

Siheng stepper motor driver manual

embedded software function

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



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.

Wiring

- Different driver or motor power requirements are different, please follow the driver or motor nameplate provisions to access the appropriate power
- Source, DC input must distinguish the positive and negative power supply, otherwise it will cause motor damage or fire
- Please connect the driver control terminal correctly according to the port definition in the manual, otherwise the motor driver will be damaged or misoperation will lead to accidents

- Do not connect the manufacturer's program update port to any cable, otherwise it will cause damage to the drive or motor chip.

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.

Check and maintenance

Do not disassemble the drive or motor for repair.

Do not assemble the motor by force; otherwise, the motor may be damaged.

Do not touch the inside of the driver and its motor. Otherwise, electric shock may occur.

Do not connect cables or perform maintenance or repair operations when the power is on.

Chapter 1 Product introduction

1.1- Technical Specifications of Stepper Driver

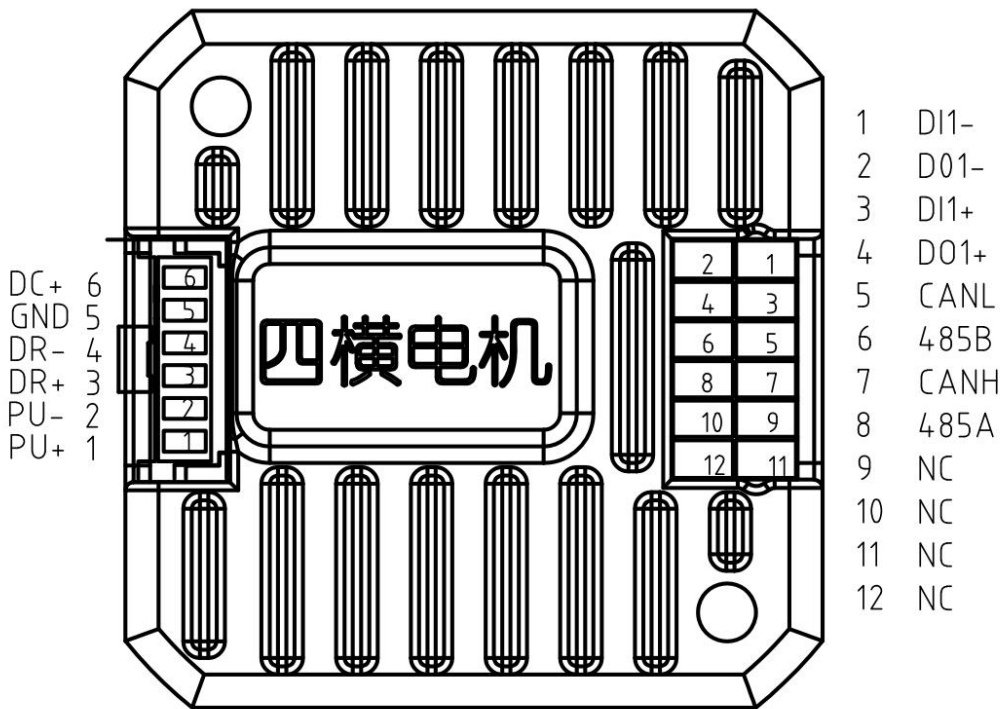
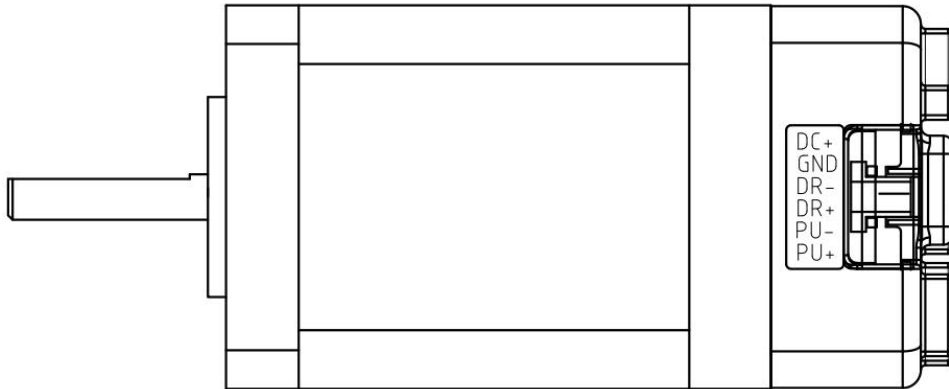
First of all, thank you for using our company's AIStep series products! AIStep series product is our company according to market orientation at a cost of independent research and development of a high-performance, low-power motor products, in the medical equipment, precision instruments, food packaging, 3 c assembly automation has excellent performance, such as intelligent power automation industry. The main advantage is embodied in the stability is strong, high positioning accuracy, motor response speed, strong overload capacity, and low noise, low fever, fine structure, function and practical rich, the application of simple and convenient, etc. For specific technical specifications, please refer to the table below ↓

input power	The allowable input voltages for different models of AIStep series motor drives are not the same. For specific details, please refer to the motor drive specifications. If you use the product for dc power input, pay attention to distinguish between the power supply is negative;	
operating environment	temperature	Working: 0°C ~ 55°C Storage: -20°C ~ +80°C
	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;	
analog input	AI1 interface $\pm 10\text{V}$ input; Speed and torque control; (If any)	
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 + B orthogonal pulse; Double pulse (the CW/CCW) electronic gear than the default, 131072:1000, or 1000 pulse lap Top receive frequency pulse $\leq 100\text{KHZ}$	
	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 rotational 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 rotational speed, operating status, etc
protect function	Overvoltage, undervoltage, overspeed, overcurrent, overload of the main power supply, abnormal encoder, position deviation, locked rotor, abnormal parameters, etc
Return to origin function	13 autonomous (search) ways to return to the origin, as well as the origin offset function.
RS485 And CAN function	Follow the standard Modbus Rtu protocol and standard of CanOpen protocol is a two way communication interface, convenient network in parallel
gain adjustment	Manually adjust Internal rigidity grade table adjustment

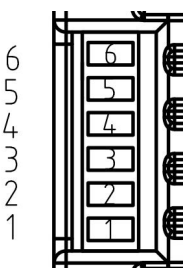
1.2-Integrated series motor hardware interface

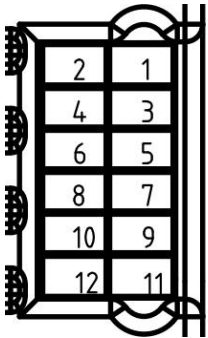
Integrated model: SMD42, SMD57, SMD60 terminal interface diagram



Note: The products are being updated successively. For models not included in this manual, please confirm on our company's official website.

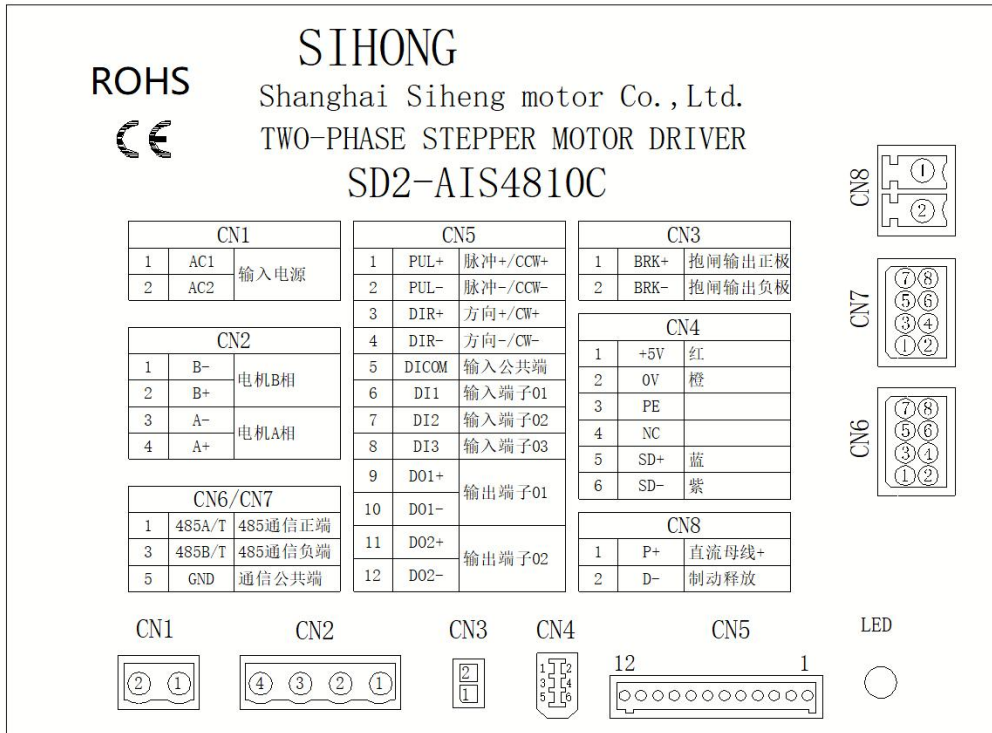
Definition of low-voltage DC integrated interface

	Pin No	Name	Function	Description
	1	PULS+	positive terminal of the command pulse	DC5V - 24V adaptive
	2	PULS-	negative terminal of the command pulse	
	3	DIR+	direction of the instruction is positive	
	4	DIR-	negative end of the instruction direction	
	5	GND	Direct current source	The voltage is DC24V - 36V. According to the actual motor voltage, distinguish the positive and negative poles. Connecting them in reverse may damage the driver
	6	DC+	Positive DC power supply	

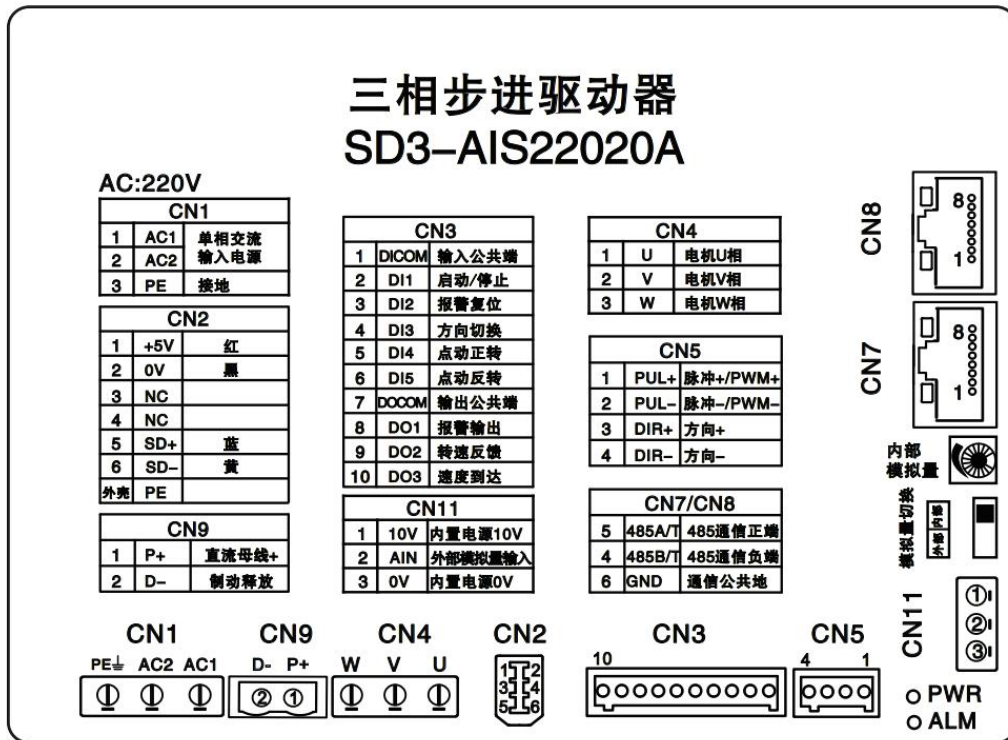
	Pin No	Name	Function
	1	DI1-	The factory default is to enable the SON step externally
	3	DI1+	
	5	CANL	CAN-L
	7	CANH	CAN-H
	2	DO1-	The factory default ALM alarm output function
	4	DO1+	
	6	485B	485-
	8	485A	485+
	9	NC	Reserved
	10	NC	Reserved
	11	NC	Reserved
	12	NC	Reserved

1.3- Split-type stepper drive hardware interface

Driver model: SD2-AIS4810C terminal interface diagram



Driver model: SD3-AIS22020A terminal interface diagram



The factory default definition of the DI/DO low-voltage DC split interface

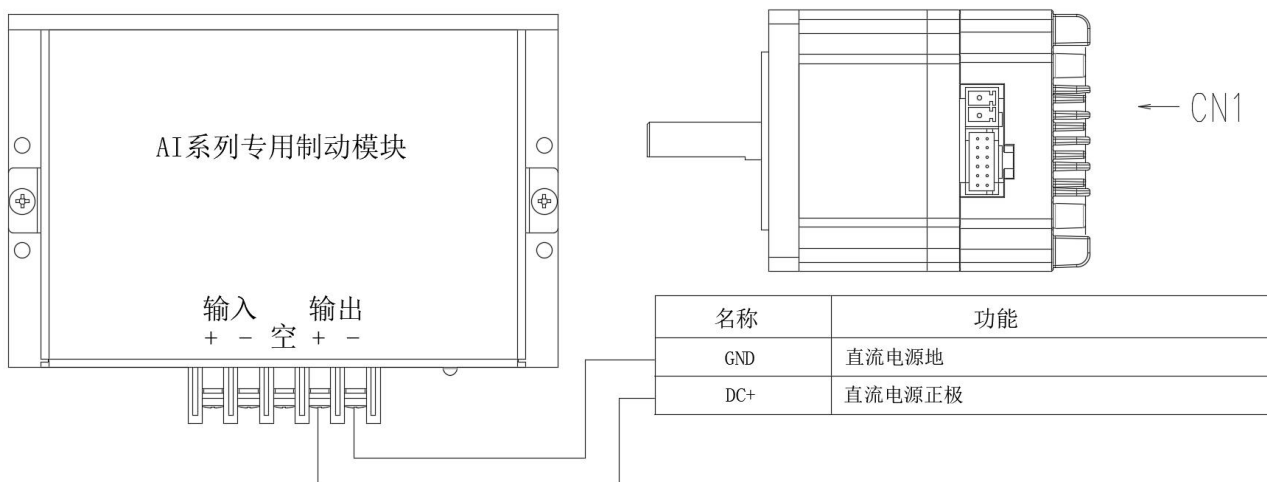
Input terminal	Terminal serial number	Functional description	Functional symbol
DI_COM	CN3/7	Input common end	COM
DI1	CN3/8	servo enables input	SON
DI2	CN3/5	alarm reset	ALM-RST
DI3	CN3/6	EMERGENCY STOP	E_STOP

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		

1.4- Not only the motor-driven brake release

Special braking module :

One-piece series motor without external interface brake discharge resistance, when the load inertia is larger, suggest to buy our AIS special brake modules, to ensure the quality of bus voltage. The external DC power supply is connected to the input +- port of the braking module, and then the output +- port of the module is connected to the motor power interface.



