

# **SD700 PROFINET Operation Manual**

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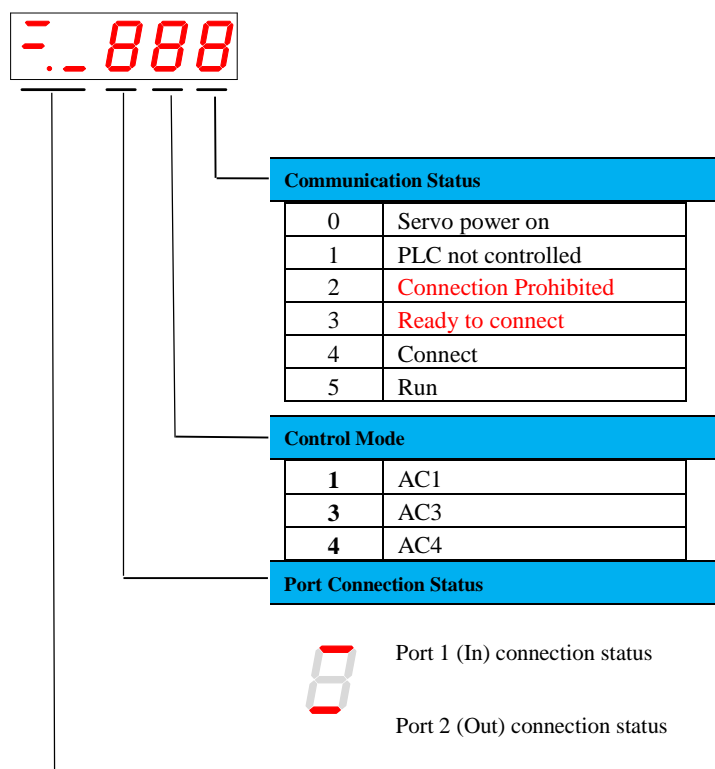
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## 1. Panel Display



Status	Meaning	Status	Meaning
	Light on when the control power is ON, off when it is OFF		Light on when the main circuit power is ON, off when it is OFF
	<b>Speed control:</b> Light on when the speed consistent (/V-CMP) signal output		Light on when the rotation checkout (/TGON) signal output
	<b>Position control:</b> Light on when the positioning completion signal (/COIN) output		<b>Speed control:</b> Light on when the speed command is input
	<b>Torque control:</b> always on		<b>Position control:</b> Light on when the position command is input
	Light on when servo is OFF, off when servo is ON		<b>Torque control:</b> Light on when the torque command is input
			<b>Position control:</b> Light on when the pulse clear signal is input

## 2. PROFINET Communication

### 2.1 Supported messages

Message	Maximum number of PZD (one PZD one word)	
Standard message 1	2	2
Standard message 3	5	9
Siemens message 102	6	10
Siemens message 105	10	10
Siemens message 111	12	12
Siemens message 750 (auxiliary message)	3	1

#### Messages for speed control

Message	1		3		102		105	
Applications Grade	1	1	1. 4	1. 4	1. 4	1. 4	4	4
PZD1	STW1	ZSW 1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOL L_A	NIST _A	NSOLL_B	NIST_B	NSOLL_B	NIST_B	NSOLL_B	NIST_B
PZD3								
PZD4			STW2	ZSW2	STW2	ZSW2	STW2	ZSW2
PZD5			G1_STW	G1_ZSW	MOMRED	MELDW	MOMRED	MELDW
PZD6				G1_XIS	G1_STW	G1_ZSW	G1_STW	G1_ZSW
PZD7				T1		G1_XIST	XERR	G1_XIST
PZD8				G1_XIS		1		1
PZD9				T2		G1_XIST	KPC	G1_XIST
PZD10						2		2

#### Auxiliary message

Message	750	
Applications Grade	-	
PZD1	M_ADD1	M_ACT
PZD2	M_LIMIT_POS	-
PZD3	M_LIMIT_NEG	

**Note:** When using 750 messages, if M\_LIMIT\_POS is set to a negative value or M\_LIMIT\_NEG is set to a positive value, uncontrolled acceleration of the motor may occur.

#### Messages for position control

Message	111	
Applications Grade	3	3
PZD1	STW1	ZSW1
PZD2	POS_STW1	POS_ZSW1
PZD3	POS_STW2	POS_ZSW2

PZD4	STW2	ZSW2
PZD5	OVERRIDE	MELDW
PZD6	MDI_TARPOS	XIST_A
PZD7		
PZD8	MDI_VELOCITY	NIST_B
PZD9		
PZD10	MDI_ACC	FAULT_CODE
PZD11	MDI_DEC	WARN_CODE
PZD12	User	User

## 2.2 IO data signal

Signal	Description	Receive Word/ Send Word	Data Type	Calibration
STW1	Control word 1	Receive	U16	
STW2	Control word 2	Receive	U16	
ZSW1	Status word 1	Send	U16	
ZSW2	Status word 2	Send	U16	
NSOLL_A	RPM setting value A	Receive	I16	4000hex<=> Rated speed
NSOLL_B	RPM setting value B	Receive	I32	40000000hex<=> Rated speed
NIST_A	RPM actual value A	Send	I16	4000hex<=> Rated speed
NIST_B	RPM actual value B	Send	I32	40000000hex<=> Rated speed
G1_STW	Encoder 1 control word	Receive	U16	
G1_ZSW	Encoder 1 status word	Send	U16	
G1_XIST1	Encoder 1 actual position 1	Send	U32	
G1_XIST2	Encoder 1 actual position 2	Send	U32	
MOMRED	Torque deceleration	Receive	I16	4000hex<=>300% Rated torque
MELDW	Message word	Send	U16	
KPC	Position controller gain factor	Receive	I32	
XERR	Position deviation	Receive	I32	
M_ADD1	Additional torque	Receive	I16	4000hex<=>Rated torque
M_LIMIT_POS	Torque positive limit	Receive	I16	4000hex<=>Rated torque
M_LIMIT_NEG	Torque negative limit	Send	I16	4000hex<=>Rated torque
MDI_TARPOS	MDI position (command)	Receive	I32	1hex<=>1LU
MDI_VELOCITY	MDI speed (command)	Receive	I32	1hex<=>1000LU/min
MDI_ACC	MDI acceleration multiplier	Receive	I16	4000hex<=>100%
MDI_DEC	MDI deceleration multiplier	Receive	I16	4000hex<=>100%



XIST_A	Position actual value A	Send	I32	1hex<=>1LU
OVEERIDE	Position speed multiplier	Receive	I16	4000hex<=>100%
FAULT_CODE	Fault Code	Send	U16	
WARN_CODE	Warning Code	Send	U16	
USER	User defined "Receive word" PnA32=0: No function PnA32=1: Torque limit	Receive	I16	When Torque Limiting 1 <=> 0.1%
USER	User defined "Send word" PnA33=0: No function PnA33=1: Torque feedback PnA33=2: Current Feedback	Send	I16	When torque feedback 1 <=> 0.1%

