

# AIMotor Series motor driver manual

## Safety notes



**Danger** means that when used incorrectly, it will lead to danger and personal injury.



**Note:** When used incorrectly, it will cause danger, personal injury and possible damage to equipment.



**Prohibition:** It means strictly prohibiting the behavior, otherwise it will lead to equipment damage or can not be used.

### 1.Use occasion


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#### DANGER

- It is forbidden to use the product in flammable and explosive occasions, which can easily cause injury or fire.
- It is forbidden to use the product in places with humidity, direct sunlight, dust, salt and metal powder.

## Wring

- Do not connect 220V driver power to 380 power supply, otherwise it will cause equipment damage or fire.
- Please grounding terminal  reliably. Poor grounding may cause electric shock or fire.
- Do not connect the output terminal of driver U-V-W motor to three-phase power supply, otherwise it will cause casualties or fire.
- Driver UVW motor output terminal and motor connection terminal UVW must be connected correspondingly, otherwise the motor may cause equipment damage and casualties due to speeding.

- Wiring please refer to wire wiring, otherwise it may cause fire.

## Operation



### Note

- Before starting operation, please make sure that you can start the emergency switch and shut down at any time.
- When commissioning, please separate the servo motor from the machine. After the action is confirmed, the motor is installed on the machine.
- After the servo motor stops and restores instantaneously, do not approach the machine. The machine may suddenly start again.
- Do not switch on or off the power frequently, otherwise it will cause overheating inside the driver.

## Function



### Stop

- When the motor is running, do not contact any rotating parts, otherwise it will cause casualties.
- When the equipment is running, it is forbidden to touch the driver and motor, otherwise it will cause electric shock or scald.
- When the equipment is running, it is forbidden to move the connecting cable, otherwise it will cause personal injury or equipment damage.

## Chapter 1 Product introduction

### Servo driver technical specifications

AIMotor is a high performance, low energy consumption motor product independently developed by our company according to the market guidance. It has excellent performance in the fields of medical instruments, precision instruments, food packaging, 3C assembly and so on.

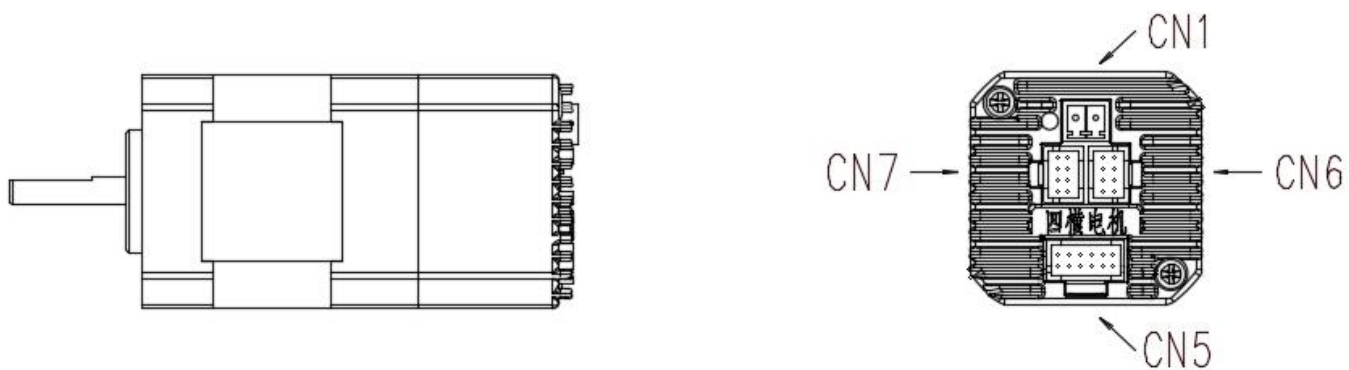
The main advantages are strong stability, high precision positioning, high motor response, low noise, low heat, fine structure, strong overload capacity, practical and rich functions, simple and convenient application, etc. See the table below for specific technical specifications

input power		The allowed input voltage of different models of AIMotor motor is not consistent. Please see the motor specifications for details Dc power input, pay attention to the positive and negative electrodes of the power supply
operating environment	temperature	Working: 0℃ ~ 55℃ Storage: -20℃ ~ +80℃
	humidity	Less than 90% (no condensation)
control method		① position control ② speed control ③ torque control ④ communication control
control characteristic		Speed frequency response: $\geq 200\text{Hz}$
		Velocity fluctuation: $< \pm 0.03$ (load 0 ~ 100%) : $< \pm 0.02 \times (0.9 \sim 1.1)$ supply voltage
		Receiving pulse frequency $\leq 100\text{kHz}$
control input		01, servo enable; 02, alarm clearance; 03, multi-segment enable; 04, multi-segment select 1; 05, many paragraphs choose 2; 06, forward overrange; 07, reverse overrange; 08, positive turn point; 09, reverse point movement; 10. Origin switch 11, origin enable; 12. Emergency shutdown; 13. Pulse prohibition; 14. Remove position deviation;
Control output		01, the servo is ready to output; 02. Complete the output of positioning; 03, fault alarm output 04. Confirm the origin back to zero output; 05, electrical confirmation back to zero output; 06, torque to the output; 07, the speed reaches the output;
position control		Pulse mode: pulse + direction; A plus B orthogonal pulse The electronic gear ratio defaults to 131072:1000, that is, 1000 pulses per turn Maximum pulse receiving frequency $\leq 100\text{KHZ}$
		Internal 4 section position mode: 1. Single cycle operation; 2, automatic cycle operation; 3. Multi-segment DI switch operation
		Communication control mode: RS485+ Modbus_Rtu controls the corresponding communication location and address
speed control		Internal 4 speed mode: 1, single cycle operation; 2, automatic cycle operation; 3. Multi-speed DI switching operation
		Communication control mode: RS485+ Modbus_Rtu controls the corresponding communication speed address
torque control		Communication control mode: RS485+ Modbus_Rtu controls the corresponding communication torque address
Acceleration and deceleration function		The time of ACC/DEC : 1 ~ 65535 ms ( 0 r/min ~ 1000 r/min )
Monitor function		Current speed, DI input, DO output, current position, command input pulse accumulation, average load rate, position deviation count, motor phase current, bus voltage value, module temperature, alarm record, command pulse frequency corresponding speed, running state, etc

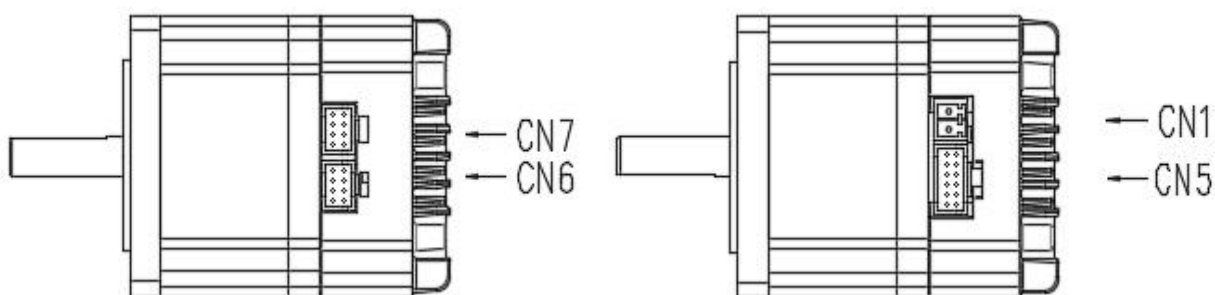
protect function	vervoltage and undervoltage of the main power supply, overspeed, overcurrent, overload, abnormal encoder, abnormal position, blocked rotation, abnormal parameters, etc
Return to origin function	13 autonomous (search) ways to return to the origin, as well as the origin offset function.
RS485 function	It follows the standard ModBUS-RTU protocol One point two communication interface, convenient network parallel
gain adjustment	Manually adjust Internal rigidity grade table adjustment

## 1.2-Integrated series motor hardware interface

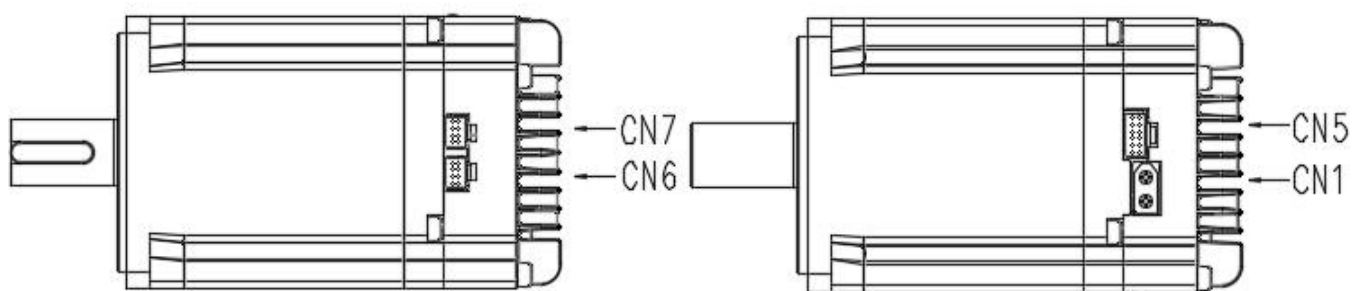
Integrated model: MD42 terminal interface  
diagram



1) Integrated model: MD57/MD60 terminal interface  
diagram



2) Integrated model: MD80/MD86 terminal interface diagram



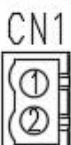
MD42  
MD57



端子序号	名称	功能
1	GND	直流电源地
2	DC+	直流电源正极

电压DC24~36V, 根据实际电机电压;  
区分正负极, 接反会损坏驱动器。

MD60



端子序号	名称	功能
1	GND	直流电源地
2	DC+	直流电源正极

电压DC24~48V, 根据实际电机电压;  
区分正负极, 接反会损坏驱动器。

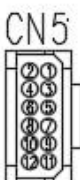
MD80  
MD86



端子序号	名称	功能
1	GND	直流电源地
2	DC+	直流电源正极

电压DC36~60V, 根据实际电机电压;  
区分正负极, 接反会损坏驱动器。

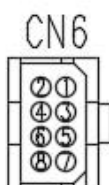
通用



端子序号	名称	功能
1	D01+	出厂默认REDY伺服准备好
2	D01-	
3	D02+	出厂默认ALM报警故障输出
4	D02-	
8	DI1	出厂默认SON伺服外部使能
5	DI2	出厂默认ALM-R报警故障复位
6	DI3	出厂默认E-STOP外部紧急停止
7	DIC	输入端子的公共端, 接DC12~24V(共阳NPN接法)或0V(共阴PNP接法), 电流≥100mA
9	DIR+	指令方向正端
10	DIR-	指令方向负端
11	PULS+	指令脉冲正端
12	PULS-	指令脉冲负端

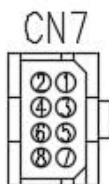
DC5~24V  
自适应

通用



端子序号	名称	功能
1	485A/T	485通信正端
2	NC	预留
3	485B/T	485通信负端
4	NC	预留
5	GND	通信公共地
6	NC	预留
7	NC	预留
8	NC	预留

通用



MD80  
MD86



端子序号	名称	功能
1	D-	制动释放
2	P+	直流母线

接制动泄放电阻



### Remark:

GND:DC power ground

DC+:DC power positive

DO1+/DO1- (Factory default REDY servo is ready)

DO2+/DO2-(Factory default REDY Alarm fault is ready)

DI1 Factory default SON server external enable

DI2 Factory default ALARM alarm fault reset

DI3 Factory default E-STOP external emergency stop

DIC The common terminal of the input terminal is connected to DC12-24V (common anode NPN connection) or OV (common cathode PNP connection), the current is less than or equal to 100mA

DIR+ (Direction+), DIR- (Direction-) , PUL+ (Pluse+), PUL-(Pulse-)

485A/T(485 communication positive terminal),NC(Reseved), 485B/T(485 communication negative terminal)

D-: brake release P+:DC bus

Note 1: Ports marked with the word "General" indicate that all integrated motors are of the common interface sequence.

Note 2: THE port marked with "MODEL" indicates that all the integrated motor interfaces are different. Please pay attention to the connection.