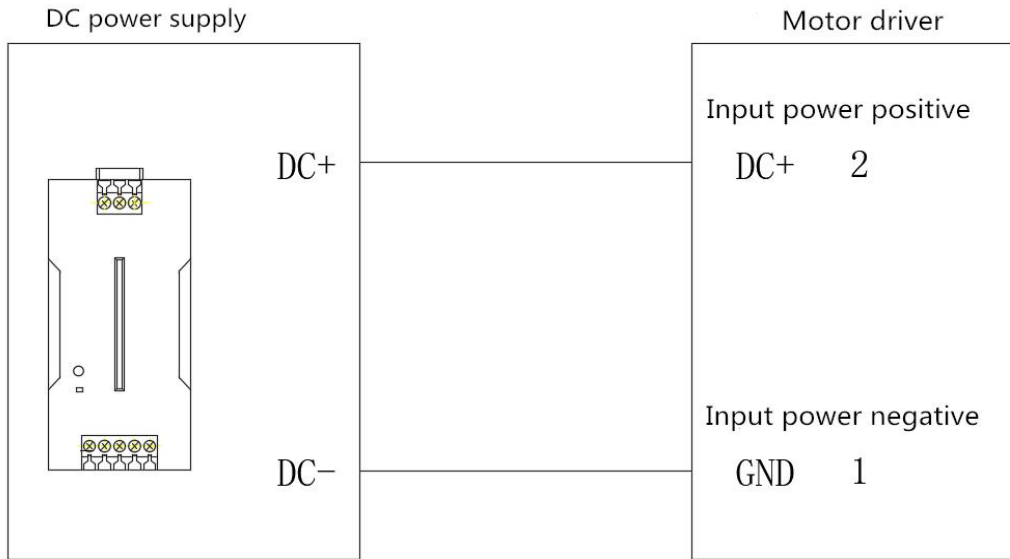
Low-voltage DC external brake discharge resistor

Reference Table for Selection Specifications of Split-type drive CN9 Interface Venting Brake Resistor

Split driver model	Rated output current	Requirements for the resistance value of the external braking resistor	Power of the external braking resistor
SDx-AIS24005A	05A	range of 10 ohms to 20 ohms	Greater than 100W
SDx-AIS48010A	10A	range of 10 ohms to 20 ohms	Greater than 100W
SDx-AIS48020A	20A	range of 5 ohms to 10 ohms	Greater than 200W
SDx-AIS48040A	40A	range of 5 ohms to 10 ohms	Greater than 200W
SDx-AIS48060A	60A	range of 5 ohms to 10 ohms	Greater than 200W

Chapter 2 Standard wiring diagram

2.1 Input power cable

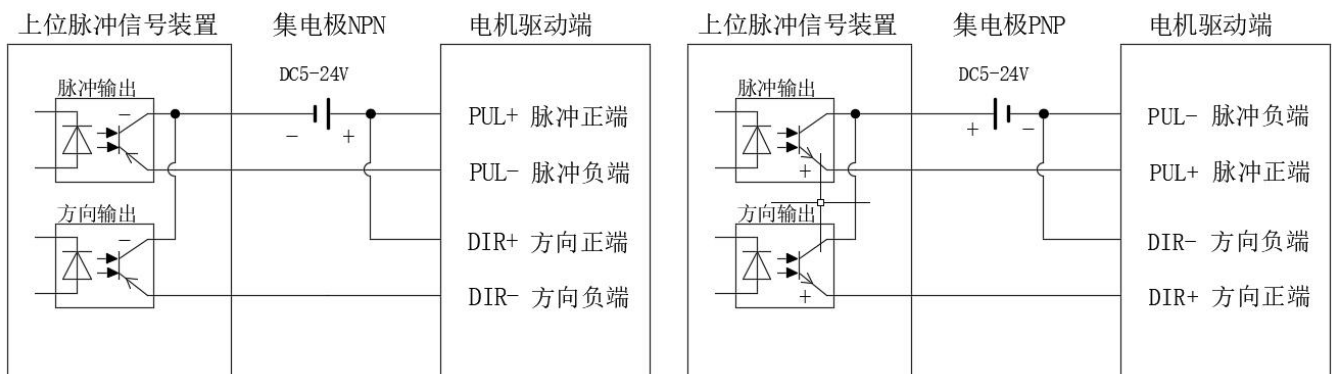


Note 1: The input terminals of the power supply are strictly divided into positive and negative terminals. The voltage range of the input power supply of different models may be different. Please refer to the hardware interface reference wiring of the corresponding model in the section above.

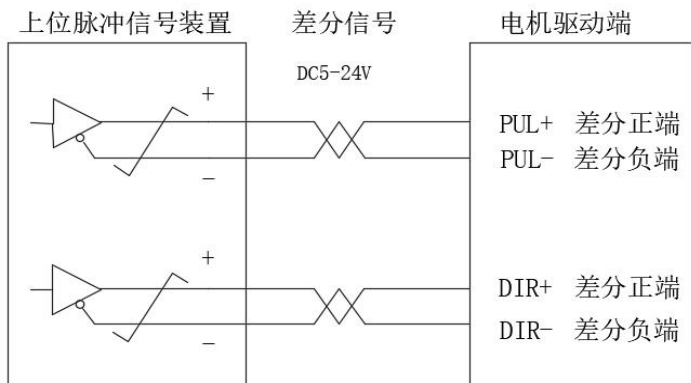
Note 2: This product has a certain overload capacity, and the selected external switching power supply should be greater than 1.5 times the output capacity of the rated current of the product. The rated current of the product is marked on the nameplate.

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.

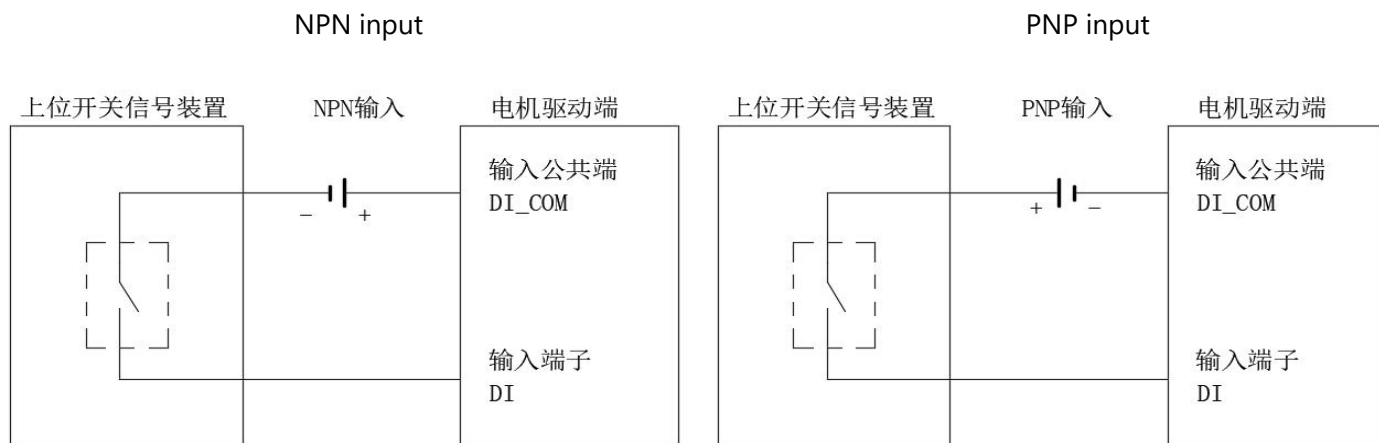
Note 2: This product supports 5-24V wide voltage pulse input, and the maximum received pulse frequency is 100KHZ. The upper pulse device should pay attention to the control frequency within 100K, otherwise the driver is easy to lose the pulse, resulting in abnormal positioning.

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 voltage receiving range of the input terminal is DC12-24V. Excessively high voltage may cause damage to the internal optocoupler isolation.

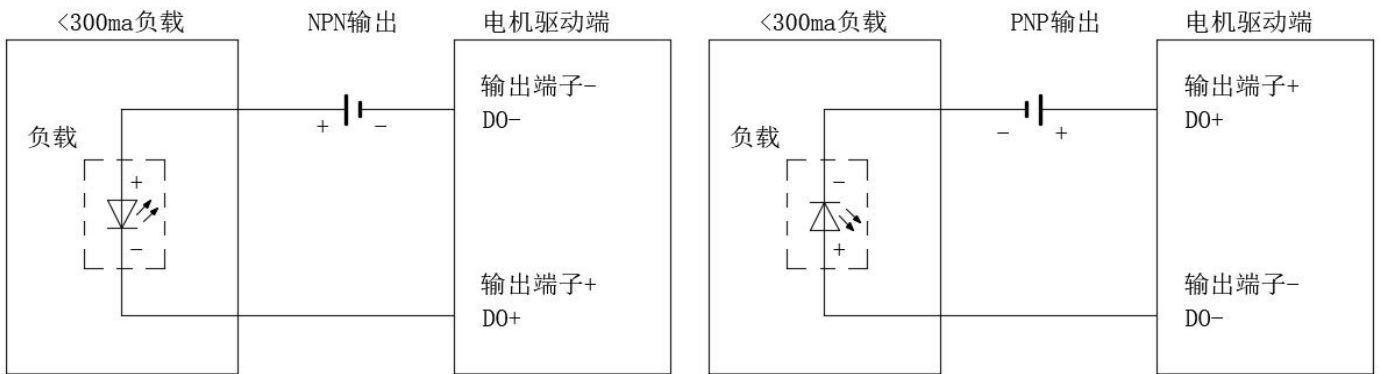
Note 2: every DI free to assign different functions (see chapter 4.3 DIDO parameters), but not multiple DI can be assigned the same function.

Note 3: control DI port moves output low level, choose NPN connection; When controlling the operation of the DI port, output a high level and select the PNP connection method.

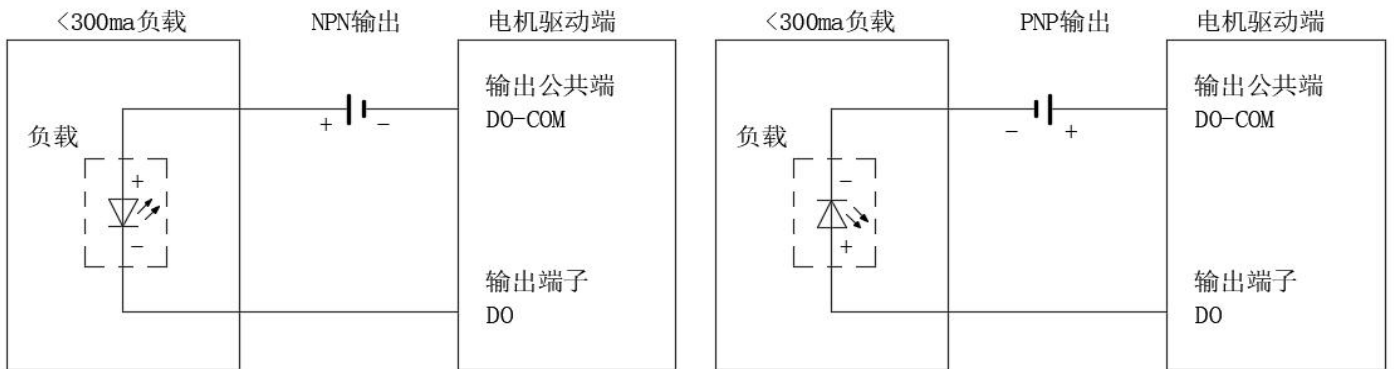
Note 4: 6 to > input terminal signal width of 5 ms, otherwise will be invalid as a signal.

DO Connect cables to the output terminal

1、Intergrated SMD series



2、SD series split driver



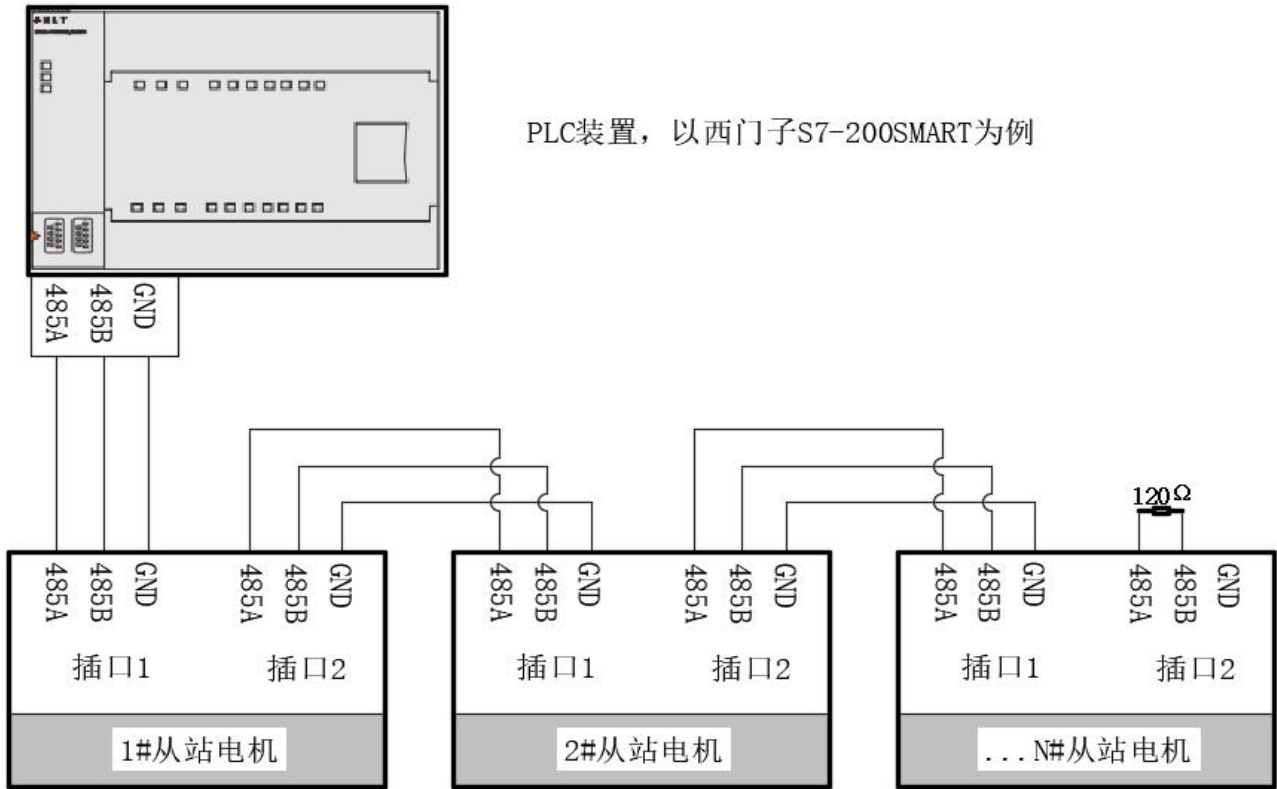
Note 1: The maximum driving capacity of the output terminal is less than 300mA current. If you need to drive a large load, please use intermediate relay to convert.

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

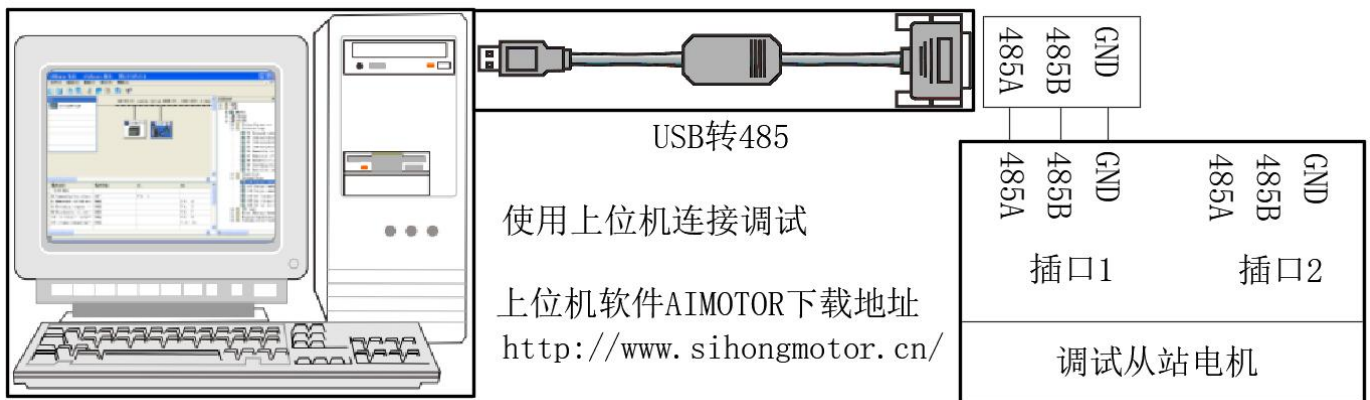
- Connect many slave stations
PLC device, with Siemens S7-200SMART as an example



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	Instruction source = 0 is derived from the internal parameters	Speed DI H06_03 set association can control start-stop SON	
			Instruction source =1 is derived from the analog quantity AI1	External analog voltage input DI associated SON can make start-stop control	
			Instruction source = 5 is derived from the internal segment	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
			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 (only available in servo operation mode H02_03 =	Torque command select H07_02 (select) left H07-00 (main) H07-01 (auxiliary)	Instruction source = 0 is derived from the internal parameters		H07_03 Set torque; Highest H07_19 set forward speed; Reverse the highest speed DI H07_20 set association SON can make start-stop control	
		Instruction source =1 is derived from the analog quantity AI1		External analog voltage input DI associated SON can make start-stop control	

Chapter 4 Parameters and Functions

Precautions for parameters:

In the parameter table, "Applicable Modes" P represents position mode, S represents speed mode, and T represents torque mode. Some parameters need to lift motor can make can change, or change the power need to restart, please pay attention to parameter table "way" and "effective way"; Communication access or control parameters please note in the table "data types", and "parameter setting";

4.1-Driver parameters(H00-H01)

H00_00	Description	Motor code		Alter mode	Enable off	factory default	Manufacturer registration	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	Manufacturer registration	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	Manufacturer registration	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	Manufacturer registration	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	Manufacturer registration	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	Enable off	factory default	Manufacturer registration	Unit	P/r
	Parameter range	0	99999999	Effective way	power off and restart	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	Manufacturer registration	Unit	10mA
	Parameter range	0	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	UInt16

Manufacturer parameters: The maximum current that different motors can accept varies. Setting an illegal value will cause the motor to overheat or get damaged. It can only be modified with the manufacturer's permission. Users should not modify it. Limit current output = Limit torque output; This parameter, together with H07_09/H07_10 and the manufacturer's parameter H01_03, serves as the actual maximum current output limit of the motor, and the lower of them is taken as effective.

