

# CL 86R

RS485 bus digital type  
86 hybrid servo motor



## 1. product presentation

### 1.1 Overview

CL 86R Is a RS485 bus based support Modbus RTU protocol, closed-loop step driver product. The product integrates the function of uniaxial controller, standard Modbus RTU bus communication protocol, the maximum available mount 32 axes, multiaxis bus synchronous control, the drive with position control, speed control, internal position and 16 internal speed control, support zero, absolute / relative positioning, JOG, can directly use touch screen or controller with RS 485 interface control.

### 1.2 Features

- ◆ Support the standard Modbus RTU protocol on the RS485 bus;
- ◆ Do not lose the step, accurate positioning;
- ◆ The current is adjusted according to the load to adapt to various mechanical load conditions;
- ◆ Built-in acceleration and deceleration and smooth filtering control, smoother operation;
- ◆ User-defined fine score;
- ◆ Support position, speed, return to zero, JOG, multiple position, multiple speed and other modes;
- ◆ 7 input ports, 3 output port functions can be programmable configuration;
- ◆ Voltage range: AC20V~80V;
- ◆ With overcurrent, overpressure, position overdifference and other protection;

### 1.3 Typical application

Suitable for a variety of small and medium-sized automation equipment and instruments, such as industrial robots, textile machinery, special industrial sewing machine, wire stripping machine, marking machine, cutting machine, laser phototypesetting, plotter, CNC machine tool, engraving machine, automatic assembly equipment, etc. It is particularly effective in devices with low noise and high speed.

## 2. Electrical, mechanical, and environmental indicators

### 2.1 Electrical indicators

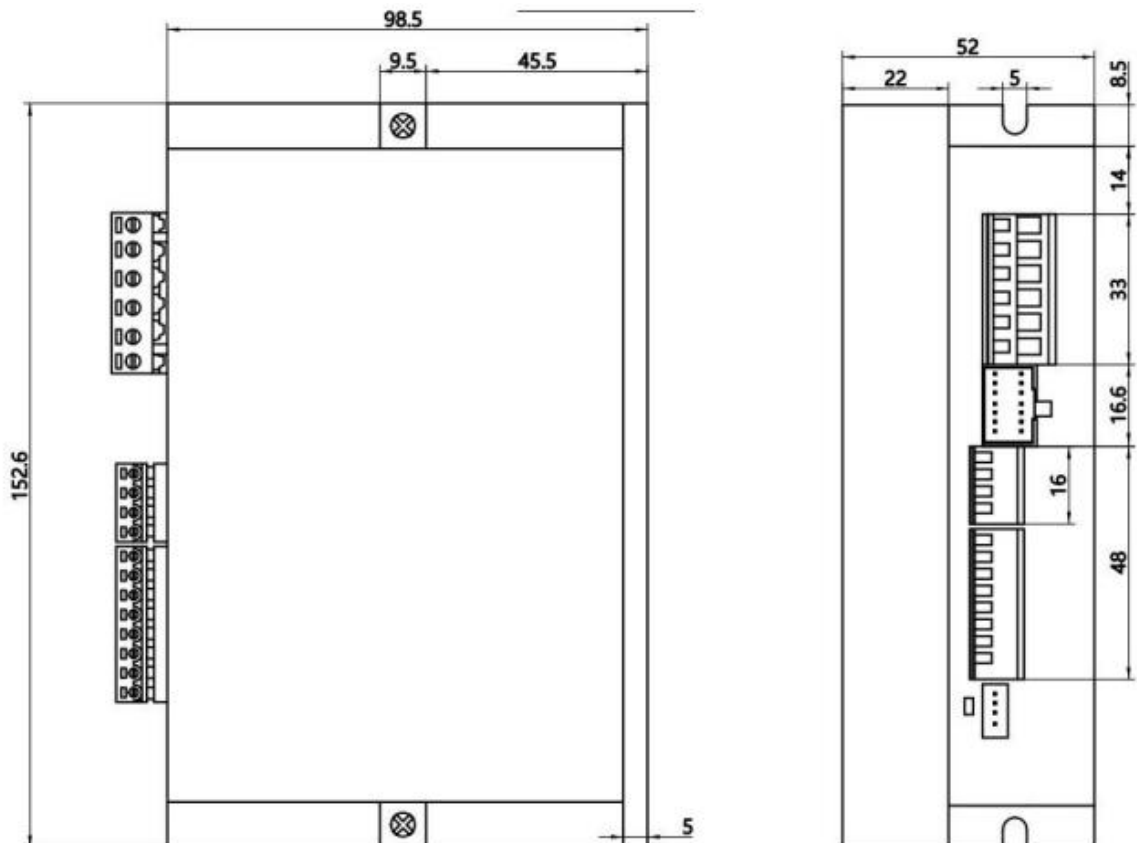
Power Supply Voltage	AC 20~80V
output	Peak value of 8.0A (current changes with load)
DI input currenton	10~50m A
DI input voltage	+24VDC

Communication type	RS485
Maximum communication rate	115200bps

### 2.2 Use environment and parameters

cooling-down method	Natural cooling or an external radiator	
service environment	Use occasion	Try to avoid dust, oil pollution and corrosive gases
	temperature	0~40°C
	humidity	40~90%RH
	vibrate	5.9m/s <sup>2</sup> Max
Save the temperature	-20°C~80°C	
weight		

### 2.3, drive installation dimensions



### 3. Driver interface, and wiring introduction

#### 3.1 Interface definition

##### (1) Power supply input port

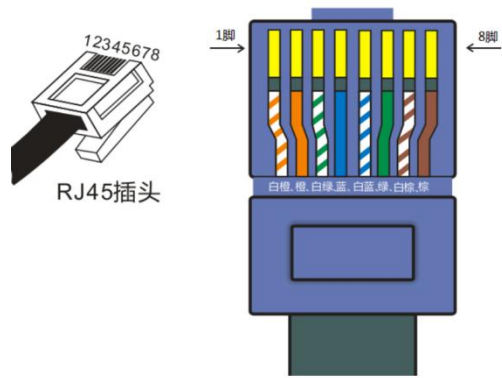
Terminal number	symbol	name	explain
1	AC1	AC1	AC20V ~80V
2	AC2	AC2	

##### (2) Motor port

pin	Signal definition	explain
1	A +	Motor winding A is phase positive
2	A -	Motor winding A is phase negative
3	B +	Motor winding # B is phase positive
4	B-	Motor winding B is phase negative

##### (3) The RS485 communication port

pin	Signal definition	Network cable color
1	RS 485+	White orange
2	RS 485-	Citrus sinensis
3	NC	white edge
4	NC	blue
5	GND	White blue
6	GND	hispid arthraxon
7	NC	White brown
8	NC	palm



水晶头引脚顺序

(4) Encoder port

pin	definition	explain
1	S HIELD	Encoder shielding layer
2	NC	RS 485-
3	NC	
4	NC	
5	EVCC	Main end of the encoder power supply
6	EGND	Encoder power supply negative end
7	NC	
8	NC	
9	EB+	
10	EB-	
11	EA+	
12	EA -	

(5) The DI / DO port

引脚	定义	说明
1	DI0	单端输入口; 有效工作电压 24V
2	DI1	
3	DI2	
4	DI3	
5	DI4	
6	DI5	
7	DI6	
8	DICOM	输入口公共端; 可兼容共阳/共阴接法
9	D00	单端输出口
10	D01	
11	D02	
12	DOCOM	输出口公共端; 只能接电源负端

(6) Status indication

PWR: the power supply indicator lamp.

When energon, the green indicator is always on.

ALM: Fault indicator light.