## 2.3 Control word definition

### 2.3.1 STW1 control word (for messages 1, 3)

Signal	Description
STW1.0	1: ON (Enables pulses) 0: OFF1 (Ramp stop, no pulse, ready to connect)
STW1.1	1: No OFF2 (Allow to enable) 0: OFF2 (Free stop, no pulse, connection prohibited)
STW1.2	1: No OFF3 (Allow to enable) 0: OFF3 (Quick stop, no pulse, connection prohibited)
STW1.3	1: Running allowed 0: Running prohibited
STW1.4	1: Running conditions (ramp function generator can be enabled) 0: Disable the ramp function generator (set the output of the ramp function generator to 0)
STW1.5	1: Continue the ramp function generator 0: Freeze the ramp function generator (freeze the output of the ramp function generator)
STW1.6	1: Enable the setting value 0: Prohibit the setting value
STW1.7	0->1 Rising edge, answering a fault
STW1.8	Reserved
STW1.9	Reserved
STW1.10	1: Controlled by PLC 0: Non-PLC control
STW1.11	Reserved
STW1.12	Reserved
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

### 2.3.2 STW1 control word (for messages 102, 105)

Signal	Description
STW1.0	1: ON (Enables pulses) 0: OFF1 (Ramp stop, no pulse, ready to connect)
STW1.1	1: No OFF2 (Allow to enable) 0: OFF2 (Free stop, no pulse, connection prohibited)
STW1.2	1: No OFF3 (Allow to enable) 0: OFF3 (Quick stop, no pulse, connection prohibited)
STW1.3	1: Running Allowed 0: Running prohibited
STW1.4	1: Running conditions (ramp function generator can be enabled) 0: Disable the ramp function generator (set the output of the ramp function generator to 0)
STW1.5	1: Continue the ramp function generator 0: Freeze the ramp function generator (freeze the output of the ramp function generator)
STW1.6	1: Enable the setting value 0: Prohibit the setting value
STW1.7	0->1 Rising edge, answering a fault
STW1.8	Reserved
STW1.9	Reserved
STW1.10	1: Controlled by PLC 0: Non-PLC control
STW1.11	1: Ramp function generator takes effect
STW1.12	1: Release the brake unconditionally
STW1.13	Reserved
STW1.14	1: Closed-loop torque is in effect 0: Closed-loop speed control is in effect
STW1.15	Reserved

### 2.3.3 STW1 control word (for message 111)

Signal	Description
STW1.0	1: ON (Enables pulses) 0: OFF1 (Ramp stop, no pulse, ready to connect)
STW1.1	1: No OFF2 (Allow enable) 0: OFF2 (Free stop, no pulse, connection prohibited)
STW1.2	1: No OFF3 (Allow enable) 0: OFF3 (Quick stop, no pulse, connection prohibited)
STW1.3	1: Running Allowed 0: Running prohibited
STW1.4	1: Do not refuse to carry out the task 0: Refuse to carry out the task
STW1.5	1: No suspension of tasks 0: Suspend the task
STW1.6	0->1 Rising edge, activate the task

STW1.7	0->1 Rising edge, answering a fault
STW1.8	1: Start JOG1 0: Stop JOG1
STW1.9	1: Start JOG2 0: Stop JOG2
STW1.10	1: Controlled by PLC 0: Non-PLC control
STW1.11	1: Start back to 0 0: Stop back to 0
STW1.12	Reserved
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

#### 2.3.4 STW2 control word (for messages 1, 3, 111)

Signal	Description
STW2.0~STW2.11	Reserved
STW2.12	Main station life symbol, bit 0
STW2.13	Main station life symbol, bit 1
STW2.14	Main station life symbol, bit 2
STW2.15	Main station life symbol, bit 3

#### 2.3.5 STW2 control word (for messages 102, 105)

Signal	Description
STW2.0~STW 2.3	Reserved
STW2.4	1: Ignore the ramp function generator
STW2.5	Reserved
STW2.6	1: Speed controller integrator prohibited
STW2.7	Reserved
STW2.8	1: Run to the fixed block
STW2.9~STW 2.11	Reserved
STW2.12	Main station life symbol, bit 0
STW2.13	Main station life symbol, bit 1
STW2.14	Main station life symbol, bit 2
STW2.15	Main station life symbol, bit 3

#### 2.3.6 POS\_STW1 positioning control word 1

Signal	Description
POS_STW1.0~ POS_STW1.7	Reserved
POS_STW1.8	1: Absolute positioning 0: Relative positioning
POS_STW1.9	1: MDI direction selection, forward direction
POS_STW1.10	1: MDI direction selection, reverse direction

POS_STW1.11~ POS_STW1.13	Reserved
POS_STW1.14	1: Signal adjustment has been selected (continuous position) 0: Signal positioning has been selected
POS_STW1.15	1=MDI selection

### 2.3.7 POS\_STW2 positioning control word 2

Signal	Description
POS_STW2.0	Reserved
POS_STW2.1	Reserved
POS_STW2.2	1: Reference point block activated (set PLC to home point)
POS_STW2.3~ POS_STW2.13	Reserved
POS_STW2.14	1: Activates the soft limit switch      0: Deactivates the soft limit switch After activating the soft limit, set the soft limit position by servo (function code PnA2A PnA2C)
POS_STW2.15	Hard limit is set by servo Pn601 to Pn607 <b>It will take effect when the corresponding hardware limit function is selected and the DI signal is input.</b>

### 2.3.7 G1\_STW encoder 1 control word

Signal	Description
G1_STW.0~ G1_STW.12	Reserved
G1_STW.13	1: Request for periodic transmission of the absolute position in G1_XIST2
G1_STW.14	1: Request resident encoder
G1_STW.15	Reserved

## 2.4 Status Word Definition

### 2.4.1 ZSW1 status word 1 (for messages 1 and 3)

Signal	Description
ZSW1.0	1: Ready to connect 0: Not ready for connection
ZSW1.1	<b>1: Ready to operate</b> <b>0: Not ready for operation</b>
ZSW1.2	1: Operation enabled 0: Operation disabled
ZSW1.3	1: Fault exists 0: No fault
ZSW1.4	<b>1: Free stop is invalid</b> <b>0: Free stop is valid</b>
ZSW1.5	1: Quick stop is invalid 0: Quick stop is valid

ZSW1.6	1: Prohibition of connection is valid 0: Prohibition of connection is invalid
ZSW1.7	1: Warning exists 0: No warning
ZSW1.8	1: Speed error within tolerance 0: Speed error exceeds tolerance, PnA3A sets tolerance threshold
ZSW1.9	1: With control request 0: No control request
ZSW1.10	1: Speed comparison value is reached or exceeded 0: Speed comparison value is not reached or exceeded Actual speed + Pn320 compared to PnA3C
ZSW1.11	Reserved
ZSW1.12	Reserved
ZSW1.13	1: No motor over-temperature alarm 0: Motor over-temperature alarm (Er.860)
ZSW1.14	1: Motor rotates in forward (actual speed $\geq 0$ ) 0: Motor rotates in reverse (actual speed $< 0$ )
ZSW1.15	1: No overheat and overload alarm for power unit 0: Power unit overheat and overload alarm (Er.7A0)