H01_00	Description	MCU software edition number		Alter mode	Display	factory default	-----	Unit	mΩ
	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_03	Description	Driver max current		Alter mode	Enable off	factory default	Manufacturer registration	Unit	10mA
	Parameter range	10	30000	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_02	Description	Driver Code		Alter mode	Enable off	factory default	Manufacturer registration	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_05	Description	Driver current sampling resistance		Alter mode	Enable off	factory default	Manufacturer registration	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	Manufacturer registration	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	Manufacturer registration	Unit	Ω
	Parameter range	500	65535	Effective way	power off and restart	Adaptation pattern	P/S/T	Data type	UInt16
<p>Manufacturer parameters, different drivers of the current amplifier feedback resistance is different, need manufacturer permission can be modified, users do not modify;</p>									

H01_08	Description	Driver temperature alarm threshold		Alter mode	Enable off	factory default	Manufacturer registration	Unit	°C
	Parameter range	40	100	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
<p>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;</p>									

H01_09	Description	Driver bus voltage attenuation coefficient		Alter mode	Enable off	factory default	Manufacturer registration	Unit	-
	Parameter range	10	65535	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
<p>Manufacturer parameters can be modified only after the permission of the manufacturer. Users do not modify them.</p>									

4.2-Basic control parameters(H02)

H02_00	Description	Control mode selection		Alter mode	Enable off	factory default	1	Unit	-
	Parameter range	0	8	Effective way	with immediate effect	Adaptation pattern	ALL	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);

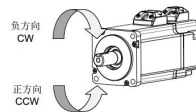
Set 2: Torque mode (refer to Section 4.6 / Torque Control Parameters);

Set8: CANOpen mode (refer to step into CANOpen manual);

H02_02	Description	Rotation direction selection		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	1	Effective way	power off and restart	Adaptation pattern	ALL	Data type	UInt16

Set 0: CCW is positive and CW is negative;

Set 1: CW is the positive direction and CCW is the negative direction;



H02_03	Description	Step-by-step operation mode		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: Open-loop operation, no encoder feedback for position and speed signals, supports position mode and speed mode. The operating current is set by H07_03, and the lock-shaft current is set by H07_07. In open-loop speed mode, the load needs to be set with appropriate acceleration H06_05 and deceleration H06_06, as well as operating current H07_03; otherwise, it may lose step.

Set 1: servo operation, location speed encoder feedback, support position, speed, torque mode, use the same as the four horizontal AIMotor series servo;

Set 2: Closed-loop operation, position and speed signals have encoder feedback, supporting position mode and speed mode; The operating base current is set by H07_12, and the real-time current system automatically regulates.

H02_05	Description	Servo enable OFF Stop mode selection		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	ALL	Data type	UInt16
Set 0: free stop, keep free state after stopping; Set 1: zero speed stop, keep free after stopping; Set 2: zero speed stop, keep DB state after stopping (damping state after enabling OFF, recommended for vertical load);									

H02_30	Description	User Password		Alter mode	Enable off	factory default	0	Unit	-
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	ALL	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	5	Effective way	with immediate effect	Adaptation pattern	ALL	Data type	UInt16

Set 0: No effect;
Set 1: restore user related factory parameters;
Set 2: Clear the fault record of H0B_33;
Set 3: Restore the factory registration parameters of the motor and drive (requiring manufacturer's permission);
Set4: special old version recovery all parameters. After performing this operation, the motor drive parameters need to be re-matched, and the password needs to be entered again to reset the three options. Set 5: Restore all system parameters. After performing this operation, the motor drive parameters need to be re-matched, and the password needs to be entered again to reset the three options. Note: normal use option 1 restore user Settings of parameters; System parameter initialization function option 3/4/5 should not be used by non-manufacturer technicians.

4.3 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	0.1ms
	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	Enable off	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:

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

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

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.

H05_09	Description	Electronic gear ratio 1 (numerator)		Alter mode	Enable off	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	Instruction 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 (Homing_Start)	Origin research	When the motor is enabled, the signal is effective
2	Enable electrical home through DI (Homing_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 (Home Record)	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	Motor Z	Motor first searches for the mechanical limit position with the set direction

		limiting position	signal	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 deceleration point, origin switch, and forward and reverse overtravel switch used in the selected mode; otherwise, an alarm will occur and ER.601 will fail to return to zero.

Note 2: If the deceleration point in the selected mode is the origin switch and is associated with the forward and reverse overtravel switch DI, the motor will automatically reverse direction and continue the search when it encounters the overtravel switch in the search path.

Note 3: In the process steps, the high-speed search speed is set by the H05_32 parameter, and the low-speed search speed is set by the H05_33 parameter.

Note 4: If the origin is still not found within the time limit of parameter H05_35, an alarm will be triggered for ER.601 to return to zero timeout.

Note 5: After the origin is successfully restored, the DO function (OutFun16-HomeAttain) is valid for completing the output when the origin returns to zero. After enabling OFF, the output is invalid when the origin returns to zero.

Note 6: back to the origin function effectively in position mode; When currently operating in the multi-segment control within the position mode, the multi-segment enable signal needs to be disabled first.

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	100	Unit	rpm
	Parameter range	0	100	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	200	Unit	ms
	Parameter range	0	200	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_35	Description	Low speed search origin switch signal speed		Alter mode	Enable OFF	factory default	60000	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set the maximum allowed time for the origin return. If the origin cannot be found within this parameter time range, an alarm is reported for ER.601 return to the origin timeout.

H05_36	Description	Mechanical origin offset		Alter mode	Enable OFF	factory default	0	Unit	Instruction unit
	Parameter range	-99999999	9999999999	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt32

Set the offset position after the origin reset. After the origin reset is successful, continue to execute the offset position action. If the origin offset of H05_36 is 0, the electrical zero position is consistent with the origin position. After the origin is successfully returned to zero, the current absolute position of the motor H0B_07 will be automatically cleared to 0. Returning to the electrical zero position means going back to the origin position. If the origin offset of H05_36 is not equal to 0, the electrical zero position is equal to the origin offset position. After the origin is successfully returned to zero, continue to move to the offset position and then stop. The current absolute position of the motor, H0B_07, is the offset position of the origin. Returning to the electrical zero position means returning to the offset position of the origin. If the origin return mode H05_31 = 14/15/16, lap electric back to zero, the motor back to the position of the single circle, mechanical origin offset is invalid, if the origin return mode H05-31 = 6/7/10/11, H05-36 sets the mechanical origin offset (positive = positive direction; Negative value = negative direction. When the offset value is consistent with the direction of the origin return, an alarm ER.668 will be triggered and the motor will not perform the action.

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;

4.5- Speed 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
<p>When H02_00=0 speed control mode; Set 0: Select the main speed instruction A source to run; Set 1: Select the auxiliary speed instruction B source to run;</p>									

H06_03	Description	Speed command communication setting value		Alter mode	Advanced configuration	factory default	0	Unit	rpm
	Parameter range	-6000	6000	Effective way	with immediate effect	Adaptation pattern	S	Data type	Int16
<p>When H06_02=0, the motor running speed is set by this parameter;</p>									

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
<p>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.</p>									

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
<p>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);</p>									

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
<p>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.</p>									

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
<p>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;</p>									

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
<p>When H02_00=2(torque control mode) and H02_03=1(servo operation mode), set the torque limit for the positive and negative direction output of the motor during operation. The limited torque output is equal to the limited current output. 100.0%= 1 times the motor torque (1 times the motor torque = the rated torque of the motor and the rated current of the motor). This parameter, together with H07_09/H07_10 and the manufacturer's parameters H00_43/H01_03, serves as the actual maximum current output limit of the motor, and the lower of them is taken as effective. H02_03 = 0 (open loop operation mode), set the running current of the machine. The larger this value is, the greater the torque will be. To reduce heat generation, an appropriate operating current should be set according to the load.</p>									

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
<p>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.</p>									

H07_07	Description	Step lock shaft torque		Alter mode	Advanced configuration	factory default	300	Unit	0.1%
	Parameter range	0	1000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
<p>When H02_03=0 (open-loop operation mode), set the lockshaft current of the motor. The larger this value is, the greater the torque will be. To reduce heat generation, an appropriate operating current should be set according to the load.</p>									

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
<p>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.</p>									

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
<p>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.</p>									

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
<p>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;</p>									

H07_12	Description	Closed-loop base torque		Alter mode	Advanced configuration	factory default	300	Unit	0.1%
	Parameter range	100	1000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
<p>When H02_03=2 (in closed-loop operation mode), set the base torque of the motor. The larger this value is, the greater the minimum torque will be. To ensure smoother operation, an appropriate base torque should be set according to the load.</p>									

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 (To Reach);

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 (To Reach);

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;

H09_41	Description	Current loop anti-saturation gain		Alter mode	Advanced configuration	factory default	100	Unit	1%
	Parameter range	0	1000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

By setting this parameter value, adjust the anti-saturation gain of the current loop. When the motor vibrates, increasing this parameter can reduce the vibration

H09_42	Description	Weak magnetic depth		Alter mode	Advanced configuration	factory default	60	Unit	-
	Parameter range	0	75	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

By setting this parameter value at H02_03=1 (servo operation mode), the upper limit of the motor's operating speed can be increased. The larger this value is, the higher the rotational speed will be and the torque will correspondingly decrease. An excessively large value may cause a runaway alarm

H09_43	Description	Weak magnetic velocity threshold		Alter mode	Advanced configuration	factory default	0	Unit	rpm
	Parameter range	0	10000	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

When H02_03=1 (servo operation mode), if the motor speed exceeds this value, the motor will perform demagnetization speed increase. When the motor is below this value, the motor does not perform demagnetization control.

H0A_04	Description	Motor overload protection gain		Alter mode	Enable OFF	factory default	100	Unit	%
	Parameter range	10	3000	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 $131072 \times 8 = 1048576$, 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;

H0A_26	Description	Motor overload shielding is enabled		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 0: open motor overload detection alarm;
Set 1: shield the motor overload detection alarm, and the motor will automatically run down after overload.

H0A_36	Description	Absolute encoder fault shield selection		Alter mode	Enable OFF	factory default	0	Unit	--
	Parameter range	0	3	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: multi-turn absolute encoder normal application;
Set 1: Screening coil overflow detection;
Set 2: Shield battery status detection
Set 3: Shielding coil overflow detection + battery status detection;

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 rotational speed of the motor after filtering; All display parameters in group H0B can only be read through communication and cannot be modified (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 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_03 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	Instruction unit
	Parameter range	-99999999	999999999	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 position instructions corresponding to 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	Display	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	Instruction unit
	Parameter range	-99999999	999999999	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	-100	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

It is used to set the faults of the motor for the last 10 times; If no fault records will not be displayed;

Set 0: H0B_34 to display the current fault information.

Set 1: H0B_34 displays the previous fault information.

Set.....

Set 9: H0B_34 displays the fault information of the last nine times.

H0B_34	Description	Selected number of fault codes		Alter mode	Display	factory default	-	Unit	-
	Parameter range	0	65535	Effective way	-	P/S/T	-	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	-	P/S/T	-	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	999999999	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	-99999999 9	999999999 9	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;

H0C_30	Description	MODBUS offline detection function		Alter mode	Advanced configuration	factory default	0	Unit	ms
	Parameter range	0	65535	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

When H0C_30=0, no disconnection detection is performed. If the driver does not receive the data packet from the master station within the time range of H0C_30=1 to 65535ms, an alarm will be triggered.

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;									
H0D_20	Description	Absolute value encoder reset enabled		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16
Set 0; Have no effect; Set 1: Reset the internal fault information of the absolute encoder; Set 2: Reset the internal fault information of absolute encoder + clear multi-circle data;									

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
When H02_00=1 selects the position control mode and H05_00=2 selects the position instruction 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 up DI switching operation, at least one DI must be associated with multi-segment operation instruction switching. InFun6 (CMD1) InFun7 (CMD2) multi-segment switching instructions 1 and 2; The number of operating segments (position within segments/speed/pre-set acceleration and deceleration) is determined by the DI terminal combination logic. There is no waiting time between segments, depending on the timing of the call. Each time the DI terminal logic is determined, multiple stages need to be enabled to start running when the rising edge is triggered. The combinational logic of the DI terminal is as follows: Note 2;							

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 command1 (CMD1)	Multi-segment switching command2 (CMD2)	Multi-level enabling (PosInSen)	Running position section
OFF	OFF	OFF→ON	Section 1
ON	OFF	OFF→ON	Section 2
OFF	ON	OFF→ON	Section 3
ON	ON	OFF→ON	Section 4

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 $\neq 2$, the multi-segment segment number is automatically increased and the switching sequence is 1,2... H11_01 end segment;

H11_02	Description	Residual treatment mode		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-bit operation mode =0/1, if the mode is switched or the multi-bit enable signal changes from ON to OFF in the multi-bit operation, the operation is suspended and the processing mode is re-run;

Set 0: continue to run the number of remaining segments. If the last run is suspended in the middle of the second segment, the re-run will abandon the remainder of the second segment 2 and continue to run from the third segment;

Set 1: Restart the operation from the first segment. If the last operation is suspended in the middle of the second segment, the restart will abandon the remaining segments and restart the operation from the first segment.

H11_04	Description	Shift instruction type selection		Alter mode	Enable OFF	factory default	0	Unit	-
	Parameter range	0	1	Effective way	with immediate effect	Adaptation pattern	P	Data type	UInt16

Set 0: Relative shift instruction (incremental shift instruction based on current position)

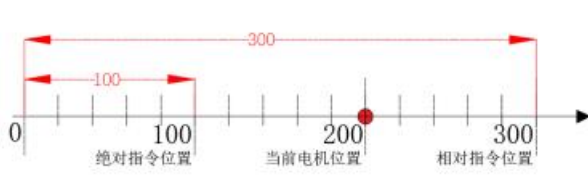
Set 1: Absolute displacement instruction (incremental displacement instruction based on zero (origin) coordinates)

As shown in the figure, the current position of the motor is 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 current position of the motor is 200. If the absolute position instruction is executed, the displacement is 100.

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



H11_05	Description	Sequential mode runs the selection of the starting segment		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 and H11_05 = 0, it indicates that the sequence runs from segment 1 to the end segment and the single cycle ends.

When H11_00=3 and H11_05≠0, it indicates that the sequence runs from segment 1 to the end segment, and then the number of segments set by this parameter is taken as the starting segment to continue the sequential loop run.

H11_12	Description	Paragraph 1 moves the displacement		Alter mode	Advanced configuration	factory default	1000	Unit	Instruction unit
	Parameter range	-10000000	10000000	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	Instruction unit
	Parameter range	-10000000	10000000	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	factory default	1000	Unit	Instruction unit
	Parameter range	-10000000	10000000	Effective way	with immediate effect	Adaptation pattern	P	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	-10000000	10000000	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	1	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

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

When the multi-segment running mode ≠2, the multi-segment speed segment number is automatically increased and the switching sequence is 1,2... H12_01 end segment;

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;

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;

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;

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;

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 + 12	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 +3low 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	

6.2-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 immediately	10~6000	rpm	UInt16

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

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 Application of multi-circle absolute value system

6.1- Multi-turn absolute value system application introduction

Using the multi-turn absolute value system application, it is necessary to install a multi-turn absolute value encoder on the matched motor, which detects the bits within one rotation of the motor

The number of turns of the motor is also counted, and the maximum recording range is -32768-32767 turns; Multi-turn absolute encoders require external uninterruptible power supply in order for position data not to be lost. In the case of servo drive power, the driver is connected

The encoder extension cable provides power to the encoder, and the battery on the encoder extension cable provides power to the encoder in the case of power loss of the driver

No more than 2 years is recommended

6.2- Fault code ER.731/ ER.730/ ER.735

ER.731 (Multi-turn absolute encoder battery failure) is to remind the user that the multi-turn absolute encoder is powered off, the recorded number of turns data is lost, and it needs to be re-repeated

Bit encoder H0D_20=2, if using absolute value positioning need to re-confirm the coordinate position;

ER.731 (multi-turn absolute encoder battery failure)

1: Connect the motor, drive and extension cables at the first time, power on the drive, and the drive will alarm ER.731;

2: Forcibly replace the battery in the case of power loss of the driver, or the battery extension cable connected to the motor encoder is disconnected, the driver will alarm ER.731;

3: The battery connected to the encoder is damaged and cannot continue to provide power to the motor encoder, and the driver will alarm ER.731;

After ensuring that the battery can supply power to the multi-turn absolute encoder normally, the H0D_20=2 reset operation is performed.

H0D_20	Description	Absolute value encoder reset enabled		Alter mode	Enable off	factory default	0	Unit	10mA
	Parameter range	0	2	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0; It has no effect.

