EtherCAT Series

Bus Drive

Product Functionality Brochure

Version: V1.0

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Catalogue

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Foreword

Thank you for using our bus type hybrid servo driver.

Before using this product, be sure to read this manual carefully for necessary safety information, precautions, and operating instructions. Incorrect operation may lead to extremely serious consequences.

Statement

This product is not designed and manufactured to protect personal safety from the threat of the mechanical system. Users are requested to consider safety precautions during the design and manufacture of the mechanical system to prevent accidents caused by improper operation or product abnormalities.

The contents of the manual are subject to change without notice due to product improvements. We will not be responsible for any modification of the product by the user.

When reading, please note the following markings in the manual:



Note: You are reminded of the key points in the text.



CAUTION: Indicates that incorrect operation may result in personal injury and equipment damage.

releases	descriptive	timing	note
V1.0	First Edition Release	2025/06/01	

1 Summarize

Yankong has launched the DM-EC series and CL-EC series of high-speed bus control drives based on EtherCAT technology, with a standard Ethernet bus interface and communication rates up to 100Mbps. The bus interface adopts the standard Ethernet interface, and the communication rate can reach 100Mbps. The products have been tested for a long time and can support the master control system of many domestic and foreign companies, such as Beckhoff, Omron, Panasonic, Keyence, Inovance, Trio, Delta, etc. They are characterized by easy use, stable and reliable. With the characteristics of easy to use, stable and reliable, it has been widely used in 3C, photovoltaic new energy, textile, robotics and other industries.

This manual is an introduction to the functions and usage of EtherCAT series bus-type drives, including the use of motion control functions, the use of commonly used functions, and the introduction of object dictionaries, etc. It is applicable to the products listed below.

Model number
DM556EC/DM860EC
CL57EC/CL86EC

For more information about the electrical specifications, dimensions and interfaces of specific models, please download the corresponding product manuals

2 EtherCAT communication protocol

EtherCAT is an open, real-time Ethernet-based fieldbus technology from Beckhoff, characterized by high performance, flexible topology and simple system configuration. At the same time, it meets and even reduces the cost of fieldbus use. etherCAT is characterized by high-precision device synchronization, optional
cable redundancy, and a functional safety protocol (SIL3). EtherCAT is a completely open technology, and it is currently included in the international standards IEC61158, IEC61784, and ISO15745-4.

2.1 Introduction to EtherCAT Features

Parameters		Clarification
EtherCAT Communication indicators	link layer	100BASE-TX Ethernet
	communications port	RJ45 standard network port
	Network topology	Line, Tree, Star, etc.
	baud	100Mbps full duplex communication
	Telecommunication cables	Double shielded Category 5 100 Gigabit Ethernet cable or higher specification cable
	Synchronization Manager	SM0: Mailbox reception
		SM1: Mailbox delivery
		SM2: Process data output RPDO
		SM3: Process data input TPDO
	communication mode	SM Synchronized Mode
		DC synchronization mode, synchronization period 250us~4000us
	application Layer protocol (ALP)	COE: CANopen Over EtherCAT
	Cia402 Operating Mode	Cyclic Synchronous Position Mode (Cyclic Synchronous Position Mode;) Position Mode (Profile Position Mode;) Velocity Mode (Profile Velocity Mode); Back to Homing Mode (Homing Mode);

2.2 Application Layer Protocol CoE

CANopen was originally developed as an application layer protocol for systems based on the CAN bus. the EtherCAT protocol supports the CANopen protocol at the application layer and has been extended accordingly, with the following

main functions:

Use mailbox communication to access the CANopen object dictionary and its objects for network initialization;

Network management using CANopen contingency objects and edgeable event- driven PDO messages; mapping of process data using object dictionaries; cyclic transfer of command data and status data;

※ COE Object Dictionary

The CoE protocol follows the CANopen protocol exactly and its object dictionary is defined in the same way. The Object Dictionary list in Section 8 lists allcommunication data objects of the COE, which is extended with the related communication objects
0x1C00 to 0x1C4F for EtherCAT communication, which are used to set the type of the storage synchronization manager, communication parameters and PDO data allocation.

※ Service Data Object (SDO)

SDO messages are used to access the object dictionary of a device and to configure the device in a CANopen network.SDO communication is based on the Client/Server model, i.e. the sent message must be acknowledged by the receiver. The accessor is called the Client, and the device whose object dictionary is accessed and responds to read and write requests is called the Server.

(Server.) The protocol specifies that reading the value of the object dictionary is called Upload and modifying the value of the parameter is called Download.

※Process Data Object (PDO)

The SDO protocol is used for the operation of object dictionaries and handles data with low real-time performance, while data with high real-time performance requirements are usually transmitted via PDO.

The PDO communication method is based on the Producer/Consumer model, where data is sent from one device (Producer) to another device (Consumer) or to many other devices (Broadcast method) and is transmitted in non-acknowledged mode, with the data transfer limited to 1 to 8 bytes. CANopen devices are described by the two parameters of the PDO: the communication Parameter:

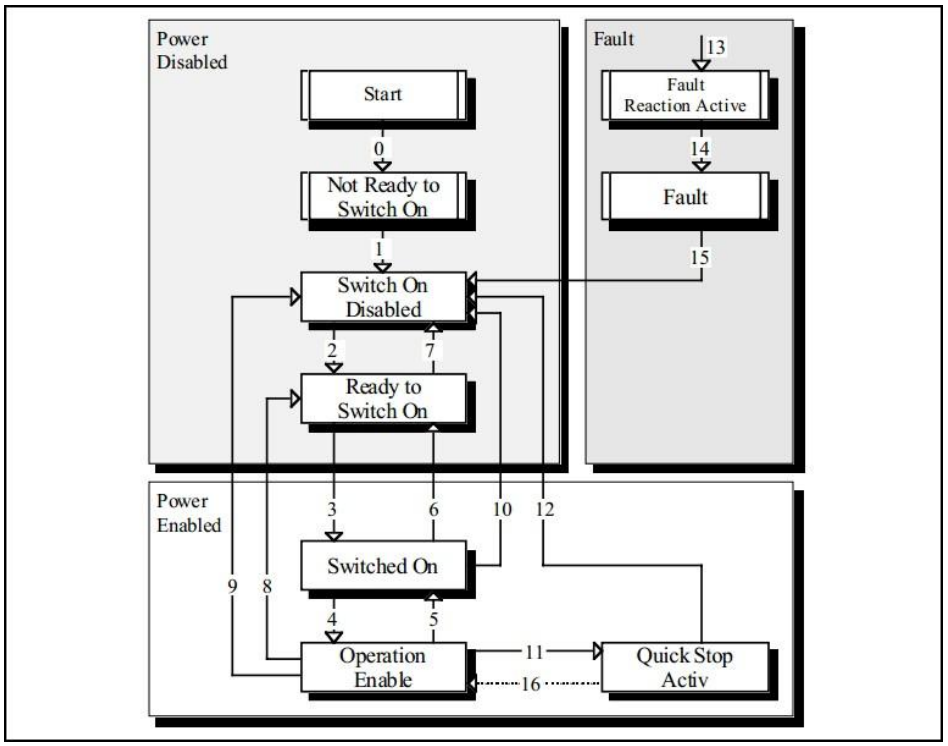
Communication
(Communication Parameter) and Mapping Parameter to complete the receive or send.

3 Motion control (CiA 402)

3.1 CIA402 State Machine

The CiA402 protocol defines the standard state machines for motion control devices, as well as the various modes of operation and their definitions in the object dictionary.

The standard state machine describes the state of a device and the possible control sequences of the driver. Each step of the state represents a specific internal or external behavior, and the state of the device determines which commands can be received.



Drive State Machine

The following table describes each state of the state machine:

Status name	Clarification
Not Ready to Switch on	The device is powered on, the drive is initialized and performing internal self-tests, the brake Also activated.
Switch on Disabled	CANopen communication has been started and the SDO communication service can be utilized for the drive Parameter Settings.
Ready to Switch on	The drive continues to be parameterized and the motor is not excited.
Switched on	The drive motor ready state, in which the output stage voltage will be turned on last, but the The drive function cannot be executed.
Operation Enable	The drive motor is enabled and the drive is in normal operation state, controlling the motor according to the control mode.
Quick Stop Active	The Quick Stop function is activated, the drive function is activated and the motor is started at the same time.

The drive state machine is controlled by the bit0~bit3 andbit7 bits of the control word (object 6040h), which are described in the following table:

Control word 6040h Switching status

Command	Control Letter					State switching
	Bit7	Bit3	Bit2	Bit1	Bit0	
Shutdown	0	X	1	1	0	2,6,8
Switchon	0	0	1	1	1	3
Switch on + Enable operation	0	1	1	1	1	3+4
Disable voltage	0	X	X	0	X	7, 9, 10, 12
Quick stop	0	X	0	1	X	7, 10, 11
Disable Operation	0	0	1	1	1	5
Enable Operation	0	1	1	1	1	4,16
Fault reset	0-1	X	X	X	X	15

the state word (object 6041h), which are described in the following table: **Status word 6041h Switching status**

Status word						State of affairs
Bit6	Bit5	Bit3	Bit2	Bit1	Bit0	
0	X	0	0	0	0	Not ready to switch on
1	X	0	0	0	0	Switch on disabled
0	1	0	0	0	1	Ready to switch on
0	1	0	0	1	1	Switched on
0	1	0	1	1	1	Operation enabled
0	0	0	1	1	1	Quick stop active
0	X	1	1	1	1	Fault reaction active
0	X	1	0	0	0	Fault

3.2 operating mode

CANopen sets the operating mode of the drive via object 6060h (Mode of Operation) and reflects the current operating mode status of the drive via object 6061h (Mode of operation display).

The drive currently supports 4 operating modes:

✓ Cyclic Synchronous Position Mode(**CSPM**);

✓ Position Mode (**Profile Position Mode** ;)

✓ Velocity Mode (**Profile Velocity Mode** ;)

✓ Back to Homing Mode (**Homing Mode**);

Indexing	Subindex	Name (of a thing)	Clarification
6060h	00	operating mode	0: Not defined; 1: Positional mode; 3: Speed mode; 6: Back to home mode; 8: Cyclic synchronized position mode;

3.3 Control and Status Words

In the Cia402 protocol, there is a control word object dictionary 6040h and a status word object dictionary 6041h. Subsection 3.2 describes the switching of the drive state machine by means of control words and status words. In addition, the master interacts with the drive via the control word and status to control the operating modes. Each bit of the control word and the status word defines a different function.

(Bit4~Bit6, Bit8) are defined differently in different operating modes, please refer to subsections 3.4~3.7 for details.

3.3.1 control letter

Each control word is defined in the following table:

※ Control word 6040 Bit definition (Bit)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Manufacturer specific				reserved			Halt	Fault reset	Operation mode specific			Enable operation	Quick stop	Enable voltage	Switch on

Bit0~Bit3, Bit7: used for Cia402 state machine control, has been detailed in section 3.2, do not go into details;

Bit4~Bit6, Bit8: These bits have slightly different functions in different working modes, and the working mode is

through 6060h object word

Canonical configuration. The following table provides an overview of the functions in each working mode. For details, see sections 3.4 to 3.7.:

Bit		8	6	5	4
工作模式	Csp	Halt	reserved	reserved	reserved
	PP	Halt	Abs/rel	Change set Immediately	New set-point
	Pv	Halt	reserved	reserved	reserved
	Home	Halt	reserved	reserved	Homing operation start

Bit9~Bit11: Reserved bits, no function for now;

Bit12~Bit15: Specified by the manufacturer, each manufacturer can define its own function according to the need, there is no function here for the time being;

3.3.2 status word

Each bit of the status word is defined as shown in the following table:

Status word 6041 Bit definition (Bit)

7	6	5	4	3	2	1	0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Opeartion enabled	Switched on	Ready to switch on
15	14	13	12	11	10	9	8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	Manufacturer

Bit0~Bit3, Bit5~Bit6: Used for Cia402 state machine feedback, which has been introduced indetail in subsection 3.2, and will not be repeated;

Bit4: Power-on valid bit, this bit 1 after power-on;

Bit5: Fast Stop Bit, a 0 in this bit indicates that the drive is stopping fast;

Bit7: Warning Bit, a 1 in this bit indicates that a warning message exists within the drive;

Bit8: Manufacturer specified bit, each manufacturer can define its own function according to the need, there is no function here for the time being;

Bit9: Remote bit, the control word can not be operated when the bit is zero;

Bit11: Hardware limit valid bit, when the limit signal is valid, this bit 1;

Bit14~Bit15: Specified by the manufacturer, each manufacturer can define its own function according to the need, there is no function here for the time being;

Bit10, Bit12~Bit13: The functions of these bits are slightly different in different

operating modes, the following table summarizes the functions of the bits in each operating mode, please refer to subsections 3.4~3.7 for detailed descriptions.

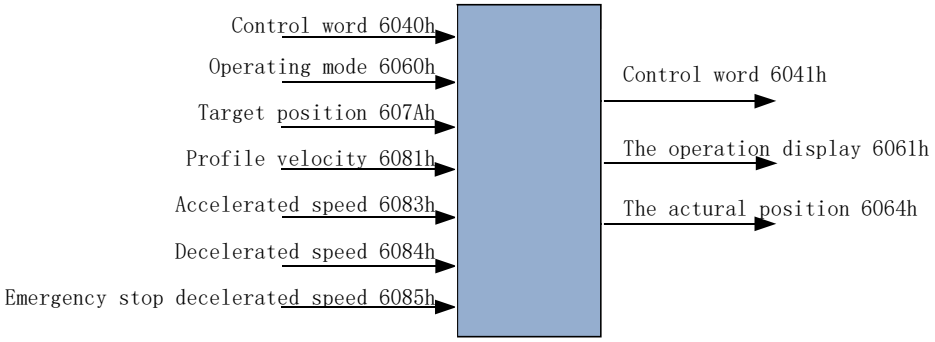
Bit		13	12	10
	Csp	Reserved	Driver follow the command value	reserved
	PP	Following error	set-point acknowledge	Target reached
	Pv	Max slippage error	Speed	Target reached
	Home	Homing error	Homing attained	Target reached

3.4 Cyclic synchronized position mode (csp)

In the cycle synchronized position mode, the controller completes the position instruction planning and outputs the planned target position 607Ah, and at the same time sends the target position to the driver in a cycle synchronized manner, and the driver completes the position and speed control internally.

At the same time, it is necessary to set the value of the operating mode object 6060h to 8. When the register of the operating mode status object 6061h is read as 8, the operation related to the CSP operating mode can be performed.

The related communication objects are listed below:



※ Control word 6040 Function

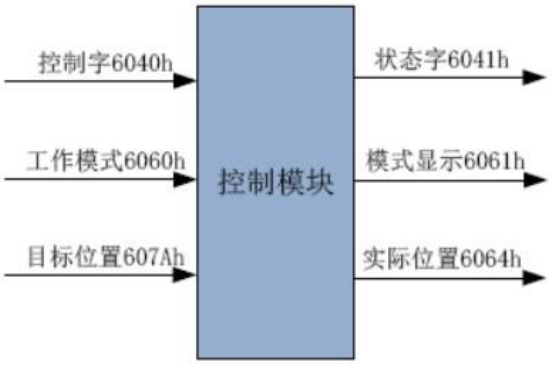
Control word **6040h**			
Byte	Name	Value	Description
Bit4	New set-point	0	no target position
		1	The target position update
Bit5	Change set immediately	0	update after acheive given position
		1	update immeditary
Bit6	abs/rel	0	target position is absolute value
		1	target position is relative value
Bit8	Halt	0	Move according to Bit4~Bit6 value
		1	Stop

※ States word 6041 Function

The State 6041h			
Byte	Name	Value	Description
Bit10	Target reached	0	Halt=0: Target speed no reached Halt=1: the axies slow down
		1	Halt=0: Target speed reached Halt=1: the axies is zero
Bit12	Drive follow the command value	0	Can update target position
		1	Cannot update target position
Bit13	Following error	0	Have no following error
		1	Have following error

In position mode, motion triggering is accomplished by writing 0 and 1 successively to Bit4 bits of the control word 6040h to generate a rising edge.

Once the driver receives the trigger command, the Bit12 of the status word is set to 1, the motion begins, and the bit6 of the control word controls whether the motion is an absolute or relative positioning motion.



※ Control word 6040 Function Description

The Control word have no function in this mode.

※ Status word 6040 Function Description

Status word 6041h			
Bytes	Name	Value	Description
Bit12	Drive follow the command value	0	Slave station did not follow
		1	Slave station follow
Bit13	Following error	0	No following error
		1	Have following error

The related object dictionary description:

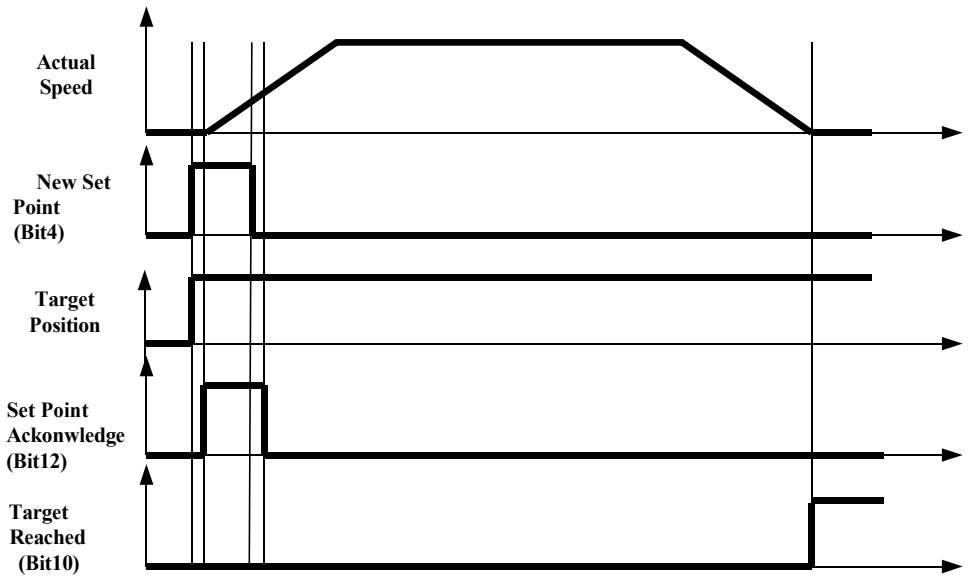
Index	Sub-index	Name	Inter view	Date types	Unit	Range
607Ah	00	target position	RW	INT32	p	-2^31~2^31-1
6064h	00	actual position	RO	INT32	p	-2^31~2^31-1

3.5 Position Modes(pp)

This mode is mainly used for point positioning motion. In this mode, the controller gives the target position 607Ah, position curve speed 6081h, acceleration 6083h, deceleration 6084h parameters, and scram deceleration 6085h to complete trajectory planning inside the drive.

At the same time, the value of working mode object 6060h needs to be set to 1. When the working mode status object 6061h register is read as 1, related operations can be performed in PP working mode.

Related communication objects are as follows:

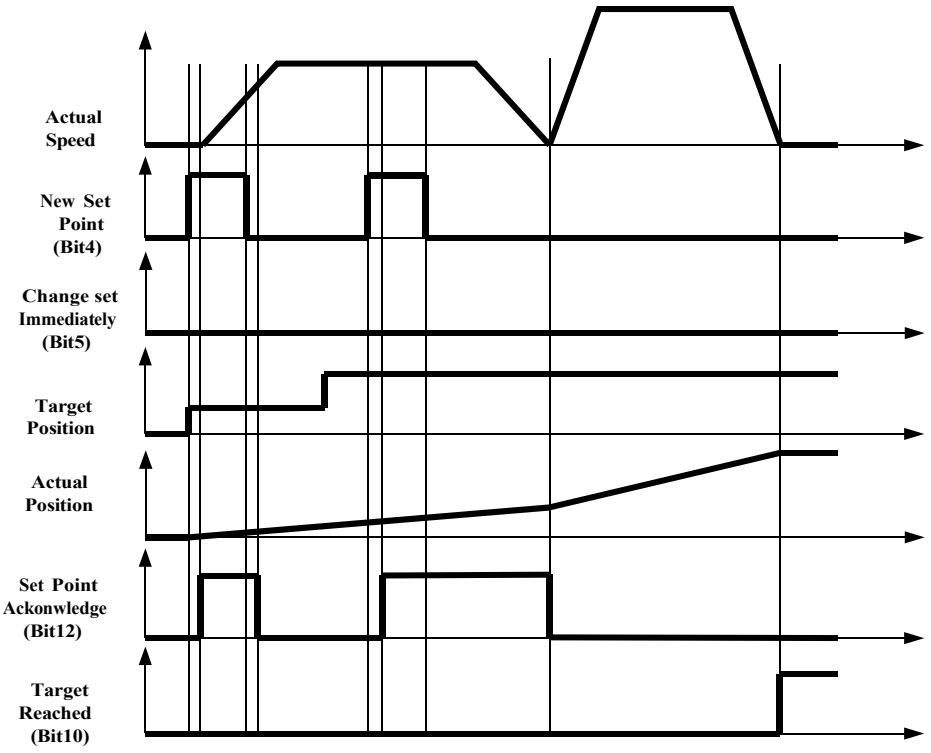


Bit10 of the status word is set to 1 once the target position has been reached,and remains 0 if the target position is not reached or if there is a fault with too large a position error deviation.

When the new target position is updated, two situations occur: the current target position is reached and the current target position is not reached. If a new target position and a new trigger command occur when the current target position has not been reached, the response should be according to the situation given in

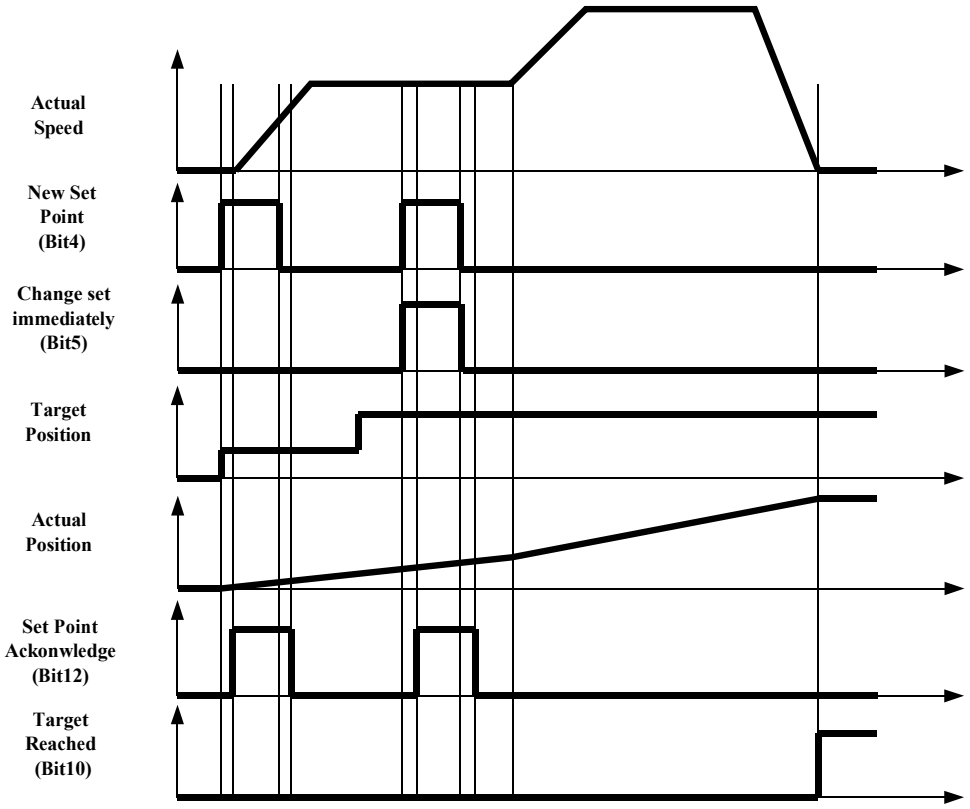
Bit 5 of control word 6040h.

When Bit5 of 6040h is 0, it means that the current motion must be completed before responding to new target position and trigger commands. The bit changes related to the control word and status word are shown below:



New target positions are not updated as soon as they become available

When the Bit5 bit of 6040h is 1, it means that the current motion is interrupted to respond immediately to the given new target position and trigger command.Order. The bit changes associated with the control word and status word are shown below:



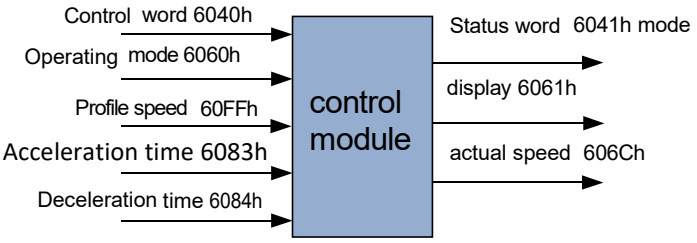
Update new target positions as soon as they become available

3.6 Speed mode (pv)

In this mode, the controller sends the target speed of 60FFh, the acceleration time of 6083h, and the deceleration time of 6084h to the driver, and the speed profile planning is done by the driver internally.

At the same time, it is necessary to set the value of the operating mode object 6060h to 3. The operation related to the PV operating mode can be performed when the register of the operating mode status object 6061h is read as 3.

The related communication objects are listed below:



※ **Function description of control word**

Control word **6040h**			
Bytes	Name	Value	Description
Bit8	Halt	0	Move according to 60FFh value
		1	Stop

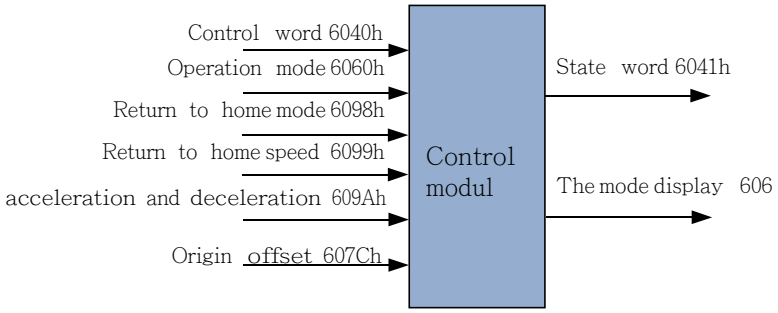
※ **States word 6041 Function**

States word **6041h**			
Bytes	Name	Value	Description
Bit10	Target reached	0	Halt=0: Target speed haven't reach Halt=1: The axies slow down
		1	Halt=0: Target speed reach Halt=1: Target speed is zero
Bit12	Speed	0	The speed is 0
		1	The speed isn't 0

3.7 Home mode (home)

Return to the origin mode requires the origin signal to be connected to the input terminal of the drive, and the drive internally completes the search and positioning of the mechanical origin.

At the same time, it is necessary to set the value of the working mode object 6060h to 6. The operation related to the HM working mode can be performed when the register of the working mode status object 6061h is read as 6. The objects involved in this mode are as follows:



※ Function description of control word

Control word 6040h			
Bytes	Name	Value	Description
Bit4	New set-point	0	No satrt to return to home
		0->1	Satrt to return to home
		1	Return to home
		1->0	Interrupt the motion to home
Bit8	Halt	0	Move according to Bit~Bit6 order
		1	Stop

※ Status word function description

State word **6041h**			
Bytes	Name	Value	Description
Bit10	Target reached	0	Halt=0: Have no reach the origin
Bit10	Target reached	0	Halt=1: Axies slow down
		1	Halt=0: Reach the origin position Halt=1: Axies speed is 0
Bit12	Drive follow the command value	0	Home mode hace no accomplish
		1	Home mode hace accomplish
Bit13	Following error	0	NO following error
		1	Following error

The driver supports 1~14, 17~30, 33, 34, 35 home return methods, among which, 1~14, 33, 34 zero return modes need to be matched with closed-loop stepping motors with Z signals, the specific description can be found in Appendix 1.

4 Common Functions

4.1 Drive Segment Configuration

The drive's interpolation value is the command value required to rotate the motor one revolution, usually the factory default interpolation value is 10000 for closed-loop drives and 50000 for open-loop drives. if you need to adjust this scale value, you can adjust it through the 2400h Object Dictionary.

※ 2400h drive segmentation setting object

Index	Subindex	Name	Clarification	Default value	Parameter range
2400h	00	drive segmentation	drive segmentation setting	-	400~51200

4.2 Output Current Configuration

The factory default current of the driver varies depending on the model, as shown in the table below:

model number	DM556EC	DM860EC
amps	4000	5500

Note: The currents in the table are rated values in mA;

In actual use, if the rated currents of the selected supporting motor and the drive do not match, the following object dictionary can be modified. If the rated current value of the supporting motor is less than the factory current value of the driver, please make sure to modify the current value in advance before driving the motor, otherwise the motor will be easily burned.