#### 2.4.1 ZSW1 status word 1 (for messages 102, 105)

Signal	Description
ZSW1.0	1: Ready to connect 0: Not ready for connection
ZSW1.1	1: Ready to operate 0: Not ready for operation
ZSW1.2	1: Operation enabled 0: Operation disabled
ZSW1.3	1: Fault exists 0: No fault
ZSW1.4	1: Free stop is invalid 0: Free stop is valid
ZSW1.5	1: Quick stop is invalid 0: Quick stop is valid
ZSW1.6	1: Prohibition of connection is valid 0: Prohibition of connection is invalid
ZSW1.7	1: Warning exists 0: No warning
ZSW1.8	1: Speed error within tolerance 0: Speed error exceeds tolerance PnA3A sets tolerance threshold
ZSW1.9	1: With control request 0: No control request
ZSW1.10	1: Speed comparison value is reached or exceeded

	0: Speed comparison value is not reached or exceeded Pn320 sets the speed arrival threshold
ZSW1.11	Reserved
ZSW1.12	Reserved
ZSW1.13	Reserved
ZSW1.14	1: Closed-loop torque control takes effect
ZSW1.15	Reserved

#### 2.4.2 ZSW1 status word 1 (for message 111)

Signal	Description
ZSW1.0	1: Ready to connect 0: Not ready for connection
ZSW1.1	1: Ready to operate 0: Not ready for operation
ZSW1.2	1: Operation enable 0: Operation disable
ZSW1.3	1: Fault exists 0: No fault
ZSW1.4	1: Free stop is invalid 0: Free stop is valid
ZSW1.5	1: Quick stop is invalid 0: Quick stop is valid
ZSW1.6	1: Prohibition of connection is valid 0: Prohibition of connection is invalid
ZSW1.7	1: Warning exists 0: No warning
ZSW1.8	1: Position tracking error is within the tolerance range 0: Position tracking error exceeds tolerance
ZSW1.9	1: With control request 0: No control request
ZSW1.10	1: Target position is reached 0: target position is not reached      Function code Pn262 sets the completion range
ZSW1.11	1: Reference point is set 0: Reference point not set      Set to 1 if back 0 is completed
ZSW1.12	0->1 Rising edge, activated positioning, mobile task confirmation
ZSW1.13	1: Drive is stopped 0: Drive is running      Function code Pn317 sets the judgment rotation threshold
ZSW1.14	Reserved
ZSW1.15	Reserved

#### 2.4.3 ZSW2 status word 2 (for messages 1, 3, 111)

Signal	Description
ZSW2.0~	Reserved

ZSW2.9	
ZSW2.10	Pulse Enable
ZSW2.11	Reserved
ZSW2.12~ ZSW2.15	Reserved

#### 2.4.3 ZSW2 status word 2 (for messages 102, 105)

Signal	Description
ZSW2.0~ ZSW2.7	Reserved
ZSW2.8	1: Run to fixed block
ZSW2.9	Reserved
ZSW2.10	Pulse Enable
ZSW2.11	Reserved
ZSW2.12	Slave station life symbol, bit 0
ZSW2.13	Slave station life symbol, bit 1
ZSW2.14	Slave station life symbol, bit 2
ZSW2.15	Slave station life symbol, bit 3

#### 2.4.4 G1\_ZSW encoder 1 status word

Signal	Description
G1_ZSW.0~ G1_ZSW.12	Reserved
G1_ZSW.13	1: The data in G1_XIST2 indicates the absolute position of the cycle transmission. 0: The data in G1_XIST2 does not indicate the absolute position of the cycle transmission.
G1_ZSW.14	1: resident encoder is active. 0: resident encoder is not active.
G1_ZSW.15	1: The data in G1_XIST2 indicates the error code of the encoder. 0: The data in G1_XIST2 does not indicate the error code of the encoder.

#### 2.4.5 POS\_ZSW1 positioning status word 1

Signal	Description
POS_ZSW1.0~ POS_ZSW1.7	Reserved
POS_ZSW1.8	Reserved
POS_ZSW1.9	Reserved
POS_ZSW1.10	1: JOG mode is active. 0: JOG mode is not active. Set to 1 after STW1.8/STW1.9 start the Jog mode
POS_ZSW1.11	Reserved
POS_ZSW1.12~ POS_ZSW1.13	Reserved
POS_ZSW1.14	1: Adjustment mode is activated. 0: Positioning mode is activated.

POS_ZSW1.15	1: MDI is activated 0: MDI is not activated
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#### 2.4.6 POS\_ZSW2 positioning status word 2

Signal	Description
POS_ZSW2.0~ POS_ZSW2.3	Reserved
POS_ZSW2.4	1: Axis moves forward 0: Axis does not move forward
POS_ZSW2.5	1: Axis moves backward 0: Axis does not move backward
POS_ZSW2.6	1: Negative soft limit switch is activated. 0: Negative soft limit switch is not activated. Set to 1 after reaching the negative soft limit position.
POS_ZSW2.7	1: Positive soft limit switch is activated 0: Positive soft limit switch is not activated Set to 1 after reaching the forward soft limit position.
POS_ZSW2.8~ POS_ZSW2.15	Reserved

## 2.5 FAULT\_CODE Fault Code

FAULT_CODE	Meaning	Panel Display
1	Parameter and check abnormal	Er.020
2	Parameter formatting abnormal	Er.021
3	System and check abnormal	Er.022
4	Reserved	Er.023
5	Main circuit detection section abnormal	Er.030
6	Parameter setting abnormal	Er.040
7	Distribution pulse output setting abnormal	Er.041
8	Parameter combination abnormal	Er.042
9	Semi-closed loop / fully closed loop parameter setting abnormal	Er.044
10	Mismatch between drive and motor capacity	Er.050
11	Product does not support alarms	Er.051
12	Encoder unit pulse distance setting abnormal	Er.080
13	Position sensor resolution setting abnormal	Er.08A
14	Servo on command invalid alarm	Er.0B0
15	Overcurrent (OC)	Er.100
16	Regeneration failure	Er.300
17	Regenerative overload	Er.320
18	The main circuit power supply is wired incorrectly	Er.330
19	Main circuit overvoltage (OV)	Er.400



