17	Acceleration time 1	0.00-65000.00s	Model dependent	☆
P0-18	Deceleration time 1	0.00-65000.00s	Model dependent	☆

Function Code	Parameter Name	Setting Range	Default	Property
P0-19	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1	★
P0-20	Reserved			
P0-21	Frequency offset of auxiliary frequency source for X and Y operation	0.00 Hz to maximum frequency (P0-10)	0.00 Hz	☆
P0-22	Frequency reference resolution	1: 0.1 Hz 2: 0.01 Hz	2	★
P0-23	Retentive of digital setting frequency upon power failure	0: Not retentive 1: Retentive	0	☆
P0-24	Reserved			
P0-25	Acceleration/Deceleration time base frequency	0: Maximum frequency(P0-10) 1: Set frequency 2: 100 Hz	0	★
P0-26	Base frequency for UP/ DOWN modification during running	0: Running frequency 1: Set frequency	0	★
P0-27	Binding command source to frequency source	Unit's digit (Binding operation panel command to frequency source) 0: No binding 1: Frequency source by digital setting 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting(DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting Ten's digit (Binding terminal command to frequency source) Hundred's digit (Binding communication command to frequency source)	000	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group P1: Motor Parameters				
P1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	★
P1-01	Rated motor power	0.1-1000.0 kW	Model dependent	★
P1-02	Rated motor voltage	1-2000 V	Model dependent	★
P1-03	Rated motor current	0.01-655.35 A (AC drive power ≤ 55 kW) 0.1-6553.5 A (AC drive power > 55 kW)	Model dependent	★
P1-04	Rated motor frequency	0.01 Hz to maximum frequency	Model dependent	★
P1-05	Rated motor rotational speed	1-65535 RPM	Model dependent	★
P1-06	Stator resistance (asynchronous motor)	0.001-65.535 Ω (AC drive power ≤ 55 kW) 0.0001-6.5535 Ω (AC drive power > 55 kW)	Tuned parameter	★
P1-07	Rotor resistance (asynchronous motor)	0.001-65.535 Ω (AC drive power ≤ 55 kW) 0.0001-6.5535 Ω (AC drive power > 55 kW)	Tuned parameter	★
P1-08	Leakage inductive reactance (asynchronous motor)	0.01-655.35mH (AC drive power ≤ 55 kW) 0.001-65.535mH (AC drive power > 55 kW)	Tuned parameter	★
P1-09	Mutual inductive reactance (asynchronous motor)	0.1-6553.5mH (AC drive power ≤ 55 kW) 0.01--655.35mH (AC drive power > 55 kW)	Tuned parameter	★
P1-10	No-load current (asynchronous motor)	0.01 to P1-03 (AC drive power ≤ 55 kW) 0.1 to P1-03 (AC drive power >55 kW)	Tuned parameter	★
P1-11~P1-36	Reserved			
P1-37	Tuned selection	0: No operation 1: Motionless tune by asynchronous motor 2: Complete tune by asynchronous motor	0	★

Group P2: Vector Control Parameters				
Function Code	Parameter Name	Setting Range	Default	Property
P2-00	Speed loop proportional gain 1	0-100	30	☆
P2-01	Speed loop integral time 1	0.01-10.00s	0.50s	☆
P2-02	Switchover frequency 1	0.00 to P2-05	5.00Hz	☆
P2-03	Speed loop proportional gain 2	0-100	20	☆
P2-04	Speed loop integral time 2	0.01-10.00s	1.00s	☆
P2-05	Switchover frequency 2	P2-02 to maximum frequency	10.00Hz	☆
P2-06	Vector control slip gain	50%-200%	100%	☆
P2-07	Time constant of speed loop filter	0.000-0.100s	0.000s	☆
P2-08	Vector control over-excitation gain	0-200	64	☆
P2-09	Torque upper limit source in speed control mode	0: P2-10 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2)	0	☆
P2-10	Digital setting of torque upper limit in speed control mode	0.0%-200.0%	150.0%	☆
P2-11~P2-12	Reserved			
P2-13	Excitation adjustment proportional gain	0-60000	2000	☆
P2-14	Excitation adjustment integral gain	0-60000	1300	☆
P2-15	Torque adjustment proportional gain	0-60000	2000	☆
P2-16	Torque adjustment integral gain	0-60000	1300	☆
P2-17	Speed loop integral property	Unit's digit: integral separation 0: Disabled 1: Enabled	0	☆
P2-18~P2-22	Reserved			

Function Code	Parameter Name	Setting Range	Default	Property
Group P3: V/F Control Parameters				
P3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation	0	★
P3-01	Torque boost	0.0% (fixed torque boost) 0.1%-30.0%	Model dependent	☆
P3-02	Cut-off frequency of torque boost	0.00 Hz to maximum output frequency	50.00 Hz	★
P3-03	Multi-point V/F frequency 1 (F1)	0.00 Hz to P3-05	0.00 Hz	★
P3-04	Multi-point V/F voltage 1 (V1)	0.0%-100.0%	0.0%	★
P3-05	Multi-point V/F frequency 2 (F2)	P3-03 to P3-07	0.00 Hz	★
P3-06	Multi-point V/F voltage 2 (V2)	0.0%-100.0%	0.0%	★
P3-07	Multi-point V/F frequency 3 (F3)	P3-05 to rated motor frequency (P1-04)	0.00 Hz	★
P3-08	Multi-point V/F voltage 3 (V3)	0.0%-100.0%	0.0%	★
P3-09	V/F slip compensation gain	0%-200.0%	0.0%	☆
P3-10	V/F over-excitation gain	0-200	64	☆
P3-11	V/F oscillation suppression gain	0-100	Model dependent	☆
P3-12	Reserved			
P3-13	Voltage source for V/F separation	0: Digital setting (P3-14) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication setting Note: 100.0% corresponds to the rated motor voltage .	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
P3-14	Voltage digital setting for V/F separation	0 V to rated motor voltage	0V	☆
P3-15	Voltage rise time of V/F separation	0.0-1000.0s It indicates the time for the voltage rising from 0 V to rated motor voltage.	0.0s	☆

Group P4: Input Terminals				
P4-00	DI1 function selection	0:No function 1:Forward RUN (FWD) 2:Reverse RUN (REV) 3:Three-line control 4:Forward JOG (FJOG) 5:Reverse JOG (RJOG) 6:Terminal UP 7:Terminal DOWN 8:Coast to stop 9:Fault reset (RESET) 10:RUN pause 11:Normally open (NO) input of external fault 12:Multi-reference terminal 1 13:Multi-reference terminal 2 14:Multi-reference terminal 3 15:Multi-reference terminal 4 16:Terminal 1 for acceleration/ deceleration time selection 17:Terminal 2 for acceleration/ deceleration time selection 18:Frequency source switchover 19:UP and DOWN setting clear (terminal, operation panel) 20:Command source switchover terminal 1 21:Acceleration/Deceleration prohibited 22:PID pause 23:PLC status reset 24:Swing pause 25:Counter input 26:Counter reset 27:Length count input 28:Length reset 29:Torque control prohibited 30:Pulse input (enabled only for DI5) 31:Reserved 32:Immediate DC braking 33:Normally closed (NC) input of external fault 34:Frequency modificationForbidden 35:Reverse PID action direction 36:External STOP terminal 1 37:Command source switchover terminal 2 38:PID integral pause 39:Switchover between main frequency source X and preset frequency 40:Switchover between auxiliary frequency source Y and preset frequency 41: Reserved 42: Reserved 43:PID parameter switchover 44:User-defined fault 1 45:User-defined fault 2 46:Speed control/Torque control switchover 47:Emergency stop 48:External STOP terminal 2 49:Deceleration DC braking 50:Clear the current running time 51-59: Reserved	1	★
P4-01	DI2 function selection		2	★
P4-02	DI3 function selection		4	★
P4-03	DI4 function selection		9	★
P4-04	DI5 function selection		0	★
P4-05~P4-09	Reserved			

Function Code	Parameter Name	Setting Range	Default	Property
P4-10	DI filter time	0.000-1.000s	0.010s	☆
P4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	★
P4-12	Terminal UP/DOWN rate	0.001-65.535Hz/s	1.00Hz/s	☆
P4-13	AI curve 1 minimum input	0.00 V to P4-15	0.00V	☆
P4-14	Corresponding setting of AI curve 1 minimum input	-100.00%-100.0%	0.0%	☆
P4-15	AI curve 1 maximum input	P4-13 to 10.00 V	10.00V	☆
P4-16	Corresponding setting of AI curve 1 maximum input	-100.00%-100.0%	100.0%	☆
P4-17	AI1 filter time	0.00-10.00s	0.10s	☆
P4-18	AI curve 2 minimum input	0.00 V to P4-20	0.00V	☆
P4-19	Corresponding setting of AI curve 2 minimum input	-100.00%-100.0%	0.0%	☆
P4-20	AI curve 2 maximum input	P4-18 to 10.00 V	10.00V	☆
P4-21	Corresponding setting of AI curve 2 maximum input	-100.00%-100.0%	100.0%	☆
P4-22	AI2 filter time	0.00-10.00s	0.10s	☆
P4-23~ P4-27	Reserved			
P4-28	Pulse minimum input	0.00 kHz to P4-30	0.00kHz	☆
P4-29	Corresponding setting of pulse minimum input	-100.00%-100.0%	0.0%	☆
P4-30	Pulse maximum input	P4-28 to 100.00 kHz	50.00kHz	☆
P4-31	Corresponding setting of pulse maximum input	-100.00%-100.0%	100.0%	☆
P4-32	Pulse filter time	0.00-10.00s	0.10s	☆

Function Code	Parameter Name	Setting Range	Default	Property
P4-33	AI curve selection	Unit's digit (AI1 curve selection)	321	☆
		1: Curve 1 (2 points, see P4-13 to P4-16) 2: Curve 2 (2 points, see P4-18 to P4-21) 3: Reserved 4: Curve 4 (4 points, see E6-00 to E6-07) 5: Curve 5 (4 points, see E6-08 to E6-15)		
		Ten's digit (AI2 curve selection)		
		Curve 1 to curve 5 (same as AI1)		
		Hundred's digit		
		Reserved		
P4-34	Setting for AI less than minimum input	Unit's digit (Setting for AI1 less than minimum input)	00	☆
		0: Minimum value 1: 0.0%		
		Ten's digit (Setting for AI2 less than minimum input)		
		0, 1 (same as AI1)		
P4-35	DI1 delay time	0.0-3600.0s	0.0s	★
P4-36	DI2 delay time	0.0-3600.0s	0.0s	★
P4-37	DI3 delay time	0.0-3600.0s	0.0s	★
P4-38	DI valid mode selection 1	0: High level valid 1: Low level valid	00000	★
		Unit's digit (DI1 valid mode)		
		Ten's digit (DI2 valid mode)		
		Hundred's digit (DI3 valid mode)		
		Thousand’s digit (DI4 valid mode)		
		Ten thousand’s digit (DI4 valid mode)		
P4-39	Reserved			

Function Code	Parameter Name	Setting Range	Default	Property
Group P5: Output Terminals				
P5-00	FM terminal output mode	0: Pulse output (FMP) 1: Switch signal output (FMR)	0	☆
P5-01	FMR function (open- collector output terminal)	0: No output 1: AC drive running 2: Fault output (stop) 3: Frequency-level detection PDT1 output 4: Frequency reached 5: Zero-speed running (no output at stop) 6: Motor overload pre-warning 7: AC drive overload pre-warning 8: Set count value reached 9: Designated count value reached 11: PLC cycle complete 12: Accumulative running time reached 13: Frequency limited 14: Torque limited 15: Ready for RUN 16: AI1 larger than AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage state output 20: Communication setting 23: Zero-speed running 2 (having output at stop) 24: Accumulative power-on time reached 25: Frequency level detection PDT2 output 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: AI1 input limit exceeded 32: Load becoming 0 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Software current limit exceeded 37: Frequency lower limit reached (having output at stop) 38: Alarm output 39: Reserved 40: Current running time reached 41: Fault output (There is no output if it is the coast to stop Fault and undervoltage occurs.)	0	☆
P5-02	Relay function (T/A-T/B-T/C)		2	☆
P5-03	Reserved			
P5-04	DO1 function selection (open-collector output terminal)		1	☆
P5-05	Reserved			

Function Code	Parameter Name	Setting Range	Default	Property
P5-06	FMP function selection	0: Running frequency 1:Set frequency 2:Output current 3: Output torque (absolute value) 4: Output power 5:Output voltage 6:Pulse input (100% corresponds 100.0kHz) 7: AI1 8: AI2 9 Keyboard potentiometer 10:length 11: Count value 12:Communication setting 13: Motor rotational speed 14: Output current (100% corresponds 1000.0A) 15: Output voltage (100% corresponds 1000.0V) 16: Reserved	0	☆
P5-07	AO1 function selection		0	☆
P5-08	Reserved			
P5-09	Maximum FMP output frequency	0.01-100.00 kHz	50.00kHz	☆
P5-10	AO1 offset coefficient	-100.0%-100.0%	0.0%	☆
P5-11	AO1 gain	-10.00-10.00	1.00	☆
P5-12~P5-16	Reserved			
P5-17	FMR output delay time	0.0-3600.0s	0.0s	☆
P5-18	Relay 1 output close delay time	0.0-3600.0s	0.0s	☆
P5-19	Reserved			
P5-20	DO1 output delay time	0.0-3600.0s	0.0s	☆
P5-21	Reserved			
P5-22	DO valid mode selection	Unit's digit (FMR valid mode) 0: Positive logic 1: Negative logic Ten's digit (Relay 1 valid mode) 0, 1 (same as FMR) Thousand's digit (DO1 valid mode) 0, 1 (same as FMR)	00000	☆
Group P6: Start/Stop Control				
P6-00	Start mode	0: Direct start 1: Rotational speed tracking restart 2: Pre-excited start (asynchronous motor)	0	☆
P6-01	Rotational speed tracking mode	0: From frequency at stop 1: From zero speed 2: From maximum frequency	0	★

Function Code	Parameter Name	Setting Range	Default	Property
P6-02	Rotational speed tracking speed	1-100	20	☆
P6-03	Startup frequency	0.00 ~10.00Hz	0.00 Hz	☆
P6-04	Startup frequency holding time	0.0 ~ 100.0s	0.0s	★
P6-05	Startup DC braking current/ Pre-excited current	0%-100%	0%	★
P6-06	Startup DC braking time/ Pre-excited time	0.0-100.0s	0.0s	★
P6-07	Acceleration/Deceler ation mode	0: Linear acceleration/ deceleration 1: S-curve acceleration/ deceleration A 2: S-curve acceleration/ deceleration B	0	★
P6-08	Time proportion of S-curve start segment	0.0% to (100.0% - P6-09)	30.0%	★
P6-09	Time proportion of S-curve end segment	0.0% to (100.0% - P6-08)	30.0%	★
P6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	☆
P6-11	Initial frequency of stop DC braking	0.00 Hz to maximum frequency	0.00 Hz	☆
P6-12	Waiting time of stop DC braking	0.0-100.0s	0.0s	☆
P6-13	Stop DC braking current	0%-100%	0%	☆
P6-14	Stop DC braking time	0.0-100.0s	0.0s	☆
P6-15	Brake use ratio	0%-100%	100%	☆
Group P7: Operation Panel and Display				
P7-01	MF.K Key function selection	0: MF.K key disabled 1: Switchover between operation panel control and remote command control (terminal or communication) 2: Switchover between forward rotation and reverse rotation 3: Forward JOG 4: Reverse JOG	3	★
P7-02	STOP/RESET key function	0: STOP/RESET key enabled only in operation panel control 1: STOP/RESET key enabled in any operation mode	1	☆

Function Code	Parameter Name	Setting Range	Default	Property
P7-03	LED display running parameters 1	0000-FFFF Bit00: Running frequency (Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: DI input status Bit08: DO output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	001F	☆
P7-04	LED display running parameters 2	0000-FFFF Bit00: PID feedback Bit01: PLC stage Bit02: Pulse setting frequency (kHz) Bit03: Running frequency 2 (Hz) Bit04: Remaining running time Bit05: AI1 voltage before correction (V) Bit06: AI2 voltage before correction (V) Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min) Bit11: Pulse setting frequency (Hz) Bit12: Communication setting value Bit14: Main frequency X display (Hz) Bit15: Auxiliary frequency Y display (Hz)	0000	☆
P7-05	LED display stop parameters	0000-FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: DI input status Bit03: DO output status Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: Pulse setting frequency(kHz)	0033	☆
P7-06	Load speed display coefficient	0.0001-6.5000	1.0000	☆
P7-07	Heatsink temperature of inverter module	0.0-100.0°C	-	●
P7-08	Passwords for timing stop	0-65535 (Please remember the password to apply the function)	-	●

Function Code	Parameter Name	Setting Range	Default	Property
P7-09	Accumulative running time	0-65535h	-	●
P7-10	Preset value for timing stop	0-65535h	0	●
P7-11	Reserved			
P7-12	Number of decimal places for load speed display	0: 0 decimal places 1: 1 decimal places 2: 2 decimal places 3: 3 decimal places	1	☆
P7-13	Accumulative power-on time	0-65535 h	-	●
P7-14	Accumulative power consumption	0-65535 kWh	-	●
Group P8: Auxiliary Functions				
P8-00	JOG running frequency	0.00 Hz to maximum frequency	5.00 Hz	☆
P8-01	JOG acceleration time	0.0-6500.0s	20.0s	☆
P8-02	JOG deceleration time	0.0-6500.0s	20.0s	☆
P8-03	Acceleration time 2	0.0-6500.0s	Model dependent	☆
P8-04	Deceleration time 2	0.0-6500.0s	Model dependent	☆
P8-05	Acceleration time 3	0.0-6500.0s	Model dependent	☆
P8-06	Deceleration time 3	0.0-6500.0s	Model dependent	☆
P8-07	Acceleration time 4	0.0-6500.0s	Model dependent	☆
P8-08	Deceleration time 4	0.0-6500.0s	Model dependent	☆
P8-09	Jump frequency 1	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-10	Jump frequency 2	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-11	Frequency jump amplitude	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-12	Forward/Reverse rotation dead-zone time	0.0-3000.0s	0.0s	~
P8-13	Reverse control	0: Enabled 1: Disabled	0	~
P8-14	Running mode when set frequency lower than frequency lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	0	☆
P8-15	Droop control	0.00-10.00 Hz	0.00 Hz	☆
P8-16	Accumulative power-on time threshold	0-65000 h	0 h	☆

Function Code	Parameter Name	Setting Range	Default	Property
P8-17	Accumulative running time threshold	0-65000 h	0 h	☆
P8-18	Startup protection	0: No 1: Yes	0	☆
P8-19	Frequency detection value (PDT1)	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-20	Frequency detection hysteresis (PDT hysteresis 1)	0.0%-100.0% (PDT1 level)	5.0%	☆
P8-21	Detection range of frequency reached	0.00-100% (maximum frequency)	0.0%	☆
P8-22	Jump frequency during acceleration/ deceleration	0: Disabled 1: Enabled	0	☆
P8-23	Reserved			
P8-25	Frequency switchover point between acceleration time 1 and acceleration time 2	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-26	Frequency switchover point between deceleration time 1 and deceleration time 2	0.00 to maximum frequency	0.00 Hz	☆
P8-27	Terminal JOG preferred	0: Disabled 1: Enabled	0	☆
P8-28	Frequency detection value (PDT2)	0.00 to maximum frequency	50.00 Hz	☆
P8-29	Frequency detection hysteresis (PDT hysteresis 2)	0.0%-100.0% (PDT2 level)	5.0%	☆
P8-30	Any frequency reaching detection value 1	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-31	Any frequency reaching detection amplitude 1	0.0%-100.0% (maximum frequency)	0.0%	☆
P8-32	Any frequency reaching detection value 2	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-33	Any frequency reaching detection amplitude 2	0.0%-100.0% (maximum frequency)	0.0%	☆
P8-34	Zero current detection level	0.0%-300.0% (rated motor current)	5.0%	☆
P8-35	Zero current detection delay time	0.01-600.00s	0.10s	☆
P8-36	Output overcurrent threshold	1. 0% (no detection) 2. 0.1%-300.0% (rated motor current)	200.0%	☆
P8-37	Output overcurrent detection delay time	0.00-600.00s	0.00s	☆

Function Code	Parameter Name	Setting Range	Default	Property
P8-38	Any current reaching 1	0.0%-300.0% (rated motor current)	100.0%	☆
P8-39	Any current reaching 1 amplitude	0.0%-300.0% (rated motor current)	0.0%	☆
P8-40	Any current reaching 2	0.0%-300.0% (rated motor current)	100.0%	☆
P8-41	Any current reaching 2 amplitude	0.0%-300.0% (rated motor current)	0.0%	☆
P8-42	Timing function	0: Disabled 1: Enabled	0	☆
P8-43	Timing duration source	0: P8-44 1: AI1 2: AI2 3: Keyboard potentiometer (100% of analog input corresponds to the value of P8-44)	0	☆
P8-44	Timing duration	0.0-6500.0 min	0.0 min	☆
P8-45	AI1 input voltage lower limit	0.00 V to P8-46	3.10 V	☆
P8-46	AI1 input voltage upper limit	P8-45 to 10.00 V	6.80 V	☆
P8-47	Module temperature threshold	0-100°C	75°C	☆
P8-48	Cooling fan control	0: Fan working during running 1: Fan working continuously	0	☆
P8-49	Wakeup frequency	Dormant frequency (P8-51) to maximum frequency (P0-10)	0.00 Hz	☆
P8-50	Wakeup delay time	0.0-6500.0s	0.0s	☆
P8-51	Dormant frequency	0.00 Hz to wakeup frequency (P8-49)	0.00 Hz	☆
P8-52	Dormant delay time	0.0-6500.0s	0.0s	☆
P8-53	Current running time reached	0.0-6500.0 min	0.0 min	☆
Group P9: Fault and Protection				
P9-00	Motor overload protection selection	0: Disabled 1: Enabled	1	☆
P9-01	Motor overload protection gain	0.20-10.00	1.00	☆
P9-02	Motor overload warning coefficient	50%-100%	80%	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-03	Overvoltage stall gain	0 (no stall overvoltage)-100	0	☆
P9-04	Overvoltage stall protective voltage	120%-150%	130%	☆
P9-05	Overcurrent stall gain	0-100	20	☆
P9-06	Overcurrent stall protective current	100%-200%	150%	☆
P9-07	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	1	☆
P9-08	Reserved			
P9-09	Fault auto reset times	0-20	0	☆
P9-10	DO action during fault auto reset	0: Not act 1: Act	0	☆
P9-11	Time interval of fault auto reset	0.1s-100.0s	1.0s	☆
P9-12	Input phase loss protection/ contactor energizing protection selection	Unit's digit: Input phase loss protection Ten's digit: Contactor energizing Protection 0: Disabled 1: Enabled	11	☆
P9-13	Output phase loss protection selection	0: Disabled 1: Enabled	1	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Buffer resistance overload 9: Undervoltage 10: AC drive overload 11: Motor overload 12:Power input phase loss 13: Power output phase loss 14: Module overheat 15: External equipment fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Reserved 21: EEPROM read-write fault 22: AC drive hardware fault 23: Short circuit to ground 24: Reserved 25: Reserved 26: Accumulative running time reached 27: User-defined fault 1 28: User-defined fault 2 29: Accumulative power-on time reached 30: Load becoming 0 31: PID feedback lost during running 40: With-wave current limit fault 41~51: Reserved	-	●
P9-15	2nd fault type		-	●
P9-16	3rd (latest) fault type		-	●
P9-17	Frequency upon 3rd fault	-	-	●
P9-18	Current upon 3rd fault	-	-	●
P9-19	Bus voltage upon 3rd fault	-	-	●
P9-20	DI status upon 3rd fault	-	-	●
P9-21	Output terminal status upon 3rd fault	-	-	●
P9-22	AC drive status upon 3rd fault	-	-	●

Function Code	Parameter Name	Setting Range	Default	Property
P9-23	Power-on time upon 3rd fault	-	-	●
P9-24	Running time upon 3rd fault	-	-	●
P9-25	Reserved			
P9-27	Frequency upon 2nd fault	-	-	●
P9-28	Current upon 2nd fault	-	-	●
P9-29	Bus voltage upon 2nd fault	-	-	●
P9-30	DI status upon 2nd fault	-	-	●
P9-31	Output terminal status upon 2nd fault	-	-	●
P9-32	AC drive status upon 2nd fault	-	-	●
P9-33	Power-on time upon 2nd Fault	-	-	●
P9-34	Running time upon 2nd Fault	-	-	●
P9-35	Reserved			
P9-37	Frequency upon 1st Fault	-	-	●
P9-38	Current upon 1st Fault	-	-	●
P9-39	Bus voltage upon 1st Fault	-	-	●
P9-40	DI status upon 1st Fault	-	-	●
P9-41	Output terminal status upon 1st Fault	-	-	●
P9-42	AC drive status upon 1st Fault	-	-	●
P9-43	Power-on time upon 1st Fault	-	-	●
P9-44	Running time upon 1st Fault	-	-	●
P9-45	Reserved			

Function Code	Parameter Name	Setting Range	Default	Property
P9-47	Fault protection action selection 1	Unit's digit (Motor overload, Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Ten's digit (Power input phase loss, Err12) Hundred's digit (Power output phase loss, Err13) Thousand's digit (External equipment Fault, Err15) Ten thousand's digit (Communication Fault, Err16)	00000	☆
P9-48	Reserved			
P9-49	Fault protection action selection 3	Unit's digit (User-defined fault 1,Err27) Same as unit's digit in P9-47 Ten's digit (User-defined fault 2,Err28) Same as unit's digit in P9-47 Hundred's digit (Accumulative power-on time reached, Err29) Same as unit's digit in P9-47 Thousand's digit (Load becoming 0, Err30) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run at 7% of rated motor frequency and resume Ten thousand's digit (PID feedback lost during running,Err31) Same as unit's digit in P9-47	00000	☆
P9-50~P9-53	Reserved			
P9-54	Frequency selection for continuing to run upon Fault	0: Current running frequency 1: Set frequency 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0	☆
P9-55	Backup frequency upon abnormality	0.0%-100.0% (maximum frequency)	100.0%	☆
P9-56~P9-58	Reserved			
P9-59	Action selection at instantaneous power Failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-60	Action pause judging voltage at instantaneous power Failure	80.0%-100.0%	90.0%	☆
P9-61	Voltage rally judging time at instantaneous power Failure	0.00-100.00s	0.50s	☆
P9-62	Action judging voltage at instantaneous power Failure	60.0%-100.0% (standard bus voltage)	80.0%	☆
P9-63	Protection upon load becoming 0	0: Disabled 1: Enabled	0	☆
P9-64	Detection level of load becoming 0	0.0%-100.0%	10.0%	☆
P9-65	Detection time of load becoming 0	0.0-60.0s	1.0s	☆
P9-66	Reserved			
Group PA: PID Function				
PA-00	PID setting source	0: PA-01 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting 6: Multi-reference	0	☆
PA-01	PID digital setting	0.0%-100.0%	50.0%	☆
PA-02	PID feedback source	0: AI1 1: AI2 2: Keyboard potentiometer 3: AI1 - AI2 4: Pulse setting (DI5) 5: Communication setting 6: AI1 + AI2 7: MAX (|AI1|, |AI2|) 8: MIN (|AI1|, |AI2|)	0	☆
PA-03	PID action direction	0: Forward action 1: Reverse action	0	☆
PA-04	PID setting feedback range	0-65535	1000	☆
PA-05	Proportional gain Kp1	0.0-100.0	20.0	☆
PA-06	Integral time Ti1	0.01-10.00s	2.00s	☆
PA-07	Differential time Td1	0.000-10.000s	0.000s	☆
PA-08	Cut-off frequency of PID reverse rotation	0.00 to maximum frequency	2.00Hz	☆

