2LS556EC
Ethercat stepper driver V1.0.0

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Catalogs

1:Products

1.1 Product overview

2LS556EC Ethercat stepper open and closed-loop integrated stepper driver adopts EtherCAT communication interface, integrating EtherCAT slave technology, vector control technology, built-in micro-fractionation technology, adaptive filtering technology and closed-loop control technology, realizing real-time control and real-time data transmission of stepping system, and optimizing the performance of the stepping motors: medium and low speeds have excellent smoothness and ultra-low noise; high speed torque is greatly improved and Expands the speed application range of stepper motors. smooth and accurate pure sinusoidal current vector control technology effectively reduces motor heating. The 2LS556EC Ethercat open and closed loop integrated stepping driver has perfectly supported many master control systems such as Beckhoff , Omron, Zmotion, Inovance , Xinjie, etc., and has been widely used in textile, robotics, lithium-ion power equipment, 3C electronics and other industries.

1.2 Product Characterization

● New generation 32-bit ARM technology, cost-effective, smooth, excellent noise and vibration performance

● Adopts EtherCAT slave technology, supports CIA301 and CIA402 sub-protocols, CSP, PV, PP, HM modes.

● The user can set the current, subdivision and locking machine current size by means of ethercat or serial communication.

● Built-in single-axis controller function: users can set the synchronized position mode, speed mode, position mode, and origin position mode through the Ethercat .

● 5-channel opto-isolated programmable input interface, receiving external control signals, realizing drive limit, origin position, emergency stop and other functions.

● built-in microparticle (computing)

● Built-in motor parameter setting

● Arbitrary current reduction ratio can be set when stationary

● Easy current setting

● Over-voltage and under-voltage protection

● Excellent smoothness, noise and vibration performance.

● Supports position control, speed control and other modes

● Pure sinusoidal current vector control effectively reduces motor heating

● 3-channel opto-isolated programmable output interface, output drive status and control signals

● Arbitrary sub-division adjustment, you can change the sub-division at will.

● Closed loop can be set up with an overshoot alarm warning value.

● Excellent smoothness at low frequencies with small subdivisions

● Voltage range: DC 20-50V

1.3 Networking solutions

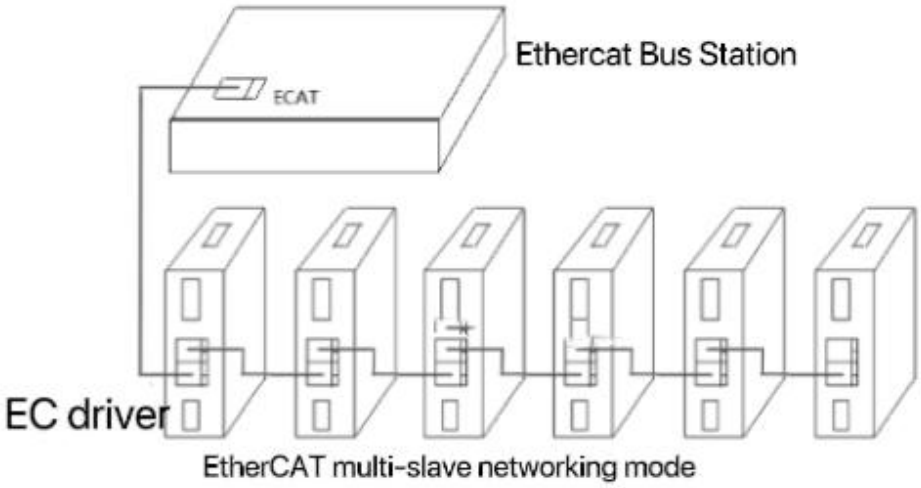
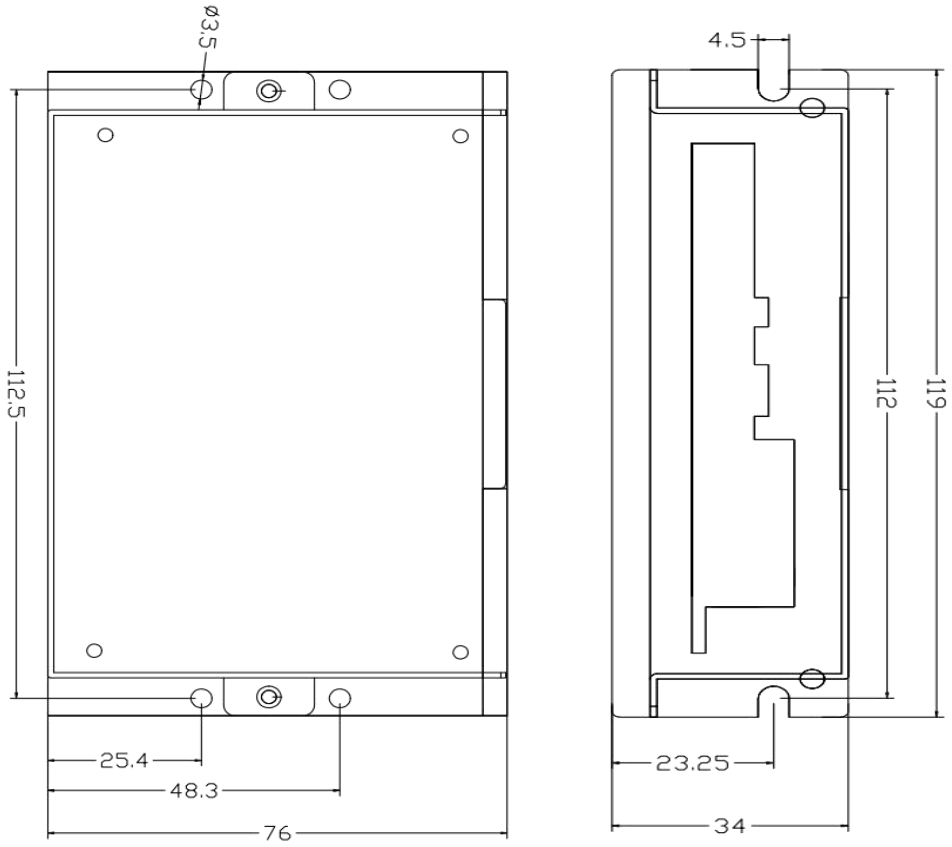


Fig. 1 Ethercat stepping networking scheme

II. :Installation Dimensions and Interface Definitions

2.1 Mechanical Installation Drawings



Front Mounting Diagram Side Mounting Diagram

Figure 2.1 Installation Dimension Drawing (Unit: mm)

2.2 Installation Notes

1）When installing the driver, please use side mounting for better heat dissipation. When designing the mounting dimensions, terminal size and wiring should be considered.

2）In order to ensure good heat dissipation conditions, the actual installation must be reserved as much as possible in the installation of a large installation interval, if necessary, the machine near the drive to install a fan, so that the drive to form the bottom of a strong air convection, to assist in the drive heat dissipation, to ensure that the drive in the reliable operating temperature range.

2.3 Electrical indicators

clarification	2LS556EC Ethercat Type Open-Closed Loop Stepper Driver			
	minimum value	typical value	maximum values	unit (of measure)
Output Current	0	-	6000	mA
Input supply voltage	20	36	50	VDC
Control signal input current	7	10	16	mA
electrical insulation resistance	50	-	-	MΩ

2.4 Operating environment and parameters

Cooling method		Natural cooling, fan cooling
operating environment	situation	Can not be placed next to other heat-generating equipment, to avoid dust, oil mist, corrosive gases, too much humidity and strong vibration places, prohibit combustible gases and conductive dust
	temp	-25℃~ 55℃
	humidity level	40~ 90%RH
	vibratory	10~55Hz/0.15mm
preservation temperature		-25℃ ~65℃

Three:Drive Interface and Wiring Description

3.1 Introduction to the driver interface

Table 3.1 Driver Interfaces

name		functionality	clarification
DIP Switches SW1-4		Setting open and closed loop mode, current, motor rotation direction	SW1: Drive open and closed loop selection
			SW2-3: Current selection
			SW4: Direction switching
ALM		Alarm indicator	Overcurrent, overvoltage, phase loss, EEPROM write error blinking
PWR		Power indicator	Lights on when energized and normal
ECAT IN/OUT		EtherCAT communication port	ECAT IN: into ECAT OUT: Out
IN/OUT	Xcom	Single-ended input port common accepted and valid	anode
	Ycom	Single-ended output port common compatible with cathode and anode	Compatible with both common-cathode and common-anode connections
	X0	Single-ended input port	Low-speed digital signal input interface
	X1		
	X2		
	X3		
	X4		
	Y0	single-ended output port	Low-speed digital signal output interface
	Y1		
	Y2		
UART	3.3V	serial port communication	Serial download of COE parameters
	GND		
	RXD		
	TXD		
ENCODER	ENZ+	Encoder Interface	Z signal level detection
	ENZ-		
	ENB+		Connect the encoder A and B signals, pay attention to the wire sequence.
	ENB-		
	ENA+		
	ENA-		
	VCC	Encoder power connector	Encoder 5V power supply

			positive
	GND		Encoder 5V power supply negative terminal
MOTOR	A+	Motor Interface	2-phase stepper motor wiring port, if the closed-loop motor, need to pay attention to the wire sequence
	A-		
	B+		
	B-		
VDC	VDC	Power connector	Switching Power Supply DC20-50V
	GND		

3.2 Dipswitches

Table 3.2 Dipswitch Functional Description

name (of a thing)	functionality	clarification
DIP Switches SW1-SW4	Setting open and closed loop mode, current, motor rotation direction	SW1: Drive open and closed loop selection
		SW2-SW3: Current selection
		SW4: Direction switching

3.2.1 Open and closed loop mode setting

The open and closed loop modes can be selected by dial code SW1 as shown in the table below.

Table 3.3 Open and closed loop mode settings

SW1	operating mode
off	open loop
on	closed loop

3.2.2 Current level setting

In both open and closed loop modes, the current size can be set by dialing SW2-SW3, with a total of 4 currents to choose from, which is compatible with motors from 42-86. If users need to adjust the current size by themselves, they can set it through the software of upper computer or ECAT master station, but they need to dial SW2-SW3 to off state to adjust it.

Table 3.4 Current Size Settings

SW2	SW3	open loop		closed loop	
		Peak	RMS	Imin	Imax
off	off	1.0	0.7	0.2	0.7
on	off	2.1	1.5	0.3	1.2
off	on	4.2	3.0	0.5	2.5
on	on	5.6	4.0	1.0	4.8

3.2.3 Direction switching settings

The user can select the initial rotation direction of the motor by dial code SW4 as shown in the table below.

Table 3.5 Direction switching settings

SW4	Initial direction of rotation
off	orientation
on	opposite direction

3.3 Indicator lights

The 2LS556EC Ethercat open and closed loop integrated stepper driver has an internally indented SMD LED with a small cutout in the driver to observe the indicator status, which is basically defined as shown in Table 3.6 below.

Table 3.6 Indicator Definitions

name	descriptive	functionality	clarification
ALM	red LED	Power supply, save parameter function indication, restore factory setting function indication, dial code state switching indication, Alarm indicator	The green light is always on and the red light is off when energized normally. When saving parameters, restoring factory settings, switching of dialing code status occurs, or an abnormality occurs in the device, the red light blinks to alarm, and its blinking pattern is viewed in Chapter 7 section;
PWR	green LED		

3.4 2LS556EC Communication Interface

The communication interface of the 2LS556EC Ethercat open and closed loop integrated stepper driver adopts the standard RJ45 socket of the conjoined type, as shown in Figure 3.1 below. Its left port is the input terminal, connected to the output terminal of the previous driver; the right port is the output terminal, connected to the input terminal of the next driver.

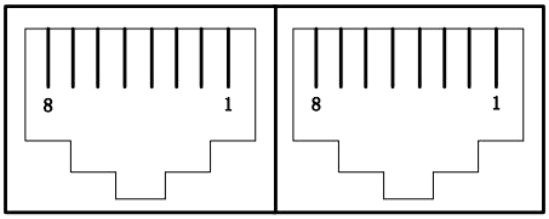


Figure 3.1 Schematic diagram of the Siamese RJ45 interface

3.5 Input Signal Interface

3.5.1 Input Signal Description and Wiring Schematic

The 2LS556EC Ethercat open and closed loop integrated stepper driver provides inputs with opto-isolated programmable interfaces.