Set 1: internal fault reset absolute value encoder information;

Set 2: reset the absolute value encoder + clear than internal fault information data

ER.730 (Multi-turn absolute encoder battery Warning), when the detected battery voltage is less than 3.0V to remind the user to replace the battery in time, otherwise the encoder data may be lost

To lose; For details about how to replace the battery, see the next section. When the battery is correctly replaced without affecting the recorded number of turns, this warning is automatically lifted without the need for an encoder reset; The wrong battery replacement method will cause the multi-turn absolute encoder to be powered off, and the recorded number of turns data will be lost. The driver will alarm ER.731

ER.735 (multi-turn absolute encoder number overflow), when the encoder multi-turn data positive revolution is greater than 32767 turns or reverse is less than -32768 will alarm; If many circles are closed in the case of linear continuous rotation, after a period of time, the number of turns will always exceed the upper or lower limit that the multi-turn absolute value encoder can count.

Through H0A_36=1, the number of shielding rings overflow fault alarm;

H0A_36	Description	Absolute encoder fault shield selection		Alter mode	Enable OFF	factory default	0	Unit	--
	Parameter range	0	3	Effective way	with immediate effect	Adaptation pattern	P/S/T	Data type	UInt16

Set 0: multi-turn absolute encoder normal application;

Set 1: Screening coil overflow detection;

Set 2: Shield battery status detection

Set 3: Shielding coil overflow detection + battery status detection;

Note: When matching the motor with the absolute value of multiple turns, it does not use its absolute value function, and is only used as an incremental motor, it can be equipped with no battery requiring H0A_36=2 shielding

Check the battery status. The number of turns overflow detection is also not required. H0A_36=3 Number of turns overflow detection + battery status detection is also not required.

6.3- Precautions for replacing absolute value encoder batteries

● When do I need to replace the encoder battery?

1: The servo is in normal use, and the encoder cable has not been removed, if the alarm ER.730, it indicates a battery warning, reminding the user to replace the encoder in time. Or else

Loss of position data recorded by the encoder may occur;

2: The servo is in normal use, and the encoder cable has not been removed. If the alarm is sent to ER.731, it indicates that the battery is faulty and reminds the user that the encoder battery must be replaced.

Encoder position data has been lost;

3: The encoder battery needs to be replaced immediately if the encoder battery is leaking, damaged, or bulging, to prevent the encoder position data from being lost due to battery loss.

● How to properly replace the encoder battery

1: Ensure that power is generated in the driver and the encoder cable is normally connected to the driver;

2: Disconnect the drive, open the battery box cover in non-running state, take out the old battery, install the new battery;

3: The end of the replacement, ER.730 automatic release indicates that the encoder position data is not lost;

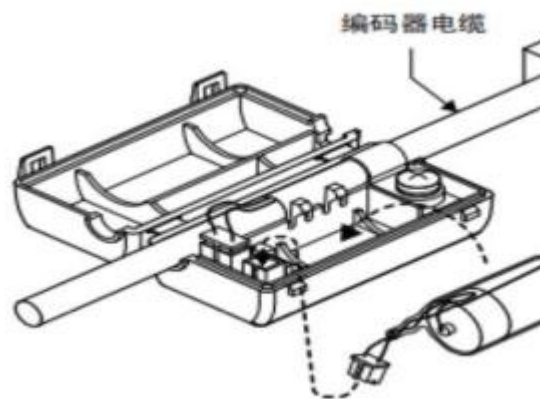
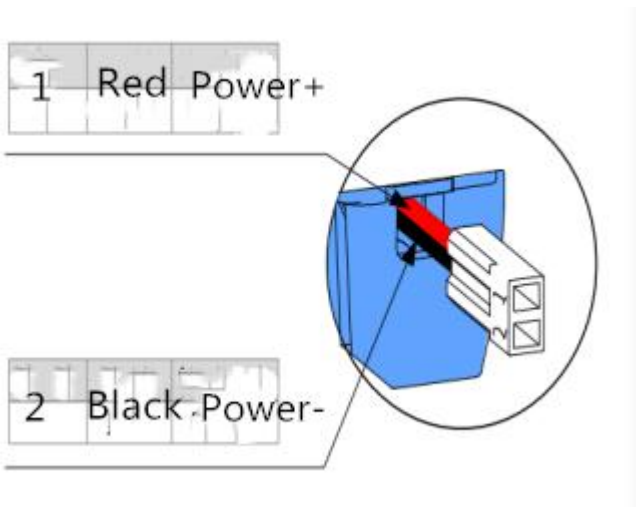
Note:

1: Recommended battery specifications: 3.6V 2500mAh;

2: Install a new battery pay attention to distinguish between positive and negative battery, generally red positive, black negative. The reverse connection of positive and negative poles may cause damage to the motor encoder;

3: Improper battery replacement causes the encoder to lose power abnormally, resulting in position data loss alarm ER.731 battery fault, need to be re-connected after the recovery

Reset encoder H0D_20=2. If absolute value positioning is used, the coordinate position needs to be reconfirmed.



Chapter 7 Alarm and handling

7.1-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.

1. Status indicator

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.

2: fault alarm and handling

- In order to distinguish the observation resolution of the red fault indicator blinking once and blinking continuously, the red fault indicator has alarm significance from blinking twice;
- In models without a display panel, the red indicator light indicates the common fault alarm status. Other alarms do not separately indicate the need to connect to the upper computer software Monitor more detailed and comprehensive alarm information;
- Warning warning type, no fault signal is output, the warning is automatically lifted after the warning condition is not established, and no fault reset is required.
- alarm fault type, will output a fault signal, need to reset the fault to remove the fault.

Failure warning table

Red indicating light	Alarm warning message	Alarm code	Type	Alarm warning principle	Possible causes	Solution
Flashing 2 times	Position error	ER.B00	Fault alarm	In position control mode, the position deviation is greater than the HOA-10 threshold	motor is blocked due to mechanical factors	Check the mechanical factors to ensure that the machine is smooth
					motor does not respond to higher input pulse frequency	Reduce the input pulse frequency;
					Acceleration and deceleration are too fast when the motor starts, stops or reverses. motor won't respond	Increase acceleration and deceleration time;
					motor selection is too small, and the torque is not enough, resulting in large	Choose bigger power motor

					position following error	
					Servo driver gain is low, motor response is slow	Increase the gain parameter value;
					Driver UVW output phase break or encoder break	Checking Cable connections
					The load inertia is large and the motor response is not timely	Appropriately increase the H0A-10 threshold;
Flashing 3 times	Driver over voltage	ER.400	Fault alarm	The input voltage exceeds the allowable value	1: The input power supply is unstable 2: The load inertia is large, and the motor generates regenerative energy when starting and stopping, resulting in high bus voltage	1. Stable input power quality, 2. Increase acceleration and deceleration time, smooth start and stop Increase regenerative braking resistance to absorb regenerative energy
	Driver under voltage	ER.410	Fault alarm	The input voltage is lower than the allowable value	1: The input power supply is unstable 2: The input power is too small, resulting in insufficient power when the load is running and the voltage is lowered	1. Stable input power quality, Increase the input power
Flashing 4 times	Motor overload, driver overload	ER.620	Fault alarm	overload energy exceeds the allowable value of the system	The load is too heavy, and the running torque of the motor exceeds the rated torque for a long time	Select bigger power motor
					Start-stop commutation is too frequent or the load inertia is too large	Increase acceleration and deceleration time to smooth start and stop
					Due to mechanical factors, the motor is blocked, resulting in excessive load during operation	Check the mechanical factors to ensure that the machine is smooth
					The gain adjustment is inappropriate or the rigidity is too strong, resulting in uncontrolled torque output	Reasonably adjusted gain
	Driver UVW output phase break or encoder break	Checking Cable connections				
Motor stall	ER.630	Fault alarm	There are motion commands and no	1: motor block due to mechanical factors; 2: Driver UVW output phase break or encoder break	1. Check the mechanical factors to ensure that the machine is smooth 2. Checking Cable connections	

				motion feedback		
	Driver hardware over current	ER.201	Fault alarm	The output current exceeds the hardware or software range	Improper gain adjustment or too rigid, resulting in uncontrolled current output	Reasonably adjusted gain
	Driver software over current	ER.207	Fault alarm		Driver UVW output phase break or encoder break	Checking Cable connections
					Transient load mutation	Check the mechanical factors to ensure that the machine is smooth
					Driver output short-circuited, UVW cable short-circuited	Check the drive output and measure the motor cable
					Drive damage or motor coil short circuit	Check the motor coil to make sure there is no short circuit
Flashing 5 times	Motor over speed	ER.500	Fault alarm	Motor running speed oversize value	The actual motor speed exceeds the maximum allowable value	Slow down
Flashing 6 times	The motor or driver temperature is too high	ER.650	Fault alarm	Driver temperature detection exceeds allowable value	The ambient temperature is too high.	Increase environmental cooling measures
					After overload, reset and restart repeatedly by shutting down the power supply long time full load operation leads to motor overheating	Motor selection is increased to avoid full load operation
Flashing 7 times	Changed parameters that require power off restart (Warning)	ER.941	Warning reminder	Remind the user that the parameter value takes effect only after the power is powered on again	Alert the user that a parameter has been changed that will not take effect until power on again	After confirming that the modified parameter is the expected value, save it permanently, power off and restart the parameter to take effect, and the warning is automatically cleared
Flashing 8 times	No match back to origin	ER.668	Fault alarm	The return to the origin mode does not match	Origin resetting mode H05-31 selects 14/15/16 single-turn electrical resetting mode, while H05-30 chooses origin resetting control	If H05-31 single turn back to zero mode, H05-30 should choose electrical return to zero trigger;
					Origin recovery mode H05-31 Select 6/7/10/11, H05-36 mechanical origin offset positive and negative direction error, (positive = positive direction, negative = negative direction)	Change the direction of the origin offset value of parameter H05-36 to move the offset position in the correct
					Origin resetting mode	Assign the corresponding DI function

					H05-31 selects either an external origin switch condition or an over-the-range limit switch condition but does not associate the condition to the corresponding physical DI pin	to the physical DI input port based on the origin restore mode selected by H05-31
					In the process of return to zero, the external origin switch and the over-range limit switch signal are connected at the same time, or the positive and negative over-range limit signal are connected at the same time	Check the external origin switch or POT/NOT limit switch for simultaneous conduction
	Timeout back to origin	ER.601	Fault alarm	Origin return The origin was not found within the H05_35 time limit	When using the origin return function, the distance from the origin is far away, and the origin is not found within the specified time	Increase the H05_33/ H05_34 origin search speed to find the origin in the specified time
The external origin switch or deceleration point has no signal, so the origin can not be found					Check whether the external origin switch or deceleration point switch signal is normal	
When Z phase is used to return to zero, a limit is encountered, resulting in a logical conflict that keeps finding the origin					Check whether the POT/NOT position of the limit switch is reasonable and change the installation position of the limit switch	
Flashing 9 times	Encoder error	ER.A3 3	Fault alarm	Encoder communication fault	The encoder wire is broken or not contacted well, resulting in the driver not recognizing the encoder signal	Check the encoder connection cables Check the encoder connection port
					The encoder is faulty or damaged	Replace motor encoder
					The encoder line is interfered with externally; Cause the driver to not recognize the encoder signal	The motor drive is properly grounded, and the encoder cable is isolated from the high-current and high-power source
Flashing 10 times	EEPROM parameters wrong	ER.101	Fault alarm	EEPROM Wrong	The system detected very frequent parameter changes written to the EEPROM in a short time	Check the communication mode and modify parameters to avoid repeatedly permanently saving parameters into EEPROM

					Internal parameters are abnormal. Procedure	All factory Settings need to be restored
					he hardware EEPROM chip is damaged	Replace hardware
Flashing 11 times	MCU program exception	ER.105	Fault alarm	The internal program is abnormal. Procedure	Internal watchdog trigger	If the power-off is not resolved, return it to the factory for testing
Flashing 12 times	Other alarm	ER.730	Warning reminder	Encoder battery warning	PFor motors using multi-turn absolute encoders, the external supply battery voltage is below 3.0V Note: This warning message, the fault signal is not output	Replace the encoder battery in time to ensure that the battery voltage is greater than 3.0V, please refer to Chapter 6 for details
		ER.731	Fault alarm	Encoder battery warning	In a motor using a multi-turn absolute encoder, the encoder is powered off, resulting in loss of the number of position turns	Check the encoder battery power cable, Check the encoder battery, Please refer to Chapter 6 for details
		ER.735	Fault alarm	Multiple absolute number of turns overflow	For a motor using a multi-turn absolute encoder, the number of turns counts in the range of positive revolutions greater than 32767 or reversals less than -32768	Avoid turning count out of range Continuous rotation can mask this alarm, Please refer to Chapter 6 for details
		ER.950	Warning reminder	The forward overdrive POT is connected	To remind that the forward over range POT limit signal is on, the forward motion will be restricted;	This warning is automatically lifted when the forward over range POT limit signal is disconnected
		ER.952	Warning reminder	Negative overdrive is NOT connected	The reminder that the negative over range POT limit signal is on will limit the negative movement	This warning is automatically lifted when the negative overreach NOT limit signal is disconnected
		ER.130	Fault alarm	DI terminal function is reassigned	Multiple DI terminals are assigned to the same DI input function, resulting in repeated assignment	The reassignment DI function is associated with an input terminal
		ER.900	Warning reminder	Scram signal in effect	The DI function stops in an emergency. The associated DI connection takes effect	The DI associated with emergency stop is disconnected, and this warning is automatically cleared
					The internal emergency stop of the upper computer takes effect	The internal emergency stop of the upper computer is disconnected, and this warning is automatically lifted
		ER.234	Fault	engine	Rapid motor shaft movement	When powering on, ensure that the

			alarm	ing	was detected during power-on initialization, and there is a hidden danger.	motor shaft is free of external interference, so that it is stationary
		ER.102	Fault alarm	Parameter EEPRM is abnormal	Specifications Unregistered Hardware The EEPROM chip is damaged	Motor drive is not registered, returned to the factory registered hardware EEPROM chip
		ER.104	Fault alarm	Note The EEPRM parameter area is abnormal		

Chapter 8 CANOPEN Bus Driver Instructions

8.1- Product Introduction

8.1.1- Product Features

CANOpen protocol characteristics: openness,

CANOpen is rather prevalent is an open standard, any company can use it to develop products, without paying licensing fees.

Network management: the CANOpen protocol defines the network management functions, such as node since diagnosis, network monitoring, etc., make the network maintenance more convenient.

Object dictionary: CANOpen dictionary use object to describe the function of the equipment and the state, for the communication between equipment, more standardized.

Services: CANOpen defines a series of services Such as NMT (Network Management), TPDO (Time-Triggered Protocol Data Object), RPDO (Real-Time Protocol Data Object), etc., to meet different application requirements.

The PDO (Process Data Object) : PDO is used for fast Data transmission Process in CANOpen objects, can real-time transmission control and status information.

SDO (Service Data Object) : SDO Object dictionary is used to access equipment, the equipment can be read from or write to the state and configuration information.

Urgent message: CANOpen also defines the urgent message, for in the event of a serious failure immediately notify the other equipment in the network.