The red light flashes once within 3 seconds: overcurrent or inter-phase short-circuit fault;

The red light flashes for 2 times within 3 seconds: overvoltage fault;

The red light flashes 7 times within 3 seconds: position error error alarm.

4. Dup switch setting

CL 86R Use the 5-bit dial switch to set the drive station number and the 2-bit dial switch to set the communication wave rate.

SW 1-SW 5: Drive station number is set. SW 6 to SW 7: Drive communication Baud rate. From the station number, the communication port rate needs to be modified again.

From the station number	SW 1	SW 2	SW 3	SW 4	SW 5
default	on	on	on	on	o n
1	off	on	on	on	o n
2	on	off	on	on	o n
3	off	off	on	on	o n
4	on	on	off	on	o n

5	off	on	off	on	on
6	on	off	off	on	on
7	off	off	off	on	on
8	on	on	on	off	on
9	off	on	on	off	on
10	on	off	on	off	on
11	off	off	on	off	on
12	on	on	off	off	on
13	off	on	off	off	on
14	on	off	off	off	on
15	off	off	off	off	on
16	on	on	on	on	off
17	off	on	on	on	off
18	on	off	on	on	off
19	off	off	on	on	off
20	on	on	off	on	off
21	off	on	off	on	off
22	on	off	off	on	off
23	off	off	off	on	off
24	on	on	on	off	off
25	off	on	on	off	off
26	on	off	on	off	off
27	off	off	on	off	off
28	on	on	off	off	off
29	off	on	off	off	off
30	on	off	off	off	off
31	off	off	off	off	off

Note: the slave number setting, when in default, can be defined by setting a custom drive slave off register (0x0020) from 1 to 31.

Communication	SW 6	SW 7
Porter rate		
9600	on	on
19200	off	on
38400	on	off
115200	off	off

Note: When the communication port rate is set to 9600bps, the serial port data format is fixed to 8 data bits, no check, and 1 stop bit. When set to the other three aud rates, the serial port data format is determined by the serial port data format register (0x0021).

SW 8: R S485 terminal resistance, the bus end drive shall set the dial switch to ON, and the rest drive shall be set to OFF.

## 5. MODBUS communication protocol

### 5.1 MODBUS definition of register address

Register address	name	explain	Range (attribute)	Windows default
<b>Monitoring parameters</b>				
0x0000	Drive model	Drive model code	(RO )	862
0x0001	software release	software release	(RO )	100
0x0002	Drive operating mode	0: Without any mode of operation 1: Location mode 2: Speed mode 3: Return to the zero mode 4: JOG pattern 5: Multiple segment position mode 6: Multiple segment speed mode	(RO )	0
0x0003	status word	Bit 0: in place Bit 1: Return to zero to complete Bit 2: Motor operation Bit 3: Alert Bit 4: Motor-enabled Bit 5 to Bit 15: reserved	(RO )	
0x0004	Error code	0: Normal 1: Overflow 2: Overpressure 4: The position is too poor	(RO )	
0x0005	Enter the terminal status flag	Bit 0: X0 terminal input status Bit 1: X 1 terminal input state Bit 2: X 2 terminal input state Bit 3: X 3 terminal input status Bit 4: X 4 terminal input state	(RO )	



		Bit 5: X 5 terminal input state Bit 6: X 6 terminal input state 0: Input terminal is disconnected 1: The input terminal is closed		
0x0006	Output terminal status flag	Bit 0: Y0 terminal output status Bit 1: Y 1 terminal output state Bit 2: Y 2 terminal output status 0: The output end is photocoupling disconnected 1: Outoutput optical output closed	(RO )	
0x0007	The current position is high	The current position at the absolute position is 16 bits higher	(RO )	
0x0008	The current position is low	Current position at the absolute position is 16 bits lower	(RO )	
0x0009	The current speed	Current motor running speed unit: rpm	(RO )	
<b>io control</b>				
0x0010	The DI effective level	Bit 0: Input terminal X 0 control bit Bit 1: the input terminal X 1 control bit Bit 2: Input terminal X 2 control bit Bit 3: Input terminal X 3 control bit Bit 4: Input terminal X 4 control bit Bit 5: the input terminal X 5 control bit Bit 6: Input terminal X 6 control bit	0~7 (RW/S )	0

		Bit 7 ~ Bit 15: reserved 0: Default 1: Level reversal		
0x0011	The DI filter time	DI filter time, in ms	0~1000	2
0x0012	The DO effective level	Bit 0: Output terminal Y 0 control bit Bit 1: Output terminal Y 1 control bit Bit 2: Output terminal Y 0 control bit Bit 3 to Bit 15: reserved 0: Default 1: Level reversal	0~7 (RW/S )	0
0x0013	Input terminal X0 terminal function selection	0: No definition; 1: the origin signal; 2: Positive limit signal; 3: Negative limit signal;	0~16 (R W )	1
0x0014	Input terminal X1 terminal function selection	4: Motor release signal; 5: alarm clearance signal; 6: Stop signal; 7: Emergency stop signal;	0~16 (R W )	2
0x0015	Input terminal X2 terminal function selection	8: Forward JOG; 9: Negative to JOG; 10: Return to zero trigger;	0~16 (R W )	3
0x0016	Input terminal X3 terminal function selection	11: Position and path trigger; 12: Speed path trigger; 13: path address 0;	0~16 (R W )	0
0x0017	Input terminal X4 terminal function selection	14: Path address 1; 15: path address 2; 16: path address 3;	0~16 (R W )	0
0x0018	Input terminal X5 terminal function selection		0~16 (R W )	0
0x0019	Input terminal X6 terminal function selection		0~16 (R W )	0
0x001A	Output terminal	0: No definition	0~5 (R W )	1

	Y 0 terminal function selection	1: alarm signal; 2: Motor operation; 3: return to zero;		
0x001B	Output terminal Y 1 terminal function selection	4: In-place signal; 5: Holding the lock signal;	0~5 (R W )	2
0x001C	Output terminal Y 2 terminal function selection		0~5 (R W )	4
<b>Servo basic parameters</b>				
0x0020	Customize the drive slave station number	1~31, custom slave station address, dial code switch SW 1 ~ SW 5 is effective in default gear position Others: invalid	1~31 (RW/S )	1
0x0021	Serial Data Format	0:8 bit data bit, no check, 1 stop bit; 1:8-bit data bits, no check, 2 stop bits; 2:8-bit data bit, even check, 1 stop bit; 3:8 bit data bit, odd check, 1 stop bit; Note: After modification, it should be regain	0~3 (RW/S )	0
0x0022	Default direction setting	0: CCW 1: CW	0~1 (RW/S )	0
0x0023	Subdivision Settings	Sets a fine score	400~51200 (RW/S )	1000
0x0024	Whether the communication write function code value is updated to the EEPROM synchronously	0: No update 1: The parameter with the attribute RW / S is synchronized to the EEPROM	0~1 (RW/S )	0
0x0025	Override parking	0: Slow down and stop 1: Urgent stop	0~1 (RW/S )	0
<b>Position-speed motion control parameters</b>				