Function Code	Parameter Name	Setting Range	Default	Property
PA-09	PID deviation limit	0.0%-100.0%	0.0%	☆
PA-10	PID differential limit	0.00%-100.00%	0.10%	☆
PA-11	PID setting change time	0.00-650.00s	0.00s	☆
PA-12	PID feedback filter time	0.00-60.00s	0.00s	☆
PA-13	PID output filter time	0.00-60.00s	0.00s	☆
PA-14	Reserved			
PA-15	Proportional gain Kp2	0.0-100.0	20.0	☆
PA-16	Integral time Ti2	0.01-10.00s	2.00s	☆
PA-17	Differential time Td2	0.000-10.000s	0.000s	☆
PA-18	PID parameter switchover condition	0: No switchover 1: Switchover via DI 2: Automatic switchover based on deviation	0	☆
PA-19	PID parameter switchover deviation 1	0.0% to PA-20	20.0%	☆
PA-20	PID parameter switchover deviation 2	PA-19 to 100.0%	80.0%	☆
PA-21	PID initial value	0.0%-100.0%	0.0%	☆
PA-22	PID initial value holding time	0.00-650.00s	0.00s	☆
PA-23	Maximum deviation between two PID outputs in forward direction	0.00%-100.00%	1.00%	☆
PA-24	Maximum deviation between two PID outputs in reverse direction	0.00%-100.00%	1.00%	☆
PA-25	PID integral property	Unit's digit (Integral separated) 0: Invalid 1: Valid Ten's digit (Whether to stop integral operation when the output reaches the limit) 0: Continue integral operation 1: Stop integral operation	00	☆
PA-26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1%-100.0%	0.0%	☆

Function Code	Parameter Name	Setting Range	Default	Property
PA-27	Detection time of PID feedback loss	0.0-20.0s	0.0s	☆
PA-28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0	☆
Group Pb: Swing Frequency, Fixed Length and Count				
Pb-00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	☆
Pb-01	Swing frequency amplitude	0.0%-100.0%	0.0%	☆
Pb-02	Jump frequency amplitude	0.0%-50.0%	0.0%	☆
Pb-03	Swing frequency cycle	0.0-3000.0s	10.0s	☆
Pb-04	Triangular wave rising time coefficient	0.0%-100.0%	50.0%	☆
Pb-05	Set length	0-65535 m	1000m	☆
Pb-06	Actual length	0-65535 m	0m	☆
Pb-07	Number of pulses per meter	0.1-6553.5	100.0	☆
Pb-08	Set count value	1-65535	1000	☆
Pb-09	Designated count value	1-65535	1000	☆
Group PC: Multi-Reference and Simple PLC Function				
PC-00	Reference 0	-100.0%-100.0%	0.0%	☆
PC-01	Reference 1	-100.0%-100.0%	0.0%	☆
PC-02	Reference 2	-100.0%-100.0%	0.0%	☆
PC-03	Reference 3	-100.0%-100.0%	0.0%	☆
PC-04	Reference 4	-100.0%-100.0%	0.0%	☆
PC-05	Reference 5	-100.0%-100.0%	0.0%	☆
PC-06	Reference 6	-100.0%-100.0%	0.0%	☆
PC-07	Reference 7	-100.0%-100.0%	0.0%	☆
PC-08	Reference 8	-100.0%-100.0%	0.0%	☆
PC-09	Reference 9	-100.0%-100.0%	0.0%	☆
PC-10	Reference 10	-100.0%-100.0%	0.0%	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-11	Reference 11	-100.0%-100.0%	0.0%	☆
PC-12	Reference 12	-100.0%-100.0%	0.0%	☆
PC-13	Reference 13	-100.0%-100.0%	0.0%	☆
PC-14	Reference 14	-100.0%-100.0%	0.0%	☆
PC-15	Reference 15	-100.0%-100.0%	0.0%	☆
PC-16	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0	☆
PC-17	Simple PLC retentive selection	Unit's digit (Retentive upon power Failure) 0: No 1: Yes Ten's digit (Retentive upon stop) 0: No 1: Yes	00	☆
PC-18	Running time of simple PLC reference 0	0.0-6553.5s (h)	0.0s(h)	☆
PC-19	Acceleration/deceleration time of simple PLC reference 0	0-3	0	☆
PC-20	Running time of simple PLC reference 1	0.0-6553.5s (h)	0.0s(h)	☆
PC-21	Acceleration/deceleration time of simple PLC reference 1	0-3	0	☆
PC-22	Running time of simple PLC reference 2	0.0-6553.5s (h)	0.0s (h)	☆
PC-23	Acceleration/deceleration time of simple PLC reference 2	0-3	0	☆
PC-24	Running time of simple PLC reference 3	0.0-6553.5s (h)	0.0s(h)	☆
PC-25	Acceleration/deceleration time of simple PLC reference 3	0-3	0	☆
PC-26	Running time of simple PLC reference 4	0.0-6553.5s (h)	0.0s(h)	☆
PC-27	Acceleration/deceleration time of simple PLC reference 4	0-3	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-28	Running time of simple PLC reference 5	0.0-6553.5s (h)	0.0s(h)	☆
PC-29	Acceleration/deceleration time of simple PLC reference 5	0-3	0	☆
PC-30	Running time of simple PLC reference 6	0.0-6553.5s (h)	0.0s(h)	☆
PC-31	Acceleration/deceleration time of simple PLC reference 6	0-3	0	☆
PC-32	Running time of simple PLC reference 7	0.0-6553.5s (h)	0.0s(h)	☆
PC-33	Acceleration/deceleration time of simple PLC reference 7	0-3	0	☆
PC-34	Running time of simple PLC reference 8	0.0-6553.5s (h)	0.0s(h)	☆
PC-35	Acceleration/deceleration time of simple PLC reference 8	0-3	0	☆
PC-36	Running time of simple PLC reference 9	0.0-6553.5s (h)	0.0s(h)	☆
PC-37	Acceleration/deceleration time of simple PLC reference 9	0-3	0	☆
PC-38	Running time of simple PLC reference 10	0.0-6553.5s (h)	0.0s(h)	☆
PC-39	Acceleration/deceleration time of simple PLC reference 10	0-3	0	☆
PC-40	Running time of simple PLC reference 11	0.0-6553.5s (h)	0.0s(h)	☆
PC-41	Acceleration/deceleration time of simple PLC reference 11	0-3	0	☆
PC-42	Running time of simple PLC reference 12	0.0-6553.5s (h)	0.0s(h)	☆
PC-43	Acceleration/deceleration time of simple PLC reference 12	0-3	0	☆
PC-44	Running time of simple PLC reference 13	0.0-6553.5s (h)	0.0s(h)	☆
PC-45	Acceleration/deceleration time of simple PLC reference 13	0-3	0	☆
PC-46	Running time of simple PLC reference 14	0.0-6553.5s (h)	0.0s(h)	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-47	Acceleration/deceleration time of simple PLC reference 14	0-3	0	☆
PC-48	Running time of simple PLC reference 15	0.0-6553.5s (h)	0.0s(h)	☆
PC-49	Acceleration/deceleration time of simple PLC reference 15	0-3	0	☆
PC-50	Time unit of simple PLC running	0: s (second) 1:h (hour)	0	☆
PC-51	Reference 0 source	0: Set by PC-00 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting 5: PID 6: Set by preset frequency (P0- 08), modified via terminal UP/ DOWN	0	☆
Group Pd: Communication Parameters				
Pd-00	Baud rate	0: 300 BPs 1: 600 BPs 2: 1200 BPs 3: 2400 BPs 4: 4800 BPs 5: 9600 BPs 6: 19200 BPs 7: 38400 BPs 8: 57600 BPs 9: 115200 BPs	5	☆
Pd-01	Data format	0: No check, data format <8,N,2> 1: Even parity check, data format <8,E,1> 2: Odd Parity check, data format <8,O,1> 3: No check, data format <8,N,1> Valid for Modbus	0	☆
Pd-02	Local address	0: Broadcast address 1-249	1	☆
Pd-03	Response delay	0-20 ms	2 ms	☆
Pd-04	Communication timeout	0.0s (invalid) 0.1-60.0s	0.0s	☆
Pd-05	Modbus protocol selection	0: Non-standard Modbus protocol 1: Standard Modbus protocol	0	☆
Pd-06	Communication reading current resolution	0: 0.01A 1: 0.1A	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
Pd-07	Master and slave selection	0: master 1: slave	0	☆
Group PP: Function Code Management				
PP-00	User password	0-65535	0	☆
PP-01	Restore default settings	0: No operation 01: Restore factory settings except motor parameters 02: Clear records	0	★
PP-02	AC drive parameter display property	Unit's digit (Group d display selection) 0: Not display 1: Display Ten's digit (Group E display selection) 0: Not display	11	★
PP-03	Reserved			
PP-04	Parameter modification property	0: Modifiable 1: Not modifiable	0	☆
Group E0: Torque Control and Restricting Parameters				
E0-00	Speed/Torque control selection	0: Speed control 1: Torque control	0	★
E0-01	Torque setting source in torque control	0: Digital setting (E0-03) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2) Full range of values 1-7 corresponds to the digital setting of E0-03.	0	★
E0-02	Reserved			
E0-03	Torque digital setting in torque control	-200.0%-200.0%	150.0%	☆
E0-05	Forward maximum frequency in torque control	0.00 Hz to maximum frequency	50.00Hz	☆
E0-06	Reverse maximum frequency in torque control	0.00 Hz to maximum frequency	50.00Hz	☆
E0-07	Acceleration time in torque control	0.00-65000s	0.00s	☆
E0-08	Deceleration time in torque control	0.00-65000s	0.00s	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group E5: Control Optimization Parameters				
E5-00	DPWM switchover frequency upper limit	0.00-15.00 Hz	12.00Hz	☆
E5-01	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0	☆
E5-02	Dead zone compensation mode selection	0: No compensation 1: Compensation mode 1 2: Compensation mode 2	1	☆
E5-03	Random PWM depth	0: Random PWM invalid 1-10: Random depth of PMW carrier frequency	0	☆
E5-04	Rapid current limit	0: Disabled 1: Enabled	1	☆
E5-05	Current detection compensation	0-100	5	☆
E5-06	Undervoltage threshold	60.0%-140.0%	100.0%	☆
E5-07	SVC optimization mode selection	0: No optimization 1: Optimization mode 1 2: Optimization mode 2	1	☆
E5-08	Dead-zone time adjustment	100%-200%	150%	☆
E5-09	Overvoltage threshold	200.0-2500.0 V	Model depend	☆
Group E6: AI Curve Setting				
E6-00	AI curve 4 minimum input	-10.00 V to E6-02	0.00V	☆
E6-01	Corresponding setting of AI curve 4 minimum input	-100.0%-100.0%	0.0%	☆
E6-02	AI curve 4 inflexion 1 input	E6-00 to E6-04	3.00V	☆
E6-03	Corresponding setting of AI curve 4 inflexion 1 input	-100.0%-100.0%	30.0%	☆
E6-04	AI curve 4 inflexion 2 input	E6-02 to E6-06	6.00V	☆
E6-05	Corresponding setting of AI curve 4 inflexion 2 input	-100.0%-100.0%	60.0%	☆
E6-06	AI curve 4 maximum input	E6-06 to 10.00 V	10.00V	☆
E6-07	Corresponding setting of AI curve 4 maximum input	-100.0%-100.0%	100.0%	☆
E6-08	AI curve 5 minimum input	-10.00 V to E6-10	-10.00V	☆
E6-09	Corresponding setting of AI curve 5 minimum input	-100.0%-100.0%	-100.0%	☆
E6-10	AI curve 5 inflexion 1 input	E6-08 to E6-12	-3.00V	☆

Function Code	Parameter Name	Setting Range	Default	Property
E6-11	Corresponding setting of AI curve 5 inflexion 1 input	-100.0%-100.0%	-30.0%	☆
E6-12	AI curve 5 inflexion 2 input	E6-10 to E6-14	3.00V	☆
E6-13	Corresponding setting of AI curve 5 inflexion 2 input	-100.0%-100.0%	30.0%	☆
E6-14	AI curve 5 maximum input	E6-12 to 10.00 V	10.00V	☆
E6-15	Corresponding setting of AI curve 5 maximum input	-100.0%-100.0%	100.0%	☆
E6-16~E6-23	Reserved			
E6-24	Jump point of AI1 input corresponding setting	-100.0%-100.0%	0.0%	☆
E6-25	Jump amplitude of AI1 input corresponding setting	0.0%-100.0%	0.5%	☆
E6-26	Jump point of AI2 input corresponding setting	-100.0%-100.0%	0.0%	☆
E6-27	Jump amplitude of AI2 input corresponding setting	0.0%-100.0%	0.5%	☆
E6-28~E6-29	Reserved			
Group EC: AI/AO Correction				
EC-00	AI1 measured voltage 1	0.500-4.000 V	Factory corrected	☆
EC-01	AI1 displayed voltage 1	0.500-4.000 V	Factory corrected	☆
EC-02	AI1 measured voltage 2	6.000-9.999 V	Factory corrected	☆
EC-03	AI1 displayed voltage 2	6.000-9.999 V	Factory corrected	☆
EC-04	AI2 measured voltage 1	0.500-4.000 V	Factory corrected	☆
EC-05	AI2 displayed voltage 1	0.500-4.000 V	Factory corrected	☆
EC-06	AI2 measured voltage 2	6.000-9.999 V	Factory corrected	☆
EC-07	AI2 displayed voltage 2	6.000-9.999 V	Factory corrected	☆
EC-08~EC-11	Reserved			
EC-12	AO1 target voltage 1	0.500-4.000 V	Factory corrected	☆
EC-13	AO1 measured voltage 1	0.500-4.000 V	Factory corrected	☆
EC-14	AO1 target voltage 2	6.000-9.999 V	Factory corrected	☆

Function Code	Parameter Name	Setting Range	Default	Property
EC-15	AO1 measured voltage 2	6.000-9.999 V	Factory corrected	☆
EC-16~EC-19	Reserved			

3.2 Monitoring Parameters

Table 3.2 Monitoring Parameter Table

Function Code	Parameter Name	Min. Unit	Communication Address
Group d0: Standard Monitoring Parameters			
d0-00	Running frequency (Hz)	0.01 Hz	7000H
d0-01	Set frequency (Hz)	0.01 Hz	7001H
d0-02	Bus voltage	0.1 V	7002H
d0-03	Output voltage	1 V	7003H
d0-04	Output current	0.01 A	7004H
d0-05	Output power	0.1 kW	7005H
d0-06	Output torque (%)	0.1%	7006H
d0-07	DI state	1	7007H
d0-08	DO state	1	7008H
d0-09	AI1 voltage (V)	0.01 V	7009H
d0-10	AI2 voltage (V)	0.01 V	700AH
d0-12	Count value	1	700CH
d0-13	Length value	1	700DH
d0-14	Load speed	1	700EH
d0-15	PID setting	1	700FH
d0-16	PID feedback	1	7010H
d0-17	PLC stage	1	7011H

Function Code	Parameter Name	Min. Unit	Communication Address
d0-18	Input pulse frequency (Hz)	0.01 kHz	7012H
d0-19	Feedback speed (0.1Hz)	0.1 Hz	7013H
d0-20	Remaining running time	0.1 Min	7014H
d0-21	AI1 voltage before correction	0.001 V	7015H
d0-22	AI2 voltage (V) before correction	0.001 V	7016H
d0-24	Linear speed	1 m/Min	7018H
d0-25	Accumulative power-on time	1 Min	7019H
d0-26	Accumulative running time	0.1 Min	701AH
d0-27	Pulse input frequency	1 Hz	701BH
d0-28	Communication setting value	0.01%	701CH
d0-30	Main frequency X	0.01 Hz	701EH
d0-31	Auxiliary frequency Y	0.01 Hz	701FH
d0-32	Viewing any register address value	1	7020H
d0-35	Target torque	0.1%	7023H
d0-37	Power factor angle	0.1°	7025H
d0-39	Target voltage upon V/F separation	1 V	7027H
d0-40	Output voltage upon V/F separation	1V	7028H
d0-41	DI state visual display	1	7029H
d0-42	DO state visual display	1	702AH
d0-43	DI function state visual display 1 (functions 01-40)	1	702BH
d0-44	DI function state visual display 2 (functions 41-80)	1	702CH
d0-45	Fault information	1	702DH
d0-59	Current set frequency	0.01%	703BH
d0-60	Current running frequency	0.01%	703CH
d0-61	AC drive running state	1	703DH
d0-62	Current fault code	1	703EH
d0-65	Torque upper limit	0.1%	7041H

4 Description of Function Codes

Group P0: Basic Parameters

Function Code	Parameter Name	Setting Range	Default
P0-00	G/P type display	1: G type (constant torque load) 2: P type (variable torque load e.g. fan and pump)	Model dependent

This parameter is used to display the delivered model and cannot be modified.

- 1: Applicable to constant torque load with rated parameters specified
- 2: Applicable to variable torque load (fan and pump) with rated parameters specified

Function Code	Parameter Name	Setting Range	Default
P0-01	Motor 1 control mode	0: Sensorless flux vector control (SVC) 1: Voltage/Frequency (V/F) control	1

- 0: Sensorless flux vector control (SVC)

It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. One AC drive can operate only one motor.

- 1: Voltage/Frequency (V/F) control

It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

Note

1) If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained.
2) As for the above control models, AC900 is applicable in asynchronous motor drive.

Function Code	Parameter Name	Setting Range	Default
P0-02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking)	0

It is used to determine the input channel of the AC drive control commands, such as run,

stop, forward rotation, reverse rotation and jog operation. You can input the commands in the following three channels:

- 0: Operation panel control ("LOCAL/REMOT" indicator off). Commands are given by pressing keys Run and Stop on the operation panel
- 1: Terminal control ("LOCAL/REMOT" indicator on)

  Commands are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF, and JOGR.
- 2: Communication control ("LOCAL/REMOT" indicator blinking)

  Commands are given from host computer. Please refer to communication parameters of Group Pd to get function parameters for communication.

Function Code	Parameter Name	Setting Range	Default
P0-03	Main frequency source X selection	0: Digital setting (preset frequency P0-08, UP/DOWN modifiable, non-retentive at power failure) 1: Digital setting (preset frequency P0-08, UP/DOWN modifiable, retentive at power failure) 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0

It is used to select the setting channel of the main frequency. You can set the main frequency in the following 10 channels:

- 0: Digital setting (non-retentive at power failure)

  The initial value of the set frequency is the value of P0-08 (Preset frequency). You can change the set frequency by pressing  and  on the operation panel (or using the UP/DOWN functions of input terminals).

  When the AC drive is powered on again after power failure, the set frequency reverts to the value of P0-08.
- 1: Digital setting (retentive at power failure)

  The initial value of the set frequency is the value of P0-08 (Preset frequency). You can change the set frequency by pressing keys  and  on the operation panel (or using the

UP/DOWN functions of input terminals).

When the AC drive is powered on again after power failure, the set frequency is the value memorized at the moment of the last power failure.

Note that P0-23 (Retentive of digital setting frequency upon power failure) determines whether the set frequency is memorized or cleared when the AC drive stops. It is related to stop rather than power failure.

- 2: AI1 (0-10 V voltage input)
- 3: AI2 (0-10 V voltage input or 0-20 mA current input, determined by jumper J1)
- 4: Keyboard potentiometer

The frequency is set by analog input. The AC900 control board provides two analog input (AI) terminals (AI1, AI2). Another AI terminal is keyboard potentiometer.

Among them, AI1 is voltage input of 0V-10V, and AI2 is either voltage input of 0V-10V or current input of 0mA-20mA, which is selected by wire jumper J1.

The AC900 provides four curves indicating the mapping relationship between the input voltage of AI1, AI2, three of which are linear (point- point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes in group P4 and function codes in group E6, and select curves for different purposes.

The function code P4-33 is intended to set analog inputs of AI1, AI2 and keyboard potentiometer, and to select which curve respectively. As for the specific mapping relationship of those four curves, please refer to the instructions of function codes in group P4 and group E6.

- 5: Pulse setting (DI5)

The frequency is set by DI5 (high-speed pulse). The signal specification of pulse setting is 9-30 V (voltage range) and 0-100 kHz (frequency range). Pulse setting can be input only through DI5.

You can set the relationship between pulse frequency of DI5 and corresponding settings through P4-28 to P4-31. The mapping relationship is linear (point-point) correspondence. The corresponding value 100% of pulse setting corresponds to the value of P0-10 (Maximum frequency).

- 6: Multi-reference

In multi-reference mode, combinations of different DI terminal states correspond to different set frequencies. The AC900 supports a maximum of 16 speeds implemented by 16 state combinations of four DI terminals (allocated with functions 12 to 15) in Group PC. The multiple

references indicate percentages of the value of P0-10 (Maximum frequency

If a DI terminal is used for the multi-reference function, you need to perform related setting in group P4.

• 7: Simple PLC

When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched over among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group PC.

• 8: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

When applying PID as the frequency source, you need to set parameters of PID function in group PA.

• 9: Communication setting

The frequency is set by means of communication.

Function Code	Parameter Name	Setting Range	Default
P0-04	Auxiliary frequency source Y selection	0: Digital setting (non-retentive at power failure) 1: Digital setting (retentive at power failure) 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0

When used as an independent frequency input channel (frequency source switched over from X to Y), the auxiliary frequency source Y is used in the same way as the main frequency source X (refer to P0-03).

When the auxiliary frequency source is used for operation (frequency source is "X and Y operation"), pay attention to the following aspects:

• If the auxiliary frequency source Y is digital setting, the preset frequency (P0-08) does not

take effect. You can directly adjust the set main frequency by pressing keys and on the operation panel (or using the UP/DOWN function of input terminals).

- If the auxiliary frequency source is analog input (AI1, AI2 and Keyboard potentiometer) or pulse setting, 100% of the input corresponds to the range of the auxiliary frequency Y (set in P0-05 and P0-06).
- If the auxiliary frequency source is pulse setting, it is similar to analog input.

Note

The main frequency source X and auxiliary frequency source Y must not use the same channel. That is, P0-03 and P0-04 cannot be set to the same value.

Function Code	Parameter Name	Setting Range	Default
P0-05	Range of auxiliary frequency Y for X and Y operation	0: Relative to maximum frequency 1: Relative to main frequency X	0
P0-06	Range of auxiliary frequency Y for X and Y operation	0%-150%	0

If X and Y operation is used, P0-05 and P0-06 are used to set the adjustment range of the auxiliary frequency source.

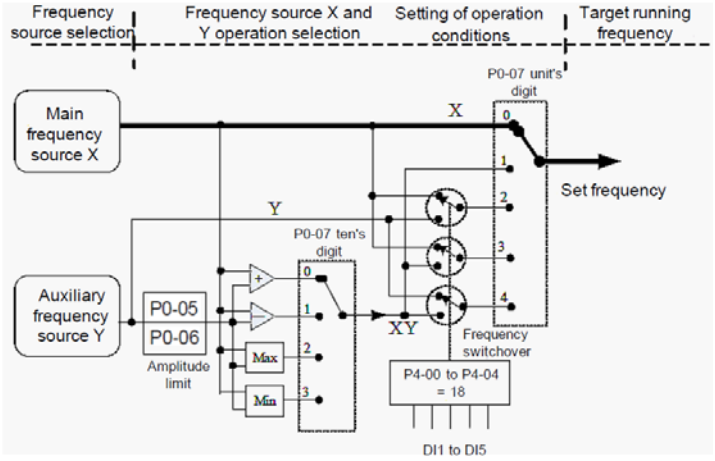
You can set the auxiliary frequency to be relative to either maximum frequency or main frequency X. If relative to main frequency X, the setting range of the auxiliary frequency Y varies according to the main frequency X.

Function Code	Parameter Name	Setting Range	Default
P0-07	Frequency source selection	Unit's digit (Frequency source selection) 0: Main frequency source X 1: X and Y operation (operation relationship determined by ten's digit) 2: Switchover between X and Y 3: Switchover between X and "X and Y operation" 4: Switchover between Y and "X and Y operation"	0

Function Code	Parameter Name	Setting Range	Default
P0-07	Frequency source selection	Ten's digit (X and Y operation relationship) 0: X+Y 1: X-Y 2: Maximum 3: Minimum	0

It is used to select the frequency setting channel. If the frequency source involves X and Y operation, you can set the frequency offset in P0-21 for superposition to the X and Y operation result, flexibly satisfying various requirements.

Frequency setting based on main frequency source X and auxiliary frequency source Y



Function Code	Parameter Name	Setting Range	Default
P0-08	Preset frequency	0.00 to maximum frequency (valid when frequency source is digital setting)	50.00 Hz

If the frequency source is digital setting or terminal UP/DOWN, the value of this parameter is the initial frequency of the AC drive (digital setting).

Function Code	Parameter Name	Setting Range	Default
P0-09	Rotation direction	0: Same direction 1: Reverse direction	0

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Note

The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

Function Code	Parameter Name	Setting Range	Default
P0-10	Maximum frequency	50.00-320.00 Hz	50.00 Hz

When the frequency source is AI, pulse setting (DI5), or multi-reference, 100% of the input corresponds to the value of this parameter.

The output frequency of the AC900 can reach up to 3200 Hz. To take both frequency reference resolution and frequency input range into consideration, you can set the number of decimal places for frequency reference in P0-22.

- If P0-22 is set to 1, the frequency reference resolution is 0.1 Hz. In this case, the setting range of P0-10 is 50.0 to 3200.0 Hz.
- If P0-22 is set to 2, the frequency reference resolution is 0.01 Hz. In this case, the setting range of P0-10 is 50.00 to 320.00 Hz.

Note

After the value of P0-22 is modified, the frequency resolution of all frequency related function codes change accordingly.

Function Code	Parameter Name	Setting Range	Default
P0-11	Source of frequency upper limit	0: Set by P0-12 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting	0

It is used to set the source of the frequency upper limit, including digital setting (P0-12), AI, pulse setting or communication setting. If the frequency upper limit is set by means of AI1, AI2, Keyboard potentiometer, DI5 or communication, the setting is similar to that of the main frequency source X. For details, see the description of P0-03.

For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

Function Code	Parameter Name	Setting Range	Default
P0-12	Frequency upper limit	Frequency lower limit (P0-14) to maximum frequency (P0-10)	50.00 Hz

This parameter is used to set the frequency upper limit.

Function Code	Parameter Name	Setting Range	Default
P0-13	Frequency upper limit offset	0.00 Hz to maximum frequency (P0-10)	0.00 Hz

If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter to the frequency upper limit set in P0-11.

Function Code	Parameter Name	Setting Range	Default
P0-14	Frequency lower limit	0.00 Hz to frequency upper limit (P0-12)	0.00 Hz

If the frequency reference is lower than the value of this parameter, the AC drive can stop, run at the frequency lower limit, or run at zero speed, determined by P8-14.

Function Code	Parameter Name	Setting Range	Default
P0-15	Carrier frequency	0.5-16.0 kHz	Model dependent

It is used to adjust the carrier frequency of the AC drive, helping to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the AC drive.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference.

Adjusting the carrier frequency will exert influences on the aspects listed in the following table.

Influences of carrier frequency adjustment

Carrier frequency	Low	High
Motor noise	Large	Small
Output current waveform	Bad	Good
Motor temperature rise	High	Low
AC drive temperature rise	Low	High
Leakage current	Small	Large
External radiation interference	Small	Large

The factory setting of carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than factory setting, it will lead to an increase in temperature rise of the AC drive's heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may overheat and alarm.