### 1.3-Split series driver hardware interface

A: Driver model: D-AISXX005A terminal interface diagram



Remark:

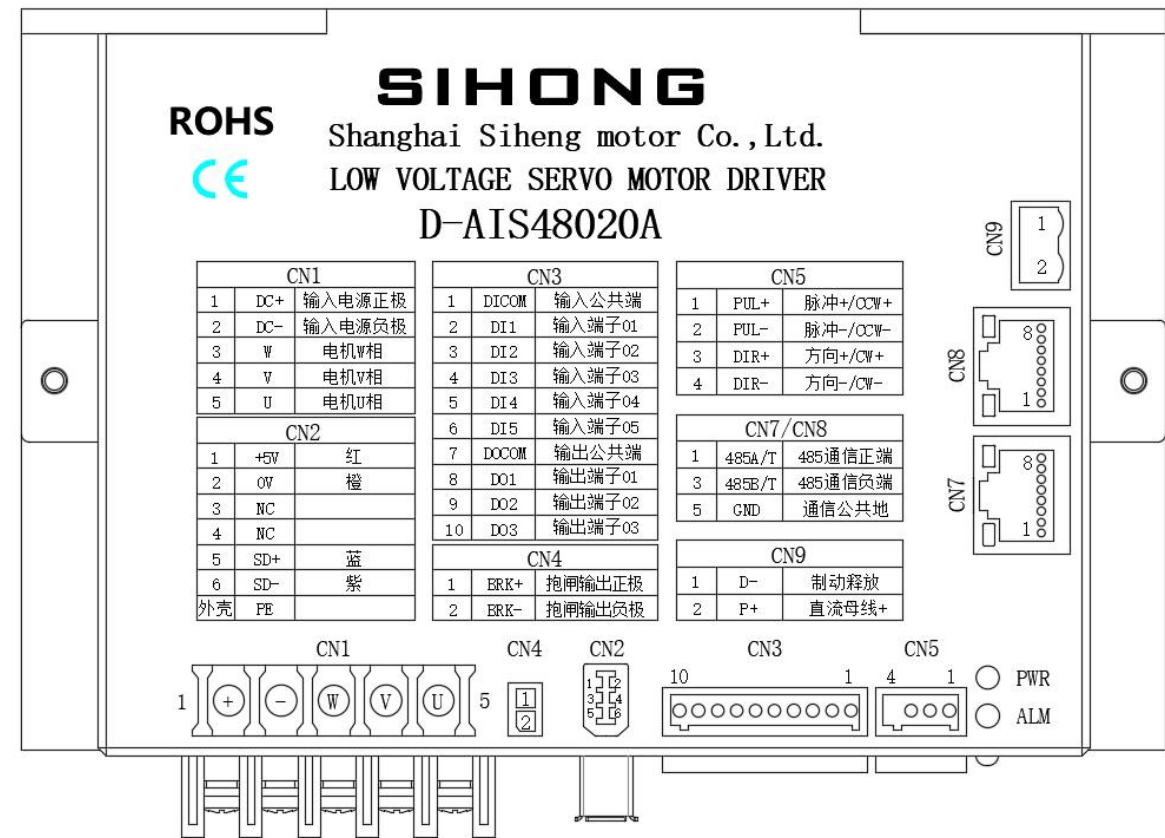
CN1-DC+ (Input power positive) DC-(Input power negative)  
CN2- +5V(Red) 0V(Orange) SD+(Blue) SD-(Purple) Shell:PE  
CN7/CN8: 485A/T(485 communication positive terminal),NC(Reserved), 485B/T(485 communication negative terminal)  
CN9:D- brake release P+:DC bus+

DI/DO interfaces are defined by factory default

Input terminal	Terminal serial number	Functional description	Functional symbol
DI_COM	CN3/7	Input common end	COM
DI1	CN3/8	servo enables input	SON
DI2	CN3/5	alarm reset	ALM-RST
DI3	CN3/6	EMERGENCY STOP	E_STOP

Input terminal	Terminal serial number	Functional description	Functional symbol
DO1+	CN3/1	S-RDY	READY
DO1-	CN3/2		
DO2+	CN3/3	Error alarm OUT	ALM
DO2-	CN3/4		

B: Driver model No : D-AISXX010A/D-AISXX020A/D-AISXX030A/D-AISXX040A//D-AISXX060A Terminal interface diagram





**Remark:**

CN1-DC+ (Input power positive) DC-(Input power negative)

CN2- +5V(Red) 0V(Orange) SD+(Blue) SD-(Purple) Shell:PE

CN7/CN8: 485A/T(485 communication positive terminal),NC(Reserved), 485B/T(485 communication negative terminal)

CN9:D- brake release P+:DC bus+

● **DI/DO interfaces are defined by factory default**

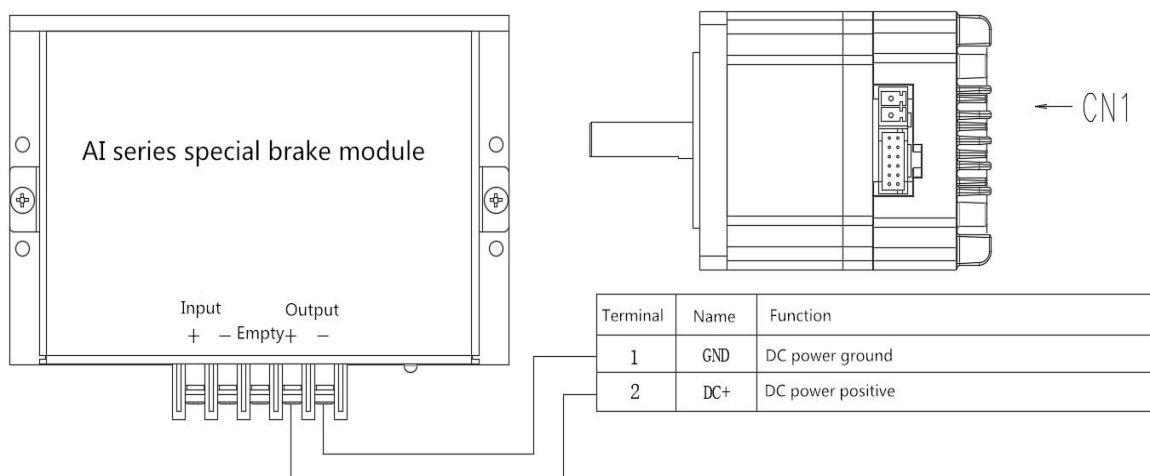
Input terminal	Terminal serial number	Functional description	Functional symbol
DI_COM	CN3/1	Input common end	COM
DI1	CN3/2	servo enables input	SON
DI2	CN3/3	Alarm reset	ALM-RST
DI3	CN3/4	EMERGENCY STOP	E_STOP
DI4	CN3/5	FJOG	JOG+
DI5	CN3/6	RJOG	JOG-

Output terminal	Terminal serial number	Functional description	Functional symbol
DI_COM	CN3/7	Output common	COM
DI1	CN3/8	S-RDY	REDY
DI2	CN3/9	Error alarm OUT	ALM
DI3	CN3/10	COIN	COIN

#### 1.4-Motor drive brake release

● **Dedicated braking module**

The integrated series motor has no external brake discharge resistance interface. When the load inertia is large, it is recommended to buy our AIS special brake module to ensure the quality of bus voltage. The external DC power supply is connected to the input +- port of the brake module, and the output +- port of the module is connected to the motor power interface.



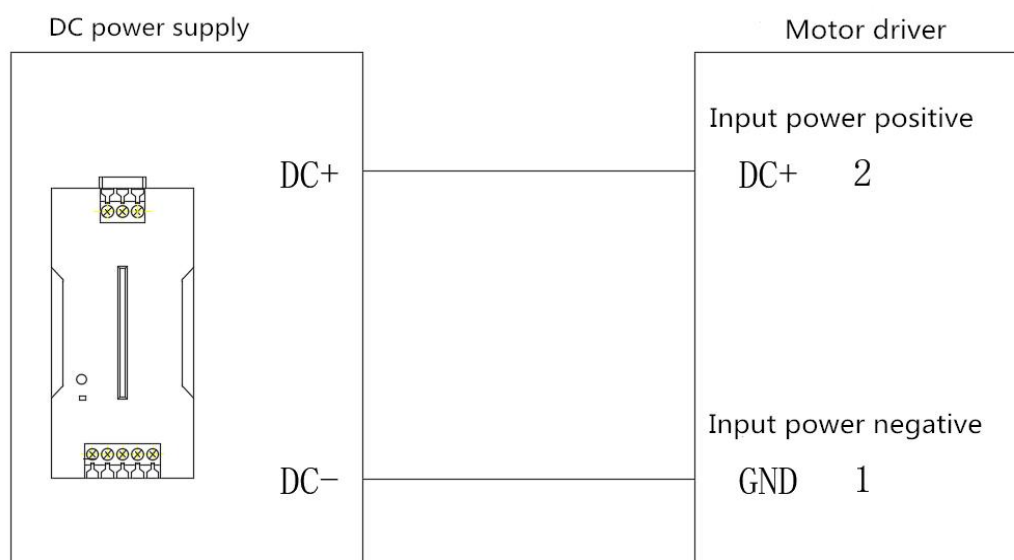
## External drain brake resistance

The type selection and specification of discharge brake resistance for split-type drive CN9 interface refer to the table

Split driver model	Rated output current	External brake resistance resistance value requirements	External brake resistance power requirements
D-AISXX0010A	10A	10 ohms to 30 ohms	More than 100W
D-AISXX0020A	20A	10 ohms to 30 ohms	More than 100W
D-AISXX0040A	40A	5 ohms to 15ohms	More than 200W
D-AISXX0060A	60A	5 ohms to 15ohms	More than 200W

## Chapter 2 Standard wiring diagram

### 2.1 Input power cable

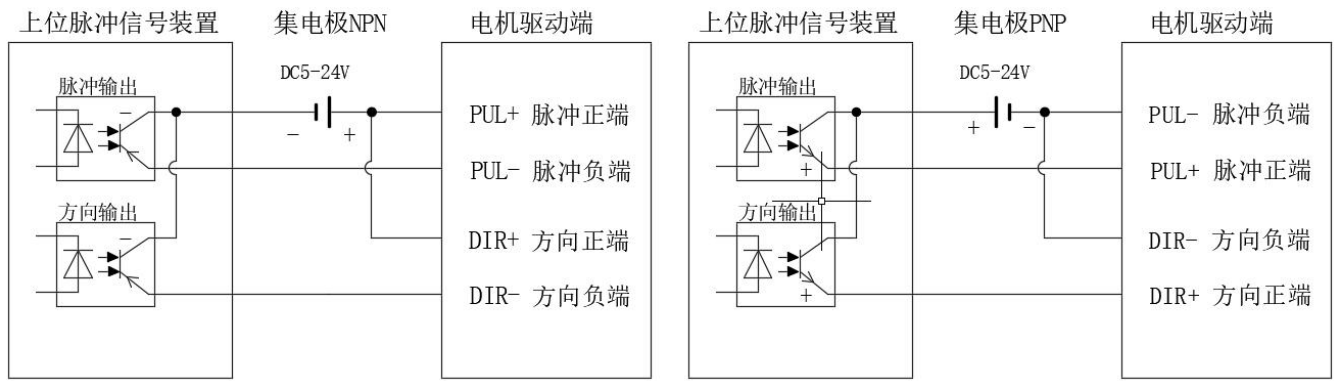


Note 1: The input terminals of the power supply are strictly divided into positive and negative terminals. The voltage range of the input power supply of different models may be different. Please refer to the hardware interface reference wiring of the corresponding model in the section above.

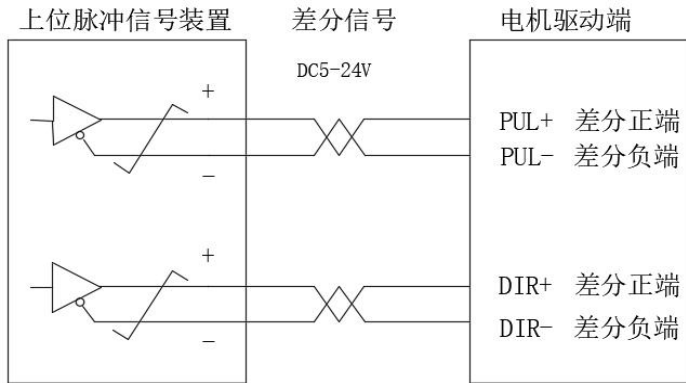
Note 2: THIS PRODUCT HAS a certain overload capacity, and the selected external switching power supply should be greater than 1.5 times the output capacity of the rated current of the product. The rated current of the product is marked on the nameplate.

### 2.2-High speed pulse signal wiring

- Open collector connection



### ● Differential signal wiring



Note 1: The position of the pulse input terminal interface may be different for different motors. Please refer to the description of the corresponding hardware interface in the previous section.

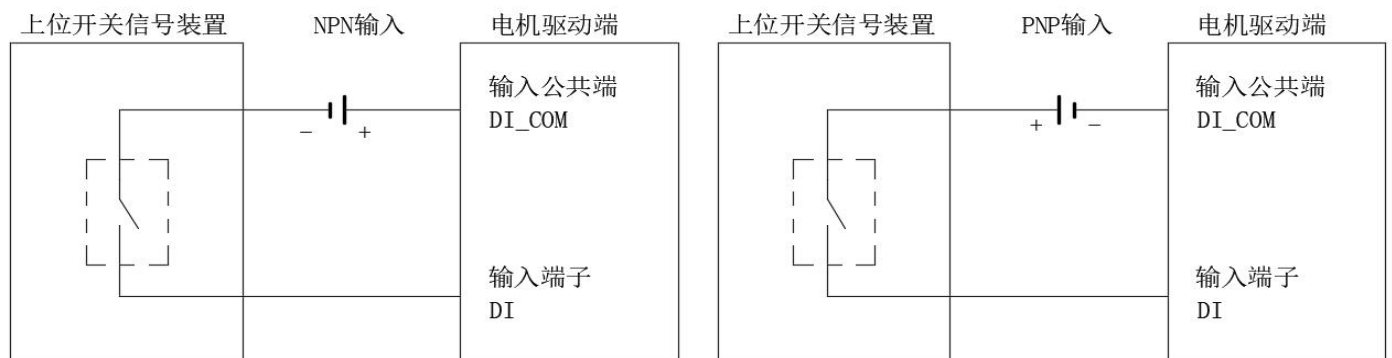
Note 2: This product supports 5-24V wide voltage pulse input, and the maximum received pulse frequency is 100KHZ. The upper pulse device should pay attention to the control frequency within 100K, otherwise the driver is easy to lose the pulse, resulting in abnormal positioning.