0x0030	starting velocity	Starting velocity unit in rpm	2~300	5
0x0031	acceleration time	Accelerated time in a unit of ms	1~2000 (RW)	100
0x0032	deceleration time	The deceleration time is measured in ms	1~2000 (RW)	100
0x0033	maximum speed	Maximum speed unit of rpm	-3000~3000 (RW)	60
0x0034	High total number of pulses at the target position	The total number of pulses at the target position was 16bit high	-2 <sup>31</sup> ~2 <sup>31</sup> -1 pulse (RW)	0
0x0035	Total number of pulses at the target position is low	Total pulses at the target position were 16bit low		5000
0x0036	Movement control word	Bit 0: Positioning control bit 0: invalid, 1: valid Bit 1: Positioning mode bit 0: relative position, 1: absolute position Bit 2: Switch mode bit 0: ignore the new instruction when the positioning is running 1: Interrupt the current location run to execute the new instructions Bit 3: Speed control bit 0: Invalid 1: valid Bit 4: Back to zero control bit 0: Invalid 1: valid Bit 5: Stop control bit 0: Invalid 1: valid Bit 6: Emergency stop control 0: Invalid 1: valid	0~127 (RW)	0
0x0037	sub-control	0: invalid 0x0001: restore factory settings 0x0002: Save the parameters 0x0004: alarm clearance	0~8 (RW)	0

		0x0008: Clear the current position at the absolute position		
0x0038	Motor to enable / release	0: Release 1: Enable	0~1 (RW )	1
0x0039	Multisegment position trigger mode	0: Ignoring new instructions when positioning is run 1: Interrupt the current location run to execute the new instructions	0~1 (RW )	0
0x003A	Multisegment position absolute position / relative position mode setting	0: the relative position mode; 1: absolute position mode;	0~1 (RW )	0
<b>Return to zero and JOG control parameters</b>				
0x0040	reset mode	17: Negative limit is close 18: Positive limit is close 24: Positive limit + the origin is close 29: Negative limit + the origin is close 35: The current position is the origin	0~35 (RW /S )	0
0x0041	Back to zero speed	Fast running speed near zero, in rpm	5~3000 (RW /S )	120
0x0042	Back to zero crawling speed	Query the slow running speed of zero in rpm	5~300 (RW /S )	60
0x0043	Return to zero acceleration and deceleration time	Back to zero acceleration and deceleration time, in unit ms	1~2000 (RW /S )	200
0x0044	Origin compensation value H	The in compensation value H, in p ulse	0~65535 (RW /S )	0
0x0045	Origin compensation value L	Origin compensation value L, in p ulse	0~65535 (RW /S )	0
0x0046	The JOG	Unit: r / min	0~3000	60

	running speed		(RW)	
0x0047	JOG running the acceleration time	unit:ms	1~2000 (RW)	100
0x0048	The JOG running deceleration time	unit:ms	1~2000 (RW)	100
<b>Servo advanced parameters</b>				
0x0050	Open the closed-loop operation mode	0: Open the ring, the full current of the open ring operation is determined by the open ring holding current register (0x0055), with automatic half-flow function 1: Closed loop	0~1 (RW/S)	1
0x0051	Encoder resolution	0:1,000-line 1:2,500-line	0~1	0
0x0052	Tracking error alarm threshold	Encoder resolution is in units	400~65535 (RW/S)	4000
0x0053	Base current ratio	unit mA	0~80 (RW/S)	42
0x0054	Closed-loop operating current ratio	unit mA	0~80 (RW/S)	75
0x0055	Open-ring operating current ratio	unit mA	0~80 (RW/S)	56
0x0056	Instruction filtering time	Unit of 50us	0~1024 (RW/S)	60
0x0057	Current ratio gain	Factory default, it cannot be modified	(RW/S)	1000
0x0058	Current integration gain	Factory default, it cannot be modified	(RW/S)	200
0x0059	Position-ring proportional gain	Factory default, and modification is not recommended	0~1000 (RW/S)	300
0x005A	Speed ratio gain	Factory default, and modification is not recommended	0~1000 (RW/S)	400
0x005B	Speed	Factory default, and	0~300	80

	feedforward gain	modification is not recommended	(RW/S)	
0x005C	Localization accuracy threshold	Unit: Encoder resolution Factory default, and modification is not recommended	1~200 (RW/S)	10
0x005D	Location completion time	unit:ms Factory default, and modification is not recommended	1~1000 (RW/S)	5
Multiple positions				
0x0060~0x006F	Position path total pulse number high level (path 0~road strength 15)	Position total pulse number is 16bit high	-2 <sup>31</sup> ~2 <sup>31</sup> -1 pulse (RW)	0
0x0070~0x007F	Position path total pulse number low (path 0 to road strength 15)	Position total pulse number is low by 16bit		5000
0x0080~0x008F	Position path running speed (path 0 to road strength 15)	Unit: r / min	0~3000 (RW)	120
0x0090~0x009F	Position path acceleration time (path 0 to road strength 15)	unit:ms	1~2000 (RW)	100
0x00A0~0x00AF	Position-path deceleration time (path 0 to road strength 15)	unit:ms	1~2000 (RW)	100
Multi-segment speed				
0x00B0~0x00BF	Speed road strength running speed (path 0 to road strength 15)	Unit: r / min	-3000~3000 (RW)	120
0x00C0~0x00CF	Speed and road	unit:ms	1~2000	100

	strength acceleration time (path 0 to road strength 15)		(RW )	
0x00D0~0x00DF	Speed and road strength deceleration time (path 0 to road strength 15)	unit:ms	1~2000 (RW )	100

**Note: Property RO-read-only, RW-readable / write, RW / S-readable / write, and synchronously update to EE PROM memory when writing.**

**Note: RO, RW, RW / S are read with function code 03H, RW, 06H, RW / S. 0x prefix indicates hexadecimal numbers.**

## 5.2 MODBUS Common function code

### MODBUS RTU Communication data structure

STX (Communication Start)	The minimum time interval from the previous frame is 3.5 characters
ADR (slave station address)	From the station address
CMD (FC)	Function number: 1 byte
DATA (n-1)	Data content
.....	
DATA (0)	
CRC (check code)	Check code: 2 Byte
END (End of Communication)	The minimum time interval from the next frame is 3.5 characters

Each entry in the communication data format box is explained

STX: The minimum time interval from the previous frame is 3.5 characters.

ADR: station address.

CMD (function code) and data characters: support common function code: 03H, 06H, 10H.

#### ◆ Function code 03H (read-hold register, readable and written): Read N words (16 bits)

For example: read the current location of the slave station number 01H, the current location is register address 0x000A, 0x000B two registers, assume 0x000A register content 0x0001, 0x0009 register content 0x0C80

### instruction information



ADDR (slave station address)	01H
CMD(FC)	03H
start address	00H (high bytes)
	0 AH (Low bytes)
Number of registers	00H (high bytes)
	02H (Low bytes)
CRC16 Low bytes	E4H
CRC16 High bytes	09H

Instructions sequence: "01 03 00 0A 00 02 E4 09"

**response message**

ADDR (slave station address)	01H
CMD(FC)	03H
Byte number	04H
0x000A Address register content	00H
	01H
0x000B Address register content	0C H
	80H
CRC16 Low bytes	AF H
CRC16 High bytes	53H

Response sequence: "01 03 04 00 01 0C 80 AF 53"

**Abnormal response information**

ADDR (slave station address)	01H
CMD (function code) + 0x80	83H
abnormal information	01H, 02H, 03H, or 04H
CRC16 Low bytes	
CRC16 High bytes	

Abnormal information meaning: 01H- -illegal function code, 02H- -illegal register address, 03H- -illegal data, 04H- -CRC check error

◆ **Function code 06H (write a single hold register, read and write): write 1 word (16bit).**

For example, write 100 (0x0064) to a register with slave station number 01H and a maximum speed register with address 0x0022.