The input interface adopts the common positive connection method, only supports NPN wiring mode, external+ 24V, in order to ensure that the driver internal optocoupler reliable conduction, the requirements of the controller side of the drive current is at least 10mA, the input level pulse width needs to be greater than 10ms, otherwise the driver may not be able to respond normally, wiring schematic as shown in Figure 3.2, 3.3.

After the driver is normally powered on, the effective level of the input interface initially defaults to rising edge or high level, and the user can also configure the effective level of the input interface initially defaults to falling edge or low level through the master station, and the specific configurations can be referred to the definitions and descriptions of the registers in subsection 4.2.

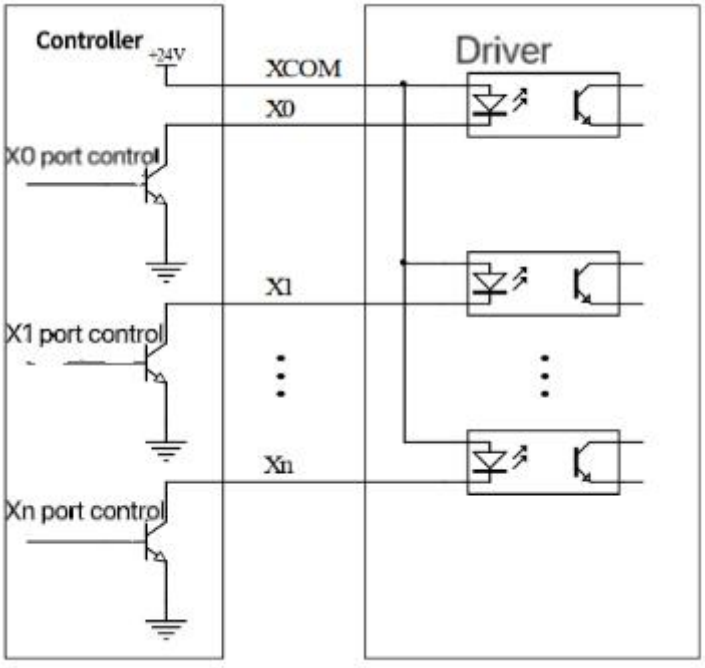


Figure 3.2 Input signal wiring diagram

Taking the NPN type sensor as an example, the wiring diagram of its access to the X0 end of the driver is as follows:

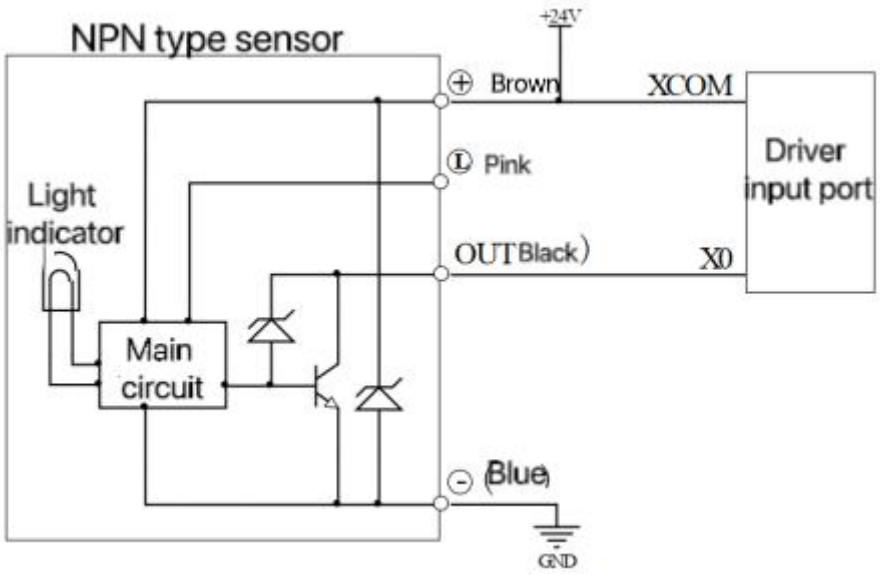


Figure 3.3 NPN type sensor wiring diagram

Note: 2LS556EC Ethercat open and closed loop integrated stepper driver default input interface supports 24V signal, if the user needs 5V signal control, you need to communicate with our business or technical personnel to change.

3.5.2 Input Signal Interface Function

The 2LS556EC Ethercat open and closed loop integrated stepper driver has input ports that contain a variety of functions that can be set. Users can set the corresponding input IO port functions through the host computer, and each input IO port can be set with up to 5 functions, as shown in Table 3.7 below. For specific use, please refer to the description in section 4.2.

Table 3.7 Input Interface Functional Definitions

name		clarification	Functional Description
IN	X0	Low-speed digital signals input interface	1: origin signal 2: Positive limit 4: Negative limit 8: Quick Stop 16: Customization
	X1		
	X2		
	X3		
	X4		
	XCOM	Single-ended input port common accepted and valid	Connect positive +24V signal

3.5.3 Input Signal Interface Functional Description

The input signal interface functions are described in Table 3.8 below:

Table 3.8 Input Interface Functional Description

functionality	descriptive
1: origin signal	Connect the origin sensor;
2: Positive limit signal	Connect the positive limit sensor;
4: Negative limit signal	Connect the negative limit sensor;
8: Quick Stop Signal	Stop motor operation;
16: Customization	The user can customize the function of a particular port;

3.6 Output signal interface

3.6.1 Output Signal Description and Wiring Schematic

The 2LS556EC Ethercat open and closed loop integrated stepper driver provides outputs with opto-isolated programmable interfaces.

The output interface is compatible with the common negative and common positive connection, supports NPN wiring and PNP wiring in two ways, and can support high level and low level effective master controller.

After the drive is normally powered on, the effective state of the output interface is initially defaulted to normally-open output, and the user can also configure the effective state of the output interface to be initially defaulted to normally-closed output through the master station, and the specific configurations can be referred to the definitions and descriptions of the registers in Chapter 4.2.

The following figure shows the wiring schematic of the output signal connector:

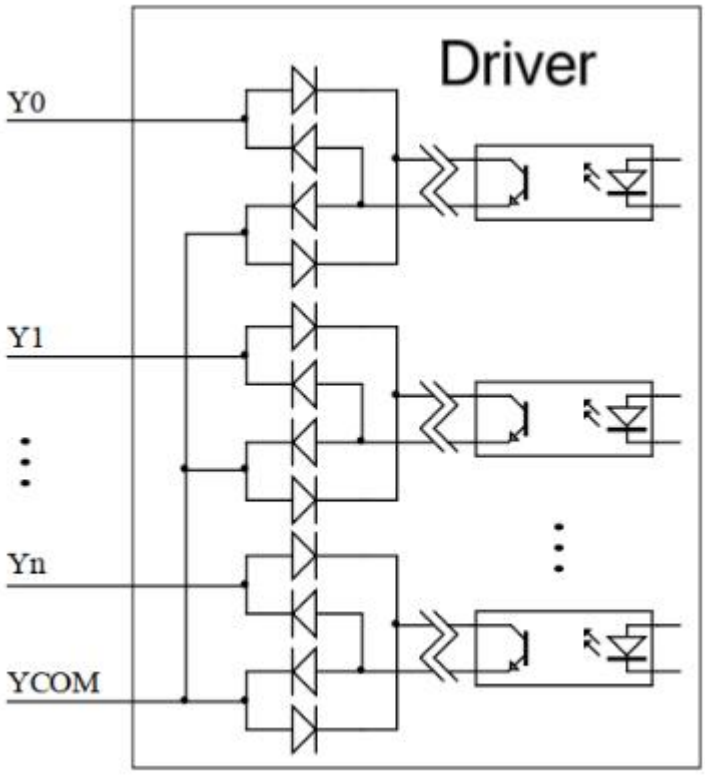


Figure 3.4 Signal Wiring Diagram of Outputs

3.6.2 Output signal interface function

The 2LS556EC Ethercat open and closed loop integrated stepper driver has output ports that contain a variety of functions that can be set. Users can set the corresponding output IO port functions through the host computer, and each output IO port can be set with up to 4 functions, as shown in Table 3.9 below. For specific use, please refer to the description in section 4.2.

Table 3.9 Output Interface Functional Definitions

name		clarification	Functional Description
OUT	Y0	Low-speed digital signals output interface	1: Alarm output 2: In place output 4: Z signal output 8: Master control output (default)
	Y1		
	Y2		
	YCOM	Single-ended output port common compatible with positive and negative	Compatible with both common-negative and common-positive connections

3.6.3 Output Signal Interface Functional Description

The output signal interface functions are described in Table 3.10 below:

Table 3.10 Output Interface Functional Description

functionality	descriptive
1: Alarm output signal	This signal output is valid when the drive is in alarm;
2: Output signal in place	This signal output is valid when the planned trajectory in position mode is completed;
4: Z signal output	Outputs the Z signal status of the encoder;
8: Master control output (default)	The master can control the output of a particular port;

3.7 Serial communication signal interface

name		clarification	functionality
UART	RXD	serial port communication interface	Serial communication interface, need to be cross-connected with the external serial signal line
	TXD		
	3.3V	Serial communication power interface	3.3V power supply positive
	GND		3.3V power supply negative terminal

3.8 Encoder input signal interface

name		clarification	functionality
Encoder	ENZ+	Encoder Interface	Connect the encoder A, B and Z signals, pay attention to the wire sequence.
	ENZ-		
	ENB+		
	ENB-		
	ENA+		
	ENA-		
	VCC	Encoder power connector	Encoder 5V power supply positive
	GND		Encoder 5V power supply negative terminal

3.9 Motor Control Output Interface

name		clarification	functionality
Motor	A+	Motor Interface	Two phase stepper motor wiring port For closed-loop motors, pay attention to the wire sequence.
	A-		
	B+		
	B-		

3.10 Power Input Connector

name (of a thing)		clarification	functionality
VDC	VDC	Power connector	Power Input DC20V~50V
	GND		

Four:Parameter description and setting

4.1 All parameters

4.1.1 Communication parameters

indexing	subindex	name	clarification	typology	causality	default value	realm
1000	0	Equipment type	Consistent with CIA rules	UINT32_t	RO	0x04020192	0~0xFFFFFFFF
1001	0	error register		UINT8_t	RO	0	0~255
1008	0	Equipment Name	Mainly product screen printing	str	RO	2LS556EC	0~32767
1009	0	hardware version	Version of PCB	str	RO	-	0~32767
100A	0	software version	Version of the burned program	str	RO	-	0~32767
1010	00	Number of subindexes	...	UINT16_t	RO	4	0~32767
	01	Save all parameters	Save command: 0x65766173	UINT32_t	RW	0	0~0xFFFFFFFF
	02	Saving communication parameters	ibid	UINT32_t	RW	0	0~0xFFFFFFFF
	03	Save manufacturer's parameters	ibid	UINT32_t	RW	0	0~0xFFFFFFFF
	04	Save motion parameters	ibid	UINT32_t	RW	0	0~0xFFFFFFFF
1011	0	Number of subindexes	...	UINT16_t	RO	4	0~32767
	01	Restore all parameters to factory values	Read command: 0x64616f6c	UINT32_t	RW	0	0~0xFFFFFFFF
	02	Restore communication parameters to factory values	ibid	UINT32_t	RW	0	0~0xFFFFFFFF
	03	Restore motion parameters to factory values	ibid	UINT32_t	RW	0	0~0xFFFFFFFF
	04	Restore user parameters to factory values	ibid	UINT32_t	RW	0	0~0xFFFFFFFF