Note 3: It is recommended to use twisted-pair shielded wire for pulse control line, and do not be laid in the same line with strong current and strong interference, which can effectively shield external strong magnetic interference;

Note 4: The above pulse connection mode should be consistent with H05-15 parameters, H05-15 factory default pulse + direction instruction form.

## 2.3-DI and DO connection

### ● DI Connect cables to the input terminal



Note 1: The input terminal control voltage DC12-24V is valid;

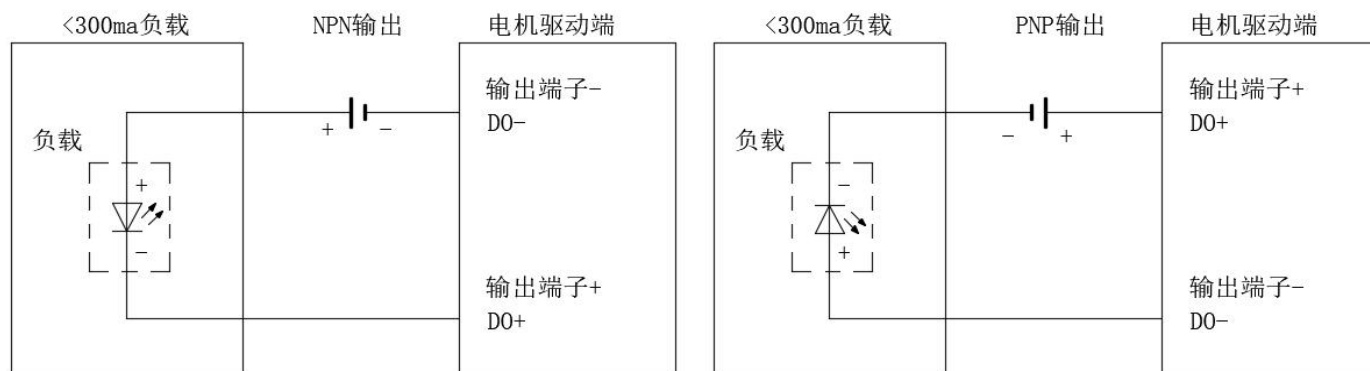
Note 2: Each DI is free to assign different functions (see Section 4.2 DIDO Parameters), but multiple DI's cannot be

assigned to the same function.

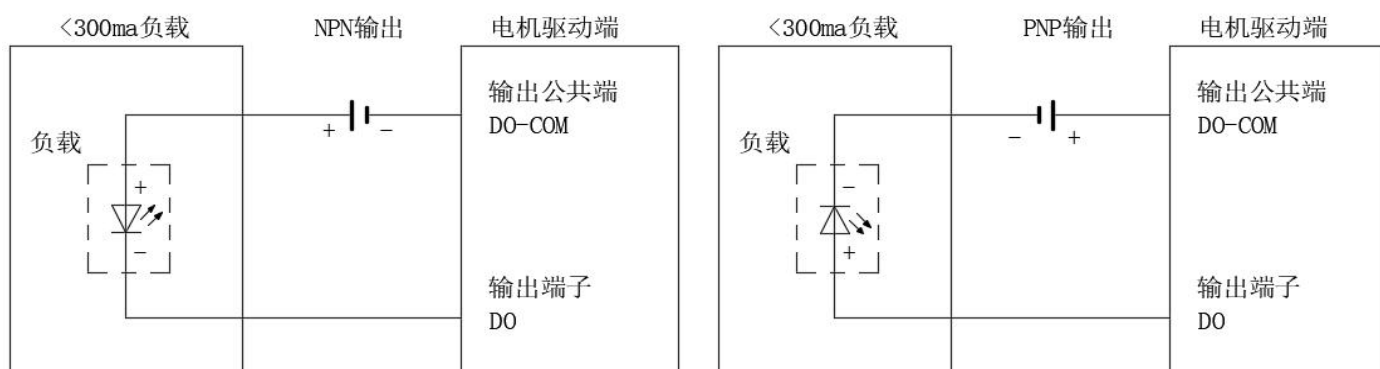
Note 3: DC-input is controlled by external switch signal, NPN type connection is selected, and the low level is effective;  
External switch signal control DC+ input, select PNP type connection, high level effective;

DO Connect cables to the output terminal

1、MD series in one piece



2、D series split driver



Note 1: The maximum driving capacity of the output terminal is less than 300mA current. If you need to drive a large load, please use intermediate relay to convert.

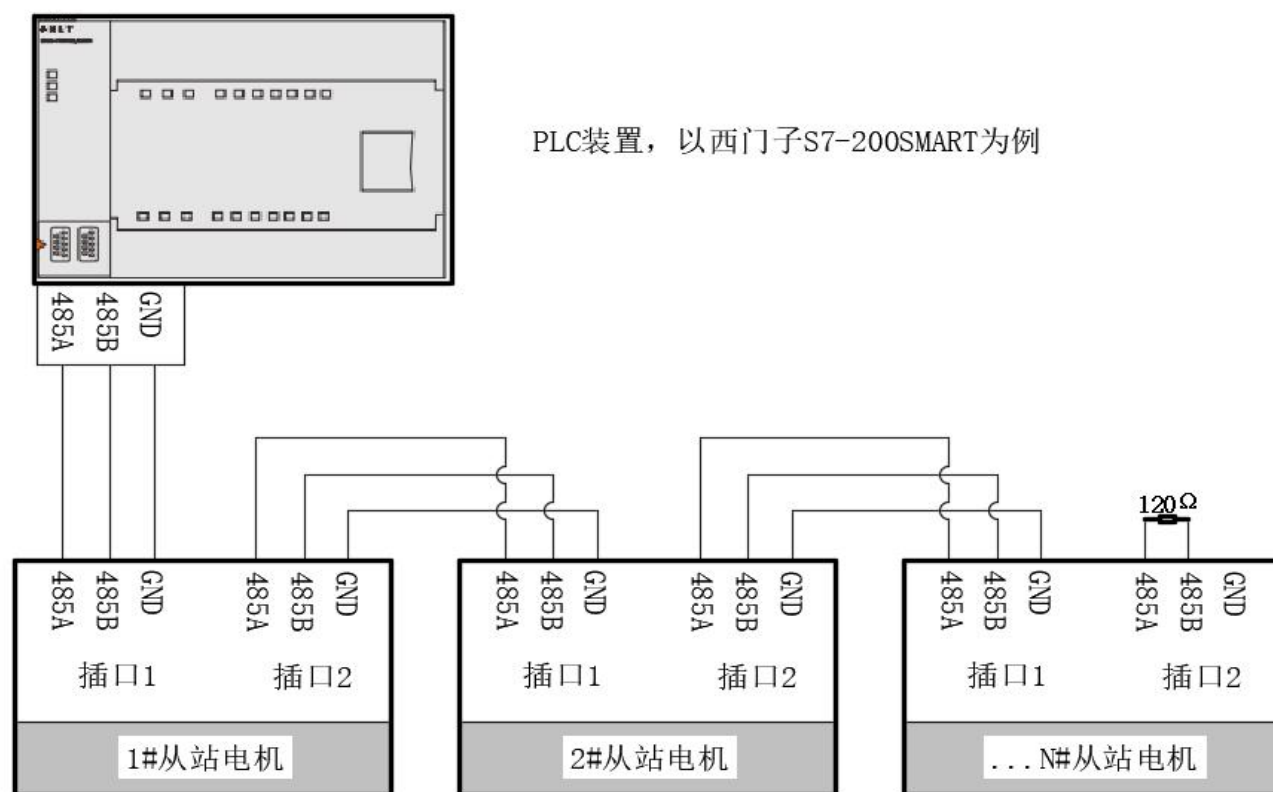
Note 2: Each DO is free to assign different functions (see section 4.2 DIDO Parameters).

Note 3: When controlling the action of DO port, output DC-, select NPN type connection, low level output; Control DO port action output DC+, select PNP type connection, high level effective;

## RS485 Communication connection wire

- Connect many slave stations

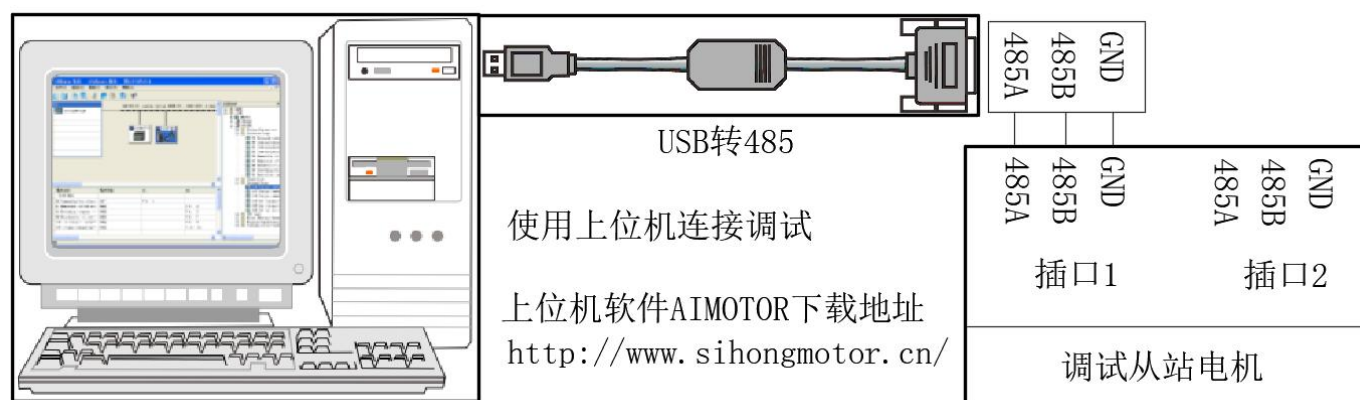
PLC device, with Siemens S7-200SMART as an example



Note 1: Most slave stations are connected. If the communication signal is noisy, it is recommended to add a 120 ohm terminal resistor to the last slave station to ensure the communication quality.

Note 2: Communications (4.5 RS485 Parameters)

- host computer debugs a connection



Note 1: Usually there is no direct 485 interface on the computer, so you need to convert USB to 485 to connect the slave motor drive.

Note 2: The PC debugging software can be downloaded from the official website of our company, which is convenient for users to debug.

### Chapter 3 control flow chart

#### Control flow graph

This system uses the tree structure setting, step by step to expand the branch, in the application of this product, please refer to the following table design; The system is structured from left to right→

Control mode Selection H02_00	=0 Speed control	Speed command selection H06_02	value is derived from H06-03	H06_03 Set speed + Enable Start/stop control	
			Derived from the internal multi-segment speed given	H12_00 Multi-speed mode selection	=0 Single cycle operation
					=1 cycle operation
					=2 DI Switchover Operation
		JOG Speed control	H06_04 Setting+DI relation JOGCMD		
	=1 Position control	Position command selection H05_00	Derived from impulse control	H05_15 Pulse command mode selection	=0 Pulse + directional positive logic
					=1 Pulse + direction negative logic
					=2 AB Phase pulse
			Originates from multiple segments control	H11_00 Multi - segment running mode selection	=0 Single cycle operation
		=1 cycle operation			
		=2 DI Switchover Operation			
		=3 Run Sequence			
		=2 Torque control	Position command selection H07_02	H07_03 Setting Speed + Enable Start/Stop control	



## Chapter 4 Parameters and Functions

### Precautions for parameters:

1. In the parameter table, the factory parameters take the 57601 motor as the template, and the specific motor takes the non-57601 motor as the template.
2. In the parameter table, the "applicable mode" P represents position mode, S represents speed mode, and T represents torque mode.
3. Some parameters cannot be changed when the motor is enabled, or you need to power off and restart, pay attention to the "modification method" and "effective method" in the parameter list.
4. Communication access or control parameters pay attention to "data type", and "parameter setting range" in the parameter list.

### 4.1-Driver parameters(H00-H01)

H00_00	Description	Motor code		Alter mode	Enable off	factory default	57601	Unit	-
	Parameter range	0	1073741824	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint32
Manufacturer parameters, different motor manufacturer number is different, need manufacturer permission can be modified, users do not modify;									

H00_08	Description	Zero state of motor encoder		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	1	Effective way	-	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer's parameters, assembly motor encoder set to zero, display parameters can not be changed;									

H00_11	Description	Motor rated current		Alter mode	Enable off	factory default	440	Unit	0.01A
	Parameter range	0	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters, different motor rated current is different, need manufacturer permission to modify, users do not modify;									

H00_14	Description	Motor rated speed		Alter mode	Enable off	factory default	1000	Unit	rpm
	Parameter range	0	6000	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters, different motor rated speed is different, need manufacturer permission to modify, users do not modify;									

H00_15	Description	Motor max speed		Alter mode	Enable off	factory default	1500	Unit	rpm
	Parameter range	0	6000	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer's parameters, the maximum speed of different motors is different, which can only be modified by the manufacturer's permission, but not by the user; This parameter serves as the maximum speed limit of the motor and has the highest priority.									

H00_28	Description	Motor encoder offset		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	999999999	Effective way	-	Adaptation pattern	P/S/T	Data type	Uint32
Factory parameters, assembly motor encoder set to zero use, users can not change;									

H00_43	Description	Motor max current		Alter mode	Enable off	factory default	660	Unit	0.01A
	Parameter range	0	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16

The maximum current that different motors can accept is different. Setting an illegal value will lead to heat or damage of the motor. Only the permission of the manufacturer can be modified.

Limit current output = limit torque output; This parameter, together with H07\_09/H07\_10 and manufacturer's parameter H01\_03, is used as the actual maximum current output limit of the motor, and its low effective value is taken.