Function Code	Parameter Name	Setting Range	Default
P0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	1

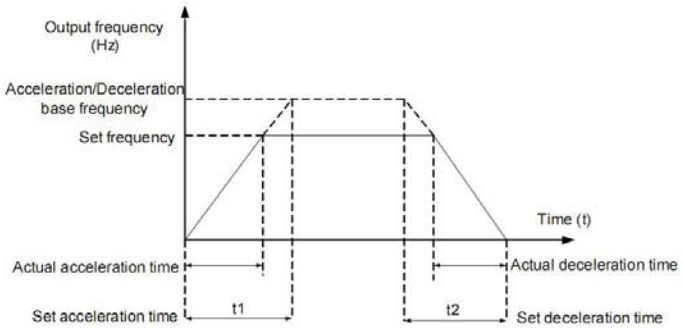
It is used to set whether the carrier frequency is adjusted based on the temperature. The AC drive automatically reduces the carrier frequency when detecting that the heatsink temperature is high. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the overheat alarms.

Function Code	Parameter Name	Setting Range	Default
P0-17	Acceleration time 1	0.00-650.00s (P0-19 = 2) 0.0-6500.0s (P0-19 = 1) 0-65000s (P0-19 = 0)	Model dependent
P0-18	Deceleration time 1	0.00-650.00s (P0-19 = 2) 0.0-6500.0s (P0-19 = 1) 0-65000s (P0-19 = 0)	Model dependent

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to "Acceleration/Deceleration base frequency" (P0-25), that is, t1 in Figure 4-1.

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (P0-25) to 0 Hz, that is, t2 in Figure 4-1.

Figure 4-1 Acceleration/Deceleration time



The AC900 provides totally four groups of acceleration/deceleration time for selection. You can perform switchover by using a DI terminal.

- Group 1: P0-17, P0-18
- Group 2: P8-03, P8-04
- Group 3: P8-05, P8-06
- Group 4: P8-07, P8-08

Function Code	Parameter Name	Setting Range	Default
P0-19	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1

To satisfy requirements of different applications, the AC900 provides three acceleration/ deceleration time units, 1s, 0.1s and 0.01s.

Note

Modifying this parameter will make the displayed decimal places change and corresponding acceleration/deceleration time also change.

Function Code	Parameter Name	Setting Range	Default
P0-21	Frequency offset of auxiliary frequency source for X and Y operation	0.00 Hz to maximum frequency (P0-10)	0.00Hz

This parameter is valid only when the frequency source is set to "X and Y operation". The final frequency is obtained by adding the frequency offset set in this parameter to the X and Y operation result

Function Code	Parameter Name	Setting Range	Default
P0-22	Frequency reference resolution	1: 0.1Hz 2: 0.01Hz	2

It is used to set the resolution of all frequency-related parameters.

If the resolution is 0.1 Hz, the AC900 can output up to 3200 Hz. If the resolution is 0.01 Hz, the AC900 can output up to 320.00 Hz.

Note

Modifying this parameter will make the decimal places of all frequency-related parameters change and corresponding frequency values change.

This parameter is not resumed when factory setting is resumed.

Function Code	Parameter Name	Setting Range	Default
P0-23	Retentive of digital setting frequency upon power failure	0: Not retentive 1: Retentive	0

This parameter is valid only when the frequency source is digital setting.

If P0-23 is set to 0, the digital setting frequency value resumes to the value of P0-08 (Preset frequency) after the AC drive stops. The modification by using keys  and  or the terminal UP/DOWN function is cleared.

If P0-23 is set to 1, the digital setting frequency value is the set frequency at the moment when the AC drive stops. The modification by using keys  and  or the terminal UP/ DOWN function remains effective.

Function Code	Parameter Name	Setting Range	Default
P0-25	Acceleration/Deceleration time base frequency	0: Maximum frequency (P0-10) 1: Set frequency 2: 100 Hz	0

The acceleration/deceleration time indicates the time for the AC drive to increase from 0 Hz to the frequency set in P0-25. If this parameter is set to 1, the acceleration/deceleration time is related to the set frequency. If the set frequency changes frequently, the motor's acceleration/deceleration also changes

Function Code	Parameter Name	Setting Range	Default
P0-26	Base frequency for UP/DOWN modification during running	0: Running frequency 1: Set frequency	0

This parameter is valid only when the frequency source is digital setting.

It is used to set the base frequency to be modified by using keys and or the terminal UP/DOWN function. If the running frequency and set frequency are different, there will be a large difference between the AC drive's performance during the acceleration/ deceleration process.

Function Code	Parameter Name	Setting Range	Default
P0-27	Binding command source to frequency source	Unit's digit (Binding operation panel command to frequency source)	000
		0: No binding 1: Frequency source by digital setting 2: AI1 3: AI2 4: Keyboard potentiometer 5: Pulse setting (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	
		Ten's digit (Binding terminal command to frequency source)	
		0-9, same as unit's digit	
		Hundred's digit (Binding communication command to frequency source)	
		0-9, same as unit's digit)	

It is used to bind the three running command sources with the nine frequency sources, facilitating to implement synchronous switchover.

For details on the frequency sources, see the description of P0-03 (Main frequency source X selection). Different running command sources can be bound to the same frequency source

If a command source has a bound frequency source, the frequency source set in P0-03 to P0-07 no longer takes effect when the command source is effective.

Group P1: Motor Parameters

Function Code	Parameter Name	Setting Range	Default
P1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0
P1-01	Rated motor power	0.1-1000.0 kW	Model dependent
P1-02	Rated motor voltage	1-2000 V	Model dependent
P1-03	Rated motor current	0.01-655.35 A (AC drive power ≤ 55 kW) 0.1-6553.5 A (AC drive power > 55 kW)	Model dependent
P1-04	Rated motor frequency	0.01 Hz to maximum frequency	Model dependent
P1-05	Rated motor rotational speed	1-65535RPM	Model dependent

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted.

To achieve better V/F or vector control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

Function Code	Parameter Name	Setting Range	Default
P1-06	Stator resistance (asynchronous motor)	0.001-65.535 Ω (AC drive power ≤ 55 kW) 0.0001-6.5535 Ω (AC drive power > 55 kW)	Model dependent
P1-07	Rotor resistance (asynchronous motor)	0.001-65.535 Ω (AC drive power ≤ 55 kW) 0.0001-6.5535 Ω (AC drive power > 55 kW)	Model dependent
P1-08	Leakage inductive reactance (asynchronous motor)	0.01-655.35mH (AC drive power ≤ 55 kW) 0.001-65.535mH (AC drive power > 55 kW)	Model dependent
P1-09	Mutual inductive reactance (asynchronous motor)	0.1-6553.5mH (AC drive power ≤ 55 kW) 0.01--655.35mH (AC drive power > 55 kW)	Model dependent
P1-10	No-load current (asynchronous motor)	0.01 to P1-03 (AC drive power ≤ 55 kW) 0.1 to P1-03 (AC drive power > 55 kW)	Model dependent

The parameters in P1-06 to P-10 are asynchronous motor parameters. These parameters are unavailable on the motor nameplate and are obtained by means of motor auto-tuning. Only P1-06

to P1-08 can be obtained through static motor auto-tuning. Through complete motor auto-tuning, encoder phase sequence and current loop PI can be obtained besides the parameters in P1-06 to P1-10.

Each time "Rated motor power" (P1-01) or "Rated motor voltage" (P1-02) is changed, the AC drive automatically restores values of P1-06 to P1-10 to the parameter setting for the common standard Y series asynchronous motor.

If it is impossible to perform motor auto-tuning onsite, manually input the values of these parameters according to data provided by the motor manufacturer.

Function Code	Parameter Name	Setting Range	Default
P1-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 2: Asynchronous motor complete auto-tuning	0

- 0: No auto-tuning

Auto-tuning is prohibited.

- 1: Asynchronous motor static auto-tuning

It is applicable to scenarios where complete auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from the load.Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of P1-00 to P1-05 first. The AC drive will obtain parameters of P1-06 to P1- 08 by static auto-tuning. Set this parameter to 1, and press RUN. Then, the AC drive starts static auto-tuning.

- 2: Asynchronous motor complete auto-tuning

To perform this type of auto-tuning, ensure that the motor is disconnected from the load. During the process of complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0-17. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in P0-18.

Before performing complete auto-tuning, properly set the motor type, motor nameplate parameters of P1-00 to P1-05, "Encoder type" (P1-28) and "Encoder pulses per revolution" (P1-27) first.

The AC drive will obtain motor parameters of P1-06 to P1-10, "A/B phase sequence of ABZ incremental encoder" (P1-30) and vector control current loop PI parameters of P2- 13 to P2-16 by complete auto-tuning.

Set this parameter to 2, and press RUN

Then, the AC drive starts complete auto- tuning.

Note

Motor auto-tuning can be performed only in operation panel mode.

Group P2: Vector Control Parameters

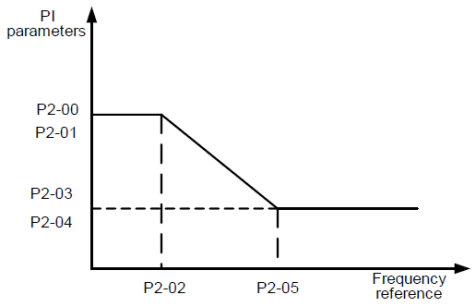
Group P2 is valid for vector control, and invalid for V/F control.

Function Code	Parameter Name	Setting Range	Default
P2-00	Speed loop proportional gain 1	1-100	30
P2-01	Speed loop integral time 1	0.01-10.00s	0.50s
P2-02	Switchover frequency 1	0.00 to P2-05	5.00 Hz
P2-03	Speed loop proportional gain 2	0-100	20
P2-04	Speed loop integral time 2	0.01-10.00s	1.00s
P2-05	Switchover frequency 2	P2-02 to maximum output frequency	10.00 Hz

Speed loop PI parameters vary with running frequencies of the AC drive.

- If the running frequency is less than or equal to "Switchover frequency 1" (P2-02), the speed loop PI parameters are P2-00 and P2-01.
- If the running frequency is equal to or greater than "Switchover frequency 2" (P2-05), the speed loop PI parameters are P2-03 and P2-04.
- If the running frequency is between P2-02 and P2-05, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 4-2.

Figure 4-2 Relationship between running frequencies and PI parameters



The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

Note

Improper PI parameter setting may cause too large speed overshoot, and overvoltage fault may even occur when the overshoot drops.

Function Code	Parameter Name	Setting Range	Default
P2-06	Vector control slip gain	50%-200%	100%

For SFVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter

For CLVC, it is used to adjust the output current of the AC drive with same load.

Function Code	Parameter Name	Setting Range	Default
P2-07	Time constant of speed loop filter	0.000-0.100s	0.000s

In the vector control mode, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

If the value of this parameter is small, the output torque of the AC drive may fluctuate greatly, but the response is quick.

Function Code	Parameter Name	Setting Range	Default
P2-08	Vector control over-excitation gain	0-200	64

During deceleration of the AC drive, over-excitation control can restrain rise of the bus voltage to avoid the overvoltage fault. The larger the over-excitation gain is, the better the restraining effect is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

Function Code	Parameter Name	Setting Range	Default
P2-09	Torque upper limit source in speed control mode	0: P2-10 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting	0
P2-10	Digital setting of torque upper limit in speed control mode	0.0%-200.0%	150.0%

In the speed control mode, the maximum output torque of the AC drive is restricted by P2-09. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of P2-10, and 100% of the value of P2-10 corresponds to the AC drive rated torque.

For details on the AI1, AI2 and keyboard potentiometer setting, see the description of the AI curves in group P4. For details on the pulse setting, see the description of P4-28 to P4-32.

When the AC drive is in communication with the master, if P2-09 is set to 5 “communication setting”, P2-10 “Digital setting of torque upper limit in speed control mode” can be set via

communication from the master.

In other conditions, the host computer writes data -100.00% to 100.00% by the communication address 0x1000, where 100.0% corresponds to the value of P2-10. The communication protocol can be Modbus.

Function Code	Parameter Name	Setting Range	Default
P2-13	Excitation adjustment proportional gain	0-60000	2000
P2-14	Excitation adjustment integral gain	0-60000	1300
P2-15	Torque adjustment proportional gain	0-60000	2000
P2-16	Torque adjustment integral gain	0-60000	1300

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no- load auto-tuning", and need not be modified.

The dimension of the current loop integral regulator is integral gain rather than integral time. Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

Group P3: V/F Control Parameters

Group P3 is valid only for V/F control.

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive operates multiple motors or there is a large difference between the AC drive power and the motor power.

Function Code	Parameter Name	Setting Range	Default
P3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation	00

- 0: Linear V/F

It is applicable to common constant torque load.

- 1: Multi-point V/F

It is applicable to special load such as dehydrator and centrifuge. Any such V/F curve can be obtained by setting parameters of P3-03 to P3-08.

- 2: Square V/F

It is applicable to centrifugal loads such as fan and pump.

- 3 to 8: V/F curve between linear V/F and square V/F
- 10: V/F complete separation

In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source, and the output voltage is determined by "Voltage source for V/F separation" (P3-13).

It is applicable to induction heating, inverse power supply and torque motor control.

- 11: V/F half separation

In this mode, V and F are proportional and the proportional relationship can be set in P3-13. The relationship between V and F are also related to the rated motor voltage and rated motor frequency in Group P1.

Assume that the voltage source input is X (0 to 100%), the relationship between V and F is:

V/F = 2*X*(Rated motor voltage)/(Rated motor frequency)

Function Code	Parameter Name	Setting Range	Default
P3-01	Torque boost	0.0%-30%	Model dependent
P3-02	Cut-off frequency of torque boost	0.00 Hz to maximum output frequency	50.00 Hz

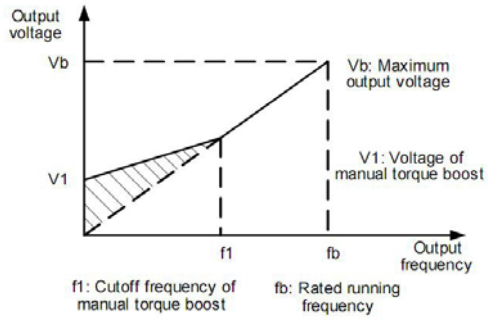
To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying P3-01.

If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer overcurrent.

If the load is large and the motor startup torque is insufficient, increase the value of P3-01. If the load is small, decrease the value of P3-01. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

P3-02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure.

Figure 4-4 Manual torque boost



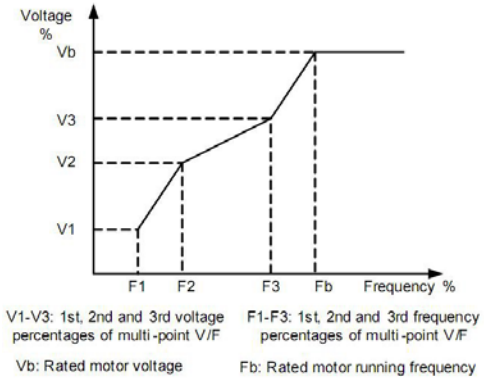
Function Code	Parameter Name	Setting Range	Default
P3-03	Multi-point V/F frequency 1 (F1)	0.00 Hz to P3-05	0.00 Hz
P3-04	Multi-point V/F voltage 1 (V1)	0.0%-100.0%	0.0%
P3-05	Multi-point V/F frequency 2 (F2)	P3-03 to P3-07	0.00 Hz
P3-06	Multi-point V/F voltage 2 (V2)	0.0%-100.0%	0.0%
P3-07	Multi-point V/F frequency 3 (F3)	P3-05 to rated motor frequency (P1-04)	0.00 Hz
P3-08	Multi-point V/F voltage 3 (V3)	0.0%-100.0%	0.0%

These six parameters are used to define the multi-point V/F curve.

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is: V1 < V2 < V3, F1 < F2 < F3

At low frequency, higher voltage may cause overheat or even burnt out of the motor and overcurrent stall or overcurrent protection of the AC drive.

Figure 4-5 Setting of multi-point V/F curve



Function Code	Parameter Name	Setting Range	Default
P3-09	V/F slip compensation gain	0%-200.0%	0.0%

This parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group P1.

Generally, if the motor rotational speed is different from the target speed, slightly adjust this parameter.

Function Code	Parameter Name	Setting Range	Default
P3-10	V/F over-excitation gain	0-200	64

During deceleration of the AC drive, over-excitation can restrain rise of the bus voltage, preventing the overvoltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current. Set P3-09 to a proper value in actual applications.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

Function Code	Parameter Name	Setting Range	Default
P3-11	V/F oscillation suppression gain	0-100	Model dependent

Set this parameter to a value as small as possible in the prerequisite of efficient oscillation suppression to avoid influence on V/F control.

Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The larger the value is, the better the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no- load current must be correct. Otherwise, the V/F oscillation suppression effect will not be satisfactory.

Function Code	Parameter Name	Setting Range	Default
P3-13	Voltage source for V/F separation	0: Digital setting (P3-14) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication setting 100.0% corresponds to the rated motor voltage (P1-02, P4-02, P5- 02, P6-02).	0
P3-14	Voltage digital setting for V/F separation	0 V to rated motor voltage	0 V

V/F separation is generally applicable to scenarios such as induction heating, inverse power supply and motor torque control.

If V/F separated control is enabled, the output voltage can be set in P3-14 or by means of analog, multi-reference, simple PLC, PID or communication. If you set the output voltage by means of non-digital setting, 100% of the setting corresponds to the rated motor voltage. If a negative percentage is set, its absolute value is used as the effective value.

- 0: Digital setting (P3-14)

  The output voltage is set directly in P3-14.

- 1: AI1; 2: AI2;

  The output voltage is set by AI terminals.

- 3: Keyboard potentiometer

  The output voltage is set by Keyboard potentiometer.

- 4: Pulse setting (DI5)

  The output voltage is set by pulses of the terminal DI5.

  Pulse setting specification: voltage range 9-30 V, frequency range 0-100 kHz

- 5: Multi-reference

  If the voltage source is multi-reference, parameters in group P4 and PC must be set to determine the corresponding relationship between setting signal and setting voltage.

- 6: Simple PLC

  If the voltage source is simple PLC mode, parameters in group PC must be set to determine the setting output voltage.

- 7: PID

The output voltage is generated based on PID closed loop. For details, see the description of PID in group PA.

- 8: Communication setting

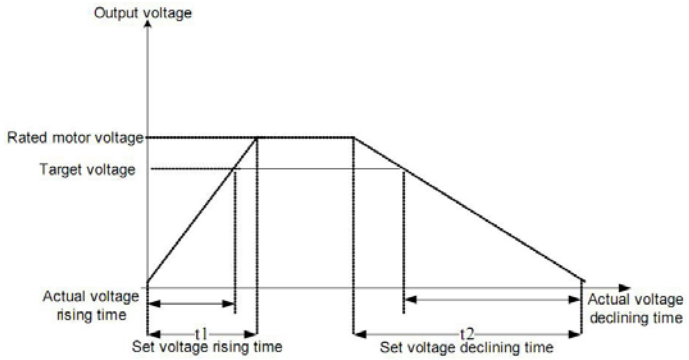
The output voltage is set by the host computer by means of communication.

The voltage source for V/F separation is set in the same way as the frequency source. For details, see P0-03. 100.0% of the setting in each mode corresponds to the rated motor voltage. If the corresponding value is negative, its absolute value is used.

Function Code	Parameter Name	Setting Range	Default
P3-15	Voltage rise time of V/F separation	0.0-1000.0s	0.0s

P3-15 indicates the time required for the output voltage to rise from 0 V to the rated motor voltage shown as t1 in the following figure.

Figure 4-5 Voltage of V/F separation



Group P4: Input Terminals

The AC900 provides five DI terminals (DI5 can be used for high-speed pulse input) and two analog input (AI) terminals.

Function Code	Parameter Name	Default	Remark
P4-00	DI1 function selection	1: Forward RUN (FWD)	Standard
P4-01	DI2 function selection	2: Reverse RUN (REV)	Standard
P4-02	DI3 function selection	4: Forward JOG (FJOG)	Standard
P4-03	DI4 function selection	9: Fault reset (RESET)	Standard
P4-04	DI5 function selection	0	Standard

The following table lists the functions available for the DI terminals.

Table 4-1 Functions of DI terminals

Value	Function	Description
0	No function	Set 0 for reserved terminals to avoid malfunction.
1	Forward RUN (FWD)	The terminal is used to control forward or reverse RUN of the AC drive.
2	Reverse RUN (FWD)	
3	Three-wire system operation control	Determine whether the operation method of AC driver is three-wire system operation control through the DI terminal. For details, please refer to the descriptions of function codes P4-11 (Terminal command mode).
4	Forward JOG (FJOG)	FJOG is JOG to run forward, while FJOG is JOG to run reverse. For details of JOG running frequency and JOG acceleration and deceleration time, please refer to the descriptions of function codes P8-00, P8-01 and P8-02.
5	Reverse JOG (RJOG)	
6	Terminal UP	Modify the UP/DOWN command when external terminals set the frequency. The setting frequency can be adjusted only under digital setting.
7	Terminal DOWN	
8	Coast to stop	The AC driver blocks the output, and the stop process of the motor will not be controlled by AC driver. It is the same as coast to stop described in P6-10.
9	Fault Reset	Operate the function using DI terminals. It is the same as that in the keyboard, in which the remote fault reset can be achieved.
10	RUN pause	The AC drive decelerates to stop, but the running parameters are all memorized, such as PLC, swing frequency and PID parameters. After this function is disabled, the AC drive resumes its status before stop.
11	Normally open (NO) input of external fault	If this terminal becomes ON, the AC drive reports Err15 and performs the fault protection action. For more details, see the description of P9-47.
12	Multi-reference terminal 1	The setting of 16 speeds or 16 other references can be implemented through combinations of 16 states of these four terminals. For details please refer to the Appendix table 1.
13	Multi-reference terminal 2	
14	Multi-reference terminal 3	
15	Multi-reference terminal 4	

Value	Function	Description
16	Terminal 1 for acceleration/ deceleration time selection	Totally four groups of acceleration/deceleration time can be selected through combinations of four states of these two terminals. For details please refer to the Appendix table 2.
17	Terminal 2 for acceleration/ deceleration time selection	
18	Frequency source switchover	The terminal is used to perform switchover between two frequency sources according to the setting in P0-07.
19	UP and DOWN setting clear (terminal, operation panel)	If the frequency source is digital setting, the terminal is used to clear the modification by using the UP/ DOWN function or the increment/decrement key on the operation panel, returning the set frequency to the value of P0-08.
20	Command source switchover terminal	If the command source is set to terminal control (P0-02 = 1), this terminal is used to perform switchover between terminal control and operation panel control. If the command source is set to communication control (P0-02 = 2), this terminal is used to perform switchover between communication control and operation panel control.
21	Acceleration/Deceleration prohibited	It enables the AC drive to maintain the current frequency output without being affected by external signals (except the STOP command).
22	PID pause	PID is invalid temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source.
23	PLC status reset	The terminal is used to restore the original status of PLC control for the AC drive when PLC control is started again after a pause.
24	Swing pause	The AC drive outputs the central frequency, and the swing frequency function pauses.
25	Counter input	This terminal is used to count pulses.
26	Counter reset	This terminal is used to clear the counter status.
29	Torque control prohibited	The AC drive is prohibited from torque control and enters the speed control mode.
30	Pulse input (enabled only for DI5)	DI5 is used for pulse input.
31	Reserved	Reserved.
32	Immediate DC braking	After this terminal becomes ON, the AC drive directly switches over to the DC braking state.
33	Normally closed (NC) input of external fault	After this terminal becomes ON, the AC drive reports Err15 and stops.

Value	Function	Description
34	Frequency modification forbidden	After this terminal becomes ON, the AC drive does not respond to any frequency modification.
35	Reverse PID action direction	After this terminal becomes ON, the PID action direction is reversed to the direction set in PA-03.
36	External STOP terminal 1	In operation panel mode, this terminal can be used to stop the AC drive, equivalent to the function of the STOP key on the operation panel.
37	Command source switchover terminal 2	It is used to perform switchover between terminal control and communication control. If the command source is terminal control, the system will switch over to communication control after this terminal becomes ON.
38	PID integral pause	After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still valid.
39	Switchover between main frequency source X and preset frequency	After this terminal becomes ON, the frequency source X is replaced by the preset frequency set in P0-08.
40	Switchover between auxiliary frequency source Y and preset frequency	After this terminal is enabled, the frequency source Y is replaced by the preset frequency set in P0-08.
43	PID parameter switchover	If the PID parameters switchover performed by means of DI terminal (PA-18 = 1), the PID parameters are PA-05 to PA-07 when the terminal becomes OFF; the PID parameters are PA-15 to PA-17 when this terminal becomes ON.
44	User-defined fault 1	If these two terminals become ON, the AC drive reports Err27 and Err28 respectively, and performs fault protection actions based on the setting in P9-49.
45	User-defined fault 2	
46	Speed control/Torque control switchover	This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in E0-00. When this terminal becomes ON, the AC drive switches over to the other control mode.
47	Emergency stop	When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state.
48	External STOP terminal 2	In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4.

Value	Function	Description
49	Deceleration DC braking	When this terminal becomes ON, the AC drive decelerates to the initial frequency of stop DC braking and then switches over to DC braking state.
50	Clear the current running time	When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by P8-42 and P8-53.

The four multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table.

The following table states combinations of the four multi-reference terminals

K4	K3	K2	K1	Reference Setting	Corresponding Parameter
OFF	OFF	OFF	OFF	Reference 0	PC-00
OFF	OFF	OFF	ON	Reference 1	PC-01
OFF	OFF	ON	OFF	Reference 2	PC-02
OFF	OFF	ON	ON	Reference 3	PC-03
OFF	ON	OFF	OFF	Reference 4	PC-04
OFF	ON	OFF	ON	Reference 5	PC-05
OFF	ON	ON	OFF	Reference 6	PC-06
OFF	ON	ON	ON	Reference 7	PC-07
ON	OFF	OFF	OFF	Reference 8	PC-08
ON	OFF	OFF	ON	Reference 9	PC-09
ON	OFF	ON	OFF	Reference 10	PC-10
ON	OFF	ON	ON	Reference 11	PC-11
ON	ON	OFF	OFF	Reference 12	PC-12
ON	ON	OFF	ON	Reference 13	PC-13
ON	ON	ON	OFF	Reference 14	PC-14
ON	ON	ON	ON	Reference 15	PC-15

If the frequency source is multi-reference, the value 100% of PC-00 to PC-15 corresponds to the value of P0-10 (Maximum frequency).

Besides the multi-speed function, the multi-reference can be also used as the PID setting

source or the voltage source for V/F separation, satisfying the requirement on switchover of different setting values.

Two terminals for acceleration/deceleration time selection have four state combinations, as listed in the following table.

The following table states combinations of two terminals for acceleration/deceleration time selection

Terminal 2	Terminal 1	Acceleration/Deceleration Time Selection	Corresponding Parameters
OFF	OFF	Acceleration/Deceleration time 1	P0-17, P0-18
OFF	ON	Acceleration/Deceleration time 2	P8-03, P8-04
ON	OFF	Acceleration/Deceleration time 3	P8-05, P8-06
ON	ON	Acceleration/Deceleration time 4	P8-07, P8-08

Function Code	Parameter Name	Setting Range	Default
P4-10	DI filter time	0.000-1.000s	0.010s

It is used to set the software filter time of DI terminal status. If DI terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of DI filter time will reduce the response of DI terminals.

Function Code	Parameter Name	Setting Range	Default
P4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0

This parameter is used to set the mode in which the AC drive is controlled by external terminals. The following uses DI1, DI2 and DI3 among DI1 to DI5 as an example, with allocating functions of DI1, DI2 and DI3 by setting P4-00 to P4-02.