1018	00	Number of subindexes	...	UINT16_t	RO	4	0~32767
	01	Manufacturer ID	Supplier ID number	UINT32_t	RO	-	0~0xFFFFFFFF
	02	Product Code		UINT32_t	RO	0x69673537	0~0xFFFFFFFF
	03	Modify the code		UINT32_t	RO	-	0~0xFFFFFFFF
	04	product key (software)		UINT32_t	RO	-	0~0xFFFFFFFF
1600	00	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	3	0~32767
	01-08	RXPDO mapping object group 1	Default RXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1601	00	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	6	0~32767
	01-08	RXPDO mapping object group 2	Default RXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1602	00	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	5	0~32767
	01-08	RXPDO mapping object group 3	Default RXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1603	0	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	7	0~32767
	01-08	RXPDO mapping object group 4	Default RXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1A00	0	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	6	0~32767
	01-08	TXPDO mapping object group 1	Default TXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1A01	0	Number of subindexes	Number of PDO default mapping objects	UINT16_t	RW	5	0~32767
	01-08	TXPDO mapping object group 2	Default TXPDO mapping object	UINT32_t	RW	...	0~0xFFFFFFFF
1C00	00	Number of subindexes		UINT16_t	RO	4	0~32767

	01	Mailbox Output Type		UINT8_t	RO	1	0~255
	02	Mailbox Input Type		UINT8_t	RO	2	0~255
	03	Process Data Output Type		UINT8_t	RO	3	0~255
	04	Process Data Input Type		UINT8_t	RO	4	0~255
1C12	0-04	PXPDO allocation		UINT16_t	RW	1600	0~32767
1C13	0-02	TXPDO allocation		UINT16_t	RW	1A00	0~32767
1C32	0-0A	RXPDO management parameters		UINT16_t	RO	...	0~32767
1C33	0-0A	TXPDO management parameters		UINT16_t	RO	...	0~32767

4.1.2 Manufacturer-defined parameters

indexing	subindex	name	clarification	typology	causality	default value	realm
2000	0	slave address	Set the slave address by yourself through the serial port; Attention needs to be paid to the 2001H setting;	UINT16_t	R/W/S	1	0~65535
2001	0	Slave address source	0: from master assigned address 1: from 2000H setting address	UINT16_t	R/W/S	0	0~1
2002	0	Open and closed loop motor running direction	When SW4 is OFF, the initial running direction of the motor can be set via the master station; 0: Motor running direction unchanged 1: Motor direction reversed	UINT16_t	R/W/S	0	0~1
2003	1	Open Loop Locker Flow Reduction Time	Flow reduction time after stopping operation Unit: ms	UINT16_t	R/W/S	500	10~3000
	2	Percentage of open-loop locking machine flow reduction	Percentage of locker current after stopping operation Unit: %	UINT16_t	R/W/S	50	0~100
2004	0	Open loop peak current setting	When SW2-SW3 are both OFF, the open-loop peak current can be set via the master; Unit: mA	UINT16_t	R/W/S	1400	100~7000

2005	0	Open and closed loop segmentation settings	The number of pulses required for one revolution; Unit: Pul/rev	UINT16_t	R/W/S	10000	6400~51200
2006	0	Open and closed loop lockout enable set up	0: No lockup 1: Locked	UINT16_t	R/W/S	0	0~1
2007	0	Current loop self-tuning enable	Current loop PI power-up self-tuning function: 0: enable 1: Not enabled	UINT16_t	R/W/S	0	0~1
2008	0	Open and closed loop current loop KP	When self-tuning is enabled, this item is read-only; When not enabled, the user can rewrite	UINT16_t	R/W/S	6000	50~32767
2009	0	Open and closed loop current loop KI	When self-tuning is enabled, this item is read-only; When not enabled, the user can rewrite	UINT16_t	R/W/S	24	10~2000
200A	0	Open and closed loop current loop Kc	Automatic acquisition, no client modification allowed	UINT16_t	R/S	-	0~32767
200B	0	Open-loop power-up locking shaft duration	Unit: ms	UINT16_t	R/W/S	50	10~3000
200C	0	Open-loop power-up locking shaft duration selection	0: Default lock shaft duration 1: Duration of 200BH setting	UINT16_t	R/W/S	0	0~1
200D	0	busbar voltage	Unit: mV	UINT16_t	R	-	0~65535
200E	0	Over difference Alarm Enable	0: Do not enable Over difference alarm 1: Enable over difference alarm	UINT16_t	R/W/S	1	0~1
200F	0	Over difference alarm value	Setting the over difference alarm angle value 1 for 0.09° , 1000 for 90°	UINT16_t	R/W/S	1000	0~4000
2010	0	Total number of external positions H	Received Position Command Accumulation Value Higher 16 bits (reserved)	UINT16_t	R	0	0~65535
2011	0	Total number of external positions L	Received Position Command Accumulation Value Lower 16 bits (temporarily reserved) Note: Write 1 to clear the counter	UINT16_t	R/W	0	0~65535

2012	0	speed limit	Used to determine if the received command speed is overspeed; Unit: rpm	UINT16_t	R/W	3000	0~3000
2013	0	Power on auto alignment	0：Normal standby after power on 1：After powering on, the motor turns forward 30° and then reverses 15° to enter the standby state	UINT16_t	R/W/S	0	0~1
2014	0	Input IO status	bit0 corresponds to the input port X0 state, bit1 corresponds to the input port X1 state, and so on.	UINT16_t	R	-	0~65535
2015	0	FIR filter enable	0: no filtering, 1: filtering (Temporary reservation)	UINT16_t	R/W/S	0	0~1
2016	0	FIR filtering time constant	Unit: ms (Temporary reservation)	UINT16_t	R/W/S	0	50~25600
2017	0	True Speed Reference	Corresponding object dictionary 0x606C	UINT16_t	R	0	0~32767
2018	0	Position error value	Encoder and command deviation values	INT16_t	R	0	-32767~32767
2019	0	Open and closed loop mode switching	When SW1 is OFF, the open and closed loop mode can be switched via the master; 0: Open loop control 1: Closed-loop control	UINT16_t	R/W/S	0	0~32767
201A	1	Driver Software Version		UINT16_t	R	-	0~32767
	2	hardware version		UINT16_t	R	-	0~32767
	3	Ethercat Hierarchy Software Version		UINT16_t	R	-	0~32767
201B	0	Fault Detection Enablement Configuration	Software fault detection enable configuration; bit0: overcurrent bit1: overvoltage bit2: EEPROM bit3: command overrun bit11: op-amp failure 0: Mask this fault detection 1: Enable corresponding fault detection	UINT16_t	R/W/S	15	0~65535
201C	1	Fault List 1	The latest alarm record, the others are historical alarm records	UINT16_t	R	-	0~65535

	2	Fault List 2	One alarm before fault list 1	UINT16_t	R	-	0~65535
	3	Fault List 3	One alarm before fault list 2	UINT16_t	R	-	0~65535
	4	Fault List 4	One alarm before fault list 3	UINT16_t	R	-	0~65535
	5	Fault List 5	One alarm before trouble list 4	UINT16_t	R	-	0~65535
	6	Fault List 6	One alarm before fault list 5	UINT16_t	R	-	0~65535
	7	Fault List 7	One alarm before fault list 6	UINT16_t	R	-	0~65535
	8	Fault List 8	One alarm before trouble list 7	UINT16_t	R	-	0~65535
	9	Fault List 9	One alarm before fault list 8	UINT16_t	R	-	0~65535
201D	0	Clear Fault Logging Enable Bit Selection	0: Do not clear the history of faults 1: Clearing historical fault records	UINT16_t	R/W	0	0~1
201E	0	Clear current fault enable bit selection	0: Do not clear the current fault 1: Clear current faults	UINT16_t	R/W	0	0~1
201F	0	Cause of no motor movement consult (a document etc)	0x2: Command Overdrive	UINT16_t	R	-	0~32767
2020	0	Mode 1 In Place Query	0: Planning is complete and in place 10: In place signal from drive	UINT16_t	R	-	0~32767
2021	0	Input digital IO port level polarity configuration	bit0: input port X0 polarity bit1: input port X1 polarity And so on; bit5-bit15: reserved in a similar fashion 0: no change 1: inverted	UINT16_t	R/W/S	0	0~65535
2022	1	Input digital IO port X0 function selection	Each bit of the sub-index corresponds to a function selection, e.g., to set input port X0 to a positive limit function, set the value of 2022:1 to 0x0002; bit0: origin signal bit1: positive limit bit2: negative limit bit3: Quick Stop bit4: Customization bit5-bit15: reserved See the description within section '3.2.1 Input signals';	UINT16_t	R/W/S	4	0~255
	2	Input digital IO port X1 function selection		UINT16_t	R/W/S	2	0~255
	3	Input digital IO port X2 function selection		UINT16_t	R/W/S	1	0~255
	4	Input digital IO port X3 function selection		UINT16_t	R/W/S	8	0~255
	5	Input digital IO port X4 function selection		UINT16_t	R/W/S	0	0~255

2023	1	Input digital IO port X0 filter time	Sets the filter time for input ports X0-X4; Unit: us	UINT16_t	R/W/S	1000	50~60000
	2	Input digital IO port X1 filter time		UINT16_t	R/W/S	1000	50~60000
	3	Input digital IO port X2 filter time		UINT16_t	R/W/S	1000	50~60000
	4	Input digital IO port X3 filter time		UINT16_t	R/W/S	1000	50~60000
	5	Input digital IO port X4 filter time		UINT16_t	R/W/S	1000	50~60000
2024	0	Output Port Polarity Configuration	bit0: output port Y0 polarity bit1: output port Y1 polarity bit2: output port Y2 polarity bit3-bit15: reserved 0: low level 1: high level See the description within section '3.2.2 Output signals';	UINT16_t	R/W/S	0	0~65535
2025	1	Output port Y0 function setting	Each bit of the sub-index corresponds to a function selection, e.g., to set output port Y0 to the bit output function, set the value of 2025:1 to 0x0001; bit0: Alarm output bit1: in place output bit2: Z signal output bit4: Master control output (default) bit3, bit5-bit15: reserved See the description within section '3.2.2 Output signals';	UINT16_t	R/W/S	16	0~255
	2	Output port Y1 function setting		UINT16_t	R/W/S	16	0~255
	3	Output port Y2 function setting		UINT16_t	R/W/S	16	0~255
2030	0	Save/Restore Manufacturer's parameters	bit0: Save factory parameters bit1: Restore factory parameters to factory settings Remarks: only for downloading parameters from serial port. This parameter is not present in COE	UINT16_t	W/S	0	0~255

4.1.3 Cia402 parameter set

indexing	subindex	name (of a thing)	clarification	typology	causality	default value	realm
603F	0	trouble code	See the description within section 'V. Fault Code Descriptions';	UINT16_t	RO	-	0~65535
6040	0	control letter	See the description within section '6.3.1 6040 Control Word';	UINT16_t	RW	0	0~65535
6041	0	status word	See the description within section '6.3.2 6041 Status Words' for details;	UINT16_t	RO	-	0~65535
605A	0	Quick Stop Codes	0: Invalid 1: Emergency stops allowed	UINT16_t	RW	1	0~65535
6060	0	Operation Mode Setting	1: PP (positional patterns) 3: PV (speed mode) 6: HM (origin Mode) 8: CSP (cyclic synchronized position mode)	USINT	RW	8	0~255
6061	0	Operational Mode Status	Query the status of the 6060H; 1: PP (positional patterns) 3: PV (speed mode) 6: HM (far back mode) 8: CSP (cyclic synchronized position mode)	USINT	RO	-	0~255
6064	0	physical location	Actual motor position in Pul	DINT	RO	-	-2147483647~ 2147483647
606C	0	Actual speed	Current speed of motor, unit: Pul/s	DINT	RO	-	-2147483647~ 2147483647
607A	0	target location	Sets the total number of running pulses for PP (position	DINT	RW	0	-2147483647~ 2147483647