※ 2401h Maximum current object

Index	Subindex	Name (of a thing)	Clarification	Default value	Parameter range
2401h	00	The max current	The max current,unit mA	-	0~5500

4.3 Input and output terminals

The driver provides multiple input and output terminals. The input and output terminals have a variety of functions, as shown in the table below:

terminals	Configurable Features
Input Terminal Function	0: Not defined; 1: Origin; 2: Positive limit; 3: Negative limit; 4: Stop; 5: Emergency stop; 6: MF signal; 7: Probe 1; 8: Probe 2; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2; 12: User-defined 3; 13: User-defined 4;
Output Terminal Function	0: Not defined; 1: Alarm signal; 2: Signal in place; 4: Brake signal; 5: Encoder z signal; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2;

The drive input and output terminals are configurable through the 2300h group registers, where:

2300h~2301h The valid level status of input signal and output signal can be changed;

2310h~2322h registers are used to configure each terminal function;

The 2330h~2336h registers describe the driver's internal software filtering time for the input terminals;

Indexing	Subinde x	Name (of a thing)	Clarification	Default value	Paramete r range
2300h	00	Input terminal active level logic	Bit0~Bit6: X0~X6 control bits; 0: Default; 1: Level inversion;	0	0~65535
2301h	00	Output Terminal Effective Level Logic	Bit0~Bit2: Y0~Y2 control bits; 0: Default; 1: Level inversion;	0	0~65535
2310h	00	Input terminal X0 Function selection	0: Not defined; 1: Origin; 2: Positive limit; 3: Negative limit; 4: Stop; 5: Emergency stop; 6: MF signal; 7: Probe 1; 8: Probe 2; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2; 12: User-defined 3; 13: User-defined 4;	1	0~13
2311h	00	Input terminal X1 Function selection		2	0~13
2312h	00	Input Terminal X2 Function Selection		3	0~13
2313h	00	Input terminal X3 Function selection		0	0~13
2314h	00	Input terminal X4 Function selection		0	0~13
2315h	00	Input terminal X5 Function selection		0	0~13
2316h	00	Input terminal X6 Function selection		0	0~13
2317h	00	Input terminal X7 Function selection		0	0~13
2320h	00	Output terminal Y0 Function selection	0: Not defined; 1: Alarm signal; 2: signal in place;	0	0~11
2321h	00	Output terminal Y1 Function selection		0	0~11

2322h	00	Output terminal Y2 Function selection	4: Brake signal; 5: Encoder z signal; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2;	0	0~11
2330h	00	Input terminal X0 Filter time	Input terminal X0 Filter time	0	0~65535
2331h	00	Input terminal X1 Filter time	Input terminal X1 Filter time	0	0~65535
2332h	00	Input terminal X2 Filter time	Input terminal X2 Filter time	0	0~65535
2333h	00	Input terminal X3 Filter time	Input terminal X3 Filter time	0	0~65535
2334h	00	Input terminal X4 Filter time	Input terminal X4 Filter time	0	0~65535
2335h	00	Input terminal X5 Filter time	Input terminal X5 Filter time	0	0~65535
2336h	00	Input terminal X6 Filter time	Input terminal X6 Filter time	0	0~65535
2337h	00	Input terminal X7 Filter time	Input terminal X7 Filter time	0	0~65535

The validity of defined input signals can be monitored via the 60FDh object dictionary.

Index	Subinde x	Name	Clarification	Default value	Paramete r range
60FD	00	input signal function status. 0: Invalid; 1: Effective;	Bit0: Negative limit state; Bit1: Positive limit state; Bit2: Home state; Bit3~Bit15:Reserved; Bit16: Probe 1; Bit17: Probe 2; Bit18: User-defined 0; Bit19: User-defined 1; Bit20: Userdefined 2 Bit21:to user-de: User-Defined; Bit22: User-defined 4;	-	-

When the output terminals Y0 to Y5 are set to user-defined (user-defined 0 to user- defined 4), you can use the 60FEh object dictionary to control whether the output is valid or invalid.

Index	Subinde x	Name	Clarification	Default value	Paramete r range
60FE	01	Physical output on	Output terminal function is valid Bit0~Bit15: Reserved; Bit16~Bit31: User- defined; 0: Output invalid; 1: The output is valid;	0	-
	02	Physical Output Enable	Output terminal function enable Bit0~Bit15: reserved; Bit16~Bit31: user- defined; 0: output disable; 1: Output enable;	0	-

For example, when bit16 o f 60FE-01 and bit16 o f 60FE-02 are both 1, the Y0 terminal output is valid;

4.4 Parameter Save Recovery

When writing parameters, it is necessary to keep the motor stopped, otherwise the parameters will fail to be written. After the parameter is written, if it needs to be saved for long-term use, it is necessary to save the command and restart to ensure that the parameter is saved correctly. The parameter save command dictionary is 2102h, and the specific usage is as follows:

※ 2102h Command Object

Index	Subindex	Name	Clarification	Default value	Paramete r range
2102h	00	EEPROM Operation	0: Invalid; 1: 2000h Group parameters are restored to factory; 2 2000h are saved to EEPROM;	0	0~2

4.5 Common Object Dictionar

※ 2004h~2005h Signal status object

index	subinde x	name	clarification	default value	Paramete r range
2004h	00	Input Signal Status	Input signal level status Bit0~Bit6: X0~X6 Input level status;	-	-
2005h	00	Output Signal Status	Output signal level status Bit0~Bit2: Y0~Y2 output	-	-

normally closed is determined by the 2300h object;

2005h describes the current output terminal state, e.g., when 2005h-Bit0 is 1, the Y0 output signal is valid at this time; whether the valid state is normally open or normally closed is determined by the 2301h object;

2206h object describes the operation mode of the drive, currently it supports 3 operation modes, when the open loop motor is adapted the object is set to 1, for the open loop operation mode; when the closed loop motor is adapted, the value can be set to 2~3, for the closed loop operation mode;

※ 2205h~2206h Configuration class object

Index	Subinde x	Name	Clarification	Default value	Paramete r range
2205h	00	Motor Default Direction	0: Default; 1: Reverse;	0	0~1
2206h	00	Drive Operation Mode	0: Invalid; 1: Open-loop mode; overdrive angle 1 mode; 3: Closed-loop overdrive angle 2 mode;	-	0~4

The 2205h object describes the motor's default positive direction, which can be modified by modifying this value .

The 2206h object describes the operating mode of the drive. Currently, four operating modes are supported. When the open-loop motor is adapted, the object is set to 1, which is the open- loop operating mode. When the closed-loop motor is adapted, the value can be set to 2~4, which is the closed-loop operation mode;

※ 2407h Encoder resolution object

Index	Subind ex	Name	Clarification	Default value	Parameter range
2407h	00	Encoder Resolution	Encoder Resolution	4000	4000~51200

The 2407h object is used to configure the drive input encoder resolution, which must be 4 times the frequency of the encoder value installed on the matching motor, e.g. for a 1000-wire closed-loop motor, the value is set to 4000;

※ 240Ah position overrun alarm threshold

Index	Subindex	Name	Clarification	Default value	Parameter range
240Ah	00	Position error alarm threshold	Position error alarm threshold	4000	0~4000

The 240Ah object describes the alarm threshold of the encoder's lost pulse value in the closed- loop working mode, the default is 4000, that is, the out-of-error alarm after losing a circle;

※ 240Bh Positioning error range object

Index	Subindex	Name	Clarification	Default value	Parameter range
240Bh	00	Positioning Error range	Positioning Error range	5	1~100

The 240Bh object describes the positioning accuracy when in place in closed-loop operating mode, in 1 encoder unit;

4.5 Probe Functions

Probe function is a function to lock the current position information instantly by capturing the rising or falling edge signal of external sensors, the probe function is usually applied in csp or pp mode. The driver supports 2 probes, X0 or X1 can be selected as the probe function.

4.5.1 Related Objects Dictionary

※ Dictionary of related objects

Indexing	Subindex	Name (of a thing)	Clarification	Default value	Parameter range
60B8h	00	Probe Control	Probe Control Object;	0	-
60B9h	00	Probe Status	Probe Status Object	0	-
60BAh	00	Probe Latch	Probe 1 rising edge latch position	0	-
60BBh	00	Probe Latch	Probe 1 falling edge latch position	0	-
60BCh	00	Probe Latch	Probe 2 rising edge latch position	0	-
60BDh	00	Probe Latch	Probe 2 falling edge latch position	0	-
60D5h	00	Probe Latch counter	Probe 1 rising edge latch position	0	-

Indexing	Subindex	Name(of a thing)	Clarification	Default value	Parameter range
60D6h	00	Probe Latch counter	Probe 2 falling edge latch	0	-
60D7h	00	Probe Latch counter	Probe 2 falling edge latch	0	-
60D8h	00	Probe Latch counter	Probe 2 rising edge latch position	0	-

4.5.2 Probe function description

Before using the probe function, configure X0 or X1 as the probe function. For details, see the following registers

※ The probe function configures the object dictionary

Index	Subindex	Name	Clarification	Default value	Parameter range
2310h	00	Terminal Functions	Input terminal X0 Function selection	7	0~65535
2311h	00	Terminal Functions	Input terminal X1 Function selection	8	0~65535

You can complete the probe function settings through the Probe Configuration Object Dictionary, and understand the current working status of the probe through the Probe Status Object Dictionary. The following table describes the specific configurations of the 60B8h Object Dictionary and the 60B9h Object Dictionary.

※ 60B8h Probe control Object Dictionary

index	subindex	functional Description	
60B8h	00	Bit0	0: Probe 1 is not enabled; 1: Probe 1 in enabled
		Bit1	0: Probe 1 one-shot mode; 1: Probe 1 continuous mode;
		Bit2~Bit3	Reservations
		Bit4	0: Probe 1 rising edge not enabled; 1: Probe 1 rising edge enable;
		Bit5	0: Probe 1 is not enabled on the falling edge; 1: Probe 1 falling edge enable;
		Bit6~Bit7	Reservations
		Bit8	0: Probe 2 is not enabled; 1: Probe 2 enabled;
		Bit9	0: Probe 2 one-shot mode; 1: Probe 2 continuous mode;
		Bit10~Bit11	Reservations
		Bit12	0: Probe 2 rising edge not enabled; 1: Probe 2 rising edge enable;
			0: Probe 2 is not enabled on the falling edge;

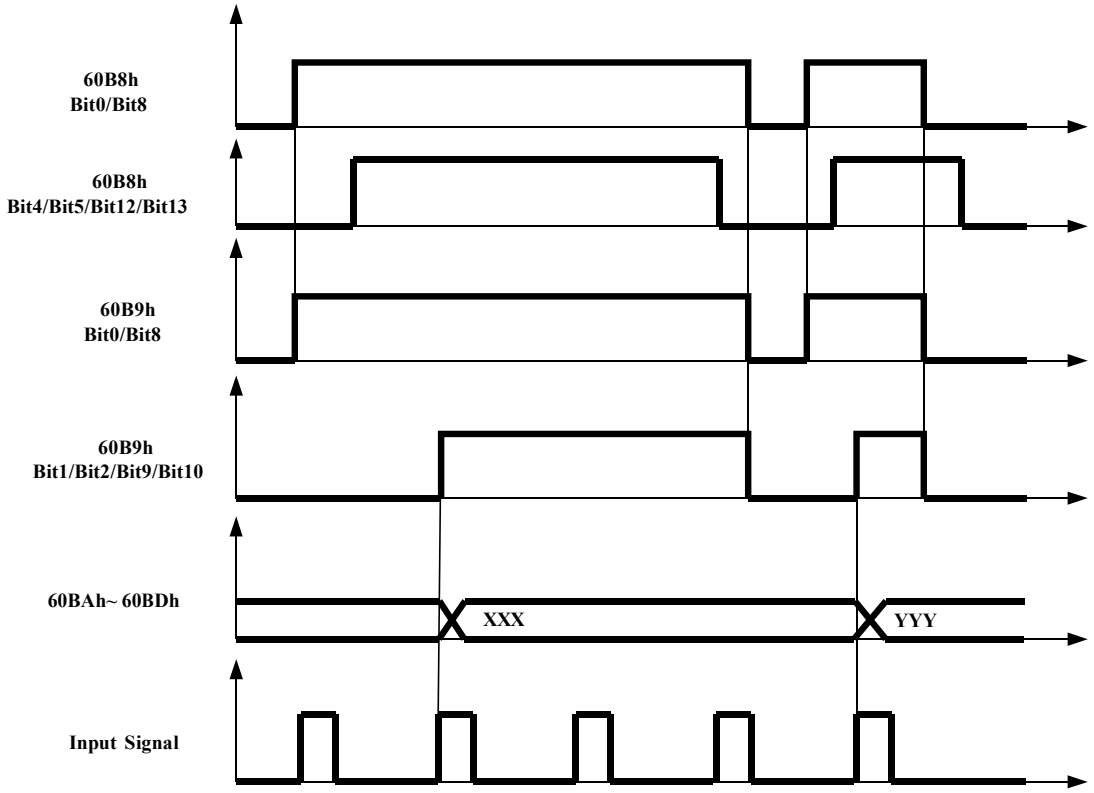
※ 60B9h Probe Status Object Diction

Index	Subindex	Functional Description	
60B9h	00	Bit0	0: Probe 1 is inactive; 1: Probe 1 in operation;
		Bit1	0: Probe 1 rising edge capture not completed; 1: Probe 1 rising edge capture completed;
		Bit2	0: Capture along the descending edge of Probe 1 is not complete; 1: Capture along the descending edge of Probe 1 is complete;
		Bit3~Bit7	reserved
		Bit8	0: Probe 1 is inactive; 1: Probe 1 in operation;
		Bit9	0: Probe 2 rising edge capture not completed; 1: Probe 2 rising edge capture completed;
		Bit10	0: Capture along Probe 2 drop is not complete; 1: Probe 2 drop along capture is complete;
		Bit11~Bit15	Reservations;

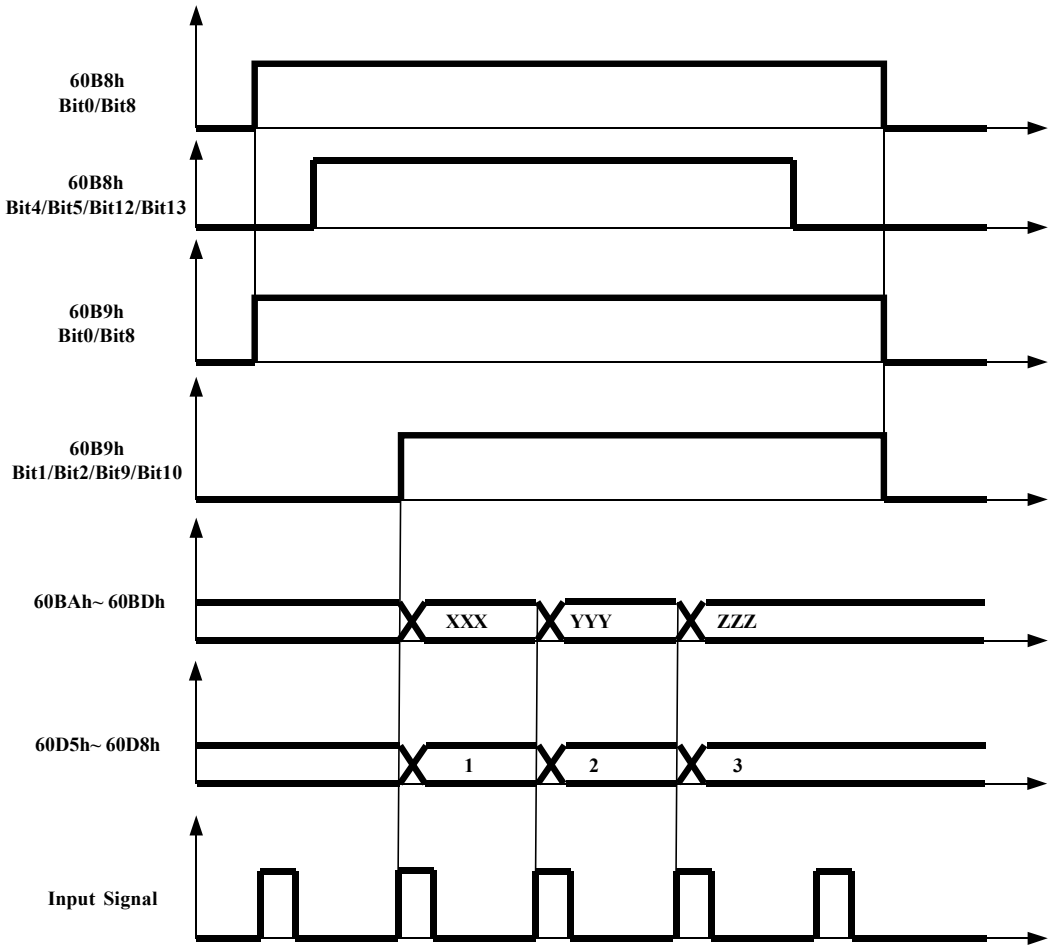
There are two types of probe operating modes, single and continuous mode, which are controlled by Bit1/Bit9 o f 60B8h.

In single mode, the probe captures the rising or falling edge signal only once, and at the same time latches the immediate position information into the 60BAh~60BDh object dictionary; in continuous mode, the probe captures each rising or falling edge signal, and at the same time latches the immediate position information into the 60BAh~60BDh object dictionary, and at the same time latches the number of captured signals into the 60D5h~60D8h object dictionary. The number of signals captured is also latched into the 60D5h~60D8h object dictionary. The startup of the probe function is controlled by Bit0/Bit8 of 60B8h, and the startup instruction is: first write "0", then write "1" to complete a command trigger. When you need to start the probe function again, you need to carry out the start command again. The following figure depicts

Schematic illustrations of probe operation in single and continuous modes are described.



Single Mode Probe Function



Continuous Mode Probe Function

The above schematic only shows the rising edge triggered latch, the falling edge triggered in a similar way, the difference is only in the falling edge to complete the latch.

4.6 Safe Torque Off (STO)

Safe Torque Off (STO) is a safety feature that is integrated in some of our drives.

The STO function disables the control signals of the power semiconductors at the output of the drive and prevents the drive from generating torque at the motor shaft end. **the STO** function blocks the **PWM** signal output to the drive power level via the external redundant hardware terminals **STO1** and **STO2**, thus preventing motor motion. These two **+24VDC** signals must be active to enable normal drive operation. If either or both of these signals go low, the PWM signal is blocked for the next 10ms.

The **STO** menu is shown below:

STO1 Input	STO2 Input	PWM signal
H	H	normalcy
L	H	interdict
H	L	interdict
L	L	interdict

The STO function allows the machine to safely enter a torque-free state and prevents accidental startup while the drive enters an error reporting state.

When the STO function is activated, it is released for shutdown if the motor is running.

The STO feature is turned off by default , and can be turned on by setting the 2218h Object Dictionary to 1. Note: The STO function is currently under development and has not yet been added to DM556EC/DM860EC/CL57EC/CL86EC.;

5 warning message

5.1 drive error (in computing)

The drive has 8 kinds of alarm information, after the drive alarm ALM alarm indicator flashes several times according to the different alarm codes, the specific alarm codes and processing methods are shown in the table below.

Trouble code	Error message (computing)	ALM Indicator	Cure	Reset (a dislocated joint, an electronic device etc)
Err1	Overcurrent or short circuit between phases	Flashes 1 time	Check if the load is too large, if there is any impact, if the motor wires are short-circuited	power-down reset (computing)
Err2	Power supply voltage too high	Blinks 2 times	Check power supply operating range	spontaneous recovery
Err3	Power supply voltage too low	Flashes 3 times	Check power supply operating range	spontaneous recovery
Err4	Motor phase line error	Blinks 4 times	Check motor phase wire breakage, misconnection, etc.	power-down reset (computing)
Err5	Motor overshoot	Blinks 5 times	Check for excessive loads and loose encoder wires	Power down, manual reset
Err6	Communication Dropout Alarm	Blinks 6 times	Check for loose communication cables	Power down, manual reset
Err8	Sensor Alarms	Blinks 8 times	Check stop, emergency stop signals, limit sensors for validity	Power down, manual reset

5.2 EtherCAT communication error

EtherCAT communication errors are mainly of the following four types, and the communication alarm lamp Err blinks when a communication error occurs:

Trouble code	Error message (computing)	ERR indicator	Cure	Reset (a dislocated joint, an electronic device etc)
Err11	EEPROM loading error	Flickering	Check for hardware damage	power-down Reset (computing)

R

Err12	AL Status register error	Single Flash	Check for loose network cables	spontaneous recovery
Err13	Process data watchdog timeout error	Double Flash	Check for loose network cables	spontaneous recovery
Err14	PDI Watchdog Timeout Error	Always on (ON)	Check for loose network cables	Power down, manual reset

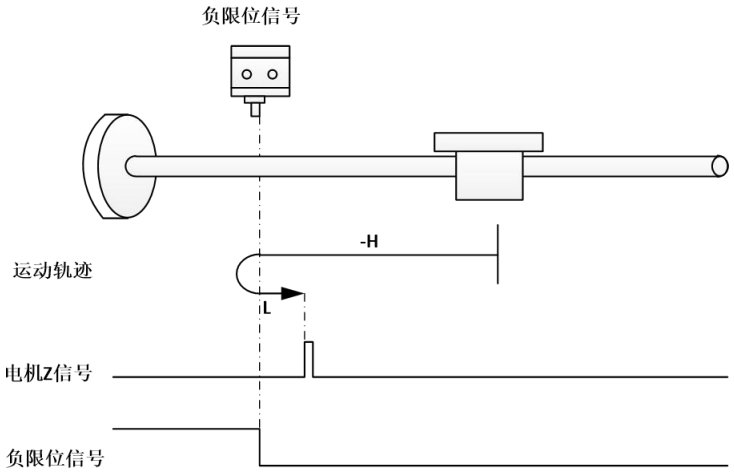
Appendix 1: Introduction to the method of return to the origin

※ Method 1 (6098h = 1)

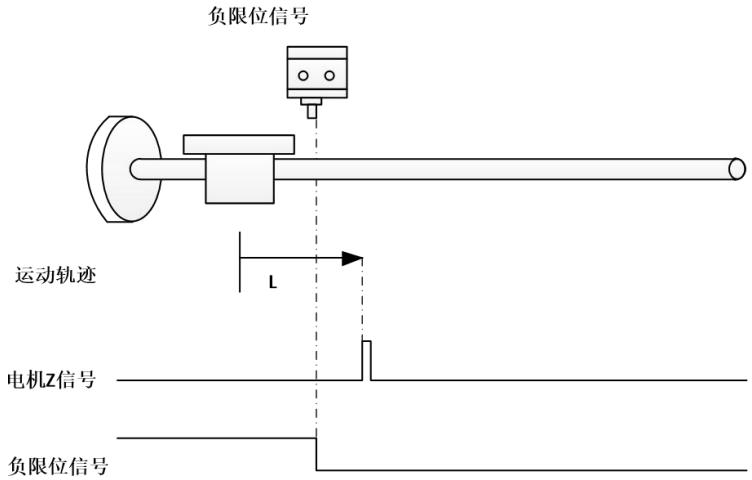
Home position: Motor Z signal

Deceleration point: Negative limit position

a) Invalid deceleration point signal at zero start: reverse high-speed operation, deceleration stop at the rising edge of the deceleration point, forward low-speed operation, stop at the first Z signal after the falling edge of the deceleration point;



b) Deceleration point signal active at zero start: forward low speed operation, stops at the first Z signal after the falling edge of the deceleration point;



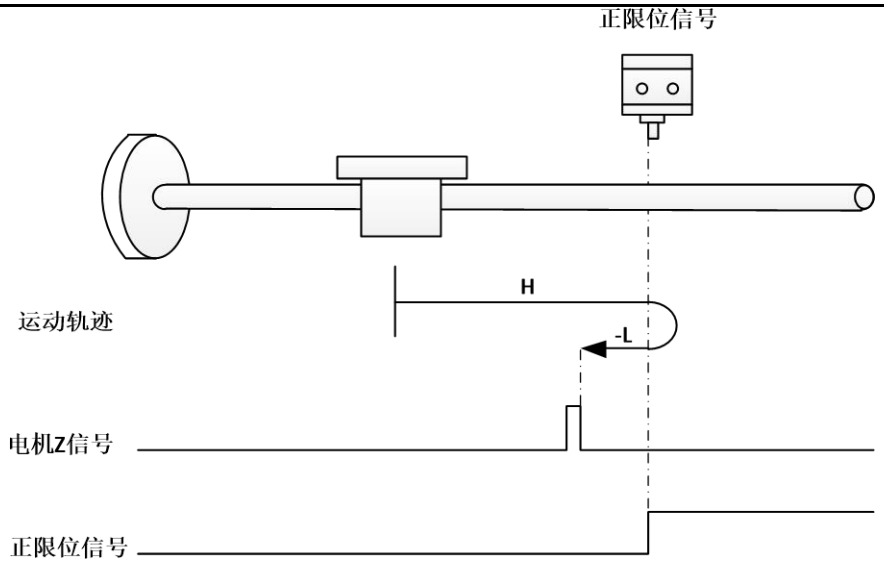
※ Method 2 (6098h =2)

Home: Motor Z signal

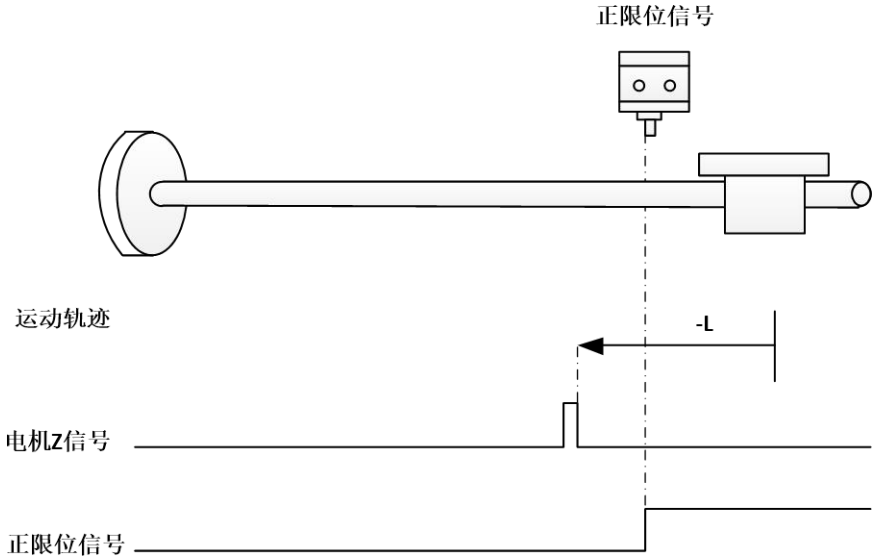
Deceleration point: Positive limit

a) Invalid deceleration point signal when starting back to zero: forward high-speed operation, deceleration stop at the rising edge of the deceleration point, reverse low- speed operation

Run and stop at the first Z signal after the falling edge of the deceleration point;



b） Deceleration point signal active at zero start: Reverse low speed operation and stop at the first Z signal after the falling edge of the deceleration point;

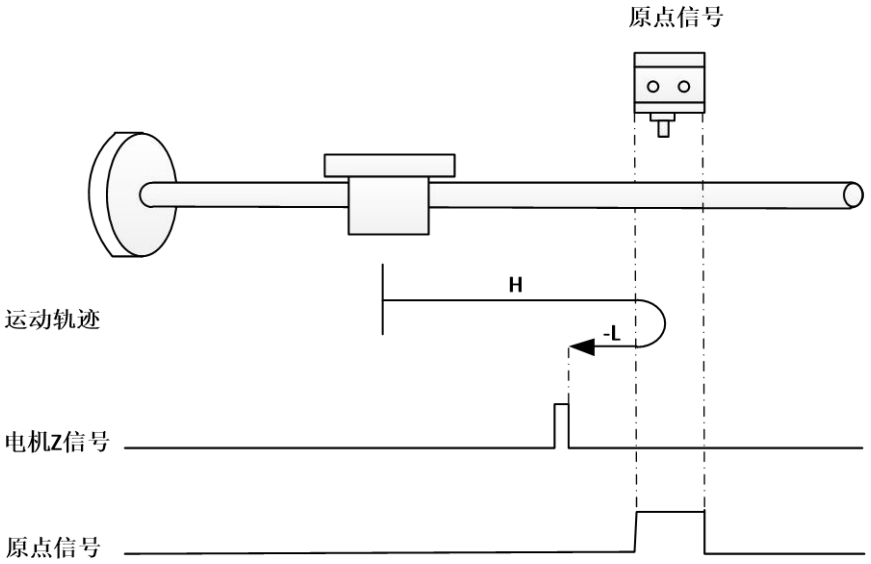


※ Method 3 (6098h = 3)