**instruction information**

ADDR (slave station address)	01H
CMD(FC)	06H

start address	00H (high bytes)
	22H (Low bytes)
Register value	00H (high bytes)
	64H (Low bytes)
CRC16 Low bytes	28H
CRC16 High bytes	2B H

**response message**

ADDR (slave station address)	01H
CMD(FC)	06H
start address	00H (high bytes)
	22H (Low bytes)
Register value	00H (high bytes)
	64H (Low bytes)
CRC16 Low bytes	28H
CRC16 High bytes	2B H

**Abnormal response information**

ADDR (slave station address)	01H
CMD (function code) + 0x80	86H
abnormal information	01H, 02H, 03H, or 04H
CRC16 Low bytes	
CRC16 High bytes	

Abnormal information meaning: 01H- -illegal function code, 02H- -illegal register address, 03H- -illegal data, 04H- -CRC check error

**◆ Function code 10H (write multiple hold registers, read and write): write multiple hold registers (each register word is 16bit long).**

For example, write from the driver target location with the station number 01H, and write 0x0001 to a register with the address 0x0023. Write 0x0C80 to the register of the address 0x0024

**instruction information**

ADDR (slave station address)	01H
CMD(FC)	10H
start address	00H
	23H
Number of registers	00H
	02H

Byte number	04H
0x0023 register value high byte	00H
0x0023 register value low bytes	01H
0x0024 Register value for high bytes	0C H
0x0024 register value low bytes	80H
CRC16 Low bytes	D2H
CRC16 High bytes	60H

Abnormal information meaning: 01H- -illegal function code, 02H- -illegal register address, 03H- -illegal data, 04H- -CRC check error

**response message**

ADDR (slave station address)	01H
CMD (FC)	10H
start address	00H
	23H
Number of registers	00H
	02H
CRC16 Low bytes	B0H
CRC16 High bytes	02H

**Abnormal response information**

ADDR (slave station address)	01H
CMD (function code) + 0x80	90H
abnormal information	01H, 02H, 03H, or 04H
CRC16 Low bytes	
CRC16 High bytes	

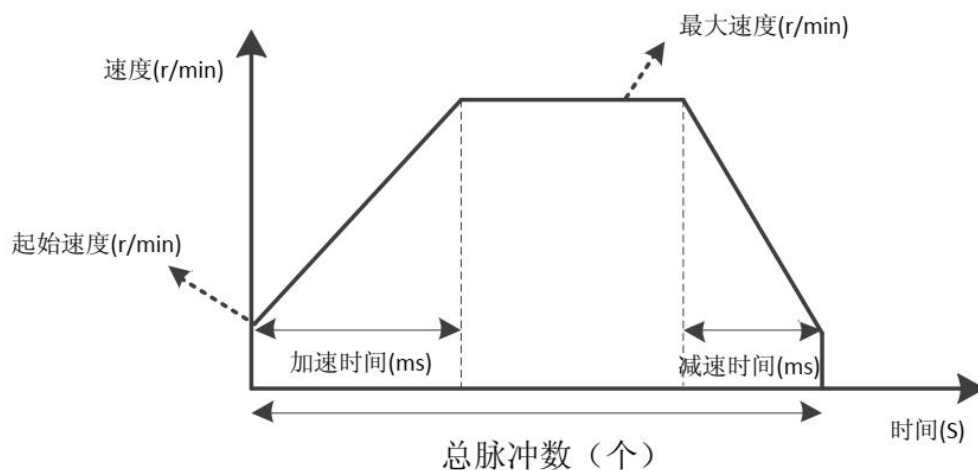
Abnormal information meaning: 01H- -illegal function code, 02H- -illegal register address, 03H- -illegal data, 04H- -CRC check error

## 6. Introduction of motion control function

### 6.1 Position mode

Position mode refers to the point-to-point motion control mode realized by the parameters such as starting speed (0x 0030), acceleration time (00x0031), deceleration time (0x0032), maximum speed (0x0033), and the total number of pulses at the target position (0x0034,0x0035), using the trapezoidal acceleration and deceleration curve. The number of pulses at the target position is positive as positive and negative as reverse. Trithe the is by the control word (0x0036).

The acceleration and deceleration curve is divided into two situations. One is that it can be accelerated to the maximum speed. The whole movement process is divided into three parts: acceleration, uniform speed and deceleration.



Position-mode acceleration and deceleration curve

The second is that the number of pulses is too small to accelerate to the maximum speed, the whole movement process is divided into acceleration and deceleration 2 parts, uniform part.

#### Setting for setting position mode:

##### (1) Drive enables operation

After the drive is powered up or reset, if the drive is disabled. Write 1 to the motor enable / release register (0x0038) and the motor enables power.

##### (2) Set the position operation parameters

Set the parameters of starting speed (0x0030), acceleration time (0x0031), deceleration time (0x0032), maximum speed (0x0033), total number of pulses at target position (0x0034,0x0035).

##### (3) Start-up / stop

After setting the operation parameters in the above position, write 0x0001 to the control word

register (0x0036), start the position mode operation, write 0x0010 deceleration stop, and write 0x0020 emergency stop.

### Position mode, programming example (assuming the slave station number is 1, set with dial switch SW 1 to SW 4, and select communication wave rate with SW 5 to SW 6)

-----Motor to overpower the-----

01 06 00 38 00 01 C 9 C 7 "Motor enables electricity"

-----Set the position control parameter-----

01 06 00 30 00 1E 09 CD "Set the starting speed to 30rpm"

01 06 00 31 00 C8 D 9 93 "Set the acceleration time to 200ms"

01 06 00 32 00 C 8 29 93 "Set the deceleration time to 200ms"

01 06 00 33 00 78 79 E7 "Set the maximum speed to 120rpm"

01 10 00 34 00 02 04 00 00 0C 80 F5 E8 "Set the total number of pulses to 3200"

You can also write the position control parameters all at once

01 10 00 30 00 06 0C 00 1E 00 C8 00 C8 00 78 00 00 0C 80 A4 48

-----Start the position to control the-----

01 06 00 36 00 01 A 8 04

-----Slow down to stop the-----

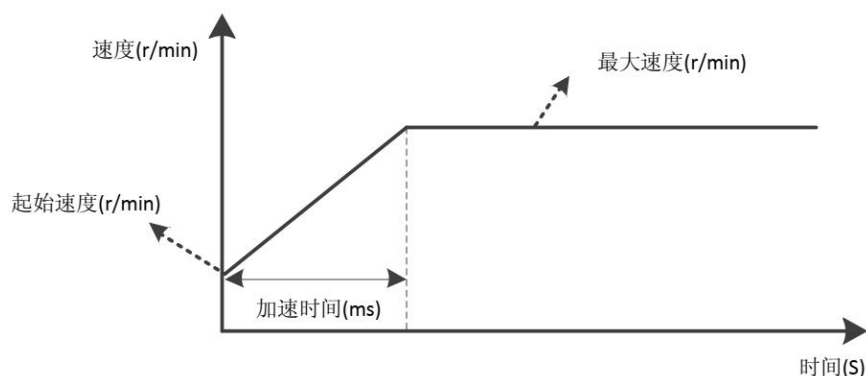
01 06 00 36 00 20 68 1C

-----Emergency stop-----

01 06 00 36 00 40 68 34

## 6.2 Speed mode

Speed mode refers to the speed control mode determined by the acceleration time, deceleration time and maximum speed and parameters. After the motor accelerates to the maximum speed according to these three parameters, it runs at a uniform speed at the maximum speed. In the process of movement, you can choose to stop or stop. The maximum speed is positive, the motor is defined as positive, the maximum speed is negative, the motor is defined as reverse.



Speed-mode acceleration curve

### Setting steps for the speed mode:

#### (1) Drive enables operation

After the drive is powered up or reset, if the drive is disabled. Write 1 to the motor enable /

release register (0x0038) and the motor enables power.