H01_00	Description	MCU software edition number		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	65535	Effective way	-	Adaptation pattern	P/S/T	Data type	Uint16

Manufacturer parameters, software version number; Display parameters cannot be changed.

H01_02	Description	Driver Code		Alter mode	Enable off	factory default	24161	Unit	-
	Parameter range	0	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16

Manufacturer parameters, different driver manufacturer number is different, need manufacturer permission can be modified, users do not modify;

H01_03	Description	Driver max current		Alter mode	Enable off	factory default	1000	Unit	0.01A
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Manufacturer parameters, different drivers can output the maximum current is different, setting an illegal value will lead to motor heating or damage, need manufacturer permission to modify, users do not modify;

Limit current output = limit torque output; This parameter, together with H07\_09/H07\_10 and manufacturer's parameter H00\_43, is used as the actual maximum current output limit of the motor, and its low effective value is taken.

H01_05	Description	Driver current sampling resistance		Alter mode	Enable off	factory default	50	Unit	mΩ
	Parameter range	5	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters, different drive current sampling resistance is different, need manufacturer permission to modify, users do not modify;									

H01_06	Description	Driver current amplifier input resistance		Alter mode	Enable off	factory default	1500	Unit	Ω
	Parameter range	500	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters, different drivers of the current amplifier input resistance is different, need manufacturer permission can be modified, users do not modify;									

H01_07	Description	Driver current amplifier feedback resistance		Alter mode	Enable off	factory default	3000	Unit	Ω
	Parameter range	500	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters, different drivers of the current amplifier feedback resistance is different, need manufacturer permission can be modified, users do not modify;									

H01_08	Description	Driver temperature alarm threshold		Alter mode	Enable off	factory default	90	Unit	℃
	Parameter range	40	100	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameter, as the driver overheat protection threshold, can only be modified by the manufacturer permission, users do not modify. If the set value is exceeded, the motor overheating fault alarm ER.650 will occur;									

H01_09	Description	Driver bus voltage attenuation coefficient		Alter mode	Enable off	factory default	2100	Unit	-
	Parameter range	10	65535	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters can be modified only after the permission of the manufacturer. Users do not modify them.									

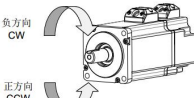
## 4.2-Basic control parameters(H02)

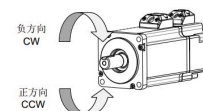
H02_00	Description	Control mode selection		Alter mode	Enable off	factory default	1	Unit	-
	Parameter range	0	6	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Set 0: speed mode (refer to Section 4.5 / Speed Control parameters); Set 1: position mode (refer to Section 4.4 / Position Control parameters); Set 2: torque mode (refer to Subsection 4.6 / torque Control parameters);									

	Description	Rotation direction selection		Alter mode	Enable off	factory default	0	Unit	-
H02_05	Parameter range	0	1	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	Uint16
Set 0: fre									
Set 1: ze									
Set 2: sto									
recomme									
H02_02									

Let 0: CCW is positive and CW is negative.

Let 1: CW be the positive direction and CCW be the negative direction ;





02_30	Description	User Password		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Manufacturer parameters can be modified only after the permission of the manufacturer. Users do not modify them.									

H02_31	Description	System parameters are initialized		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	4	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: no effect.

Set 1: restore user-related factory parameters;

Set 2: Clear H0B\_33 fault records.

Set 3: restore relevant factory parameters of the motor (permission of the manufacturer is required);

Set 4: restore the factory parameters related to the drive (permission of the manufacturer is required);

#### 4.DI/DO parameters(H03-H04)

Input terminal DI function options		
InFun Set vable	Symbol	Function
1	SON	servo motor is enabled
2	ALM_RST	Fault alarm reset
6	CMD1	Multi-segment running instruction switch 1
7	CMD2	Multi-segment running instruction switch 2
14	P_OT	Forward overrange switch
15	N_OT	Reverse overrange switch
18	JOG_CMD+	velocity is moving in a positive direction
19	JOG_CMD-	velocity points in the opposite direction
28	PosInSen	Multi - segment position running command enable
31	Home_Switch	External origin switch
32	Homeing_Start	Origin return was enabled. Procedure
34	EmergencyStop	emergency shut down
35	ClrPosErr	Error Counter
37	PulseInhibit	Pulse In hibit
41	Home_Record	Set current position to origin (zero bit)

Note: InFun option (a DI function option can only be associated with one DI terminal and cannot be assigned repeatedly; otherwise, a DI duplication assignment fault alarm ER.130 will occur)

H03_02	Description	DI1 Terminal Function Selection		Alter mode	Advanced configuration	factory default	1	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: InFun1 servo enable;

If you need to change the associated function, see Input Terminal DI Function Option Table.



H03_03	Description	DI1 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: indicates that signal conduction is effective, disconnection is invalid (positive logic input);

Set 1: indicates that the signal disconnection is valid and the conduction is invalid (inverse logic input);

H03_04	Description	DI2 Terminal Function Selection		Alter mode	Advanced configuration	factory default	2	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Factory default association: InFun2 alarm reset;

If you need to change the associated function, see Input Terminal DI Function Option Table.

H03_05	Description	DI2 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: indicates that signal conduction is effective, disconnection is invalid (positive logic input);

Set 1: indicates that the signal disconnection is valid and the conduction is invalid (inverse logic input);

H03_06	Description	DI3 Terminal Function Selection		Alter mode	Advanced configuration	factory default	34	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Factory default association: InFun34 emergency shutdown;

If you need to change the associated function, see Input Terminal DI Function Option Table.

H03_07	Description	DI3 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: indicates that signal conduction is effective, disconnection is invalid (positive logic input);  
Set 1: indicates that the signal disconnection is valid and the conduction is invalid (inverse logic input);

H03_08	Description	DI4 Terminal Function Selection		Alter mode	Advanced configuration	factory default	18	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: InFun18 speed forward dot;  
If you need to change the associated function, see Input Terminal DI Function Option Table.

H03_09	Description	DI4 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: indicates that signal conduction is effective, disconnection is invalid (positive logic input);  
Set 1: indicates that the signal disconnection is valid and the conduction is invalid (inverse logic input);

H03_10	Description	DI5 Terminal Function Selection		Alter mode	Advanced configuration	factory default	19	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: InFun19 speed negative dot;  
If you need to change the associated function, see Input Terminal DI Function Option Table.

H03_11	Description	DI5 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: indicates that signal conduction is effective, disconnection is invalid (positive logic input);  
Set 1: indicates that the signal disconnection is valid and the conduction is invalid (inverse logic input);

Output terminal DO function option table		
OutFun Set Value	Symbol	Function
1	S_RDY	S_RDY
5	COIN	Positioning complete output
11	ALM	Error alarm OUT
16	Home_Attaion	origin returns to zero to complete the output
17	ElecHomeAttain	Electrical return to zero completes output
18	ToqReach	Torque to the output
19	V-Arr	Speed to the output

H04_00	Description	DO1 Terminal Function Selection		Alter mode	Advanced configuration	factory default	1	Unit	-
	Parameter range	0	24	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: OnFun1 servo is ready;

If you need to change the associated function, see the Output Terminal DO Function Option Table.

H04_01	Description	DO1 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: when the signal is valid, the optocoupler is on (positive logic output);

Set 1: when the signal is effective, the optocoupler is turned off (inverse logic output);

H04_02	Description	DO2 Terminal Function Selection		Alter mode	Advanced configuration	factory default	11	Unit	-
	Parameter range	0	24	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: OnFun11 fault alarm output;

If you need to change the associated function, see the Output Terminal DO Function Option Table.

H04_03	Description	DO2 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: when the signal is valid, the optocoupler is on (positive logic output);

Set 1: when the signal is effective, the optocoupler is turned off (inverse logic output);

H04_04	Description	DO3 Terminal Function Selection		Alter mode	Advanced configuration	factory default	5	Unit	-
	Parameter range	0	24	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: OnFun5 positioning completed output;

If you need to change the associated function, see the Output Terminal DO Function Option Table.

H04_05	Description	DO3 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Set 0: when the signal is valid, the optocoupler is on (positive logic output);

Set 1: when the signal is effective, the optocoupler is turned off (inverse logic output);

H04_06	Description	DO4 Terminal Function Selection		Alter mode	Advanced configuration	factory default	18	Unit	-
	Parameter range	0	24	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16

Factory default association: OnFun18 torque reaches output;

If you need to change the associated function, see the Output Terminal DO Function Option Table.

H04_07	Description	DO4 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Set 0: when the signal is valid, the optocoupler is on (positive logic output); Set 1: when the signal is effective, the optocoupler is turned off (inverse logic output);									

H04_08	Description	DO5 Terminal Function Selection		Alter mode	Advanced configuration	factory default	19	Unit	-
	Parameter range	0	24	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Factory default association: OnFun19 speed to output; If you need to change the associated function, see the Output Terminal DO Function Option Table.									

H04_09	Description	DO5 Terminal logic selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Set 0: when the signal is valid, the optocoupler is on (positive logic output); Set 1: when the signal is effective, the optocoupler is turned off (inverse logic output);									

#### 4.4-Position control parameter(H05)

H05_00	Description	Source of position command		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16
When H02_00=1(position control mode); Set 0: pulse command (the external controller outputs high-speed pulse train, and the motor positioning and rotation are controlled by pulse input to the motor drive, and the input pulse form is set by H05-15) Set 1: multi-segment position instruction (set by internal multi-segment position parameter to control motor rotation, refer to Section 3.8 / Group H11 internal multi-segment position for details)									

H05_04	Description	Position command low-pass filtering time constant		Alter mode	Enable off	factory default	0	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16

Set the first-order low-pass filter time constant of the position command;

Setting this parameter will increase the delay of positioning response but has no effect on the displacement (total number of position instructions).

When the external controller does not set the function of pulse acceleration and deceleration, and the motor impact is relatively large, the value of this parameter can be appropriately increased to indirectly achieve the passive hysteresis effect;

H05_07	Description	Electronic gear ratio 1 (numerator)		Alter mode	Advanced configuration	factory default	131072	Unit	-
	Parameter range	0	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint32

Set the position command electronic gear ratio molecule, AIMotor motor encoder resolution is 131072; L When the electronic gear ratio molecule is fixed as the motor resolution, the electronic gear ratio (H05-09) parameter value is the number of pulse commands required for the motor to rotate 1 turn; L When the electronic gear ratio molecule is not fixed as the motor resolution, the calculation method of the motor gear ratio is as follows:

Example 1: It is known that the motor drives the lead screw through the coupling to move in a straight line. The screw pitch is 10mm, and it is required that 1 pulse unit corresponds to 0.01mm.

Calculate :

Eg2 : It is known that the motor drives the pulley through the coupling to move in a straight line. The circumference of the pulley is 60mm, and 5 pulse units are required to correspond to 0.02mm.

$$\frac{B}{A} = \frac{131072}{5} \times \frac{0.02}{60} \quad \frac{B}{A} = \frac{131072}{15000} \quad \text{Electronic gear molecule}=131072 \quad \text{Denominator}=15000$$

$$\frac{B}{A} = \frac{131072}{1} \times \frac{0.01}{10} \quad \frac{B}{A} = \frac{131072}{1000} \quad \text{Electronic gear molecule}=131072 \quad \text{Denominator}=1000$$

H05_09	Description	Electronic gear ratio 1 (numerator)		Alter mode	Advanced configuration	factory default	1000	Unit	-
	Parameter range	0	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint32



Set the position command electronic gear score, the factory default is 1000, indicating that the motor needs 1000 pulse command input for 1 turn; L When the electronic gear ratio molecule (H05-07) is fixed as the motor resolution, the value of the electronic gear ratio parent parameter is the number of pulse commands required for the motor to rotate 1 turn;

H05_15	Description	Pulse command pattern		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	3	Effective way	power off and restart	Adaptation pattern	P	Data type	Uint16

Set 0: pulse + direction positive logic (high-speed pulse train controls motor rotation, direction signal OFF is CW direction, direction signal ON is CCW direction);  
Set 1: pulse + direction negative logic (high-speed pulse train controls motor rotation, direction signal OFF is CCW direction, direction signal ON is CW direction);  
Set 2: A/B phase orthogonal pulse 4 times frequency (A phase before B phase 90° motor positive turn, B phase before A phase 90° motor reverse);  
Set 3: CW/CCW double pulses (CCW pulse receives CW pulse to disconnect the motor forward, CW pulse receives CCW pulse to disconnect the motor reverse);

H05_21	Description	The locating completion threshold		Alter mode	Advanced configuration	factory default	92	Unit	Encoder unit
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16

Set the positioning completion threshold, motor position deviation value < positioning completion threshold, OutFun5 (COIN) positioning completion signal COIN is effective;  
The positioning completion signal COIN is only valid in position mode and motor enabled state;

H05_30	Description	Origin return enable control		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	8	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set the origin return mode and trigger signal source;

Set Value	Trigger signal	Zero return mode	Remark
0	Close the origin and return	-	Stop origin return
1	Enable homing through DI (Homeing_Start)	Origin research	When the motor is enabled, the signal is effective
2	Enable electrical home through DI (Homeing_Start)	Electric back to zero	When the motor is enabled, the signal is effective