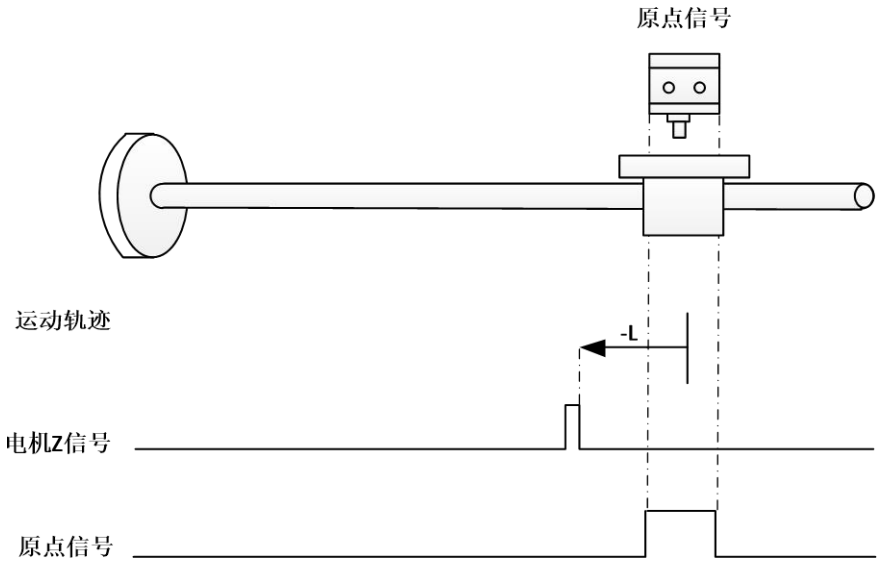
Home: Motor Z signal

Deceleration point: Home signal

a） Invalid deceleration point signal at zero start: forward high speed operation, deceleration stop after encountering the rising edge of the deceleration point, reverse low speed operation, stop after encountering the first Z signal after encountering the falling edge of the deceleration point;



b) Deceleration point signal active at zero start: Reverse low speed operation and stop at the first Z signal after the falling edge of the deceleration point;

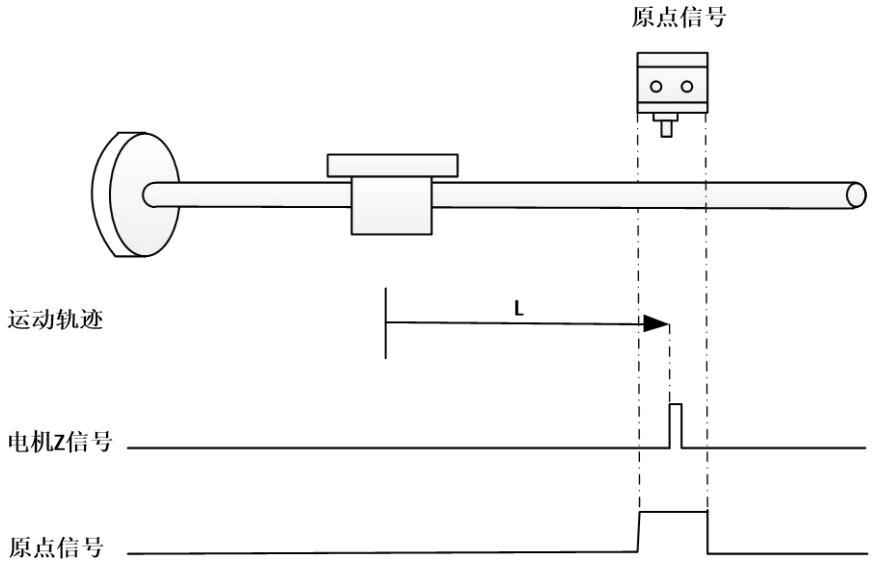


※ Method 4 (6098h = 4)

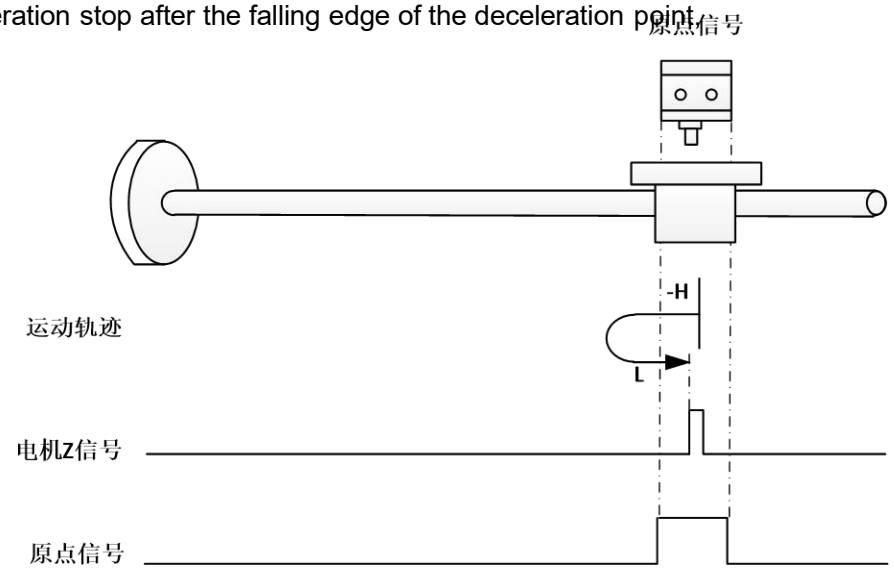
Home: Motor Z signal

Deceleration point: Home signal

a) Invalid deceleration point signal at zero start: Forward low speed operation, stop at the first Z signal after the rising edge of the deceleration point;



b) The deceleration point signal is valid for zero start: reverse high speed operation, deceleration stop after the falling edge of the deceleration point



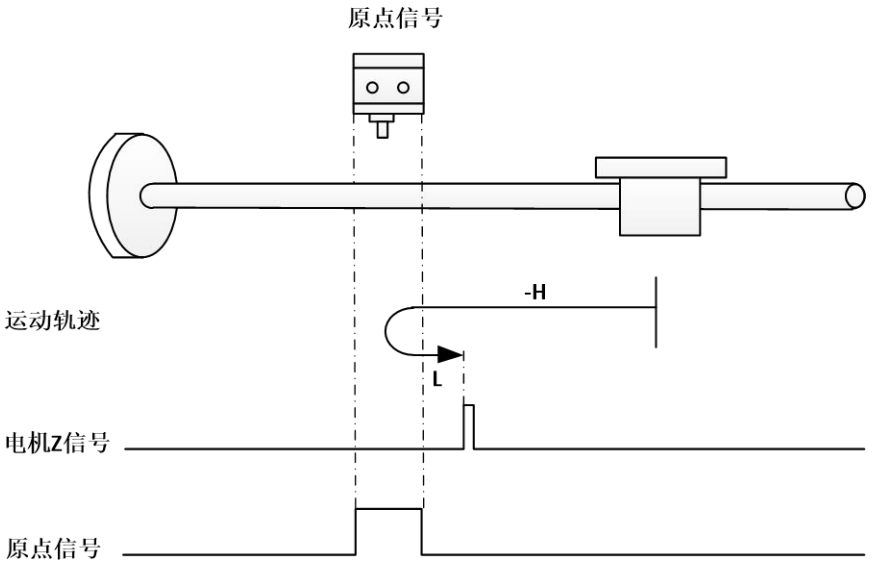
forward low speed operation, stop after the first Z signal after the rising edge of the deceleration point;

※ Method 5 (6098h = 5)

Home: Motor Z signal

Deceleration point: Home signal

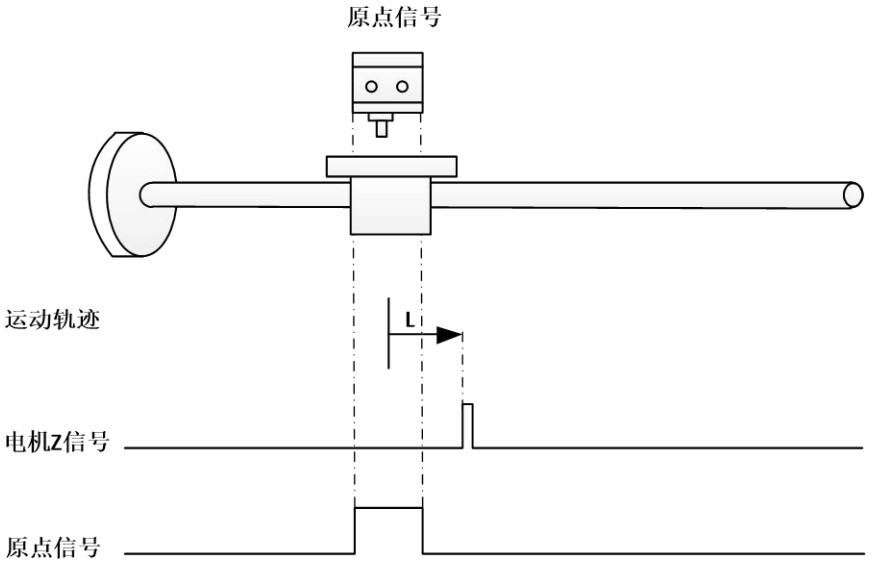
a) Invalid deceleration point signal at zero start: Reverse high-speed operation, deceleration stop after the rising edge of the deceleration point, forward low-speed operation, stop after the first Z signal after the falling edge of the deceleration point;



Home: Motor Z signal

Deceleration point: Home signal

b） The deceleration point signal is valid for zero start: Forward low speed operation, stop at the first Z signal after the falling edge of the deceleration point;

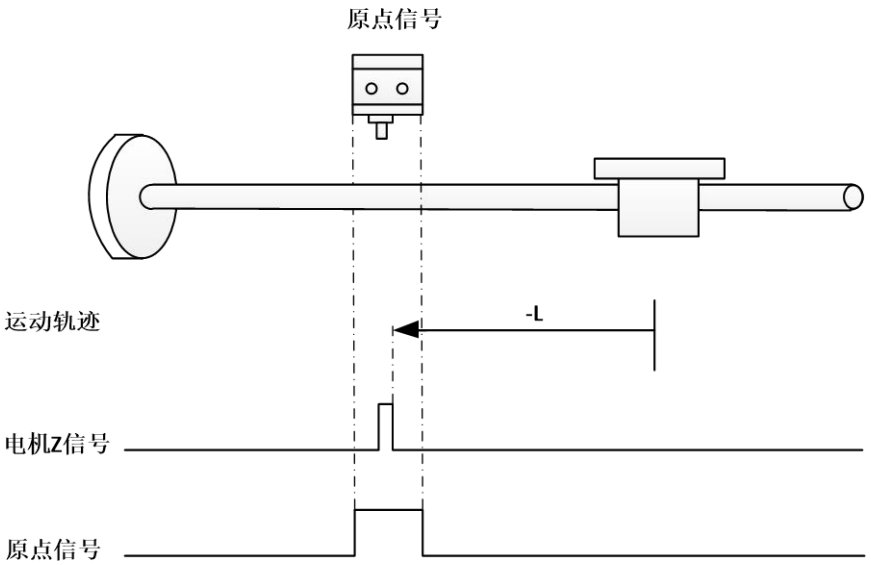


※ Method 6 (6098h =6)

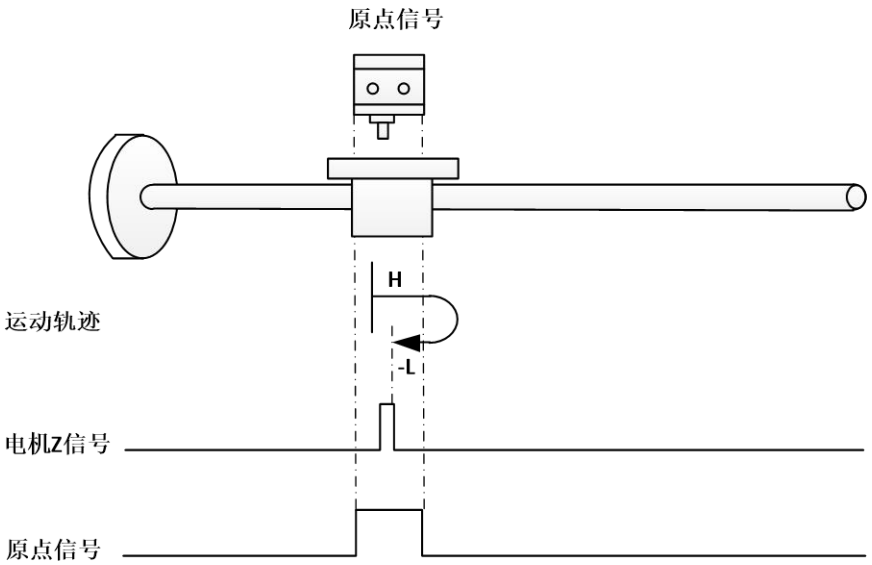
Home: Motor Z signal

Deceleration point: Home signal

a） Invalid deceleration point signal at zero start: Reverse low speed operation and stop at the first Z signal after the rising edge of the deceleration point;



b) The deceleration point signal is valid for zero start: forward high speed operation, deceleration stop after the falling edge of the deceleration point,



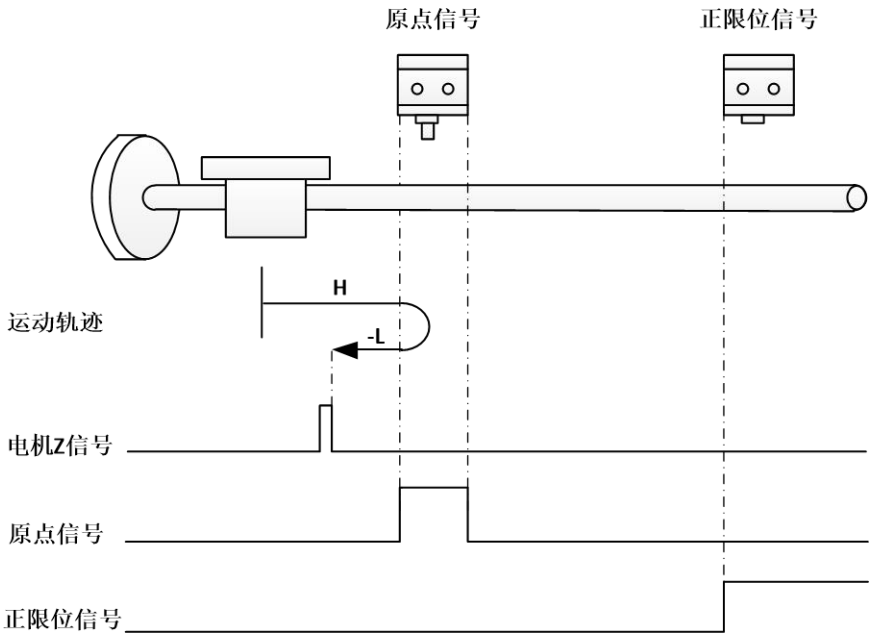
reverse low speed operation, stop after the first Z signal after the rising edge of the deceleration point;

※ Method 7 (6098h = 7)

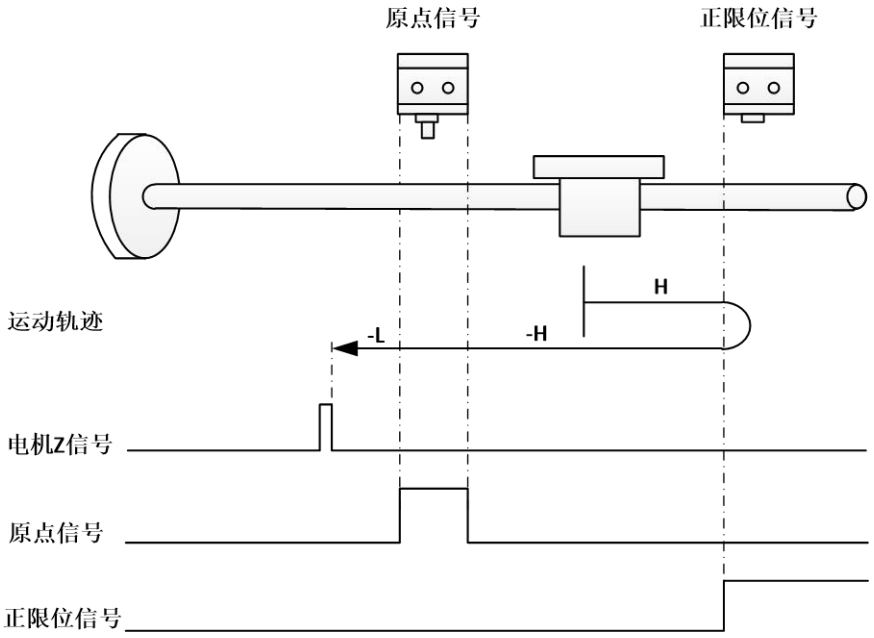
Home: Motor Z signal

Deceleration point: Home signal

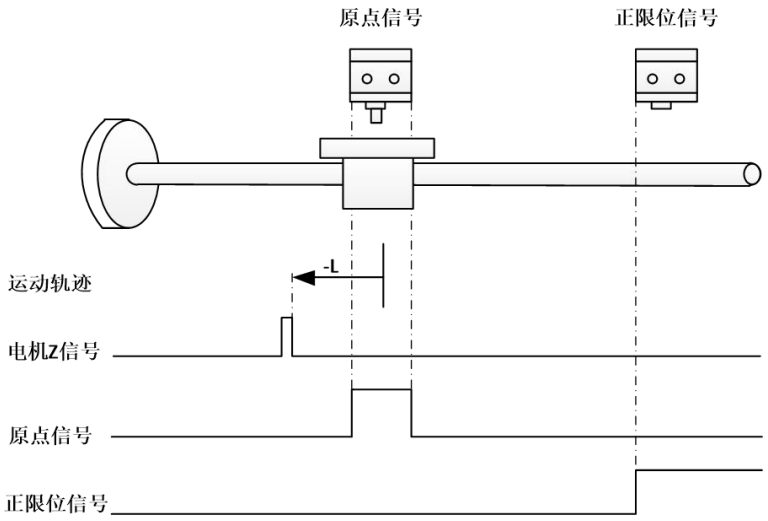
a) Invalid deceleration point signal at zero start: forward high speed operation, deceleration stop after the rising edge of deceleration point, reverse low speed operation, stop after the first Z signal after the falling edge of deceleration point;



b) The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration and stop in the case of a positive limit signal, reverse high-speed operation, low-speed operation in the case of a rising edge of the deceleration point, and stop in the case of a falling edge of the deceleration point and the first Z signal after the first Z signal;



c) The deceleration point signal is valid for zero start: Reverse low speed operation and stop at the first Z signal after the falling edge of the deceleration point;

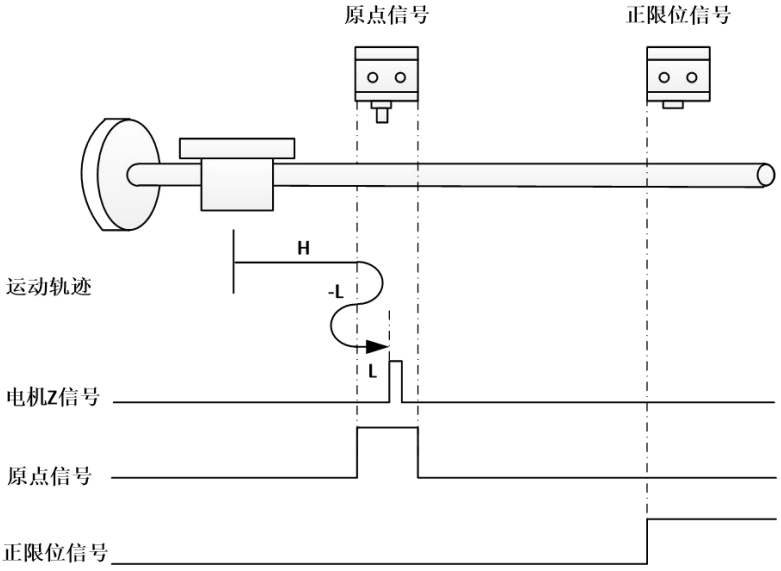


※ Method 8 (6098h = 8)

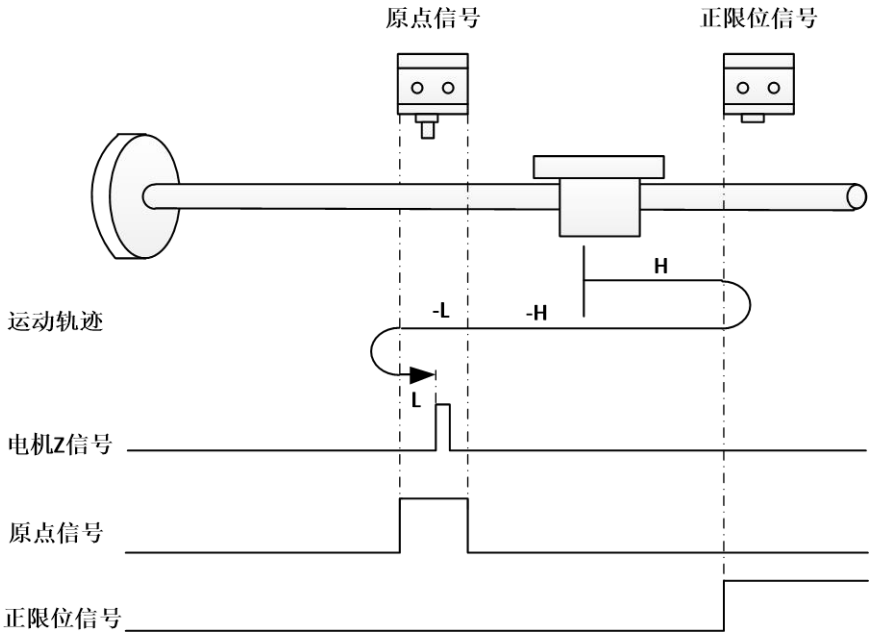
Home: Motor Z signal

Deceleration point: Home signal

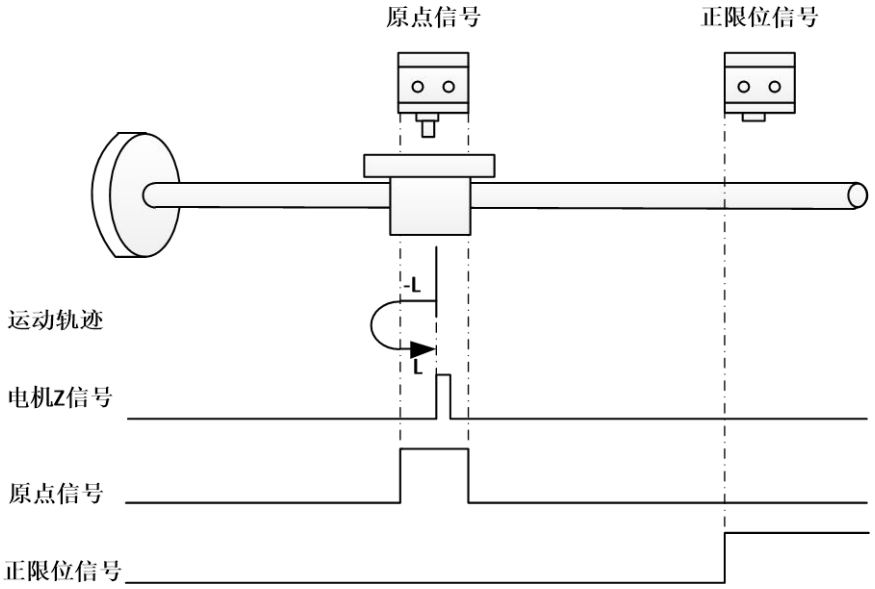
a) Invalid deceleration point signal at zero start: forward high speed operation, deceleration stop after deceleration point rising edge, reverse low speed operation, deceleration stop after deceleration point falling edge, forward low speed operation,stopafter the first Z signal after deceleration point rising edge;



b) The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration and stop at the positive limit signal, reverse high-speed operation, low-speed operation at the rising edge of the deceleration point, deceleration and stop at the falling edge of the deceleration point, forward low-speed operation, stop at the first Z signal after the rising edge of the deceleration point;



c) The deceleration point signal is valid for zero start: reverse low speed operation, deceleration stop at the falling edge of the deceleration point, forward low speed operation, stop at the first Z signal after the rising edge of the deceleration point;

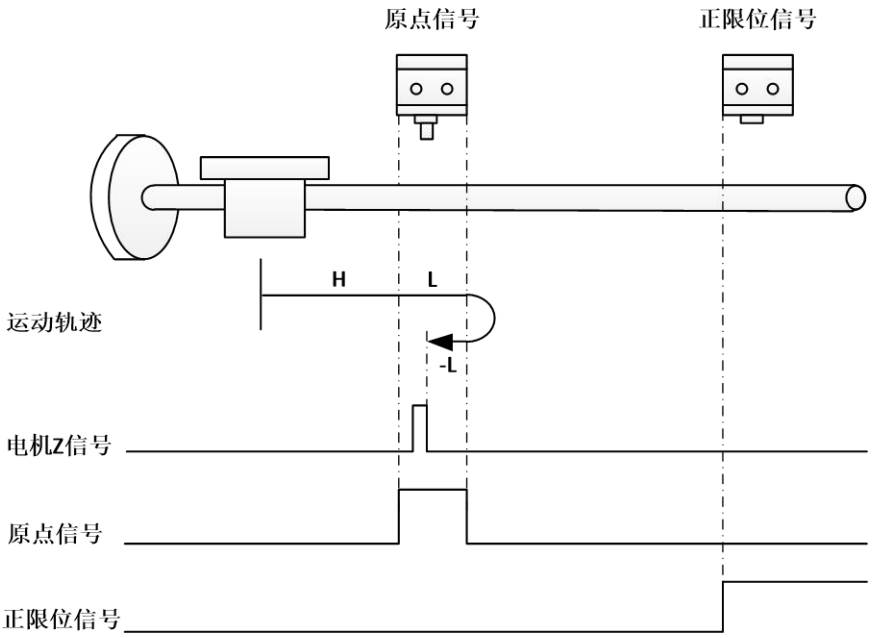


※ Method 9 (6098h =9)

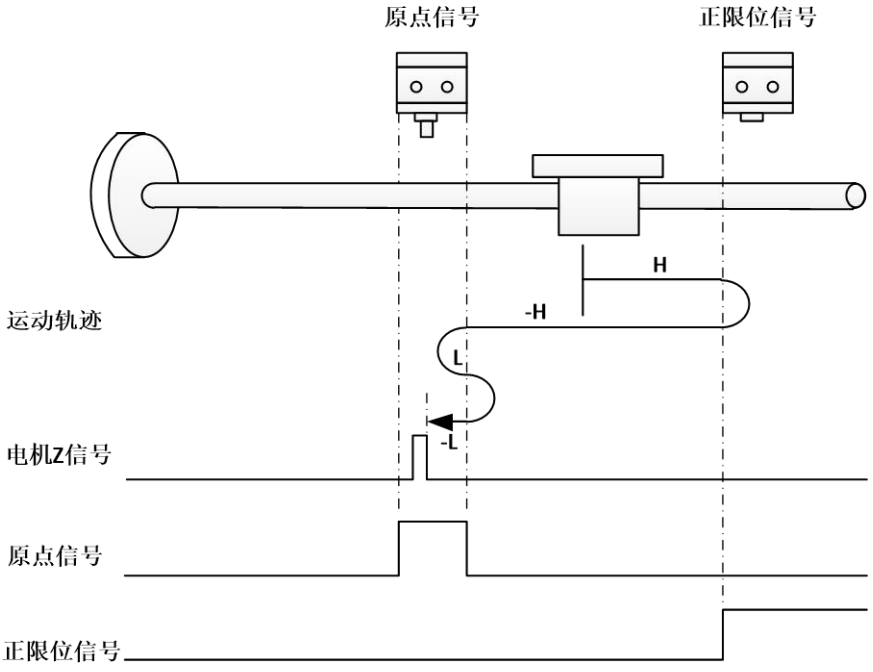
Home: Motor Z signal

Deceleration point: Home signal

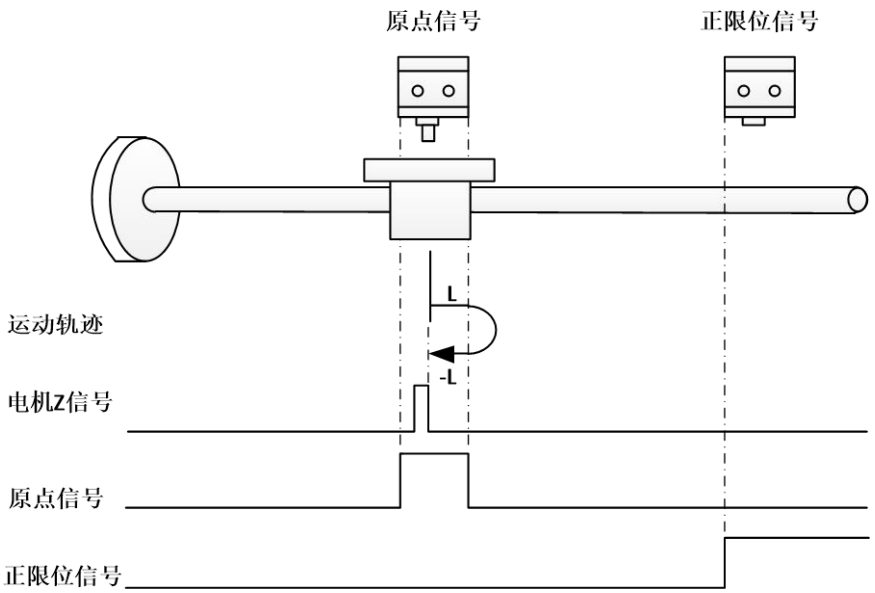
a) The deceleration point signal is invalid when starting back to zero: forward high speed operation, low speed operation at the rising edge of the deceleration point, deceleration stop at the falling edge of the deceleration point, reverse low speed operation, stop at the first Z signal after the rising edge of the deceleration point;



b) The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration stops at the positive limit signal, reverse high-speed operation, deceleration stops at the rising edge of the deceleration point,forward low-speed operation, deceleration stops at the falling edge of the deceleration point, reverse low-speed operation, and stops at the first Z signal after the rising edge of the deceleration point;



c) The deceleration point signal is valid for zero start: forward low-speed operation, deceleration stop at the falling edge of the deceleration point, reverse low-speed operation, stop at the first Z signal after the rising edge of the deceleration point;