20	Main circuit undervoltage	Er.410
21	Converter abnormal	Er.42A
22	Main circuit capacitor overvoltage	Er.450
23	Over speed (OS)	Er.510
24	Frequency division pulse output overspeed	Er.511
25	Vibration Alarms	Er.520
26	Auto-tuning alarm	Er.521
27	Maximum speed setting abnormal	Er.550
28	Overload (instantaneous maximum load)	Er.710
29	Overload (continuous maximum load)	Er.720
30	DB Overload 1	Er.730
31	DB Overload 2	Er.731
32	Inrush current limiting resistor overload	Er.740
33	Heat sink overheating	Er.7A0
34	Control base plate temperature abnormal	Er.7AA
35	Servo unit built-in fan stop	Er.7AB
36	Encoder backup alarm	Er.810
37	Encoder data check alarm	Er.820
38	Encoder battery alarm	Er.830
39	Encoder data abnormal	Er.840
40	Encoder overspeed	Er.850
41	Encoder overheating	Er.860
50	Speed command A/D abnormal	Er.B10
51	Speed command A/D conversion data abnormal	Er.B11
52	Torque command A/D abnormal	Er.B20
53	Current detection fault 1 (U phase)	Er.B31
54	Current detection fault 2 (V-phase)	Er.B32
55	Current detection fault 3 (current detector)	Er.B33
58	System Alarm 0	Er.BF0
59	System Alarm 1	Er.BF1
60	System Alarm 2	Er.BF2
61	System Alarm 3	Er.BF3
62	Hardware Overcurrent	Er.BF4
63	Prevent uncontrolled detection	Er.C10
64	Phase error detection	Er.C20
65	Hall sensor abnormal	Er.C21
66	Inconsistent phase information	Er.C22
67	Magnetic pole monitoring failure	Er.C50
68	Magnetic pole monitoring stop	Er.C51
69	Magnetic pole monitoring is not finished	Er.C52
70	Magnetic pole monitoring overtravel	Er.C53
71	Magnetic pole monitoring failure2	Er.C54

72	Encoder clearing abnormal	Er.C80
73	Encoder communication failure	Er.C90
74	Abnormal acceleration of encoder communication position data	Er.C91
75	Encoder communication timer abnormal	Er.C92
76	Abnormal encoder parameters	Er.CA0
77	Encoder return checksum abnormal	Er.CB0
78	Inconsistent upper and lower rotation limit values	Er.CC0
81	Excessive position deviation	Er.D00
82	Excessive position deviation at servo ON	Er.D01
83	Excessive position deviation caused by speed limit at servo ON	Er.D02
84	Excessive deviation between motor-load positions	Er.D10
85	Position data overflow	Er.D30
120	Missing phase when three-phase power input is selected for the main circuit	Er.F10
126	Positive limit failure	Er.F11
127	Negative limit failure	Er.F12
128	PLC Stop fault	Er.F13

## 2.6 WARN\_CODE Warning Code

WARN_CODE	Meaning	Warning Display
1	Excessive position deviation	AL.900
2	Excessive position deviation at servo ON	AL.901
3	Overload warning	AL.910
4	Vibration Warning	AL.911
5	Regeneration overload warning	AL.920
6	DB overload warning	AL.921
7	Battery undervoltage warning	AL.930
9	Frequent storage parameter operations	AL.940
10	Warning of parameter changes that require re-powering	AL.941
11	PLC disconnection warning	AL.942
12	Position beyond soft limit	AL.950
13	Undervoltage warning	AL.971
14	Overtravel warning	AL.9A0
16	Life Signals Error	AL.9B0
17	High encoder temperature	AL.860
18	Positive limit warning	AL.951
19	Negative limit warning	AL.952
20	PLC stop running warning	AL.953

### 3 Home position return

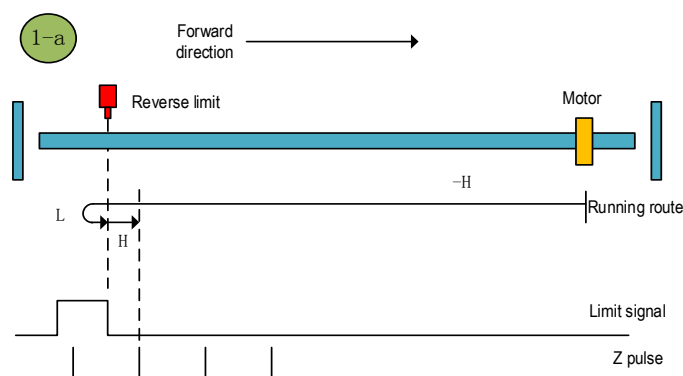
The home position return method for messages 3, 102 and 105 can be configured via the Botto configuration. If message 111 is used, the servo's internal home position return function is required.

The servo internal home position return method is set by PnA20 function code, and the home return speed is set by PnA21 and PnA23, respectively. Unit (1000LU/min). The home return acceleration multiplier is set by PnA25, and its reference points are PnA26 and PnA28. The following is the introduction of each home return method.

#### 3.1 Home position return method

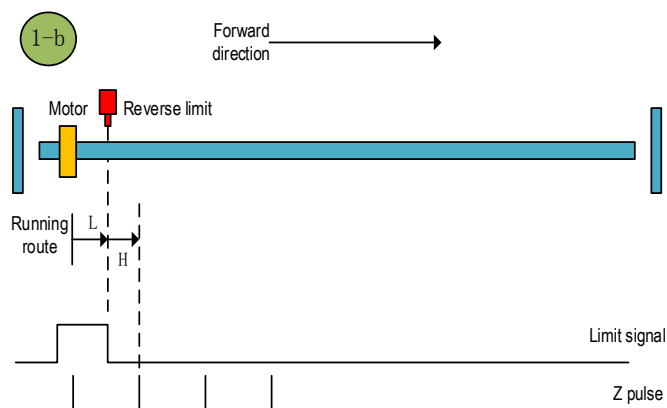
##### 3.1.1 Home position return method 1

a. Start the home position return → search for the reverse limit at high speed reverse direction → encounter the rising edge of reverse limit → decelerate to 0 → search for the falling edge of reverse limit at low speed forward direction → search for Z pulse in forward direction



Home position return method 1-a

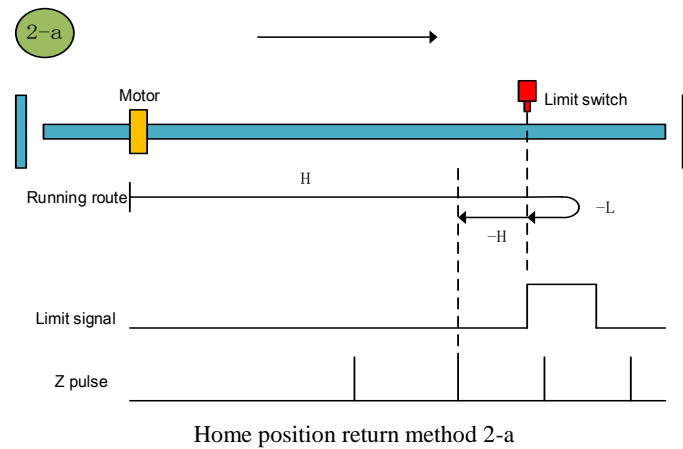
b. Start the home position return → reverse limit valid → Search for the falling edge of reverse limit at low speed forward direction → search for Z pulse in forward direction