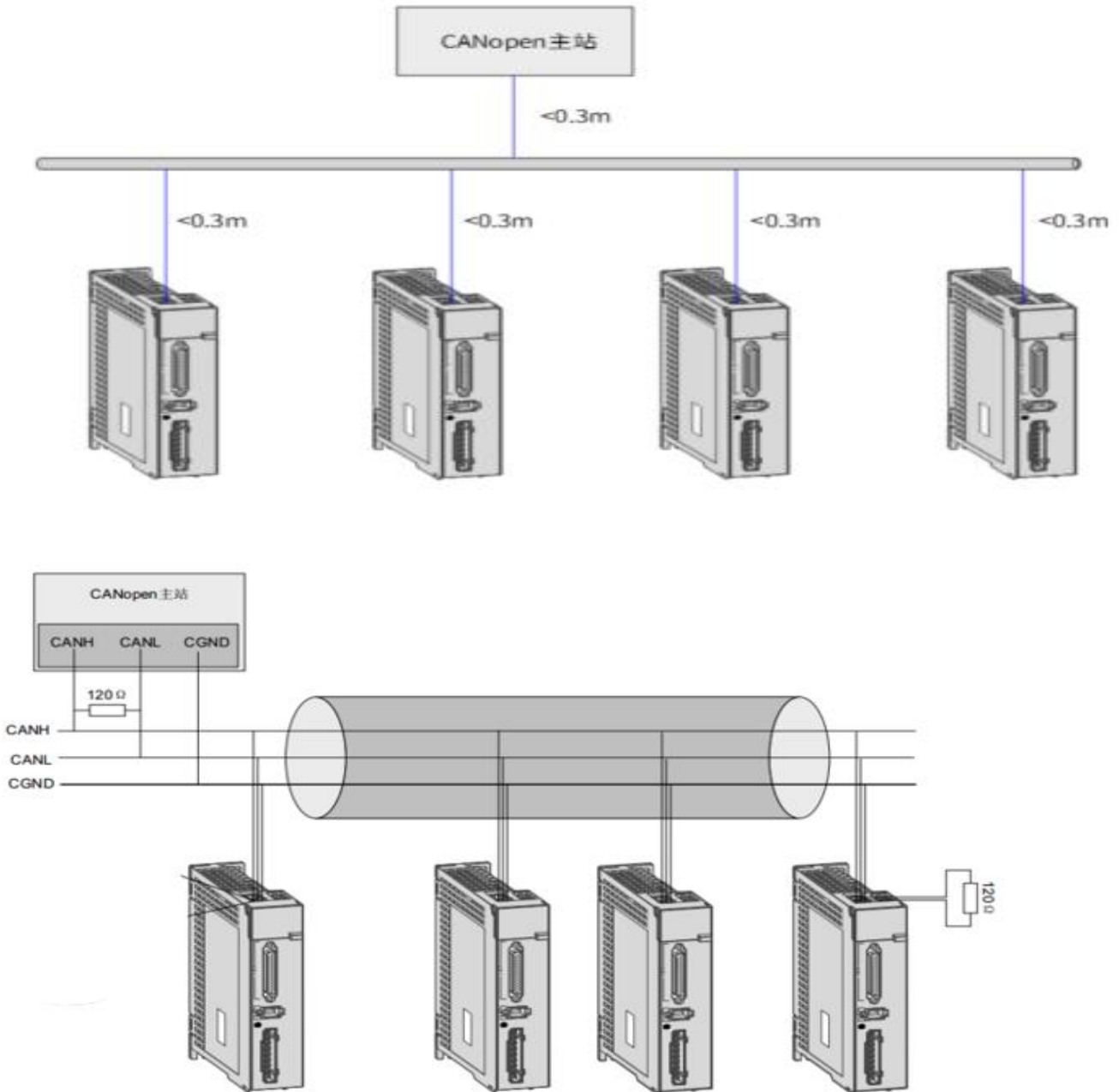
Heartbeat message: heartbeat message is used for monitoring the running state of network equipment, if not received over a period of time a heartbeat message device, network management system will think that this equipment has been offline.



8.1.2- Networking Solution

The transmission distance with CAN bus baud rate, communication cable, and is directly related, the maximum length of bus lines and baud rate relationships shown in the following table: this machine factory default NodeId = 1, rate = 500 KBPS, if want to change, please use the AIStep series RS485 debugging PC change H0C_00 H0C - 08 parameters;

Transmission distance	COMMUNICATION RATE	Node number	Twisted-pair cable diameter
25m	1Mbps	64	0.2mm ²
95m	500kbps	64	0.3mm ²
560m	100kbps	64	0.5mm ²
1100m	50kbps	64	0.75mm ²



8.2- Explanation and Settings of the Object Dictionary

8.2.1 Object dictionary

The object dictionary is the most important part of the device specification. It is an ordered set of parameters and variables, including all the parameters of the device description and the network status of the device. A group of objects that can be accessed in an ordered and predefined way through the network.

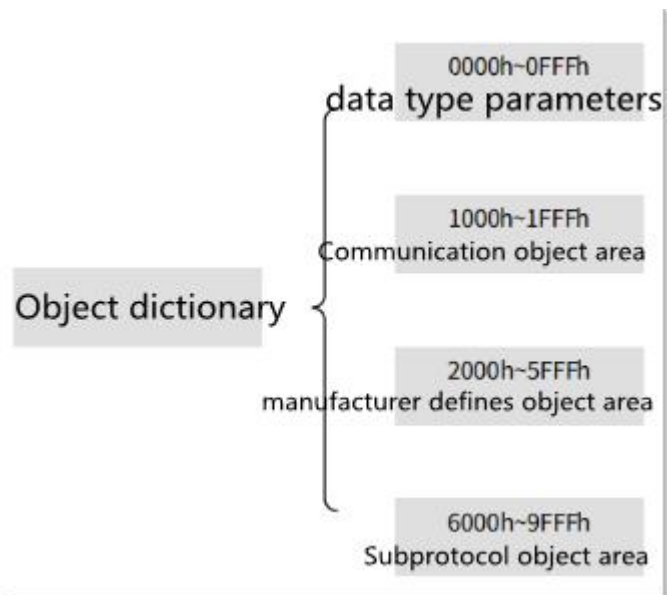
The CANopen protocol adopts an object dictionary with 16-bit indexes and 8-bit sub-indexes. The structure of the object dictionary is shown in the right figure.

0000 h - 0 FFFh users without access to meaning;

1000 h - 1 FFFh communication object parameters according to the definition of CIA301 protocol and device type, etc.;

2000 h - 5 FFFh manufacturer defined object area, we will define the region the AIStep drive all parameters function code object;

6000 h - 9 FFFh CIA402 some commonly used control object according to the definition of CIA402 agreement;



The corresponding relationship between AIMOTOR drive parameter function code and object dictionary is as follows: Object dictionary index = 0x2000 + function code group number; Object dictionary subindex = hexadecimal + 1 offset in function code set

Example of mapping relationship between drive parameter function code and object dictionary:

Parameter function code			Corresponding object dictionary address	
Parameter function code name	Function code group number (hexadecimal)	In-group bias	Index (hexadecimal)	Subindex (hexadecimal)
H02-00	0x02	00	0x2002	0x01
H03-09	0x03	09	0x2003	0x0A
H0B-26	0x0B	26	0x200B	0x1B

8.2.2 CIA301 subprotocol communication parameters

Index	Sub-Index	Name	Description	Type	Nature	False	Range
1000	0	device type	Consistent with CIA rules	Uint32	RO	-	-
1001	0	Error register	No effect, reserved to increase	Uint8	RO	0	-
1003	0	The current number of alarms	1. 00h indicates the current number of recorded alarms, and only 0 can be written to clear the records. 2-0, 01 h ah historical	Uint8	RW	0	0~9
	1-0A	Historical alarm cache entries	alarm cache entry data: bit00 - bit15, standard error code bit16 - bit23 manufacturers custom error code	Uint32	RO	-	0~0xFFFFFFFF
1005	0	Sync Messages COB-ID	Used in the periodic	Uint32	RW	0x80	0~0xFFFFFFFF
1006	0	Synchronous loop period us	synchronization function	Uint32	RW	0	0~0xFFFFFFFF
100A	0	Software version	AIMOTOR_CIA402	str	RO	-	-

100C	0	Node guard time	When used under the node daemon function, if 100C is not 0,	Uint16	RW	0	0~32767
100D	0	Life factor	the node daemon function will be enabled. The guardian timeout = 100C*100D	Uint8	RW	0	0~255
1010	00	Sub index number	Write 0x65766173 (save) to the corresponding sub-index to save the current cia301 or cia402 object value to the device's eeprom storage. Power on again to retrieve the eeprom value as the object value	Uint8	RO	4	-
	01	Save all parameters					
	02	Save the cia301 object					
	03	Save the cia402 object		Uint32	RW	0	0~0xFFFFFFFF
1011	00	Sub index number	Writing 0x64616F6C (load) to the corresponding sub-index will restore the current cia301 or cia402 object value to the factory default	Uint8	RO	4	-
	01	Restore all objects					
	02	Restore the cia301 object					
	03	Restore the cia402 object		Uint32	RW	0	0~0xFFFFFFFF
1014	0	Emergency message COB-ID	Emergency packet identifier	Uint32	RO	0x80+ID	
1016	0	Sub index number	Sets the consumer heartbeat time bit0 - bit15, monitor the heartbeat timeout ms bit16 - bit23 monitoring node id	Uint8	RO	1	-
	1	Consumer heartbeat time		Uint32	RW	0	0~0xFFFFFFFF
1017	0	Producer heartbeat time	Set the producer heartbeat time (the interval between heartbeats generated by this machine) in ms	Uint32	RW	0	0~0xFFFFFFFF
1200	0	Sub index number	SDO Communication COB-ID	Uint8	RO	2	-
	1	Client to server COB-ID		Uint32	RO	0x600+ID	-
	2	Server to client COB-ID		Uint32	RO	0x580+ID	-
Index	Sub-Index	Name	Description	Type	Nature	False	Range
1400	0	Sub index number	Set RPDO1 communication parameters, transmission type 000-240, for the synchronous transmission mode. The transmission type is set to 254-255, indicating asynchronous transmission mode. Synchronous transmission is triggered and takes effect by synchronous frames. Changes in asynchronous transmission data	Uint8	RO	6	-
	1	COB-ID of RPDO1		Uint32	RO	0x200+ID	-
	2	Transmission type of RPDO1		Uint8	RW	1	0~255

			take effect immediately				
1401	0	Sub index number		UInt8	RO	6	-
	1	COB-ID of RPDO2	Setup RPDO2 communication interface	UInt32	RO	0x300+ID	0~0xFFFFFFFF
	2	Transmission type of RPDO2		UInt8	RW	1	0~255
1402	0	Sub index number		UInt8	RO	6	-
	1	COB-ID of RPDO3	Setup RPDO3 communication interface	UInt32	RO	0x400+ID	-
	2	Transmission type of RPDO3		UInt8	RW	1	0~255
1403	0	Sub index number		UInt8	RO	6	-
	1	COB-ID of RPDO4	Setup RPDO4 communication interface	UInt32	RO	0x500+ID	-
	2	Transmission type of RPDO4		UInt8	RW	1	0~255
1600	0	Number of RPDO1 mappings	Setup RPDO Group 1 Mapping object;	UInt8	RO	8	-
	1	RPDO1 Mapping object 1	Factory default mapping is as follows:	UInt32	RW	0x60400010	0~0xFFFFFFFF
	2	RPDO1 Mapping object 2	Sub index 1 maps 6040 control words;	UInt32	RW	0x60600008	0~0xFFFFFFFF
	3	RPDO1 Mapping object 3	Sub index 2 maps 6060 control mode;	UInt32	RW	0x607A0020	0~0xFFFFFFFF
	4-8	RPDO1 Mapping object 4~8	Sub index 3 maps 607A target location; Sub indexes 4-8 are unmapped and can be allocated on demand.	UInt32	RW	0x00000000	0~0xFFFFFFFF
1601	0	Number of RPDO2 mappings	Set an RPDO group 2 mapping object.	UInt8	RO	8	-
	1	RPDO2 Mapping object 1	The factory default mapping is as follows:	UInt32	RW	60FF0020	0~0xFFFFFFFF
	2	RPDO2 Mapping object 2	Sub index 1 maps 60FF target speed;	UInt32	RW	60710010	0~0xFFFFFFFF
	3-8	RPDO2 Mapping object 3~8	Sub index 2 maps 6071 target torque; Sub indexes 3-8 are unmapped and can be allocated on demand.	UInt32	RW	0x00000000	0~0xFFFFFFFF
1602	00	Number of RPDO3 mappings	Set the RPDO group 3 mapping object.	UInt8	RO	8	-
	01-08	RXPDO3 Maps objects 1 to 8	Sub indexes 1-8 are unmapped and can be allocated on demand.	UInt32	RW	0x00000000	0~0xFFFFFFFF
1603	0	Number of RPDO4 mappings	Set an RPDO group4 mapping object.	UInt8	RO	8	-

	01-08	RXPDO4 Maps objects 1 to 8	Sub indexes 1-8 are unmapped and can be allocated on demand.	Uint32	RW	0x00000000	0~0xFFFFFFFF
Index	Sub-Index	Name	Description	Type	Nature	False	Range
1800	0	Sub index number	Set TPDO1 communication parameters, transmission type 000-240, for the synchronous transmission mode. The transmission type is set to 254-255, indicating asynchronous transmission mode. Synchronous transmission is triggered by synchronous frames for upload. When the asynchronous transmission data changes or the event timer time is up, it is uploaded immediately	Uint8	RO	6	-
	1	COB-ID of TPDO1		Uint32	RO	0x180+ID	-
	2	Transport type of TPDO1		Uint8	RW	1	0~255
	5	The event timer of TPDO1		Uint16	RW	0	0-65535
1801	0	Sub index number	Set TPDO2 communication parameters	Uint8	RO	6	-
	1	COB-ID of TPDO2		Uint32	RO	0x280+ID	-
	2	Transport type of TPDO2		Uint8	RW	1	0~255
	5	The event timer of TPDO2		Uint16	RW	0	0-65535
1802	0	Sub index number	Set TPDO3 communication parameters	Uint8	RO	6	-
	1	COB-ID of TPDO3		Uint32	RO	0x380+ID	-
	2	Transport type of TPDO3		Uint8	RW	1	0~255
	5	The event timer of TPDO3		Uint16	RW	0	0-65535
1803	0	Sub index number	Set TPDO4 communication parameters	Uint8	RO	6	-
	1	COB-ID of TPDO4		Uint32	RO	0x480+ID	-
	2	Transport type of TPDO4		Uint8	RW	1	0~255
	5	The event timer of TPDO4		Uint16	RW	0	0-65535
1A00	0	Number of TPDO1 mappings	Set the TPDO group 1 mapping object.	Uint8	RO	8	-
	1	TPDO1 Mapping object 1	The factory default mapping is as follows:	Uint32	RW	0x60410010	0~0xFFFFFFFF

	2	TPDO1 Mapping object 2	Sub index 1 maps 6041 status words;	Uint32	RW	0x60610008	0~0xFFFFFFFF
	3	TPDO1 Mapping object 3	Sub index 2 maps 6061 display mode;	Uint32	RW	0x60640020	0~0xFFFFFFFF
	4-8	TPDO1 Mapping object 4~8	Sub index 3 maps 6064 actual location; Sub indexes 4-8 are unmapped and can be allocated on demand.	Uint32	RW	0x00000000	0~0xFFFFFFFF
1A01	0	Number of TPDO2 mappings	Set the mapping object of TPDO group 2.	Uint8	RO	8	-
	1	TPDO2 Mapping object 1	The factory default mapping is as follows:	Uint32	RW	606C0020	0~0xFFFFFFFF
	2	TPDO2 Mapping object 2	Sub index 1 maps 606C actual speed;	Uint32	RW	60770010	0~0xFFFFFFFF
	3-8	TPDO2 Mapping object 3~8	Sub index 2 maps 6077 actual torque; Sub indexes 3-8 are unmapped and can be allocated on demand.	Uint32	RW	0x00000000	0~0xFFFFFFFF
1A02	00	Number of RPDO3 mappings	Set the mapping object of TPDO group 3.	Uint8	RO	8	-
	01-08	RXPDO3 Maps objects 1 to 8	Sub indexes 1-8 are unmapped and can be allocated on demand.	Uint32	RW	0x00000000	0~0xFFFFFFFF
1A03	0	Number of RPDO4 mappings	Set the mapping object of TPDO group 4.	Uint8	RO	8	-
	01-08	RXPDO4 Maps objects 1 to 8	Sub indexes 1-8 are unmapped and can be allocated on demand.	Uint32	RW	0x00000000	0~0xFFFFFFFF

8.2.3 Manufacturer custom parameters

The 2000h-5FFFh manufacturer defines the object area. Our company has defined all the parameter function code objects of the AIMOTOR driver in this area. Each parameter has a corresponding object dictionary index and index, AIMOTOR drive parameter function code is as follows: the corresponding relationship between object dictionary object dictionary index = 0 x2000 + function block number; Object dictionary sub-index = hexadecimal offset within the function code group + 1;

Example: Mapping relationship between drive parameter function code and object dictionary

Parameter function code			Corresponding object dictionary address	
Parameter function code name	Function code group number (hexadecimal)	In-group bias	Index (hexadecimal)	Sub index (hexadecimal)
H02-00	0x02	00	0x2002	0x01
H03-09	0x03	09	0x2003	0x0A
H0B-26	0x0B	26	0x200B	0x1B
H12-20	0x12	20	0x2012	0x15

Due to the excessive parameter function code, it is not listed in the CANOPEN manual, please refer to the same series of standard pulse product manual parameter description.