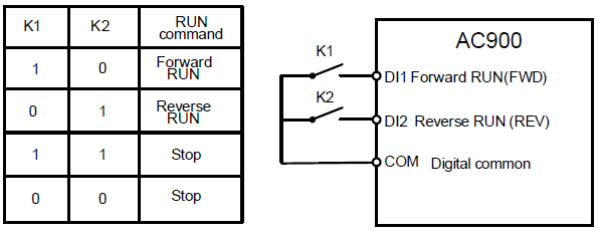
- 0: Two-line mode 1

It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor

is decided by DI1 and DI2. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
P4-11	Terminal command mode	0	Two-line 1
P4-00	DI1 function selection	1	Forward RUN (FWD)
P4-01	DI2 function selection	2	Reverse RUN (REV)

Figure 4-6 Setting of two-line mode 1



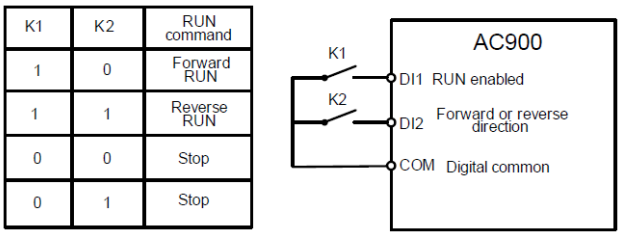
As shown in the preceding figure, when only K1 is ON, the AC drive instructs forward rotation. When only K2 is ON, the AC drive instructs reverse rotation. When K1 and K2 are ON or OFF simultaneously, the AC drive stops.

- 1: Two-line mode 2

In this mode, DI1 is RUN enabled terminal, and DI2 determines the running direction. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
P4-11	Terminal command mode	1	Two-line 2
P4-00	DI1 function selection	1	RUN enabled
P4-01	DI2 function selection	2	Forward or reverse direction

Figure 4-7 Setting of two-line mode 2



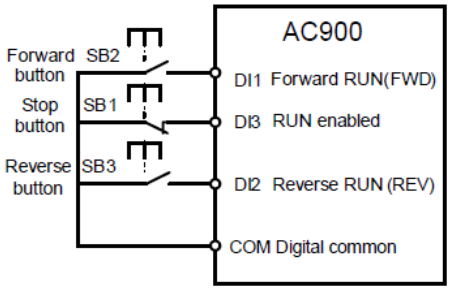
As shown in the preceding figure, if K1 is ON, the AC drive instructs forward rotation when K2 is OFF, and instructs reverse rotation when K2 is ON. If K1 is OFF, the AC drive stops.

- 2: Three-line mode 1

In this mode, DI3 is RUN enabled terminal, and the direction is decided by DI1 and DI2. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
P4-11	Terminal command mode	2	Three-line 1
P4-00	DI1 function selection	1	Forward RUN (FWD)
P4-01	DI2 function selection	2	Reverse RUN (REV)
P4-02	DI3 function selection	3	Three-line control

Figure 4-8 Setting of three-line mode 1



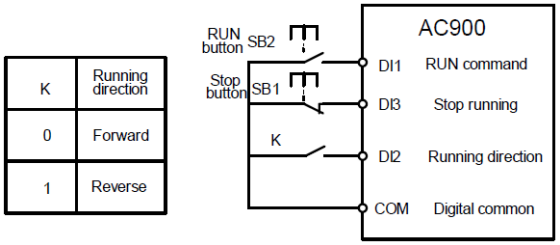
As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON. The AC drives stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions on SB1, SB2 and SB3.

- 3: Three-line mode 2

In this mode, DI3 is RUN enabled terminal. The RUN command is given by DI1 and the direction is decided by DI2. The parameters are set as below:

Function Code	Parameter Name	Value	Function Description
P4-11	Terminal command mode	3	Three-line 2
P4-00	DI1 function selection	1	RUN enabled
P4-01	DI2 function selection	2	Forward or reverse direction
P4-02	DI3 function selection	3	Three-line control

Figure 4-9 Setting of three-line mode 2



As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON; the AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drives stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions of SB1, SB2 and K.

Function Code	Parameter Name	Setting Range	Default
P4-12	Terminal UP/DOWN rate	0.01-65.535 Hz/s	1.00 Hz/s

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

- If P0-22 (Frequency reference resolution) is 2, the setting range is 0.001-65.535 Hz/s.
- If P0-22 (Frequency reference resolution) is 1, the setting range is 0.01-655.35 Hz/s.

Function Code	Parameter Name	Setting Range	Default
P4-13	AI curve 1 minimum input	0.00 V to P4-15	0.00 V
P4-14	Corresponding setting of AI curve 1 minimum input	-100.00%-100.0%	0.0%
P4-15	AI curve 1 maximum input	P4-13 to 10.00 V	10.00 V
P4-16	Corresponding setting of AI curve 1 maximum input	-100.00%-100.0%	100.0%
P4-17	AI1 filter time	0.00-10.00s	0.10s

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (P4- 15), the maximum value is used. When the analog input voltage is less than the minimum value (P4-13), the value set in P4-34 (Setting for AI less than minimum input) is used.

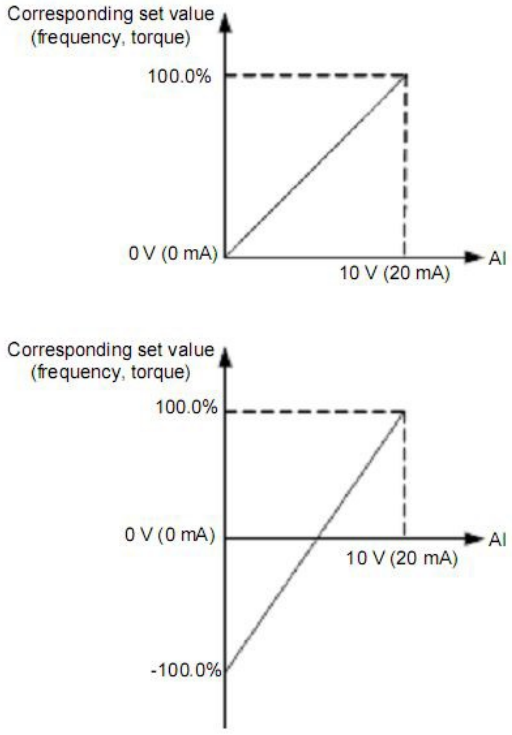
When the analog input is current input, 1mA current corresponds to 0.5 V voltage.

P4-17 (AI1 filter time) is used to set the software filter time of AI1. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions

In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.

Figure 4-10 Corresponding relationship between analog input and set values



Function Code	Parameter Name	Setting Range	Default
P4-18	AI curve 2 minimum input	0.00 V to P4-20	0.00 V
P4-19	Corresponding setting of AI curve 2 minimum input	-100.00%-100.0%	0.0%
P4-20	AI curve 2 maximum input	P4-18 to 10.00 V	10.00 V
P4-21	Corresponding setting of AI curve 2 maximum input	-100.00%-100.0%	100.0%
P4-22	AI2 filter time	0.00-10.00s	0.10s

The method of setting AI2 functions is similar to that of setting AI1 function.

Function Code	Parameter Name	Setting Range	Default
P4-28	Pulse minimum input	0.00 kHz to P4-30	0.00 kHz
P4-29	Corresponding setting of pulse minimum input	-100.00%-100.0%	0.0%
P4-30	Pulse maximum input	P4-28 to 50.00 kHz	50.00 kHz
P4-31	Corresponding setting of pulse maximum input	-100.00%-100.0%	100.0%
P4-32	Pulse filter time	0.00-10.00s	0.10s

These parameters are used to set the relationship between DI5 pulse frequency and corresponding settings. The pulses can only be input by DI5. The method of setting this function is similar to that of setting AI1 function.

Function Code	Parameter Name	Setting Range	Default
P4-33	AI curve selection	Unit's digit (AI1 curve selection)	321
		Curve 1 (2 points, see P4-13 to P4-16) Curve 2 (2 points, see P4-18 to P4-21) Curve 3 (Reserved) Curve 4 (4 points, see E6-00 to E6-07) Curve 5 (4 points, see E6-08 to E6-15)	
		Ten's digit (AI2 curve selection)	
		Curve 1 to curve 5 (same as AI1)	
		Hundred's digit	
		Reserved	

The unit's digit, ten's digit and hundred's digit of this parameter are respectively used to select

the corresponding curve of AI1, AI2. Any of the four curves can be selected for AI1, AI2.

Curve 1 and curve 2 are all 2-point curves, set in group P4. Curve 4 and curve 5 are both 4-point curves, set in group E6.

The AC900 provides two AI terminals as standard.

Function Code	Parameter Name	Setting Range	Default
P4-34	Setting for AI less than minimum input	Unit's digit (Setting for AI1 less than minimum input)	00
		0: Minimum value 1: 0.0%	
		Ten's digit (Setting for AI2 less than minimum input)	
		0, 1 (same as AI1)	
		Hundred's digit	
		Reserved	

This parameter is used to determine the corresponding setting when the analog input voltage is less than the minimum value. The unit's digit, ten's digit and hundred's digit of this parameter respectively correspond to the setting for AI2, AI2 and Reserved.

If the value of a certain digit is 0, when analog input voltage is less than the minimum input, the corresponding setting of the minimum input (P4-14, P4-19, P4-24) is used.

If the value of a certain digit is 1, when analog input voltage is less than the minimum input, the corresponding value of this analog input is 0.0%.

Function Code	Parameter Name	Setting Range	Default
P4-35	DI1 delay time	0.0-3600.0s	0.0s
P4-36	DI2 delay time	0.0-3600.0s	0.0s
P4-37	DI3 delay time	0.0-3600.0s	0.0s

These parameters are used to set the delay time of the AC drive when the status of DI terminals changes.

Currently, only DI1, DI2 and DI3 support the delay time function.

Function Code	Parameter Name	Setting Range	Default
P4-38	DI valid mode selection 1	Unit's digit (DI1 valid mode) 0: High level valid 1: Low level valid Ten's digit (DI2 valid mode) 0, 1 (same as DI1) Hundred's digit (DI3 valid mode) 0, 1 (same as DI1) Thousand's digit (DI4 valid mode) 0, 1 (same as DI1) Ten thousand's digit (DI5 valid mode) 0, 1 (same as DI1)	00000

These parameters are used to set the valid mode of DI terminals.

• 0: High level valid

The DI terminal is valid when being connected with COM, and invalid when being disconnected from COM.

• 1: Low level valid

The DI terminal is invalid when being connected with COM, and invalid when being disconnected from COM.

Group P5: Output Terminals

The AC900 provides an analog output (AO) terminal, a digital output (DO) terminal, a relay terminal and a FM terminal (used for high-speed pulse output or open-collector switch signal output) as standard.

Function Code	Parameter Name	Setting Range	Default
P5-00	FM terminal output mode	0: Pulse output (FMP) 1: Switch signal output (FMR)	0

The FM terminal is programmable multiplexing terminal. It can be used for high-speed pulse output (FMP), with maximum frequency of 100 kHz. Refer to P5-06 for relevant functions of FMP. It can also be used as open collector switch signal output (FMR)

Function Code	Parameter Name	Default
P5-01	FMR function (open-collector output terminal)	0
P5-02	Relay function (T/A-T/B-T/C)	2
P5-04	DO1 function selection (open-collector output terminal)	1

These three parameters are used to select the functions of the three digital output terminals. T/A-T/B-T/C are respectively the relays on the control board card.

The functions of the output terminals are described in the following table

Table Functions of output terminals

Value	Function	Description
0	No output	The terminal has no function.
1	AC drive running	When the AC drive is running and has output frequency (can be zero), the terminal becomes ON.
2	Fault output (stop)	When the AC drive stops due to a fault, the terminal becomes ON.
3	Frequency-level detection FDT1 output	Refer to the descriptions of P8-19 and P8-20.
4	Frequency reached	Refer to the descriptions of P8-21.
5	Zero-speed running (no output at stop)	If the AC drive runs with the output frequency of 0, the terminal becomes ON. If the AC drive is in the stop state, the terminal becomes OFF.
6	Motor overload pre-warning	The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of P9-00 to P9-02.
7	AC drive overload pre- warning	The terminal becomes ON 10s before the AC drive overload protection action is performed.
8	Set count value reached	The terminal becomes ON when the count value reaches the value set in Pb-08.
9	Designated count value reached	The terminal becomes ON when the count value reaches the value set in Pb-09.
11	PLC cycle complete	When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms.
12	Accumulative running time reached	If the accumulative running time of the AC drive exceeds the time set in P8-17, the terminal becomes ON.
13	Frequency limited	If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON.
14	Torque limited	In speed control mode, if the output torque reaches the torque limit, the AC drive enters the stall protection state and meanwhile the terminal becomes ON.

Value	Function	Description
15	Ready for RUN	If the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON.
16	AI1 larger than AI2	When the input of AI1 is larger than the input of AI2, the terminal becomes ON.
17	Frequency upper limit reached	If the running frequency reaches the upper limit, the terminal becomes ON.
18	Frequency lower limit reached (no output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF.
19	Undervoltage state output	If the AC drive is in undervoltage state, the terminal becomes ON.
20	Communication setting	Refer to the communication protocol.
23	Zero-speed running 2 (having output at stop)	If the output frequency of the AC drive is 0, the terminal becomes ON. In the state of stop, the signal is still ON.
24	Accumulative power-on time reached	If the AC drive accumulative power-on time (P7-13) exceeds the value set in P8-16, the terminal becomes ON.
25	Frequency level detection FDT2 output	Refer to the descriptions of P8-28 and P8-29.
26	Frequency 1 reached	Refer to the descriptions of P8-30 and P8-31.
27	Frequency 2 reached	Refer to the descriptions of P8-32 and P8-33.
28	Current 1 reached	Refer to the descriptions of P8-38 and P8-39.
29	Current 2 reached	Refer to the descriptions of P8-40 and P8-41.
30	Timing reached	If the timing function (P8-42) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time.
31	AI1 input limit exceeded	If AI1 input is larger than the value of P8-46 (AI1 input voltage upper limit) or lower than the value of P8-45 (AI1 input voltage lower limit), the terminal becomes ON.
32	Load becoming 0	If the load becomes 0, the terminal becomes ON.
33	Reverse running	If the AC drive is in the reverse running state, the terminal becomes ON.
34	Zero current state	Refer to the descriptions of P8-28 and P8-29.
35	Module temperature reached	If the heatsink temperature of the inverter module (P7-07) reaches the set module temperature threshold (P8-47), the terminal becomes ON.
36	Software current limit exceeded	Refer to the descriptions of P8-36 and P8-37.

Value	Function	Description
37	Frequency lower limit reached (having output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the signal is still ON.
38	Alarm output	If a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal.
40	Current running time reached	If the current running time of AC drive exceeds the value of 8-53, the terminal becomes ON.
41	Fault Output	Fault output is the fault of coasting to stop and no output in occasion of under voltage.

Function Code	Parameter Name	Default
P5-06	FMP function selection	0
P5-07	AO1 function selection	0

The output pulse frequency of the FMP terminal ranges from 0.01 kHz to "Maximum FMP output frequency" (P5-09). The value of P5-09 is between 0.01 kHz and 100.00 kHz.

The output range of AO1 is 0-10 V or 0-20 mA. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table.

Table Relationship between pulse and analog output ranges and corresponding functions

Value	Function	Range (Corresponding to Pulse or Analog Output Range 0.0%-100.0%)
0	Running frequency	0 to maximum output frequency
1	Set frequency	0 to maximum output frequency
2	Output current	0 to 2 times of rated motor current
3	Output torque (absolute value)	0 to 2 times of rated motor torque
4	Output power	0 to 2 times of rated power
5	Output voltage	0 to 1.2 times of rated AC drive voltage
6	Pulse input	0.01-100.00 kHz
7	AI1	0-10 V
8	AI2	0-10 V (or 0-20mA)
9	Keyboard potentiometer	
10	Length	0 to maximum set length
11	Count value	0 to maximum count value
12	Communication setting	0.0%-100.0%

Value	Function	Range (Corresponding to Pulse or Analog Output Range 0.0%-100.0%)
13	Motor rotational speed	0 to rotational speed corresponding to maximum output frequency
14	Output current	0.0-1000.0 A
15	Output voltage	0.0-1000.0 V
16	Output torque (actual value)	-2 times of rated motor torque to 2 times of rated motor torque

Function Code	Parameter Name	Setting Range	Default
P5-09	Maximum FMP output frequency	0.01-100.00 kHz	50.00 kHz

If the FM terminal is used for pulse output, this parameter is used to set the maximum frequency of pulse output.

Function Code	Parameter Name	Setting Range	Default
P5-10	AO1 offset coefficient	-100.0%-100.0%	0.0%
P5-11	AO1 gain	-10.00-10.00	1.00

These parameters are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve.

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output, the actual output is: Y = kX + b.

The zero offset coefficient 100% of AO1 corresponds to 10 V (or 20mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20mA) with no zero offset or gain adjustment.

For example, if the analog output is used as the running frequency, and it is expected that the output is 8 V when the frequency is 0 and 3 V at the maximum frequency, the gain shall be set to -0.50, and the zero offset shall be set to 80%.

Function Code	Parameter Name	Setting Range	Default
P5-17	FMR output delay time	0.0-3600.0s	0.0s
P5-18	Relay 1 output close delay time	0.0-3600.0s	0.0s
P5-20	DO1 output delay time	0.0-3600.0s	0.0s

Function Code	Parameter Name	Setting Range	Default
P5-22	DO valid mode selection	Unit's digit (FMR valid mode)	00000
		0: Positive logic 1: Negative logic	
		Ten's digit (Relay 1 valid mode)	
		0, 1 (same as FMR)	
		Hundred's digit	
		Reserved	
		Thousand's digit (DO1 valid mode)	
		0, 1 (same as FMR)	
		Ten thousand's digit	
		Reserved	

It is used to set the logic of output terminals FMR, relay 1 and DO1.

• 0: Positive logic

The output terminal is valid when being connected with COM, and invalid when being disconnected from COM.

• 1: Positive logic

The output terminal is invalid when being connected with COM, and valid when being disconnected from COM.

Group P6: Start/Stop Control

Function Code	Parameter Name	Setting Range	Default
P6-00	Start mode	0: Direct start 1: Rotational speed tracking restart 2: Pre-excited start (asynchronous motor)	0

- 0: Direct start

If the DC braking time is set to 0, the AC drive starts to run at the startup frequency.

If the DC braking time is not 0, the AC drive performs DC braking first and then starts to run at the startup frequency. It is applicable to small-inertia load application where the motor is likely to rotate at startup.

- 1: Rotational speed tracking restart

The AC drive judges the rotational speed and direction of the motor first and then starts at the tracked frequency. Such smooth start has no impact on the rotating motor. It is applicable to the restart upon instantaneous power failure of large-inertia load. To ensure the performance of rotational speed tracking restart, set the motor parameters in group P1 correctly.

- 2: Pre-excited start (asynchronous motor)

It is valid only for asynchronous motor and used for building the magnetic field before the motor runs. For pre-excited current and pre-excited time, see parameters of P6-05 and P6-06.

If the pre-excited time is 0, the AC drive cancels pre-excitation and starts to run at startup frequency.

If the pre-excited time is not 0, the AC drive pre-excites first before startup, improving the dynamic response of the motor.

Function Code	Parameter Name	Setting Range	Default
P6-01	Rotational speed tracking mode	0: From frequency at stop 1: From zero speed 2: From maximum frequency	0

To complete the rotational speed tracking process within the shortest time, select the proper mode in which the AC drive tracks the motor rotational speed.

• 0: From frequency at stop

It is the commonly selected mode.

• 1: From zero frequency

It is applicable to restart after a long time of power failure.

• 2: From the maximum frequency

It is applicable to the power-generating load.

Function Code	Parameter Name	Setting Range	Default
P6-02	Rotational speed tracking speed	1-100	20

In the rotational speed tracking restart mode, select the rotational speed tracking speed. The larger the value is, the faster the tracking is. However, too large value may cause unreliable tracking.

Function Code	Parameter Name	Setting Range	Default
P6-03	Startup frequency	0~10.00Hz	0.00 Hz
P6-04	Startup frequency holding time	0.0-100.0s	0.0s

To ensure the motor torque at AC drive startup, set a proper startup frequency. In addition, to build excitation when the motor starts up, the startup frequency must be held for a certain period.

The startup frequency (P6-03) is not restricted by the frequency lower limit. If the set target frequency is lower than the startup frequency, the AC drive will not start and stays in the standby state.

During switchover between forward rotation and reverse rotation, the startup frequency holding time is disabled. The holding time is not included in the acceleration time but in the running time of simple PLC.

Example 1:

P0-03 = 0	The frequency source is digital setting.
P0-08 = 2.00 Hz	The digital setting frequency is 2.00 Hz.
P6-03 = 5.00 Hz	The startup frequency is 5.00 Hz.
P6-04 = 2.0s	The startup frequency holding time is 2.0s.

In this example, the AC drive stays in the standby state and the output frequency is 0.00 Hz.

Example 2:

P0-03 = 0	The frequency source is digital setting.
P0-08 = 10.0 0 Hz	The digital setting frequency is 10.00 Hz.
P6-03 = 5.00 Hz	The startup frequency is 5.00 Hz.
P6-04 = 2.0s	The startup frequency holding time is 2.0s.

In this example, the AC drive accelerates to 5.00 Hz, and then accelerates to the set frequency 10.00 Hz after 2s.

Function Code	Parameter Name	Setting Range	Default
P6-05	Startup DC braking current/Pre-excited current	0%-100%	0%
P6-06	Startup DC braking time/Pre-excited time	0.0-100.0s	0.0s

Startup DC braking is generally used during restart of the AC drive after the rotating motor stops. Pre-excitation is used to make the AC drive build magnetic field for the asynchronous motor before startup to improve the responsiveness.

Startup DC braking is valid only for direct start. In this case, the AC drive performs DC braking at the set startup DC braking current. After the startup DC braking time, the AC drive starts to run. If the startup DC braking time is 0, the AC drive starts directly without DC braking. The larger the startup DC braking current is, the larger the braking force is.

If the startup mode is pre-excited start, the AC drive builds magnetic field based on the set pre-excited current. After the pre-excited time, the AC drive starts to run. If the pre-excited time is 0, the AC drive starts directly without pre-excitation.

The startup DC braking current or pre-excited current is a percentage relative to the base value.

Function Code	Parameter Name	Setting Range	Default
P6-07	Acceleration/ Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration A 2: S-curve acceleration/deceleration B	0

It is used to set the frequency change mode during the AC drive start and stop process.

- 0: Linear acceleration/deceleration

The output frequency increases or decreases in linear mode. The AC900 provides four group of acceleration/deceleration time, which can be selected by using P4-00 to P4-08.

- 1: S-curve acceleration/deceleration A

The output frequency increases or decreases along the S curve. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. P6-08 and P6-09 respectively define the time proportions of the start segment and the end segment.

- 2: S-curve acceleration/deceleration B

In this curve, the rated motor frequency fb is always the inflexion point. This mode is usually used in applications where acceleration/deceleration is required at the speed higher than the rated frequency.

When the set frequency is higher than the rated frequency, the acceleration/ deceleration time is:

$$t=(\frac{4}{9}\times(\frac{f}{f_b})^2+\frac{5}{9})\times T$$

In the formula, f is the set frequency, is the rated motor frequency and T is the acceleration time from 0 Hz to fb.

Function Code	Parameter Name	Setting Range	Default
P6-08	Time proportion of S-curve start segment	0.0% to (100.0% - P6-09)	30.0%
P6-09	Time proportion of S-curve end segment	0.0% to (100.0% - P6-08)	30.0%

These two parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement: P6-08 +P6-09 ≤ 100.0%.

In Figure 4-11, t1 is the time defined in P6-08, within which the slope of the output frequency change increases gradually. t2 is the time defined in P6-09, within which the slope of the output frequency change gradually decreases to 0. Within the time between t1 and t2, the slope of the output frequency change remains unchanged, that is, linear acceleration/ deceleration.

Figure 4-11 S-curve acceleration/deceleration A

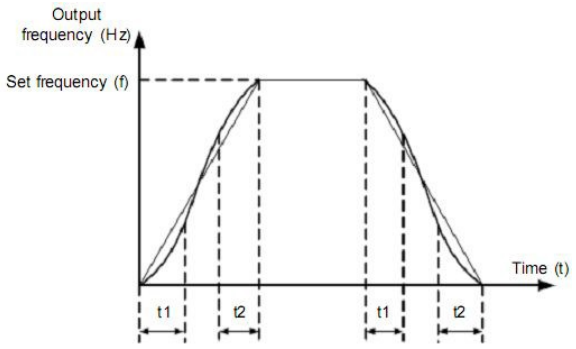
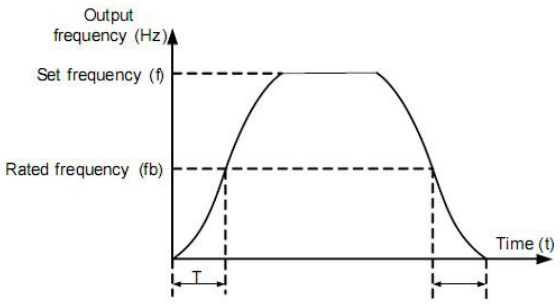


Figure 4-12 S-curve acceleration/deceleration B



Function Code	Parameter Name	Setting Range	Default
P6-10	Stop mode	0: Decelerate to top 1: Coast to stop	0

- 0: Decelerate to stop

After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

- 1: Coast to stop

After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

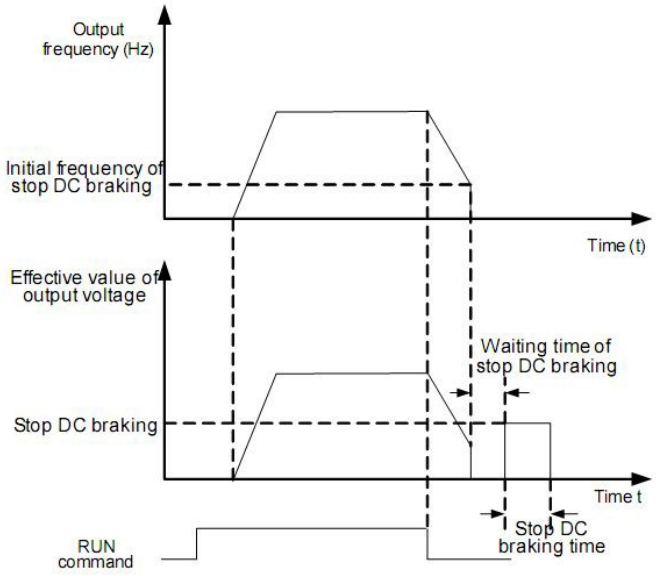
Function Code	Parameter Name	Setting Range	Default
P6-11	Initial frequency of stop DC braking	0.00 Hz to maximum frequency	0.00 Hz
P6-12	Waiting time of stop DC braking	0.0-100.0s	0.0S
P6-13	Stop DC braking current	0%-100%	0%
P6-14	Stop DC braking time	0.0-100.0s	0.0s

- Initial frequency of stop DC braking: During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in P6-11.
- Waiting time of stop DC braking: When the running frequency decreases to the initial frequency of stop DC braking, the AC drive stops output for a certain period and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed.
- Stop DC braking current: Ts parameter specifies the output current at DC braking and is a percentage relative to the base value.

- Stop DC braking time: This parameter specifies the holding time of DC braking. If it is set to 0, DC braking is cancelled.

  The stop DC braking process is shown in the following figure.