			mode); Unit: pul				
607C	0	origin offset	Sets the origin offset for HM (origin mode); Unit: Pul	DINT	RW	0	-2147483647~2147483647
60FF	0	target speed	Sets the maximum speed for PV (speed mode); Unit: Pul/s	DINT	RW	0	-2147483647~2147483647
6081	0	trapezoidal velocity	Set the maximum speed for PP (position mode); Unit: Pul/s	DINT	RW	50000	-2147483647~2147483647
6082	0	starting and finishing speeds	Set the start and stop speeds for PP (position mode); Unit: Pul/s	DINT	RW	0	-2147483647~2147483647
6083	0	accelerations	Set the acceleration of PP (position mode) and PV (speed mode); Unit: Pul/s^2	DINT	RW	500000	-2147483647~2147483647
6084	0	deceleration	Set the deceleration speed for PP (position mode) and PV (speed mode); Unit: Pul/s^2	DINT	RW	500000	-2147483647~2147483647
6085	0	Emergency stop deceleration	Set the emergency stop deceleration speed for PP (position mode), PV (speed mode), and HM (origin return mode); Unit: Pul/s^2	DINT	RW	5,000,000	-2147483647~2147483647
6098	0	Return-to-origin method	Currently, the values that can be set for the way back to the origin position are: (-1)~(-6), 1~14, 17~30, 33, 34, 35, 37; See the description within section '5.5 Return to origin Mode Methods' for more details;	SUINT	RW	0	0~255
6099	01	Search origin speed 1	HM (origin Mode) Finding origin Speed 1: Finding origin at high speed; Unit: Pul/s	DINT	RW	50000	-2147483647~2147483647
	02	Search origin speed 2	HM (origin Mode) Find origin Speed 2: Find origin at low	DINT	RW	25,000	-2147483647~2147483647

			speed; Unit: Pul/s				
609A	0	Return to origin acceleration and deceleration	HM (origin Mode) for origin plus or minus speed; Unit: Pul/s^2	DINT	RW	25,000	-2147483647~ 2147483647
60FD	0	Input IO status	bit0 corresponds to the input port X0 state, bit1 corresponds to the input port X1 state, and so on; See the description within section '3.2.1 Input signals'; **Note:** The newly added bit31 indicates the input state of the Z signal;	UDINT	RO	-	0~4294967296
60FE	1	Physical output on	The output port function is turned on; bit0: Port Y0 output on bit1: Port Y1 output on bit2: Port Y2 output on bit3-bit15: reserved 0: Invalid output 1: Output valid	UDINT	RW	0	0~4294967296
	2	Physical output enable	Output port function enable; bit0: Port Y0 output enable bit1: Port Y1 output enable bit2: Port Y2 output enable bit3-bit15: reserved 0: Output deactivation 1: Output enable	UDINT	RW	7	0~4294967296

4.2 IO Function Configuration

4.2.1 Input signals

The functions of the input ports include positive limit signal, negative limit signal, origin signal, quick stop signal, and user-defined, and each function of the input port can be selected as one of them by using the object dictionary 0x2022. The following table describes the default input functions and settings of X0-X4.

Input port	Default function	Function selection object dictionary	Function selects the default setting of the object dictionary	IO port status query dictionary of objects used1	IO port status query dictionary of objects used2
X0	negative limit	2022:01	4	60FD-bit0	2014-bit0
X1	positive limit	2022:02	2	60FD-bit1	2014-bit1
X2	origin signal	2022:03	1	60FD-bit2	2014-bit2

X3	quick stop signal	2022:04	8	60FD-bit3	2014-bit3
X4	customizable	2022:05	0	60FD-bit4	2014-bit4

Brief description:

(1) 2022:01 means object dictionary 0x2022, subindex 01 register; and so on;

(2) The state of the input port can be queried through the object dictionary 0x60FD, e.g., when the X0 input is valid, bit0 of 0x60FD becomes 1. The state of the X1-X4 input ports corresponds to bit1-bit4 of 0x60FD in turn.

Attention:

(1) Bit31 of 0x60FD represents the input state of Z signal. 0x2014 has the same meaning as 0x60FD except for bit31.

The dictionary of objects related to the configuration of the input port function is listed in the following table, and the specific meanings can be referred to the section '3.1 All Parameters' for the description.

Input port	Polarity configuration	Function selection	Filter time setting	IO port status query dictionary of objects used1	IO port status query dictionary of objects used2
X0	2021-bit0	2022:01	2023:01	60FD-bit0	2014-bit0
X1	2021-bit1	2022:02	2023:02	60FD-bit1	2014-bit1
X2	2021-bit2	2022:03	2023:03	60FD-bit2	2014-bit2
X3	2021-bit3	2022:04	2023:04	60FD-bit3	2014-bit3
X4	2021-bit4	2022:05	2023:05	60FD-bit4	2014-bit4

4.2.2 Output signals

The functions of the output ports include Alarm Output, In-Place Output, Z-Signal Output, Master Control Output (user-defined), and each output port function can be selected as one of them by using the object dictionary 0x2025. The following table describes the default output functions and settings of Y0-Y2.

Output port	Default function	Function selection object dictionary	Function selects the default setting of the object dictionary	IO port status query dictionary of objects used1	IO port status query dictionary of objects used2
Y0	Master Control Output	2025:01	16	60FD-bit0	2014-bit0
Y1	Master Control Output	2025:02	16	60FD-bit1	2014-bit1

Y2	Master Control Output	2025:03	16	60FD-bit2	2014-bit2

The following table explains which bit setting corresponds to each output function, using the Y0 port as an example.

Y0 port function selection	Function selector bit
Alarm output	2025:01-bit0
Output in place	2025:01-bit1
Z signal output	2025:01-bit2
Master Control Output	2025:01-bit4

The object dictionary related to the configuration of the output port function is listed in the following table, and the specific meanings can be referred to the section '3.1 All Parameters'.

Output port	Polarity configuration	Function selection control	Physical output on	Physical output enable 60fe+02
Y0	2024-bit0	2025:01	60FE:01-bit0	60FE:02-bit0
Y1	2024-bit1	2025:02	60FE:01-bit1	60FE:02-bit1
Y2	2024-bit2	2025:03	60FE:01-bit2	60FE:02-bit2

For example, to set the Y2 setting to the custom output function, proceed as follows:

(1) First set the value of 0x2025 subindex 03 to 16 (user-defined output function);

(2) Set both 60FE:01 and 60FE:02 to 4, when Y2 outputs the signal;

Five:Common Functions

5.1 Parameter saving and restoring factory settings

Write command 0x65766173 to the sub-index corresponding to 0x1010 to save the corresponding category parameters into EEPROM; write command 0x64616f6c to the sub-index corresponding to 0x1011 to restore the factory settings of the corresponding category parameters. After writing the save command, please do not turn off the power immediately, especially when saving all the parameters, you need to wait for the 'red indicator' to go out before turning off the power to ensure that all the parameters are saved successfully.

Functionality	Object dictionary	Command	Result state	Note
Save Cia402 Series Parameters	1010:04	0x65766173	Return 1	
Save factory customized parameters	1010:03	0x65766173	Return 1	
Saving communication parameters	1010:02	0x65766173	Return 1	
Save all parameters	1010:01	0x65766173	Return 1	The serial port is the Save Parameters button
Recovery Cia402 Series Parameters	1011:04	0x64616f6c	Return 1	
Restore factory-defined parameters	1011:03	0x64616f6c	Return 1	
Restore communication parameters	1011:02	0x64616f6c	Return 1	
Restore all series parameters	1011:01	0x64616f6c	Return 1	Serial port is the Restore Parameters button

5.2 Control Word, Status Word Bit Definitions

5.2.1 6040 control word

Bite	0	1	2	3	4-6	7	8	9-15
functionality	activate (a plan)	electricity supply	emergency stop	Enable Run	Mode of operation related	reset error	pause (media player)	-

Additional notes on the other bits:

Bit 2: Fast Stop Trigger Logic is 0 valid, note the distinction from other triggered logic.

Bit 7: Error reset trigger logic is rising edge valid

Bit 5: Immediate trigger trigger logic is rising edge

5.2.2 6041 status word

Bite	0	1	2	3	4	5	6	9	11	7, 8, 10...
functionality	prepare to launch	activate (a plan)	allowed operations	incorrect	get on the phone	quick stop	inactive	remotely	limit valid	model related

Additional notes on the other bits:

Bit 4 is set when the drive is powered on.

Bit 5: Fast stop activation, is only valid with a logic 0, contrary to the logic of the other bits.

Bit 9: Remote, displays the status of the communication state machine, is 0 below ProOP, in which case the commands of the control word (6040h) cannot be executed.

Bit 11: Limit, set when the hardware limit is valid.

Bit 8: Abnormal stop, generally valid in hardware limit, deceleration stop and fast stop trigger state.

Bit 12: Follow master, if the driver is not enabled or no longer follows the master's command under CSP, this bit will be 0

Bit 10: Set at the same time as bit 15 to indicate that the origin position has been found.

5.3 Control mode and associated object dictionary

Control mode	Indexes + subindexes	Name	Data type	Read-write permission	Unit
Synchronized Position Mode (CSP)	6040	control letter	UINT16_t	RW	-
	607A	target location	DINT	RW	Pul
	6041	status word	UINT16_t	RO	-
	6064	physical location	DINT	RW	Pul
	606C	Actual speed	DINT	RW	Pul/s
Positional mode (PP)	607A	target location	DINT	RW	Pul
	6081	Maximum speed	DINT	RW	Pul/s
Speed mode (PV)	60FF	target speed	DINT	RW	Pul/s
Speed Mode Position Mode for public use	6040	control letter	UINT16_t	RW	-
	6083	accelerations	DINT	RW	Pul/s^2
	6084	deceleration	DINT	RW	Pul/s^2
origin Mode (HM)	6040	control letter	UINT16_t	RW	-
	6098	Zero return method	SUINT	RW	-
	6099:01	originward bound speed 1	DINT	RW	Pul/s
	6099:02	originward bound speed 2	DINT	RW	Pul/s
	609A	(math.) acceleration at the origin	DINT	RW	Pul/s^2
	607C	origin offset	DINT	RW	Pul
PV,PP,HM mode total	6041	status word	UINT16_t	RO	-
	6064	physical location	DINT	RW	Pul
	606C	Actual speed	DINT	RW	Pul/s
Other associated	60FD	digital input	UINT16_t	RO	-

parameters	603F	Latest Error Codes	UINT16_t	RO	-
	6060	Operation Mode Setting	SUINT	RW	-
	6082	starting speed	DINT	RW	Pul/s
	6085	emergency stop to reduce speed	DINT	RW	Pul/s^2
	6061	operational mode status	SUINT	RO	-

Regardless of which control mode is used to control the slave, it is indispensable to read and write the two object dictionaries 6040H (control word) and 6041H (status word), which are used by the master and the slave as the transmission medium to realize the command issuance and status monitoring. The following subsection focuses on the definition and meaning of each bit of these two object dictionaries.

5.4 State jumps for each mode of control operation

	Steps	0	1	2	3	4	5	6	7	8
mode	**action**	**preparatory work**	**initial**	**power**	**on start**	**enable**	**start running**	**change position**	**stop**	**fault**
CSP mode	6040	Establishment of communication OP status, activation of NC axes	00h	06h	07h	0Fh	1F Master send command	master control	Master stop position command	-
	6041		250h	231h	233h	1237h	1237h	1237h	1237h	238h
PP mode	6040	Establish communication OP status and set motion parameters	00h	06h	07h	0Fh	-	2Fh~3Fh	10Fh	-
	6041		250h	231h	233h	8237h	1237h	1237h	1637~ 1237h	1238h
PV mode	6040	Establish communication OP status and set motion parameters	00h	06h	07h	0Fh	Runs when enabled	Just change the speed.	10Fh	-
	6041		250h	231h	233h	1637h	1637h	1637h	1737h	1638h
HM mode	6040	Establish	00h	06h	07h	0Fh	1Fh	null	10Fh	-

	6041	communicati on OP status and set motion parameters	250h	231h	233h	8337h	237h	237h	737h	238h

Additional notes on other bits:

When changing position in PP mode, it is necessary to give a rising edge to bit5 of the control word to start the new position movement;

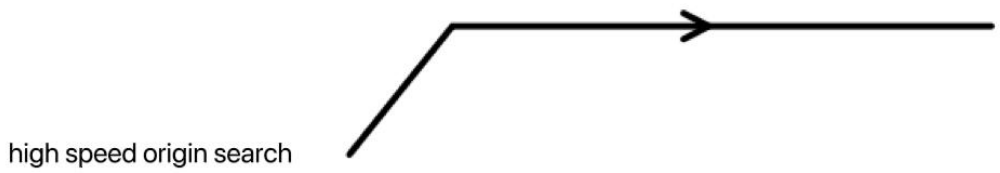
5.5 Return to origin mode way

The 2LS556EC series drive products currently support zero return modes 1-14, 17-30, 33, 34, 35, 37, (-1)-(-6),, which require the use of positive and negative limits, origin or Z signals.