3	After the function is enabled, the system automatically returns to the origin	Origin research	After the device is powered on again, the first enable signal is effective
4	Communication control (H05_30 write 4) enables origin return	Origin research	After the motor is enabled, the command takes effect
5	Communication control (H05_30 write 5) Enables electrical return to zero	Electric back to zero	After the motor is enabled, the command takes effect
6	Communication control (H05_30 write 6) triggers the current position to be the origin	Set position H0B-07 to 0	After the trigger succeeds, H05_30=0
8	Trigger the current position as the origin through DI (HomeRecord)	Set position H0B-07 to 0	After the trigger succeeds, H05_30=0
Note 1: For communication control (H05_30 writes 4/H05_30 writes 5/H05_30 writes 6), H05_30 automatically sets to 0 after the command is executed. Do not circulate communication control commands;			

H05_31	Description	Zero return mode		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	16	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16
Set the motor initial direction, deceleration point, and origin during origin search									
Set value	Search direction	deceleration point	Original point	Process steps					
0	Forwarder	Origin Switch	Origin Switch	Motor first searches for the origin switch at a high speed in the set direction. When it encounters the rising edge of the origin switch signal, it starts to run and detangle at a low speed. When it detaches from the falling edge of the origin switch signal, the motor reverses and continues to search for the rising edge of the origin switch signal at a low speed.					
1	Reverse	Origin Switch	Origin Switch						
2	Forwarder	Origin Switch	Motor Z signal	Motor first searches phase Z at a high speed in the set direction. When encountering the rising edge of the motor Z trust signal, it starts to reverse to run at a low speed. When encountering the rising edge of the other side of phase Z, the signal stops immediately and returns to zero successfully.					
3	Reverse	Origin Switch	Motor Z signal						
4	Forwarder	Origin Switch	Motor Z signal	Motor first searches for the origin switch at a high speed in the set direction. When it encounters the rising edge of the origin switch signal, it starts to reverse and detangle at a low speed. When it detaches from the falling edge of the origin switch signal, it reverses again and searches for the rising edge of the origin switch signal at a low speed.					
5	Reverse	Origin Switch	Motor Z signal						
6	Forwarder	Positive distance	Positive distance	Motor first searches for the origin switch at a high speed in the set direction. When it encounters the rising edge of the forward overrange switch signal, it starts to reverse and detangle at a low speed. When it detaches from the falling edge of the forward overrange switch signal, the motor reverses again at a low speed and searches for the rising edge of the forward overrange switch signal.					
7	Reverse	Inverse distance	Inverse distance						

8	Forwarder	Positive distance	Motor Z signal	Motor first searches for the forward overrange switch at a high speed in the set direction. When it meets the rising edge of the forward overrange switch signal, it starts to decelerate and reverse to run away from it. When it detaches from the falling edge of the forward overrange switch signal, it continues to run until the motor Z trust signal stops immediately and returns to zero successfully.
9	Reverse	Inverse distance	Motor Z signal	
10	Forwarder	Mechanical limiting position	Mechanical limiting position	Motor first searches for the mechanical limit position at low speed with the set direction and torque (torque set by H05_56). When the mechanical limit position reaches the blocked rotation and the torque reaches the upper limit of the torque limit of touch stop and return to zero, the motor stops immediately and returns to zero successfully while keeping the default time.
11	Reverse	Mechanical limiting position	Mechanical limiting position	
12	Forwarder	Mechanical limiting position	Motor Z signal	Motor first searches for the mechanical limit position with the set direction and torque (torque set by H05_56) at a low speed. When the mechanical limit position reaches the blocked rotation and the torque reaches the upper limit of the zero torque limit and keeps the default time, the motor runs in reverse until the motor Z trust signal stops immediately and returns to zero successfully.
13	Reverse	Mechanical limiting position	Motor Z signal	
14	Forwarder	Electrical return to zero operation.		Motor returns to the zero position in a single turn predetermined by the user in the set direction at a high speed, ignoring the data of the number of turns. Clears the current position upon arrival.
15	Reverse			
16	Auto			Motor returns to the zero position in a single turn predetermined by the user at a high speed in the optimal direction.

Note 1: Please associate the DI function options corresponding to the useful deceleration point, origin switch and forward and backward overpass switch in the selected mode, otherwise, an alarm will occur. ER.601 fails to return to zero.

Note 2: In the selected mode, if the deceleration point is the origin switch and the forward and reverse overrange switch DI is associated, the motor will automatically reverse and continue searching when it encounters the overrange switch in the search path.

Note 3: In the process step, the high-speed search speed is set by parameter H05\_32, and the low-speed search speed is set by parameter H05\_33.

Note 4: The default maximum search time is 65535 seconds. If the origin is not found within this time, an alarm ER.601 fails to return to zero.

Note 5: After the origin return is successful, the output of the DO function (outfun16-homeattain) returns to zero, and the output of the origin return to zero is invalid when OFF is enabled.

H05_32	Description	High speed search origin switch signal speed		Alter mode	Advanced configuration	factory default	100	Unit	rpm
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

1: Set the setting of high-speed search speed in the origin return process; 2: Speed setting for starting electrical return to zero;

H05_33	Description	Low speed search origin switch signal speed		Alter mode	Advanced configuration	factory default	10	Unit	rpm
	Parameter range	0	1000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set the low search speed setting in the origin return process; The lower the setting value is, the higher the origin search accuracy is.

If the selected reduction point of the origin return mode is the machine limit position (block turn back to zero), the motor will always run at low speed until the origin return is successful;

H05_34	Description	The acceleration and deceleration times when searching the origin		Alter mode	Enable OFF	factory default	1000	Unit	ms
	Parameter range	0	1000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

When setting the origin resetting mode, the speed change time of the motor from 0-1000rpm can be appropriately increased when the impact of the origin resetting motor is large.

H05_36	Description	Mechanical origin offset		Alter mode	Enable OFF	factory default	0	Unit	command unit
	Parameter range	-2147483647	2147483647	Effective way	with immediate effect	Adaptation pattern	P	Data type	Int32

Set the offset position after the origin return, return successfully continue to move the offset position, after the success of DO function (outfun17-Elechomeattain) electrical return to zero to complete the output is effective;

When the electrical zero position exists, the electrical return to zero is triggered. After the motor returns to the electrical zero position successfully, the DO function (Outfun17-Elechomeattain) completes the electrical return to zero and the output is effective.

After OFF is enabled, the electrical return to zero completes and the output is invalid;

If the origin offset of H05\_36 is 0, the electrical zero position is consistent with the origin position, and the absolute position of the current motor H0B\_07 will automatically clear 0 after the origin is successfully returned to zero. Return to electrical zero is to return to the origin position;

If the origin offset of H05\_36  $\neq 0$ , the electrical zero is equal to the origin offset position. After the origin returns to zero successfully, continue to go to the offset position and then stop. The current absolute position of the motor H0B\_07 is the origin offset position, and the return to electrical zero is to return to the origin offset position.

H05_58	Description	Touch stop return to zero torque limit		Alter mode	Advanced configuration	factory default	1000	Unit	0.10%
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set the limit of positive and negative maximum torque in the origin return mode (H05\_31=10/11/12/13); Must ensure that the set torque can drive the load movement;

• **Acceleration control parameters(H06)**

H06_02	Description	Speed command selection		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

When H02\_00=0 speed control mode;  
Let 0 be derived from the given value H06\_30; Let 1 be derived from the given internal multi-segment speed (refer to Section 4.10 / internal multi-segment speed parameter);

H06_03	Description	Speed command communication setting value		Alter mode	Advanced configuration	factory default	200	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16

When H06\_02=0, the motor running speed is set by this parameter;

H06_04	Description	JOG jog speed setting value		Alter mode	Advanced configuration	factory default	100	Unit	rpm
	Parameter range	0	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

When the DI function of H03 group is InFun18 (JOG\_CMD+) and InFun19 (JOG\_CMD-), this parameter is used to set the JOG running speed of the motor.

H06_05	Description	Speed command acceleration ramp time constant		Alter mode	Advanced configuration	factory default	0	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

In the setting speed mode, the acceleration time of the motor is determined by 0-1000rpm (the acceleration and deceleration time of the internal multi-speed is determined by the H12 group parameters, which has nothing to do with it);								

H06_06	Description	Speed command deceleration ramp time constant		Alter mode	Advanced configuration	factory default	0	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

Deceleration time of motor from 1000-0rpm in setting speed mode; The acceleration and deceleration time of multiple velocities in the speed mode is determined by H12 group parameters, and has nothing to do with this parameter.

H06_18	Description	Speed reaches signal threshold		Alter mode	Advanced configuration	factory default	1000	Unit	rpm
	Parameter range	10	6000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set the speed condition for the speed to arrive;  
When the actual motor speed after filtering is  $\geq$  the set value, the speed is judged to arrive, and the OutFun19 (V-ARR) speed arrival signal is effective. Otherwise, the speed arrival signal is invalid;

#### 4.6-Torque control parameters (H07)

H07_03	Description	Torque command communication setting value		Alter mode	Advanced configuration	factory default	0	Unit	0.10%
	Parameter range	-3000	3000	Effective way	with immediate effect	Adaptation pattern	T	Data type	Int16

When H02\_00=2(torque control mode); Set the torque limit of the positive and negative direction output when the motor is running, and limit the torque output is equal to limit the current output;  
100.0%= 1 times of motor torque (1 times of motor torque = motor rated torque and motor rated current);  
This parameter, together with H07\_09/H07\_10 and manufacturer's parameter H00\_43/H01\_03, is used as the actual maximum current output limit of the motor, and its low effective value is taken.



H07_05	Description	Torque command filter time constant		Alter mode	Advanced configuration	factory default	79	Unit	0.01ms
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

By setting the low-pass filtering time of the torque command, the operation of the torque command can be smoother and the vibration can be reduced. If the setting value is too large, the motor responsiveness will decrease.

H07_09	Description	Positive internal torque limit		Alter mode	Advanced configuration	factory default	3000	Unit	0.10%
	Parameter range	0	4000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set the torque limit of the positive direction output when the motor is running, any mode is valid;  
100.0%= 1 times of motor torque (1 times of motor torque = motor rated torque and motor rated current);  
Limit torque output = limit current output. This parameter and the manufacturer's parameter H00\_43/H01\_03 are both used as the actual maximum current output limit of the motor, and the low effective value is taken.

H07_10	Description	Negative internal torque limit		Alter mode	Advanced configuration	factory default	3000	Unit	0.10%
	Parameter range	0	4000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set the torque limit of the negative direction output when the motor is running, independent of the mode; Limiting torque output is equal to limiting current output;  
100.0%= 1 times of motor torque (1 times of motor torque = motor rated torque and motor rated current);  
Limit torque output = limit current output. This parameter and the manufacturer's parameter H00\_43/H01\_03 are both used as the actual maximum current output limit of the motor, and the low effective value is taken.

H07_19	Description	Torque control forward speed limit value		Alter mode	Advanced configuration	factory default	3000	Unit	rpm
	Parameter range	0	6000	Effective way	with immediate effect	Adaptation pattern	T	Data type	UInt16

When setting the torque mode, the maximum forward speed limit of the motor should be limited. When setting the torque control, the speed limit must be set to avoid excessive speed caused by the unlimited speed increase of the light load motor.  
The torque output percentage and speed limit are set. When the load is less than the torque output, the motor will

accelerate and rotate in the direction of the torque output. When the load is accelerated to the speed limit or the output torque is insufficient to support continued acceleration, the motor will stop accelerating, and the speed will fluctuate according to the load fluctuation. When the load is about equal to the torque output, the motor will stop. When the load is greater than the output torque, the motor will be dragged to reverse rotate into reverse damping torque;

H07_20	Description	Negative speed limit value for torque control		Alter mode	Advanced configuration	factory default	3000	Unit	rpm
	Parameter range	0	6000	Effective way	with immediate effect	Adaptation pattern	T	Data type	UInt16

When setting the torque mode, limit the reverse maximum speed limit of the motor. When setting the torque control, the speed limit must be set to avoid excessive speed caused by the unlimited speed increase of the light load motor.

The process principle is consistent with H07\_19 torque control forward speed limit;

H07_21	Description	Torque reaches reference value		Alter mode	Advanced configuration	factory default	0	Unit	0.10%
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Parameter H0B\_02/H07\_21/H07\_22/H07\_23 is used as the valid condition for the torque ToReach the output OutFun18 (ToReach). The relation is as follows:

The actual torque (H0B\_02), the torque reaches the reference value (H07\_21), the torque reaches the effective value (H07\_22), and the torque reaches the invalid value (H07\_23);

When the actual torque  $\geq$  torque reaches the reference value + torque reaches the effective value; The moment reaches the output OutFun18 (ToReach) effectively;

When the actual torque  $<$  torque reaches the reference value + torque reaches the invalid value; Moment reaches output OutFun18 (ToReach) invalid;

H07_22	Description	Torque reaches effective value		Alter mode	Advanced configuration	factory default	200	Unit	0.10%
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

The effective conditions for the torque ToReach the output OutFun18 (ToReach);

H07_23	Description	Torque reaches invalid value		Alter mode	Advanced configuration	factory default	100	Unit	0.10%
	Parameter range	0	3000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	Uint16
Invalid condition for torque ToReach output OutFun18 (ToReach);									

#### 4.7 Performance and protection parameters (H08~H09~H0A)

H08_00	Description	Velocity loop gain		Alter mode	Advanced configuration	factory default	200	Unit	0.1Hz
	Parameter range	1	20000	Effective way	with immediate effect	Adaptation pattern	P/S	Data type	Uint16
Setting the speed loop gain can determine the speed loop to follow, changing the speed command maximum frequency; Under the condition that the motor does not have noise and vibration, increasing the value of this parameter appropriately can speed up the positioning time and the following property; When noise and vibration occur, the value of this parameter is reduced;									

H08_01	Description	Velocity loop integration time constant		Alter mode	Advanced configuration	factory default	1000	Unit	0.01ms
	Parameter range	15	51200	Effective way	with immediate effect	Adaptation pattern	P/S	Data type	Uint16
Setting the speed loop integration time constant can eliminate the speed loop deviation; Reducing the setting value can strengthen the integral function and speed up the positioning time, but too small the setting value is easy to cause motor and mechanical vibration;									

H08_02	Description	Position loop gain		Alter mode	Advanced configuration	factory default	100	Unit	0.1Hz
	Parameter range	0	20000	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16
Setting the speed loop gain can determine the position loop to follow, changing the speed command maximum frequency; Under the condition that the motor does not have noise and vibration, increasing the value of this parameter appropriately can speed up the positioning time and improve the ability of resisting external disturbance when the motor is static. If the setting value is too large, the system may be unstable and oscillate.									