  Figure 4-13 Stop DC braking process



Function Code	Parameter Name	Setting Range	Default
P6-15	Brake use ratio	0%-100%	100%

It is valid only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

Group P7: Operation Panel and Display

Function Code	Parameter Name	Setting Range	Default
P7-01	MF.K Key function selection	0: MF.K key disabled 1: Switchover between operation panel control and remote command control (terminal or communication) 2: Switchover between forward rotation and reverse rotation 3: Forward JOG 4: Reverse JOG	0

MF.K key refers to multifunctional key. You can set the function of the MF.K key by using this parameter. You can perform switchover by using this key both in stop or running state.

- 0: MF.K key disabled

  This key is disabled.

- 1: Switchover between operation panel control and remote command control (terminal or communication)

  You can perform switchover from the current command source to the operation panel control (local operation). If the current command source is operation panel control, this key is invalid.

- 2: Switchover between forward rotation and reverse rotation

  You can change the direction of the frequency reference by using the MF.K key. It is valid only when the current command source is operation panel control.

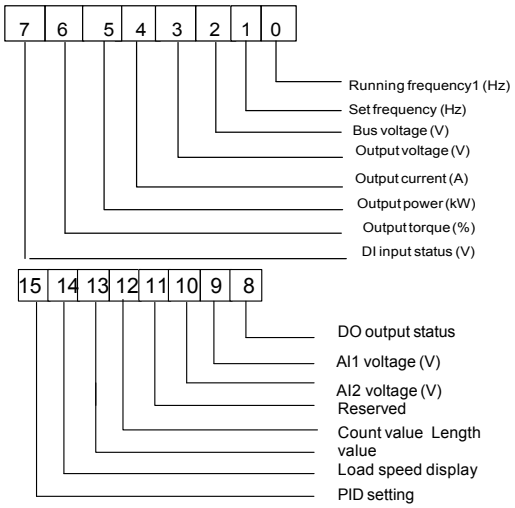
- 3: Forward JOG

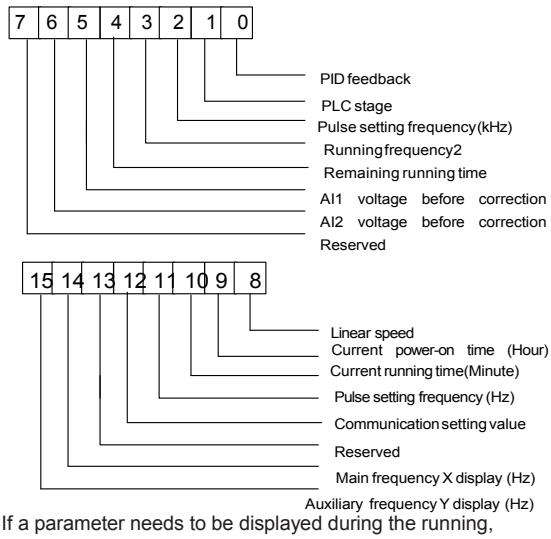
  You can perform forward JOG (FJOG) by using the MF.K key.

- 4: Reverse JOG

  You can perform reverse JOG (FJOG) by using the MF.K key.

Function Code	Parameter Name	Setting Range	Default
P7-02	STOP/RESET key function	0: STOP/RESET key enabled only in operation panel control 1: STOP/RESET key enabled in any operation mode	1

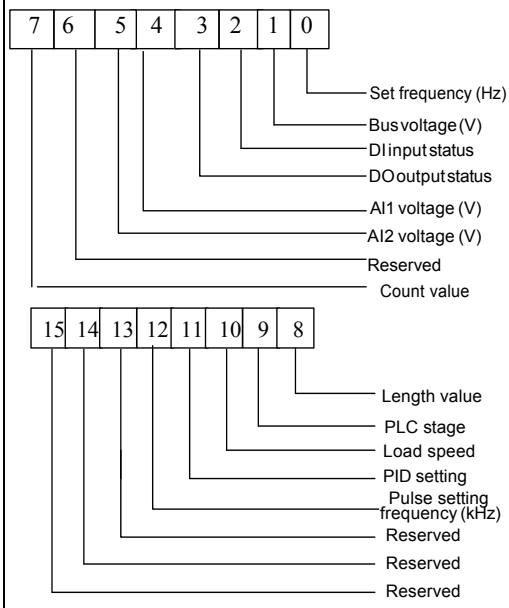
<table>
<tr><th>Function Code</th><th>Parameter Name</th><th>Setting Range</th><th>Default</th></tr>
<tr><td>P7-03</td><td>LED display running parameters 1</td><td>0000-FFFF
 

If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number.</td><td>1F</td></tr>
<tr><td>P7-04</td><td>LED display running parameters 2</td><td>0000-FFFF
 

If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number.</td><td>0</td></tr>
</table>

These two parameters are used to set the parameters that can be viewed when the AC drive is

in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of P7-03.

Function Code	Parameter Name	Setting Range	Default
P7-05	LED display stop parameters	0000-FFFF  If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-05 to the hexadecimal equivalent of this binary number.	0

Function Code	Parameter Name	Setting Range	Default
P7-06	Load speed display coefficient	0.0001-6.5000	1.0000

This parameter is used to adjust the relationship between the output frequency of the AC drive and the load speed. For details, see the description of P7-12.

Function Code	Parameter Name	Setting Range	Default
P7-07	Heatsink temperature of inverter module	0.0-100.0°C	0°C

It is used to display the insulated gate bipolar transistor (IGBT) temperature of the inverter module, and the IGBT overheat protection value of the inverter module depends on the model.

Function Code	Parameter Name	Setting Range	Default
P7-08	Passwords for timing stop	0-65535	0

It is used to Passwords for timing stop.

Function Code	Parameter Name	Setting Range	Default
P7-09	Accumulative running time	0-65535h	0h

It is used to display the accumulative running time of the AC drive. After the accumulative running time reaches the value set in P8-17, the terminal with the digital output function 12 becomes ON. After the accumulative running time reaches the value set in P7-10, the AC drive will be stopped and reports ERR26 until reset P7-09 or P7-10.

Function Code	Parameter Name	Setting Range	Default
P7-10	Preset value for timing stop	0-65535h	0h

P7-08,P7-9, P7-10 It is used for passwords for timing stop.

If P7-08 is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters. If P7-08 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

P7-12	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	0

P7-12 is used to set the number of decimal places for load speed display. The following gives an example to explain how to calculate the load speed:

Assume that P7-06 (Load speed display coefficient) is 2.000 and P7-12 is 2 (2 decimal places). When the running frequency of the AC drive is 40.00 Hz, the load speed is 40.00 x2.000=80.00 (display of 2 decimal places).

If the AC drive is in the stop state, the load speed is the speed corresponding to the set frequency, namely, "set load speed". If the set frequency is 50.00 Hz, the load speed in the stop state is 50.00 x 2.000 = 100.00 (display of 2 decimal places).

Function Code	Parameter Name	Setting Range	Default
P7-13	Accumulative power-on time	0-65535 h	0h

It is used to display the accumulative power-on time of the AC drive since the delivery. If the time reaches the set power-on time (P8-17), the terminal with the digital output function 24 becomes ON.

Function Code	Parameter Name	Setting Range	Default
P7-14	Accumulative power consumption	0-65535 kWh	/

It is used to display the accumulative power consumption of the AC drive until now.

Group P8: Auxiliary Functions

P8-00	JOG running frequency	Default	5.00Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-01	JOG acceleration time	Default	20.0s
	Setting Range	0.0-6500.0s	
P8-02	JOG deceleration time	Default	20.0s
	Setting Range	0.0-6500.0s	

These parameters are used to define the set frequency and acceleration/deceleration time of the AC drive when jogging.

The startup mode is "Direct start" (P6-00 = 0) and the stop mode is "Decelerate to stop" (P6-10 = 0) during jogging.

P8-03	Acceleration time 2	Default	Model dependent
	Setting Range	0.0-6500.0s	
P8-04	Deceleration time 2	Default	Model dependent
	Setting Range	0.0-6500.0s	
P8-05	Acceleration time 3	Default	Model dependent
	Setting Range	0.0-6500.0s	

P8-06	Deceleration time 3	Default	Model dependent
	Setting Range	0.0-6500.0s	
P8-07	Acceleration time 4	Default	Model dependent
	Setting Range	0.0-6500.0s	
P8-08	Deceleration time 4	Default	Model dependent
	Setting Range	0.0-6500.0s	

The AC900 provides a total of four groups of acceleration/deceleration time, that is, the preceding three groups and the group defined by P0-17 and P0-18.

Definitions of four groups are completely the same. Please see the descriptions of P0-17 to P0-18.

You can switch over between the four groups of acceleration/deceleration time through different state combinations of DI terminals. For more details, see the descriptions of P4-01 to P4-05.

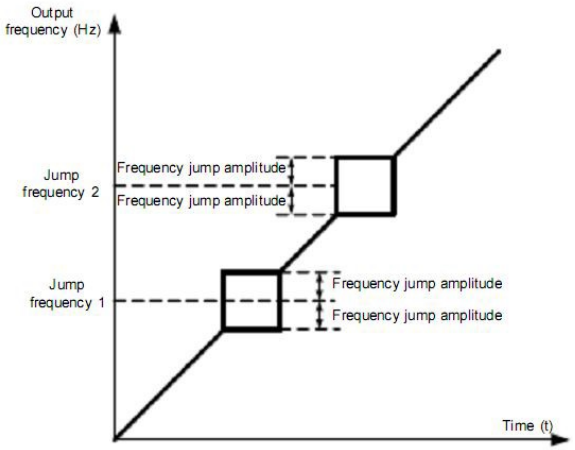
P8-09	Jump frequency 1	Default	0.00Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-10	Jump frequency 2	Default	0.00Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-11	Jump frequency 3	Default	0.00Hz
	Setting Range	0.00 Hz to maximum frequency	

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load.

The AC900 supports two jump frequencies. If both are set to 0, the frequency jump function is disabled.

The principle of the jump frequencies and jump amplitude is shown in the following figure.

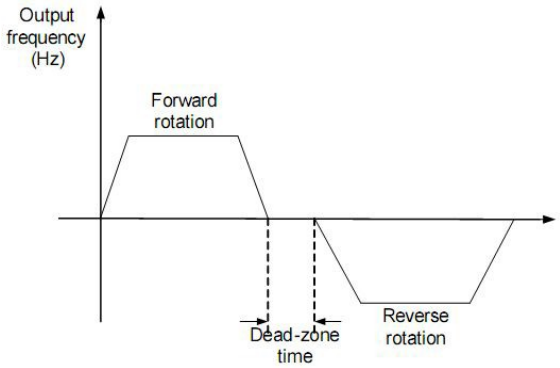
Figure4-14 Principle of the jump frequencies



P8-12	Forward/Reverse rotation dead-zone time	Default	0.00s
	Setting Range	0.0-3000.0s	

It is used to set the time when the output is 0 Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

Figure 4-15 Forward/Reverse rotation dead-zone time



P8-13	Reverse control		Default	0
	Setting Range	0	Enabled	
		1	Disabled	

It is used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to P8-13=1.

P8-14	Running mode when set frequency lower than frequency lower limit		Default	0
	Setting Range	0	Run at frequency lower limit	
		1	Stop	
		2	Run at zero speed	

It is used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The AC900 provides three running modes to satisfy requirements of various applications.

P8-15	Droop control	Default	0.00Hz
	Setting Range	0.00-10.00 Hz	

This function is used for balancing the workload allocation when multiple motors are used to drive the same load.

The output frequency of the AC drives decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

The parameter indicates the drop-out value of output frequency when AC driver outputs rated load.

P8-16	Accumulative power-on time threshold	Default	0h
	Setting Range	0-65000 h	

If the accumulative power-on time (P7-13) reaches the value set in P8-16, the corresponding DO terminal becomes ON.

P8-17	Accumulative running time threshold	Default	0h
	Setting Range	0-65000 h	

It is used to set the accumulative running time threshold of the AC drive.

If the accumulative running time (P7-09) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

P8-18	Startup protection		Default	0
	Setting Range	0	No	
		1	Yes	

This parameter is used to set whether to enable the safety protection.

If it is set to 1, the AC drive does not respond to the run command valid upon AC drive power-on (for example, an input terminal is ON before power-on). The AC drive responds only after the run command is cancelled and becomes valid again.

In addition, the AC drive does not respond to the run command valid upon fault reset of the AC drive. The run protection can be disabled only after the run command is cancelled.

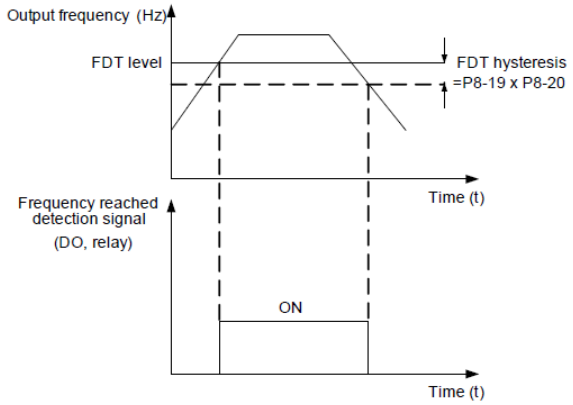
In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

P8-19	Frequency detection value (FDT1)	Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-20	Frequency detection hysteresis (FDT hysteresis 1)	Default	5.0%
	Setting Range	0.0%-100.0% (FDT1 level)	

If the running frequency is higher than the value of P8-19, the corresponding DO terminal becomes ON. If the running frequency is lower than value of P8-19, the DO terminal goes OFF

These two parameters are respectively used to set the detection value of output frequency and hysteresis value upon cancellation of the output. The value of P8-20 is a percentage of the hysteresis frequency to the frequency detection value (P8-19). The FDT function is shown in the following figure.

Figure 4-16 FDT level

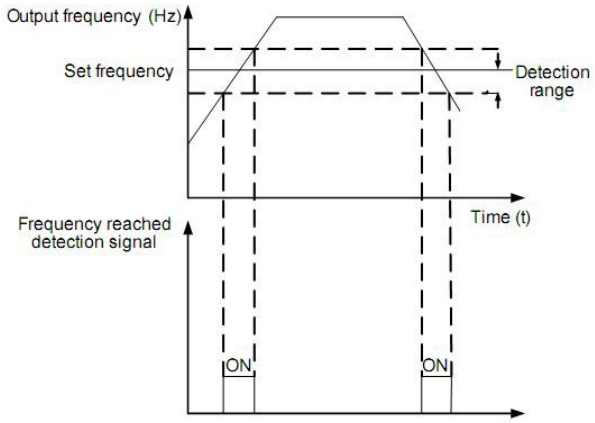


P8-21	Detection range of frequency reached	Default	0.0%
	Setting Range	0.00-100% (maximum frequency)	

If the AC drive running frequency is within the certain range of the set frequency, the corresponding DO terminal becomes ON.

This parameter is used to set the range within which the output frequency is detected to reach the set frequency. The value of this parameter is a percentage relative to the maximum frequency. The detection range of frequency reached is shown in the following figure.

Figure 4-17 Detection range of frequency reached

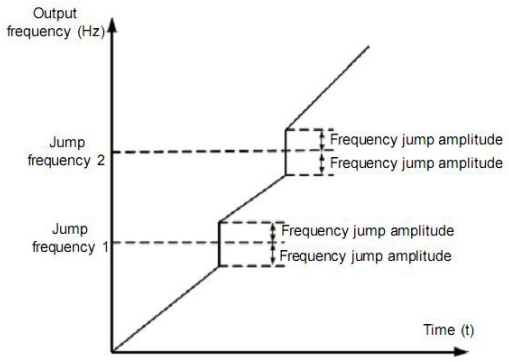


P8-22	Jump frequency during acceleration/deceleration		Default	0
	Setting Range	0	Disabled	
		0	Enabled	

It is used to set whether the jump frequencies are valid during acceleration/deceleration.

When the jump frequencies are valid during acceleration/deceleration, and the running frequency is within the frequency jump range, the actual running frequency will jump over the set frequency jump amplitude. The following figure shows the diagram when the jump frequencies are valid during acceleration/deceleration.

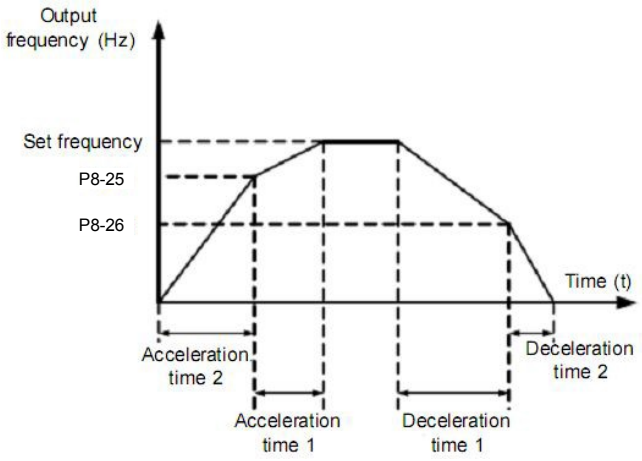
Figure 4-18 Diagram when the jump frequencies are valid during acceleration/deceleration



P8-25	Frequency switchover point between acceleration time 1 and acceleration time 2	Default	0.00 Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-26	Frequency switchover point between deceleration time 1 and deceleration time 2	Default	0.00Hz
	Setting Range	0.00 Hz to maximum frequency	

This function is valid when motor 1 is selected and acceleration/deceleration time switchover is not performed by means of DI terminal. It is used to select different groups of acceleration/ deceleration time based on the running frequency range rather than DI terminal during the running process of the AC drive.

Figure 4-19 Acceleration/deceleration time switchover



During acceleration, if the running frequency is smaller than the value of P8-25, acceleration time 2 is selected. If the running frequency is larger than the value of P8-25, acceleration time 1 is selected.

During deceleration, if the running frequency is larger than the value of P8-26, deceleration time 1 is selected. If the running frequency is smaller than the value of P8-26, deceleration time 2 is selected.

P8-27	Terminal JOG preferred		Default	0
	Setting Range	0	Disabled	
		1	Enabled	

It is used to set whether terminal JOG is preferred.

If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

P8-28	Frequency detection value (FDT2)	Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-29	Frequency detection hysteresis(FDT hysteresis 2)	Default	5.0%
	Setting Range	0.0%-100.0% (FDT2 level)	

The frequency detection function is the same as FDT1 function. For details, refer to the

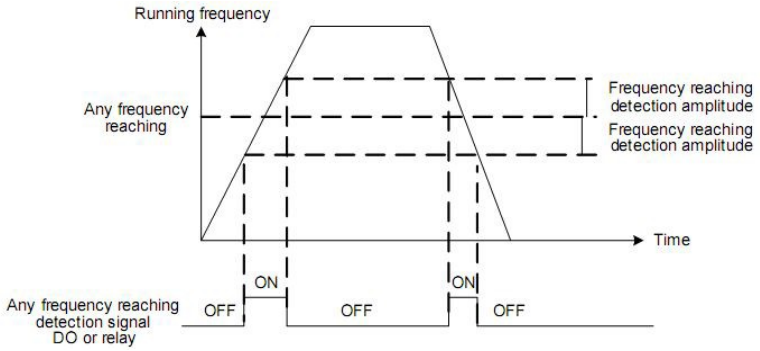
descriptions of P8-19 and P8-20.

P8-30	Any frequency reaching detection value 1	Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-31	Any frequency reaching detection amplitude 1	Default	0.0%
	Setting Range	0.0%-100.0% (maximum frequency)	
P8-32	Any frequency reaching detection value 2	Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency	
P8-33	Any frequency reaching detection amplitude 2	Default	0.0%
	Setting Range	0.0%-100.0% (maximum frequency)	

If the output frequency of the AC drive is within the positive and negative amplitudes of the any frequency reaching detection value, the corresponding DO becomes ON.

The AC900 provides two groups of any frequency reaching detection parameters, including frequency detection value and detection amplitude, as shown in the following figure.

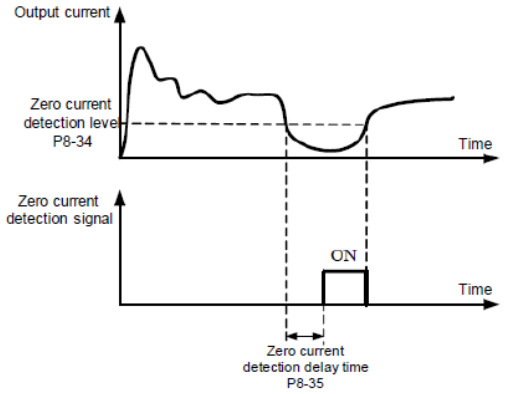
Figure 4-20 Any frequency reaching detection



P8-34	Zero current detection level	Default	5.0%
	Setting Range	0.0%-300.0% (rated motor current)	
P8-35	Zero current detection delay time	Default	0.10s
	Setting Range	0.00-600.00s	

If the output current of the AC drive is equal to or less than the zero current detection level and the duration exceeds the zero current detection delay time, the corresponding DO becomes ON. The zero current detection is shown in the following figure.

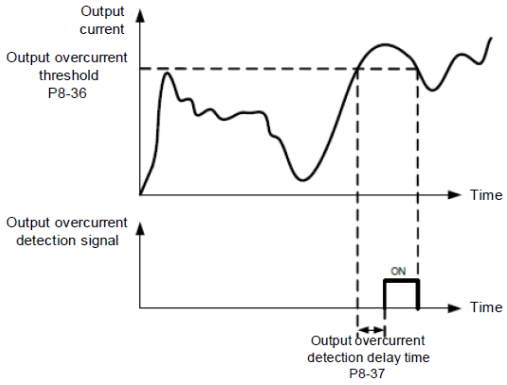
Figure 4-21 Zero current detection



P8-36	Output overcurrent threshold	Default	200.0%
	Setting Range	0.0% (no detection) 0.1%-300.0% (rated motor current)	
P8-37	Output overcurrent detection delay time	Default	0.00s
	Setting Range	0.00-600.00s	

If the output current of the AC drive is equal to or higher than the overcurrent threshold and the duration exceeds the detection delay time, the corresponding DO becomes ON. The output overcurrent detection function is shown in the following figure.

Figure 4-22 Output overcurrent detection

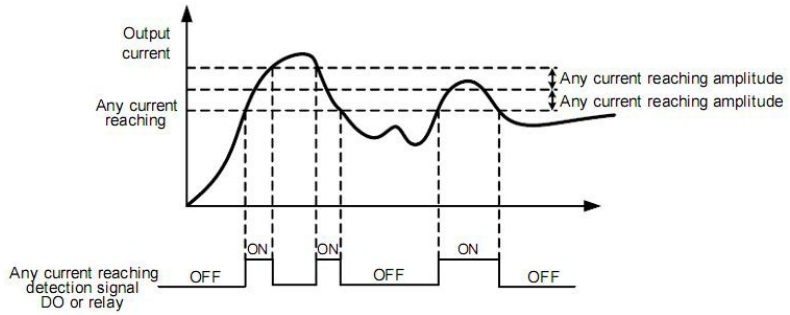


P8-38	Any current reaching 1	Default	100.0%
	Setting Range	0.0%-300.0% (rated motor current)	
P8-39	Any current reaching 1 amplitude	Default	0.0%
	Setting Range	0.0%-300.0% (rated motor current)	
P8-40	Any current reaching 2	Default	100.0%
	Setting Range	0.0%-300.0% (rated motor current)	
P8-41	Any current reaching 2 amplitude	Default	0.0%
	Setting Range	0.0%-300.0% (rated motor current)	

If the output current of the AC drive is within the positive and negative amplitudes of any current reaching detection value, the corresponding DO becomes ON.

The AC900 provides two groups of any current reaching detection parameters, including current detection value and detection amplitudes, as shown in the following figure.

Figure 4-23 Any current reaching detection



P8-42	Timing function		Default	0
	Setting Range	0	Disabled	
		1	Enabled	
P8-43	Timing duration source		Default	0
			0: P8-44 1: AI1 2: AI2 3: Keyboard potentiometer (100% of analog input corresponds to the value of P8-44)	
P8-44	Timing duration source		Default	0.0Min
	Setting Range		0.0-6500.0 Min	

These parameters are used to implement the AC drive timing function.

If P8-42 is set to 1, the AC drive starts to time at startup. When the set timing duration is reached, the AC drive stops automatically and meanwhile the corresponding DO becomes ON.

The AC drive starts timing from 0 each time it starts up and the remaining timing duration can be queried by d0-20.

The timing duration is set in P8-43 and P8-44, in unit of minute.

P8-45	AI1 input voltage lower limit	Default	3.10V
	Setting Range	0.00 V to P8-46	
P8-46	AI1 input voltage upper limit	Default	6.80V
	Setting Range	P8-45 to 10.00 V	

When the AI1 input is larger than the value of P8-46 or smaller than the value of P8-45, the corresponding DO becomes ON, indicating that AI1 input exceeds the limit.

P8-47	Module temperature threshold	Default	75 °C
	Setting Range	0-100°C	

When the heatsink temperature of the AC drive reaches the value of this parameter, the corresponding DO becomes ON, indicating that the module temperature reaches the threshold.

P8-48	Cooling fan control	Default	0
	Setting Range	0: Fan working during running 1: Fan working continuously	

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40°C, and stops working if the heatsink temperature is lower than 40°C.

If this parameter is set to 1, the cooling fan keeps working after power-on.

P8-49	Wakeup frequency	Default	0.00Hz
	Setting Range	Dormant frequency (P8-51) to maximum frequency (P0-10)	
P8-50	Wakeup delay time	Default	0.0s
	Setting Range	0.0s-6500.0s	

P8-51	Dormant frequency	Default	0.00Hz
	Setting Range	0.00 Hz to wakeup frequency (P8-49)	
P8-52	Dormant delay time	Default	0.0s
	Setting Range	0.0s-6500.0s	

These parameters are used to implement the dormant and wakeup functions in the water supply application.

When the AC drive is in running state, the AC drive enters the dormant state and stops automatically after the dormant delay time (P8-52) if the set frequency is lower than or equal to the dormant frequency (P8-51).

When the AC drive is in dormant state and the current running command is effective, the AC drives starts up after the wakeup delay time (P8-50) if the set frequency is higher than or equal to the wakeup frequency (P8-49).

Generally, set the wakeup frequency equal to or higher than the dormant frequency. If the wakeup frequency and dormant frequency are set to 0.00Hz, the dormant and wakeup functions are disabled.

When the dormant function is enabled, if the frequency source is PID, whether PID operation is performed in the dormant state is determined by PA-28. In this case, select PID operation enabled in the stop state (PA-28 = 1).

P8-53	Current running time reached	Default	0.0Min
	Setting Range	0.0 Min-6500.0 Min	

If the current running time reaches the value set in this parameter, the corresponding DO becomes ON, indicating that the current running time is reached.

Group P9: Fault and Protection

P9-00	Motor overload protection selection		Default	1
	Setting Range	0	Disabled	
		1	Enabled	
P9-01	Motor overload protection gain		Default	1.00
	Setting Range		0.20-10.00	

- P9-00 =0

The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the AC drive and the motor.

- P9-00 =1

The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

The inverse time-lag curve of the motor overload protection is:
220% x P9-01 x rated motor current (if the load remains at this value for one minute, the AC drive reports motor overload fault), or 150% x P9-01 x rated motor current (if the load remains at this value for 60 minutes, the AC drive reports motor overload fault)

Set P9-01 properly based on the actual overload capacity. If the value of P9-01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

P9-02	Motor overload warning coefficien	Default	80%
	Setting Range	50% - 100%	

This function is used to give a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which pre- warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by P9-02, the DO terminal on the AC drive allocated with function 6 (Motor overload pre-warning) becomes ON.