Among them, Mode 1-2 is limit + Z signal return to zero mode, Mode 3-6 is origin + Z signal return to zero mode, Mode 7-10 is origin + positive limit + Z signal return to zero mode, Mode 11-14 is origin + negative limit + Z signal return to zero mode, Mode 17-18 is positive and negative limit return to zero mode, Mode 19-22 is origin return to zero mode, Mode 23-26 is origin + positive limit return to zero mode, Mode 27-30 is origin + negative limit return to zero mode, Mode 33 and 34 are Z signal return to zero mode in closed-loop mode, (-1)-(-6) are closed-loop mode. mode, mode 27-30 is origin + negative limit return to zero mode, mode 33 and 34 are Z signal return to zero mode, and (-1)-(-6) are blocking return to zero mode in closed-loop mode. Users need to select the appropriate return-to-zero mode according to the actual application. The following only introduces the return to zero mode 17-30, 33, 34, (-3)-(-6), the specific return to the origin of the process shown in the following subsection diagram, the rest of the return to zero mode with the above return to zero mode is the same, but only increased the Z signal fixed origin, you can check the description of the subsection 5.5.21.

Icon

Explanation:



Note: In the schematic diagrams defining all of the following return-to-zero methods, movement to the right is in the forward direction and movement to the left is in the reverse direction.

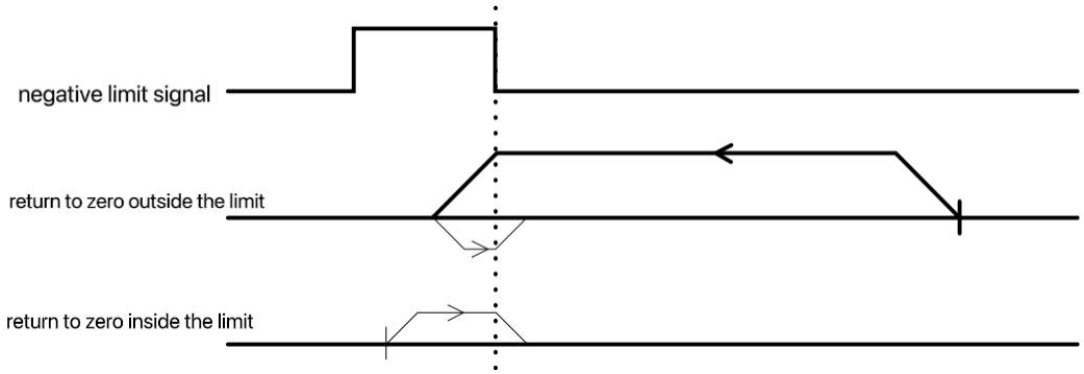
5.5.1 Mode 17 (negative limit return to zero)

The origin stop position for 'Negative Limit Return to Zero' is at the negative limit signal.

The whole action of 'negative limit return to zero' is divided into two cases, as follows:

Situation A: After the drive receives the command of 'origin return enable signal', it starts to move with several parameters of 'origin return speed V1' and 'origin return acceleration/deceleration time', and when it encounters the limit When the rising edge of the limit signal is encountered, the deceleration stops. Then it will run in the opposite direction with 'origin speed V2' until it encounters the falling edge of the limit signal, then decelerate and stop, and the whole return-to-zero action is completed.

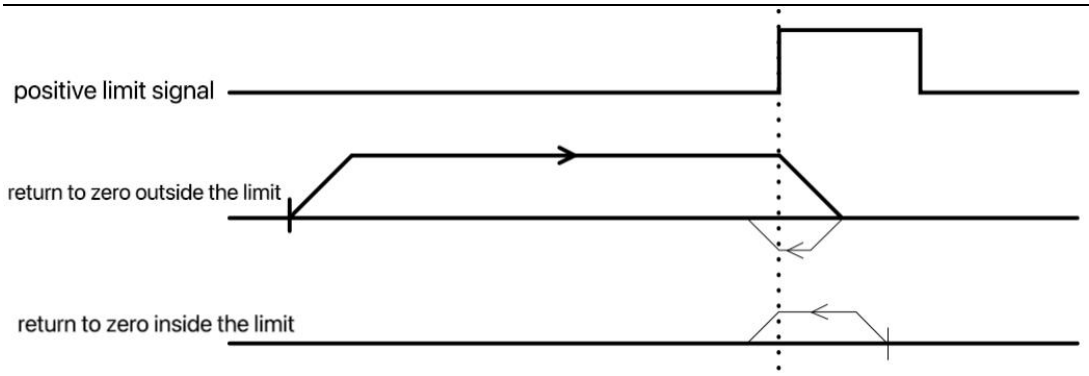
Situation B: The drive is in the limit position after receiving the command of 'origin return enable signal', then it will start the movement according to the parameters of 'origin return speed V2' and 'origin return acceleration/deceleration time'. When it meets the falling edge of the limit signal, deceleration stops and the whole return to zero action is finished.



5.5.2 Mode 18 (positive limit return to zero)

The origin stop position for 'Positive Limit Return to Zero' is at the positive limit signal.

'Positive Limit Return to Zero' is similar to 'Negative Limit Return to Zero', except that it operates in the opposite direction, and will not be described in detail here.



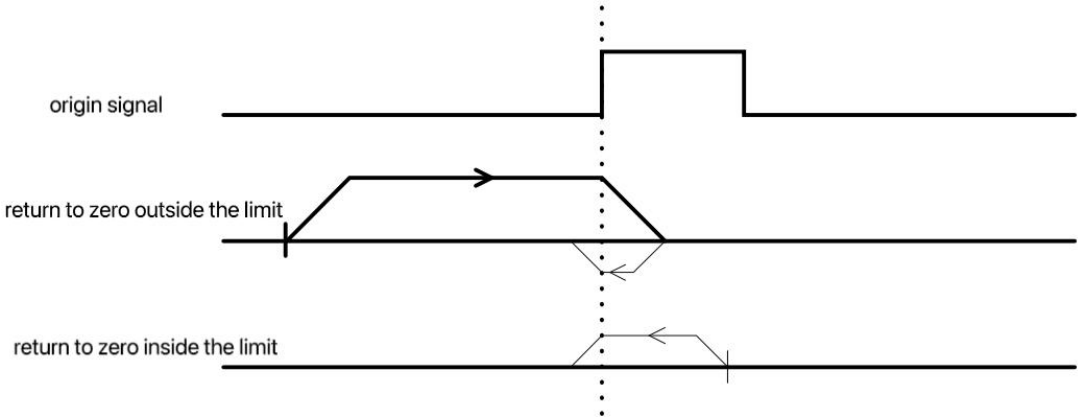
5.5.3 Mode 19 (origin return to zero 1)

The origin stop position of 'origin Return to Zero 1' is to the left of the rising edge of the origin signal in the positive direction.

The whole action of 'origin Return to Zero 1' is divided into two cases, as follows:

Situation A: After the drive receives the 'origin return enable signal' command, it moves in the positive direction with several parameters of 'origin return speed V1' and 'origin return acceleration/deceleration time', and when it meets the When it meets the rising edge of the origin signal, it decelerates and stops. Then it will run in the opposite direction with 'origin speed V2' until it encounters the falling edge of the origin signal, then decelerate and stop, and the whole return-to-zero action is completed.

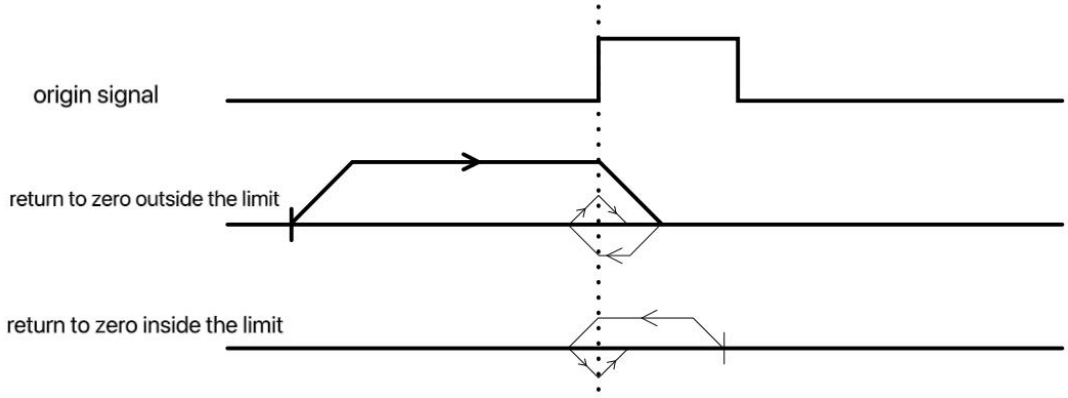
Situation B: After receiving the command of 'origin enable signal', the drive is within the origin signal, then it will move in the opposite direction with the 'origin speed V2', 'origin acceleration and deceleration time' several When it meets the falling edge of the origin signal, the deceleration will stop and the whole back to zero action is finished.



5.5.4 Mode 20 (origin return 2)

The origin stop position for 'origin Return to Zero 2' is to the right of the rising edge of the origin signal in the positive direction.

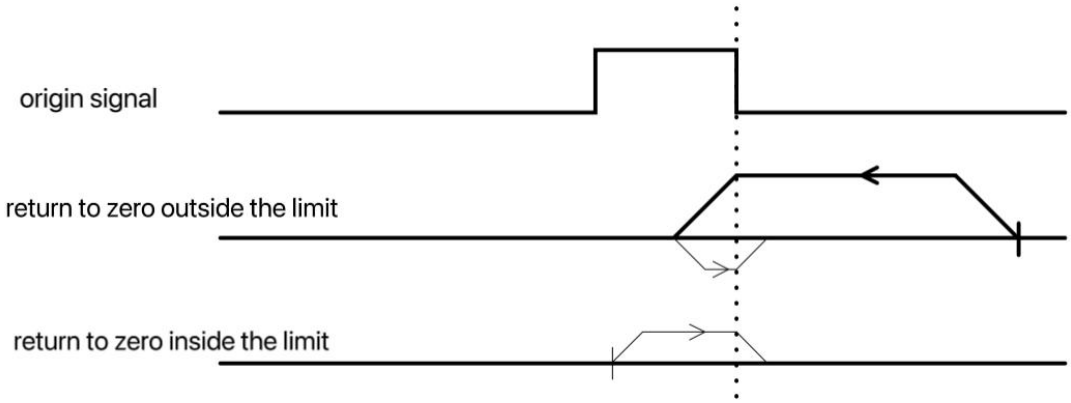
The entire action of 'origin Return to Zero 2' is shown below. It will not be described in detail here.



5.5.5 Mode 21 (origin return to zero 3)

The origin stop position for 'origin Return to Zero 3' is to the right of the rising edge of the origin signal in the opposite direction.

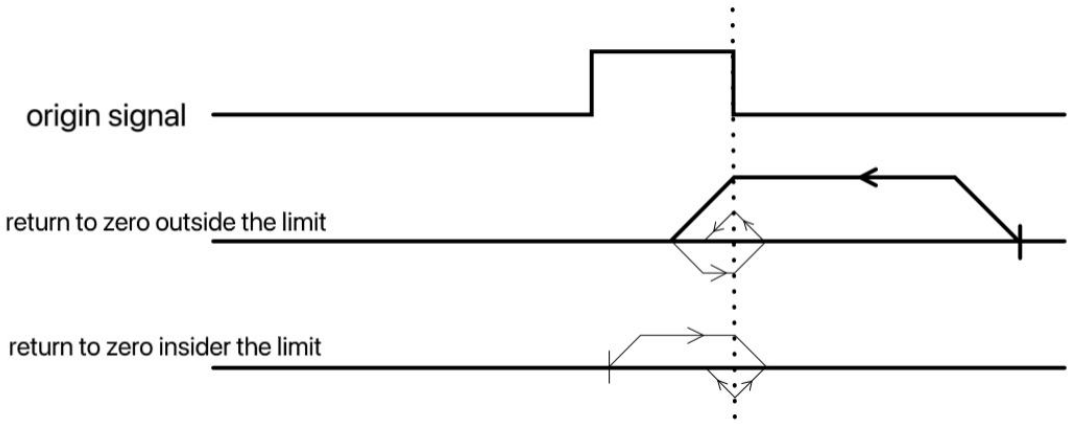
The entire action of 'origin Return to Zero 3' is similar to that of 'origin Return to Zero 1', except that the initial running direction is reversed. This will not be explained in detail here.