### **(2) Set the speed running parameters**

Set the starting speed (0x0030), acceleration time (0x0031), deceleration time (0x0032), maximum speed (0x0033)

### **(3) Start-up / stop**

After the above speed running parameters are set, write 0x0001 to the control word register (0x0036) to start, write 0x0010 deceleration stop, write x00020, emergency stop.

### **Speed mode, programming example (assuming the slave station number is 1)**

-----Motor to overpower the-----

01 06 00 38 00 01 C 9 C7 "Motor enables electricity"

-----Set the speed control parameter, -----

01 06 00 30 00 1E 09 CD "Set the starting speed to 30rpm"

01 06 00 31 00 C8 D 9 93 "Set the acceleration time to 200ms"

01 06 00 32 00 C 8 29 93 "Set the deceleration time to 200ms"

01 06 00 33 00 78 79 E7 "Set the maximum speed to 120rpm"

You can also write the speed control parameters in one time

01 10 00 30 00 04 08 00 1E 00 C 8 00 C8 00 78 68 37

-----Start the speed control-----

01 06 00 36 00 08 68 02

-----Slow down to stop the-----

01 06 00 36 00 20 68 1C

-----Emergency stop-----

01 06 00 36 00 40 68 34

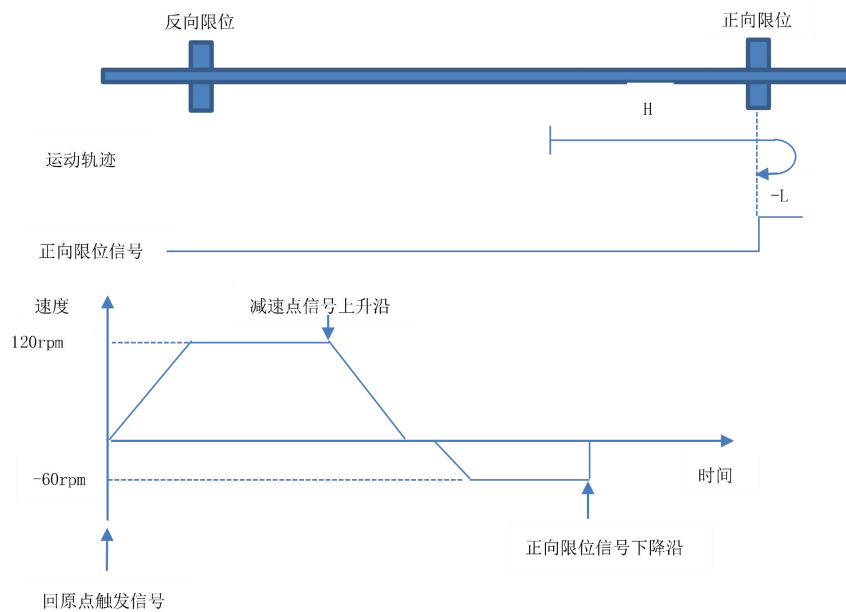
### 6.3 Return to zero mode

At present, there are 5 modes of zero, and the limit signal or origin signal needs to be used in the process of zero.

1) Back to zero mode selection register (0x0040) = 18, positive direction to find the origin (positive limit mode).

- ◆ Origin: forward limit drop edge
- ◆ Reduced-down point: the forward limit switch

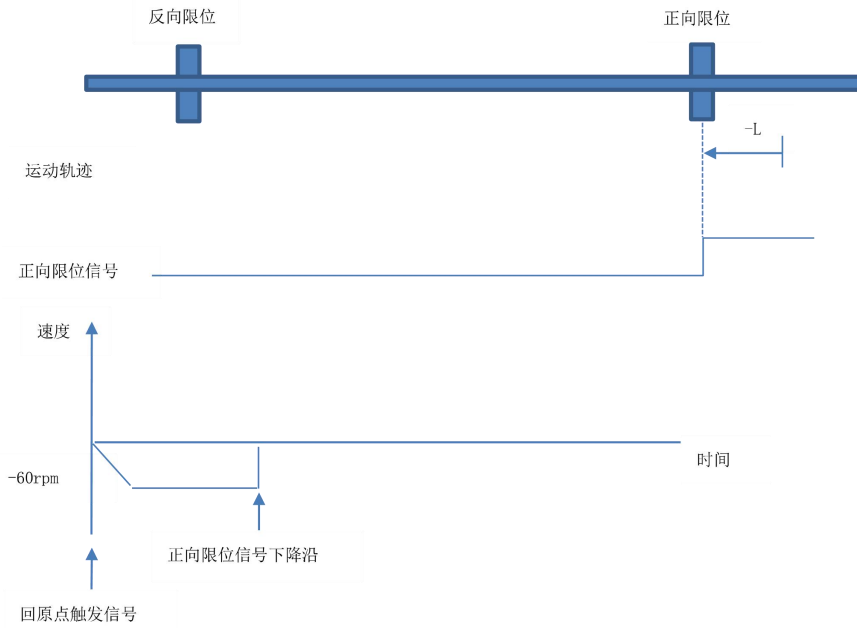
(1) The deceleration signal is invalid when starting back to the origin



0x0040=18 and the deceleration point signal is invalid

P-OT = 0 returns to zero at the forward high speed. After the P-OT rising edge, slow down the reverse low speed operation, and stop after the P-OT falling edge.

(2) The deceleration point signal is effective when starting back to zero



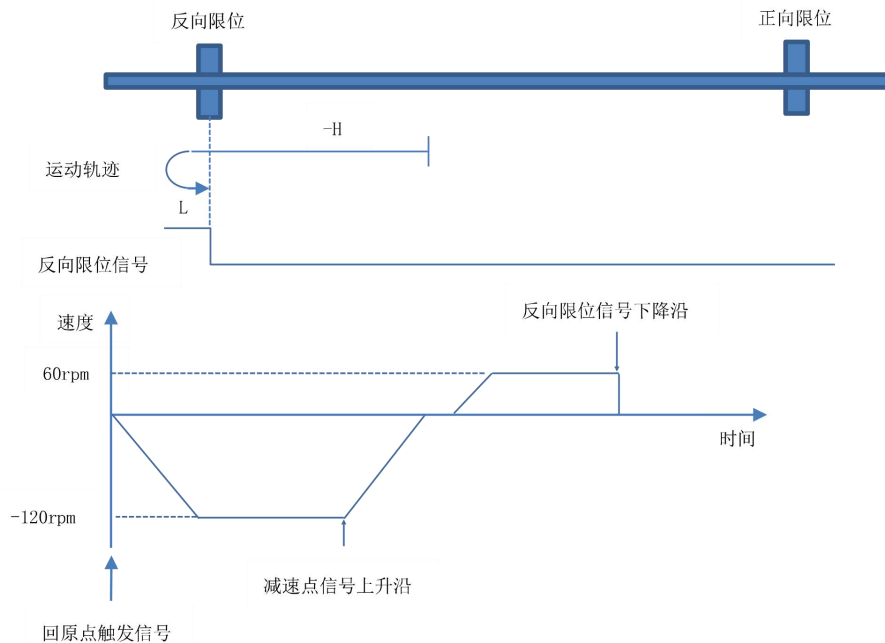
0x0040=18 and the deceleration point signal is valid

Back to zero start P-OT = 1, direct reverse low speed back to zero, encounter P-OT descent along the shutdown.

2) Select register (0x0040) = 17, and find the origin (negative limit mode).