H08_15	Description	Load moment of inertia ratio		Alter mode	Advanced configuration	factory default	0	Unit	0.01 times
	Parameter range	0	12000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set the inertia ratio of mechanical load relative to the inertia of the motor itself; H08\_15=0 indicates that the motor is not loaded. H08\_15=1 indicates that the load inertia is equal to the motor inertia;  
For high inertia load, increase the value of this parameter first and then adjust the gain.

H09_00	Description	Self-adjusting mode selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: invalid automatic adjustment of parameters (standard rigid table), manual adjustment of gain parameters;  
Set 1: the standard rigid table is used, and the gain is automatically adjusted according to the rigid table level.

H09_01	Description	Selection of rigidity level		Alter mode	Advanced configuration	factory default	10	Unit	-
	Parameter range	0	41	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

When H09\_00=1, set the motor rigidity according to the rigidity table level. The higher the rigidity level, the stronger the gain and the faster the response, but too strong rigidity will cause vibration;

H0A_04	Description	Motor overload protection gain		Alter mode	Enable OFF	factory default	100	Unit	%
	Parameter range	10	300	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

By setting this parameter value, determine the motor overload fault alarm ER.620 reported time; 100% is about 10S, different motors have differences;  
Setting this parameter should be determined according to the actual heating condition of the motor. If the electric machine is too large, the electric machine will exceed its torque for a long time and fail to load alarm, which will cause the motor temperature to be too high.

H0A_10	Description	Excessive position deviation fault threshold		Alter mode	Advanced configuration	factory default	1048576	Unit	Encoder unit
	Parameter range	1	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt32

Set the position deviation too large overload alarm threshold in position mode; Default 131072\*8=1048576, maximum 8 turns;  
When the deviation between the actual position of the motor and the command position exceeds this parameter value, a fault alarm will occur ER.B00;

#### 4.8- Monitor read-only parameters (H0B)

H0B_00	Description	Real motor speed		Alter mode	Display	factory default	-	Unit	rpm
	Parameter range	-9999	9999	Effective way	-	Adaptation pattern	-	Data type	Int16

Display the real-time speed of the motor after filtering;  
All display parameters of group H0B can only be read by communication and cannot be changed (written);

H0B_02	Description	Internal real-time torque command		Alter mode	Display	factory default	-	Unit	0.10%
	Parameter range	-32767	32767	Effective way	-	Adaptation pattern	-	Data type	Int16

Display real-time internal torque output, 100.0% corresponding to the rated torque of the motor;

H0B_03	Description	Input signal (DI signal) monitoring		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	65535	Effective way	-	Adaptation pattern	-	Data type	UInt16

Displays d hardware DI port status in decimal notation. For example, if DI1 and DI3 are valid and other DO are invalid, the binary value is 00000101 and H0B\_05 is displayed as 5 (decimal).

H0B_05	Description	Output signal (DO signal) monitoring		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	65535	Effective way	-	Adaptation pattern	-	Data type	UInt16

Decimal display hardware DO port status; For example, if DO1 and DO2 are valid and other DO are invalid, the binary value is 00000011, and H0B\_05 is displayed as 3 (decimal).

H0B_07	Description	Absolute position counter (32-bit decimal display)		Alter mode	Display	factory default	-	Unit	command unit
	Parameter range	-99999999	9999999999	Effective way	-	Adaptation pattern	-	Data type	Int32
Display the real-time absolute position of the motor (command pulse unit); After the origin returns successfully, the current position will be cleared to zero;									

H0B_11	Description	Enter the speed information		Alter mode	Display	factory default	-	Unit	rpm
	Parameter range	-6000	6000	Effective way	-	Adaptation pattern	-	Data type	Int16
Display the rotational speed information corresponding to the command pulse input frequency, independent of enabling; This parameter can be used to test whether the external command pulse frequency is correct when OFF is enabled;									

H0B_12	Description	Average load ratio		Alter mode	PST	factory default	-	Unit	0.10%
	Parameter range	0	5000	Effective way	-	Adaptation pattern	-	Data type	UInt16
Display the real-time percentage of the average load of the motor in the rated torque of the motor, 100.0% corresponding to the rated torque of the motor; It has a low hysteresis.									

H0B_13	Description	Input command pulse counter (32-bit decimal display)		Alter mode	Display	factory default	-	Unit	command unit
	Parameter range	-99999999	9999999999	Effective way	-	Adaptation pattern	-	Data type	Int32
The number of display command pulse input is accumulated or decreased according to the direction, and has nothing to do with enabling; This parameter can be used to test whether the number of external instruction pulse input is correct when OFF is enabled.									

H0B_15	Description	Encoder position deviation counter (32-bit decimal display)		Alter mode	Display	factory default	-	Unit	Encoder unit
	Parameter range	-99999999	9999999999	Effective way	-	Adaptation pattern	-	Data type	Int32
The motor displays the real-time deviation value between the current position and the command position									

H0B_24	Description	Effective value of phase current		Alter mode	Display	factory default	-	Unit	0.01A
	Parameter range	0	10000	Effective way	-	Adaptation pattern	-	Data type	UInt16
Display motor real-time output phase current value;									

H0B_26	Description	Bus voltage value		Alter mode	Display	factory default	-	Unit	0.1V
	Parameter range	0	10000	Effective way	-	Adaptation pattern	-	Data type	UInt16
Display drive real-time input bus voltage; Can be used to monitor external power input voltage stability;									

H0B_27	Description	Module temperature value		Alter mode	Display	factory default	-	Unit	℃
	Parameter range	0	100	Effective way	-	Adaptation pattern	-	Data type	UInt16
Display the current drive MOS real-time temperature value;									

H0B_33	Description	Error record		Alter mode	Advanced configuration	factory default	0	Unit	previous failures
	Parameter range	0	9	Effective way	with immediate effect	Adaptation pattern	-	Data type	UInt16
<p>It is used to set the faults of the motor for the last 10 times; If no fault records will not be displayed;</p> <p>Set 0: H0B_34 to display the current fault information.</p> <p>Set 1: H0B_34 displays the previous fault information.</p> <p>Set.....</p> <p>Set 9: H0B_34 displays the fault information of the last nine times.</p>									

H0B_34	Description	Selected number of fault codes		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	65535	Effective way	-	Adaptation pattern	-	Data type	UInt16

The fault information selected by H0B\_33 is displayed. By default, the current fault is displayed.

H0B_70	Description	Absolute encoder rotation number data		Alter mode	Display	factory default	-	Unit	r
	Parameter range	-32768	32767	Effective way	-	Adaptation pattern	-	Data type	Int16

Display absolute value encoder rotation number data, single turn absolute value motor on the number of turns automatically reset;

The absolute number of multi-turn motor turns is memorized;

H0B_71	Description	Absolute value of the encoder's position within 1 turn		Alter mode	Display	factory default	-	Unit	Encoder unit
	Parameter range	0	2147483647	Effective way	-	Adaptation pattern	-	Data type	UInt32

Display absolute value encoder position data in a single turn, AIMtor motor 1 turn subdivided into 131072;

H0B_77	Description	Absolute encoder absolute position (Low 32 bits)		Alter mode	Display	factory default	-	Unit	Encoder unit
	Parameter range	-99999999	9999999999	Effective way	-	Adaptation pattern	-	Data type	Int32

Display multi-turn absolute value motor based on absolute encoder position 32 bits lower;  
Single-turn absolute value motor on the number of turns automatically cleared, the number of multi-turn absolute value motor turns memory;



H0B_79	Description	Absolute encoder absolute position (high 32 bits)		Alter mode	Display	factory default	-	Unit	Encoder unit
	Parameter range	-99999 999	999999999	Effective way	-	Adaptation pattern	-	Data type	Int32

Display multi-turn absolute value motor based on absolute encoder position high 32 bits;  
Single-turn absolute value motor on the number of turns automatically cleared, the number of multi-turn absolute value motor turns memory;

#### 4.9-RS485 communication and function parameters (H0C)

H0C_00	Description	Servo axis address		Alter mode	Advanced configuration	factory default	1	Unit	-
	Parameter range	1	247	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set the servo shaft address;  
AIMotor supports broadcast mode (in broadcast mode, the host can only write to the slave station, and the slave station executes according to the command received from the master station but does not return data).  
When a host controls multiple slave stations, it is necessary to ensure that each slave station has a unique axis address, which cannot be repeated, otherwise the communication will fail.

H0C_02	Description	Serial port baud rate setting		Alter mode	Advanced configuration	factory default	5	Unit	-
	Parameter range	0	6	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set servo shaft communication baud rate, factory default 57600; The baud rate of the servo axis must be consistent with that of the host, otherwise communication cannot be established;

Setting Value	Baud rate	Remark
0	2400kbp/s	The lower the baud rate, the slower the communication speed and the less susceptible to external signals.
1	4800kbp/s	
2	9600kbp/s	
3	19200kbp/s	When connecting the debugging software of the manufacturer's upper computer, it is recommended to use high baud rate, which is more smooth.
4	38400kbp/s	The higher the baud rate, the faster the communication speed is, and it is relatively easy to be interfered by external signals. It is recommended to use low baud rate to ensure communication stability in case of severe electromagnetic or long-distance communication.
5	57600kbp/s	
6	115200kbp/s	

H0C_03	Description	MODBUS data format		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	3	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
Set the servo shaft communication data verification mode; Servo axis Modbus data format is consistent with the host; Set 0 to zero check and two end bits. Let 1: parity check, 1 end bit; Set 2: odd check, 1 end bit; Set 3: no parity, 1 end bit;									

H0C_13	Description	Whether the MODBUS communication write is updated to the EEPROM		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
The parameter value changed by communication is saved in the temporary storage area for effect. After power failure, the parameter will be restored to the value before the change. This parameter determines whether to permanently save the modified parameter value. Set 1: Save the parameters changed by communication into EEPROM, and automatically set to 0 if the parameters are saved successfully;									

#### 4.10- Auxiliary function parameters (H0D)

H0D_00	Description	Software reset		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
Set 1: the software of the motor system is reset and restarted, similar to the effect of power-off restart; Automatically set to 0 after successful reset;									

H0D_01	Description	Error reset		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
Set 1: reset driver fault alarm state (some fault alarms do not support fault reset need to check the reason after power restart);									

H0D_05	Description	E-STOP		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0; Lift emergency shutdown; Set 1: internal emergency stop, the motor immediately stop after emergency stop to keep the position locked;

#### 4.11- Internal multibit parameters (H11)

H11_00	Description	Multi-segment position operation mode		Alter mode	Enable OFF	factory default	1	Unit	-
	Parameter range	0	5	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

If H02\_00=1 selects the position control mode and H05\_00=2 selects the position command from multiple segments, set the multi-segment operation mode in the following table

Setting value	Running way	Remark
0	Stop at the end of single cycle operation	It will stop after running for 1 round, and will start to run when the multi-stage enable level is effective. The segment number is automatically incremented from the first segment to the final segment, and a waiting time can be set between segments. Multi-bit OFF, force stop;
1	Cycle running	Cyclic operation, multi-segment enable level when the start of operation; The segment number is automatically incremented from the first segment to the final segment. After the final segment completes the waiting time, it automatically repeats from the first segment. Multi-bit OFF, force stop;
2	DI switching operation	To set DI switchover operation, at least one DI must be associated with multi-segment running instruction switchover. InFun6 (CMD1) InFun7 (CMD2) multi-segment switch instructions 1, 2; The number of segments to run is determined by the DI terminal combination logic (position/speed/acceleration/deceleration presettings within segments). There is no waiting time between segments, depending on the timing of the call; Each time the logic of the DI terminal is determined, it needs to start running when the rising edge trigger is enabled for multiple segments. The combination logic of the DI terminal is as follows: Note 2.
3	Run sequentially	H11_05 = 0: runs in a single cycle in sequence. When the multi-bit enable level is valid, it starts to run; The segment number will automatically increase from the first segment to the stop of the final segment, and there will be no waiting time between segments. Multi-bit OFF, force stop;

		H11_05≠0: runs in sequence. When the multi-bit enable level is valid, it starts to run; The start time number runs automatically incrementally from the first segment to the end segment and then starts to run automatically in a cyclic sequence from the number of start segments set by H11_05, without waiting time between segments. Automatic smooth transition according to acceleration and deceleration; Multi-bit OFF, force stop;
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Note 1: DI must be associated with an InFun28 (PosInSen) for all multi-segment operation modes.