P9-03	Overvoltage stall gain	Default	0
	Setting Range	0 (no stall overvoltage)-100	
P9-04	Overvoltage stall protective voltage	Default	130%
	Setting Range	120% - 150%	

When the DC bus voltage exceeds the value of P9-04 (Overvoltage stall protective voltage) during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate.

P9-03 (Overvoltage stall gain) is used to adjust the overvoltage suppression capacity of the AC drive. The larger the value is, the greater the overvoltage suppression capacity will be in the prerequisite of no overvoltage occurrence, set P9-03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overvoltage fault may occur.

If the overvoltage stall gain is set to 0, the overvoltage stall function is disabled.

The overvoltage stall protective voltage setting 100% corresponds to the base values in the following table:

Voltage Class	Corresponding Base Value
Single-phase 220 V	290 V
Three-phase 220 V	290 V
Three-phase 380 V	530 V

P9-05	Overcurrent stall gain	Default	20
	Setting Range	0-100	
P9-06	Overcurrent stall protective voltage	Default	150%
	Setting Range	100% - 200%	

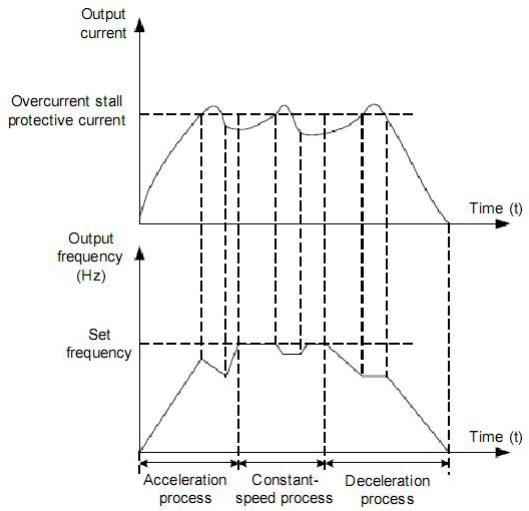
Overcurrent stall: When the output current exceeds the overcurrent stall protective current (P9-06), the output current declines during acceleration of the AC drive; the output current declines if the AC drive runs at constant speed; the falling speed declines during deceleration of the AC drive. The running frequency returns to normal until the output current is less than the overcurrent stall protective current (P9-06).

Overcurrent stall protective current: is used to decide when to perform current protection for overcurrent stall. The AC drive performs overcurrent stall protective current if the figure exceeds the parameter. The figure is the percentage to the rated current of the relative motor.

Overcurrent stall gain: is used to adjust the overcurrent suppression capacity of the AC drive. The larger the value is, the greater the overcurrent suppression capacity will be. In the prerequisite of no overcurrent occurrence, set P9-05 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and overcurrent fault may occur. For ultra-small-inertia occasions, the overcurrent stall gain should be set to 20. If the overcurrent stall gain is set to 0, the overcurrent stall function is disabled.

Figure 4-24 Diagram of the overcurrent stall protection function



P9-07	Short-circuit to ground upon power- on		Default	1
	Setting Range	0	Disabled	
		1	Enabled	

It is used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive.

If this function is enabled, the AC drive's UVW will have voltage output a while after power-on.

P9-09	Fault auto reset times	Default	0
	Setting Range	0-20	

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state.

P9-10	DO action during fault auto reset		Default 0
	Setting Range	0	Not act
		1	Act

It is used to decide whether the DO acts during the fault auto reset if the fault auto reset function is selected.

P9-11	Time interval of fault auto reset	Default	1.0s
	Setting Range	0.1s-100.0s	

It is used to set the waiting time from the alarm of the AC drive to fault auto reset.

P9-12	Input phase loss protection/contactor energizing protection selection		Default 11
	Setting Range	Unit's digit:	Input phase loss protection
		Ten's digit:	Contactor energizing protection
		0	Disabled
		1	Enabled

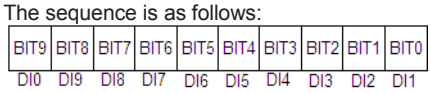
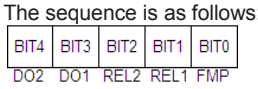
It is used to determine whether to perform input phase loss or contactor energizing protection. The AC900 models only provide this function when the power is 11KW or over 11KW. This function is disabled when the power is less than 11KW.

P9-13	Output phase loss protection selection		Default 1
	Setting Range	0	Disabled
		1	Enabled

It is used to determine whether to perform output phase loss protection.

P9-14	1st fault type	0-99
P9-15	2nd fault type	
P9-16	3nd (last time) fault type	

It is used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 5.

P9-17	Frequency upon 3rd fault	It displays the frequency when the latest fault occurs.
P9-18	Current upon 3rd fault	It displays the current when the latest fault occurs.
P9-19	Bus voltage upon 3rd fault	It displays the bus voltage when the latest fault occurs.
P9-20	DI status upon 3rd fault	It displays the status of all DI terminals when the latest fault occurs. The sequence is as follows:  If a DI is ON, the setting is 1. If the DI is OFF, the setting is 0. The value is the equivalent decimal number converted from the DI status.
P9-21	Output terminal status upon 3rd fault	It displays the status of all output terminals when the latest fault occurs. The sequence is as follows:  If an output terminal is ON, the setting is 1. If the output terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the DI statuses.
P9-22	AC drive status upon 3rd fault	Reserved
P9-23	Power-on time upon 3rd fault	It displays the present power-on time when the latest fault occurs.
P9-24	Running time upon 3rd fault	It displays the present running time when the latest fault occurs.

P9-27	Frequency upon 2nd fault	Same as P9-17-P9-24.	
P9-28	Current upon 2nd fault		
P9-29	Bus voltage upon 2nd fault		
P9-30	DI status upon 2nd fault		
P9-31	Output terminal status upon 2nd fault		
P9-32	Frequency upon 2nd fault		
P9-33	Current upon 2nd fault		
P9-37	DI status upon 1st fault	Same as P9-17-P9-24.	
P9-38	Output terminal status upon 1st fault		
P9-39	Frequency upon 1st fault		
P9-40	Current upon 1st fault		
P9-41	Bus voltage upon 3rd fault		
P9-42	DI status upon 1st fault		
P9-43	Output terminal status upon 1st fault		
P9-44	Frequency upon 1st fault		
P9-47	Fault protection action selection 1	Default	00000
	Setting Range	Unit's digit	Motor overload (Err11)
		0	Coast to stop
		1	Stop according to the stop
		2	Continue to run
		Ten's digit	Power input phase loss (Err12) Same as unit's digit
		Hundred's digit	Power output phase loss (Err13) Same as unit's digit
		Thousand's digit	External equipment fault (Err15) Same as unit's digit
		Ten thousand's digit	Communication fault (Err16) Same as unit's digit

Function Code	Parameter Name	Setting Range	Default
P9-49	Fault protection action selection 3	Unit's digit (User-defined fault 1, Err27)	00000
		Same as unit's digit in P9-47	
		Ten's digit (User-defined fault 2, Err28)	
		Same as unit's digit in P9-47	
		Hundred's digit (Accumulative power-on time reached, Err29)	
		Same as unit's digit in P9-47	
		Thousand's digit (Load becoming 0, Err30)	
		0: Coast to stop 1: Stop according to the stop mode 2: Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers	
		Ten thousand's digit (PID feedback lost during running, Err31)	
		Same as unit's digit in P9-47	

P9-54	Frequency selection for continuing to run upon fault	Default	0
	Setting Range	0	Current running frequency
		1	Set frequency
		2	Frequency upper limit
		3	Frequency lower limit
		4	Backup frequency upon abnormality
P9-55	Backup frequency upon abnormality	Default	100.0%
	Setting Range	0.0%-100.0%	

If a fault occurs during the running of the AC drive and the handling of fault is set to "Continue to run", the AC drive displays A** and continues to run at the frequency set in P9-54.

During the running of Backup frequency upon abnormality, the setting of P9-55 is a percentage relative to the maximum frequency.

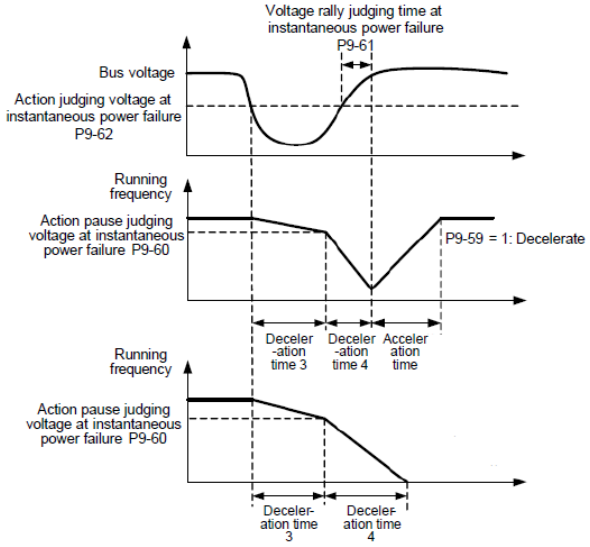
If the motor temperature exceeds the value set in P9-58, the DO terminal on the AC drive allocated with function 39 (Motor overheat warning) becomes ON.

P9-59	Action selection at instantaneous power failure	Default	0
	Setting Range	0	Invalid
		1	Decelerate
		2	Decelerate to stop
P9-60	Action pause judging voltage at instantaneous power failure	Default	90%
	Setting Range	80.0%-100.0%	
P9-61	Voltage rally judging time at instantaneous power failure	Default	0.50s
	Setting Range	0.00s-100.00s	
P9-62	Action judging voltage at instantaneous power failure	Default	80.0%
	Setting Range	60.0%-100.0%(standard bus voltage)	

Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

- If P9-59 = 1, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in P9-61, it is considered that the bus voltage resumes to normal.
- If P9-59 = 2, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates to stop.

Figure 4-25 AC drive action diagram upon instantaneous power failure



P9-63	Protection upon load becoming 0	Default	0
	Setting Range	0	Invalid
		1	Decelerate
P9-64	Detection level of load becoming 0	Default	10.0%
	Setting Range	0.0%-100.0% (rated motor current)	
P9-65	Detection time of load becoming 0	Default	1.0s
	Setting Range	0.0s-60.0s	

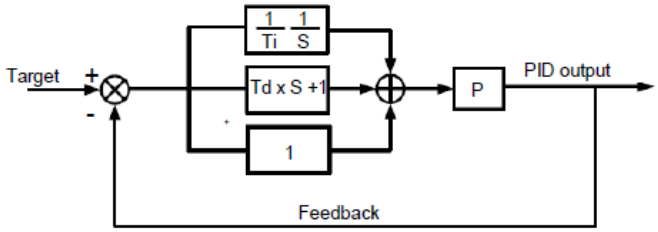
If protection upon load becoming 0 is enabled, when the output current of the AC drive is lower than the detection level (P9-64) and the lasting time exceeds the detection time (P9-65), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

Group PA: Process Control PID Function

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

Figure 4-26 Principle block diagram of PID control



Function Code	Parameter Name	Setting Range	Default
PA-00	PID setting source	0: PA-01 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting 6: Multi-reference	0
PA-01	PID digital setting	0.0%-100.0%	50.0%

This parameter is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID feedback equal

Function Code	Parameter Name	Setting Range	Default
PA-02	PID feedback source	0: AI1 1: AI2 2: Keyboard potentiometer 3: AI1 - AI2 4: Pulse setting (DI5) 5: Communication setting 6: AI1 + AI2 7: MAX (|AI1|, |AI2|) 8: MIN (|AI1|, |AI2|)	0

This parameter is used to select the feedback signal channel of process PID. The PID feedback is a relative value and ranges from 0.0% to 100.0%.

Function Code	Parameter Name	Setting Range	Default
PA-03	PID action direction	0: Forward action 1: Reverse action	0

0: Forward action

When the feedback value is smaller than the PID setting, the AC drive's output frequency rises. For example, the winding tension control requires forward PID action.

1: Reverse action

When the feedback value is smaller than the PID setting, the AC drive's output frequency reduces. For example, the unwinding tension control requires reverse PID action.

Note that this function is influenced by the DI function 35 "Reverse PID action direction".

Function Code	Parameter Name	Setting Range	Default
PA-04	PID setting feedback range	0-65535	1000

This parameter is a non-dimensional unit. It is used for PID setting display (d0-15) and PID feedback display (d0-16).

Relative value 100% of PID setting feedback corresponds to the value of PA-04. If PA-04 is set to 2000 and PID setting is 100.0%, the PID setting display (d0-15) is 2000.

Function Code	Parameter Name	Setting Range	Default
PA-05	Proportional gain Kp1	0.0-100.0	20.0
PA-06	Integral time Ti1	0.01-10.00s	2.00s
PA-07	Differential time Td1	0.00-10.000	0.000s

PA-05 (Proportional gain Kp1)

It decides the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

PA-06 (Integral time Ti1)

It decides the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in PA-06.Then the adjustment amplitude reaches the maximum frequency.

PA-07 (Differential time Td1)

It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

Function Code	Parameter Name	Setting Range	Default
PA-08	Cut-off frequency of PID reverse rotation	0.00 to maximum frequency	2.00 Hz

In some situations, only when the PID output frequency is a negative value (AC drive reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and PA-08 is used to determine the reverse rotation frequency upper limit.

Function Code	Parameter Name	Setting Range	Default
PA-09	PID deviation limit	0.0%-100.0%	0.00%

If the deviation between PID feedback and PID setting is smaller than the value of PA-09, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications

Function Code	Parameter Name	Setting Range	Default
PA-10	PID differential limit	0.00%-100.00%	0.10%

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.

Function Code	Parameter Name	Setting Range	Default
PA-11	PID setting change time	0.00-650.00s	0.00s

The PID setting change time indicates the time required for PID setting changing from 0.0% to 100.0%. The PID setting changes linearly according to the change time, reducing the impact caused by sudden setting change on the system.

Function Code	Parameter Name	Setting Range	Default
PA-12	PID feedback filter time	0.00-60.00s	0.00s
PA-13	PID output filter time	0.00-60.00s	0.00s

PA-12 is used to filter the PID feedback, helping to reduce interference on the feedback but slowing the response of the process closed-loop system.

PA-13 is used to filter the PID output frequency, helping to weaken sudden change of the AC drive output frequency but slowing the response of the process closed-loop system.

Function Code	Parameter Name	Setting Range	Default
PA-15	Proportional gain Kp2	0.0-100.0	20.0
PA-16	Integral time Ti2	0.01-10.00s	2.00s
PA-17	Differential time Td2	0.000-10.000s	0.000s
PA-18	PID parameter switchover condition	0: No switchover 1: Switchover via DI 2: Automatic switchover based on deviation	0
PA-19	PID parameter switchover deviation 1	0.0% to PA-20	20.0%
PA-20	PID parameter switchover deviation 2	PA-19 to 100.0%	80.0%

In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process. These parameters are used for switchover between two groups of PID parameters.

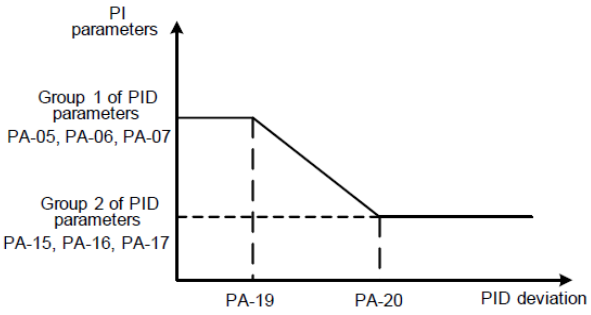
Regulator parameters PA-15 to PA-17 are set in the same way as PA-05 to PA-07.
The switchover can be implemented either via a DI terminal or automatically implemented based on the deviation.

If you select switchover via a DI terminal, the DI must be allocated with function 43 "PID parameter switchover". If the DI is OFF, group 1 (PA-05 to PA-07) is selected. If the DI is ON, group 2 (PA-15 to PA-17) is selected.

If you select automatic switchover, when the absolute value of the deviation between PID

feedback and PID setting is smaller than the value of PA-19, group 1 is selected. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of PA-20, group 2 is selected. When the deviation is between PA-19 and PA-20, the PID parameters are the linear interpolated value of the two groups of parameter values.

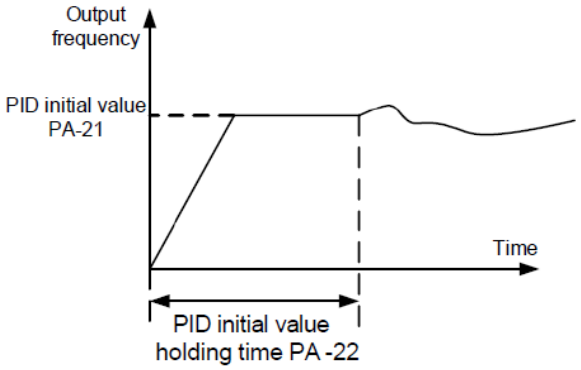
Figure 4-2 PID parameters switchover



Function Code	Parameter Name	Setting Range	Default
PA-21	PID initial value	0.0%-100.0%	0.0%
PA-22	PID initial value holding time	0.00-650.00s	0.00s

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (PA-21) and lasts the time set in PA-22.

Figure 4-28 PID initial value function



Function Code	Parameter Name	Setting Range	Default
PA-23	Maximum deviation between two PID outputs in forward direction	0.00%-100.00%	1.00%
PA-24	Maximum deviation between two PID outputs in reverse direction	0.00%-100.00%	1.00%

This function is used to limit the deviation between two PID outputs (2 ms per PID output) to suppress the rapid change of PID output and stabilize the running of the AC drive.

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

Function Code	Parameter Name	Setting Range	Default
PA-25	PID integral property	Unit's digit (Integral separated) 0: Invalid 1: Valid Ten's digit (Whether to stop integral operation when the output reaches the limit) 0: Continue integral operation 1: Stop integral operation	00

- Integral separated

If it is set to valid, , the PID integral operation stops when the DI allocated with function 22 "PID integral pause" is ON In this case, only proportional and differential operations take effect.

If it is set to invalid, integral separated remains invalid no matter whether the DI allocated with function 22 "PID integral pause" is ON or not.

- Whether to stop integral operation when the output reaches the limit

If "Stop integral operation" is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

Function Code	Parameter Name	Setting Range	Default
PA-26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1%-100.0%	0.0%
PA-27	Detection time of PID feedback loss	0.0-20.0s	0.0s

These parameters are used to judge whether PID feedback is lost.

If the PID feedback is smaller than the value of PA-26 and the lasting time exceeds the value of PA-27, the AC drive reports Err31 and acts according to the selected fault protection action.

Function Code	Parameter Name	Setting Range	Default
PA-28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the AC drive stops.

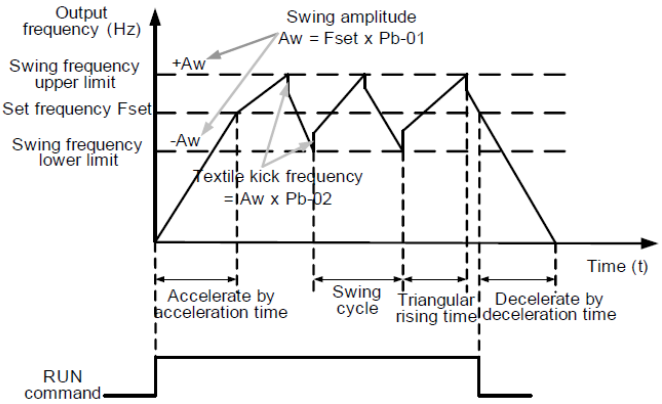
Group Pb: Swing Frequency, Fixed Length and Count

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure.

The swing amplitude is set in Pb-00 and Pb-01. When Pb-01 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect

Figure 4-29 Swing frequency control



Function Code	Parameter Name	Setting Range	Default
Pb-00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0

This parameter is used to select the base value of the swing amplitude.

0: Relative to the central frequency (P0-07 frequency source selection)

It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

1: Relative to the maximum frequency (P0-10 maximum output frequency) It is fixed swing amplitude system. The swing amplitude is fixed.

Function Code	Parameter Name	Setting Range	Default
Pb-01	Swing frequency amplitude	0.0%-100.0%	0.0%
Pb-02	Jump frequency amplitude	0.0%-50.0%	0.0%

This parameter is used to determine the swing amplitude and jump frequency amplitude.

If relative to the central frequency (Pb-00 = 0), the actual swing amplitude AW is the calculation result of P0-07 (Frequency source selection) multiplied by Pb-01.

If relative to the maximum frequency (Pb-00 = 1), the actual swing amplitude AW is the calculation result of P0-10 (Maximum frequency) multiplied by Pb-01.

Jump frequency = Swing amplitude AW x Pb-02 (Jump frequency amplitude).

If relative to the central frequency (Pb-00 = 0), the jump frequency is a variable value.

If relative to the maximum frequency (Pb-00 = 1), the jump frequency is a fixed value.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

Function Code	Parameter Name	Setting Range	Default
Pb-03	Swing frequency cycle	0.0-3000.0s	10.0s
Pb-04	Triangular wave rising time coefficient	0.0%-100.0%	50.0%

Pb-03 specifies the time of a complete swing frequency cycle.

Pb-04 specifies the time percentage of triangular wave rising time to Pb-03 (Swing frequency cycle).

- Triangular wave rising time = Pb-03 (Swing frequency cycle) x Pb-04 (Triangular wave rising time coefficient, unit: s)
- Triangular wave falling time = Pb-03 (Swing frequency cycle) x (1 - Pb-04 Triangular wave rising time coefficient ,unit: s)

Function Code	Parameter Name	Setting Range	Default
Pb-05	Set length	0-65535 m	1000 m
Pb-06	Actual length	0-65535 m	0 m
Pb-07	Number of pulses per meter	0.1-6553.5	100.0

The preceding parameters are used for fixed length control.

The length information is collected by DI terminals. Pb-06 (Actual length) is calculated by dividing the number of pulses collected by the DI terminal by Pb-07 (Number of pulses each meter).

When the actual length Pb-06 exceeds the set length in Pb-05, the DO terminal allocated with function 10 (Length reached) becomes ON.

During the fixed length control, the length reset operation can be performed via the DI terminal allocated with function 28. For details, see the descriptions of P4-00 to P4-09.

Allocate corresponding DI terminal with function 27 (Length count input) in applications. If the pulse frequency is high, DI5 must be used.

Function Code	Parameter Name	Setting Range	Default
Pb-08	Set count value	1-65535	1000
Pb-09	Designated count value	1-65535	1000

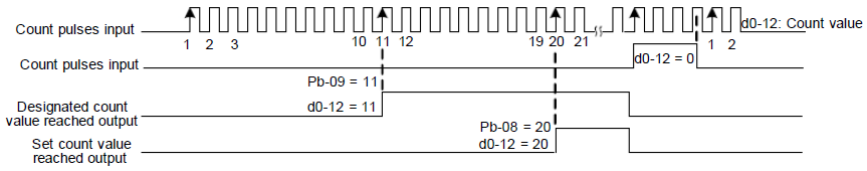
The count value needs to be collected by DI terminal. Allocate the corresponding DI terminal with function 25 (Counter input) in applications. If the pulse frequency is high, DI5 must be used.

When the count value reaches the set count value (Pb-08), the DO terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the counting value reaches the designated counting value (Pb-09), the DO terminal allocated with function 9 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached.

Pb-09 should be equal to or smaller than Pb-08

Figure 4-30 Reaching the set count value and designated count value



Group PC: Multi-Reference and Simple PLC Function

The AC900 multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

Function Code	Parameter Name	Setting Range	Default
PC-00	Reference 0	-100.0%-100.0%	0.0%
PC-01	Reference 1	-100.0%-100.0%	0.0%
PC-02	Reference 2	-100.0%-100.0%	0.0%
PC-03	Reference 3	-100.0%-100.0%	0.0%
PC-04	Reference 4	-100.0%-100.0%	0.0%
PC-05	Reference 5	-100.0%-100.0%	0.0%
PC-06	Reference 6	-100.0%-100.0%	0.0%
PC-07	Reference 7	-100.0%-100.0%	0.0%
PC-08	Reference 8	-100.0%-100.0%	0.0%
PC-09	Reference 9	-100.0%-100.0%	0.0%
PC-10	Reference 10	-100.0%-100.0%	0.0%
PC-11	Reference 11	-100.0%-100.0%	0.0%
PC-12	Reference 12	-100.0%-100.0%	0.0%
PC-13	Reference 13	-100.0%-100.0%	0.0%
PC-14	Reference 14	-100.0%-100.0%	0.0%
PC-15	Reference 15	-100.0%-100.0%	0.0%

Multi-reference can be the setting source of frequency, V/F separated voltage and process PID.

The multi-reference is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

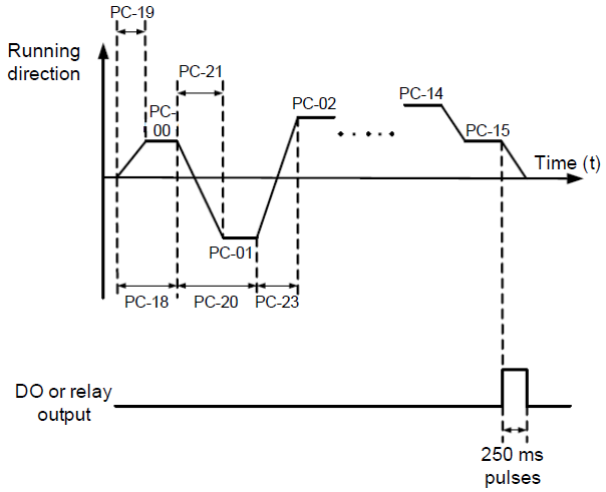
Multi-reference can be switched over based on different states of DI terminals. For details, see the descriptions of group P4.

Function Code	Parameter Name	Setting Range	Default
PC-16	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0

Simple PLC can be either the frequency source or V/F separated voltage source.

When simple PLC is used as the frequency source, whether parameter values of PC-00 to PC-15 are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

Figure 4-31 Simple PLC when used as frequency source.



- 0: Stop after the AC drive runs one cycle

The AC drive stops after running one cycle, and will not start up until receiving another command.

- 1: Keep final values after the AC drive runs one cycle

The AC drive keeps the final running frequency and direction after running one cycle.