- ◆ Origin: reverse limit drop edge
- ◆ Reduced-down point: reverse limit switch

(1) The deceleration signal is invalid when starting at zero

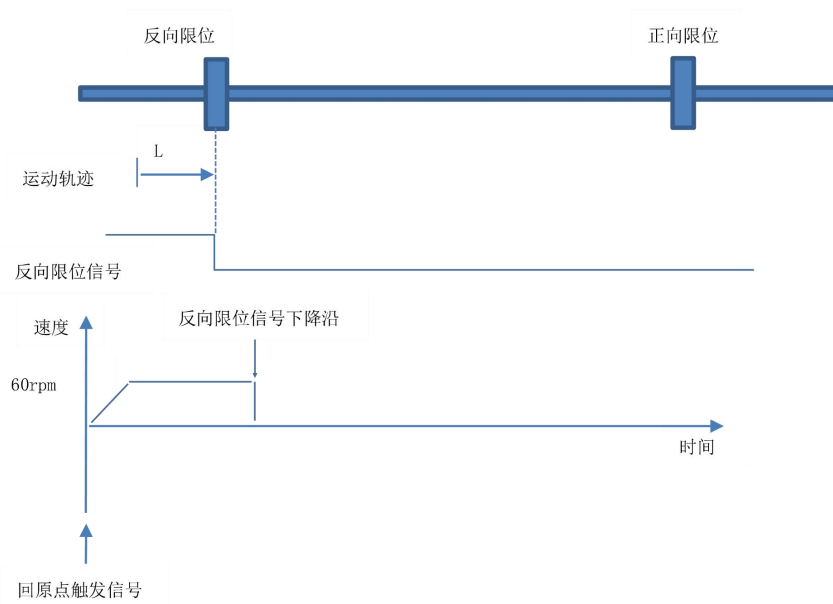


0x0040=17 and the deceleration point signal is invalid

Start back to zero N-OT = 0, start back to zero at the reverse high speed, after the N-OT rising edge, deceleration reverse forward low speed, and stop after the N-OT falling edge.



(2) The deceleration signal is effective when returning to zero to start



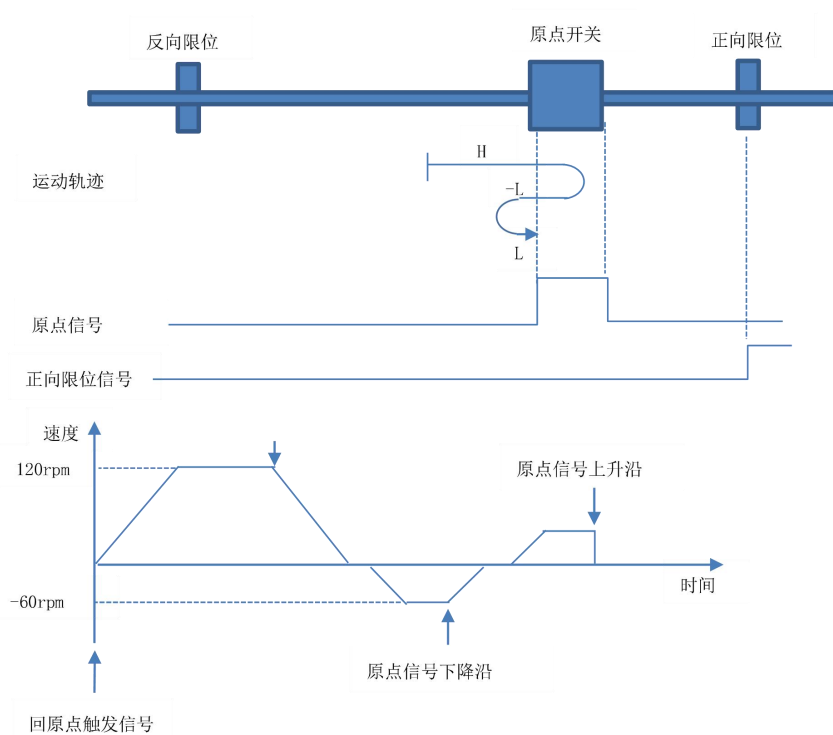
0x0040=17 and the deceleration point is valid

N-OT = 1, directly back to low speed, and N-OT downshutdown.

3) Select the register (0x0040) = 24, looking for the origin (the positive limit + the origin mode), which can be used with the forward limit switch.

- ◆ Origin: the origin switch rise edge
- ◆ Reduced-down point: the origin switch

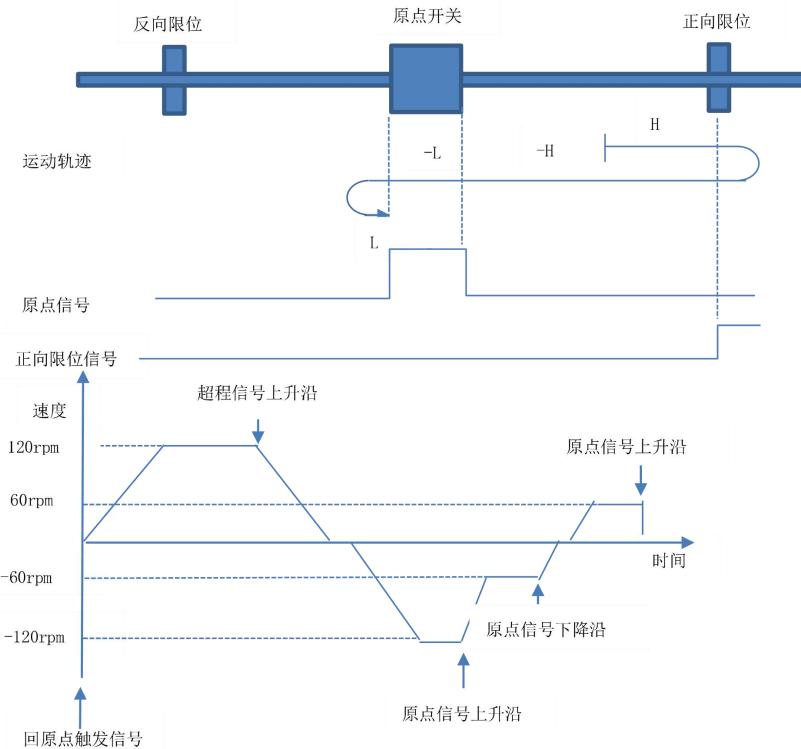
(1) The deceleration signal at zero time is invalid, and no forward limit switch is encountered



0x0040=24 and the deceleration point is invalid, no forward limit switch is encountered

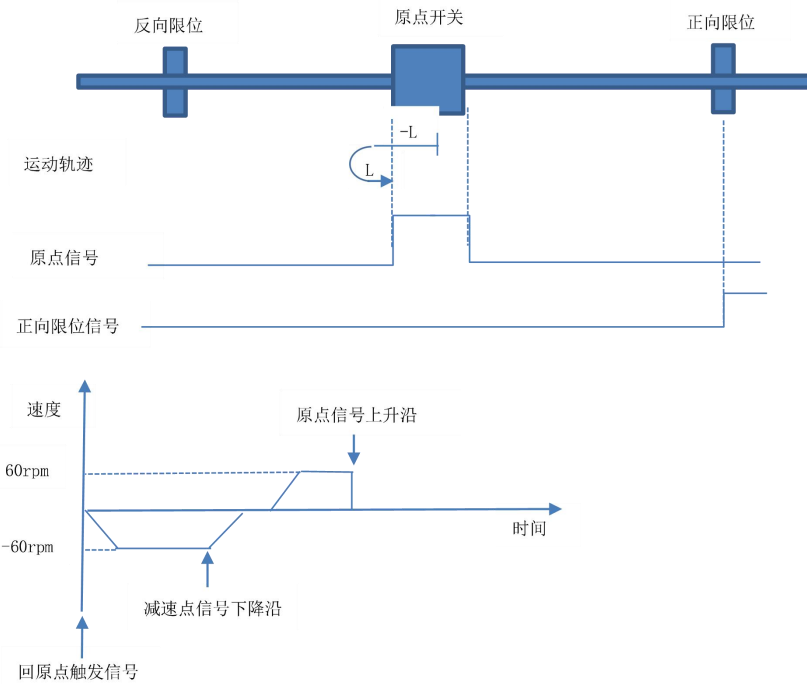
HW return to zero = 0, and start to return to the origin at the forward high speed. If there is no forward limit switch, after the HW rising edge, slow down in the reverse and reverse low speed, encounter the HW falling edge, reverse the forward low speed, and stop the HW rising edge.