Note 2: DI switch run combinatorial logic is:

Multi-segment switching command 1 (CMD1) =OFF, multi-segment switching command 2 (CMD2) =OFF, multi-segment enabling (PosInSen) trigger, switch the first segment position to run;

Multi-segment switching command 1 (CMD1) =ON, multi-segment switching command 2 (CMD2) = OFF, multi-segment enabling (PosInSen) trigger, switch the second segment position to run;

Multi-segment switching command 1 (CMD1) = OFF, multi-segment switching command 2 (CMD2) =ON, multi-segment enabling (PosInSen) trigger, switch the third segment position to run;

Multi-segment switching command 1 (CMD1) = ON, multi-segment switching command 2 (CMD2) = ON, multi-segment enabling (PosInSen) trigger, switch the fourth segment position to run;

H11_01	Description	Number of end segments of displacement command		Alter mode	Enable OFF	factory default	1	Unit	-
	Parameter range	1	4	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set the total number of multi-segment running, different number of segments can be set different displacement, speed, acceleration and deceleration time;

When the multi-segment running mode ≠2, the multi-segment segment number is automatically increased and the switching sequence is 1,2... H11\_01 end segment;

H11_02	Description	Allowance treatment method		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

When the multi-segment operation mode ≠2, if the mode is switched or the multi-segment enable signal changes from ON to OFF in the multi-segment operation, the operation will be suspended and the processing mode will be run again. Set 0: the number of remaining segments in the last run. If the last run is paused in the middle of the second segment, the re-run will abandon the second segment 2 margin and continue to run from the third segment.

Suppose 1: start the operation from the first paragraph again. If the last operation is suspended in the middle of the second paragraph, the number of remaining paragraphs will be discarded and the operation will start again from the first paragraph.

H11_04	Description	Displacement instruction type selection		Alter mode	Advanced configuration	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16

Set 0: relative displacement command (incremental displacement command based on current position)

Let 1: absolute displacement instruction (incremental displacement instruction based on coordinate zero (origin))

As shown in the figure, the motor is currently at position 200. If the relative position instruction is executed, the displacement is 100.

Then the motor finally moves to  $200+100=300$  position;

As shown in the figure, the motor is currently at position 200. If the absolute position command is executed, the displacement is 100.

Then the motor finally moves to  $0+100=100$  position;



H11_05	Description	Sequential mode runs starting segment selection		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	4	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16

When H11\_00=3, H11\_05 = 0: indicates that the sequence runs from segment 1 to the end of a single cycle.

When H11\_00=3, H11\_05≠0: indicates that the sequence runs from segment 1 to the end segment and then the number of segments set by this parameter is the starting segment to continue the cycle sequence.

H11_12	Description	Paragraph 1 moves the displacement		Alter mode	Advanced configuration	factory default	1000	Unit	command unit
	Parameter range	-1073741824 24	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	Int32

When H11\_04=0 relative displacement command, set the relative displacement increment of the first segment of multi-segment position. Motor movement direction depends on the set positive and negative;

When H11\_04=1 absolute displacement command, the first segment of multi-segment position is set to move the target position. The motor movement direction depends on the current position and the coordinate direction of the target position.

The same is true for the following other segments;

H11_14	Description	Maximum running speed of displacement in section 1		Alter mode	Advanced configuration	factory default	200	Unit	rpm
	Parameter range	1	6000	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16
Set the highest speed to perform the first stage of position operation; When the displacement is very small, the motor will start to slow down in the process of acceleration, and the stop position will not reach the maximum speed. The same is true for the following other segments;									

H11_15	Description	Section 1 displacement acceleration and deceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	Uint16
Set the acceleration time of 0-1000rpm and deceleration time of 1000-0rpm when executing the first segment of position. The same is true for the following other segments; The same is true for the following other segments;									

H11_16	Description	Wait time after the completion of the first shift		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	10000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16
Set the delay time to pause the setting after the end of the first segment, and then execute the next segment; This parameter is invalid when H11_00=2 (DI switching runs) and H11_00=3 (sequential runs). The same is true for the following other segments;									

H11_17	Description	Paragraph 2 moves the displacement		Alter mode	Advanced configuration	factory default	1000	Unit	指令单位
	Parameter range	-1073741824	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	Int32

H11_19	Description	Section 2 displacement maximum running speed		Alter mode	Advanced configuration	factory default	200	Unit	rpm
	Parameter range	1	6000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_20	Description	Section 2 displacement acceleration and deceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_21	Description	Wait time after the completion of the second shift		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	10000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_22	Description	Paragraph 3 moves the displacement		Alter mode	Advanced configuration	Unit	Unit	Unit	Instruction unit
	Parameter range	-1073741824	1073741824	Effective way	with immediate effect	Data type	Data type	Data type	Int32

H11_24	Description	Section 3 displacement maximum running speed		Alter mode	Advanced configuration	factory default	200	Unit	rpm
	Parameter range	1	6000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_25	Description	Section 3 displacement acceleration and deceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_26	Description	Wait time after the completion of the Third shift		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	10000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_27	Description	Paragraph 4 moves the displacement		Alter mode	Advanced configuration	factory default	1000	Unit	Instruction unit
	Parameter range	-1073741824	1073741824	Effective way	with immediate effect	Adaptation pattern	P	Data type	Int32

H11_29	Description	Section 4 displacement maximum running speed		Alter mode	Advanced configuration	factory default	200	Unit	rpm
	Parameter range	1	6000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_30	Description	Section 4 displacement acceleration and deceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

H11_31	Description	Wait time after the completion of the Forth shift		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	10000	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16



#### 4.12-Internal multi-stage velocity parameter (H12)

H12_00	Description	Multi - speed command operation mode		Alter mode	Enable OFF	factory default	1	Unit	-
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

When H02\_00=0 selects the position control mode and H06\_00=1 selects the speed command from multi-speed, set the multi-speed operation mode in the following table

Set value	Running mode	Remark
0	Stop at the end of single cycle operation	The machine will stop after running for 1 round, and the servo enable level will start to run when it is effective. The segment number is automatically incremented from the first segment to the final segment, and the running time of each segment can be set. The servo is enabled to OFF, and the motor stops according to the enabled OFF mode set by H02_05;
1	cycle operation	Cyclic operation, start operation when the servo enable level is effective; The segment number is automatically incremented from the first segment to the final segment, and the running time of each segment can be set. When the running time of the end section is finished, the loop is repeated from the first section. The servo is enabled to OFF, and the motor stops according to the enabled OFF mode set by H02_05;
2	DI Switchover Operation	To set DI switchover operation, at least one DI must be associated with multi-segment running instruction switchover. InFun6 (CMD1) InFun7 (CMD2) multi-segment switch instructions 1, 2; The number of segments (intra-segment speed/segment running time) is determined by the DI terminal combination logic. After each DI terminal logic is determined and the servo is enabled, the corresponding segment number will be switched to run immediately.

Note 1: When the servo enable level is valid; The combined logic of DI switchover is as follows:

Multi-segment switching command 1 (CMD1) =OFF, multi-segment switching command 2 (CMD2) =OFF, switching the speed of the first segment;

Multi-segment switching command 1 (CMD1) =ON, multi-segment switching command 2 (CMD2) = OFF, switching the speed of the second segment;

Multi-segment switching command 1 (CMD1) = OFF, multi-segment switching command 2 (CMD2) =ON, switching the speed of the third segment;

Multi-segment switching command 1 (CMD1) = ON, multi-segment switching command 2 (CMD2) = ON, switching the speed of the fourth segment;

H12_01	Description	Speed command end segment number selection		Alter mode	Enable OFF	factory default	4	Unit	-
	Parameter range	1	4	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

<p>Set the total number of multi-speed running segments, different number of segments can be set different running speed and running time;</p> <p>When the multi-segment running mode <math>\neq 2</math>, the multi-segment speed segment number is automatically increased and the switching sequence is 1,2... H12_01 end segment;</p>								

H12_03	Description	acceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

Set the acceleration time from 0-1000rpm; When switching from segment to segment, the motor will automatically accelerate and decelerate smoothly. The number of all segments is universal;								
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H12_04	Description	deceleration time		Alter mode	Advanced configuration	factory default	10	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

Set the acceleration time of 1000-0rpm; When switching from segment to segment, the motor will automatically accelerate and decelerate smoothly. The number of all segments is universal;								
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H12_20	Description	Paragraph 1 Speed command		Alter mode	Advanced configuration	factory default	0	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16

Set the maximum speed to perform the first speed run; Motor movement direction depends on the set positive and negative; The same is true for the following other segments;								
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H12_21	Description	Paragraph 1 indicates the running time		Alter mode	Advanced configuration	factory default	50	Unit	0.1s
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

Set the time to execute the first speed run; Time to reach this section of the run is complete; The same is true for the following other segments;								
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H12_23	Description	Paragraph2 Speed command		Alter mode	Advanced configuration	factory default	100	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16

H12_24	Description	Paragraph2 indicates the running time		Alter mode	Advanced configuration	factory default	50	Unit	0.1s
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

H12_26	Description	Paragraph 3 Speed command		Alter mode	Advanced configuration	factory default	300	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16

H12_27	Description	Paragraph 3 indicates the running time		Alter mode	Advanced configuration	factory default	50	Unit	0.1s
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

H12_29	Description	Paragraph4 Speed command		Alter mode	Advanced configuration	factory default	500	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16

H12_30	Description	Paragraph 4 indicates the running time		Alter mode	Advanced configuration	factory default	50	Unit	0.1s
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	S	Data type	UInt16

## Chapter 5 485 communication function

### 5.1-Introduction to Communication Protocols

Standard Modbus RTU communication protocol is embedded in the servo driver, which supports the Modbus RTU master station to read and write single or multiple parameters. After the controller with Modbus protocol is successfully connected to the servo drive, the controller can directly set parameters, monitor and read the servo drive. Servo drive in In communication control mode, the controller can modify the operating command parameters of position, speed and torque in real time to change the operating position, speed and torque of the motor.

The mapping between driver parameters function ID and Modbus address of the device is as follows

Parameter Function No.		Calculation mode	Modbus address
hexadecimal	10hex	(hexadecimal group number) × 256 + (decimal group number)	10hex
H02	00	02 (02)×256 + 00	512
H0C	12	0C(12)×256 + 13	3085
H11	04	11(17)×256 + 04	4356
Parameter Function group number (hexadecimal) × 256+ Parameter group address number (decimal) = Modbus register control address (decimal)			

Modbus RTU protocol has a variety of bus commands, the servo driver supports the most commonly used three kinds of function code commands (03H/06H/10H), these three kinds of function code commands can meet the controller's omnidirectional control of the servo driver.

#### 1 : Communication read/write parameter data length

The Modbus register is 16 bits long. Pay attention to the data type of the access parameter when using the Modbus command.

Parameter data type is UInt16, Int16 should use function code 03H read, 06H write;

Parameter Data type: Int32 or read/write multiple parameters using function code 03H for reading and 10H for writing.

#### 2 : 03H(read a single register)

If a parameter is read only with FUNCTION code 03H, the register starts at the register address for that parameter. The return data is the data corresponding to the parameter.

Example: The host sends the following request data frame to read the driver communication address station number 01 and parameter number H0B\_00 (current motor speed) data.

The H0B\_00 register address is 0B00H; The number of read registers is 1(data type Int16); Send request needle ↓;

Slave address	Function No	Register start address high order	Register start address low order	Read the high order of the number of registers	Read the low order of the number of registers	CRC check high bit	CRC check lower bit
01H	03H	0BH	00H	00H	01H	86H	2EH

Assume that the current speed of the motor is 0, and the correct return of the driver is ↓. The return start address data is H0B\_00 data.

Slave address	Function No	Return the length of data bytes	Return start address data high bit	Return start address data low bit	CRC check high bit	CRC check high bit
01H	03H	02H	00H	00H	B8H	44H

### 3 : 06H(Write a single register)

The 06H function code can only write a 16-bit data length parameter, the register starting address is the register address of the parameter, the driver will receive the request data frame after the success of this parameter value changed to write data; For example, the host sends the following request data frame and writes data 1 to drive communication address station 01 and parameter H02\_00 (control mode selection).

H02\_00 register address is 0200H; The write data is 1 and the data type is Int16. Send the request needle ↓

Slave address	Function No	Register start address high order	Register start address low order	Write register data high bits	Write register data low bits	CRC check high bit	CRC check high bit
01H	06H	02H	00H	00H	01H	49H	B2H

The value of ↓H0B\_00 returned by the drive will be changed to 1.

Slave address	Function No	Register start address high order	Register start address low order	Received register data high bits	Received register data low bits	CRC check high bit	CRC check high bit
01H	06H	02H	00H	00H	01H	49H	B2H

### 4 : 03H(Read multiple registers in succession)

Parameter table Some parameters are of 32-bit data type, and some parameters have jumps. For example, the next parameter of H0B\_00 is H0B\_02. If you want to read multiple parameter data continuously, you need to use 03H function to read multiple 16-bit registers continuously. When 03H is used to read consecutive parameters, the register starts at the register address of the first parameter. Return continuous data in the order of the first parameter data → the second parameter data → the NTH parameter data; The system is based on the return of the first parameter data automatically sequentially offset, the amount of data returned depends on the number of read registers;

Example: The host sends the following request data frame, reads the driver communication address station number is 01, the parameter number is H0B\_02 (motor real-time torque) and its next parameter H0B\_03(input DI monitoring) and its next parameter H0B\_05(output DO monitoring) three parameter data.