5.5.6 Mode 22 (origin return to zero 4)

The origin stop position of 'origin Return to Zero 4' is to the left of the rising edge of the origin signal in the opposite direction.

The entire action of 'origin Return to Zero 4' is similar to that of 'origin Return to Zero 2', except that the initial running direction is reversed. This will not be explained in detail here.



5.5.7 Mode 23 (origin + positive limit return to zero 1)

The origin stop position for 'origin + Positive Limit Return to Zero 1' is to the left of the rising edge of the origin signal in the positive direction.

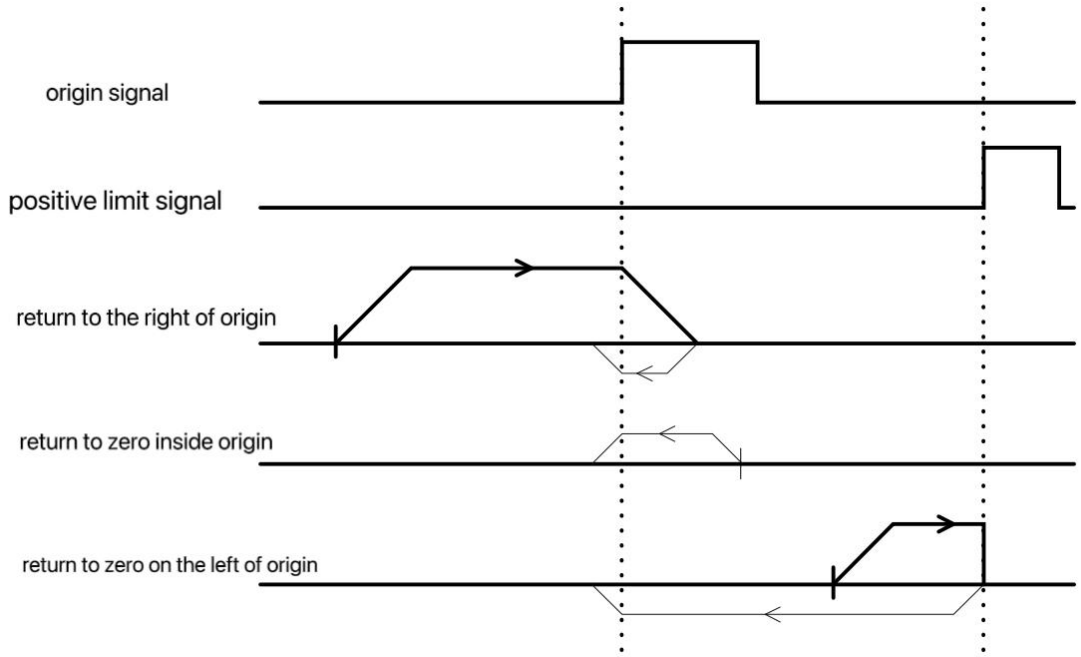
The whole action of 'origin + Positive Limit Return to Zero 1' is divided into three cases as follows:

Situation A: After the drive receives the 'origin return enable signal' command, it moves in the positive direction with several parameters of 'origin return speed V1' and 'origin return acceleration/deceleration time', and when it meets the When it meets the rising edge of the origin signal, it decelerates and stops. Then it will run in the opposite direction with 'origin speed V2' until it encounters the falling edge of the origin signal, then decelerate and stop, and the whole return-to-zero action is completed.

Situation B: After the drive receives the 'origin return enable signal' command, it moves in the positive

direction with several parameters of 'origin return speed V1' and 'origin return acceleration/deceleration time', and stops immediately when it meets the When it meets the rising edge of the positive limit signal, it stops immediately. Then it will run in the opposite direction with 'origin speed V2' until it encounters the falling edge of the origin signal, then it will decelerate and stop, and the whole return-to-zero action is completed.

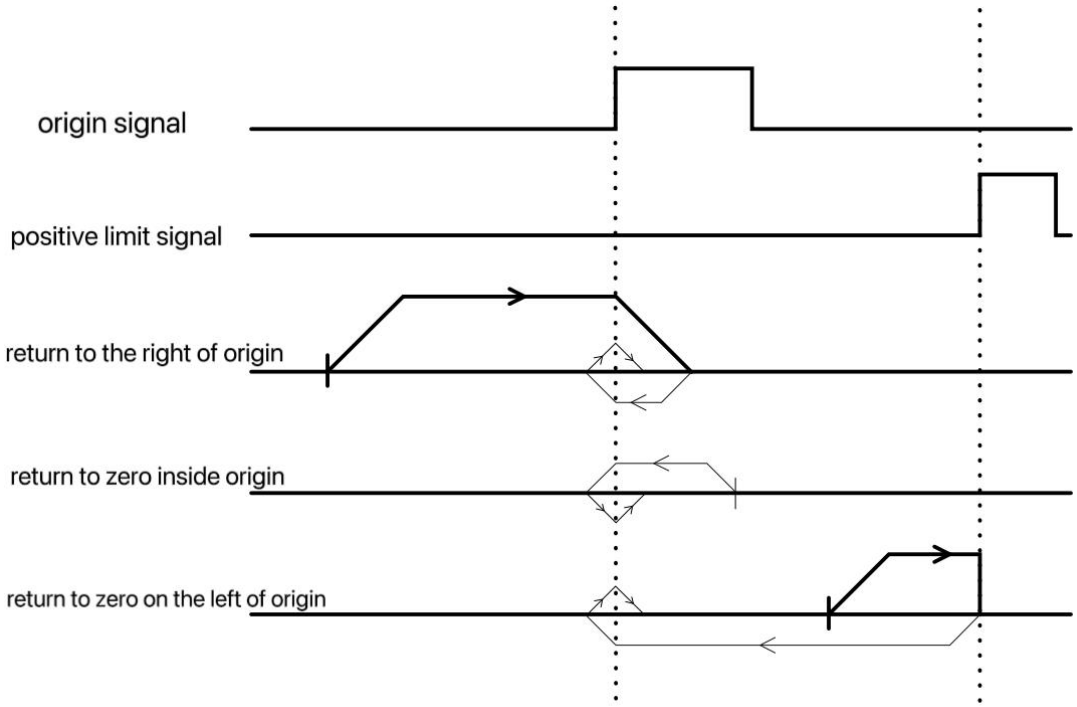
Situation C: After receiving the command of 'origin enable signal', the drive is within the origin signal, then it will move in the opposite direction with the 'origin speed V2', 'origin acceleration and deceleration time' several When it meets the falling edge of the origin signal, the deceleration will stop and the whole back to zero action is finished.



5.5.8 Mode 24 (origin + positive limit return to zero 2)

The origin stop position for 'origin + Positive Limit Return to Zero 2' is to the right of the rising edge of the origin signal in the positive direction.

The entire action of 'origin + Positive Limit Return to Zero 2' is shown below. It will not be explained in detail here.



5.5.9 Mode 25 (origin + positive limit return to zero 3)

The origin stop position of 'origin + positive limit return to zero 3' is on the left side of the falling edge of the origin signal in the positive direction.

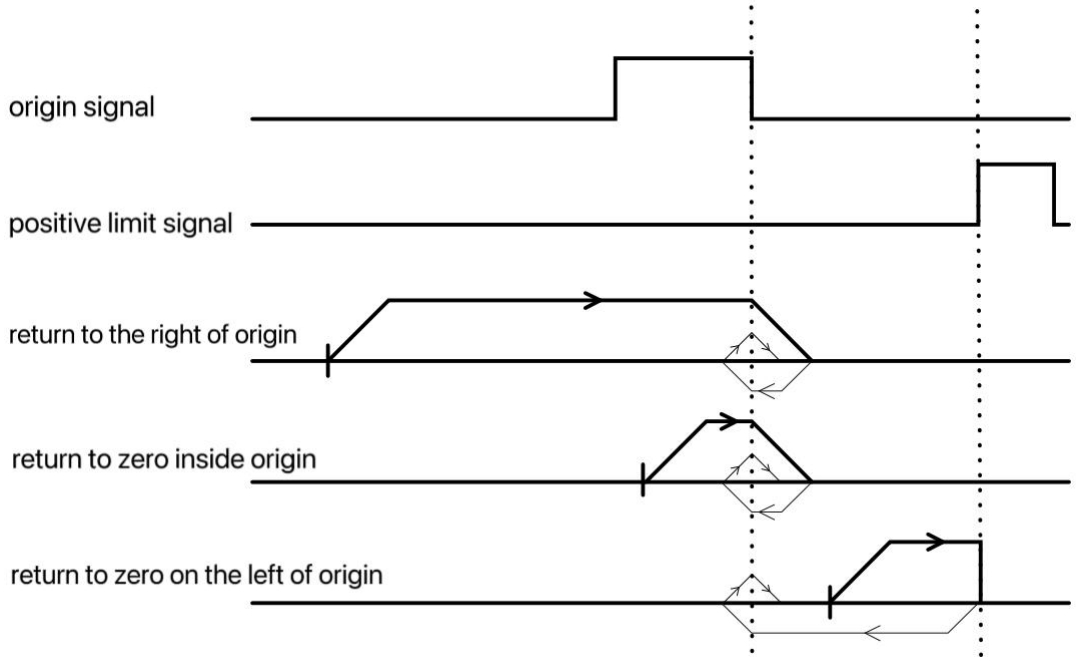
The entire action of 'origin + positive limit return to zero 1' is divided into three cases, as follows:

Case A: After the driver receives the 'origin enable signal' command, it moves in the positive direction with the parameters of 'origin speed V1' and 'origin acceleration and deceleration time'. When it encounters the rising edge of the origin signal, it continues to run. When it encounters the falling edge of the origin signal, it decelerates and stops. Then it runs in the opposite direction with the 'origin speed V2' until it encounters the rising edge of the origin signal, decelerates and stops, and the entire return to zero action is completed.

Case B: After the driver receives the 'origin enable signal' command, it moves in the positive direction with the parameters of 'origin speed V1' and 'origin acceleration and deceleration time'. When it encounters the rising edge of the positive limit signal, it stops immediately. Then it runs in the reverse direction at the 'return to origin speed V2' until it encounters the rising edge of the origin signal, decelerates and stops, and the entire return to zero action is completed.

Case C: After the drive receives the 'return to origin enable signal' command, it is in the origin signal, and it will move in the positive direction at the 'return to origin speed V1' and 'return to origin acceleration and deceleration time' parameters. When it encounters the falling edge of the origin signal, it decelerates and stops.

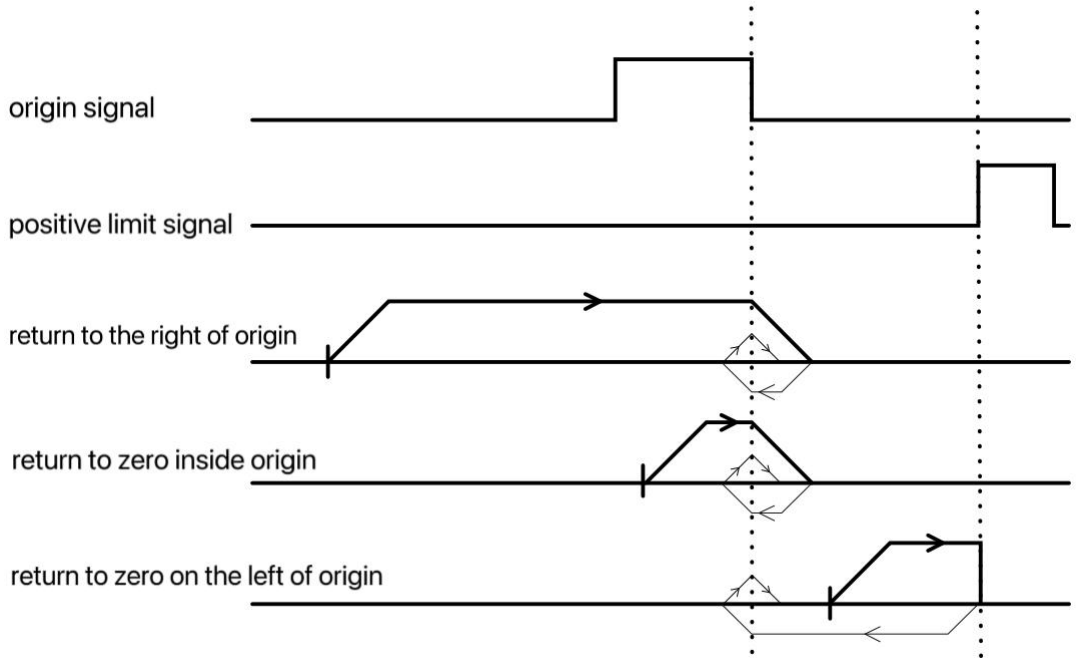
Then it runs in the reverse direction at the ‘return to origin speed V2’ until it encounters the rising edge of the origin signal, decelerates and stops, and the entire return to zero action is completed.