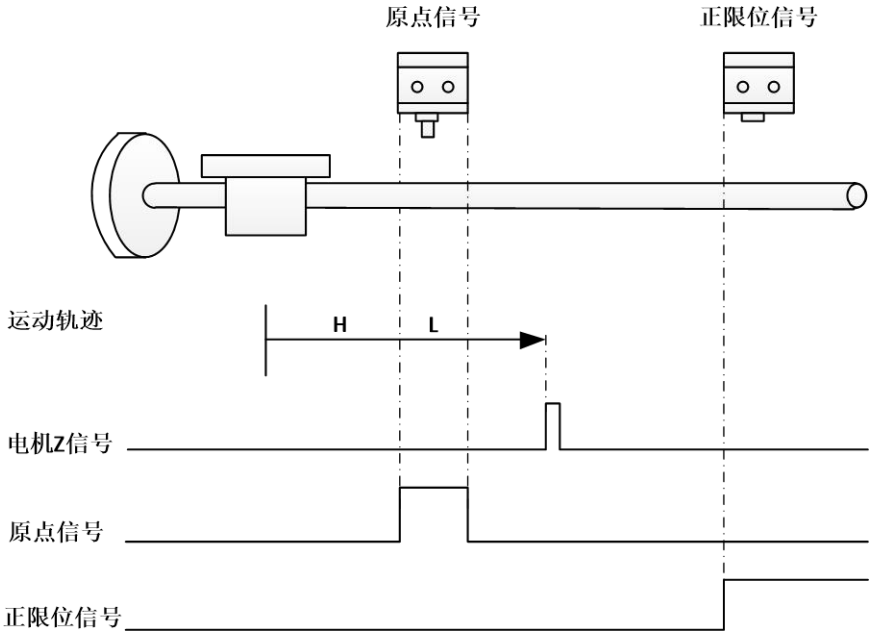


※ Method 10 (6098h =10)

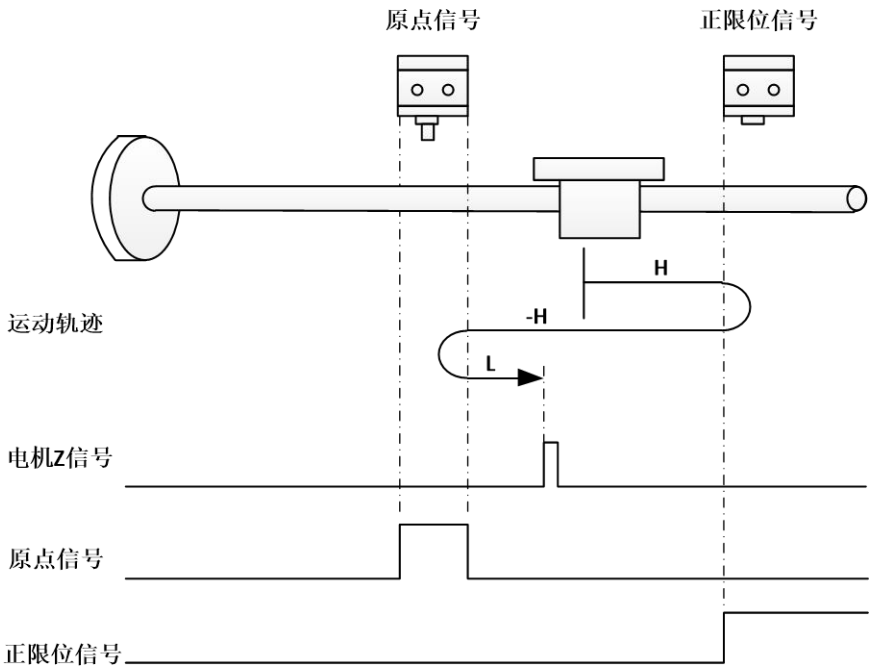
Home: Motor Z signal

Deceleration point: Home signal

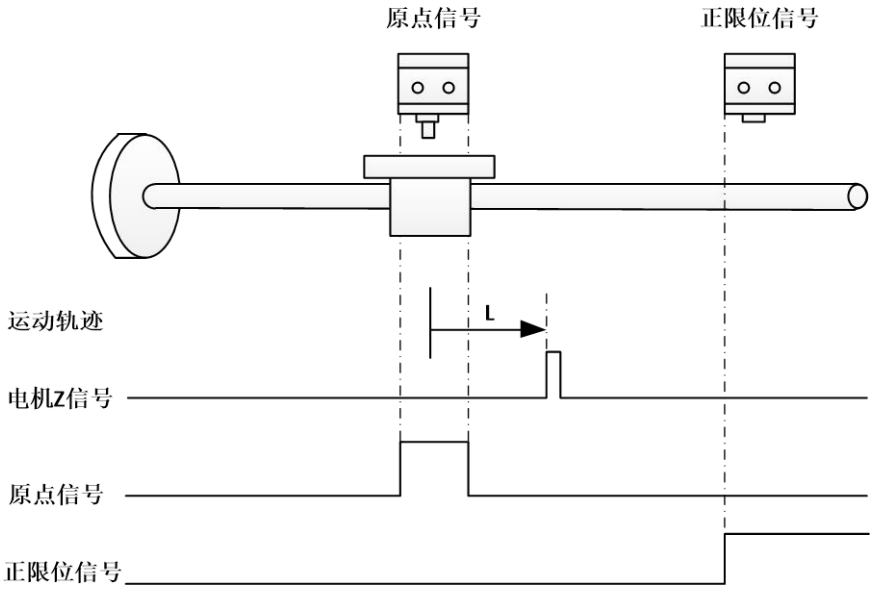
a） Invalid deceleration point signal at zero start: forward high speed operation, low speed operation at the rising edge of the deceleration point, stop at the first Z signal after the falling edge of the deceleration point;



b） The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration stops at the positive limit signal, reverse high- speed operation, deceleration stops at the rising edge of the deceleration point, forward low-speed operation, stops at the first Z signal after the falling edge of the deceleration point;



c） Invalid deceleration point signal at zero start: Forward low-speed operation, the first Z signal after the falling edge of the deceleration point stops the machine;

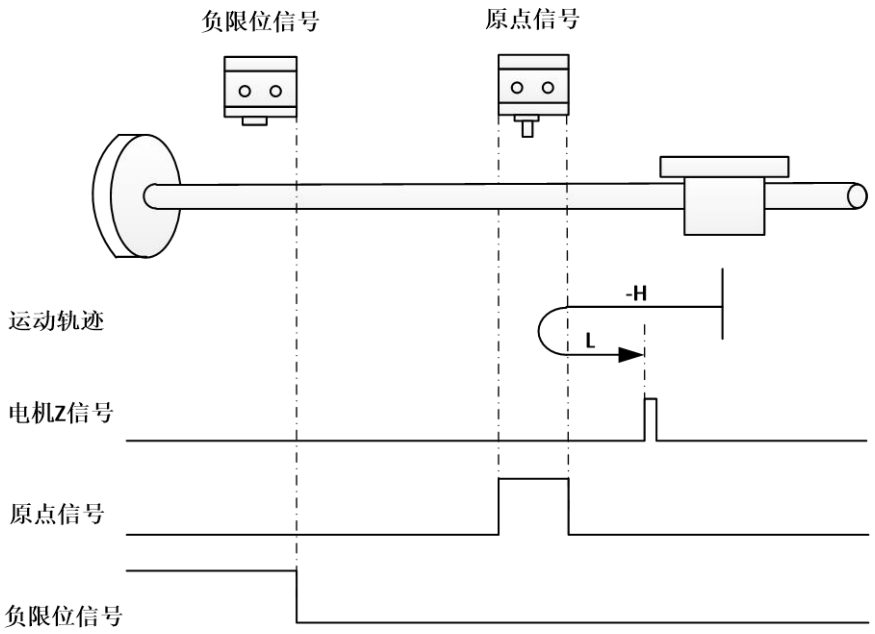


※ Method 11 (6098h =11)

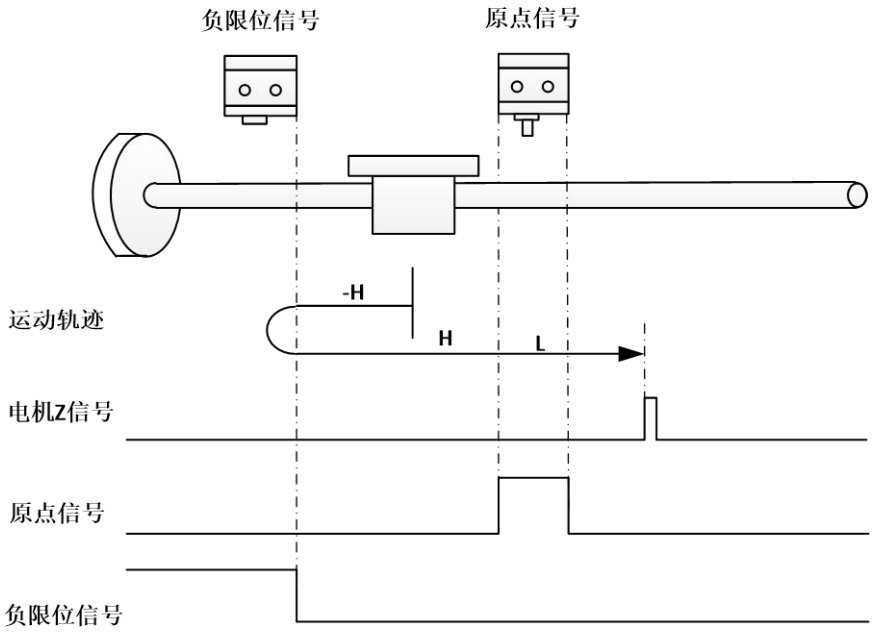
Home: Motor Z signal

Deceleration point: Home signal

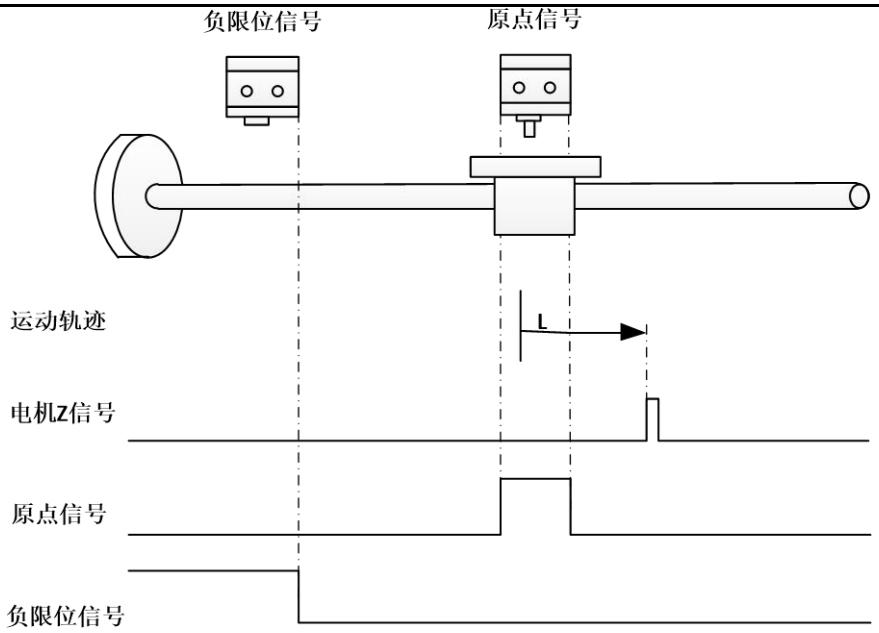
a） Invalid deceleration point signal at zero start: reverse high-speed operation, deceleration stop at the rising edge of the deceleration point, forward low-speed operation, stop at the first Z signal after the falling edge of the deceleration point;



b） Invalid deceleration point signal at zero start: reverse high-speed operation, deceleration stop at negative limit, forward high-speed operation, low-speed operation at rising edge of deceleration point, stop at the first Z signal after falling edge of deceleration point;



c） Deceleration point signal valid for zero start: forward low speed operation, stopping at the first Z signal after the falling edge of the deceleration point;

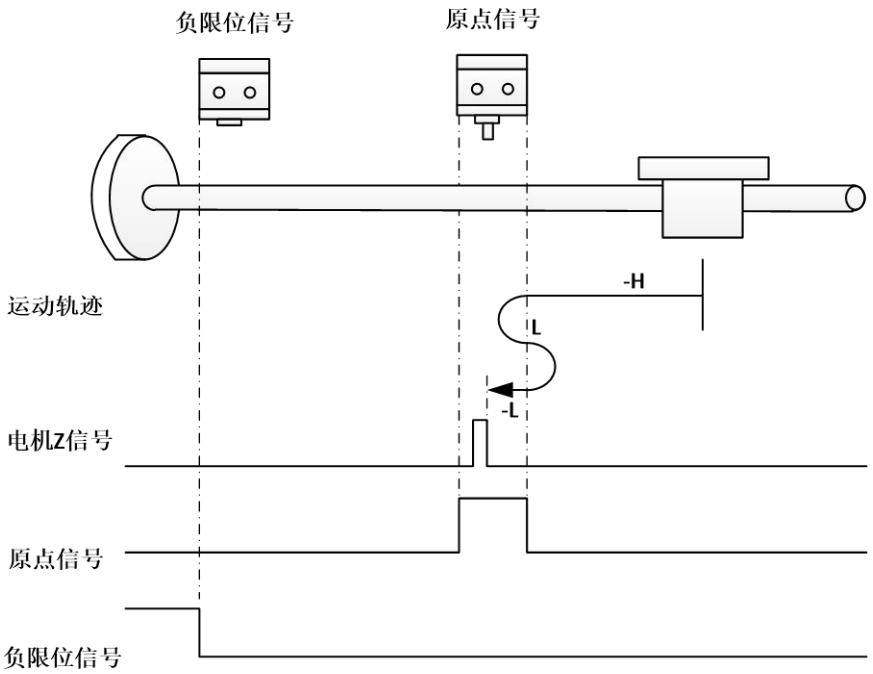


※ Method 12 (6098h =12)

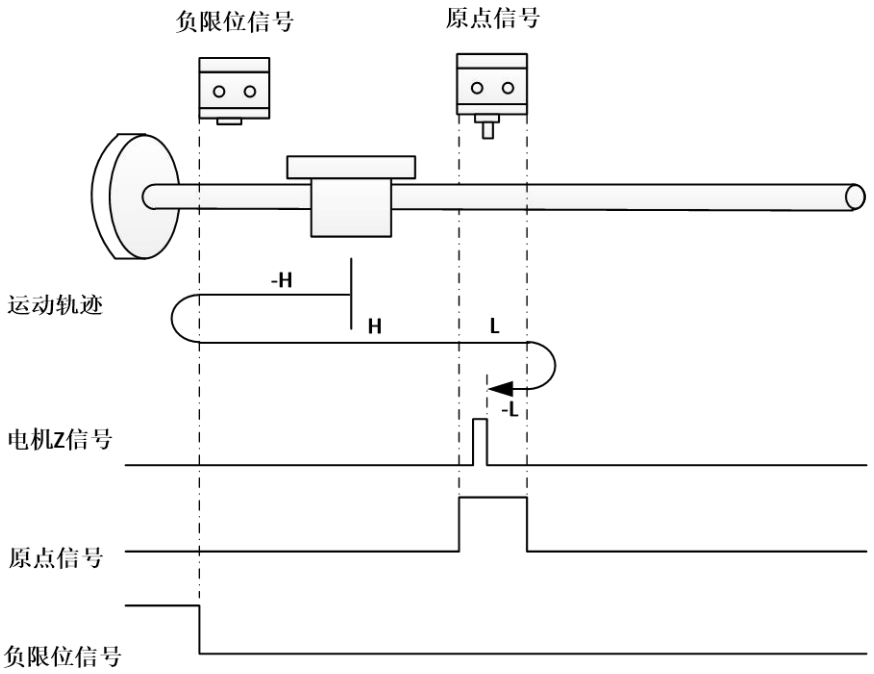
Home: Motor Z signal

Deceleration point: Home signal

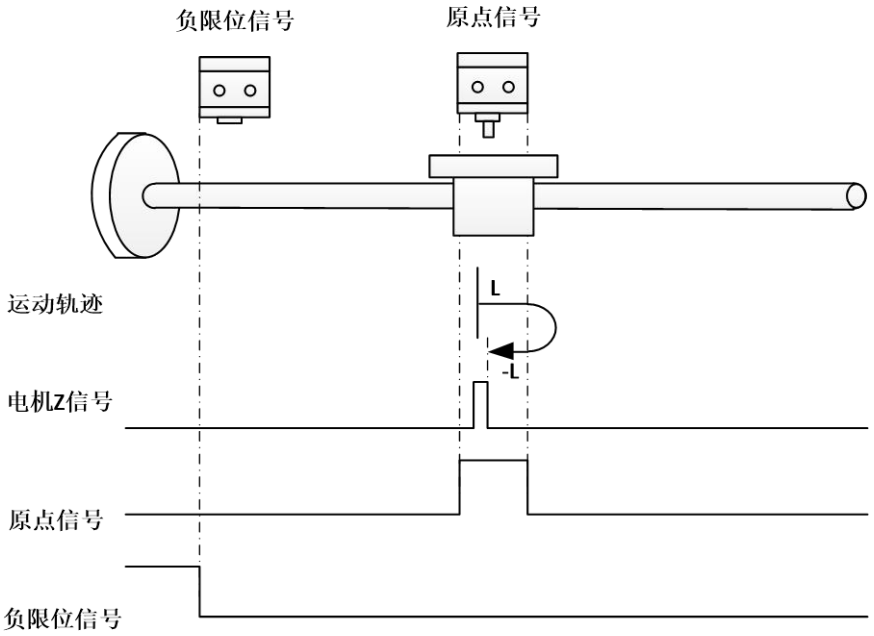
a） Invalid deceleration point signal at zero start: reverse high-speed operation, deceleration stop at rising deceleration point, forward low-speed operation, deceleration stop at falling deceleration point, reverse low-speed operation, stop at the first Z signal after the rising deceleration point;



b） Invalid deceleration point signal when starting back to zero: reverse high- speed operation, deceleration stop at negative limit, forward high-speed operation, low-speed operation at the rising edge of deceleration point, deceleration stop at the falling edge of deceleration point, reverse low-speed operation, stop at the first Z signal after the rising edge of deceleration point;



c) The deceleration point signal is valid for zero start: forward low-speed operation, deceleration stop at the falling edge of the deceleration point, reverse low-speed operation, stop at the first Z signal after the rising edge of the deceleration point;

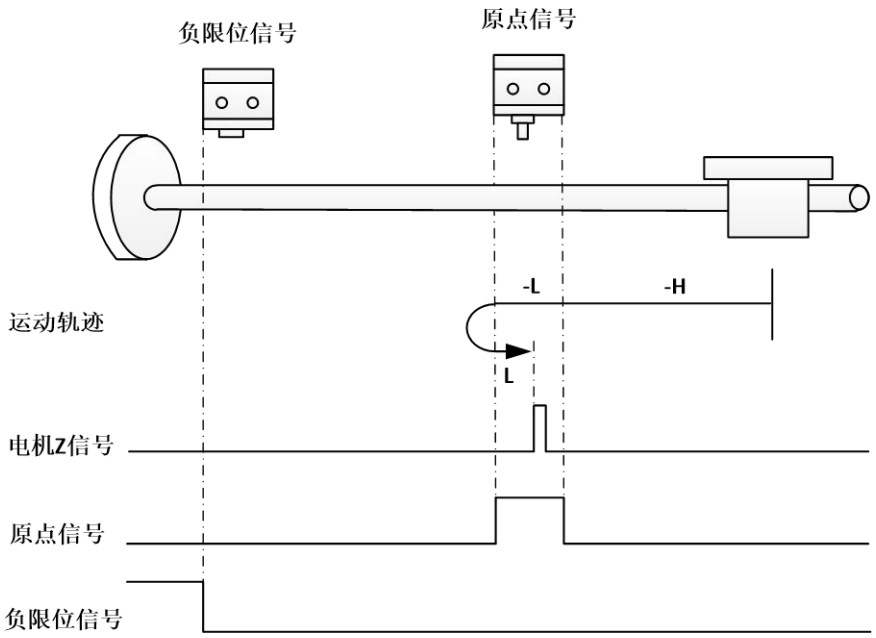


※ Method 13 (6098h =13)

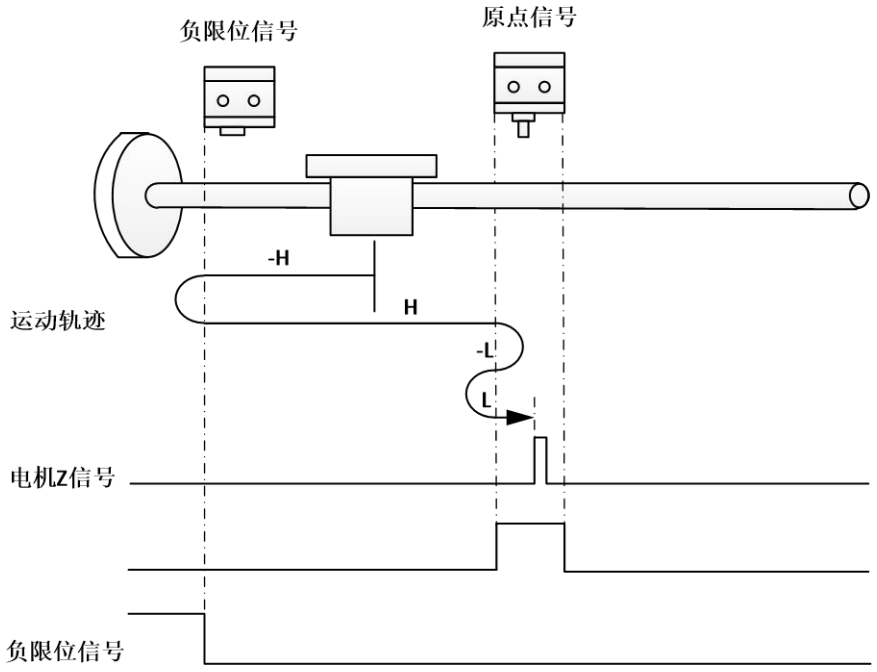
Home: Motor Z signal

Deceleration point: Home signal

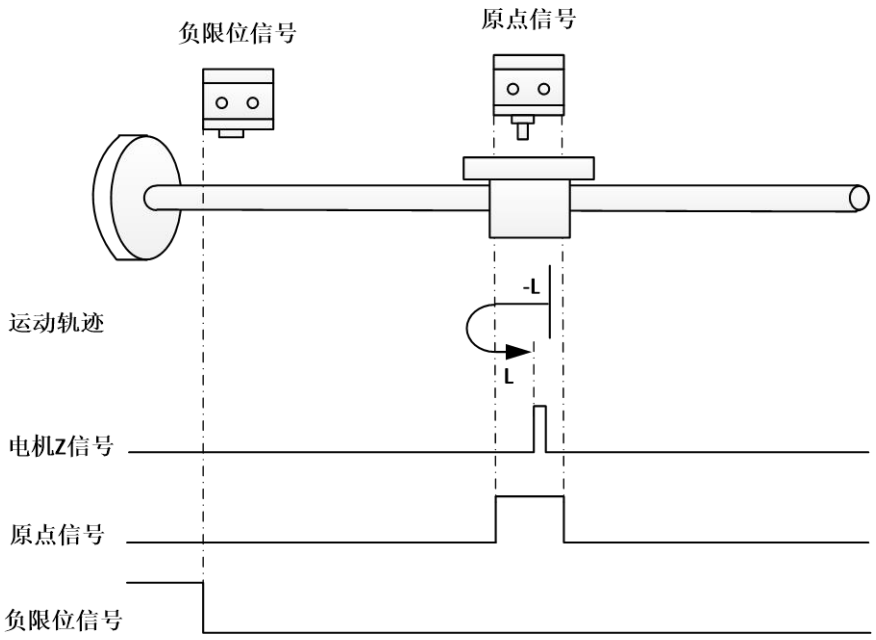
a) Invalid deceleration point signal at zero start: reverse high-speed operation, low-speed operation at the rising edge of the deceleration point, deceleration stop at the falling edge of the deceleration point, forward low-speed operation, stop at the first Z signal after the rising edge of the deceleration point;



b) The deceleration point signal is invalid when starting back to zero: reverse high-speed operation, deceleration stops at the negative limit, forward high-speed operation, deceleration stops at the rising edge of the deceleration point, reverse low-speed operation, deceleration stops at the falling edge of the deceleration point,forward low-speed operation, and stops at the first Z signal after the rising edge of the deceleration point;



c) The deceleration point signal is invalid when starting back to zero: reverse low-speed operation, deceleration stop at the falling edge of the deceleration point, forward low-speed operation, stop at the first Z signal after the rising edge of the deceleration point;

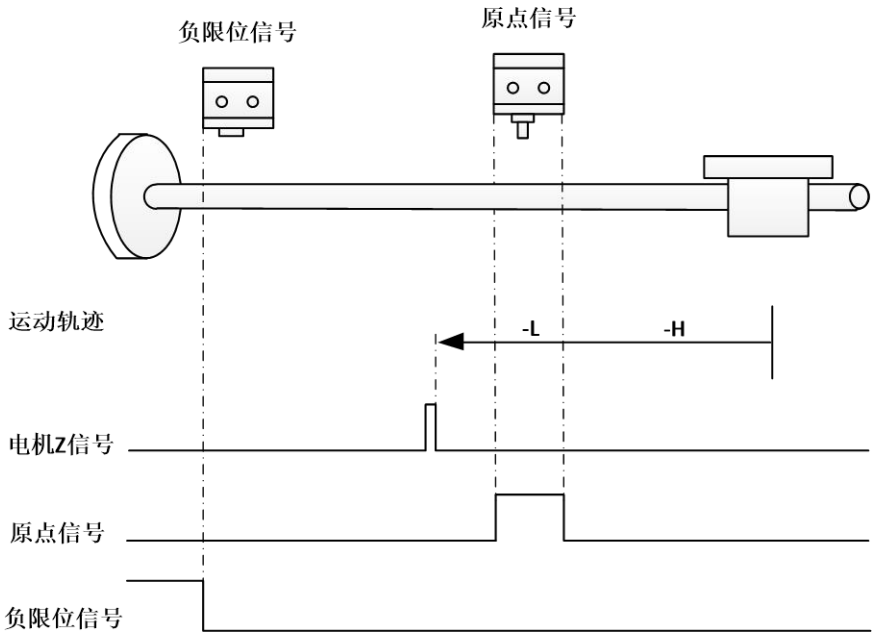


※ Method 14 (6098h =14)