The register address of the start parameter H0B\_02 is 0B02H. The parameter data type is H0B\_02(Int16), H0B\_03(UInt32), H0B\_05(UInt16), number of registers to read according to the parameter data type is 4. Send request needle ↓;

Slave address	Function No	Register start address high order	Register start address low order	Read the high order of the number of registers	Read the low order of the number of registers	CRC check high bit	CRC check high bit
01H	03H	0BH	02H	00H	04H	E7	ED

Assume that the current parameter values H0B\_02=100, H0B\_03=1, and H0B\_02=3 drive correctly returns the reply pin as

↓

Slave address	Function No	return data byte length	Return start address data high bit	Return start address data low bit	Return starting address + 1 high data bit	Return starting address + 1 low data bit	Return starting address + 2 high data bit	Return starting address + 2 low data bit	Return starting address + 3 high data bit	Return starting address + 3 low data bit	CRC check high bit	CRC check high bit
01H	03H	08H	00H	64H	00H	00H	00H	01H	00H	03H	A1H	D0H
			H0B_02 parameter return value		H0B_03 parameter return value				H0B_05 parameter return value			

## 5 : 10H(Write to multiple registers in succession)

Parameter table Some parameters are of 32-bit data type, and some parameters have jumps. For example, the next parameter of H05\_04 is H05\_07. If you want to write multiple parameter data consecutively, you need to write multiple 16-bit registers consecutively using the 10H function code. When using 10H to read consecutive parameters, the register address starts with the first parameter's register address. Write continuous data in the order of the first parameter data → the second parameter data → the NTH parameter data; The system is automatically sequentially offset according to the received first parameter data, written data;

Example: THE host sends the following request data frame, writing the drive communication address station number 01, parameter number H11\_12 (segment 1 displacement) to 1000 and its next parameter H11\_14(segment 1 maximum speed) to 200.

The register address of the start parameter H11\_12 is 110CH. The parameter data types are H11\_12(Int32), H11\_14(UInt16); The number of registers written according to the parameter data type is 3; Send request needle ↓;

Slave address	Function No	Register start address high order	Register start address low order	Write register number high	Write register number low	number of bytes written	Start address data high order	Start address data low order	Start address + 1 data high order	Start address + 1 data low order	Start address + 2 data high order	Start address + 2 data low order	CRC check high bit	CRC check high bit
01H	10H	11H	0CH	00H	03H	06H	00H	00H	03H	E8H	00H	C8H	F7H	65H
							Data written by H11_12				H11_14data			

The value of ↓H11\_12 is changed to 1000. H11\_14 will be changed to 200;

Slave address	Function No	Register start address high order	Register start address low order	Received register count high order	Received register count low order	CRC check high bit	CRC check high bit
01H	10H	11H	0CH	00H	03H	45H	37H

## 6 : Communication error code

If the MASTER sends an INCORRECT data frame or the slave server receives an error message from the master due to interference during communication, the slave will return an error data frame in the following format

Slave address	Function error code	Error number	CRC check high bit	CRC check high bit
Return according to the actual communication station number	(When using 03H code) = 83H (When using 06H code) = 86H (When using 10H code) = 90H	(Function code error) =01H (parameter address error)=02H (CRC check error)=04H	Checksum based on the first three byte values	

## 5.2-Communication control scheme

### 1:Communication controls the speed of operation

First, use the debugging software of the upper computer to set the following parameters in advance

Parameter No	Set Value	Function description	Modification	Effective way	parameter range	Data type
H02_00	0	Control mode selection: speed control	Enable disconnect	Effective immediately	0~2	UInt16
H03_02	1	DI1 Association: Servo enable control	Run settings	Effective immediately	0~41	UInt16
H03_03	0	DI1 Logical selection: valid and logical	Run settings	Effective immediately	0~1	UInt16
H04_00	19	DO1 association: Speed reaches output	Run settings	Effective immediately	0~19	UInt16
H04_01	0	DO1 logic selection: conduction output when signal is valid, positive logic	Run settings	Effective immediately	0~1	UInt16
H06_02	0	Speed Command Source: Internal Speed Command	Enable disconnect	Effective immediately	0~1	UInt16
H0C_13	1	Parameter is saved to EEPROM and automatically set to 0 after success. Power to keep	Run settings	Effective immediately	0~1	UInt16

Then communication controls the following parameter table object

Parameter No	Function description	Modification	Effective way	parameter range	Unit	Data type
H06_03	Sets the running speed command communication setting value	Run settings	Effective immediately	-6000~6000	rpm	Int16
H06_05	Set the speed to run the speedup time	Run settings	Effective immediately	0~65535	ms	UInt16
H06_06	Set the deceleration time for the speed operation	Run settings	Effective immediately	0~65535	ms	UInt16
H06_18	Speed reaches signal threshold	Run settings	Effective	10~6000	rpm	UInt16

			immediately			
H03_03	Set 1 to enable the conduction motor to run; Set 0 to stop the motor Or DI1 external signal, control motor operation and stop	Run settings	Effective immediately	0~1	-	UInt16

Note: The servo enable in this control scheme is not only the motor enable switch, but also the start speed running switch; If the running process is interrupted and enabled, the motor will stop according to the method of H05\_05 parameter setting; If the current actual motor speed  $H0B\_00 \geq H06\_18$ , DO1 speed reaches the output effectively;

## 2 : Communication control position operation

First, use the debugging software of the upper computer to set the following parameters in advance

Parameter No	Set Value	Function description	Modification	Effective way	parameter range	Data type
H02_00	1	Control mode selection: position control	Enable disconnect	Effective immediately	0~2	UInt16
H03_02	1	DI1 Association: Servo enable control	Run settings	Effective immediately	0~41	UInt16
H03_03	0	DI1 Logical selection: valid and logical	Run settings	Effective immediately	0~1	UInt16
H03_04	28	DI2 Association: Enable multi-bit running	Run settings	Effective immediately	0~41	UInt16
H03_05	0	DI2 Logical selection: valid and logical	Run settings	Effective immediately	0~1	UInt16
H04_00	5	DO1 association: Positioning is complete	Run settings	Effective immediately	0~19	UInt16
H04_01	0	DO1 logic selection: conduction output when signal is valid, positive logic	Run settings	Effective immediately	0~1	UInt16
H05_00	2	Position command source: internal multi-segment bit command	Enable disconnect	Effective immediately	0~1	UInt16
H11_00	0	Multi-segment operation mode: The end of a single cycle	Enable disconnect	Effective immediately	0~3	UInt16
H11_01	1	End segment of displacement command: run only 1 segment;	Enable disconnect	Effective immediately	1~4	UInt16
H0C_13	1	Parameter is saved to EEPROM and automatically set to 0 after success. Power to keep	Run settings	Effective immediately	0~1	UInt16



Then communication controls the following parameter table object

Parameter No	Function description	Modification	Effective way	parameter range	Unit	Data type
H05_21	Positioning Completion Signal Threshold	Run settings	Effective immediately	0~65535	Encoder	UInt16
H11_04	Set 0 relative displacement; set 1 absolute displacement	Run settings	Effective immediately	0~1	-	UInt16
H11_12	Set the displacement amount of the run	Run settings	Effective immediately	-9999999~9999999	rpm	Int32
H11_14	Set the running speed	Run settings	Effective immediately	0~6000	ms	UInt16
H11_15	Set the acceleration and deceleration time	Run settings	Effective immediately	0~65535	ms	UInt16
H11_16	Set the wait time for the end of the run	Run settings	Effective immediately	0~65535	-	UInt16
H03_03	Set 1 motor to enable conduction; Set 0 to enable the motor to be disconnected Or DI1 external signal, control motor enable on and off.	Run settings	Effective immediately	0~1	-	UInt16
H03_05	Set 1 more segment to start running; Let 0 multibit stop Or DI2 external signal, control multi-bit enable start and stop	Run settings	Effective immediately	0~1	-	UInt16

Note: Multi-stage enabling is similar to multi-stage running switch. The multi-stage enabling motor starts to run according to the set position and speed, and the motor stops automatically after running. Running again requires re-enabling multibit enablement. If the multi-segment enable is disconnected during operation, the motor will stop immediately;

If the current value of the current deviation counter  $H0B_{15} < H05_{21}$ , the output of DO1 is valid after the completion of DO1 positioning;

### 3 : Communication control torque operation

First, use the debugging software of the upper computer to set the following parameters in advance

Parameter No	Set Value	Function description	Modification	Effective way	parameter range	Data type
H02_00	2	Control mode selection: torque control	Enable disconnect	Effective immediately	0~2	UInt16
H03_02	1	DI1 Association: Servo enable control	Run settings	Effective immediately	0~41	UInt16
H03_03	0	DI1 Logical selection: valid and logical	Run settings	Effective immediately	0~1	UInt16
H04_00	18	DO1 association: Torque reaches output	Run settings	Effective immediately	0~19	UInt16
H04_01	0	DO1 logic selection: conduction output when signal is valid, positive logic	Run settings	Effective immediately	0~1	UInt16

H0C_13	1	Parameter is saved to EEPROM and automatically set to 0 after success. Power to keep	Run settings	Effective immediately	0~1	UInt16
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Then communication controls the following parameter table object

Parameter No	Function description	Modification	Effective way	parameter range	Unit	Data type
H07_03	Set the communication setting value of the running torque command	Run settings	Effective immediately	-3000~3000	0.1%	Int16
H07_19	Set forward maximum speed limit for torque operation	Run settings	Effective immediately	0~6000	rpm	UInt16
H07_20	Sets reverse maximum speed limit for torque operation	Run settings	Effective immediately	0~6000	rpm	UInt16
H07_21	Set the torque to reach the reference value	Run settings	Effective immediately	0~3000	0.1%	
H07_22	Set the torque to an effective value	Run settings	Effective immediately	0~3000	0.1%	
H07_23	Set the torque to an invalid value	Run settings	Effective immediately	0~3000	0.1%	
H03_03	Set 1 to enable the conduction motor to run; Set 0 to stop the motor Or DI1 external signal, control motor operation and stop.	Run settings	Effective immediately	0~1	-	UInt16

Note: The servo enable in this control scheme is not only the motor enable switch, but also the switch to start the torque operation; If the running process is interrupted and enabled, the motor will stop according to the method of H05\_05 parameter setting;

If the actual motor torque  $H0B\_02 \geq (H07\_21 + H07\_22)$  DO1 torque reaches the output, it is effective;

If the current motor actual torque  $H0B\_02 < (H07\_21 + H07\_23)$  DO1 torque reaches the output invalid;

## Chapter 6 Alarm and handling

### 6.1-Status light and alarm information

AIMtor motor has a variety of alarm protection functions, without a display panel, through the motor rear cover indicator light to indicate specific fault information, can also connect to the upper computer software to view more detailed alarm information, according to the alarm information obtained to identify the corresponding cause of alarm and resolve.

The lights on the rear cover of the AIMtor motor are divided into a green running indicator and a red fault indicator, flashing at 0.5HZ.

Green indicating light	Information	-	Reason
Flicker	Motor enable ON	-	The driver is powered on and the motor is enabled.
Always bright	Motor enable OFF	-	The driver is powered on, but the motor is not enabled;
Always off	The driver is not powered on or the driver is faulty, see the table below	-	The driver is powered off or the drive is powered on, but a fault alarm is generated and the red light blinks.

Red indicating light	Information	Alarm code	Reason
In order to distinguish the observation resolution of flickering once and continuous flickering, the motor alarm indicator has alarm significance from flashing twice.			
Flashing 2 times	Position error	ER.B00	1: In position control mode, the position deviation is greater than the set value H0A-10; 2: motor block due to mechanical factors; 3: servo drive gain is low; 4: the motor cannot respond to the high input pulse frequency;
Flashing 3 times	Driver overvoltage	ER.400	1: Input voltage exceeds the allowed value; 2: The input power is unstable. 3: servo drive failure;
	Driver undervoltage	ER.410	1: The input voltage is lower than the allowed value. 2: The input power is unstable. 3: servo drive failure;
Flashing 4 times	Motor overload, driver overload	ER.620	1: the load is too heavy, the motor output torque exceeds the rated torque for a long time operation; 2: acceleration and deceleration is too frequent or the load inertia is very large; 3: the gain adjustment is not suitable or the rigidity is too strong; 4: Due to mechanical factors, the motor is blocked, causing excessive load during operation
	Motor stall	ER.630	1: motor block due to mechanical factors; 2: driver UVW output is disconnected or encoder is disconnected;
Flashing 5 times	Motor over speed	ER.500	1: the actual speed of the servo motor exceeds the overspeed fault threshold"
Flashing 6 times	The motor or driver	ER.650	1: The ambient temperature is too high.

	temperature is too high		2: After overload, reset and restart repeatedly by shutting down the power supply; 3: long time full load operation leads to motor overheating;
Flashing 7 times	Changed parameters that require power off restart (Warning)	ER.941	1: Changed parameters that need to take effect after power-on again;
Flashing 8 times	No match back to origin	ER.668	1: The use mode of return to zero does not match the set mode. 2: No DI function corresponding to the deceleration point and origin in the origin return mode is allocated;
	Timeout back to origin	ER.601	1: when using the origin recovery function, the origin is not found within the specified time; 2: no signal at the external origin switch or deceleration point;
Flashing 9 times	Encoder error	ER.A33	1: encoder fault or damage;
Flashing 10 times	The parameter changes frequently, and the EEPROM parameter is incorrect	ER.101	1: Internal parameters are abnormal, and the factory Settings need to be restored or the EEPROM is broken.
Flashing 11 times	MCU program exception	ER.105	1: The MCU program is abnormal and restarts after power failure. Return to the factory for inspection if the problem is not solved after power-off restart;
Flashing 12 times	Other alarm	-	Please connect the upper computer to check the specific information of other alarms;