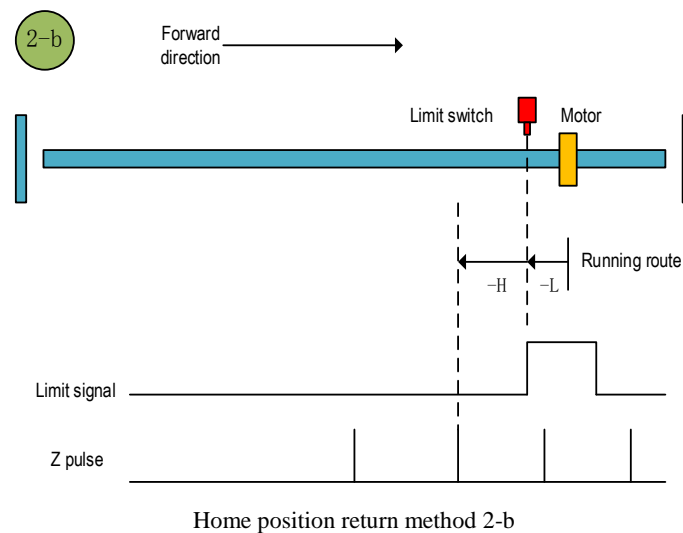
Home position return method 1-b

### 3.1.2 Home position return method 2

a. Start the home position return → search for the forward limit at high speed forward direction → encounter the forward limit rising edge → decelerate to 0 → search for the falling edge of forward limit at low speed reverse direction → search for Z pulse in reverse direction

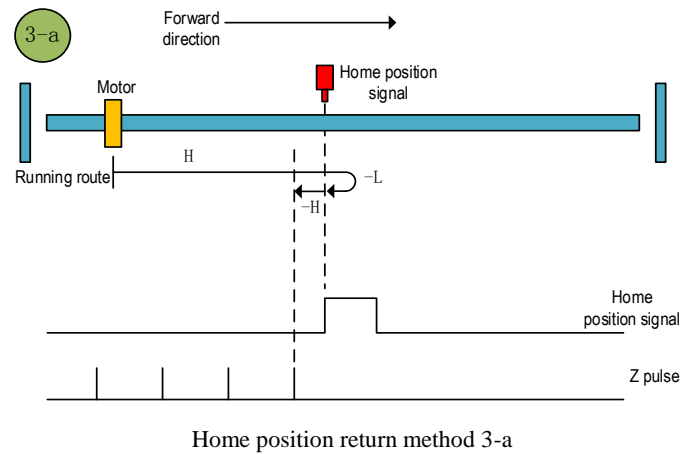


b. Start the home position return → forward limit valid → search for the falling edge of forward limit at low speed reverse direction → search for Z pulse in reverse direction

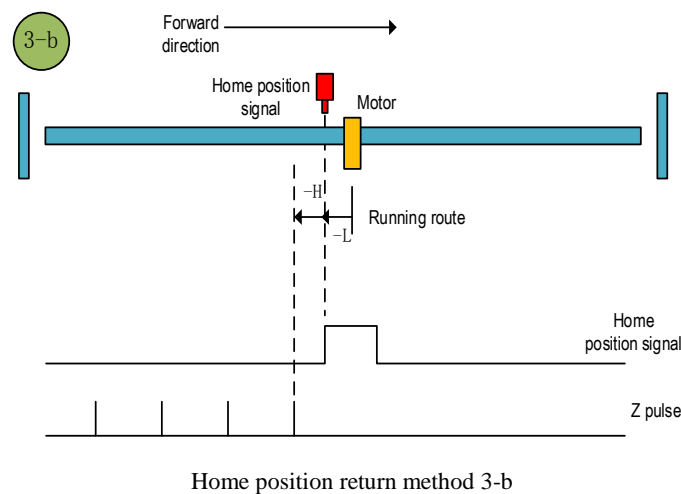


### 3.1.3 Home position return method 3

a. Start the home position return → home position signal is OFF → search for the rising edge of home position signal at high speed forward direction → decelerate to 0 → search for the falling edge of home position signal at low speed reverse direction → search for Z pulse in reverse direction

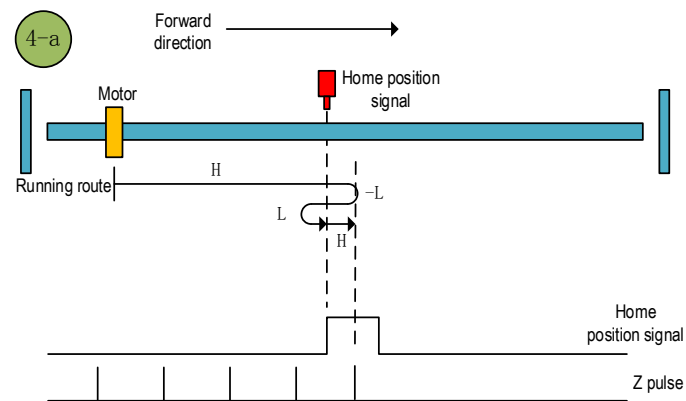


b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed reverse direction → search for Z pulse in reverse direction



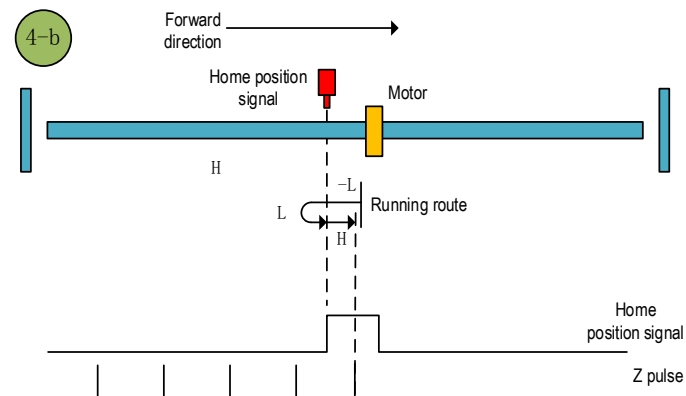
### 3.1.4 Home position return method 4

a. Start the home position return → home position signal OFF → search for the rising edge of home position at high speed forward direction → decelerate to 0 → search for the falling edge of home position at low speed reverse direction → decelerate to 0 → search for the rising edge of home position at low speed forward direction → search for Z pulse in forward direction



Home position return method 4-a

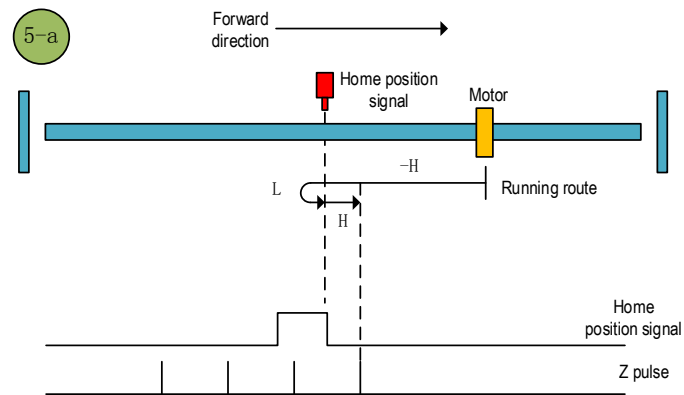
b. Start the home position return → home position signal ON → search for the falling edge of home position at low speed reverse direction → decelerate to 0 → search for the rising edge of home position at low speed forward direction → search for Z pulse in forward direction