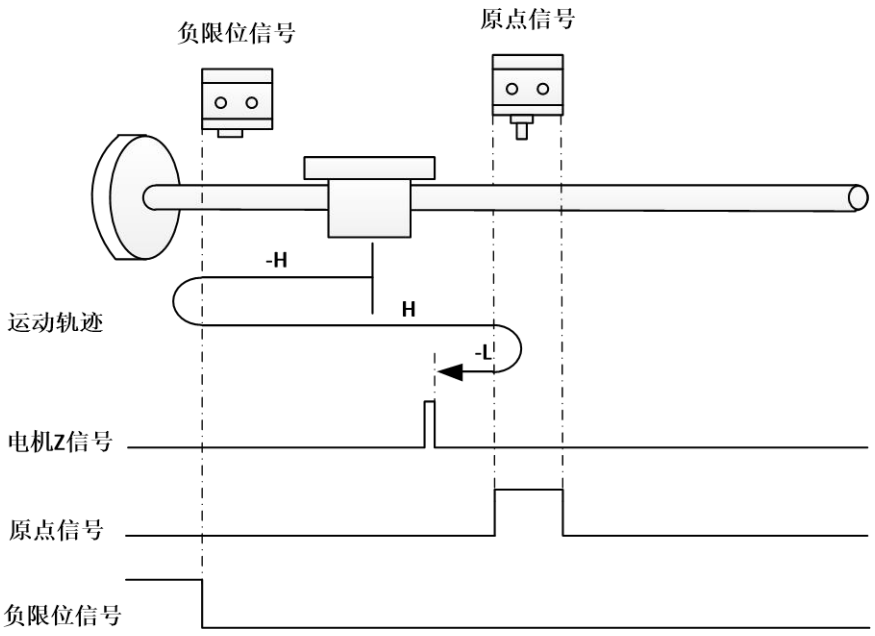
Home: Motor Z signal

Deceleration point: Home signal

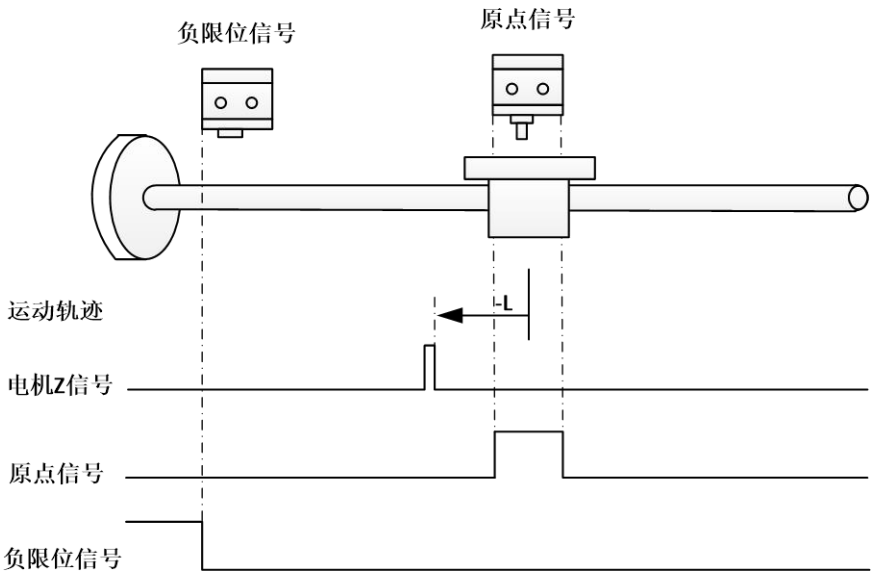
a) Invalid deceleration point signal at zero start: Reverse high-speed operation, low-speed operation at the rising edge of the deceleration point, and stop at the first Z signal after the falling edge of the deceleration point;



b) Invalid deceleration point signal at zero start: reverse high speed operation, deceleration stop at negative limit, forward high speed operation, deceleration stop at rising edge of deceleration point, reverse low speed operation, stop at first Z signal after falling edge of deceleration point;



c) Invalid deceleration point signal at zero start: Reverse low speed operation and stop at the first Z signal after the falling edge of the deceleration point;

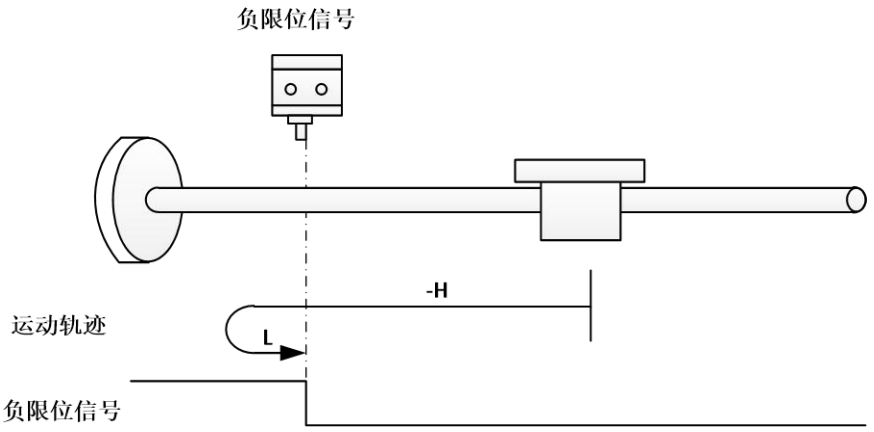


※ Method 17 (6098h =17)

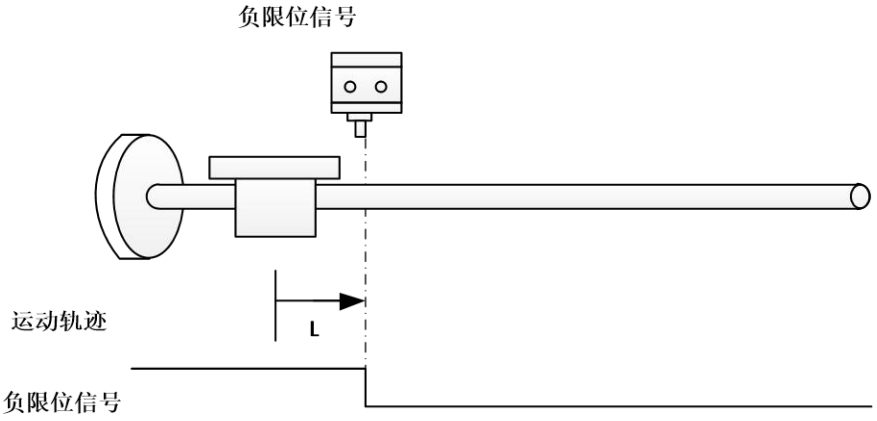
Home: NegativeLimit

Deceleration point: negative limit

a) Invalid deceleration point signal when starting back to zero: reverse high-speed operation, decelerate and stop when encountering the rising edge of the deceleration point, forward low-speed operation, stop when encountering the falling edge of the deceleration point;



b） Deceleration point signal is valid at zero start: forward low speed operation, stop after encountering the falling edge of the deceleration point;

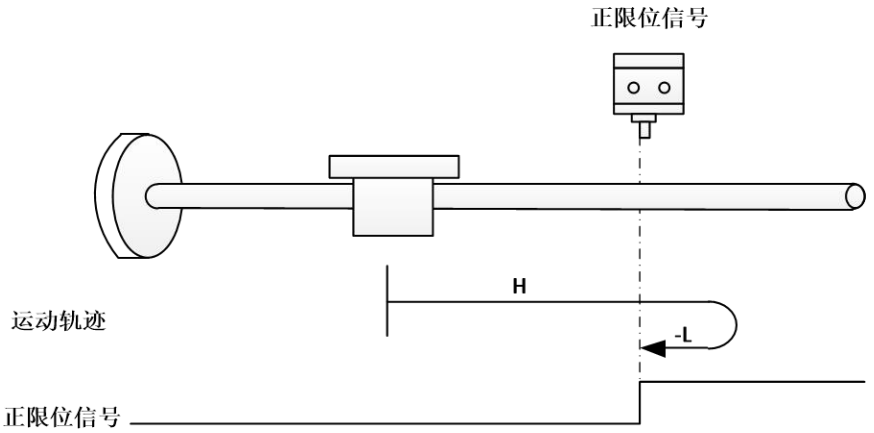


※ Method 18 (6098h =18)

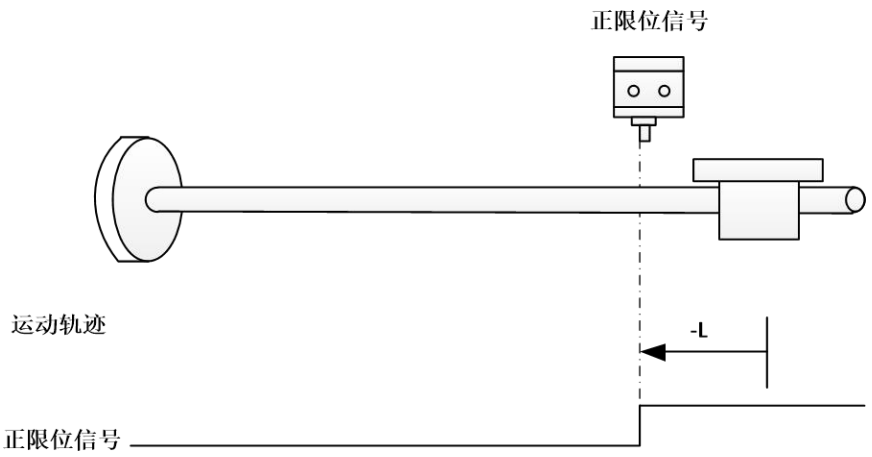
Home: Positive Limit

Deceleration point: Positive limit

a） Invalid deceleration point signal when starting back to zero: forward high-speed operation, deceleration stops after meeting the rising edge of the deceleration point, reverse low-speed operation, stops after meeting the falling edge of the deceleration point;



b） Deceleration point signal is valid at start back to zero: reverse low speed operation and stop after encountering the falling edge of the deceleration point;

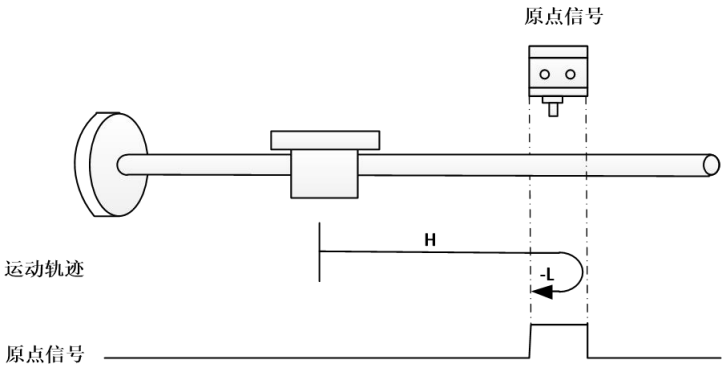


※ Method 19 (6098h =19)

Home: Home signal

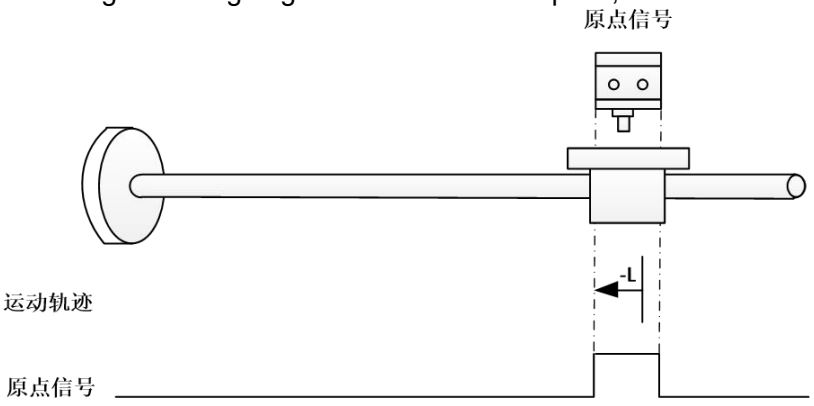
Deceleration point: Home signal

a) Invalid deceleration point signal at zero start: forward high-speed operation, deceleration stop after encountering the rising edge of the deceleration



point, reverse low-speed operation, stop after encountering the falling edge of the deceleration point;

b) Deceleration point signal is valid at start back to zero: reverse low speed operation and stop after encountering the falling edge of the deceleration point;

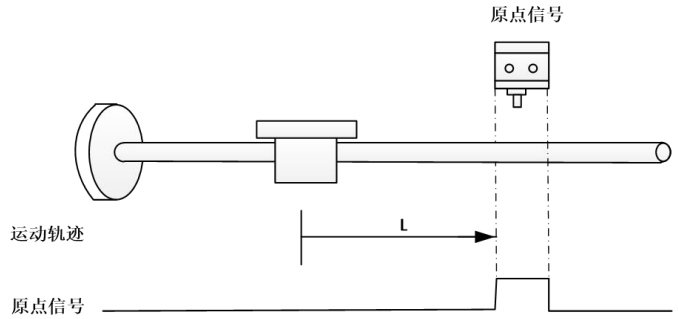


※ Method 20 (6098h =20)

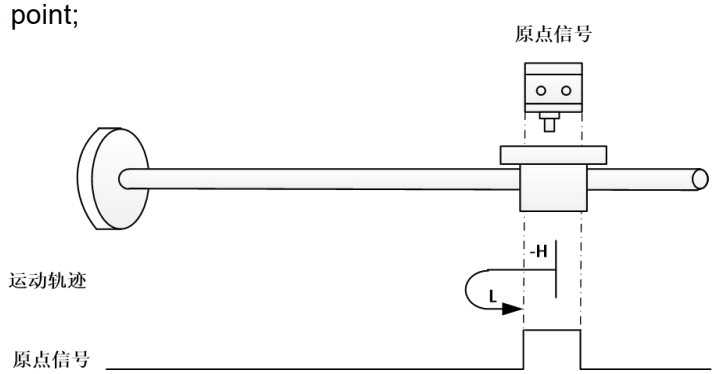
Home: Home signal

Deceleration point: Home signal

a） Invalid deceleration point signal when starting back to zero: Positive low-speed operation, stopping after encountering the rising edge of the deceleration point;



b） The deceleration point signal is valid when starting back to zero: high-speed operation in the reverse direction, deceleration and stop after encountering the falling edge of the deceleration point, low-speed operation in the forward direction, and stop after encountering the rising edge of the deceleration point;

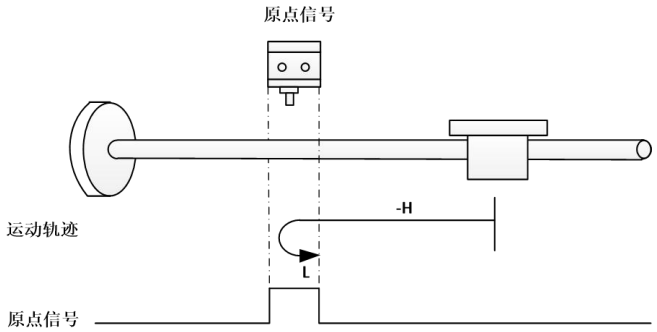


※ Method 21 (6098h =21)

Home: Home signal

Deceleration point: Home signal

a） The deceleration point signal is invalid when starting back to zero:reverse high-speed operation, deceleration and stop after encountering the rising edge of

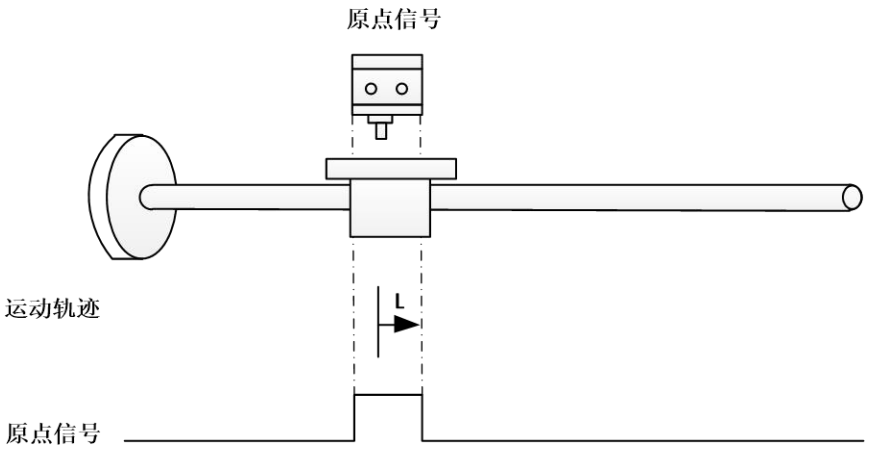


the deceleration point, forward low-speed operation, stop after encountering the falling edge of the deceleration point;

Home: Home signal

Deceleration point: Home signal

b） Deceleration point signal is valid when starting back to zero: forward low speed operation, stop after encountering the falling edge of the deceleration point;

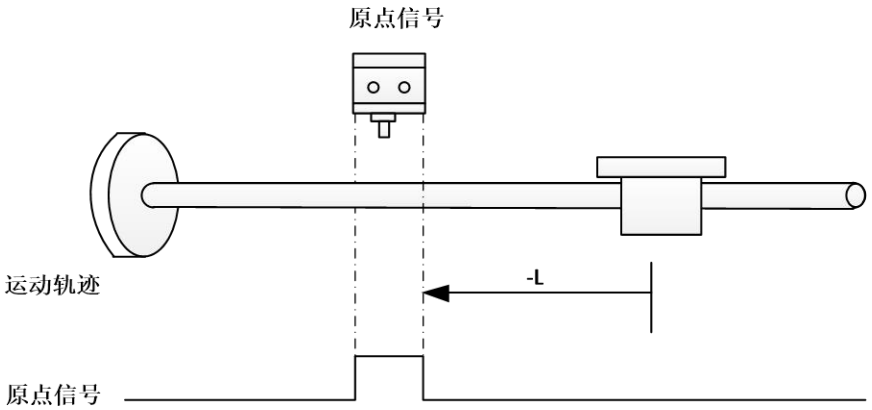


※ Method 22 (6098h =22)

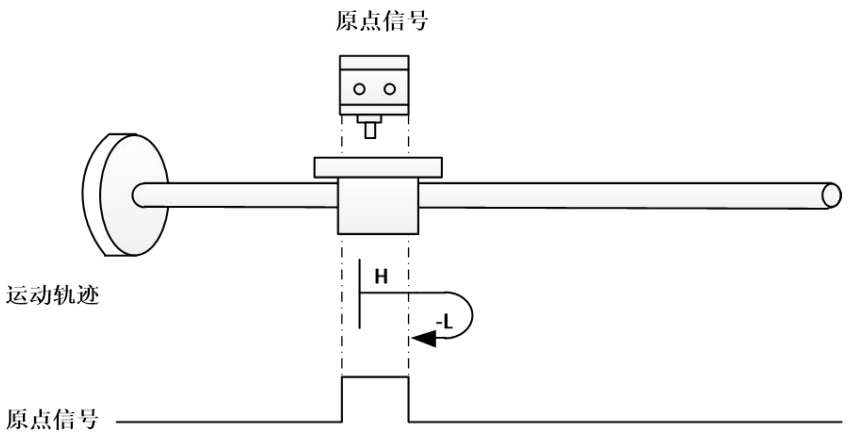
Home: Home signal

Deceleration point: Home signal

a) Invalid deceleration point signal when starting back to zero: Reverse low speed operation and stop after encountering the rising edge of the deceleration point;



b) The deceleration point signal is valid when starting back to zero: forward high-speed operation, deceleration and stop after encountering the falling edge of the deceleration point, reverse low-speed operation, stop after encountering the rising edge of the deceleration point;

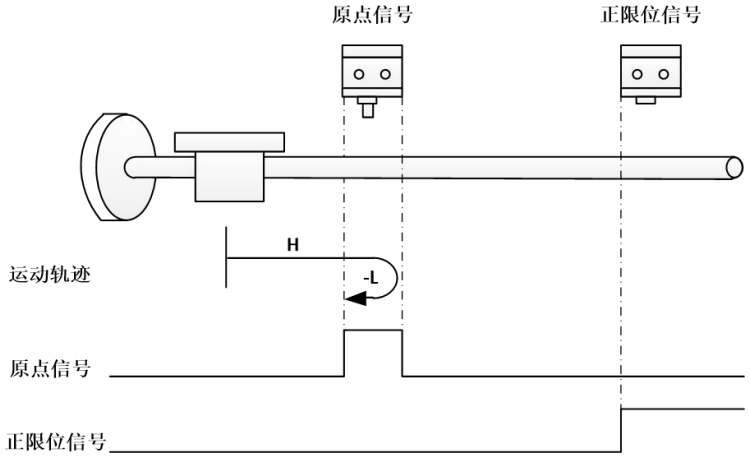


※ Method 23 (6098h =23)

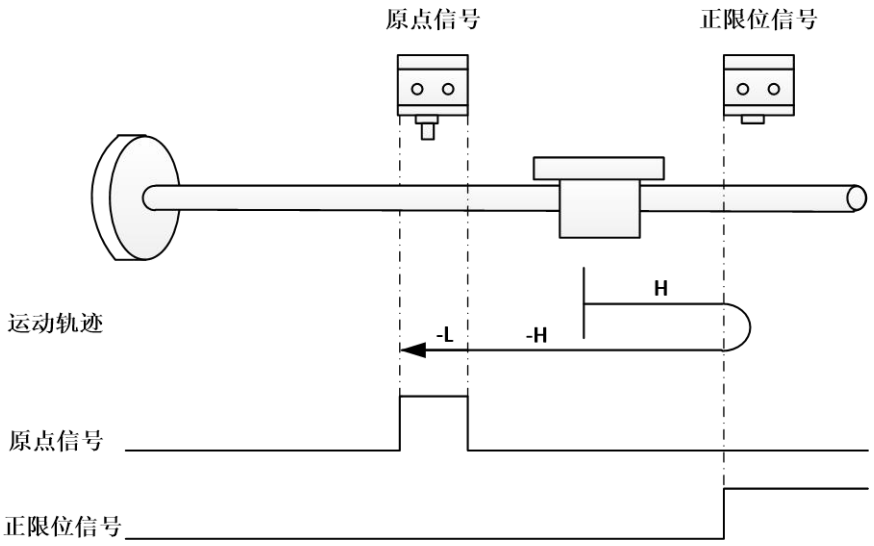
Home: Home signal

Deceleration point: Home signal

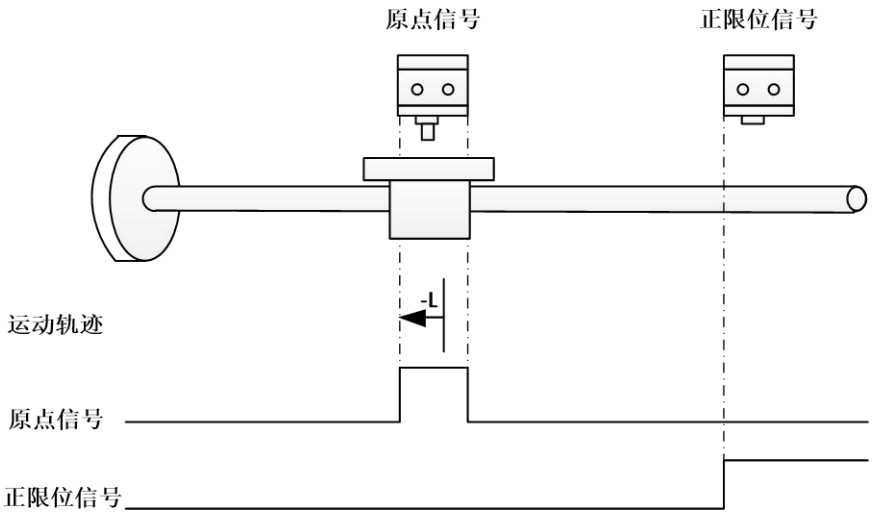
a) The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration stops after encountering the rising edge of the deceleration point, reverse low-speed operation, stops after encountering the falling edge of the deceleration point;



b) Invalid deceleration point signal when starting back to zero: forward high- speed operation, deceleration stop in case of positive limit signal, reverse high- speed operation, low-speed operation in case of rising edge of deceleration point, and stop after falling edge of deceleration point;



c) Deceleration point signal is valid when starting back to zero: Reverse low speed operation and stop after meeting the falling edge of the deceleration point;

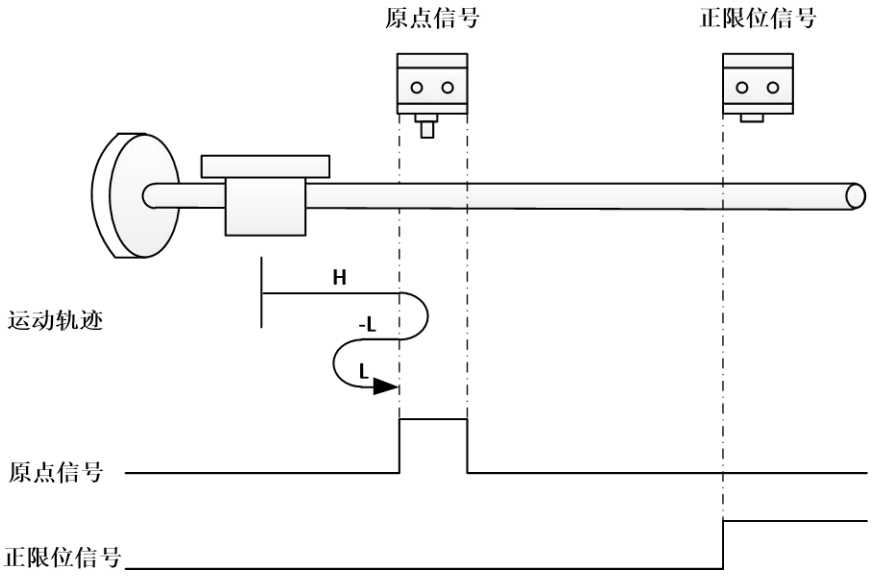


※ Method 24 (6098h =24)

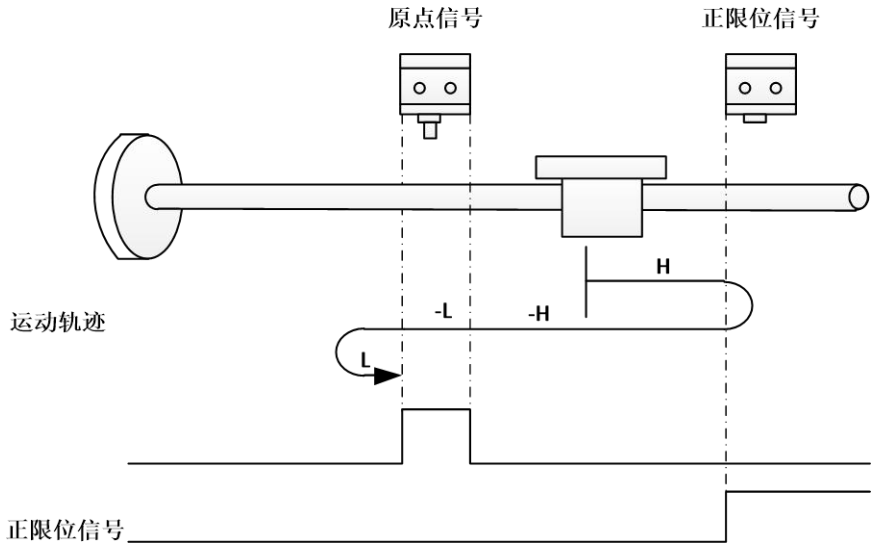
Home: Home signal

Deceleration point: Home signal

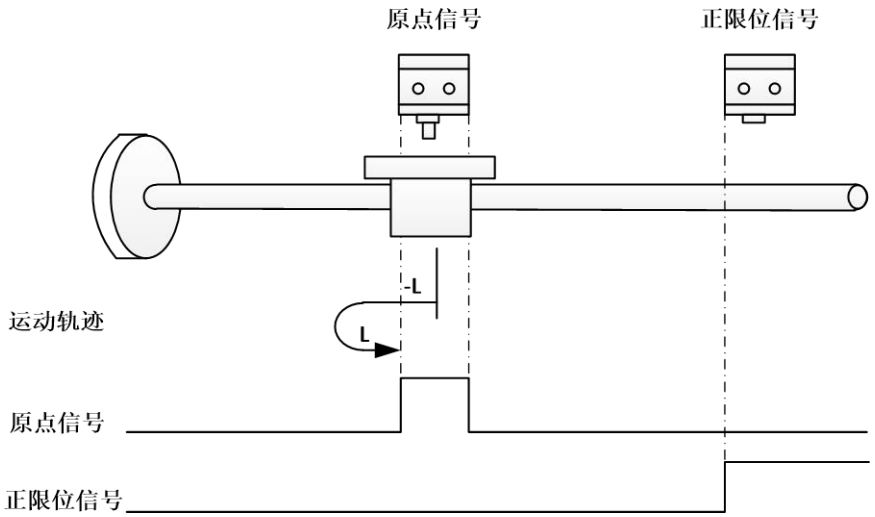
a) The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration stops after encountering the rising edge of the deceleration point, reverse low-speed operation, deceleration stops after encountering the falling edge of the deceleration point, forward low-speed operation, deceleration stops after encountering the rising edge of the deceleration point;



b) Invalid deceleration point signal when starting back to zero: forward high- speed operation, deceleration stop in case of positive limit signal, reverse high- speed operation, low-speed operation in case of rising edge of deceleration point, deceleration stop in case of falling edge of deceleration point, forward-low-speed operation, stop after rising edge of deceleration point;



c) The deceleration point signal is valid when starting back to zero: reverse low-speed operation, deceleration stops after meeting the falling edge of the deceleration point, forward low-speed operation, stops after meeting the rising edge of the deceleration point;