- ◆ When using SDO communication to read and write the manufacturer's custom parameter object, please pay attention to the attribute of the parameter;
 - 1.If the modify mode property is < Enable disconnect > parameter, you need to disconnect the motor enable and then write the parameter object value;
 - 2.If the factory value attribute is < registered value > parameter, the user can only read but not write;
- ◆H00 group, H01 group, H0B group parameters, users can only read but not write;

◆SDO communication error abort code

Abort code	Tag	Description
0x00000000	OD_SUCCESSFUL	SDO communication successful
0x06010001	OD_READ_NOT_ALLOWED	Trying to read only write objects
0x06010002	OD_WRITE_NOT_ALLOWED	Attempting to write to a read-only object
0x06020000	OD_NO_SUCH_OBJECT	Object does not exist in the dictionary
0x06040041	OD_NOT_MAPPABLE	Objects cannot be mapped in PDO
0x06060000	OD_ACCES_FAILED	Access failed due to hardware error
0x06070010	OD_LENGTH_DATA_INVALID	Data type and length of the service parameter do not match
0x06090011	OD_NO_SUCH_SUBINDEX	Word index does not exist
0x06090030	OD_VALUE_RANGE_EXCEEDED	Out of parameter value range (write access only)
0x06090031	OD_VALUE_TOO_LOW	Parameter value is too high
0x06090032	OD_VALUE_TOO_HIGH	Parameter value is too low
0x05030000	SDOABT_TOGGLE_NOT_ALTERNED	Switching bits do not alternate
0x05040000	SDOABT_TIMED_OUT	SDO protocol communication timed out
0x05040001	SDOABT_CS_NOT_VALID	Command specifier is invalid
0x05040002	SDOABT_INVALID_BLOCK_SIZE	Invalid block size (block mode only)
0x05040005	SDOABT_OUT_OF_MEMORY	Memory Overflow
0x08000000	SDOABT_GENERAL_ERROR	SDO message size is incorrect
0x08000021	SDOABT_LOCAL_CTRL_ERROR	Due to local control, data cannot be transferred or stored in the application

8.2.4 Cia402 shaft control parameter group

Index	Sub-Index	Name	Description	Type	Nature	False	Range
603F	0	Fault Code	The fault codes currently generated by the driver are detailed in the description of Section "6.0 Fault Code Information Table".	Uint16	RO	0	0~65535
6040	0	Control Word	For details, see section "2.4 6040 Control Words".	Uint16	RW	0	0~65535
6041	0	Status Word	For details, see section "2.5 6041 Status Word".	Uint16	RO	-	0~65535
605A	0	Quick stop code	Value	Source of deceleration	After reducing to 0	1	0~65535
			0	Free	Disable		

			shutdown					
			1	0x6084	Disable			
			2	0x6085	Disable			
			3	0x6084	Maintain the lock shaft			
			4	0x6085	Maintain the lock shaft			
6060	0	Run mode setting	0: No action 1: PP (contour position mode) 3: PV (contour speed mode) 4: PT (contour torque mode) 6: HM search pattern (the source) 8: CSP (position loop synchronous mode) 9: CSV (loop synchronous speed mode) 10: CST (loop synchronous torque mode)		Int8	RW	1	0~10
6061	0	Run mode state	Query the status of 6060H; 0;No action 1: PP (position) 3: PV (speed mode) 4: PT (contour torque mode) 6: HM search pattern (the source) 8: CSP (position loop synchronous mode) 9: CSV (loop synchronous speed mode) 10: CST (loop synchronous torque mode)		Int8	RO	-	0~10
60FC	0	Internal instruction position	Position instructions generated within the drive; Unit: Enc		Int32	RO	-	-2147483648~2147483647
6062	0	Internal instruction position	Position instructions generated within the drive; Unit: Pul		Int32	RO	-	-2147483648~2147483647
6063	0	Actual position	Actual motor location, Unit: Enc		Int32	RO	-	-2147483648~2147483647
6064	0	Actual position	Actual motor location, Unit: Pul		Int32	RO	-	-2147483648~2147483647
606B	0	Internal command speed	Speed instructions generated within the driver; Unit: Pul/s		Int32	RO	-	-2147483648~2147483647
606C	0	Actual speed	Actual motor speed, Unit: Pul/s		Int32	RO	-	-2147483648~2147483647
6071	0	Target torque	Set PT(Contour torque mode) running torque; (1000 indicates rated torque)		Int16	RW	0	-3000~3000

			Unit: 0.1%				
6074	0	Internal instruction torque	Torque instructions generated inside the drive; Unit: 0.1%	Int16	RO	-	-3000~3000
6077	0	Actual torque	Actual torque of the motor, Unit: 0.1%	Int16	RO	-	-3000~3000
6078	0	Actual current	Actual current of the motor, Unit: 0.01A	Int16	RO	-	-32767~32767
Index	Sub-Index	Name	Description	Type	Nature	False	Range
607A	0	Target location	Set PP(contour position mode) running position; Unit: Pul	Int32	RW	0	-2147483648~2147483647
607C	0	Origin Offset	Set HM(back to origin mode) origin offset; Unit: Pul	Int32	RW	0	-2147483648~2147483647
607D	0	Number of sub-indexes	-	UInt8	RO	2	0~255
	1	Negative limit of the software	Software Settings take effect CANOPEN pattern software limit, limit function also need to set H0A - 40 parameters	Int32	RW	-2147483648	-2147483648~2147483647
	2	Software forward limit		Int32	RW	2147483647	-2147483648~2147483647
607E	0	Command polarity	Set the instruction direction logic in PP/PV/PT contour mode;	UInt8	RW	0	0~255
607F	0	Maximum profile velocity	Set the maximum speed limit for PT(contour torque mode) operation; Unit: Pul/s	UInt32	RW	0	-2147483648~2147483647
6081	0	Profile velocity	Set the maximum speed of PP(contour position mode); Unit: Pul/s	Int32	RW	0	-2147483648~2147483647
6083	0	Contour acceleration	Set the acceleration of PP(profile position mode) and PV(profile velocity mode); Unit: Pul/s^2	Int32	RW	100000	-2147483648~2147483647
6084	0	Contour deceleration	Set the speed reduction of PP(contour position mode) and PV(contour velocity mode); Unit: Pul/s^2	Int32	RW	100000	-2147483648~2147483647
6085	0	Quick stop and deceleration	Set quick stop and speed reduction in PP/PV/PT profile mode; Unit: Pul/s^2	Int32	RW	500000	-2147483648~2147483647
6098	0	Return to origin	Current can be set way back to the	Int8	RW	35	0~38

		mode	origin of value is: 01/02/04/06/17/18/24/28/33/34/35/37/38; For details, please refer to the description in Chapter "2.8 Return to Origin Mode Method".				
6099	0	Sub index number-		Uint8	RO	2	0~255
	1	Origin velocity 1	HM(Back to origin mode) Approach to the origin speed: high speed to find the origin; Unit: Pul/s	Int32	RW	10000	-2147483648~2147483647
	2	Origin velocity 2	HM(back to origin mode) to determine the origin speed: low speed to find the origin; Unit: Pul/s	Int32	RW	1000	-2147483648~2147483647
609A	0	Return to origin acceleration and deceleration	The rate of addition and subtraction of HM(return to origin mode) back to origin; Unit: Pul/s^2	Int32	RW	10000	-2147483648~2147483647
60FD	0	Digital signal input status	DI1 - DI7 input port state feedback 2 hexadecimal bit15 - bit21 said	Uint32	RO	-	0~127
60FE	0	Sub index number	-	Uint8	RO	2	0~255
	1	Digital signal output	For details, please refer to the description in Section '2.1060FEh'	Uint32	RW	-	-2147483648~2147483647
	2	Forced masking of digital quantity signals		Uint32	RW	0	-2147483648~2147483647
60FF	0	target speed	Set the PV(contour speed mode) running speed; Unit: Pul/s	Int32	RW	0	-2147483648~2147483647
6502	0	operation mode supported by the driver	Used to query the CIA402 motion control modes supported by the product, 0x03AD indicates support for PP,PV,PT,HM,CSP,CSV, and CST operation modes	Uint32	RO	0x03AD	0~0xFFFFFFFF

8.2.5 Each control mode and associated object dictionary

Control Mode	Index + sub-index	Name	Data type	read-write access permission	Unit	Required or not
Synchronous Position Mode (CSP)	6060	Control mode setting =8	Int8	RW	-	√
	6040	Control word	UInt16	RW	-	√
	607A	Target position	Int32	RW	Pul	√
	6061	Control mode feedback	Int8	RO	-	
	6041	Status word	UInt16	RO	-	√
	6064	Real position	Int32	RO	Pul	√
	606C	Real speed	Int32	RO	Pul/s	
	6077	Read torque	Int16	RO	0.1%	
Profile Position Mode (PP)	6060	Control mode setting =1	Int8	RW	-	√
	6040	Control word	UInt16	RW	-	√
	607A	Target position	Int32	RW	Pul	√
	6081	Maximum speed	Int32	RW	Pul/s	√
	6083	Acceleration	DINT	RW	Pul/s ²	√
	6084	Deceleration	DINT	RW	Pul/s ²	√
	6061	Control mode feedback	Int8	RO	-	
	6041	Status word	UInt16	RO	-	√
	6064	Real position	Int32	RO	Pul	
	606C	Real speed	Int32	RO	Pul/s	
Profile Velocity Mode (PV)	6060	Control mode setting =3	Int8	RW	-	√
	6040	Control word	UInt16	RW	-	√
	60FF	Target speed	DINT	RW	Pul/s	√
	6083	Acceleration	DINT	RW	Pul/s ²	(PV)√
	6084	Deceleration	DINT	RW	Pul/s ²	(PV)√
	6061	Control mode feedback	Int8	RO	-	
	6041	Status word	UInt16	RO	-	√
	6064	Real position	Int32	RO	Pul	
	606C	Real speed	Int32	RO	Pul/s	√

	6077	Read torque	Int16	RO	0.1%	
Contour torque mode (PT)	6060	Control mode setting =4	Int8	RW	-	√
	6040	Control word	UInt16	RW	-	√
	6071	Target torque	Int16	RW	0.1%	√
	607F	Maximum speed limit	UInt32	RW	Pul/s	√
	6061	Control mode feedback	Int8	RO	-	
	6041	Status word	UInt16	RO	-	√
	6064	Real position	Int32	RO	Pul	
	606C	Real speed	Int32	RO	Pul/s	
	6077	Read torque	Int16	RO	0.1%	√
	Control Mode	Index + sub index	Name	Data type	read-write access permission	Unit
Back to origin mode (HM)	6060	Control mode setting =3	Int8	RW	-	√
	6040	Control word	UInt16	RW	-	√
	6098	Return-to-zero method	Int8	RW	-	√
	6099:01	Search origin high speed 1	Int32	RW	Pul/s	√
	6099:02	Find origin low speed 2	Int32	RW	Pul/s	√
	609A	Origin acceleration	Int32	RW	Pul/s ²	√
	607C	Origin Offset	Int32	RW	Pul	
	6061	Control mode feedback	Int8	RO	-	
	6041	Status word	UInt16	RO	-	√
	6064	Real position	Int32	RO	Pul	
	606C	Real speed	Int32	RO	Pul/s	
6077	Read torque	Int16	RO	0.1%		
Other auxiliary associated parameters	605A	Quick shutdown code	UInt16	RW	-	
	6085	Sudden stop to slow down	UInt32	RW	Pul/s ²	
	607E	Instruction polarity	UInt8	RW	-	
	607D-01	Negative limit of the software	Int32	RW	-	
	607D-02	Software forward limit	Int32	RW	-	

60FD	Digital input status	Uint32	RO	-	
60FE-01	Digital output status	Uint32	RW	-	
60FE-02	Digital output mask	Uint32	RW	-	

No matter which control mode is used to control the slave station, it is inseparable from the read and write operation of the two object dictionaries of 6040H(control word) and 6041H(status word). The master and slave station use these two object dictionaries as transmission media to realize command delivery and status monitoring. The following sections focus on the definitions and meanings of the individual bits of the two object dictionaries.

8.2.6 Cia402 object dictionary position, speed, acceleration and deceleration unit calculation

Instruction pulse per second Pul/s; The unit of acceleration and deceleration is Pul/s²;

If I want to set the speed per minute, I should first convert minutes into seconds, and then multiply the number of pulses of the motor 1 turn;

AIMotor series drive factory default 1000 pulse motor rotation 1 turn; If you change the pulse number of 1 turn, please use debugging software or SDO communication mode to set H05-07 electronic gear molecule and H05-09 electronic gear denominator. For example, if you set 2000 pulse motor to rotate 1 turn, then set H05-09 parameter value 2000.

Unit conversion schematic table

Number of pulses in 1 turn	user understands the unit				Convert to units that comply with CIA402 protocol			
	Target position r	Target speed r/min	Acceleration to target acceleration time	Deceleration time to 0	Target position Pul	Target speed Pul/s	Acceleration Pul/s ²	Deceleration Pul/s ²
H05-07molecule H05-09 denominator Factory default 1000	Run to 100.5 RPM	2000 rpm per minute	2 seconds to 2000 RPM	3 seconds to slow down to a full stop	100.5*1000 =100500	2000/60*1000 =33333	33333/2 =16666	33333/3 =11111

For example, if the control mode is PP contour position mode, as shown in the table above, the position value, speed value and acceleration and deceleration value in CIA402 are calculated according to the number of pulses in 1 turn and the target position, target speed and acceleration and deceleration time expected by the user, and then the specific steps of absolute positioning operation of the motor are controlled by SDO communication.

Step1: Use the host computer to set the driver control mode parameter H02-00 to 8 (CanOpen control mode);

Step2: Use SDO communication to write the 6060h motion mode in the CIA402 object dictionary to 1 (contour position mode);

Step3: Use SDO communication to write the contour-position pattern related object in the CIA402 object dictionary - target position 607Ah into 100500; Target speed 6081h write 33333;

Acceleration 6083h write 16666; Speed down 6084h write 11111;

Step4: Use SDO communication to write the 6040h control words in the CIA402 object dictionary into 00h→06h→07h→0Fh→1F motor to start and run, and the motor will stop automatically when it runs to 100500 position.

8.2.7 6040h Bit definition of the control word

Bit	0	1	2	3	4-6	7	8	9-15
Function	Enter servo and stand by	Enter the main circuit	Execute quick stop	Execute the enable run	Operation mode correlation	Fault resetting	Reserved	NA

Supplementary explanations for other bits:

Bit 2: The quick stop trigger logic is valid at 0. Be sure to distinguish it from other trigger logics.

Bit4: in pp and hm trigger logic is rising along the effective mode, pp run to trigger the updated position, hm to trigger the origin; Position

Bit7: The trigger logic for the slave fault reset is that the rising edge is valid.

Bit8: from the machine run suspended trigger logic is rising along the effective;

◆ It is meaningless to assign a value to each bit of a control word separately; it must be combined with other bits to form a certain control instruction (refer to 2.6 Control Instructions and State Transitions).

◆ bit0 - bit3 and bit7 have the same meaning in each servo mode. Commands must be sent in sequence before the servo driver can be introduced into the expected state according to the CiA402 state machine switching process. Each command corresponds to a unique and determined state.

◆ bit4 to bit6 are related to each servo mode (please check the control instruction status transitions under different modes).

8.2.8 6041 Bit definition of the status word

Bit	0	1	2	3	4	5	6	7/8	9
Function	be ready	Waiting enable	Enabled to run	Go Wrong	Powered on	Quickly stop activation	Not Runnable	NA	Remote control
	10	11	12-13	14	15				
	target reached	limit	Related to the operation mode	NA	origin has been found.				

Supplementary note for other bits: When the drive is powered on, bit 4 will be set.

◆ Each bit of the status word is meaningless to read alone. It must be composed together with other bits to feedback the current status of the servo (refer to 2.6 Control Instructions and Status Transitions).

◆ bit0 to bit9 have the same meaning in each servo mode. After the control word 6040h sends commands in sequence, the servo feeds back a uniquely determined state.

◆ bit12 to bit13 are related to each servo mode (please refer to the control instructions under different modes).