Home position return method 4-b

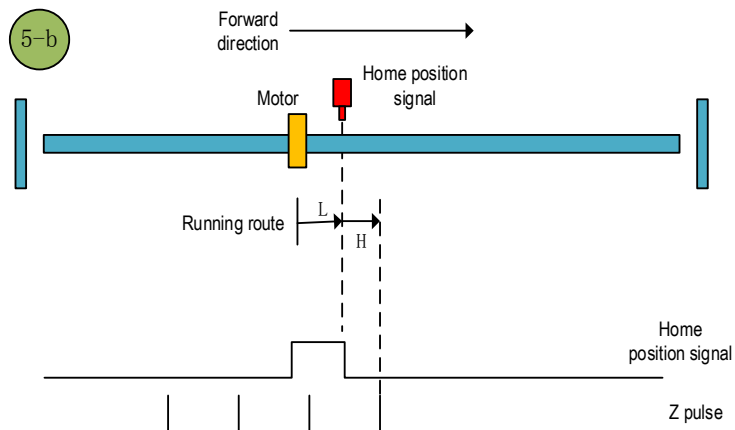
### 3.1.5 Home position return method 5

a Start the home position return →home position signal OFF→ search for the rising edge of home position at high speed reverse direction →decelerate to 0→ search for the falling edge of home position at low speed forward direction →search for Z pulse in forward direction



Home position return method 5-a

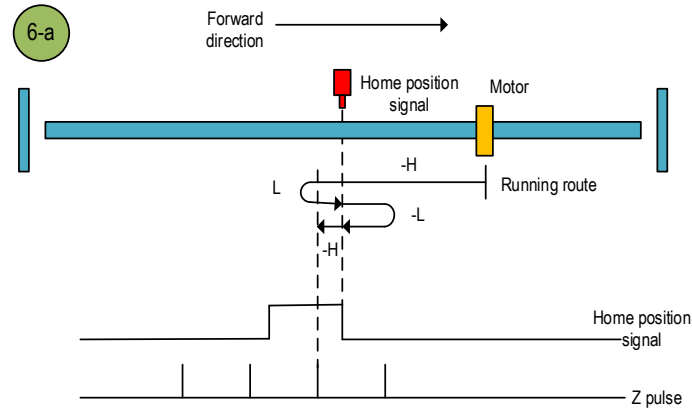
b. Start the home position return →home position signal ON→ search for the falling edge of home position at low speed forward direction →search for Z pulse in forward direction



Home position return method 5-b

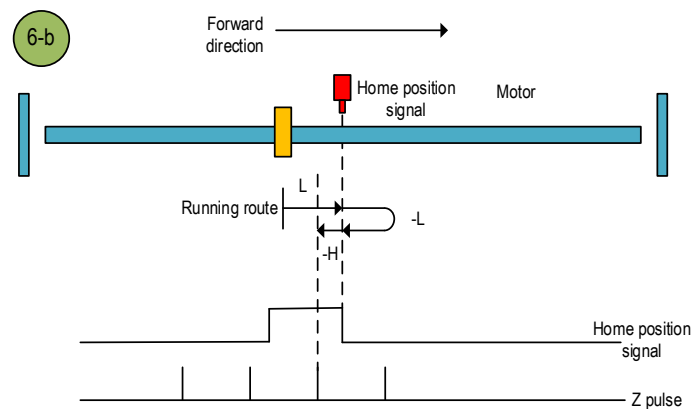
### 3.1.6 Home position return method 6

a Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 6-a

b Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed forward direction → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction

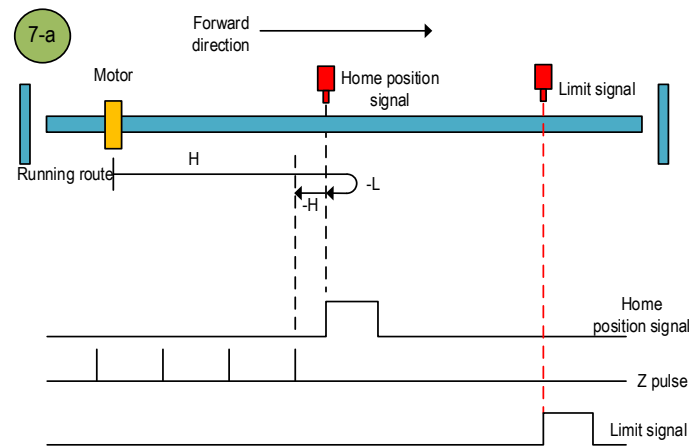


Home position return method 6-b



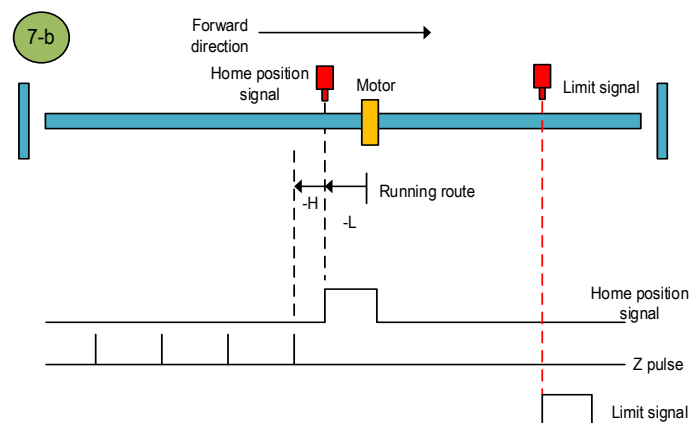
### 3.1.7 Home position return method 7

a Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



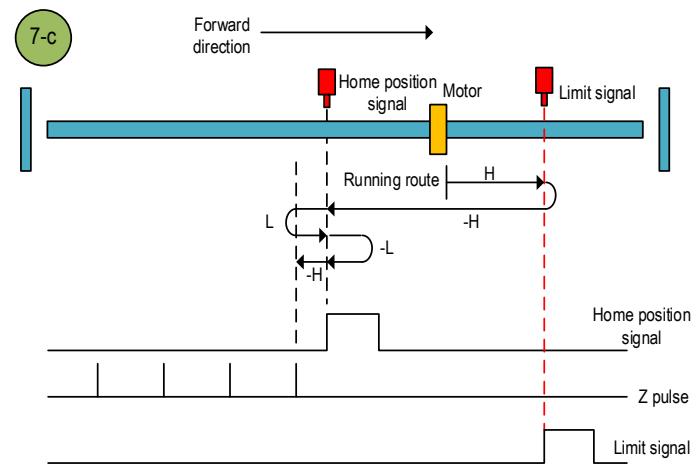
Home position return method 7-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 7-b