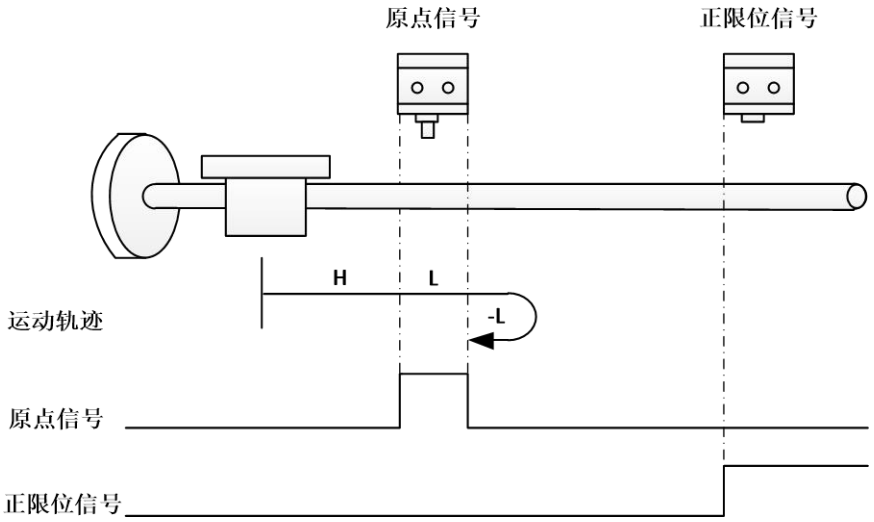


※ Method 25 (6098h =25)

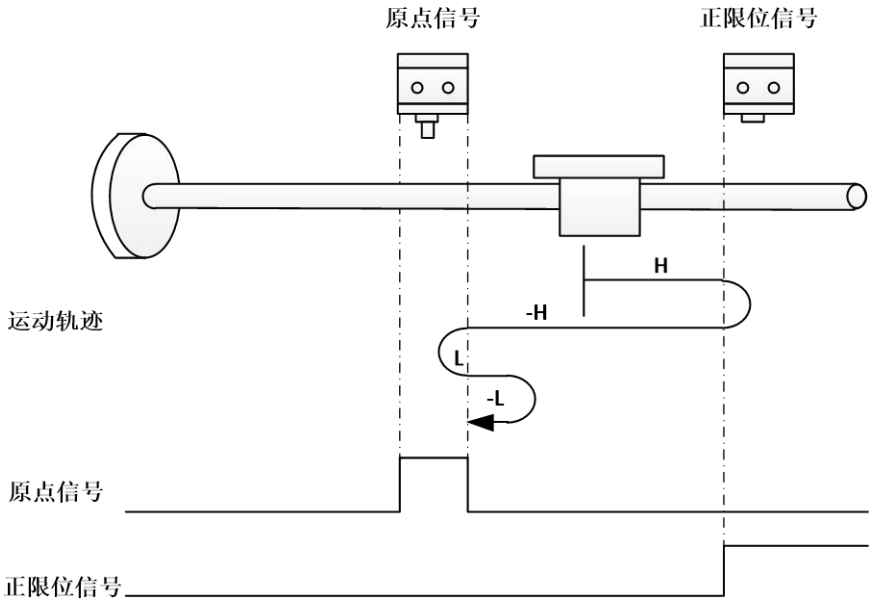
Home: Home signal

Deceleration point: Home signal

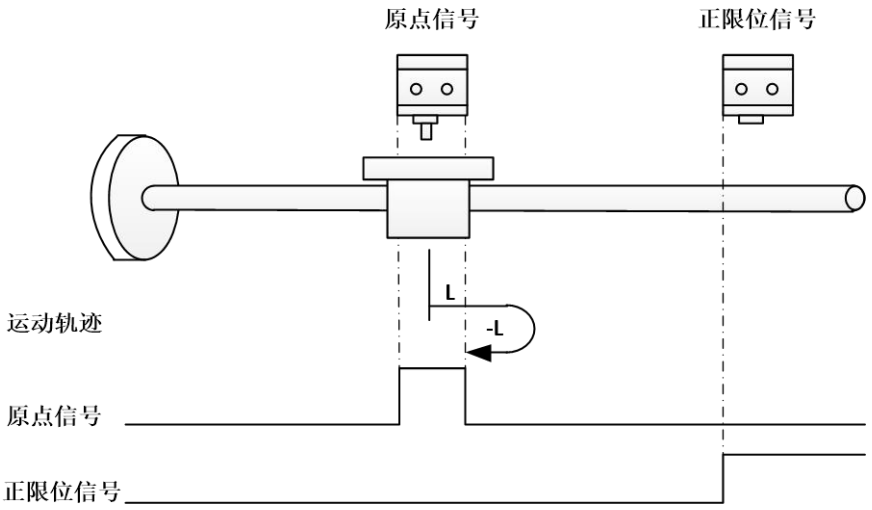
a) Invalid deceleration point signal when starting back to zero: forward high-speed operation, low-speed operation in case of rising edge of deceleration point, deceleration stop in case of falling edge of deceleration point, reverse low-speed operation, stop after rising edge of deceleration point;



b） The deceleration point signal is invalid when starting back to zero: forward high-speed operation, deceleration stops when encountering the positive limit signal, reverse high-speed operation,deceleration stops when encountering the rising edge of the deceleration point, forward low-speed operation, deceleration stops when encountering the falling edge of the deceleration point, reverse low-speed operation, and stops after encountering the rising edge of the deceleration point;



c） The deceleration point signal is valid when starting back to zero: forward low-speed operation, deceleration stops after meeting the falling edge of the deceleration point, reverse low-speed operation, stops after meeting the rising edge of the deceleration point;

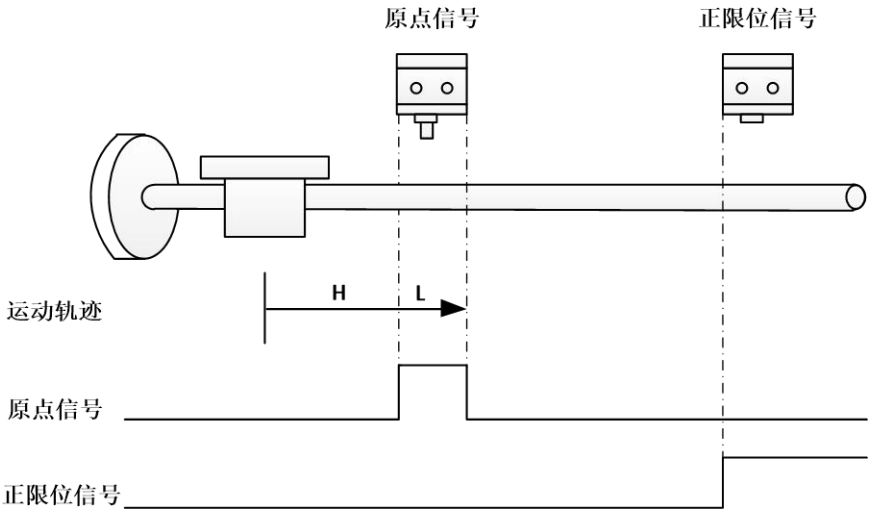


※ Method 26 (6098h =26)

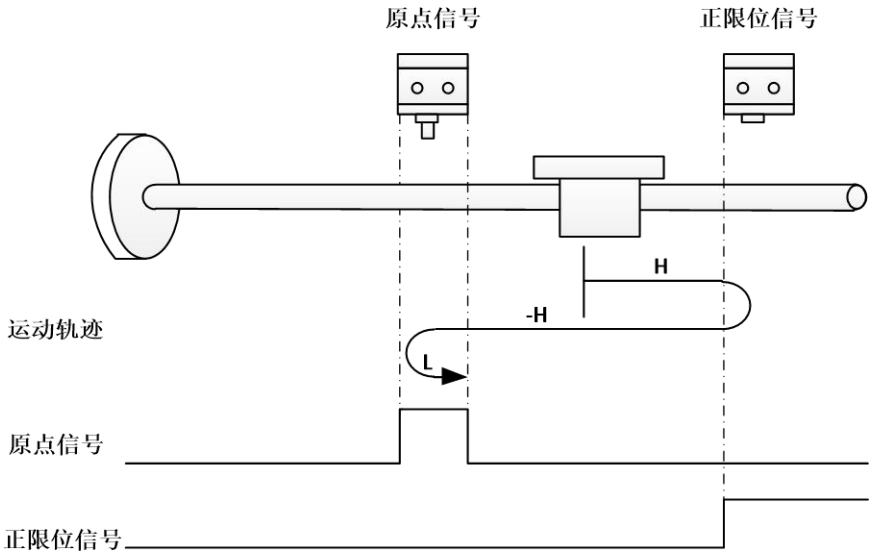
Home: Home signal

Deceleration point: Home signal

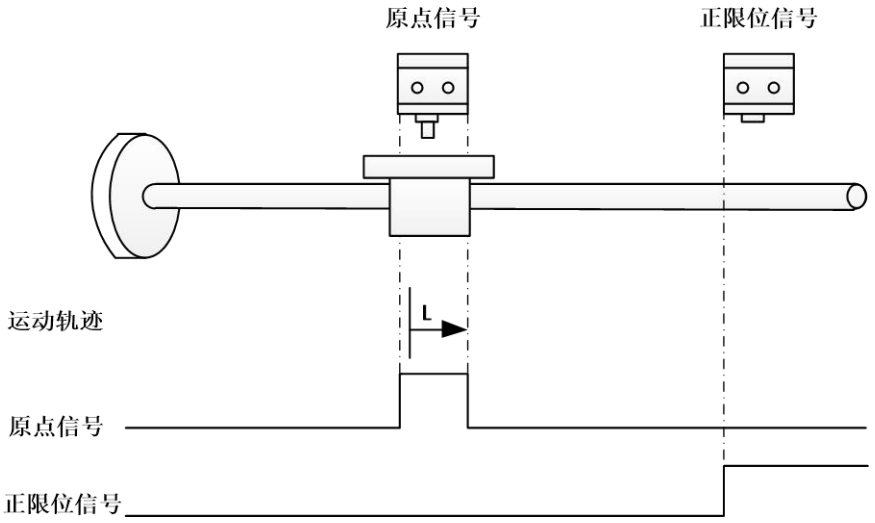
a) Invalid deceleration point signal when starting back to zero: forward high-speed operation, low-speed operation when encountering the rising edge of the deceleration point, and stopping after encountering the falling edge of the deceleration point;



b) Invalid deceleration point signal when starting back to zero: forward high- speed operation, deceleration stop when encountering positive limit signal, reverse high-speed operation, deceleration stop when encountering rising edge of deceleration point, forward low-speed operation, stop when encountering falling edge of deceleration point;



c) Invalid deceleration point signal when starting back to zero: Positive low-speed



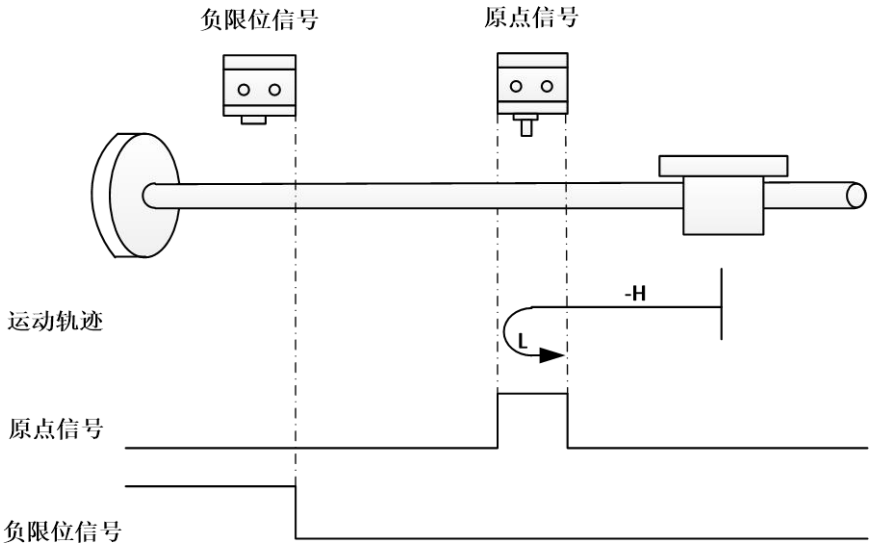
operation, stopping after encountering the falling edge of the deceleration point;

※ Method 27 (6098h =27)

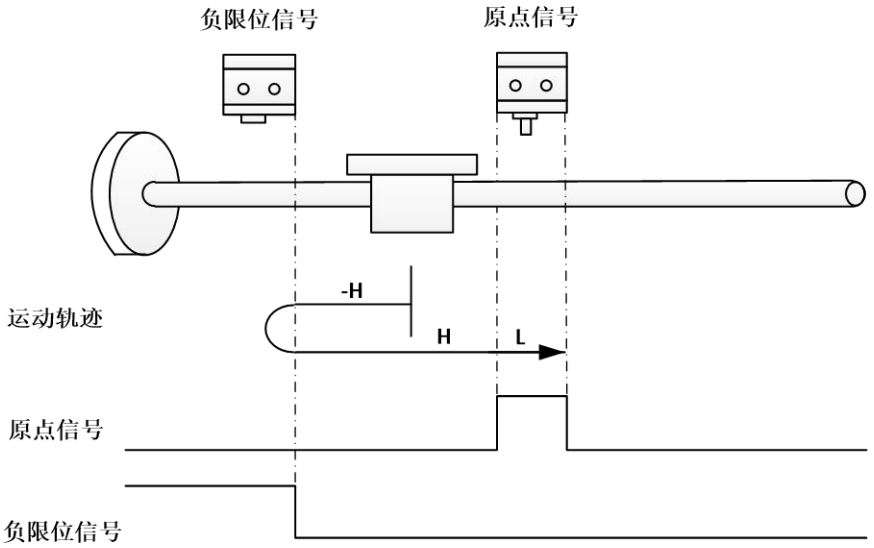
Home: Home signal

Deceleration point: Home signal

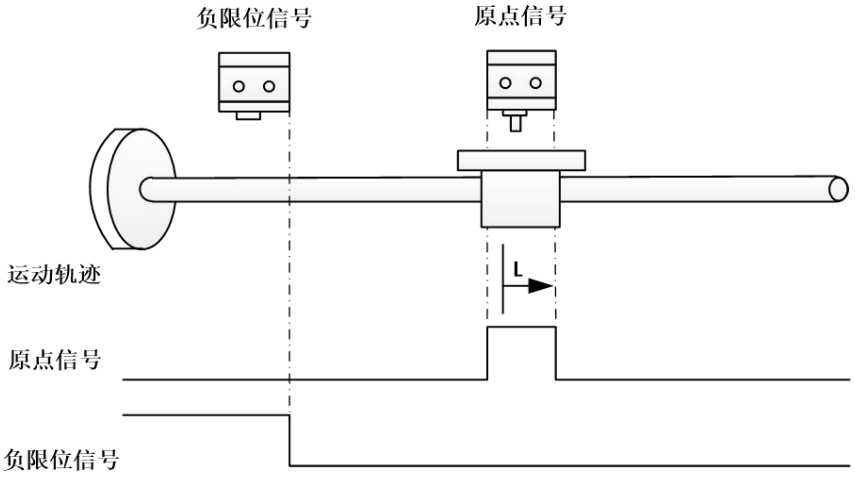
a) Invalid deceleration point signal when starting back to zero: reverse high-speed operation, deceleration stop when meeting the rising edge of the deceleration point, forward low-speed operation, stop when meeting the falling edge of the deceleration point;



b) Invalid deceleration point signal when starting back to zero: reverse high-speed operation, deceleration stop in case of negative limit, forward high-speed operation, low-speed operation in case of rising edge of deceleration point, stop after falling edge of deceleration point;



c) Deceleration point signal is valid when starting back to zero: forward low speed operation, stop after encountering the falling edge of the deceleration point;

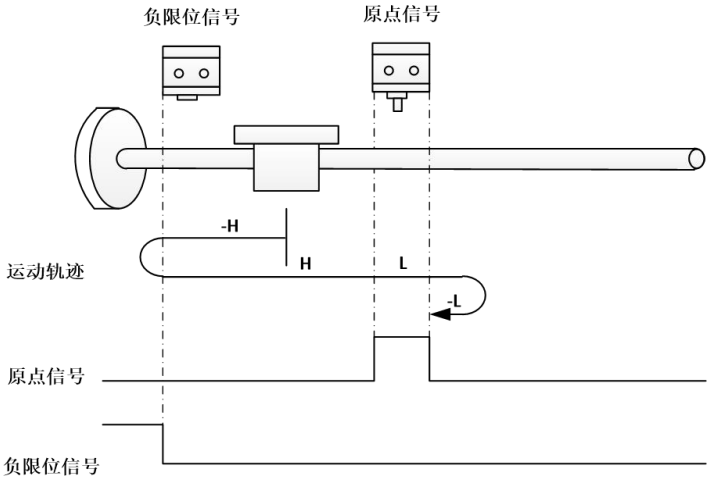


※ Method 28 (6098h =28)

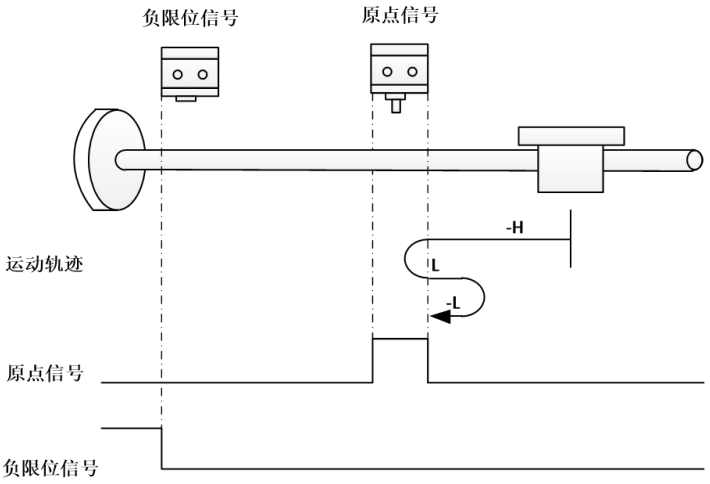
Home: Home signal

Deceleration point: Home signal

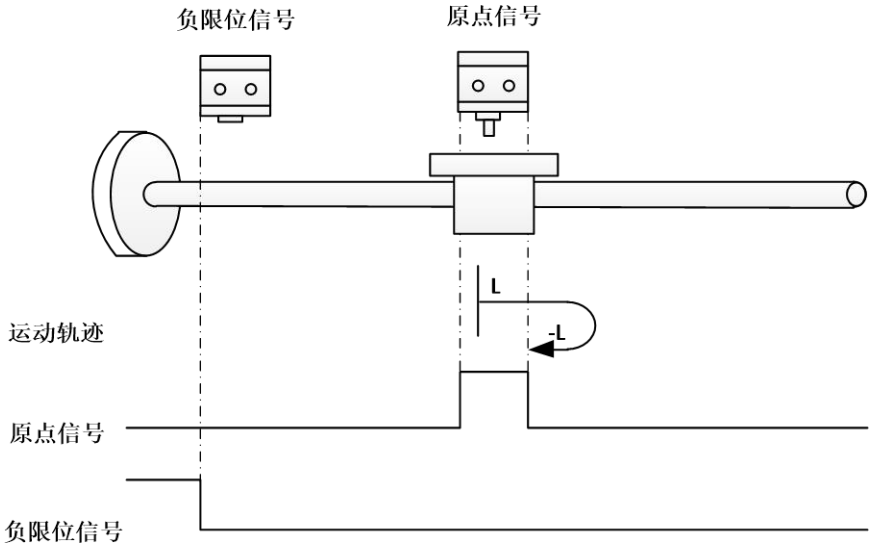
a） The deceleration point signal is invalid when starting back to zero: reverse high-speed operation, deceleration stop at the rising edge of the deceleration point, forward low-speed operation, deceleration stop at the falling edge of the deceleration point, reverse low-speed operation, deceleration stop at the rising edge of the deceleration point, and shutdown after the rising edge of the deceleration point;



b） Invalid deceleration point signal when starting back to zero: reverse high- speed operation, deceleration stop in case of negative limit, forward high-speed operation, low-speed operation in case of rising edge of deceleration point, deceleration stop in case of falling edge of deceleration point, reverse low-speed operation, stop after rising edge of deceleration point;



c） The deceleration point signal is valid when starting back to zero: forward low-speed operation, deceleration stops after meeting the falling edge of the deceleration point,reverse low-speed operation, stops after meeting the rising edge of the deceleration point;

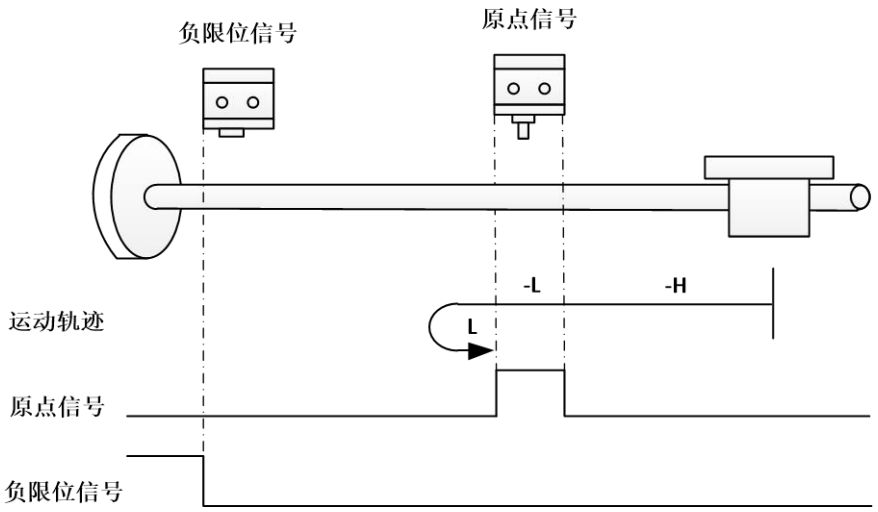


※ Method 29 (6098h =29)

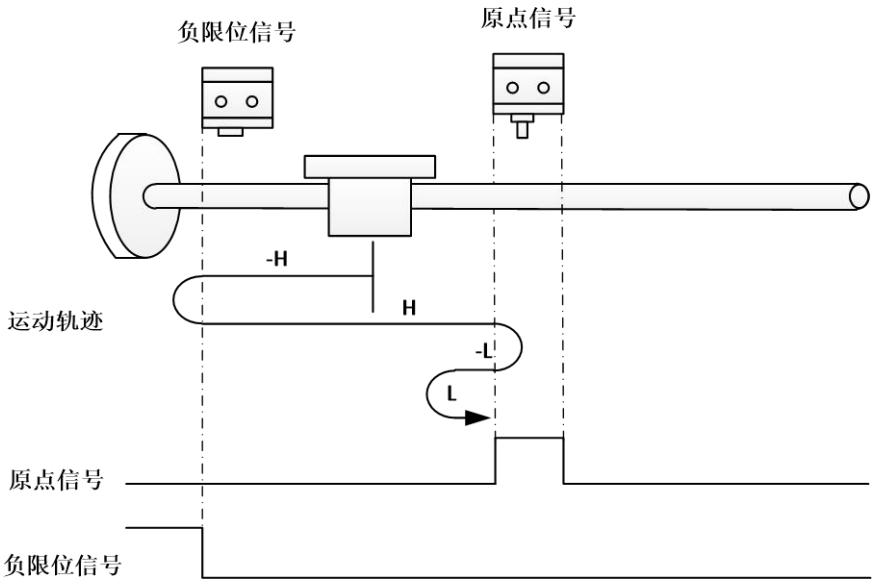
Home: Home signal

Deceleration point: Home signal

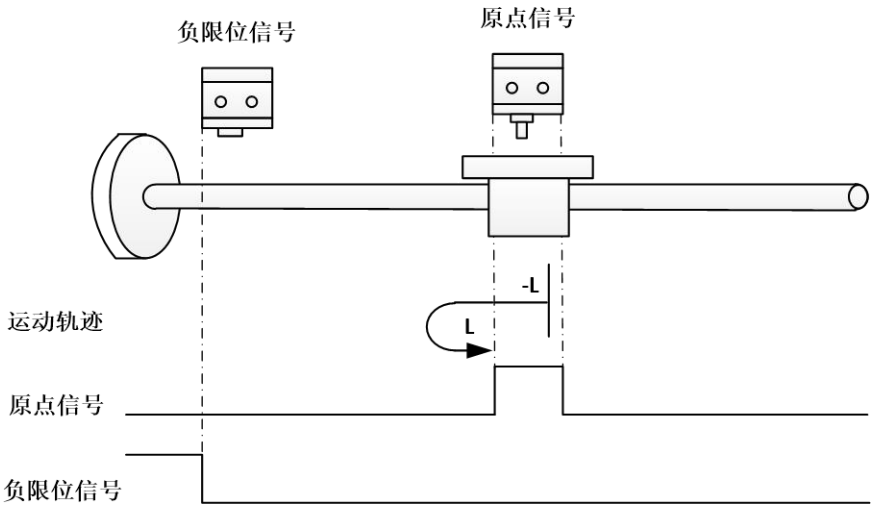
a) Invalid deceleration point signal when starting back to zero: reverse high-speed operation, low-speed operation in case of rising edge of deceleration point, deceleration stop in case of falling edge of deceleration point, forward low-speed operation, stop after rising edge of deceleration point;



b) Invalid deceleration point signal when starting back to zero: reverse high- speed operation, deceleration stop at negative limit, forward high-speed operation, deceleration stop at rising edge of deceleration point, reverse low-speed operation, deceleration stop at falling edge of deceleration point, forward low-speed operation, stop after rising edge of deceleration point;



c) Invalid deceleration point signal when starting back to zero: reverse low-speed operation, deceleration stop when meeting the falling edge of the deceleration point, forward low-speed operation, stop when meeting the rising edge of the deceleration point;

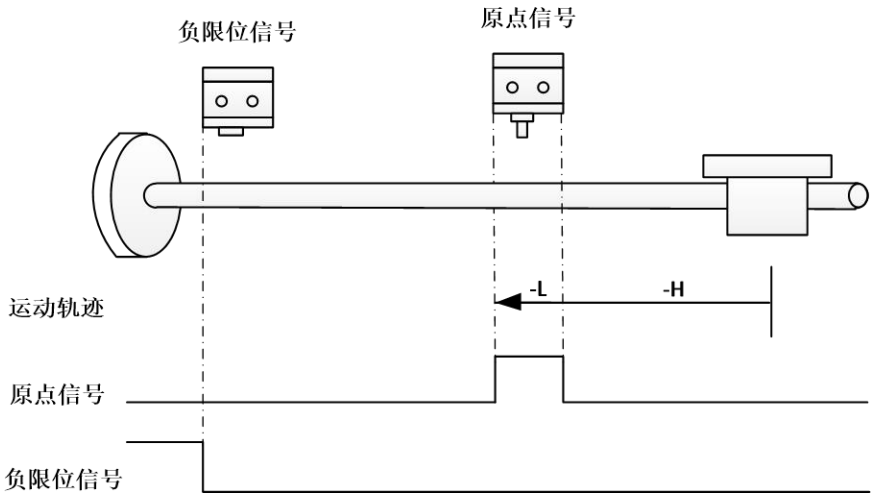


※ Method 30 (6098h =30)

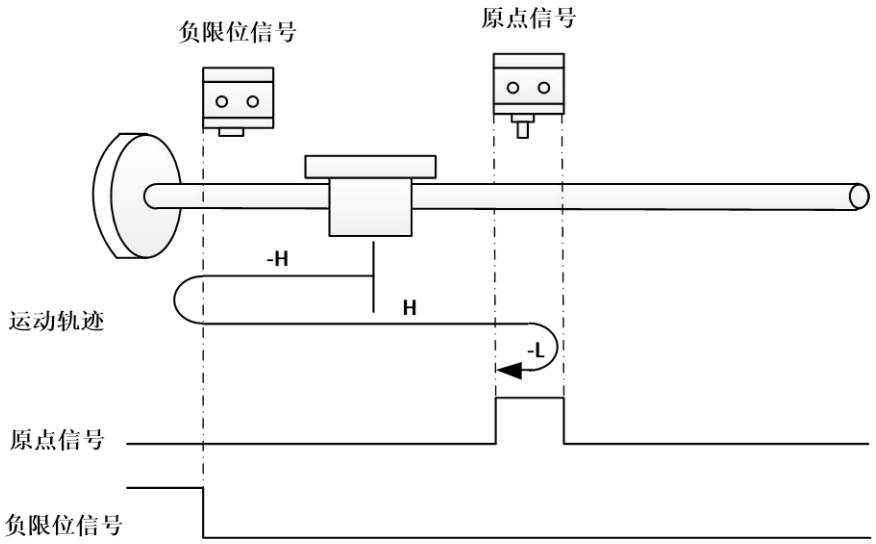
Home: Home signal

Deceleration point: Home signal

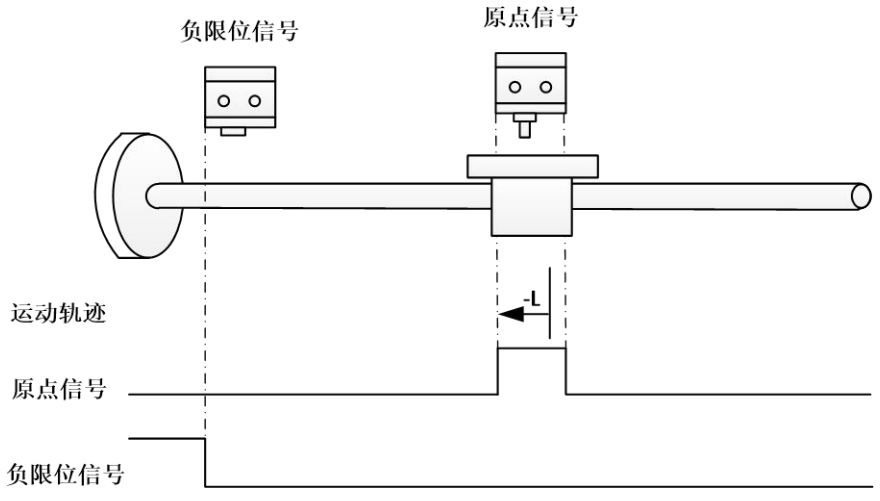
a) Invalid deceleration point signal when starting back to zero: reverse high-speed operation, low-speed operation when encountering the rising edge of the deceleration point, and stop when encountering the falling edge of the deceleration point;



b） The deceleration point signal is invalid when starting back to zero: reverse high-speed operation, deceleration stops when encountering negative limit,forward high-speed operation, deceleration stops when encountering the rising edge of the deceleration point, reverse low-speed operation, and stops after encountering the falling edge of the deceleration point;