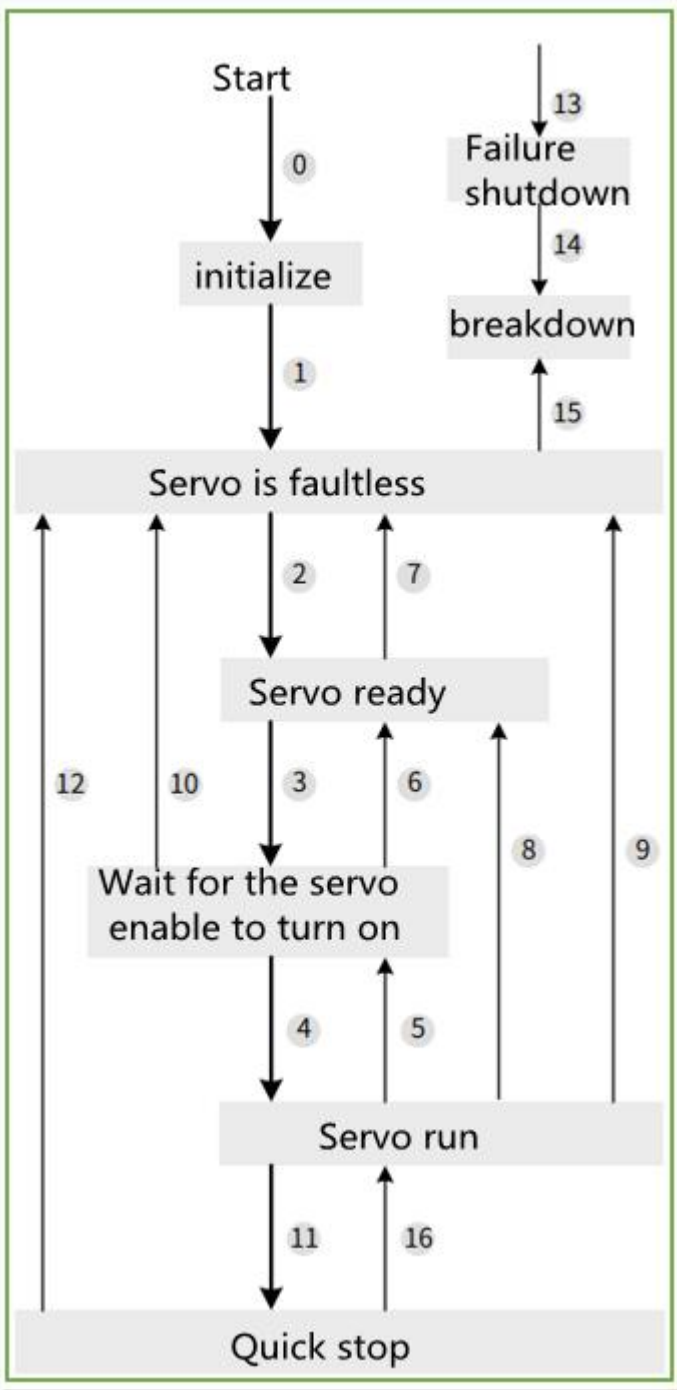
◆ bit10 and bit15 have the same meaning in each servo mode and provide feedback on the state of the servo after it executes a certain servo mode.

8.2.9 Control Instructions and Status Transitions

CIA402 status switch		Control word 6040	Control word 6041
Tab	Process migration	Control command	Feedback bit0-bit9
0	Power-on → Initialization	Internal automatic transition, no command required	0x0000
1	Initialization → Servo no fault	1. If a fault is detected after initialization, go to 13. 2. If there is no fault at the end of	0x0250

		initialization, the transition will be automatic without command	
2	Servo no fault → Servo ready	0x06	0x0231
3	Servo ready → Wait to turn on the servo enable	0x07	0x0233
4	Wait for servo Enable → Servo run	0x0F	0x0237
5	Servo Run → Wait for the servo enable to turn on	0x07	0x0233
6	Wait for servo Enable → Servo ready	0x06	0x0231
7	Servo ready → Servo no fault	0x00	0x0250
8	Servo Run → Servo ready	0x06	0x0231
9	Servo run → No fault in the servo	0x00	0x0250
10	Wait to turn on the servo enable → No fault of the servo	0x00	0x0250
11	Servo operation → Quick shutdown	0x02	0x0217
12	Quick stop → Servo fault free	Automatic transition after quick shutdown, no command required	0x0250
13	→Fault shutdown	In addition to the fault state, in other states, once the driver detects an alarm, it automatically switches to the fault shutdown state without command	0x021F
14	Failure stop → Failure	Automatic transition after the shutdown is complete, no command required	0x0218
15	Fault → Servo no fault	0x80	0x0250
16	Quick stop → Servo run	When the quick stop is complete, send the command 0x0F	0x0237

CIA402 state transition diagram



Users must control the CANOPEN motor in accordance with the state transition table. Control word 6040 h every single assignment a bit pointless, must constitute a control instruction together with the other bits. Status word bit0 ~ 6041 h of combination and bit11 bit15 in servo any operation mode the same meaning. The status word 6041 h bit10, bit12, bit13 in servo different operation mode is not the same meaning.

8.2.10 6040h Control command Step

Note: To use CanOpen control, you need to use our company's debugging AIMOTOR software to set the H02-00 control mode parameter to 8 (CanOpen control).

Once set to CanOpen control must comply with CanOpen control requirements, its corresponding object dictionary takes effect; Other control modes are invalid;

Sequence control step		0	1	2	3	4	5	6	7
Mode	Control word	preparation work	initial	Ready	Wait for enable	Enable	Startup run	conjugation	Stop
CSP Cyclic synchronization position mode	6040	Establish communication, assign PDO mapping, and activate master loop synchronization	00h	06h	07h	0Fh	Master station send position send command	Master station control	Command is sent from the stop position of the master station
PP profile Position mode	6040	Establish communication status Set motion parameters related to PP mode	00h	06h	07h	0Fh	The location is not updated immediately0Fh→1Fh	1: Automatically stop when the position is reached; 2: send stop command;	
						2Fh	Absolute positioning is updated immediately2Fh→3Fh		
						4Fh	Relative positioning is not updated immediately4Fh→5Fh		
						6Fh	The relative positioning is updated immediately6Fh→7Fh		
PV profile speed mode	6040	Establish the communication status and set the motion parameters related to the PV mode	00h	06h	07h	0Fh	Start running after enabling	Just change the speed	Forcible stop write 00h/02h or 06h/07h
PT profile torque mode	6040	Establish communication status and set motion parameters related to PT mode	00h	06h	07h	0Fh	Start running after enabling	Just change the torque	Forcible stop write 00h/02h or 06h/07h
HM back to origin mode	6040	Establish the communication state and set the motion parameter state related to HM mode	00h	06h	07h	0Fh	0Fh→1Fh Start	-	1: Automatically stops when the origin is found. 2: forcibly stops writing 00h/02h or 06h/07h

◆CSP cyclic synchronous position mode mode, the position is delivered by the main control unit according to the agreed synchronization cycle, the motor performs displacement according to the delivered position point and synchronous frame, and the motor running contour curve (such as position, speed, etc.) is planned and calculated by the main control unit in advance;

◆PP/PV/PT contour mode, the main control unit can use the SDO communication mode to set the necessary parameters of the mode, control the motor operation according to the mode control command steps, and the

motor operation contour curve is planned and calculated by the motor according to the set parameter values (such as acceleration and deceleration speed, running speed, etc.).

◆ In CSV synchronous speed mode, the main control unit independently plots the speed curve, and there is no acceleration or deceleration hysteresis at the motor end.

Note 1: The operation process is not normal stop mode

Switching mode: Write the control character 6040h to 0h, 6h or 7h. The control state of CIA402 will no longer be in operation, and the motor will be de-enabled and stop freely according to inertia.

Quick stop way: the control word write 2 h, 6040 h motor will be in accordance with the 605 ah object index after choose the way of deceleration and stop state; Deceleration suspend mode: write control word 6040 h 10 fh, motor will be in accordance with the 605 ah object index after choose the way of deceleration and stop state; Quick outage and suspended shall not apply and the CSP, HM model, CSP model plan trajectory is controlled by the host. In HM mode, the control character 6040h writes from 1F to 0F and stops.

8.2.11 6098h Origin search mode

Set value	Initial Orientation	Deceleration point	Origin	Process steps
24	Forward	Origin Switch	Origin Switch	Motor first searches the origin switch at high speed in the set direction. When it encounters the origin switch signal rising edge, it starts to run out at low speed.
28	Reverse	Origin Switch	Origin Switch	When it breaks away from the origin switch signal falling along the motor, it reverses and continues to search the origin switch signal rising edge at low speed.
34	Forward	Z Signal	Motor Z Signal	Motor first searches the Z phase at a high speed in the set direction. When it encounters the rising edge of the motor Z, it starts to reverse at a low speed.
33	Reverse	Z Signal	Motor Z Signal	When it encounters the rising edge signal on the other side of the Z phase, it stops immediately and returns to zero successfully
4	Forward	Origin Switch	Motor Z Signal	Motor first searches the origin switch at a high speed in the set direction. When it encounters the origin switch signal rising edge, it begins to reverse at a low speed and runs away from the origin switch signal falling edge.
6	Reverse	Origin Switch	Motor Z Signal	When it encounters the origin switch signal rising edge, it runs to the Z signal and stops immediately, returning to zero successfully.
18	Forward	Forward overpass	Forward overpass	Motor first searches the origin switch at a high speed in the set direction. When it encounters the rising edge of the forward over range switch signal, it begins to reverse at a low speed.
17	Reverse	Reverse overpass	Reverse overpass	When it breaks away from the falling edge of the forward over range switch signal, the motor reverses again to search the rising edge of the forward over range switch signal at a low speed. When it encounters the rising edge of the forward over range switch signal, it stops immediately and returns to zero.
2	Forward	Forward overpass	Z Signal	Motor first searches for the forward over range switch at a high speed in the set direction. When it encounters the rising edge of the forward over range switch signal, it begins to slow down and reverse the operation.
1	Reverse	Reverse overpass	Z Signal	When it breaks away from the falling edge of the forward over range switch signal, it continues to run until the motor Z is stopped immediately and the return to zero is successful.
37	Forward	Mechanical	Mechanical	Motor first searches the mechanical limit position at a low speed with the set

		limit potential	limit potential	direction and torque (the torque set by H05_58). When the mechanical limit position reaches the locking and the torque reaches the upper limit of the zero torque limit and maintains the default time, the motor stops immediately and the return to zero is successful.
38	Reverse	Mechanical limit potential	Mechanical limit potential	
35	-	-	-	Set the current position as the origin

Note:

- ◆ The external switch signal useful in the origin search mode, please associate the selected corresponding DI function option, otherwise the alarm ER.601 return to zero failure will occur;
- ◆ Change the origin search mode, please modify the object parameters of the origin mode 6098h when the motor is disabled;
- ◆ In the selected mode, if the deceleration point is the origin switch, and the positive and negative over range switch DI is associated, the motor encounters the over range switch motor in the search path and automatically reverses to continue the search;
- ◆ In the process steps, the sub-index 1 object of the high-speed search speed 6099 index is set, and the low-speed search speed is set by the sub-index 2 of the 6099 index;
- ◆ If the origin is not found within the H05_35 parameter time, the alarm ER.601 return to zero timeout will occur;
- ◆ The DO function (OutFun16-HomeAttain) takes effect when the origin resets to zero, but takes effect when the OFF function is enabled.

8.2.12 607E command polarity

Bit	0	1	2	3	4	5	6	7
Funtion	NA	NA	NA	NA	NA	Torque command polarity	Speed command polarity	Speed command polarity

Bit7=1, indicating that in the PP contour position mode, the position instruction is 607Ah×(-1), and the motor is turned in reverse.

Bit6=1, indicating that in PV profile speed mode, the speed instruction is 60FFh×(-1), and the motor is turned in reverse.

Bit5=1, indicating that in PT contour torque mode, torque instruction 6071h×(-1), the motor turns in reverse.

NA: no definition

8.2.13 60FDh Digital Input Status Monitoring

Bit	0-15	16	17	18	19	20	21	22	23-31
Physical input terminal monitoring	Retain	DI1	DI2	DI3	DI4	DI5	DI6	DI7	Retain

8.2.14 Monitoring and enforcing 60FEh digital output status

Bit	0	1-15	16	17	18	19	20	21-31
Physical output terminal	Brake	Retain	DO1	DO2	DO3	DO4	DO5	Retain
60FE-01h Status Monitoring & bit mandatory control	1. If the bit corresponding to 60FE-02h is set to 0, the status of the bit in 60FE-01h is determined by the internal status. You can monitor the current status of the bit.2. When the corresponding bit of 60FE-02h is set to 1, the bit of 60FE-01h maintains the current output state and is no longer determined by the internal state. The user can force the write operation to the bit of 60FE-01h by writing 1 to the bit. The physical port output is forced ON. Write 0 to this bit to force the physical port output OFF;							
60FE-02h Indicates that force control bit selection is enabled	3. 0 bit is a special control bit for the brake holding motor, which is invalid for the user to force off when the motor is enabled to run. Write 1 can be enabled forcibly or write 0 can be disabled only after the function is disabled.							

8.3 SDO control message reference

The following SDO control messages are all based on control Node 1 motor as an example:

8.3.1 Speed mode control

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode storage			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
Write run mode =3	601	data frame	standard frame	8	2F	60 60	00	03 00 00 00
Slave answer	581	data frame	standard frame	8	60	60 60	00	00 00 00 00
Write target speed	601	data frame	standard frame	8	23	FF 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	FF 60	00	00 00 00 00
Write acceleration	601	data frame	standard frame	8	23	83 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	83 60	00	00 00 00 00
Write deceleration	601	data frame	standard frame	8	23	84 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	84 60	00	00 00 00 00
[Note1]Write control word =6	601	data frame	standard frame	8	2B	40 60	00	06 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note1]Write control word =7	601	data frame	standard frame	8	2B	40 60	00	07 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00

[Note1]Write control word =0F	601	data frame	standard frame	8	2B	40 60	00	0F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
Read Status	601	data frame	standard frame	8	40	41 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	4B	41 60	00	xx xx xx xx returned value
Read current speed	601	data frame	standard frame	8	40	6C 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	43	6C 60	00	xx xx xx xx returned value

[Note 1] Write 6040h control word 06, the motor enters the ready state; Write 07, motor waiting to enable state; 07→0F, the motor will enable and run at speed according to the parameters of the speed configuration; 0F→07, the motor will be unenabled, free stop;

8.3.2 Position mode control

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode storage			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
Write run mode=1	601	data frame	standard frame	8	2F	60 60	00	01 00 00 00
Slave answer	581	data frame	standard frame	8	60	60 60	00	00 00 00 00
Write target location	601	data frame	standard frame	8	23	7A 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	7A 60	00	00 00 00 00
Write run speed	601	data frame	standard frame	8	23	81 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	81 60	00	00 00 00 00
Write acceleration	601	data frame	standard frame	8	23	83 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	83 60	00	00 00 00 00
Write deceleration	601	data frame	standard frame	8	23	84 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	84 60	00	00 00 00 00
[Note1]Write control word=6	601	data frame	standard frame	8	2B	40 60	00	06 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note1]Write control word=7	601	data frame	standard frame	8	2B	40 60	00	07 00 00 00

Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note 1]Write control word=0F	601	data frame	standard frame	8	2B	40 60	00	0F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note 1]Write control word=1F	601	data frame	standard frame	8	2B	40 60	00	1F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
Read Status	601	data frame	standard frame	8	40	41 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	4B	41 60	00	xx xx xx xx return value
Read current position	601	data frame	standard frame	8	40	64 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	43	64 60	00	xx xx xx xx return value

[Note 1] Write 6040h control word 06, the motor enters the ready state; Write 07, motor waiting to enable state; Then write 0F or 2F or 4F or 6F and the motor will enable; Finally write 1F or 3F or 5F or 7F, the motor will run according to the command;

0F→1F, the motor will perform absolute positioning without immediate update; 2F→3F, the motor will perform absolute positioning and update immediately; The motor stops automatically after the positioning is completed. 4F→5F, the motor will perform relative positioning without immediate update; 6F→7F, the motor will perform relative positioning and update immediately; The motor stops automatically after the positioning is completed.

8.3.3 Return to origin mode control

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode storage			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
Write run mode=6	601	data frame	standard frame	8	2F	60 60	00	06 00 00 00
Slave answer	581	data frame	standard frame	8	60	60 60	00	00 00 00 00
[Note 1]Write back to the original method	601	data frame	standard frame	8	2F	98 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	98 60	00	00 00 00 00
Write back to the original speed	601	data frame	standard frame	8	23	99 60	01	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	99 60	01	00 00 00 00
Write back to the original low speed	601	data frame	standard frame	8	23	99 60	02	xx xx xx xx write value

Slave answer	581	data frame	standard frame	8	60	99 60	02	00 00 00 00
Write acceleration	601	data frame	standard frame	8	23	9A 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	9A 60	00	00 00 00 00
[Note 2]Write control word=6	601	data frame	standard frame	8	2B	40 60	00	06 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note 2]Write control word=7	601	data frame	standard frame	8	2B	40 60	00	07 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note 2]Write control word=0F	601	data frame	standard frame	8	2B	40 60	00	0F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[Note 2]Write control word=1F	601	data frame	standard frame	8	2B	40 60	00	1F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
Read Status	601	data frame	standard frame	8	40	41 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	4B	41 60	00	xx xx xx xx return value
Read current position	601	data frame	standard frame	8	40	64 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	43	64 60	00	xx xx xx xx return value

[Note 1] : Please refer to section 2.8 [6098h origin Search Method] for the supported origin return mode.