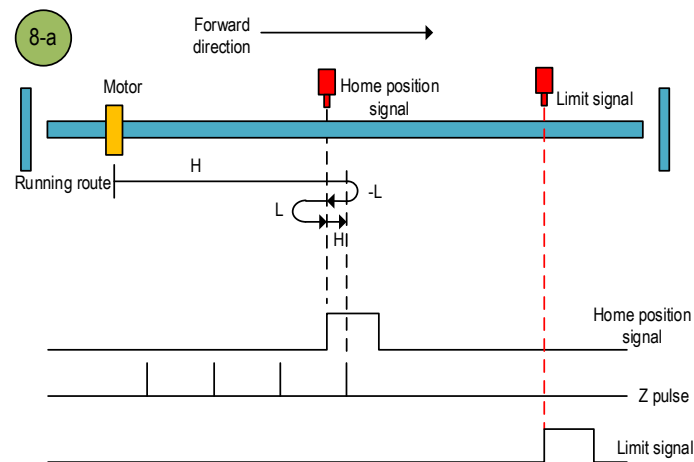
c. Start the home position return → Home position OFF → Search for the rising edge of home position at high speed forward direction → Touch the forward limit → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 7-c

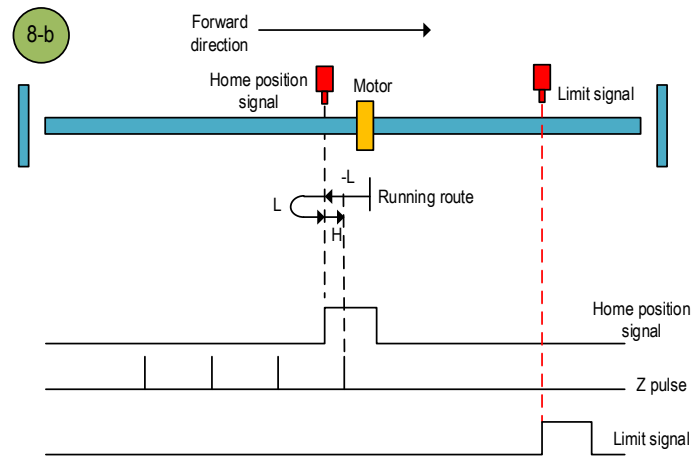
### 3.1.8 Home position return method 8

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



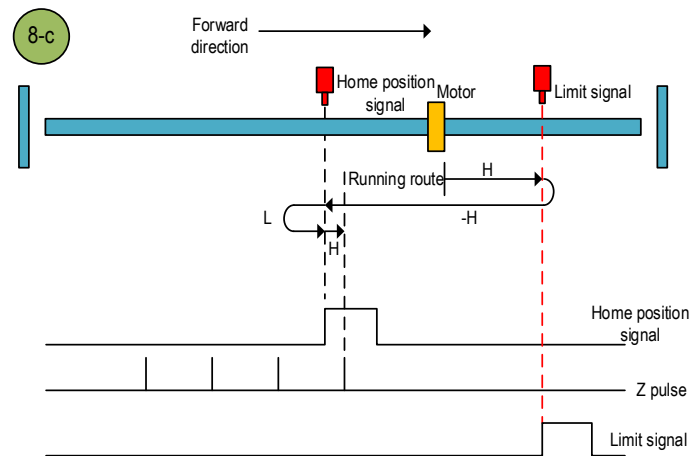
Home position return method 8-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed reverse direction → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 8-b

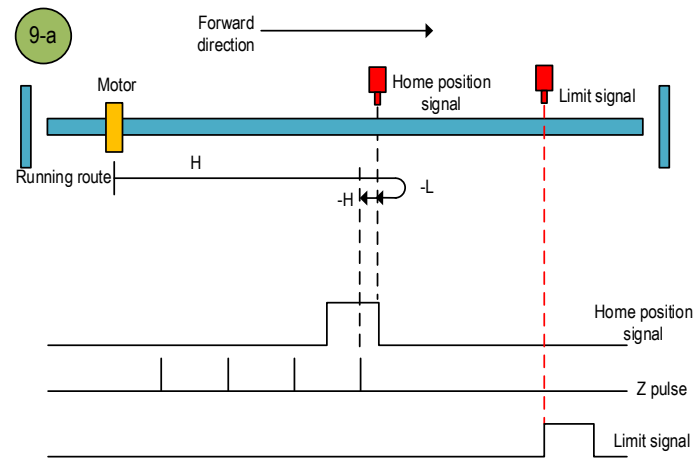
c. Start the home position return → Home position OFF → Search for the rising edge of home position at high speed forward direction → Touch the forward limit → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 8-c

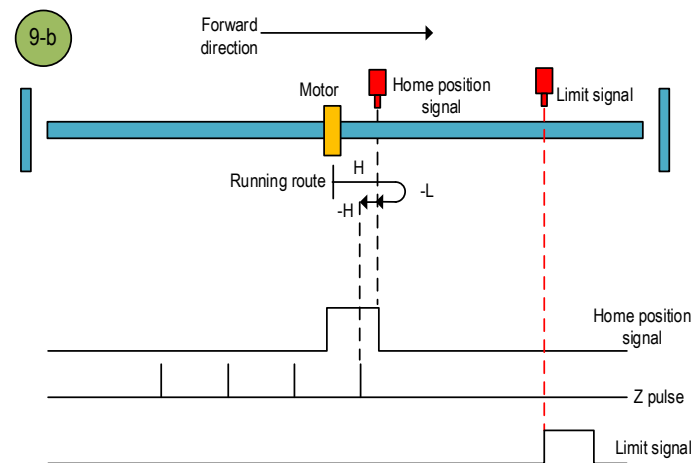
### 3.1.9 Home position return method 9

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



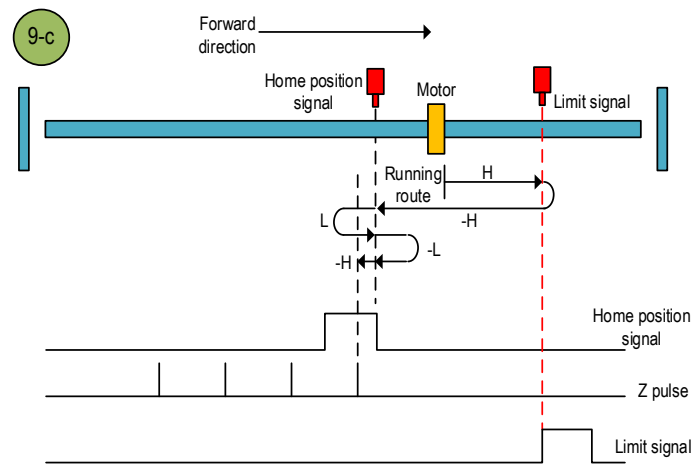
Home position return method 9-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 9-b