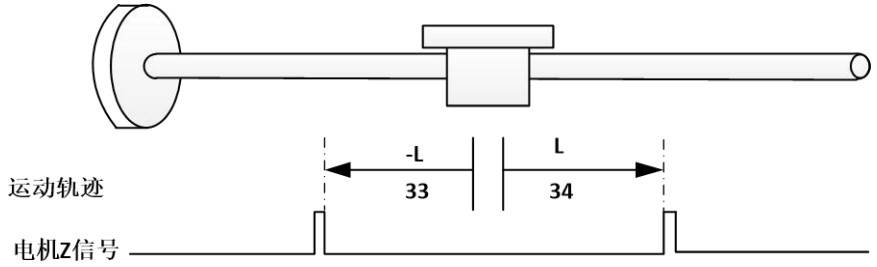
c） Invalid deceleration point signal when starting back to zero: Reverse low speed operation and stop after encountering the falling edge of the deceleration point;



※ Method 33 and Method 34 (6098h =33 and 34)

Home: Motor Z signal

Deceleration points: none



※ Method 35 (6098h = 35)

Return to Zero Mode 35 with the current position as the mechanical home position;

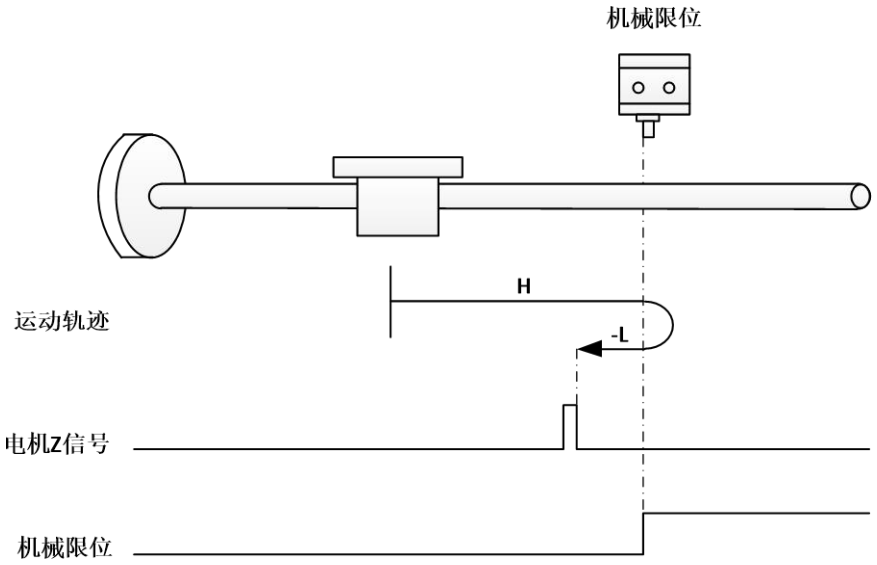
※ Method-1 (6098h = -1)

Home: Motor Z signal

Deceleration point: mechanical limit

Forward low-speed operation, deceleration stops at the rising edge of the deceleration point, reverse low-speed operation, the first one after the falling edge of the deceleration point.

Z signal stop;



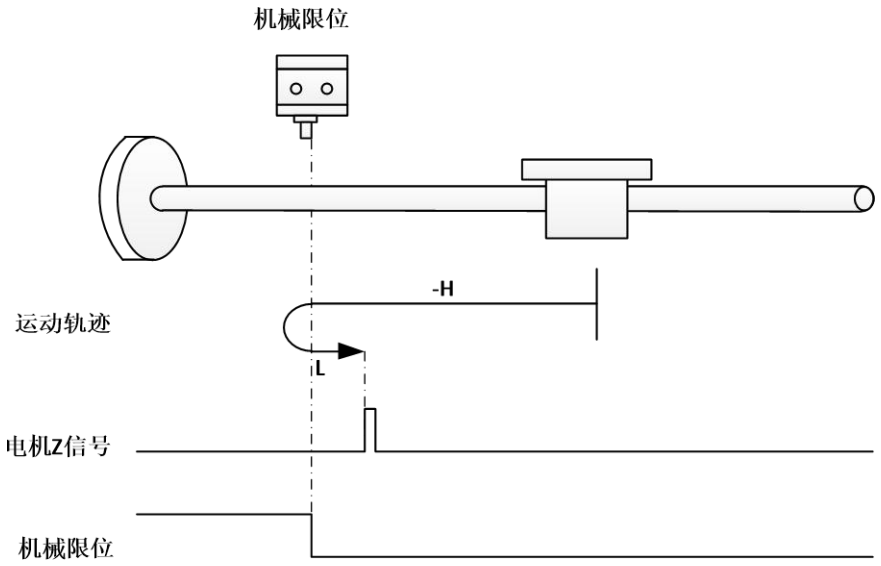
※ Method-2 (6098h = -2)

Home: Motor Z Signal

Deceleration point: mechanical limit

Reverse low-speed operation, deceleration stops at the rising edge of the deceleration point, forward low-speed operation, the first one after the falling edge of the deceleration point.

Z signal stop;

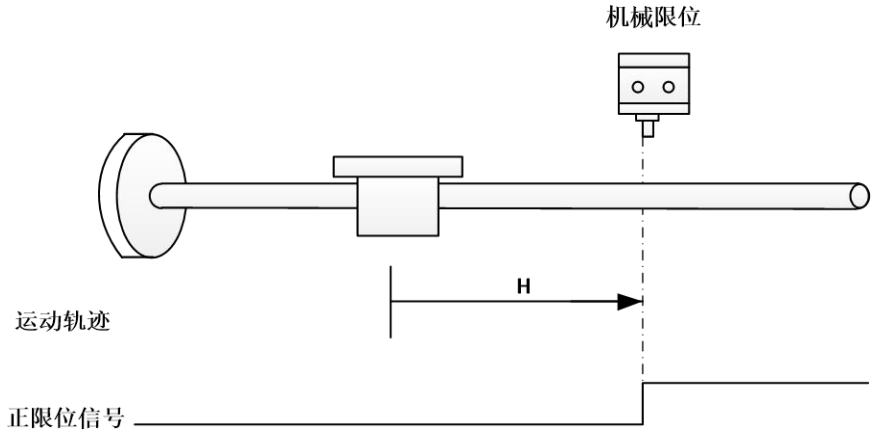


※ Method-3 (6098h = -3)

Home:Mechanical Limits

Deceleration points: none

Positive low speed, meet the origin rising along the stop;

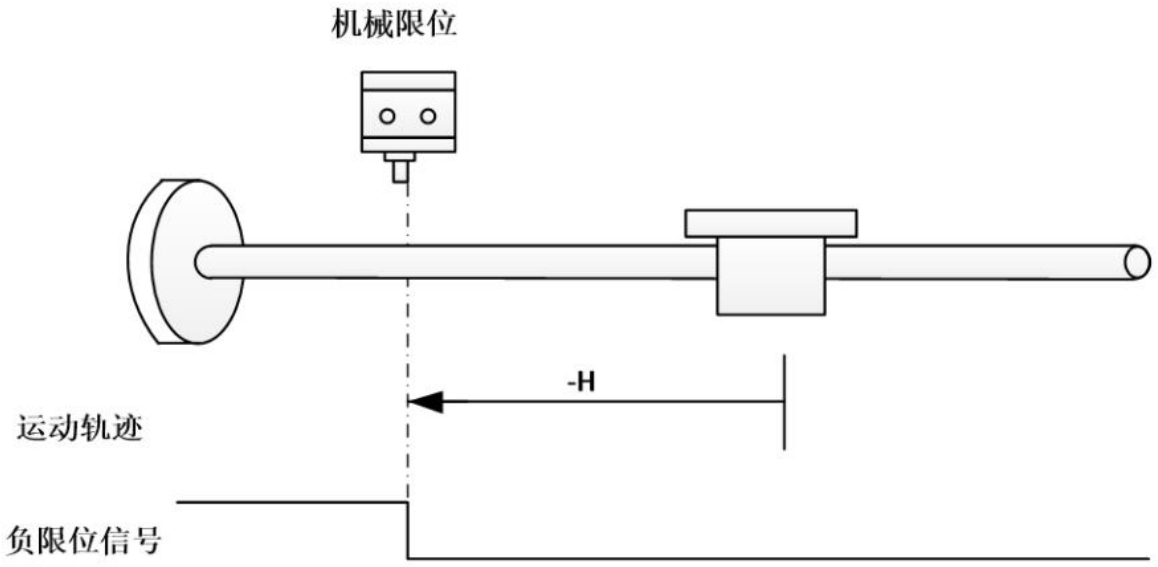


※ Method-4 (6098h = -4)

Home: Mechanical Limits

Deceleration points: none

Reverse low speed operation and stop when meeting the rising edge of the home position;


机械限位
-H
运动轨迹
负限位信号

Appendix 2: DM556EC/DM860EC Driver Object Dictionary

The object dictionary consists of three parts, the 1000h~1FFFh registers defined by CIA301, the factory-defined

2000h~2FFFh registers and 6000h~6FFFh registers defined by CIA402.

1000h~1FFFh registers are the basic COE-related communication parameters defined by CIA301, including SDO, PDO and mapping registers;

2000h~2FFFh registers are the contents of drive function parameters and factory-defined parameters, including such as subdivision, current modification can be realized in this group of parameters;

6000h~6FFFh registers are the motion parameters related to motion control defined by CIA402, including position mode, speed mode, home return mode and other operating mode registers and related motion parameters registers.

indexing	subindex	name (of a thing)	clarification	typology	causality	PD O project (an image onto a screen etc) allu de to	Paramete r range	default value
CiA 301 Basic communication parameter set								
1000h	00	Equipment type	This device supports CIA301, CIA402 pact	U32	RO	NO	-	0x40192
1001h	00	error register	Current error status of the drive	U08	RO	NO	-	0
1008h	00	Equipment Name	Synchronized message COB identifier	-	RO	NO	-	MS-ECAT
1009h	00	hardware version	hardware version	-	RO	NO	-	-
100Ah	00	software version	software version	-	RO	NO	-	-
	00	Manufacturer Information	subindex	U08	RO	NO	-	4

1018h	01		Supplier ID	U32	RO	NO	-	0x0994
	02	Product Code	Supplier Product Number	U32	RO	NO	-	0x2000/ 0x2100/ 0x2200
	03	Revision number	Product version number	U32	RO	NO	-	0x0001
	04	Serial number	Product Serial Number	U32	RO	NO	-	0x0001
1600h	00	Number of subindexes	Number of subindexes	U08	RW	NO	1~12	1
	01	RPDO0- Mapping 1	Maps to 6040h register	U32	RW	NO	-	60400010h
	02	RPDO0- Mapping 2	unmapped	U32	RW	NO	-	-
	03	RPDO0- Mapping 3	unmapped	U32	RW	NO	-	-

	04	RPDO0-Mapping 4	unmapped	U32	RW	NO	-	-
	05	RPDO0 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	RPDO0-Mapping 6	unmapped	U32	RW	NO	-	-
	07	RPDO0-Mapping 7	unmapped	U32	RW	NO	-	-
	08	RPDO0-Mapping 8	unmapped	U32	RW	NO	-	-
	09	RPDO0-Mapping 9	unmapped	U32	RW	NO	-	-
	10	RPDO0-Mapping 10	unmapped	U32	RW	NO	-	-
	11	RPDO0-Mapping 11	unmapped	U32	RW	NO	-	-
	12	RPDO0-Mapping 12	unmapped	U32	RW	NO	-	-
1601h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-
	01	RPDO1-Mapping 1	unmapped	U32	RW	NO	-	-
	02	RPDO1-Mapping 2	unmapped	U32	RW	NO	-	-
	03	RPDO1-Mapping 3	unmapped	U32	RW	NO	-	-
	04	RPDO1-Mapping 4	unmapped	U32	RW	NO	-	-
	05	RPDO1-Mapping 5	unmapped	U32	RW	NO	-	-
	06	RPDO1-Mapping 6	unmapped	U32	RW	NO	-	-
	07	RPDO1-Mapping 7	unmapped	U32	RW	NO	-	-
	08	RPDO1-Mapping 8	unmapped	U32	RW	NO	-	-
	09	RPDO1-Mapping 9	unmapped	U32	RW	NO	-	-
	10	RPDO1-Mapping 10	unmapped	U32	RW	NO	-	-
	11	RPDO1-Mapping 11	unmapped	U32	RW	NO	-	-
	12	RPDO1-Mapping 12	unmapped	U32	RW	NO	-	-
1A00h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-

	02	TPDO0-Mapping 2	unmapped	U32	RW	NO	-	-
	03	TPDO0-Mapping 3	unmapped	U32	RW	NO	-	-
	04	TPDO0 - Mapping 4	unmapped	U32	RW	NO	-	-
	05	TPDO0 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	TPDO0 - Mapping 6	unmapped	U32	RW	NO	-	-
	07	TPDO0 - Mapping 7	unmapped	U32	RW	NO	-	-
	08	TPDO0 - Mapping 8	unmapped	U32	RW	NO	-	-
	09	TPDO0 - Mapping 9	unmapped	U32	RW	NO	-	-
	10	TPDO0-Mapping 10	unmapped	U32	RW	NO	-	-
	11	TPDO0 - Mapping 11	unmapped	U32	RW	NO	-	-
	12	TPDO0 - Mapping 12	unmapped	U32	RW	NO	-	-
1A01h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-
	01	TPDO1-Mapping 1	unmapped	U32	RW	NO	-	-
	02	TPDO1 - Mapping 2	unmapped	U32	RW	NO	-	-
	03	TPDO1 - Mapping 3	unmapped	U32	RW	NO	-	-
	04	TPDO1 - Mapping 4	unmapped	U32	RW	NO	-	-
	05	TPDO1 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	TPDO1 - Mapping 6	unmapped	U32	RW	NO	-	-
	07	TPDO1 - Mapping 7	unmapped	U32	RW	NO	-	-
	08	TPDO1 - Mapping 8	unmapped	U32	RW	NO	-	-
	09	TPDO1 - Mapping 9	unmapped	U32	RW	NO	-	-
	10	TPDO1 - Mapping 10	unmapped	U32	RW	NO	-	-
	11	TPDO1 - Mapping 11	unmapped	U32	RW	NO	-	-
	12	TPDO1 - Mapping	unmapped	U32	RW	NO	-	-

1C00h	00	Number of subindexes	Number of subindexes	U08	RO	NO	0	4
	01	SM0	Type of communication	U08	RO	NO	1	1
	02	SM1	Type of communication	U08	RO	NO	2	2
	03	SM2	Type of communication	U08	RO	NO	3	3
	04	SM3	Type of communication	U08	RO	NO	4	4
1C12h	00	Number of subindexes	Number of subindexes	U08	RO	NO	1~2	1
	01	RPDO Assigned Objects	RPDO Assigned Objects	U16	RW	NO	1600h~1601h	1600h
1C13h	00	Number of subindexes	Number of subindexes	U08	RO	NO	1~2	1
	01	TPDO Assigned Objects	TPDO Assigned Objects	U16	RW	NO	1A00h~1A01h	1A00h
1C32h	00	Number of subindexes	SM2 Synchronization Manager Output Parameters	U08	RO	NO	-	-
	01	Synchronization type	Synchronization type	U16	RO	NO	-	-
	02	cycle time	cycle time	U32	RO	NO	-	-
	04	Supported synchronization types	Supported synchronization types	U16	RO	NO	-	-
	05	Minimum cycle time	Minimum cycle time	U32	RO	NO	-	-
	06	Calculation and Replication Time	Calculation and Replication Time	U32	RO	NO	-	-
	08	Get cycle time	Get cycle time	U16	RO	NO	-	-
	09	latency	latency	U32	RO	NO	-	-
	10	SYNC0 Cycle time	SYNC0 Cycle time	U32	RO	NO	-	-
	11	SM Event Loss Count	SM Event Loss Count	U16	RO	NO	-	-
	12	Cyclic overflow count	Cyclic overflow count	U16	RO	NO	-	-

	32	Sync Error	Sync Error	BOOL	RO	NO		
1C33h	00	Number of subindexes	SM3 Synchronization Manager Input Parameters	U08	RO	NO		
	01	Synchronization type	Synchronization type	U16	RO	NO		

	02	cycle time	cycle time	U32	RO	NO	-	-
	04	Supported synchronization types	Supported synchronization types	U16	RO	NO	-	-
	05	Minimum cycle time	Minimum cycle time	U32	RO	NO	-	-
	06	Calculation and Replication Time	Calculation and Replication Time	U32	RO	NO	-	-
	08	Get cycle time	Get cycle time	U16	RO	NO	-	-
	09	latency	latency	U32	RO	NO	-	-
	10	SYNC0 Cycle time	SYNC0 Cycle time	U32	RO	NO	-	-
	11	SM Event Loss Count	SM Event Loss Count	U16	RO	NO	-	-
	12	Cyclic overflow count	Cyclic overflow count	U16	RO	NO	-	-
	32	Sync Error	Sync Error	BOOL	RO	NO	-	-
Drive Function Parameter Group								
2000h	00	Drive version number	Drive version number	U16	RO	NO	-	0x0410/ 0x0420/
2001h	00	software version number	software version number	U16	RO	NO	-	-
2004h	00	Input Signal Status	Input signal level status Bit0~Bit3: X0~X3 Input Levels State;	U16	RO	YES	-	0
2005h	00	Output signal status	Output signal level status Bit0~Bit1: Y0~Y1 output status;	U16	RO	YES	-	0
2101h	00	Current Error Clearing	0: Invalid; 1: Clearance operation;	U16	RW	YES	0~1	0
2102h	00	EEPROM Operation	0: Invalid; 1: 2000h Group parameters are restored to factory; 2: 2000h group parameters are saved to EEPROM;	U16	RW	YES	0~2	0

2201h	00	Ratios and Subdivision switch modes or data streams	0: Breakdown is valid; 1: Electronic gear ratios are effective;	U16	RW	NO	0~1	0
2202h	00	Lock axis selection when not enabled	0: Locking shaft; 1: Does not lock the shaft;	U16	RW	NO	0~1	1
2203h	00	Enable signal clear fault option	0: Clear the current fault; 1: Does not clear the current fault;	U16	RW	NO	0~1	1
2204h	00	Overtravel parking method	0: Stop; 1: Emergency stop; 2: Invalid;	U16	RW	NO	0~2	0

2205h	00	Motor Default Direction	0: Default; 1: Reverse;	U16	RW	NO	0~1	0
2208h	00	Pulse command filter enable	0: Invalid; 1: Effective;	U16	RW	NO	0~1	0
2209h	00	Pulse command filter coefficients	Pulse command filter coefficient, the smaller this value is The more pronounced the filtering effect;	U16	RW	NO	0~1024	5
220Ah	00	microparticle enablement	0: Invalid; 1: Effective;	U16	RW	NO	0~1	0
220Ch	00	External stop emergency stop signal and limit sensor response	0: No action; 1: Shutdown alarm;	U16	RW	NO	0~1	0
2211h	00	Power-on motor state switching	0: Enable; 1: Release;	U16	RW	NO	0~1	0
2213h	00	Feedback speed filtering	Feedback speed filter level, 1~64, etc. The larger the level, the higher the filtering effect;	U16	RW	NO	0~64	32

2214h	00	Back to Zero Auxiliary Setting	0: Run 607C offset, 6064 will show 607C value after zero return; 1: Run 607C offset, 6064 will show 0 after zero return; 2: Run 607C offset, after zero return is completed, 6064 shows -607C value; 3: Run 607C offset, after zero return is completed, 6064 shows actual value; 4: Run 607C offset, after zero return is completed, 6064 shows actual value superimposed with 607C value; 5: Run 607C Offset, when zero return is complete, 6064 is displayed as an actual value overlay -607C Value; 6: Without running 607C offset, 6064 shows 607C value after zero return is completed; 7: Without running 607C offset, 6064 shows 0 after zero return is completed; 8: Without running 607C offset, 6064 shows -607C value after zero return is completed; 9: Without running 607C offset, 6064 shows actual value after zero return is completed; 10: Without running 607C offset, 6064 shows actual value superimposed with 607C value after zero return is completed; 11: Without running 607C offset, 6064 shows actual value superimposed with 607C value after zero return is completed 10: Without running 607C offset, the 6064 displays the actual value after the zero return is completed; 11: Do not run 607C Offset,	U16	RW	NO	0~11	0

			6064 will display as actual value overlay after zero return is complete -607C Value;					
2215h	00	Slave node source	0: Knob dial code; 1:2216h Object Dictionary;	U16	RW	NO	0~1	0

2216h	00	slave node number	Slave node number, write to ESC 0012h registers, re-power-up is valid;	U16	RW	NO	0~65535	1
2217h	00	Synchronized Frame Threshold	Synchronized frame alarm threshold;	U16	RW	NO	0~65535	20
2300h	00	Input terminal active level logic	Bit0: input terminal X0 control bit; Bit1: input terminal X1 control bit; Bit2: input terminal X2 control bit; Bit3: input terminal X3 control bit; 0: Normally open; 1: Normally closed;	U16	RW	NO	0~65535	0
2301h	00	Output Terminal Effective Level Logic	Bit0: Output terminal Y0 control bit; Bit1: Output terminal Y1 control bit; 0: Normally open; 1: Normally closed;	U16	RW	NO	0~65535	0
2310h	00	Input Terminal X0 Function option	0: Not defined; 1: Origin; 2: Positive limit; 3: Negative limit; 4: Stop; 5: Emergency stop; 6: MF signal; 7: Probe 1; 8: Probe 2; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2; 12: User-defined 3; 13: User-defined 4;	U16	RW	NO	0~13	1
2311h	00	Input Terminal X1 Function option		U16	RW	NO	0~13	2
2312h	00	Input Terminal X2 Function option		U16	RW	NO	0~13	3
2313h	00	Input terminal X3 Function selection		U16	RW	NO	0~13	0
2320h	00	Output terminal Y0 Function option	0: Not defined; 1: Alarm signal;	U16	RW	NO	0~11	0

2321h	00	Output terminal Y1 Function selection	2: Signal in place; 4: Brake signal; 5: z Signal; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2;	U16	RW	NO	0~11	0
2330h	00	Input terminal X0 Filter timing	Input terminal X0 Filter time	U16	RW	NO	0~65535	2
2331h	00	Input terminal X1 Filter timing	Input terminal X1 Filter time	U16	RW	NO	0~65535	2
2332h	00	Input Terminal X2 Filter timing	Input terminal X2 Filter time	U16	RW	NO	0~65535	2

2333h	00	Input terminal X3 Filter timing	Input terminal X3 Filter time	U16	RW	NO	0~65535	2
2400h	00	Segmentation Settings	Number of pulses for one revolution of the motor;	U16	RW	NO	400~51200	50000
2401h	00	Maximum effective current	Unit mA;	U16	RW	NO	0~5000	2000/ 4000/ 5500
2402h	00	Percentage of base current	Operating base current in %;	U16	RW	NO	0~100	40
2403h	00	Percentage of closed-loop maximum current (particle used for comparison and "-er than")	Maximum current in % for closed loop operation;	U16	RW	NO	0~150	100
2404h	00	Percentage of maximum open-loop current (particle used for comparison and "-er than")	Maximum current in % for open loop operation;	U16	RW	NO	0~100	100
2405h	00	Percentage of locker current	Current at lockup in %;	U16	RW	NO	0~100	20
2406h	00	lock time	Lock time in ms;	U16	RW	NO	0~5000	100
2408h	00	Electronic Gear Score Master	Electronic Gear Score Master	U16	RW	NO	1~51200	1000
2409h	00	Electronic gear ratio molecules	Electronic gear ratio molecules	U16	RW	NO	1~51200	4000
240Dh	00	Pulse command mean value filtering	Pulse command mean value filtering	U16	RW	NO	1~1024	512
Manufacturer-defined parameter sets								
2500h	00	Current loop Kp gain times criticize (i.e. enumerate shortcomings)	Current loop Kp Gain multiplier	U16	RW	NO	0~65535	-
2501h	00	Current loop Kp gain	Current loop Kp gain	U16	RW	NO	0~65535	-

2502h	00	op Ki gain	Current loop Ki gain	U16	RW	NO	0~65535	-
2503h	00	Current loop Kc gain	Current loop Kc gain	U16	RW	NO	0~65535	-
CiA 402 Parameter sets								
603Fh	00	Drive Fault Codes	Manufacturer-defined drive error scenarios The status is the same as the contents of the lower 16 bits of the 1003h register. 0000h: no error; FF01h: overcurrent; FF02h: overvoltage; FF03h: undervoltage; FF05h: overdifferential alarm; FF06h: communication alarm; FF08h: Sensor alarm;	U16	RO	YES	-	0

6040h	00	control letter	Control Word;	U16	RW	YES	0~65535	0
6041h	00	status word	Status words;	U16	RO	YES	0~65535	0
605A	00	Qiuck Stop method.	0: Release; 1: Stop; 2: Emergency stops;	I16	RW	NO	0~2	1
605B	00	Shutdown mode	0: Release; 1: Stop; 2: Emergency stop;	I16	RW	NO	0~2	0
605C	00	Disable operation way (of life)	0: Release; 1: Stop; 2: Emergency stops;	I16	RW	NO	0~2	1
605Dh	00	Halt stopping method	0: Release; 1: Stop; 2: Emergency stop;	I16	RW	NO	0~2	1
605Eh	00	Fault reaction method	0: Release; 1: Stop; 2: Emergency stop;	I16	RW	NO	0~2	2
6060h	00	Operation Mode Control Register	0: Not defined; 1: Positional mode; 3: Speed mode; 6: Back to home mode; 8: Cyclic synchronized position mode;	I8	RW	YES	-128~127	0
6061h	00	Operation Mode Status Register	0: Not defined; 1: Positional mode; 3: Speed mode; 6: Back to home mode; 8: Cyclic synchronized position mode;	I8	RO	YES	-128~127	0
6064h	00	Actual position value register	Actual motor position in pul;	I32	RO	YES	-	0
606Ch	00	Real-time speed value register	Current motor speed in pul/s;	I32	RO	YES	-	0
607Ah	00	Total pulses	Total number of pulses for position mode operation (including acceleration, uniform speed and deceleration) (steps) range in pul;	U32	RW	YES	-	0
607Ch	00	Home Compensation Value	Origin compensation value in pul;	I32	RW	YES	-	0

607Dh	00	f subindexes	Number of subindexes	U08	RO	NO		2
	01	Negative soft limit	Negative soft limit	132	RW	YES		-2000000
	02	Positive Soft Limit	Positive Soft Limit	132	RW	YES		200000000

607Eh	00	polarities	0: Default; 1: Flip;	U8	RW	YES	-	0
6081h	00	Maximum speed	Maximum speed in position mode, in pul/s;	U32	RW	YES	-	0
6083h	00	accelerations	Acceleration in pul/s^2;	U32	RW	YES	-	0
6084h	00	deceleration	Deceleration in pul/s^2;	U32	RW	YES	-	0
6085h	00	emergency stop to reduce speed	Emergency stop deceleration rate in pul/s^2;	U32	RW	YES	-	0
6091h	00	Number of subindexes	Number of subindexes	U08	RO	NO	-	2
	01	Motor Resolution	The default setting is motor encoder resolution Rate;	U32	RW	YES	-	4000
	02	Axis resolution	Load axis position feedback equivalent;	U32	RW	YES	-	10000
6098h	00	Return to Home Mode	1~14, 17~30, 33~34, 35 Mode selectable	I08	RW	YES	-	0
6099h	00	Number of subindexes	Number of subindexes	U08	RO	NO	-	2
	01	Return speed	Running speed when querying the home position, single Bit pul/s;	U32	RW	YES	-	0
	02	Return-to-origin query speed	Return speed after querying the origin, in pul/s;	U32	RW	YES	-	0
609Ah	00	Back to the origin plus or minus speed	Acceleration and deceleration in pul/s^2;	U32	RW	YES	-	0
60B8h	00	Probe Control	Probe Control Object;	U16	RW	YES	-	0
60B9h	00	Probe Status	Probe Status Object	U16	RO	YES	-	0
60BAh	00	Probe Latch	Probe 1 rising edge latch position	I32	RO	YES	-	0
60BBh	00	Probe Latch	Probe 1 falling edge latch position	I32	RO	YES	-	0
60BCh	00	Probe Latch	Probe 2 rising edge latch position	I32	RO	YES	-	0

60BDh	00	h	Probe 2 falling edge latch position	I32	RO	YES	-	0
60D5h	00	Probe Latch Counter	Probe 1 Rising Edge Latch Count	U16	RO	YES	-	0
60D6h	00	Probe Latch Counter	Probe 1 falling edge latch count	U16	RO	YES	-	0
60D7h	00	Probe Latch Counter	Probe 2 Rising Edge Latch Count	U16	RO	YES	-	0
60D8h	00	Probe Latch Counter	Probe 2 Falling Edge Latch Count	U16	RO	YES	-	0

60F4h	00	position error	The error between the given position and the actual position, single Bit 1 Encoder unit;	I32	RO	YES	-	0
60FDh	00	input signal function status. 0: Invalid; 1: Effective;	Bit0: Negative limit state; Bit1: Positive limit state; Bit2: Home state; Bit3~Bit15: Reserved; Bit16: Probe 1; Bit17: Probe 2; Bit18: User- defined 0; Bit19: User-defined 1; Bit20: User-defined 2; Bit21: User- defined 3; Bit22: User-defined 4;	U32	RO	YES	-	0
60FEh	00	subindex	Output terminal status	U08	RO	NO	-	2
	01	Physical output on	Output terminal function is valid Bit0~Bit15: Reserved; Bit16~Bit31: User- defined; 0: Output invalid; 1: The output is valid;	U32	RW	YES	-	0
	02	Physical Output Enable	Output terminal function enable Bit0~Bit15: reserved; Bit16~Bit31: user- defined; 0: output disable; 1: Output enable;	U32	RW	YES	-	0
60FFh	00	Maximum speed	Maximum speed in speed mode, unit pul/s;	I32	RW	YES	-	0
6502h	00	Supported operating modes	Bit 0: Profile Position Mode; Bit 1: Velocity Mode; Bit 2: Profile Velocity Mode; Bit 3: Torque Profile Mode; Bit 4: Reserved; Bit 5: Homing Mode; Bit 6: Interpolated Position Mode; Bit 7: Cyclic Sync Position Mode; Bit 9: Cyclic Sync Torque Mode; Bit 10~31: reserved;	U32	RO	NO	-	0x00A5

Note: U16 means unsigned 16-bit; I16 means signed 16-bit; U32 means unsigned 32-bit; I32 means signed 32-bit.