(2) The deceleration signal at zero time is invalid, and the forward limit switch is encountered



0x0040=24 and the deceleration point is invalid, and the positive limit switch is encountered Start back to zero HW = 0, and start to return to the origin at the forward speed. If you encounter the limit switch, automatically reverse, reverse high speed operation. Encounter the HW rising edge, slow down and run at low speed, encounter the reverse forward low speed of the HW falling edge, and stop after encountering the HW rising edge

(3) The deceleration signal is effective at zero time return



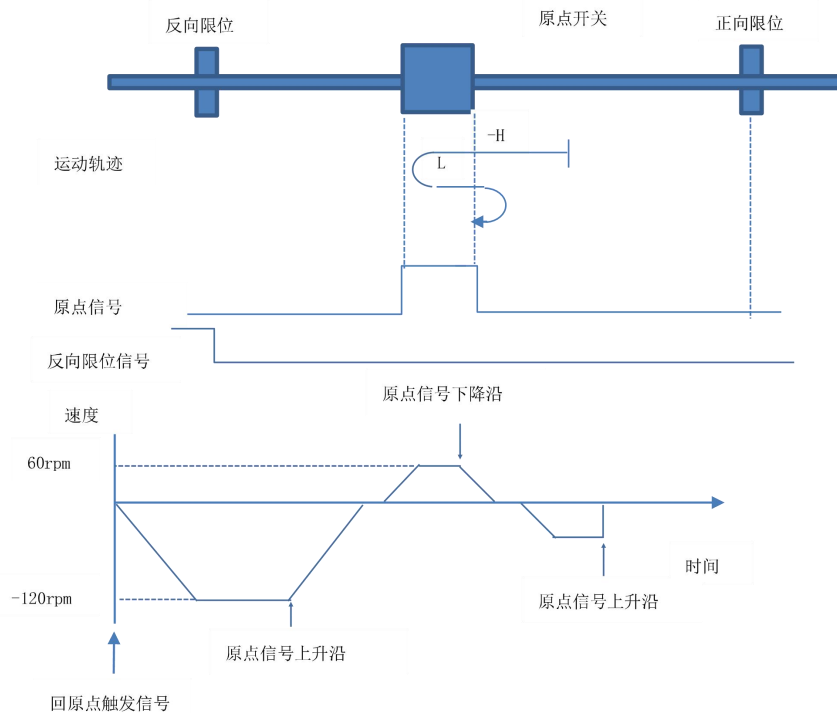
0x0040=24 and the deceleration point is valid

When HW = 1 is started back to zero, start back to zero directly, meet with the reverse forward low speed of HW falling edge and the shutdown of HW rising edge.

4) Back to zero mode selection register (0x0040) = 29, the opposite direction to find the origin (negative limit + origin mode), can be used with the negative limit switch.

- ◆ Origin: the origin switch rise edge
- ◆ Reduced-down point: the origin switch

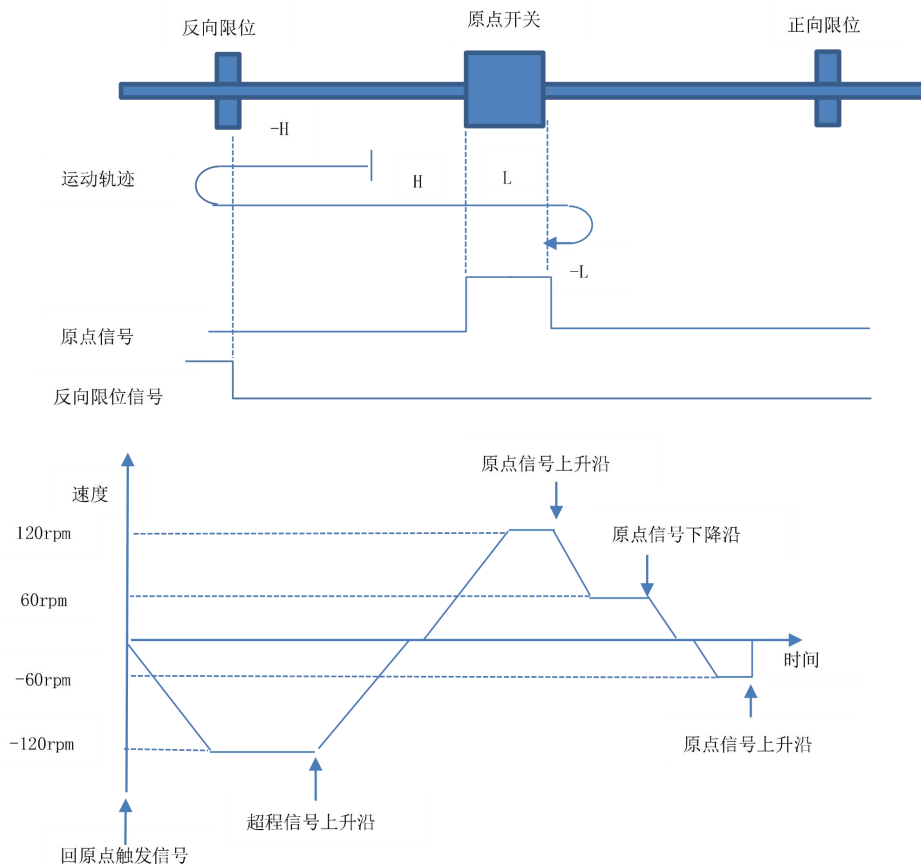
(1) The deceleration signal at zero time is invalid, and no reverse limit switch is encountered



0x0040=29 and the deceleration point is invalid, no forward limit switch is encountered

Start back to zero HW = 0, start back to zero at reverse high speed. If there is no reverse limit switch, encounter HW rising edge, slow down reverse forward low speed, encounter HW falling edge, reverse and reverse low speed, and stop at HW rising edge.