5.5.10 Mode 26 (origin + positive limit return to zero 4)

The origin stop position of ‘origin + positive limit return to zero 4’ is on the right side of the falling edge of the origin signal in the positive direction.

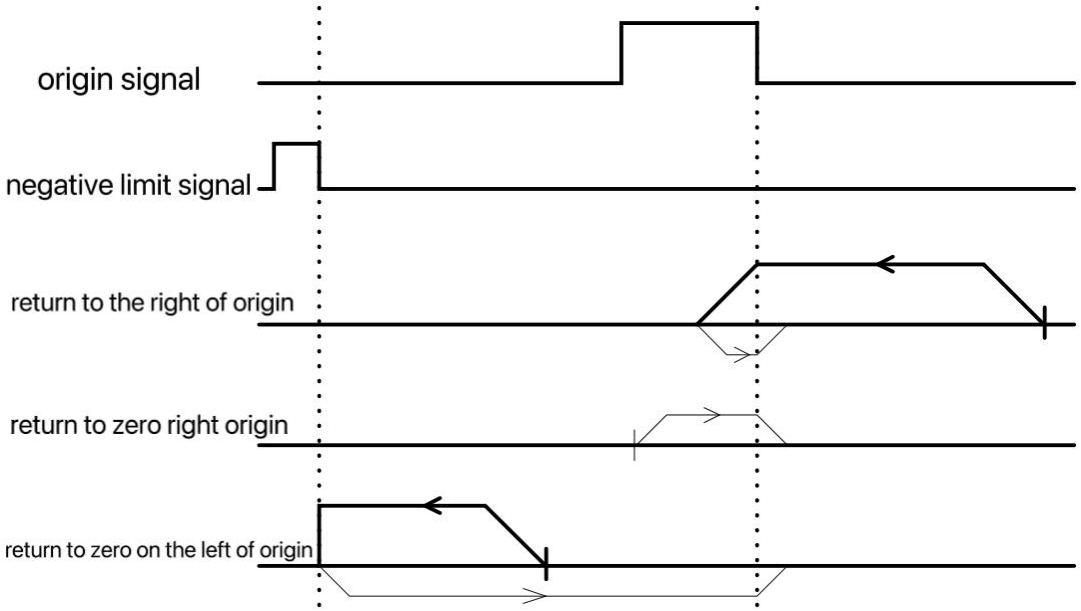
The entire action of ‘origin + positive limit return to zero 4’ is shown in the figure below.



5.5.11 Mode 27 (origin + negative limit return to zero 1)

The origin stop position of ‘origin + negative limit return to zero 1’ is on the right side of the rising edge of the origin signal in the reverse direction.

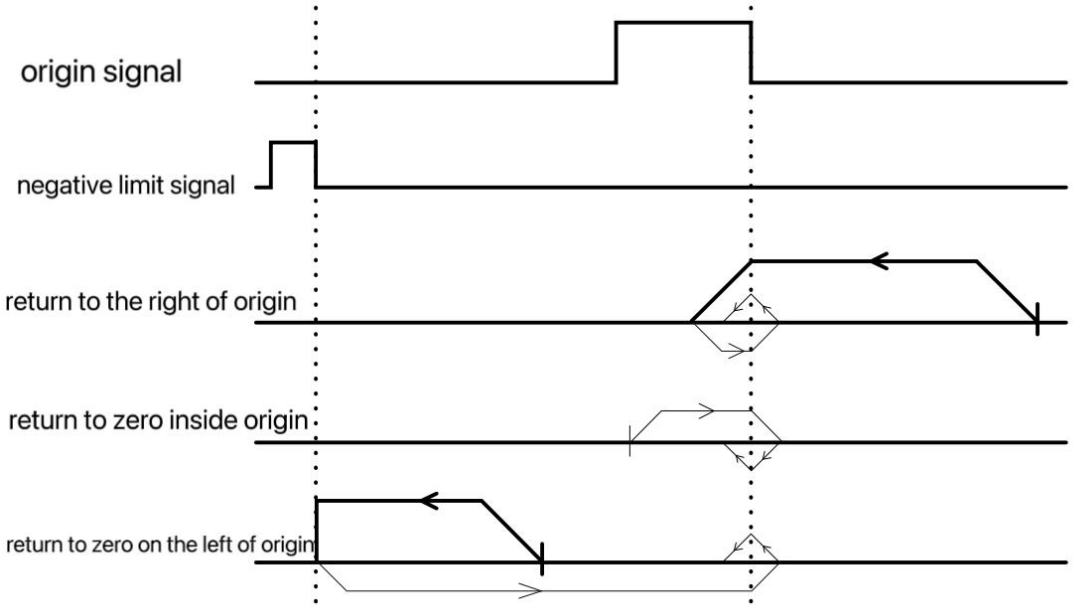
The entire action of ‘origin + negative limit return to zero 1’ is similar to that of ‘origin + positive limit return to zero 1’, except that the initial running direction is opposite.



5.5.12 Mode 28 (origin + negative limit return to zero 2)

The origin stop position of 'origin + negative limit return to zero 2' is on the left side of the rising edge of the origin signal in the reverse direction.

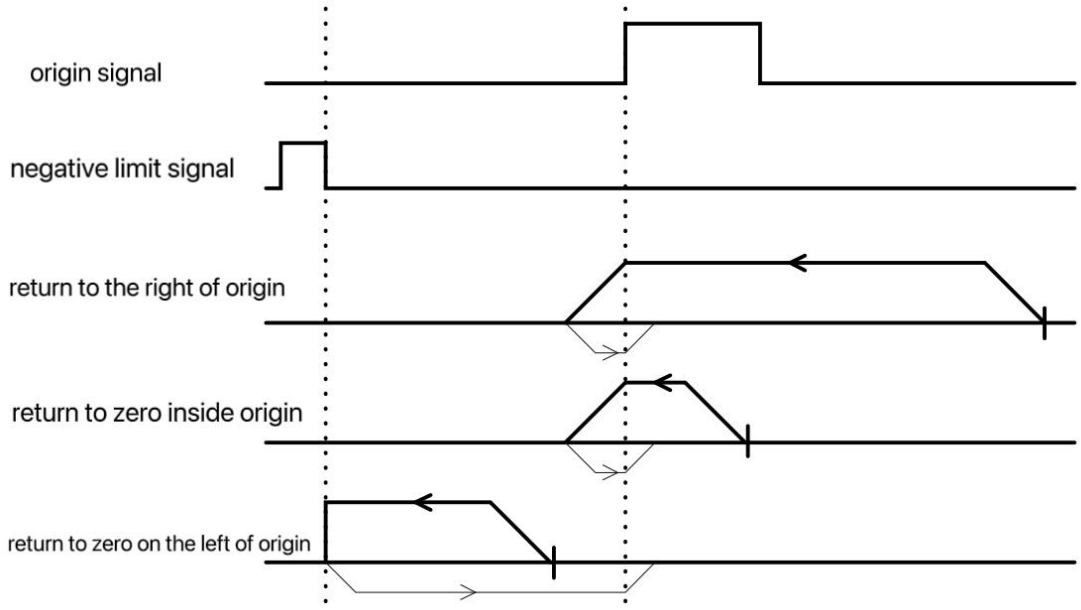
The entire action of 'origin + negative limit return to zero 2' is similar to that of 'origin + positive limit return to zero 2', except that the initial running direction is opposite.



5.5.13 Mode 29 (origin + negative limit return to zero 3)

The origin stop position of 'origin + negative limit return to zero 3' is on the right side of the falling edge of the origin signal in the reverse direction.

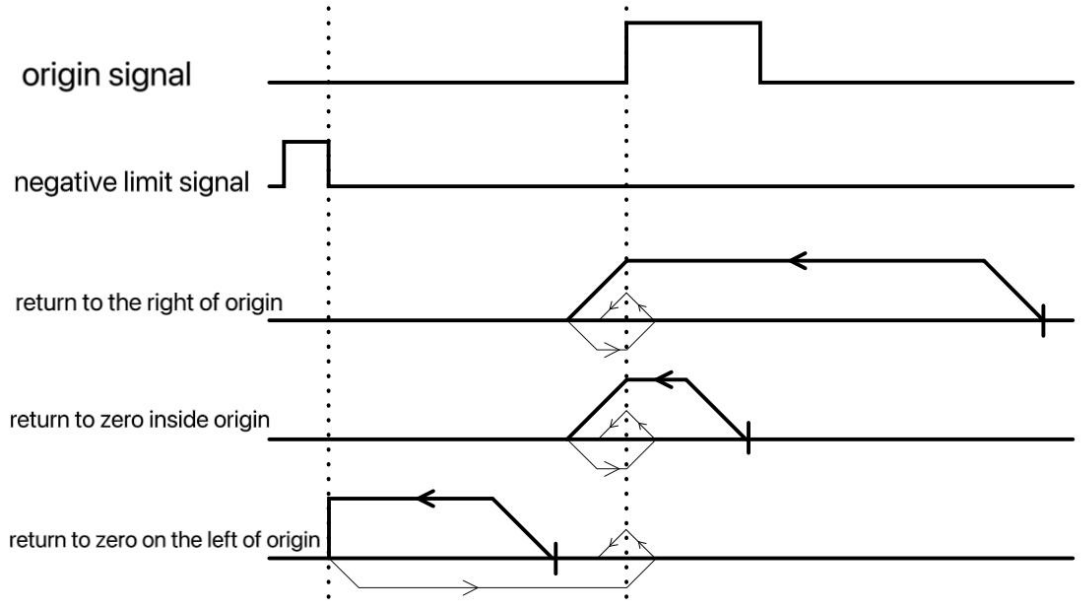
The entire action of ‘origin + negative limit return to zero 3’ is similar to that of ‘origin + positive limit return to zero 3’, except that the initial running direction is opposite.



5.5.14 Mode 30 (origin + negative limit return to zero 4)

The origin stop position of ‘origin + negative limit return to zero 4’ is on the left side of the falling edge of the origin signal in the reverse direction.

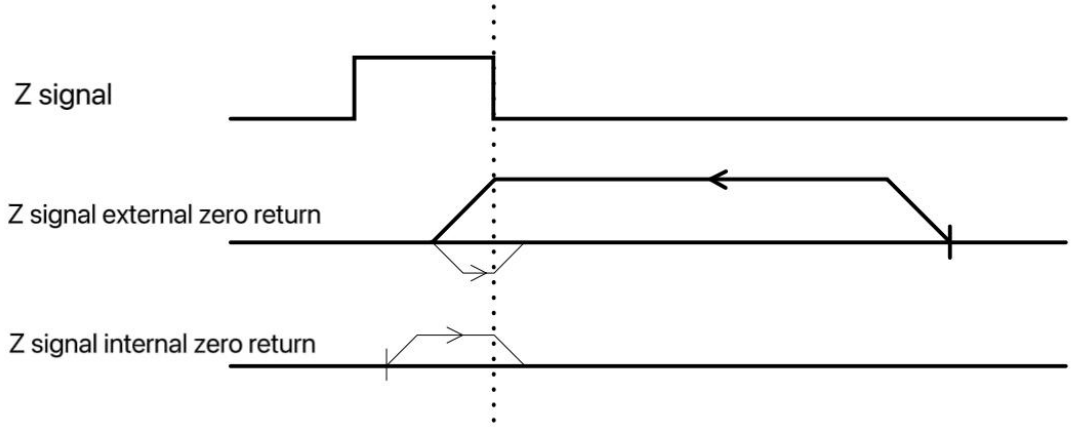
The entire action of ‘origin + negative limit return to zero 4’ is similar to that of ‘origin + positive limit return to zero 4’, except that the initial running direction is opposite.