[Note 2] : Write 6040h control word 06, the motor enters the ready state; Write 07, motor waiting to enable state; Then write 0F motor will enable;

0F→1F, the motor will return to the origin according to the parameters of the origin, the motor will automatically stop after the origin is successfully returned, and the current position will clear to zero;

1F→0F, the motor will stop the current origin return action;

8.3.4 Torque mode control

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
Write run mode=4	601	data frame	standard frame	8	2F	60 60	00	04 00 00 00
Slave answer	581	data frame	standard frame	8	60	60 60	00	00 00 00 00

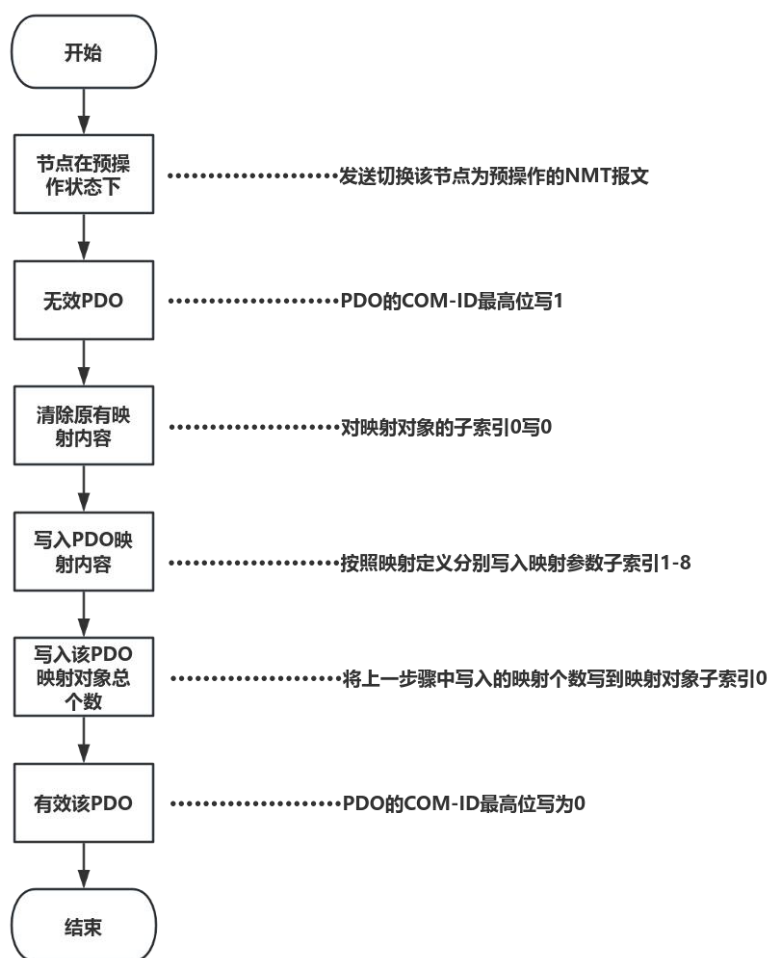
Write target torque	601	data frame	standard frame	8	2B	71 60	00	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	98 60	00	00 00 00 00
Write speed limit	601	data frame	standard frame	8	23	7F 60	01	xx xx xx xx write value
Slave answer	581	data frame	standard frame	8	60	99 60	01	00 00 00 00
[[Note1]Write control word=6	601	data frame	standard frame	8	2B	40 60	00	06 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[[Note1]Write control word=7	601	data frame	standard frame	8	2B	40 60	00	07 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
[[Note1]Write control word=0F	601	data frame	standard frame	8	2B	40 60	00	0F 00 00 00
Slave answer	581	data frame	standard frame	8	60	40 60	00	00 00 00 00
Read Status	601	data frame	standard frame	8	40	41 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	4B	41 60	00	xx xx xx xx returne value
Read the current torque	601	data frame	standard frame	8	40	77 60	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	4B	77 60	00	xx xx xx xx return value

[Note 1] :

Write 6040h control word 06, the motor enters the ready state; Write 07, motor waiting to enable state; 07→0F, the motor will enable and perform torque operation according to the torque configuration parameters; 0F→07, the motor will be unenabled, free stop;

8.4 PDO control mode

8.4.1 PDO Mapping Configuration Flowchart



8.4.2 Communication parameters of the PDO channel

According to the difference between receiving and sending, PDO can be divided into RPDO and TPDO. PDO is determined by communication parameters and mapping parameters together to determine the final transmission mode and content. AIMOTOR servo drive uses four TPdos and four RPdos to implement PDO transmission, and the related objects are listed below.

Name		COB-ID	Communication Objects	Mapping object
RPDO	1	200h+NODE_ID	1400h	1600h
	2	300h+NODE_ID	1401h	1601h
	3	400h+NODE_ID	1402h	1602h
	4	500h+NODE_ID	1403h	1603h
TPDO	1	180h+NODE_ID	1800h	1A00h
	2	280h+NODE_ID	1801h	1A02h
	3	380h+NODE_ID	1802h	1A03h
	4	480h+NODE_ID	1803h	1A04h

8.4.3 Reference example for PDO configuration process

Under the PDO control packets are 1 motor control node, for example: 041

TPDO1 mapping object for 1:6_00h (status word) "06 c_00h (speed). 040

RPDO1 mapping object for 1:6_00h (control word) but 060_00h (control model) set 0 ff_00h (target speed).

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
Set the node to a pre-operation state	000	data frame	standard frame	2	80	01	-	-
Unavailable answer	-	-	-	-	-	-	-	-
Set the COB_ID of RPDO1 and invalidate RPDO1	601	data frame	standard frame	8	23	00 14	01	01 02 00 80
Slave answer	581	data frame	standard frame	8	60	00 14	01	00 00 00 00
Write transport type of RPDO1	601	data frame	standard frame	8	2F	00 14	02	01 00 00 00
Slave answer	581	data frame	standard frame	8	60	00 14	02	00 00 00 00
Set the number of RPDO1 mappings to 0	601	data frame	standard frame	8	2F	00 16	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	60	00 16	00	00 00 00 00
Write mapping object 1 of RPDO1	601	data frame	standard frame	8	23	00 16	01	10 00 40 60
Slave answer	581	data frame	standard frame	8	60	00 16	01	00 00 00 00
Write mapping object 2 of RPDO1	601	data frame	standard frame	8	23	00 16	02	08 00 60 60
Slave answer	581	data frame	standard frame	8	60	00 16	02	00 00 00 00
Write mapping object 3 of RPDO1	601	data frame	standard frame	8	23	00 16	03	20 00 FF 60
Slave answer	581	data frame	standard frame	8	23	00 16	03	00 00 00 00
The number of RPDO1 mappings is set to 3	601	data frame	standard frame	8	2F	00 16	00	03 00 00 00
Slave answer	581	data frame	standard frame	8	60	00 16	00	00 00 00 00
Set the COB_ID of	601	data	standard	8	23	00 14	01	01 02 00 00

RPDO1 and take effect on RPDO1		frame	frame					
Slave answer	581	data frame	standard frame	8	60	00 14	01	00 00 00 00
Set the COB_ID of RPDO2 and take effect on RPDO2	601	data frame	standard frame	8	23	01 14	01	01 03 00 80
Slave answer	581	data frame	standard frame	8	60	01 14	01	00 00 00 00
Set the COB_ID of RPDO3 and take effect on RPDO3	601	data frame	standard frame	8	23	02 14	01	01 04 00 80
Slave answer	581	data frame	standard frame	8	60	02 14	01	00 00 00 00
Set the COB_ID of RPDO4 and take effect on RPDO4	601	data frame	standard frame	8	23	03 14	01	01 05 00 80
Slave answer	581	data frame	standard frame	8	60	03 14	01	00 00 00 00
Set the COB_ID of TPDO1 and invalidate TPDO1	601	data frame	standard frame	8	23	00 18	01	81 01 00 80
Slave answer	581	data frame	standard frame	8	60	00 18	01	00 00 00 00
Set the transport type of TPDO1	601	data frame	standard frame	8	2F	00 18	02	01 00 00 00
Slave answer	581	data frame	standard frame	8	60	00 18	02	00 00 00 00
The number of TPDO1 mappings is set to 0	601	data frame	standard frame	8	2F	00 1A	00	00 00 00 00
Slave answer	581	data frame	standard frame	8	2F	00 1A	00	00 00 00 00
Write mapping object 1 of TPDO1	601	data frame	standard frame	8	23	00 1A	01	10 00 41 60
Slave answer	581	data frame	standard frame	8	60	00 1A	01	00 00 00 00
Write mapping object 2 of TPDO1	601	data frame	standard frame	8	23	00 1A	02	20 00 6C 60
Slave answer	581	data frame	standard frame	8	23	00 1A	02	00 00 00 00
The number of TPDO1 mappings is set to 2	601	data frame	standard frame	8	2F	00 1A	00	02 00 00 00
Slave answer	581	data frame	standard frame	8	60	00 1A	02	00 00 00 00

Set the COB_ID of TPDO1 and take effect on TPDO1	601	data frame	standard frame	8	23	00 18	01	81 01 00 00
Slave answer	581	data frame	standard frame	8	60	00 18	01	00 00 00 00
Set the COB_ID of TPDO2 and take effect on TPDO2	601	data frame	standard frame	8	23	01 18	01	81 02 00 80
Slave answer	581	data frame	standard frame	8	60	01 14	01	00 00 00 00
Set the COB_ID of TPDO3 and take effect on TPDO3	601	data frame	standard frame	8	23	02 18	01	81 03 00 80
Slave answer	581	data frame	standard frame	8	60	02 18	01	00 00 00 00
Set the COB_ID of TPDO4 and take effect on TPDO4	601	data frame	standard frame	8	23	03 18	01	81 04 00 80
Slave answer	581	data frame	standard frame	8	60	03 18	01	00 00 00 00
Set the node to the operational state	000	data frame	standard frame	2	01	01	-	-
Unavailable answer	-	-	-	-	-	-	-	-

8.4.4 Synchronous Message Configuration Description Example

Description	Frame ID	Frame Type	Frame Format	DLC	Data Segment DATA[0]~DATA[7] Hexadecimal Big endian mode			
					DATA[0]	DATA[1]~ DATA[2]	DATA[3]	DATA[4]~ DATA[7]
[Note 1] Sync Frame	080	data frame	standard frame	0				
[Note 2] TPDO Return reply	181	data frame	standard frame	6	37	02 E8	03	00 00
[Note 3] RPDO Fill message	201	data frame	standard frame	7	0F	00 03	E8	03 00 00

[Note 1] : When the TPDO transmission type is 1-240, the TPDO reply packet is sent when the synchronization frame with the number of responses is received. When the RPDO transmission type is 0-240, the latest data of the RPDO is updated to the application as soon as a synchronization frame is received.

[Note 2] : The preceding packet contains 37 02 E8 03 00 00 In which TPDO1 mapping object 1 is 6041_00h and its data width is two bytes. In the packet returned by TPDO1, 3702 is the value of 6041_00h. TPDO1 mapping object 2 is 606C_00h and its data width is four bytes. In the packet returned by TPDO1, E8 0300 00 is the value of 606C_00h.

[Note 3] : The preceding packet contains 0F 00 03 E8 03 00 00 Where RPDO1 mapping object 1 is 6040_00h and its data width is two bytes, 0F 00 is the set value of 6040_00h. If RPDO1 mapping object 2 is 6060_00h and its data width is one byte, 03 is the set value of 6060_00h. If RPDO1 mapping object 3 is 60FF_00h and its data width is four bytes, E8 03 00 00 00 is the set value of 60FF_00h.

After the configuration is completed and the operation state is entered, the slave machine will trigger the TPDO to upload the mapping object data based on the synchronous frame on the network, and the RPDO mapping object data will take effect.

8.4.5 Mapping Object Length Correspondence Table

Object length	Bit length
08h	8bit
10h	16bit
20h	32bit

For example, the mapping parameter for the 16-bit command word 6040_00h is 60400010h

8.5. Fault query

8.5.1 Alarm Code

Description	Fault code is customized by the manufacturer H0B_34 parameters	Cia402 standard fault code 603Fh object	Hardware alarm indicator blinking times	Alarm Type
No Fault	0x0000	0x0000	Green	-
Parameter id is out of range	0x0101	0x6320	10Red1Green	NO.1
Parameter CRC error	0x0102	0x6320	12Red1Green	NO.1
Registration parameter CRC error	0x0104	0x6320	12Red1Green	NO.1
An internal program exception triggers the watchdog	0x0105	0x6320	11Red1Green	NO.1
DI function is reassigned	0x0130	0x6320	12Red1Green	NO.1
Hardware over current	0x0201	0x2312	4Red1Green	NO.1
ia/ic static current bias calibration failed	0x0208	0xFF00	12Red1Green	NO.1
Software over current	0x0207	0x2311	4Red1Green	NO.1
aerodyne	0x0234	0xFF00	12Red1Green	NO.1
Encoder data exception	0x0A33	0x7306	9Red1Green	NO.1
Primary circuit over voltage	0x0400	0x3210	3Red1Green	NO.1
Main circuit under voltage	0x0410	0x3220	3Red1Green	NO.1
motor overload	0x0620	0x3230	4Red1Green	NO.1
Radiator overheating	0x0650	0x4210	6Red1Green	NO.1
Excessive position deviation	0x0B00	0x8611	2Red1Green	NO.1
The return to zero mode does not match	0x0668	0xFF00	8Red1Green	NO.2
Back to origin timeout	0x0601	0x8610	8Red1Green	NO.2
emergency shut down	0x0900	0x5442	12Red1Green	NO.3
Forward overshoot warning	0x0950	0x5443	12Red1Green	NO.3
Negative overshoot warning	0x0952	0x5444	12Red1Green	NO.3
Encoder battery failure	0x0731	0x7306	12Red1Green	NO.2

Encoder multi-turn count error	0x0733	0x7306	12Red1Green	NO.2
Encoder multi-turn count overflow	0x0735	0x7306	12Red1Green	NO.2
Encoder battery warning	0x0730	0x7307	12Red1Green	NO.3
CAN communication connection is interrupted	0x0D03	0x8130	12Red1Green	NO.2
The changed parameters take effect after being powered on again	0x0941	0xFF00	7Red1Green	NO.3
Parameter storage frequency	0x0942	0x7600	12Red1Green	NO.3

- 1.manufacturers user-defined fault code, one fault information corresponds to a fault code, has a unique;
- 2.Cia402 standard fault code. Refer to cia402 regulations. If fault information is not specified in cia402, it is expressed as 0xFF00 fault code and is not unique.
3. Because the integrated motor has no display panel, it can judge the alarm information by referring to the flashing change of the indicator light without connecting the debugging software, which is not unique;

8.5.2 Fault query method

1. Query using object dictionary manufacturer-defined parameters

Parameter number: H0B-33, select the fault record to query; object dictionary index: 200Bh, sub-index 22h, read and write

Parameter number: H0B-34, selected number of fault codes; Object dictionary index: 200Bh, sub-index 23h, read only

Usage: H0B-33 (200B-22h) is used to select the fault record to view, H0B-34 (200B-23h) displays the selected historical fault

Example: When H0B-33 (200B-22h) is set to 0, once a fault occurs, H0B-34 (200B-23h) will display the current manufacturer's customized fault code;

When H0B-33 (200B-22h) is set to 1, the system will query the manufacturer's customized fault code generated previously in history and display it in H0B-34 (200B-23h);

When H0B-33 (200B-22h) is set to 2, the system will query the manufacturer's customized fault codes generated twice in history and display them in H0B-34 (200B-23h);

When H0B-33 (200B-22h) is set to 9, the system will query the manufacturer's customized fault codes generated in the previous 9 times in history and display them in H0B-34 (200B-23h);

2.Use object dictionary CIA402+CIA301 parameter query

Current fault code; Object dictionary index: 603Fh, sub-index 00h, read-only

Number of historical faults; object dictionary index: 1003h, sub-index 00h, read and write

Historical fault entry; object dictionary index: 1003h, sub-index 01h~0Ah, read only

Usage: Once a fault occurs, 603F-00h will generate the Cia402 standard fault code corresponding to the current fault, and the corresponding manufacturer's customized fault code and Cia402 standard fault code combination are stored in 01h~0Ah of object 1003h;

00h of object 1003h is the number of faults currently recorded. Writing 0 to 1003-00h means clearing historical fault records, and writing non-zero values is not allowed;

01h~0Ah of object 1003h is a queue of 10 fault record entries, which are stored in stack mode and follow the first-in-first-out rule. When the historical alarm storage is full and a new alarm is generated, the earliest error will be deleted, and the previous errors will be moved downwards in turn; the storage rules of each entry are bit0-bit15 to store the Cia402 standard fault code, and bit16-bit31 to store the manufacturer. Customized fault codes;

For example: The user can first read the Cia402 standard fault code value in 603F-00h (a value other than 0 indicates a fault) to determine whether the current node is faulty. Once a fault occurs, you can refer to "Chapter 3.1 Fault Table" to initially determine the fault information. Because the Cia402 standard fault code is not unique in this system, you can continue to read the value in 1003-01h (the most recent fault record). The lower 16 bits of the value are the same as the current Cia402 standard fault code value in 603F-00h. Consistent, the high 16 bits represent the corresponding manufacturer-defined fault code, and the specific fault information is determined by obtaining the manufacturer-defined fault code.