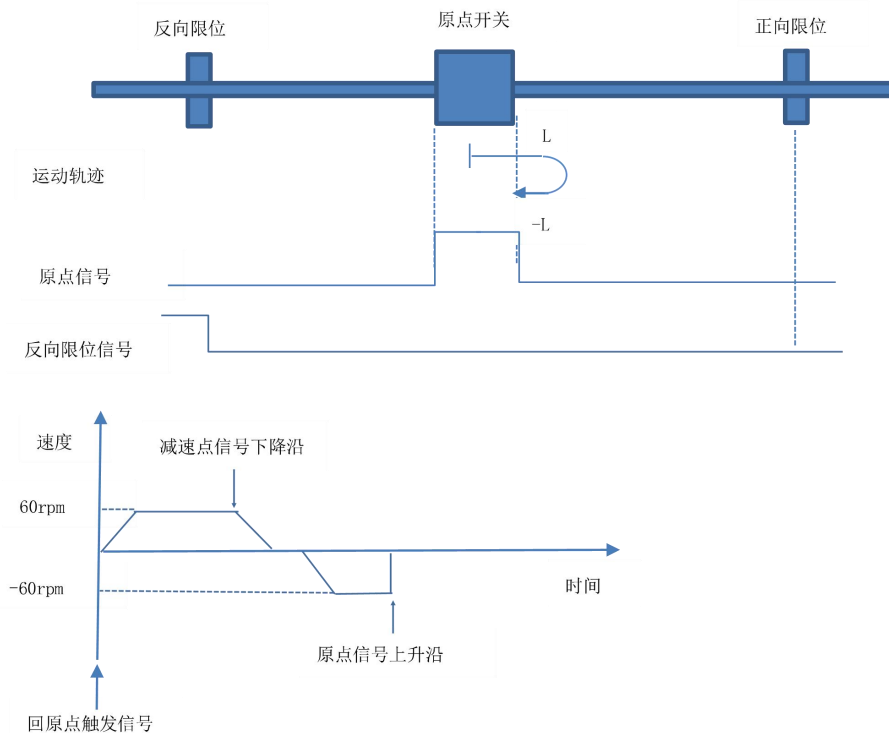
(2) The deceleration signal is invalid at zero time, and the reverse limit switch is encountered



0x0040=29 and invalid deceleration point, reverse limit switch encountered

Start back to zero HW = 0, start back to zero at reverse high speed, if the limit switch, automatically reverse, forward at high speed, HW rising edge, deceleration, forward low speed, HW falling edge reverse low speed, and HW rising edge

(3) The deceleration signal is effective at zero time return



0x0040=29 and the deceleration point is valid

When HW = 1 starts to zero, it will directly return to zero towards low speed, reverse low speed at HW descending edge and stop at HW rising edge.

### Back to zero setting steps:

#### (1) Drive enables operation

After the drive is powered up or reset, if the drive is disabled. Write 1 to the motor enable / release register (0x0038) and the motor enables power.

#### (2) Set the mode back to zero mode

Set back to origin mode and write 18 to the drive (0x0040).

#### (3) Set the running parameters back to zero

Set back, zero approach speed (0x0041), query back zero speed (0x0042), back zero acceleration and deceleration time (0x0043) and other parameters.

#### (4) Start to return to zero action

Start to write 0x0010 to the control word (0x0036), write 0x0020 deceleration stop, write x0040, emergency stop.

### Example of return to zero programming (assuming the slave station number is 1)

-----Motor to overpower the-----

```
01 06 00 38 00 01 C 9 C7 "Motor enables electricity"
```

-----Set the back-zero running parameter-----

```
01 06 00 40 00 12 08 13 "Set back to zero mode selection register to 18"
```

```
01 06 00 41 00 78 D9 FC "Set the return to zero approach speed to 120rpm"
```

```
01 06 00 42 00 1E A 9 D 6 "Set speed query zero speed to 30rpm"
```

01 06 00 43 00 64 79 F5 "Set back to zero subtraction time to 100ms"

You can also write back to the origin parameter all at once

01 10 00 40 00 04 08 00 12 00 78 00 1E 00 64 53 75

-----Start back to zero to-----

01 06 00 36 00 10 68 08

-----Slow down to stop the-----

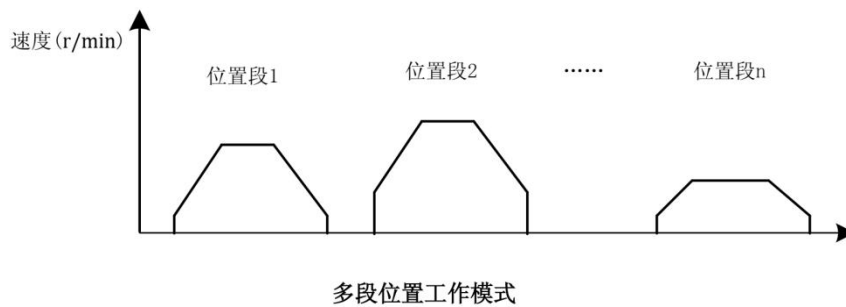
01 06 00 36 00 20 68 1C

-----Emergency stop-----

01 06 00 36 00 40 68 34

#### .46 Multiple position mode

.1 Multisegment position mode function is a working mode of combining multiple position segments in a certain order, triggering the movement through DI signal, and completing a series of position segment movements. This function can also be seen as a combination of position modes described by the 6-position mode. The difference is that the user can store the description parameters of several position segments such as acceleration and deceleration time, the total number of pulses in the EEPROM in advance, and only a trigger signal is provided to complete the work when these position segments are enabled. The working process is described as shown in the figure below.



Multiple locations need to be selected and triggered by the DI port to run, as illustrated below:

Register address	Set the value	explain
0x0015	11	D I2 is configured to trigger for the positional path
0x0016	13	DI 3 is configured as the path selection switch 0
0x0017	14	DI 4 is configured as a path selection switch 1
0x0018	15	DI 5 is configured as a path selection switch 2
0x0019	16	DI 6 is configured as a path selection switch 3

After configuring the DI port according to the table above, select the position segment through DI 3 to DI 6, and then trigger the DI 2 (rising edge) position segment. The corresponding table of the position segment parameters is as follows:

The parameter name	explain
Total Pulses high (0x0060~0x006F)	Pulse number high
Total pulse number low (0x0070~0x007F)	Pulse number low
Operating speed (0x0080~0x008F)	Position-segment running speed
Acceleration time (0x0090~0x009F)	The position segment runs on the acceleration time
Reduced-down time (0x00A	Position segment running deceleration

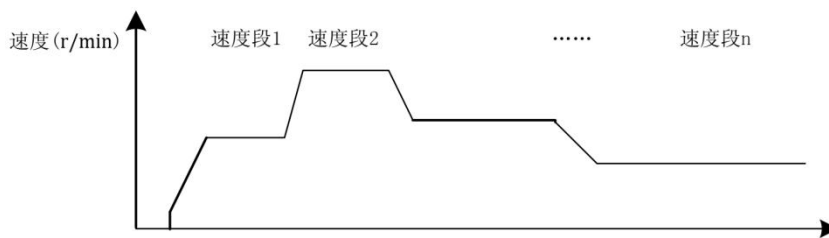
0~0x00AF)	time
-----------	------

#### Multisegment position mode setting

Register address	definition	Windows default	explain
0x0039	Multisegment position trigger mode	0	0: Ignoring new instructions when positioning is run 1: Interrupt the current location run to execute the new instructions
0x003A	Multisegment position absolute position / relative position mode setting	0	0: the relative position mode; 1: absolute position mode;

#### .56 Multiple speed mode

The multisegment speed mode function is a working mode of storing multiple speed segments in advance, triggering movements through DI signal, and completing a series of different speed movements. The working process is described as shown in the figure below.



多段速度工作模式

Multiple speeds need to be selected and triggered through the DI port to run. Examexamples are shown below.

Register address	Set the value	explain
0x0015	12	D I2 is configured to trigger for the speed path
0x0016	13	DI 3 is configured as the path selection switch 0
0x0017	14	DI 4 is configured as a path selection switch 1



0x0018	15	DI 5 is configured as a path selection switch 2
0x0019	16	DI 6 is configured as a path selection switch 3

After configuring DI according to the table above, select the speed segment through DI 3 to DI 6, and then DI2 triggers (turn on and run off and stop) for the speed segment,

The parameter name	explain
Operating speed (0x00B0~0x00B F)	Speed segment running speed
Acceleration time (0x00C 0~0x00C F)	Speed segment running acceleration time
Reduced-down time (0x00D 0~0x00D F)	Speed segment running deceleration time