- 2: Repeat after the AC drive runs one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

Function Code	Parameter Name	Setting Range	Default
PC-17	Simple PLC retentive selection	Unit's digit (Retentive upon power failure)	00
		0: No 1: Yes	
		Ten's digit (Retentive upon stop)	
		0: No 1: Yes	

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

Function Code	Parameter Name	Setting Range	Default
PC-18	Running time of simple PLC reference 0	0.0-6553.5s (h)	0.0s (h)
PC-19	Acceleration/deceleration time of simple PLC reference 0	0-3	0
PC-20	Running time of simple PLC reference 1	0.0-6553.5s (h)	0.0s (h)
PC-21	Acceleration/deceleration time of simple PLC reference 1	0-3	0
PC-22	Running time of simple PLC reference 2	0.0-6553.5s (h)	0.0s (h)
PC-23	Acceleration/deceleration time of simple PLC reference 2	0-3	0
PC-24	Running time of simple PLC reference 3	0.0-6553.5s (h)	0.0s (h)
PC-25	Acceleration/deceleration time of simple PLC reference 3	0-3	0
PC-26	Running time of simple PLC reference 4	0.0-6553.5s (h)	0.0s (h)
PC-27	Acceleration/deceleration time of simple PLC reference 4	0-3	0
PC-28	Running time of simple PLC reference 5	0.0-6553.5s (h)	0.0s (h)

Function Code	Parameter Name	Setting Range	Default
PC-29	Acceleration/deceleration time of simple PLC reference 5	0-3	0
PC-30	Running time of simple PLC reference 6	0.0-6553.5s (h)	0.0s (h)
PC-31	Acceleration/deceleration time of simple PLC reference 6	0-3	0
PC-32	Running time of simple PLC reference 7	0.0-6553.5s (h)	0.0s (h)
PC-33	Acceleration/deceleration time of simple PLC reference 7	0-3	0
PC-34	Running time of simple PLC reference 8	0.0-6553.5s (h)	0.0s (h)
PC-35	Acceleration/deceleration time of simple PLC reference 8	0-3	0
PC-36	Running time of simple PLC reference 9	0.0-6553.5s (h)	0.0s (h)
PC-37	Acceleration/deceleration time of simple PLC reference 9	0-3	0
PC-38	Running time of simple PLC reference 10	0.0-6553.5s (h)	0.0s (h)
PC-39	Acceleration/deceleration time of simple PLC reference 10	0-3	0
PC-40	Running time of simple PLC reference 11	0.0-6553.5s (h)	0.0s (h)
PC-41	Acceleration/deceleration time of simple PLC reference 11	0-3	0
PC-42	Running time of simple PLC reference 12	0.0-6553.5s (h)	0.0s (h)
PC-43	Acceleration/deceleration time of simple PLC reference 12	0-3	0
PC-44	Running time of simple PLC reference 13	0.0-6553.5s (h)	0.0s (h)
PC-45	Acceleration/deceleration time of simple PLC reference 13	0-3	0
PC-46	Running time of simple PLC reference 14	0.0-6553.5s (h)	0.0s (h)
PC-47	Acceleration/deceleration time of simple PLC reference 14	0-3	0
PC-48	Running time of simple PLC reference 15	0.0-6553.5s (h)	0.0s (h)
PC-49	Acceleration/deceleration time of simple PLC reference 15	0-3	0
PC-50	Time unit of simple PLC running	0: s (second) 1: h (hour)	0

Function Code	Parameter Name	Setting Range	Default
PC-51	Reference 0 source	0: Set by PC-00 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting 5: PID 6: Set by preset frequency (P0-08), modified via terminal UP/DOWN	0

It determines the setting channel of reference 0. You can perform convenient switchover between the setting channels. When multi-reference or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.

Group Pd Communication Parameters

Please refer to the *AC900 Communication Agreement.*

Group PP: User Password

PP-00	User password	Default	0
	Setting Range	0-65535	

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters.

If PP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

PP-01	Parameter Name	Restore default settings	0
	Setting Range	0: No operation 1: Restore factory settings except motor parameters 2: Clear records	

1. Restore default settings except motor parameters

If PP-01 is set to 1, most function codes are restored to the default settings except motor parameters, frequency reference resolution (P0-22), fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14).

2. Clear records

If PP-01 is set to 2, the fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14) are cleared.

PP-02	AC drive parameter display property		Default	11
	Setting Range	Unit's digit	Group d display selection	
		0	Not display	
		1	Display	
		Ten's digit	Group E display selection	
		0	Not display	
		1	Display	

PP-04	Parameter modification property	Default	0
	Setting Range	0	Modifiable
		1	Not modifiable

It is used to set whether the parameters are modifiable to avoid mal-function. If it is set to 0, all parameters are modifiable. If it is set to 1, all parameters can only be viewed.

Group E0: Torque Control and Restricting Parameters

E0-00	Speed/Torque control selection		Default	0
	Setting Range	0	Speed control	
		1	Torque control	

It is used to select the AC drive's control mode: speed control or torque control.

The AC900 provides DI terminals with two torque related functions, function 29 (Torque control prohibited) and function 46 (Speed control/Torque control switchover). The two DI terminals need to be used together with E0-00 to implement speed control/torque control switchover.

If the DI terminal allocated with function 46 (Speed control/Torque control switchover) is OFF, the control mode is determined by E0-00. If the DI terminal allocated with function 46 is ON, the control mode is reverse to the value of E0-00.

However, if the DI terminal with function 29 (Torque control prohibited) is ON, the AC drive is fixed to run in the speed control mode.

E0-01	Setting Range	0: Digital setting (E0-03) 1: AI1 2: AI2 3: Keyboard potentiometer 4: Pulse setting (DI5) 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2)		
E0-03	Torque digital setting in torque control		Default	150.0%
	Setting Range	-200.0%-+200.0%		

E0-01 is used to set the torque setting source. There are a total of eight torque setting sources.

The torque setting is a relative value. 100.0% corresponds to the AC drive's rated torque. The setting range is -200.0% to 200.0%, indicating the AC drive's maximum torque is twice of the AC drive's rated torque.

If the torque setting is positive, the AC drive rotates in forward direction.

If the torque setting is negative, the AC drive rotates in reverse direction.

- 0: Digital setting (E0-03)

  The target torque directly uses the value set in E0-03.

- 1: AI1
- 2: AI2

The target torque is decided by analog input. The AC900 control board provides two AI terminals (AI1, AI2). AI1 is 0-10 V voltage input, AI2 is 0-10 V voltage input or 0-20 mA current input decided by jumper J1 on the control board.

The AC900 provides four curves indicating the mapping relationship between the input voltage of AI1, AI2 and the target frequency, two of which are linear (point- point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes P4-13 to P4-27 and function codes in group E6, and select curves for AI1, AI2 in P4-33.

When AI is used as frequency setting source, the corresponding value 100% of voltage/ current input corresponds to the value of E0-03.

- 3: Keyboard potentiometer

  The target torque is decided by potentiometer.

- 4: Pulse setting (DI5)

  The target torque is set by DI5 (high-speed pulse).

  The pulse setting signal specification is 9-30 V (voltage range) and 0-100 kHz (frequency

range). The pulse can only be input via DI5.

The relationship (which is a two-point line) between DI5 input pulse frequency and the corresponding value is set in P4-28 to P4-31. The corresponding value 100.0% of pulse input corresponds to the value of E0-03.

- 5: Communication setting

The target torque is set by means of communication.

Data is given by host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100% corresponds to the value of E0-03.

E0-05	Forward maximum frequency in torque control		Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency (P0-10)		
E0-06	Reverse maximum frequency in torque control		Default	50.00 Hz
	Setting Range	0.00 Hz to maximum frequency (P0-10)		

The two parameters are used to set the maximum frequency in forward or reverse rotation in torque control mode.

In torque control, if the load torque is smaller than the motor output torque, the motor's rotational speed will rise continuously. To avoid runaway of the mechanical system, the motor maximum rotating speed must be limited in torque control.

You can implement continuous change of the maximum frequency in torque control dynamically by controlling the frequency upper limit.

E0-07	Acceleration time in torque control		Default	0.00s
	Setting Range	0.00-65000s		
E0-08	Deceleration time in torque control		Default	0.00s
	Setting Range	0.00-65000s		

In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. The motor rotational speed may change quickly and this will result in noise or too large mechanical stress. The setting of acceleration/deceleration time in torque control makes the motor rotational speed change softly.

However, in applications requiring rapid torque response, set the acceleration/deceleration time in torque control to 0.00s.

For example, two AC drives are connected to drive the same load. To balance the load allocation, set one AC drive as master in speed control and the other as slave in torque control. The slave receives the master's output torque as the torque command and must follow the master rapidly. In this case, the acceleration/deceleration time of the slave in torque control is set to 0.0s.

Group E5: Control Optimization Parameters

E5-00	DPWM switch over frequency upper limit	Default	12.00 Hz
	Setting Range	0.00-15.00 Hz	

This parameter is valid only for V/F control.

It is used to determine the wave modulation mode in V/F control of asynchronous motor. If the frequency is lower than the value of this parameter, the waveform is 7-segment continuous modulation. If the frequency is higher than the value of this parameter, the waveform is 5-segment intermittent modulation.

The 7-segment continuous modulation causes more loss to switches of the AC drive but smaller current ripple. The 5-segment intermittent modulation causes less loss to switches of the AC drive but larger current ripple. This may lead to motor running instability at high frequency. Do not modify this parameter generally.

For instability of V/F control, refer to parameter P3-11. For loss to AC drive and temperature rise, refer to parameter P0-15.

E5-01	PWM modulation mode		Default	0
	Setting Range	0	Asynchronous modulation	
		1	Synchronous modulation	

This parameter is valid only for V/F control.

Synchronous modulation indicates that the carrier frequency varies linearly with the change of the output frequency, ensuring that the ratio of carrier frequency to output frequency remains unchanged. Synchronous modulation is generally used at high output frequency, which helps improve the output voltage quality.

At low output frequency (100 Hz or lower), synchronous modulation is not required. This is because asynchronous modulation is preferred when the ratio of carrier frequency to output

frequency is high.

Synchronous modulation takes effect only when the running frequency is higher than 85 Hz. If the frequency is lower than 85 Hz, asynchronous modulation is always used.

E5-02	Dead zone compensation mode		Default	1
	Setting Range	0	No compensation	
		1	Compensation mode 1	
		2	Compensation mode 2	

Generally, you need not modify this parameter. Try to use a different compensation mode only when there is special requirement on the output voltage waveform quality or oscillation occurs on the motor.

For high power AC drive, compensation mode 2 is recommended.

E5-03	Random PWM depth		Default	0
	Setting Range	0	Random PWM invalid	
		1-10	Random PWM depth	

The setting of random PWM depth can make the shrill motor noise softer and reduce the electromagnetic interference. If this parameter is set to 0, random PWM is invalid.

E5-04	Rapid current limit		Default	1
	Setting Range	0	Disabled	
		1	Enabled	

The rapid current limit function can reduce the AC drive's over current faults at maximum, guaranteeing uninterrupted running of the AC drive.

However, long-time rapid current limit may cause the AC drive to overheat, which is not allowed. In this case, the AC drive will report Err40, indicating the AC drive is overloaded and needs to stop.

E5-05	Current detection compensation	Default	5
	Setting Range	0-100	

It is used to set the AC drive current detection compensation. Too large value may lead to deterioration of control performance. Do not modify it generally.

E5-06	Undervoltage threshold	Default	100.0%
	Setting Range	60.0%-140.0%	

It is used to set the undervoltage threshold of Err09. The undervoltage threshold 100% of the AC drive of different voltage classes corresponds to different nominal values, as listed in the following table.

Voltage Class	Nominal Value of Undervoltage threshold
Single-phase 220 V	200 V
Three-phase 220 V	200 V
Three-phase 380 V	350 V

E5-07	SFVC optimization mode selection		Default	1
	Setting Range	0	No optimization	
		1	Optimization mode 1	
		2	Optimization mode 2	

1: Optimization mode 1

It is used when the requirement on torque control linearity is high.

2: Optimization mode 2

It is used for the requirement on speed stability is high.

E5-08	Dead-zone time adjustment	Default	150%
	Setting Range	100%-200%	

It is only valid for 1140 V voltage class.

You can modify the value of this parameter to improve the voltage utilization rate. Too small value may system instability. Do not modify it generally.

E5-09	Overvoltage threshold	Default	Model dependent
	Setting Range	200.0-2500.0 V	

It is used to set the overvoltage threshold of the AC drive. The default values of different voltage classes are listed in the following table.

Voltage Class	Default Overvoltage Threshold
Single-phase 220 V	400.0 V
Three-phase 220 V	400.0 V
Three-phase 380 V	810.0 V

NOTE: The default value is also the upper limit of the AC drive's internal overvoltage protection voltage. The parameter becomes effective only when the setting of E5-09 is lower than the default value. If the setting is higher than the default value, use the default value.

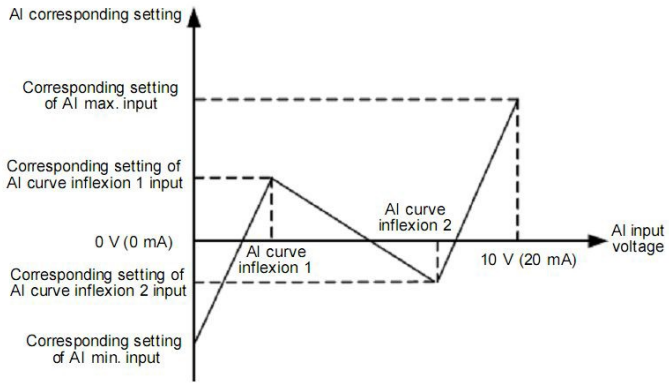
Group E6: AI Curve Setting

E6-00	AI curve 4 minimum input	Default	0.00 V
	Setting Range	-10.00 V to E6-02	
E6-01	Corresponding setting of AI curve 4 minimum input	Default	0.00 V
	Setting Range	-100.0%-100.0%	
E6-02	AI curve 4 inflexion 1 input	Default	3.00 V
	Setting Range	E6-00 to E6-04	
E6-03	Corresponding setting of AI curve 4 inflexion 1 input	Default	30.00 V
	Setting Range	-100.0%-100.0%	
E6-04	AI curve 4 inflexion 1 input	Default	6.00 V
	Setting Range	E6-02 to E6-06	
E6-05	Corresponding setting of AI curve 4 inflexion 1 input	Default	60.0%
	Setting Range	-100.0%-100.0%	
E6-06	AI curve 4 maximum input	Default	10.00 V
	Setting Range	E6-06 to 10.00 V	
E6-07	Corresponding setting of AI curve 4 maximum input	Default	100.0%
	Setting Range	-100.0%-100.0%	
E6-08	AI curve 5 minimum input	Default	-10.00 V
	Setting Range	-10.00 V to E6-10	

E6-09	Corresponding setting of AI curve 5 minimum input	Default	-100.0%
	Setting Range	-100.0%-100.0%	
E6-10	AI curve 5 inflexion 1 input	Default	-3.00 V
	Setting Range	E6-08 to E6-12	
E6-11	Corresponding setting of AI curve 5 inflexion 1 input	Default	-30.0%
	Setting Range	-100.0%-100.0%	
E6-12	AI curve 5 inflexion 1 input	Default	3.00 V
	Setting Range	E6-10 to E6-14	
E6-13	Corresponding setting of AI curve 5 inflexion 1 input	Default	30.0%
	Setting Range	-100.0%-100.0%	
E6-14	AI curve 5 maximum input	Default	10.00 V
	Setting Range	E6-14 to 10.00 V	
E6-15	Corresponding setting of AI curve 5 maximum input	Default	100.0%
	Setting Range	-100.0%-100.0%	

The function of curve 4 and curve 5 is similar to that curve 1 to curve 2, but curve 1 to curve 2 are lines, and curve 4 and curve 5 are 4-point curves, implementing more flexible corresponding relationship. The schematic diagram of curve 4 and curve 5 is shown in the following figure.

Figure 4-32 Schematic diagram curve 4 and curve 5



When setting curve 4 and curve 5, note that the curve's minimum input voltage, inflexion 1 voltage, inflexion 2 voltage and maximum voltage must be in increment order.

P4-34 (AI curve selection) is used to select curve for AI1 and AI2.

E6-24	Jump point of AI1 input	Default	0.0%
	Setting Range	-100.0%-100.0%	
E6-25	Jump amplitude of AI1 input	Default	0.5%
	Setting Range	0.0%-100.0%	
E6-26	Jump point of AI2 input	Default	0.0%
	Setting Range	-100.0%-100.0%	
E6-27	Jump amplitude of AI2 input	Default	0.5%
	Setting Range	0.0%-100.0%	

The AI terminals (AI1 to AI2) of the AC900 all support the corresponding setting jump function, which fixes the AI input corresponding setting at the jump point when AI input corresponding setting jumps around the jump range.

For example, AI1 input voltage jumps around 5.00 V and the jump range is 4.90-5.10 V. AI1 minimum input 0.00 V corresponds to 0.0% and maximum input 10.00 V corresponds to 100.0%. The detected AI1 input corresponding setting varies between 49.0% and 51.0%.

If you set E6-16 to 50.0% and E6-17 to 1.0%, then the obtained AI1 input corresponding setting is fixed to 50.0%, eliminating the fluctuation effect.

Group EC: AI/AO Correction

EC-00	AI1 measured voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-01	AI1 displayed voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-02	AI1 measured voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	
EC-03	AI1 displayed voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	
EC-04	AI2 measured voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-05	AI2 displayed voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-06	AI2 measured voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	
EC-07	AI2 displayed voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	

These parameters are used to correct the AI to eliminate the impact of AI zero offset and gain. They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. Generally, you need not perform correction in the applications.

Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter. Displayed voltage indicates the voltage display value sampled by the AC drive. For details, refer to d0-21, and d0-22.

During correction, send two voltage values to each AI terminal, and save the measured values and displayed values to the function codes d0. Then the AC drive will automatically perform AI zero offset and gain correction.

If the input voltage and the actual voltage sampled by the AC drive are inconsistent, perform correction on site. Take AI1 as an example. The on-site correction is as follows:

- Send a voltage signal (approximately 2 V) to AI1.

- Measure the AI1 voltage and save it to EC-00.
- View the displayed value of d0-21 and save the value to EC-01.
- Send a voltage signal (approximately 8 V) to AI1.
- Measure AI1 voltage and save it to EC-02.
- View the displayed value of d0-21 and save the value to EC-03.

At correction of AI2, the actually sampled voltage is respectively queried in d0-22.

For AI1 and AI2, 2 V and 8 V are suggested as the correction voltages.

EC-12	AO1 target voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-13	AO1 measured voltage 1	Default	Factory-corrected
	Setting Range	0.500-4.000 V	
EC-14	AO1 target voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	
EC-15	AO1 measured voltage 2	Default	Factory-corrected
	Setting Range	6.000-9.999 V	

These parameters are used to correct the AO.

They have been corrected upon delivery. When you resume the factory values, these parameters will be restored to the factory-corrected values. You need not perform correction in the applications.

Target voltage indicates the theoretical output voltage of the AC drive. Measured voltage indicates the actual output voltage value measured by instruments such as the multimeter.

Group d0: Monitoring Parameters

Group d0 is used to monitor the AC drive's running state. You can view the parameter values by using operation panel, convenient for on-site commissioning, or from the host computer by means of communication (address: 0x7000-0x7044).

d0-00 to d0-31 are the monitoring parameters in the running and stop state defined by P7- 03 and P7-04. For more details, see PAGE 121.

d0-00	Running frequency	Display Range	0.00-320.00 Hz (P0-22 = 2)
d0-01	Set frequency		0.00-3200.0 Hz (P0-22 = 1)

These two parameters display the absolute value of theoretical running frequency and set frequency. For the actual output frequency of the AC drive, see d0-19.

d0-02	Bus voltage	Display Range	0.0-3000.0 V

It displays the AC drive's bus voltage.

d0-03	Output voltage	Display Range	0-1140 V

It displays the AC drive's output voltage in the running state.

d0-04	Output current	Display Range	0.00-655.35 A (AC drive power ≤ 55 kW) 0.0-6553.5 A (AC drive power > 55 kW)

It displays the AC drive's output current in the running state.

d0-05	Output power	Display Range	0-32767

It displays the AC drive's output power in the running state.

d0-06	Output torque	Display Range	-200.0%-200.0%

It displays the AC drive's output torque in the running state.

d0-07	DI state	Display Range	0-32767

It displays the current state of DI terminals. After the value is converted into a binary number, each bit corresponds to a DI. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and DIs is described in the following table.

Bit0	Bit1	Bit2	Bit3
DI1	DI2	DI3	DI4
Bit4	Bit5	Bit6	Bit7
DI5	DI6	DI7	DI8
Bit8	Bit9	Bit10	Bit11
DI9	DI10	DI11	DI12
Bit12	Bit13	Bit14	Bit15
DI13	DI14	DI15	

d0-08	DO state	Display Range	0-1023

It indicates the current state of DO terminals. After the value is converted into a binary number, each bit corresponds to a DO. "1" indicates high level signal, and "0" indicates low level signal. The corresponding relationship between bits and DOs is described in the following table.

Bit0	Bit1	Bit2	Bit3
DO3	Relay 1	Relay 2	DO1
Bit4	Bit5	Bit6	Bit7
OD2	Retain	Retain	Retain
Bit8	Bit9	Bit10	Bit11
Retain	Retain		

d0-10	AI2 voltage (V)/current (mA)	Display Range	0.00-10.57 V/ 0.00-20.00 mA
d0-14	Load speed	Display Range	0-65535 0.00-20.00 mA

For more details, see the description of P7-12.

d0-15	PID setting	Display Range	0-65535
d0-16	PID feedback	Display Range	0-65535

They display the PID setting value and PID feedback value.

- PID setting = PID setting (percentage) x PA-04
- PID feedback = PID feedback (percentage) x PA-04

d0-18	Input pulse frequency	Display Range	0.00-100.00 kHz

It displays the high-speed pulse sampled frequency of DI5, in minimum unit of 0.01 kHz.

d0-19	Feedback speed	Display Range	-320.00-320.00 Hz -3200.0-3200.0 Hz

It displays the actual output frequency of the AC drive.

- If P0-22 (Frequency reference resolution) is set to 1, the display range is -3200.00-3200.00Hz.
- If P0-22 (Frequency reference resolution) is set to 2, the display range is -320.00Hz-320.00Hz.

d0-20	Remaining running time	Display Range	0.0-6500.0 min

It displays the remaining running time when the timing operation is enabled. For details on timing operation, refer to P8-42 to P8-44.

d0-21	AI1 voltage before correction	Display Range	0.00-10.57 V
d0-22	AI2 voltage (V)/ current (mA) before correction	Display Range	0.00-10.57 V 0.00-20.00 mA

They display the AI sampleding voltage/current value of AI.

The actually used voltage/ current is obtained after linear correction to reduce the deviation between the sampled voltage/current and the actual input voltage/current.

For actual corrected voltage, see d0-09, d0-10 and d0-11. Refer to group EC for the correction mode.

d0-24	Linear speed	Display Range	0-65535 m/min

It displays the linear speed of the DI5 high-speed pulse sampling.

The unit is meter/minute. The linear speed is obtained according to the actual number of pulses sampled per minute and Pb-07 (Number of pulses per meter).

d0-27	Pulse input frequency	Display Range	0-65535 Hz

It displays the DI5 high-speed pulse sampling frequency, in minimum unit of 1 Hz. It is the same as d0-18, except for the difference in units.

d0-28	Communication setting value	Display Range	-100.00%-100.00%

It displays the data written by means of the communication address 0x1000.

d0-30	Main frequency X	Display Range	0.00-320.00 Hz 0.0-3200.0 Hz

It displays the setting of main frequency X.

- If P0-22 (Frequency reference resolution) is 1, the display range is -3200.0-3200.0 Hz.
- If P0-22 (Frequency reference resolution) is 2, the display range is -320.00-320.00 Hz.

d0-31	Auxiliary frequency Y	Display Range	0.00-320.00 Hz 0.0-3200.0 Hz

It displays the setting of auxiliary frequency Y.

- If P0-22 (frequency reference resolution) is 1, the display range is -3200.0-3200.0 Hz.

- If P0-22 (frequency reference resolution) is 2, the display range is -320.00-320.00 Hz.

d0-35	Target torque	Display Range	-200.0%-200.0%

It displays the setting of auxiliary frequency Y.

d0-37	Power factor angle	Display Range	-

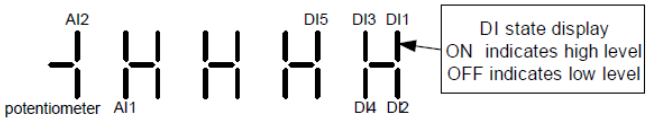
It displays the current power factor angle.

d0-39	Target voltage upon V/F separation	Display Range	0 V to rated motor voltage
d0-40	Output voltage upon V/F separation	Display Range	0 V to rated motor voltage

They display the target output voltage and current actual output voltage in the V/F separation state. For V/F separation, see the descriptions of group P3.

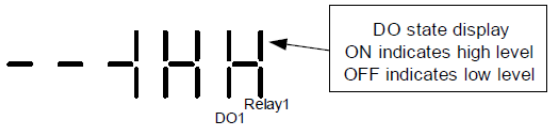
d0-41	DI state visual display	Display Range	-

It displays the DI state visually and the display format is shown in the following figure. Figure Display format of the DI state



d0-42	DO state visual display	Display Range	-

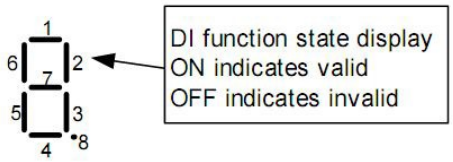
It displays the DO state visually and the display format is shown in the following figure. This is the display format of the DO state



d0-43	DI function state visual display 1	Display Range	-

It displays whether the DI functions 1-40 are valid. The operation panel has five 7-segment LEDs and each 7-segment LED displays the selection of eight functions. The 7-segment LED is defined in the following figure.

This is definition of 7-segment LED



The 7-segment LED display functions 1-8, 9-16, 17-24, 25-32 and 33-40 respectively from right to left.

d0-44	DI function state visual display 2	Display Range	-

It displays whether the DI functions 41-59 are valid. The display format is similar to d0-43. The 7-segment LEDs display functions 41-48, 49-56 and 57-59, respectively from right to left.

d0-59	Current set frequency	Display Range	-100.00%-100.00%
d0-60	Current running frequency	Display Range	-100.00%-100.00%

It displays the current set frequency and running frequency. 100.00% corresponds to the AC drive's maximum frequency (P0-10).

d0-61	AC drive running state	Display Range	0-65535

It displays the running state of the AC drive.

The data format is listed in the following table:

d0-61	Bit0	0: Stop 1: Forward 2: Reverse
	Bit1	
	Bit2	0: Constant 1: Accelerate 2: Decelarate
	Bit3	
	Bit4	0: Normal 1: Abnormal

d0-62	Current fault code	Display Range	0-99

It displays the current fault code.

d0-65	Torque upper limit	Display Range	-200.00%-200.00%

It displays the current setting torque upper limit.

5 Troubleshooting and Resolutions

5.1 Faults and solutions

The AC900 provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the AC drive implements the protection function, AC drive output stops, and displays the fault code on the operation panel. Before seeking for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or our company.

Err22 mentioned below is the AC drive hardware overcurrent or overvoltage signal. In most situations, hardware overvoltage fault causes Err22.

Fault Name	Display	Possible Causes	Solutions
Inverter unit protection	Err01	1: The output circuit is short circuited. 2: The connecting cable of the motor and the AC drive is too long. 3: The module overheats. 4: The internal connections become loose. 5:The main control board is faulty. 6: The drive board is faulty. 7: The inverter module is faulty.	1: Eliminate external faults. 2: Install a reactor or an output filter. 3: Check the air filter and the cooling fan and troubleshoot existing problems 4: Connect all cables properly. 5: Seek for technical support 6: Seek for technical support 7: Seek for technical support
Overcurrent during acceleration	Err02	1: The output circuit is grounded or short circuited. 2: vector control is presented and Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor auto-tuning. 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an AC drive of higher power class.

Fault Name	Display	Possible Causes	Solutions
Overcurrent during deceleration	Err03	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The deceleration time is too short. 4: The voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed.	1: Eliminate external faults. 2: Perform the motor auto-tuning. 3: Increase the deceleration time. 4: Adjust the voltage to normal range. 5: Remove the added load. 6: Install the braking unit and braking resistor.
Overcurrent at constant speed	Err04	1: The output circuit is grounded or short circuited. 2: Vector control is presented and Motor auto-tuning is not performed. 3: The voltage is too low. 4: A sudden load is added during operation. 5: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor auto-tuning. 3: Adjust the voltage to normal range. 4: Remove the added load. 5: Select an AC drive of higher power class.
Overvoltage during acceleration	Err05	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
Overvoltage during deceleration	Err06	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor.
Overvoltage at constant speed	Err07	1: The input voltage is too high. 2: An external force drives the motor during deceleration.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor.
Control power supply fault	Err08	1:The input voltage is not within the allowable range.	1:Adjust the input voltage to the allowable range.