5.5.15 Mode 33 (Z signal return to zero 1)

This zero return method uses the Z signal as the zero return detection signal, which is in the same direction as the 'Negative Limit Zero Return', and the origin position is to the right of the Z signal.

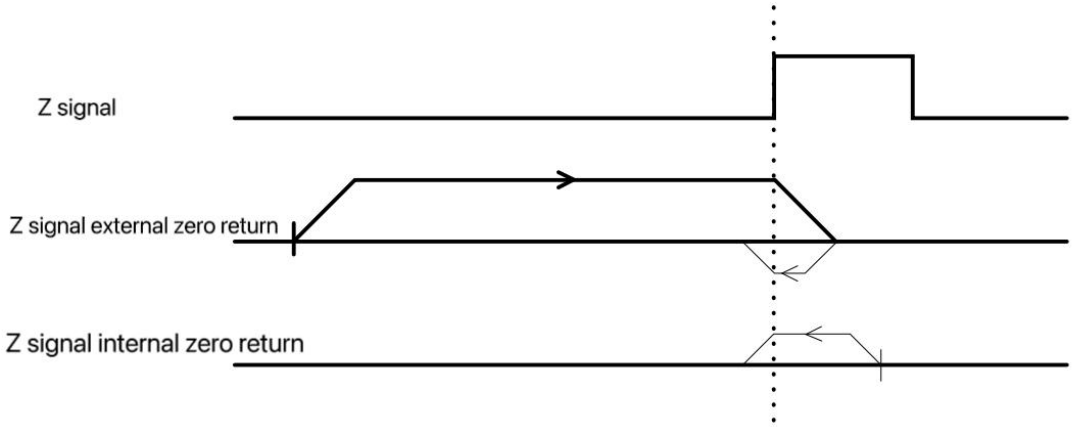
The entire action of 'Z signal back to zero 1' is shown below.



5.5.16 Mode 34 (Z signal return to zero 2)

This zero return method uses the Z signal as the zero return detection signal, which is in the same direction as the 'positive limit zero return', and the origin position is to the left of the Z signal.

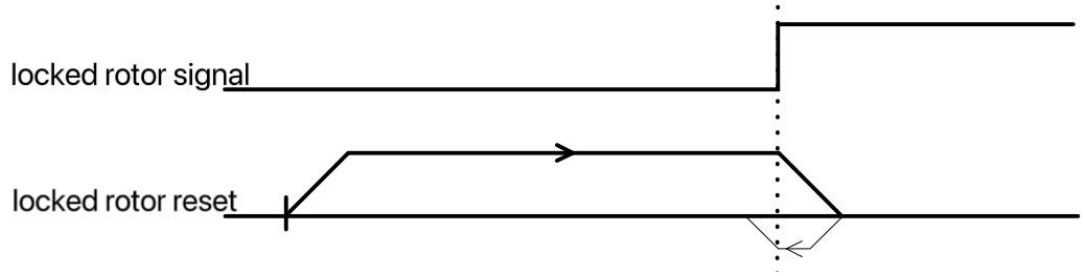
The entire action of 'Z signal back to zero 2' is shown below.



5.5.17 Mode -3 (blocking return to zero 1)

The motor initially runs in the positive direction at the 'return to origin speed V1', decelerates to a stop and moves in the reverse direction after a blockage occurs, and decelerates to a stop after the motor's dynamic torque has disappeared, using that position as the origin position.

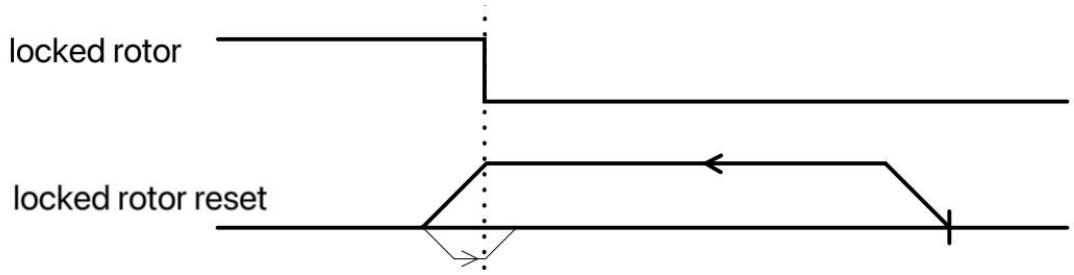
The entire action of this zero return method is shown below.



5.5.18 Mode -4 (blocking return to zero 2)

The motor initially runs in the reverse direction at the 'return to origin speed V1', decelerates to a stop and moves in the reverse direction after a blockage occurs, and decelerates to a stop after the motor's dynamic torque has disappeared, using that position as the origin position.

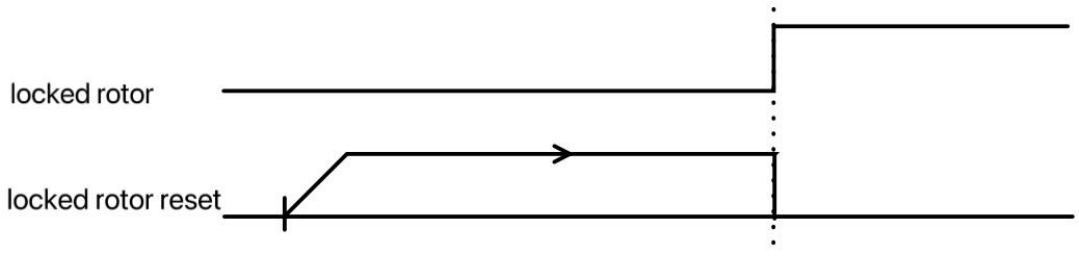
The entire action of this zero return method is shown below.



5.5.19 Mode -5 (blocking return to zero 3)

The motor initially runs in the positive direction at the 'return to origin speed V1' and stops immediately after a blockage occurs, using that position as the origin position.

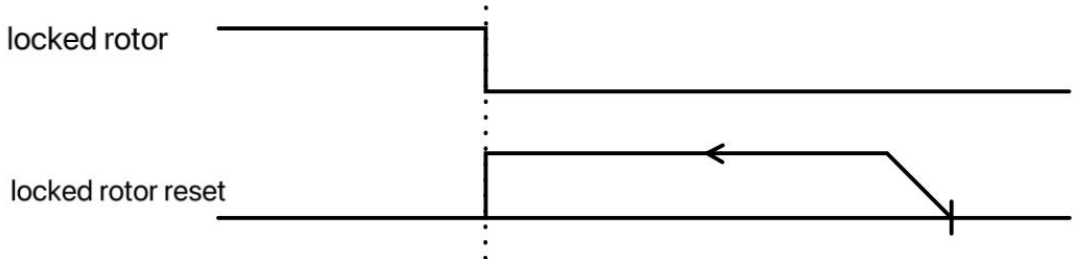
The entire action of this zero return method is shown below.



5.5.20 Mode -6 (blocking return to zero 4)

The motor initially runs in the opposite direction of the 'return to origin speed V1' and stops immediately after a blockage occurs, using that position as the origin position.

The entire action of this zero return method is shown below.



5.5.21 Introduction to the remaining return-to-zero methods

The above subsection describes the return-to-zero methods 17-30, 33, 34, (-3)-(-6), the rest of the return-to-zero methods are the same as the above return-to-zero methods, the correspondence is shown in the following table:

Zero return method	Similar return to zero	descriptive
1	17	After finding each positive and negative limit or origin limit, continue operation with the first Z signal detected as the zero position;
2	18	
3	19	
4	20	
5	21	
6	22	
7	23	
8	24	
9	25	
10	26	
11	27	
12	28	
13	29	
14	30	
-1	3	
-2	4	
35, 37	not have	The current position is used as the zero position;

Six.Description of serial port download parameters

See the description within the document 《2LS556EC Serial Port Download Communications Protocol Manual》.

Seven.Error code and indicator light

7.1 Drive failure

603F Code	1001 code	Meaning	201C Code	Removability	201B Corresponding position	LED flashing
0x2211	0x02	overcurrent fault	0x0E0	No	Bit0	1 time
0x4211	0x04	Busbar overvoltage	0x0C0	No	Bit1	2 times
0x5110	0x80	Motor phase A out of phase	0x210	No	Bit1	3 times
0x5120	0x80	Motor phase B out of phase	0x210	No	Bit1	3 times
0x8402	0x20	Command Overspeed	0x1A0	Yes	Bit2	4 times
0x5530	0x80	Failure to save parameters	0x240	Yes	Bit3	3 times
0x8403	0x20	Command pulse increment is too large within PWM cycle	0x1A1	Yes	-	4 times
0x8401	0x20	Position out of tolerance	0x1A2	No	-	4 times
-	-	hardware interrupt protection	-	-	-	

Writing 1 to 201E clears the current alarm;

Writing a 1 to 201D clears the fault record, i.e., clears the 201B fault list;

7.2 EtherCAT communication alarms

According to the EtherCAT ALM status code definition, some of the error codes are listed below

603F Code	1001 code	Meaning	201C	Removability	LED flashing
0x8213	0x10	BOOT is not supported		1	4 times
0x8215	0x10	Invalid BOOT mode configuration		1	4 times
0x8216	0x10	Invalid mailbox configuration		1	4 times
0x8217	0x10	Invalid SM configuration		1	4 times
0x821B	0x10	SM Watchdog timeout	0x101B	1	4 times

0x821C	0x10	Invalid SM type	0x101C	1	4 times
0x821D	0x10	Invalid output configuration		1	4 times
0x821E	0x10	Invalid input configuration		1	4 times
0x821F	0x10	Invalid watchdog configuration		1	4 times
0x821A	0x10	Synchronization mode error	0x101A	1	4 times
0x8230	0x10	Invalid DC configuration		1	4 times
0x8232	0x10	DC PLL error	0x1032	1	4 times
0x8233	0x10	DC Synchronization IO Error	0x1033	1	4 times
0x8234	0x10	DC Synchronization timeout	0x1034	1	4 times
0x8211	0x10	Invalid change of state request	0x1011	1	4 times
0x8212	0x10	Unknown change of state request	0x1012	1	4 times
0x8221	0x10	Slave needs Init state	0x1021	1	4 times
0x8222	0x10	Slave requires Pre-Op state	0x1022	1	4 times
0x8223	0x10	Slave requires Safe-OP state	0x1023	1	4 times

Eight:Warranty & After Sales

8.1 Warranty

8.1.1 Free warranty situation

The company solemnly promises that all products purchased from the company, if damaged during the use of the product due to its own reasons, are provided with one year free maintenance service. The return shipping cost of the product is borne in half by each side.

8.1.2 Non-warranty situations

(1) The drive is damaged due to the customer's own wiring error;

(2) Exceeding the rated operating voltage causes damage to the drive;

(3) DC-powered drives plugged into an AC power source that causes damage to the drive;

(4) The drive is damaged due to the extremely harsh environment at the customer's site, such as humidity, extreme cold, extreme heat and other harsh environmental factors, without informing the Company in advance;

(5) Customer has privately disassembled the drive enclosure or there are signs that the serial tag number has been torn off;

(6) The enclosure has been visibly damaged or struck, resulting in damage to the drive, 15 days after the customer has confirmed receipt of the goods;

(7) Irresistible natural disasters, such as fires, earthquakes, tsunamis, typhoons and other factors;

In the above cases, after evaluating the interests of all parties, our company will charge a certain maintenance cost fee, and the rest of the cases are permanently free of charge.

Nine:revision history

version number	clarification	Modification Deadline	Developer/Reviewer
V1.0.0	2LS556EC Series Initial Instruction Manual Version;	2023.9.27	TJB/JXQ

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