Appendix 3: CL57EC/CL86EC Driver Object Dictionary

The object dictionary consists of three parts, the 1000h~1FFFh registers defined by CIA301, the factory-defined
2000h~2FFFh registers and 6000h~6FFFh registers defined by CIA402.

1000h~1FFFh registers are the basic COE-related communication parameters defined by CIA301, including SDO, PDO and mapping registers;

2000h~2FFFh registers are the contents of drive function parameters and factory-defined parameters, including such as subdivision, current modification can be realized in this group of parameters;

6000h~6FFFh registers are the motion parameters related to motion control defined by CIA402, including position mode, speed mode, home return mode and other operating mode registers and related motion parameters registers.

indexing	subindex	name (of a thing)	clarification	typology	causality	PD O project(an Image onto a Screen etc) allude to	Paramete r range	default value
CiA 301 Basic communication parameter set								
1000h	00	Equipment type	This device supports CIA301, CIA402 pact	U32	RO	NO	-	0x40192
1001h	00	error register	Current error status of the drive	U08	RO	NO	-	0
1008h	00	Equipment Name	Synchronized message COB identifier	-	RO	NO	-	ECAT-DR
1009h	00	hardware version	hardware version	-	RO	NO	-	-
100Ah	00	software version	software version	-	RO	NO	-	-
	00	Manufacturer Information	subindex	U08	RO	NO	-	4
	01	Vendor ID	Supplier ID	U32	RO	NO	-	0x0994

1018h	02	de	Supplier Product Number	U32	RO	NO	-	0x3000
	03	Revision number	Product version number	U32	RO	NO	-	0x0001
	04	Serial number	Product Serial Number	U32	RO	NO	-	0x0001
1600h	00	Number of subindexes	Number of subindexes	U08	RW	NO	1~12	1
	01	RPDO0- Mapping 1	Maps to 6040h register	U32	RW	NO	-	60400010h
	02	RPDO0- Mapping 2	unmapped	U32	RW	NO	-	-
	03	RPDO0- Mapping 3	unmapped	U32	RW	NO	-	-

	04	RPDO0-Mapping 4	unmapped	U32	RW	NO	-	-
	05	RPDO0 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	RPDO0-Mapping 6	unmapped	U32	RW	NO	-	-
	07	RPDO0-Mapping 7	unmapped	U32	RW	NO	-	-
	08	RPDO0-Mapping 8	unmapped	U32	RW	NO	-	-
	09	RPDO0-Mapping 9	unmapped	U32	RW	NO	-	-
	10	RPDO0-Mapping 10	unmapped	U32	RW	NO	-	-
	11	RPDO0-Mapping 11	unmapped	U32	RW	NO	-	-
	12	RPDO0-Mapping 12	unmapped	U32	RW	NO	-	-
1601h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-
	01	RPDO1-Mapping 1	unmapped	U32	RW	NO	-	-
	02	RPDO1-Mapping 2	unmapped	U32	RW	NO	-	-
	03	RPDO1-Mapping 3	unmapped	U32	RW	NO	-	-
	04	RPDO1-Mapping 4	unmapped	U32	RW	NO	-	-
	05	RPDO1-Mapping 5	unmapped	U32	RW	NO	-	-
	06	RPDO1-Mapping 6	unmapped	U32	RW	NO	-	-
	07	RPDO1-Mapping 7	unmapped	U32	RW	NO	-	-
	08	RPDO1-Mapping 8	unmapped	U32	RW	NO	-	-
	09	RPDO1-Mapping 9	unmapped	U32	RW	NO	-	-
	10	RPDO1-Mapping 10	unmapped	U32	RW	NO	-	-
	11	RPDO1-Mapping 11	unmapped	U32	RW	NO	-	-
	12	RPDO1-Mapping 12	unmapped	U32	RW	NO	-	-
1A00h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-

	02	TPDO0-Mapping 2	unmapped	U32	RW	NO	-	-
	03	TPDO0-Mapping 3	unmapped	U32	RW	NO	-	-
	04	TPDO0 - Mapping 4	unmapped	U32	RW	NO	-	-
	05	TPDO0 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	TPDO0 - Mapping 6	unmapped	U32	RW	NO	-	-
	07	TPDO0 - Mapping 7	unmapped	U32	RW	NO	-	-
	08	TPDO0 - Mapping 8	unmapped	U32	RW	NO	-	-
	09	TPDO0 - Mapping 9	unmapped	U32	RW	NO	-	-
	10	TPDO0-Mapping 10	unmapped	U32	RW	NO	-	-
	11	TPDO0 - Mapping 11	unmapped	U32	RW	NO	-	-
	12	TPDO0 - Mapping 12	unmapped	U32	RW	NO	-	-
1A01h	00	Number of subindexes	Number of subindexes	U08	RW	NO	-	-
	01	TPDO1-Mapping 1	unmapped	U32	RW	NO	-	-
	02	TPDO1 - Mapping 2	unmapped	U32	RW	NO	-	-
	03	TPDO1 - Mapping 3	unmapped	U32	RW	NO	-	-
	04	TPDO1 - Mapping 4	unmapped	U32	RW	NO	-	-
	05	TPDO1 - Mapping 5	unmapped	U32	RW	NO	-	-
	06	TPDO1 - Mapping 6	unmapped	U32	RW	NO	-	-
	07	TPDO1 - Mapping 7	unmapped	U32	RW	NO	-	-
	08	TPDO1 - Mapping 8	unmapped	U32	RW	NO	-	-
	09	TPDO1 - Mapping 9	unmapped	U32	RW	NO	-	-
	10	TPDO1 - Mapping 10	unmapped	U32	RW	NO	-	-
	11	TPDO1 - Mapping 11	unmapped	U32	RW	NO	-	-
	12	TPDO1 - Mapping	unmapped	U32	RW	NO	-	-

1C00h	00	Number of subindexes	Number of subindexes	U08	RO	NO	0	4
	01	SM0	Type of communication	U08	RO	NO	1	1
	02	SM1	Type of communication	U08	RO	NO	2	2
	03	SM2	Type of communication	U08	RO	NO	3	3
	04	SM3	Type of communication	U08	RO	NO	4	4
1C12h	00	Number of subindexes	Number of subindexes	U08	RO	NO	1~2	1
	01	RPDO Assigned Objects	RPDO Assigned Objects	U16	RW	NO	1600h~1601h	1600h
1C13h	00	Number of subindexes	Number of subindexes	U08	RO	NO	1~2	1
	01	TPDO Assigned Objects	TPDO Assigned Objects	U16	RW	NO	1A00h~1A01h	1A00h
1C32h	00	Number of subindexes	SM2 Synchronization Manager Output Parameters	U08	RO	NO	-	-
	01	Synchronization type	Synchronization type	U16	RO	NO	-	-
	02	cycle time	cycle time	U32	RO	NO	-	-
	04	Supported synchronization types	Supported synchronization types	U16	RO	NO	-	-
	05	Minimum cycle time	Minimum cycle time	U32	RO	NO	-	-
	06	Calculation and Replication Time	Calculation and Replication Time	U32	RO	NO	-	-
	08	Get cycle time	Get cycle time	U16	RO	NO	-	-
	09	latency	latency	U32	RO	NO	-	-
	10	SYNC0 Cycle time	SYNC0 Cycle time	U32	RO	NO	-	-
	11	SM Event Loss Count	SM Event Loss Count	U16	RO	NO	-	-
	12	Cyclic overflow count	Cyclic overflow count	U16	RO	NO	-	-

	32	Sync Error	Sync Error	BOOL	RO	NO		
1C33h	00	Number of subindexes	SM3 Synchronization Manager Input Parameters	U08	RO	NO		
	01	Synchronization type	Synchronization type	U16	RO	NO		

	02	cycle time	cycle time	U32	RO	NO	-	-
	04	Supported synchronization types	Supported synchronization types	U16	RO	NO	-	-
	05	Minimum cycle time	Minimum cycle time	U32	RO	NO	-	-
	06	Calculation and Replication Time	Calculation and Replication Time	U32	RO	NO	-	-
	08	Get cycle time	Get cycle time	U16	RO	NO	-	-
	09	latency	latency	U32	RO	NO	-	-
	10	SYNC0 Cycle time	SYNC0 Cycle time	U32	RO	NO	-	-
	11	SM Event Loss Count	SM Event Loss Count	U16	RO	NO	-	-
	12	Cyclic overflow count	Cyclic overflow count	U16	RO	NO	-	-
	32	Sync Error	Sync Error	BOOL	RO	NO	-	-
Drive Function Parameter Group								
2000h	00	Drive version number	Drive version number	U16	RO	NO	-	-
2001h	00	software version number	software version number	U16	RO	NO	-	-
2004h	00	Input Signal Status	Input signal level status Bit0~Bit2: X3, X4, X7 Inputs Level state;	U16	RO	YES	-	0
2005h	00	Output signal status	Output signal level status Bit0: Y2 output status;	U16	RO	YES	-	0
2101h	00	Current Error Clearing	0: Invalid; 1: Clearance operation;	U16	RW	YES	0~1	0
2102h	00	EEPROM Operation	0: Invalid; 1: 2000h Group parameters are restored to factory; 2: 2000h group parameters are saved to EEPROM;	U16	RW	YES	0~2	0

2201h	00	Ratios and Subdivision switch modes or data streams	0: Breakdown is valid; 1: Electronic gear ratios are effective;	U16	RW	NO	0~1	0
2202h	00	Lock axis selection when not enabled	0: Locking shaft; 1: Does not lock the shaft;	U16	RW	NO	0~1	1
2203h	00	Enable signal clear fault option	0: Clear the current fault; 1: Does not clear the current fault;	U16	RW	NO	0~1	1
2204h	00	Overtravel parking method	0: Stop; 1: Emergency stop; 2: Invalid;	U16	RW	NO	0~2	0

			Note: This function is available in pp, pv modes Effect;					
2205h	00	Motor Default Direction	0: Default; 1: Reverse;	U16	RW	NO	0~1	0
2206h	00	Drive Operation Mode	0: Invalid; 1: Open-loop mode; 2: Closed-loop over drive angle 1 mode; 3: Closed-loop overdrive angle 2 mode;	U16	RW	NO	0~3	1
2208h	00	Pulse command filter enable	0: Invalid; 1: Effective;	U16	RW	NO	0~1	0
2209h	00	Pulse command filter coefficients	Pulse command filter coefficient, the smaller this value is The more pronounced the filtering effect;	U16	RW	NO	0~1024	5
220Ah	00	microparticle enablement	0: Invalid; 1: Effective;	U16	RW	NO	0~1	1
220Ch	00	External stop emergency stop signal and limit sensor response	0: No action; 1: Shutdown alarm;	U16	RW	NO	0~1	0
220Dh	00	Holding brake protection	0: Invalid; 1: Effective;	U16	RW	NO	0~1	0
220Eh	00	Z Signal Function Control	0: Invalid; 1: Effective; 2: For Omron; When this value is set to 2, the z signal is used as the Probe 1 function, and the external signal of Probe 1 will be invalid. PLC-specific settings;	U16	RW	NO	0~2	0
2211h	00	Power-on motor state switching	0: Enable; 1: Release;	U16	RW	NO	0~1	0
2212h	00	Z Signal Output Width	Valid for closed-loop motors only, in ms;	U16	RW	NO	0~1024	5
2213h	00	Feedback velocity filtering	Feedback speed filter level, 1~64, etc. The larger the level, the	U16	RW	NO	0~64	14

			higher the filtering effect;					
2214h	00	Back to Zero Auxiliary Setting	0: Run 607C offset, 6064 will show 607C value after zero return; 1: Run 607C offset, 6064 will show 0 after zero return; 2: Run 607C offset, after zero return is completed, 6064 shows -607C value; 3: Run 607C offset, after zero return is completed, 6064 shows actual value; 4: Run 607C offset, after zero return is completed, 6064 shows actual value superimposed with 607C value; 5: Running 607C offset, return to zero complete After 6064 shown as actual value overlay -607C Value;	U16	RW	NO	0~11	0

			6: Do not run 607C offset, 6064 will display as 607C value after zero return is completed; 7: Do not run 607C offset, 6064 will display as 0 after zero return is completed; 8: Without running 607C offset, 6064 shows -607C value after zero return is completed; 9: Without running 607C offset, 6064 shows actual value after zero return is completed; 10: Without running 607C offset, 6064 shows actual value superimposed on 607C value after zero return is completed; 11: Do not run 607C Offset, 6064 will display as actual value overlay after zero return is complete -607C Value;					
2215h	00	Slave node source	0: Knob dial code; 1:2216h Object Dictionary;	U16	RW	NO	0~1	1
2216h	00	slave node number	Slave node number, write to ESC 0012h registers, re-power-up is valid;	U16	RW	NO	0~65535	0
2217h	00	Synchronized Frame Threshold	Synchronized frame alarm threshold;	U16	RW	NO	0~65535	20
2218h	00	STO Function Enable Bit	0: Not turned on by default; 1: Turn on the STO function;	U16	RW	NO	0~1	0
2219h	00	STO Detection Time	Detection of STO signal absence time, unit ms;	U16	RW	NO	0~65535	10
221Ah	0	Stop/Emergenc y Stop Signal Alarm Method for IO Inputs	0: No alarm in case of stop/emergency stop signal; 1: In case of stop/emergency stop signal, the warning lamp flashes; 2: In case of stop/emergency stop signal, the warning lamp flashes. blinking, the error is	U16	RW	NO	0~2	2

			reported to the master;					
221Bh	00	IO Input Limit Signal Alarm Method	0: No shutdown and no alarm in case of limit signal; 1: Shutdown in case of limit signal, warning light flashes; 2: Stop the machine in case of limit signal, the warning lamp flashes. blinking, the error is reported to the master;	U16	RW	NO	0~2	0
221Ch	00	Power-up Phase Angle Flyer Bailout protect	0: Invalid; 1: Effective;	U16	RW	NO	0~1	0
221Dh	00	Enable release of phase angle lock machine angle	0: Zero degree angle; 1: Encoder angle;	U16	RW	NO	0~1	0
2300h	00	Input terminal active level logic	Bit0: Input terminal X3 control bit; Bit1: Input terminal X4 control bit; Bit2: Input terminal X7 control bit; 0: Normally open; 1: Normally closed;	U16	RW	NO	0~65535	0

2301h	00	Output Terminal Effective Level Logic	Bit0: Output terminal Y2 control bit; 0: Normally open; 1: Normally closed;	U16	RW	NO	0~65535	0
2310h	00	Input Terminal X3 Function option	0: Not defined; 1: Origin; 2: Positive limit; 3: Negative limit; 4: Stop; 5: Emergency stop; 7: Probe 1; 8: Probe 2; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2; 12: User-defined 3; 13: User-defined 4; 14: User-defined 5; 15: User-defined 6; 16: User-defined 7;	U16	RW	NO	0~16	1
2311h	00	Input Terminal X4 Function option		U16	RW	NO	0~16	2
2312h	00	Input terminal X7 Function selection		U16	RW	NO	0~16	3
2320h	00	Output terminal Y2 Function selection	0: Not defined; 1: Alarm signal; 2: Signal in place; 4: Brake signal; 5: z Signal; 6: STO error output signal; 9: User-defined 0; 10: User-defined 1; 11: User-defined 2; 12: User-defined 3; 13: User-defined 4; 14: User-defined 5;	U16	RW	NO	0~14	0
2330h	00	Input terminal X3 Filter timing	Input terminal X3 Filter time	U16	RW	NO	0~65535	2
2331h	00	Input terminal X4 Filter timing	Input terminal X4 Filter time	U16	RW	NO	0~65535	2
2332h	00	Input terminal X7 Filter timing	Input terminal X7 Filter time	U16	RW	NO	0~65535	2

2400h		Segmentation Settings	Number of pulses for one revolution of the motor;	U16	RW	NO	400-5120	10000
2401h	00	Maximum effective current	Unit mA;	U16	RW	NO	0-50	1000/5000

2402h	00	Percentage of base current	Operating base current in %;	U16	RW	NO	0~100	40
2403h	00	Percentage of closed-loop maximum current (particle used for comparison and "- er than")	Maximum current in % for closed loop operation;	U16	RW	NO	0~150	100
2404h	00	Percentage of maximum open- loop current (particle used for comparison and "- er than")	Maximum current in % for open loop operation;	U16	RW	NO	0~100	100
2405h	00	Percentage of locker current	Current at lockup in %;	U16	RW	NO	0~100	20
2406h	00	lock time	Lock time in ms;	U16	RW	NO	0~5000	100
2407h	00	Encoder Resolution	Encoder Resolution	U16	RW	NO	4000	4000
2408h	00	Electronic Gear Score Master	Electronic Gear Score Master	U16	RW	NO	1~51200	1000
2409h	00	Electronic gear ratio molecules	Electronic gear ratio molecules	U16	RW	NO	1~51200	4000
240Ah	00	Position overrun alarm threshold	Position overrun alarm threshold	U16	RW	NO	0~4000	4000
240Bh	00	Positioning Error Range	Positioning Error Range	U16	RW	NO	1~100	5
240Ch	00	End time in place	End time in place	U16	RW	NO	1~65535	1000
240Dh	00	Pulse command mean value filtering	Pulse command mean value filtering	U16	RW	NO	1~1024	512
Manufacturer-defined parameter sets								
2500h	00	Current loop Kp gain times criticize (i.e. enumerate shortcomings)	Current loop Kp Gain multiplier	U16	RW	NO	0~65535	-
2501h	00	Current loop Kp	Current loop Kp gain	U16	RW	NO	0~65535	-

2502h	00	Current loop Ki gain	Current loop Ki gain	U16	RW	NO	0~65535	-
2503h	00	Current loop Kc gain	Current loop Kc gain	U16	RW	NO	0~65535	-
2504h	00	LA position loop Kp gain	LA position loop Kp gain	U16	RW	NO	0~65535	-
2505h	00	LA Speed loop Kv gain	LA Speed loop Kv gain	U16	RW	NO	0~65535	-
2506h	00	LA Velocity feedforward Kvf increase all the more	LA Speed feedforward Kvf gain	U16	RW	NO	0~65535	-
2507h	00	LA position ring Ki gain	LA position ring Ki gain	U16	RW	NO	0~65535	-
2508h	00	LA Speed Node 1	LA Speed Node 1	U16	RW	NO	0~65535	-
2509h	00	LA speed Kp1	LA speed Kp1	U16	RW	NO	0~65535	-

250Ah	00	LA Speed Kv1	LA Speed Kv1	U16	RW	NO	0~65535	-
250Bh	00	LA Speed Node 2	LA Speed Node 2	U16	RW	NO	0~65535	-
250Ch	00	LA speed Kp2	LA speed Kp2	U16	RW	NO	0~65535	-
250Dh	00	LA Speed Kv2	LA Speed Kv2	U16	RW	NO	0~65535	-
250Eh	00	Close_limit	Close_limit	U16	RW	NO	0~65535	-
250Fh	00	Open_limit	Open_limit	U16	RW	NO	0~65535	-
2510h	00	LA_ViSat	LA_ViSat	U16	RW	NO	0~65535	-
2511h	00	Speed Feedback Kv1	Speed Feedback Kv1	U16	RW	NO	0~65535	-
2512h	00	Speed Feedback Kv2	Speed Feedback Kv2	U16	RW	NO	0~65535	-
2513h	00	Velocity feedforward Kvf	Velocity feedforward Kvf	U16	RW	NO	0~65535	-
2514h	00	Acceleration Feed Forward Kaf	Acceleration Feed Forward Kaf	U16	RW	NO	0~65535	-
CiA 402 Parameter sets								
603Fh	00	Drive Fault Codes	Manufacturer-defined drive error scenarios The status is the same as the contents of the lower 16 bits of the 1003h register. 0000h: no error; FF01h: overcurrent; FF02h: overvoltage; FF03h: undervoltage; FF05h: overdifferential alarm; FF06h: communication alarm; FF08h: Sensor alarm;	U16	RO	YES	-	0
6040h	00	control letter	Control Word;	U16	RW	YES	0~65535	0
6041h	00	status word	Status words;	U16	RO	YES	0~65535	0
605A	00	Qiuck Stop method.	0: Release; 1: Stop; 2: Emergency stop;	I16	RW	NO	0~2	1
605B	00	Shutdown mode	0: Release; 1: Stop; 2: Emergency stop;	116	RW	NO	0-2	
605C	00	Disable operation way (of life)	0: Release; 1: Stop; 2: Emergency stops;	116	RW	NO	0-2	

605Dh	00	Halt stopping method	0: Release; 1: Stop; 2: Emergency stops;	I16	RW	NO	0~2	1
605Eh	00	Fault reaction method	0: Release; 1: Stop; 2: Emergency stops;	I16	RW	NO	0~2	2
6060h	00	Operation Mode Control Register	0: Not defined; 1: Positional mode; 3: Speed mode; 6: Back to home mode; 8: Cyclic synchronized position mode;	I8	RW	YES	-128~127	0
6061h	00	Operation Mode Status Register	0: Not defined; 1: Positional mode; 3: Speed mode; 6: Back to home mode; 8: Cyclic synchronized position mode;	I8	RO	YES	-128~127	0
6064h	00	Actual position value register	Actual motor position in pul;	I32	RO	YES	-	0
606Ch	00	Real-time speed value register	Current motor speed in pul/s;	I32	RO	YES	-	0
607Ah	00	Total pulses	Total number of pulses for position mode operation (including acceleration, uniform speed and deceleration) (steps) range in pul;	U32	RW	YES	-	0
607Ch	00	Home Compensation Value	Origin compensation value in pul;	I32	RW	YES	-	0
607Dh	00	Number of subindexes	Number of subindexes	U08	RO	NO	-	2
	01	Negative soft limit	Negative soft limit	I32	RW	YES	-	-2000000000
	02	Positive Soft Limit	Positive Soft Limit	I32	RW	YES	-	2000000000
607Eh	00	polarities	0: Default; 1: Flip;	U8	RW	YES	-	0
6081h	00	Maximum speed	Maximum speed in position mode, in pul/s;	U32	RW	YES	-	0

6083h	00	ns	Acceleration in pul/s^2;	U32	RW	YES	-	500000
6084h	00	deceleration	Deceleration in pul/s^2;	U32	RW	YES	-	500000
6085h	00	emergency stop to reduce speed	Emergency stop deceleration rate in pul/s^2;	U32	RW	YES	-	0
6091h	00	Number of subindexes	Number of subindexes	U08	RO	NO	-	2

	01	Motor Resolution	The default setting is motor encoder resolution rate;	U32	RW	YES	-	4000
	02	Axis resolution	Load axis position feedback equivalent;	U32	RW	YES	-	10000
6098h	00	Return to Home Mode	1~14, 17~30, 33~34, 35 Mode selectable	I08	RW	YES	-	17
6099h	00	Number of subindexes	Number of subindexes	U08	RO	NO	-	2
	01	Return speed	Running speed when querying the home position, single Bit pul/s;	U32	RW	YES	-	50000
	02	Return-to-origin query speed	Return speed after querying the origin, in pul/s;	U32	RW	YES	-	10000
609Ah	00	Back to the origin plus or minus speed	Acceleration and deceleration in pul/s^2;	U32	RW	YES	-	500000
60B8h	00	Probe Control	Probe Control Object;	U16	RW	YES	-	0
60B9h	00	Probe Status	Probe Status Object	U16	RO	YES	-	0
60BAh	00	Probe Latch	Probe 1 rising edge latch position	I32	RO	YES	-	0
60BBh	00	Probe Latch	Probe 1 falling edge latch position	I32	RO	YES	-	0
60BCh	00	Probe Latch	Probe 2 rising edge latch position	I32	RO	YES	-	0
60BDh	00	Probe Latch	Probe 2 falling edge latch position	I32	RO	YES	-	0
60D5h	00	Probe Latch Counter	Probe 1 Rising Edge Latch Count	U16	RO	YES	-	0
60D6h	00	Probe Latch Counter	Probe 1 falling edge latch count	U16	RO	YES	-	0
60D7h	00	Probe Latch Counter	Probe 2 Rising Edge Latch Count	U16	RO	YES	-	0
60D8h	00	Probe Latch Counter	Probe 2 Falling Edge Latch Count	U16	RO	YES	-	0

60F4h	00	position error	The error between the given position and the actual position, single Bit 1 Encoder unit;	I32	RO	YES	-	0
60FDh	00	input signal function status. 0: Invalid; 1: Effective;	Bit0: Negative limit state; Bit1: Positive limit state; Bit2: Home state; Bit3~Bit15: Reserved; Bit16: Probe 1; Bit17: Probe 2; Bit18: User- defined 0; Bit19: User-defined 1; Bit20: User-defined 2; Bit21: User-defined 3; Bit22: user-defined 4; Bit23: user-defined 5; Bit24: user-defined 6; Bit25: user-defined 7; Bit31: Z signal;	U32	RO	YES	-	0

60FEh	00	subindex	Output terminal status	U08	RO	NO	-	2
	01	Physical output on	Output terminal function is valid Bit0~Bit15: Reserved; Bit16~Bit31: User defined; 0: Output invalid; 1: The output is valid;	U32	RW	YES	-	0
	02	Physical Output Enable	Output terminal function enable Bit0~Bit15: reserved; Bit16~Bit31: user- defined; 0: output disable; 1: Output enable;	U32	RW	YES	-	0
60FFh	00	Maximum speed	Maximum speed in speed mode, unit pul/s;	I32	RW	YES	-	0
6502h	00	Supported operating modes	Bit 0: Profile Position Mode; Bit 1: Velocity Mode; Bit 2: Profile Velocity Mode; Bit 3: Torque Profile Mode; Bit 4: Reserved; Bit 5: Homing Mode; Bit 6: Interpolated Position Mode; Bit 7: Cyclic Sync Position Mode; Bit 9: Cyclic Sync Torque Mode; Bit 10~31: reserved;	U32	RO	NO	-	0x00A5

Note: U16 means unsigned 16-bit; I16 means signed 16-bit;
U32 means unsigned 32-bit; I32 means signed 32-bit.