Fault Name	Display	Possible Causes	Solutions
Undervoltage	Err09	1: Instantaneous power failure. 2: The AC drive's input voltage is not within the allowable range. 3: The bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The drive board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2: Adjust the voltage to normal range. 3: Seek technical support. 4: Seek technical support. 5: Seek technical support. 6: Seek technical support.
AC drive overload	Err10	1: The load is too heavy or locked-rotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.
Motor overload	Err11	1: P9-01 is set improperly. 2: The load is too heavy or locked-rotor occurs on the motor. 3: The AC drive model is of too small power class.	1: Set the parameter correctly. 2: Reduce the load and check the motor and the mechanical condition. 3: Select an AC drive of higher power class.
Power input phase loss	Err12	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightening board is faulty. 4: The main control board is faulty.	1: Eliminate external faults. 2: Seek technical support. 3: Seek technical support. 4: Seek technical support.
Power output phase loss	Err13	1: The cable connecting the AC drive and the motor is faulty. 2: The AC drive's three-phase outputs are unbalanced when the motor is running. 3: The drive board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Seek technical support. 4: Seek technical support.
Module overheat	Err14	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.

ault Name	Display	Possible Causes	Solutions
External equipment fault	Err15	1: External fault signal is input via DI. 2: External fault signal is input via virtual I/O.	1: Reset the operation. 2: Reset the operation.
Communicati on fault	Err16	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: reservation 4: The communication parameters in group Pd are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set communication expansion cards correctly. 4: Set the communication parameters properly.
Contactor fault	Err17	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty contactor.
Current detection fault	Err18	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Motor auto-tuning fault	Err19	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the AC drive and the motor.
EEPROM read-write fault	Err21	1: The EEPROM chip is damaged.	1: Replace the main control board.
AC drive hardware fault	Err22	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on overvoltage. 2: Handle based on overcurrent.
Short circuit to ground	Err23	1: The motor is short circuited to the ground.	1:Replace the cable or motor.
Accumulative running time reached	Err26	1: The accumulative running time reaches the setting value.	1: Clear the record through the parameter initialization function.
User-defined fault 1	Err27	1: The user-defined fault 1 signal is input via DI. 2: User-defined fault 1 signal is input via virtual I/O.	1: Reset the operation. 2: Reset the operation.

Fault Name	Display	Possible Causes	Solutions
User-defined fault 2	Err28	1: The user-defined fault 2 signal is input via DI. 2: The user-defined fault 2 signal is input via virtual I/O.	1: Reset the operation. 2: Reset the operation.
Accumulative power-on time reached	Err29	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Load becoming 0	Err30	1: The AC drive running current is lower than P9-64.	1: Check that the load is disconnected or the setting of P9-64 and P9-65 is correct.
PID feedback lost during running	Err31	1: The PID feedback is lower than the setting of PA-26.	1: Check the PID feedback signal or set PA-26 to a proper value.
Pulse-by-pulse current limit fault	Err40	1: The load is too heavy or locked-rotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.
Motor overheat	Err45	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high.	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation measures.
Initial position fault	Err51	1: The motor parameters are not set based on the actual situation.	1: Check that the motor parameters are set correctly and whether the setting of rated current is too small.

5.2 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.

Table 5-1 Troubleshooting to common faults of the AC drive

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on.	1: There is no power supply to the AC drive or the power input to the AC drive is too low. 2: The power supply of the switch on the drive board of the AC drive is faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the drive board and the operation panel breaks.	1: Check the power supply. 2: Check the bus voltage. 3: Re-connect the 34-core cables. 4: Contact our company for technical support.
2	“HC” is displayed at power-on.	1: The cable between the drive board and the control board is in poor contact. 2: Related components on the control board are damaged. 3: The motor or the motor cable is short circuited to the ground. 4: The HALL device is faulty. 5: The power input to the AC drive is too low.	1: Re-connect the 34-core cables. 2: Contact our company for technical support.
3	“Err23” is displayed at power-on.	1: The motor or the motor output cable is short-circuited to the ground. 2: The AC drive is damaged.	1: Measure the insulation of the motor and the output cable with a megger. 2: Contact our company for technical support.
4	The AC drive display is normal upon power-on. But “HC” is displayed after running and stops immediately.	1:The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited.	1: Replace the damaged fan. 2: Eliminate external fault

SN	Fault	Possible Causes	Solutions
5	Err14 (module overheat) fault is reported frequently.	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the AC drive are damaged (thermal coupler or others).	1: Reduce the carrier frequency (P0-15). 2: Replace the fan and clean the air filter. 3: Contact the agent or Inovance for technical support.
6	The motor does not rotate after the AC drive runs.	1: Check the motor and the motor cables. 2: The AC drive parameters are set improperly (motor parameters). 3: The cable between the drive board and the control board is in poor contact. 4: The drive board is faulty.	1: Ensure the cable between the AC drive and the motor is normal. 2: Replace the motor or clear mechanical faults. 3: Check and re-set motor parameters.
7	The DI terminals are disabled.	1: The parameters are set incorrectly. 2: The external signal is incorrect. 3: The jumper bar across OP and +24 V becomes loose. 4: The control board is faulty.	1: Check and reset the parameters in group P4. 2: Re-connect the external signal cables. 3: Re-confirm the jumper bar across OP and +24V. 4: Contact our company for technical support.
9	The AC drive reports overcurrent and overvoltage frequently.	1: The motor parameters are set improperly. 2: The acceleration/deceleration time is improper. 3: The load fluctuates.	1: Re-set motor parameters or re-perform the motor auto-tuning. 2: Set proper acceleration/ deceleration time. 3: Contact our company for technical support.
10	Err17 is reported upon power-on or running.	1: The soft startup contactor is not picked up.	1: Check whether the contactor cable is loose. 2: Check whether the contactor is faulty. 3: Check whether 24 V power supply of the contactor is faulty. 4: Contact our company for technical support.
11	8.8.8.8.8 is displayed upon power-on.	1: Related component on the control board is damaged.	1: Replace the control board.

Appendix 1 AC900 Communication Data Address

AC900 series AC drive support Modbus communication protocol. Host computer can control and monitor the AC drive, and revise and check the function parameters through the protocol.

AC900 communication data is consisted of function code data and non-function code data. The latter includes run command, running status, running parameter and warning information.

1.1 AC900 Function Code Data

Function code data is very important setting parameter of AC drive and includes group P and group E, as below:

AC900 function code data	Group P (read-write)	P0,P1,P2,P3,P4,P5,P6,P7,P8,P9,PA,Pb,PC,Pd,PP
	Group E (read-write)	E0,E5,E6,EC

The definition of function code data communication address is:

1. when read the function code data,

As for function code data in group P0-PF, E0-EC, the communication address will be function group series number if it is above 16's digit, or it will be sequence number of function code in function group. For example:

P0-16 function parameter's communication address is F010H, among which, F0H represents function parameter of group P0; 10H represents the hexadecimal data format of number 16 in function group.

EC-08 function parameter's communication address is AC08, among which, ACH represents function parameter of group EC; 08H represents the hexadecimal data format of number 8 in function group.

2. When write the function code data,

As for function code data in group P0-PP, it will be divided into 00-0F and F0-FF according to whether to write in EEPROM if it is above 16's digit, or it will be sequence number of function code in function group. For example:

As for function parameter P0-16, the communication address is 0010H if it is not written in EEPROM; and F010H if it is written in EEPROM.

As for function code data in group E0-EC, it will be divided into 40-4C and A0-AC according to whether to write in EEPROM if it is above 16's digit, or it will be sequence number of function code in function group. For example:

As for function parameter EC-08, the communication address is 4C08H if it is not written in EEPROM; and AC08H if it is written in EEPROM.

1.2 AC900 non-function code data

AC900 non-function code data	Status data (read only)	Group d monitoring parameter, AC drive faults description, AC drive running status
	Control parameter (read only)	Run command, communication set value, digital output terminal control, analog output AO1 control, FMP output control, parameter initialization

1. Status Data

Status data is consisted of group d monitoring parameter, AC drive faults description, and AC drive running status.

Group d monitoring parameter

See the group d monitoring parameter descriptions in chapter 4. The definition is as below:

d0 is 70 if the communication address is above 16's digit, or it will be the sequence number of monitoring parameter. For example:

d0-11's communication address is 700BH

AC drive faults description

When communication read AC drive faults description, the communication address will be 3000H. When computer reads this address data, it can access the running status of current AC drive. The definition is as below:

AC drive running status communication address	Reading status definition
3000H	1: forward running
	2: reverse running
	3: stop

2. Control parameter

Control parameter includes Run command, communication set value, digital output terminal control, analog output AO1 control, FMP output control.

Run command

Select 2 in P0-02: with communication control, computer will start or stop AC drive through this communication address. The definition is as below:

Run control communication address	Control function
2000H	1:Forward running
	2:Reverse running
	3:Forward inching
	4:Reverse inching
	5:Stop
	6:Decreasing stop
	7:Faults resetting

Communication set value

The communication address is 1000H. When host computer set this communication address, the data range is -10000~10000 and the relative set value is -100.00%~100.00%.

Digital output terminal control

When select function20 of digital output terminal control: with communication control, it can control digital output terminal of AC drive. The definition is as below:

Digital output terminal control communication address	Control contents
2001H	BIT0: DO1 output control BIT1: Reserved BIT2: RELAY1 output control BIT3: Reserved BIT4:FMR output control BIT5: Reserved BIT6: Reserved BIT7:Reserved BIT8:Reserved BIT9: Reserved

Analog output AO1 control, FMP output control

When select function12 of Analog output AO1 control,, FMP output control: with communication setting, it can control analog quantity and FMP output of AC drive. The definition is as below:

Output control communication address		Command contents
AO1	2002H	0~7FFF represents 0%~100%
FMP	2004H	

Parameter initialization

This function is needed when host computer need to have parameter initialization of AC drive.

If PP-00(User password) is not zero, then password should be verified at first. After it is done, host computer can have parameter initialization within 30 seconds.

The communication address of password verification is 1F00H. The password verification can be finished when directly write correct password in the address.

The communication address of parameter initialization is 1F01H. The definition is as below:

parameter initialization communication address	Command functions
1F01H	1:restore factory default
	2:record information

Appendix 2 AC900 Modbus Communication Protocol

The AC900 series provides RS485 communication interface, and supports the Modbus-RTU slave communication protocol. You can query or modify the AC drive's function codes, query various running state parameters, query its faults information through computer and PLC.

2.1 Protocol Content

The serial communication protocol defines information contents and using format transmitted through serial communication, including host computer polling(broadcasting)format; host computer encoding, including function code requesting actions, transmitting data and error verify. The response of slave computer is also the same structure, including action confirm, return data and error verify. If slave computer breaks down when it receives information or cannot finish the action requested by host computer, it will organize fault information and feedback to host computer.

2.1.1 Application mode

AC drive will be served as communication slave computer after it is connected to “single host multi-slave” PC/PLC control net fitted with RS485 bus.

2.1.2 Bus structure

1) Hardware interface

AC drive has RS485 communication interface itself.

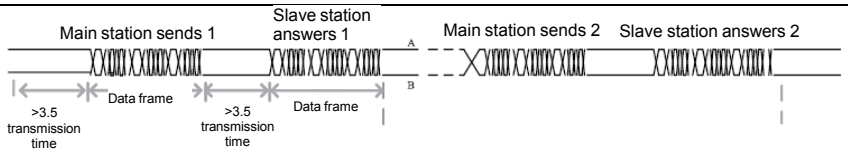
2) Topology structure

System with single host and multi-slave: every communication device has a slave address, among which one device serves as host computer (PC, PLC, HMI etc) and start communication to write or read parameters in slave. Other devices will respond the host on query or operation of slave. Only one device can send data while others receive data at the same time.

The set range of slave address is 1~247. 0 stands for the broadcast communication address. The slave address should be only.

3) Communication transmission mode

Asynchronous serial, half-duplex transmission: In the process of asynchronous serial, data will be sent in the form of message and 1 frame each time. According to the Modbus-RTU protocol, when the idle time without data is more than 3.5 Byte transmission time, it means the beginning of a new frame.

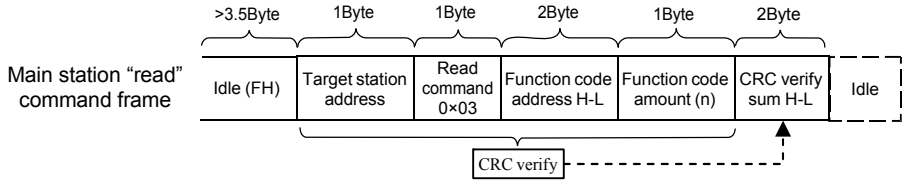


The communication protocol of AC900 series AC drive is Modbus-RTU slave communication protocol, which can respond the “Check/Command” of main station or make related action according to “Check/Command” of main station and answer the communication data.

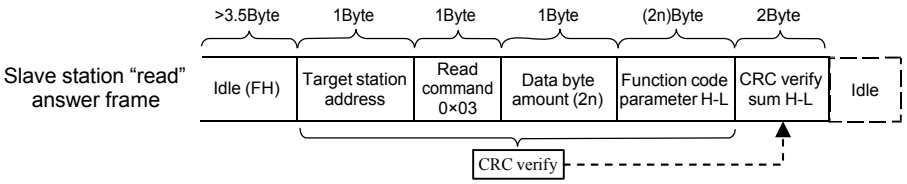
The main station includes PC, Industrial control device, PLC, etc. When main station send “Check/Command” to a single slave station, it has to resend a answer frame; when main station send broadcast information, slave stations have no need to respond.

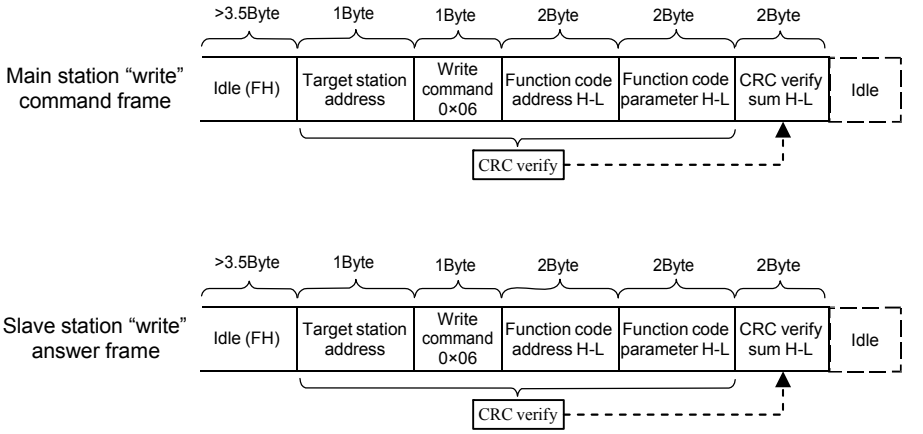
2.2 Communication Information Structure

The format of Modbus protocol communication data of AC900 series AC drive is as below: AC drive only support the read and write of Word parameter, and the “read” operation command is 0×03； “write” operation command is 0 ×06; the read and write operation of byte and bit is not supported.

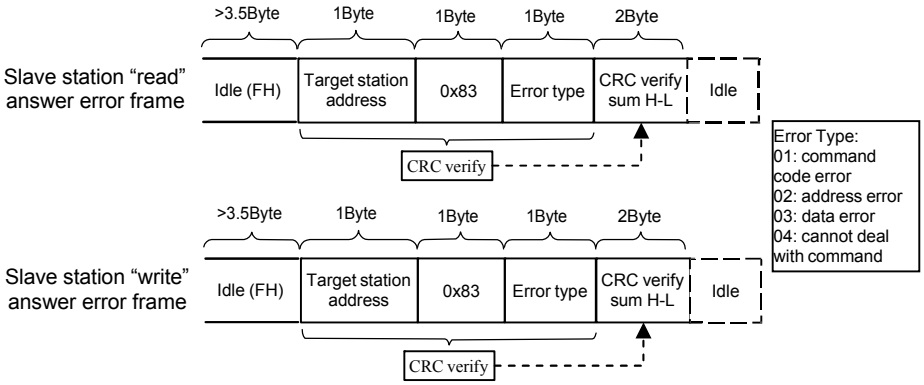


In theory, host computer can read dozens of function codes continuously（n max=12）, but it cannot stride the last function code of this function code group, or the answer might have error.





If slave stations test error in communication frames or cannot read or write it successfully, those stations will answer error frame.



Instruction for data frame fields

Frame Head START	>3.5 byte transmission time
Slave address ADR	Communication address range:1-247 0=broadcast address
Command code CMD	03:read slave station parameter 06:write slave station parameter
Function code H	Parameter address of AC drive, represented by hexadecimal; include function code and non-function code (such as running status parameter, run command) parameters, details

Function code L	see definition of address. When sending it, high byte is forward and low byte is behind.
Function code amount H	Function code amount read by this frame. 1 means it can read 1 function code. When sending it, high byte is forward and low byte is behind. Only 1 function code can be revised each time according to this proposal.
Function code amount L	
Data H	Data answered or to be written. When sending it, high byte is forward and low byte is behind.
Data L	
CRC CHK	Test value: CRC 16 verify value. When sending it, high byte is forward and low byte is behind. Calculation method see instruction of CRC verify
CRC CHK	
END	When it is 3.5 byte

CRC verity method:

CRC (Cyclical Redundancy Check) uses the format of RTU frame. The message includes error test domain based on CRC method. CRC domain has tested all the messages. CRC domain is two-byte and includes a binary system with 16 bits. It can add to the message after the calculation of transmission device. The receive device can recalculate the CRC which receives messages and compare it with the CRC domain value. If these two values are not the same, it shows transmission error.

CRC deposits 0×FFFF first and deals with continuous 8 bytes in message and the value in current register through a process. Only 8 bits in each byte is valid to CRC, the start bit, end bit, and odd-even verify bit are invalid.

When CRC is added to messages, the simple function of CRC is as below:

```
unsigned int crc_chk_value (unsigned char *data_value, unsigned char length)
{
  unsigned int crc_value = 0xFFFF;
  int i;
  while (length--)
  {
    crc_value^=*data_value++;
    for (i=0; i<8; i++)
    {
```

```
            if (crc_value&0x0001)
            {
               crc_value = (crc_value>>1^0xa001;
            }
            else
            {
               crc_value = crc_value>>1;
            }
          }
        }
        return (crc_value);
    }
```

Definition of communication parameter address

Function code parameter for read and write (some function codes can not change and are only used or monitored by manufacturer).

2.3 Specified Regulations of Function Code Parameter Address

Regulations were made on the basis of function code group number and label representing parameter address:

High byte: F0-FF(group P)、A0-AF(group E)、70-7F(group d)

Low byte: 00-FF

For example: if looking for range function code P3-12, 0xF30C indicates the access address of function code.

Attention:

Group PF: parameters can neither be read nor be changed.

Group d: parameters can only be read, but cannot be changed.

Some parameters cannot be changed when the AC drive is running; Some parameters cannot be changed regardless of the situation of the AC drive; when changing function code parameter, attention should be paid to the range and units of parameters and relevant instructions.

Function code group number	communication access address	Function code address while modifying RAM
Group P0-PE	0xF000-0xFEFF	0x0000-0x0EFF
Group E0-EC	0xA000-0xACFF	0x4000-0x4CFF
Group d0	0x7000-0x70FF	

Attention: if being used frequently, the lifespan of EEPROM will be shortened. So, some function codes cannot be stored under the model of communication, and you only need to change the value of RAM.

For parameters in group P, you only need to change F to 0 in high byte of function code address to implement this function.

For parameters in group E, you only need to change A to 4 in high byte of function code address to implement this function.

Relevant function code address is as follows:

High byte: 00-0F(group P)、40-4F(group E)

Low byte: 00-FF

For example:

Function code P3-12 is not stored in EEPROM, 030C indicates the address.

Function code E0-05 is not stored in EEPROM, 4005 indicates the address.

These addresses indicate that RAM can only be written, but cannot be read. The addresses are invalid while reading.

For all parameters, the function can be implemented by command code 07H.

Stop/Operation parameters:

Parameter address	Parameter description	Parameter address	Parameter description
1000H	Communication setting value(decimal)	1010H	PID setting
1001H	Running frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC procedure
1003H	Output voltage	1013H	input pulse frequency, unit 0.01kHz
1004H	Output current	1014H	Feedback speed, unit 0.1Hz
1005H	Output power	1015H	Remaining running time

Parameter address	Parameter description	Parameter address	Parameter description
1006H	Output torque	1016H	AI1 voltage before calibration
1007H	Running speed	1017H	AI2 voltage before calibration
1008H	DI input flag	1018H	Reserved
1009H	DO output flag	1019H	linear speed
100AH	AI1 voltage	101AH	Present power-on time
100BH	AI2 voltage	101BH	Present running time
100CH	Reserved	101CH	input pulse frequency, unit 1Hz
100DH	Count value input	101DH	Communication setting value
100EH	Length value input	101EH	Actual feedback speed
100FH	Load speed	101FH	Principal frequency X display
--	--	1020H	Auxiliary frequency Y display

Attention：

Communication setting value is the percentage to the relevant value. 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.

For frequency dimension data, the figure is the percentage of relevant maximum frequency; For torque dimension data, the figure is P2-10 (the set maximum numbers correspond to motor respectively)

Input control commands into AV drive: (write only)

Command word address	Function
2000H	0001: forward running
	0002: reverse running
	0003: forward jog
	0004: reverse jog
	0005:free stop
	0006: decelerate to stop
	0007:fault reset

Input control commands into AV drive: (read only)

Status word address	Function
3000H	0001: forward running
	0002: reverse running
	0003: stop

Password check for locked parameters: (8888H indicates password validated)

Password address	Enter password
1F00H	******

Digital output terminal control: (write only)

Command address	Command information
2001H	BIT0: DO1 output control
	BIT1: Reserved
	BIT3: RELAY1 output control
	BIT4: FMR output control
	BIT5: Reserved
	BIT6: Reserved
	BIT7: Reserved
	BIT8: Reserved
	BIT9: Reserved

Analog output AO1control: (write only)

Command address	Command information
2002H	0-7FFF correspond to 0%-100%

Pulse output control: (write only)

Command address	Command information
2004H	0-7FFF correspond to 0%-100%

AC drive fault description:

AC drive fault address	AC drive fault information	
8000H	0000: fault-free	0015: parameter read-write fault
	0001: reserved	0016: AC drive hardware fault
	0002: overcurrent during acceleration	0017: Short circuit to ground
	0003: overcurrent during deceleration	0018: reserved
	0004: overcurrent at constant speed	0019:reserved
	0005:Overvoltage during acceleration	001A: Accumulative running time reached
	0006: Overvoltage during deceleration	001B: User-defined fault 1
	0007: Overvoltage at constant speed	001C: User-defined fault 2
	0008: Buffer resistance overload	001D: Accumulative power-on
	0009: Undervoltage	001E: Load becoming 0
	000A: AC drive overload	001F: PID feedback lost during running
	000B: Motor overload	0028: fast current limit timeout fault
	000C: Power input phase loss	0029: Reserved
	000D: Power output phase loss	002A: Reserved
	000E: Module overheat	002B: Reserved
	0010: Communication fault	002D: Reserved
	0011: Contactor fault	005A: Reserved
	0012: Current detection fault	005B: Reserved
	0013: Motor auto-tuning fault	005C: Reserved
	0014: Reserved	005E: Reserved

2.4 Instructions of Group Pd Communication Parameters

Pd-00	Baud rate	default	5
	Setting range	MODBUS Baud Rate	
		0: 300BPS	5: 9600BPS
		1:600BPS	6:19200BPS
		2:1200BPS	7:38400BPS
		3: 2400BPS	8:57600BPS
		4: 4800BPS	9: 115200BPS

It is used to set the data transfer rate between upper computer and AC drive.

Attention: the baud Rate of upper computer and AC drive must be consistent. Otherwise, communication is impossible. The grater the baud rate, the higher the speed of communication.

Pd-01	Data format	default	0
	Setting range	0: no parity: data format <8,N,2> 1: even parity: data format<8,E,1> 2: odd parity: data format<8,O,1> 3: no parity: data format<8-N-1>	

The data format of upper computer and AC drive must be consistent. Otherwise, communication is impossible.

Pd-02	Native address	default	1
	Setting range	1-249, 0 indicates broadcast address	

If the native address is set at 0 (broadcast address), the broadcast function of the upper computer is activated.

Native address is unique (except broadcast address), and this is the basis of the point-to-point communication between upper computer and AC drive.

Pd-03	Response delay	default	2ms
	Setting range	0-20ms	

Response delay: the interval between AC drive receiving data and upper computer sending data. If response delay is less than system processing time, the latter serves as response delay. If response delay is more than system processing time, after the system processing, upper computer will not send data until the response delay time.

Pd-04	Communication timeout	default	0.0s
	Setting range	0.0s (invalid):0.1-60.0s	

If the function code is set at 0.0s, the communication timeout is invalid.

When the function code is set at valid value, the system will generate communication fault (Err16) if the interval between communications exceeds communication timeout. In general, the parameter is set at 0.0s. In continuous communication, the parameter is used to monitor communication situation.

Pd-05	Communication protocol selection	Default	1
	Setting range	0：non-standard Modbus protocol 1:standard Modbus protocol	

Pd-05=1: Select standard Modbus protocol

Pd-05=0: If the number of bytes that returned to the slave is more than the standard Modbus protocol, refer to Section 5 *Communication Data Structure* in the protocol.

Pd-06	Resolution While reading current	default	0
	Setting range	0: 0.01A: 1: 0.1A	

It is used to ensure the output unit of current value while reading output current.

Warranty Agreement

1) The warranty period of the product is 12 months (Bar code of the product shall prevail). If the product malfunctions or breaks down when it is used under normal conditions based on Operating Instruction and the product is within warranty period, our company shall repair it free of charge.

2) Our company shall charge certain fees for repair if the breakdown of the product is caused by the following reasons even though the product is within the warranty period:

A. Breakdown caused by wrong operation, unprofessional repair and transformation;

B. Breakdown caused by fire disaster, flood, abnormal voltage, other natural disasters and secondary disasters;

C. Hardware breakdown caused by man-made fall off and transportation issues after purchasing;

D. Breakdown caused by wrong operation that without the reference of *User's Manual* provided by our company;

E. Malfunction or breakdown caused by problems (such as problems of peripheral equipment) that have nothing to with the product itself;

3) When your product malfunctions or breaks down, please fill in your *Warranty Card* correctly and carefully.

4) The repair fees are based on our company's newly-adjusted *Price List of Maintenance.*

5) Each product just has one *Warranty Card,* please reserve the card carefully and take your card while repairing the product.

6) If you encounter any problems during the repair, please contact our company or its agents immediately.

7) ANCHUAN ELECTRONICS CO., LTD. reserves the right to interpret the agreement.

ANCHUAN ELECTRONICS CO., LTD.

Call of Customer Service Center: 400-886-9116

Website: www.anchuandz.com

Warranty Card

<table>
<tr><td rowspan="3">Customer's Information</td><td colspan="2">Company Address:</td></tr>
<tr><td>Company Name:

Post Code:</td><td>Contact:

Phone Number:</td></tr>
<tr><td rowspan="3">Product Information</td><td colspan="2">Product Model:</td></tr>
<tr><td colspan="2">Bar Code of the Product (paste here):</td></tr>
<tr><td colspan="2">Name of the Agent:</td></tr>
<tr><td>Fault Information</td><td colspan="2">(Time and Contents of Repair):

Repairmen:</td></tr>
</table>