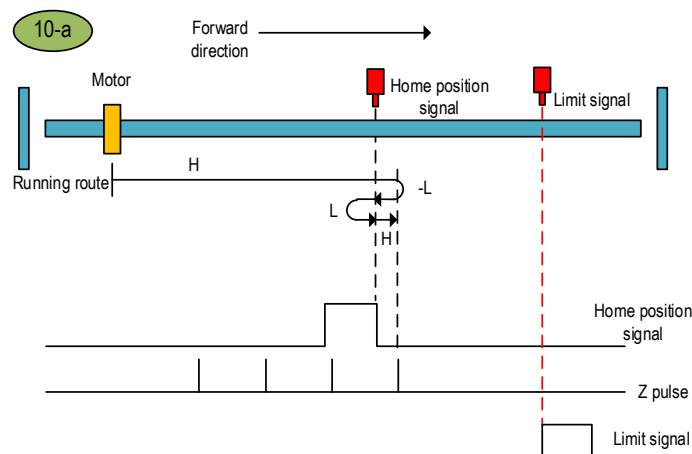
c. Start the home position return → Home position OFF → Search for the falling edge of home position at high speed forward direction → Touch the forward limit → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 9-c

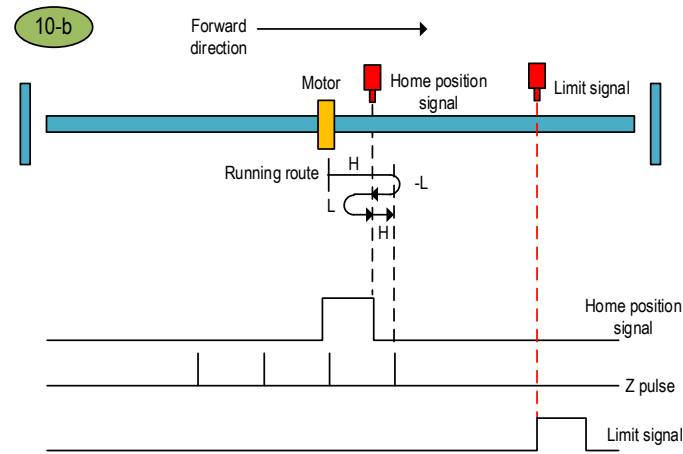
### 3.1.10 Home position return method 10

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the falling edge of home position at low speed forward direction → Search for the Z pulse in forward direction



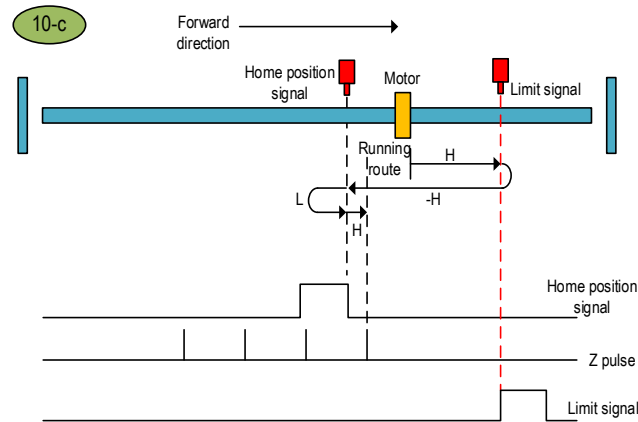
Home position return method 10-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the falling edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 10-b

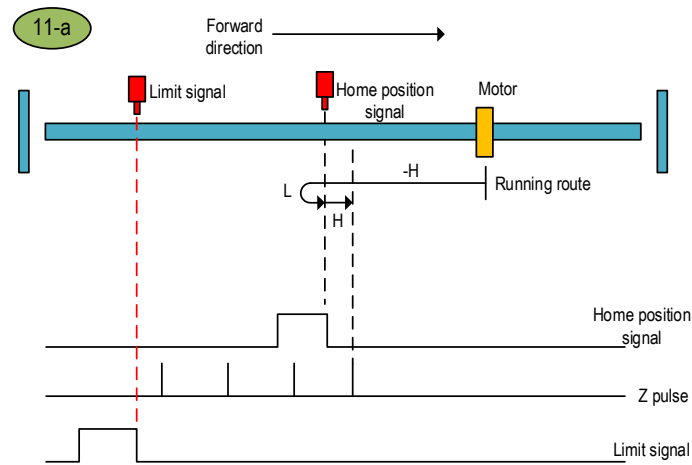
c. Start the home position return → Home position OFF → Search for the falling edge of home position at high speed forward direction → Touch the forward limit → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 10-c

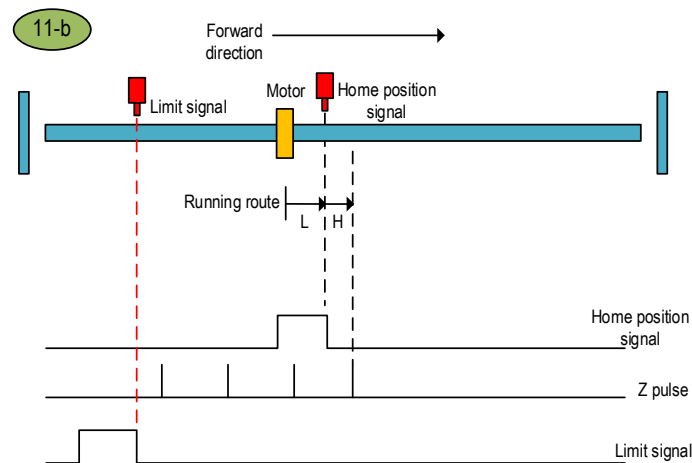
### 3.1.11 Home position return method 11

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Search for the Z pulse in forward direction



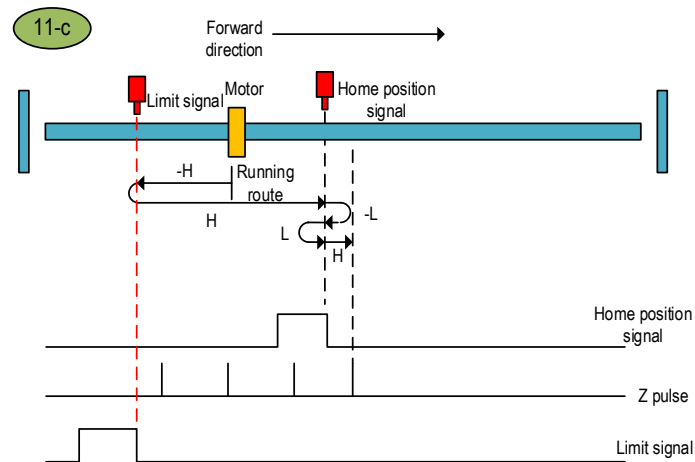
Home position return method 11-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 11-b

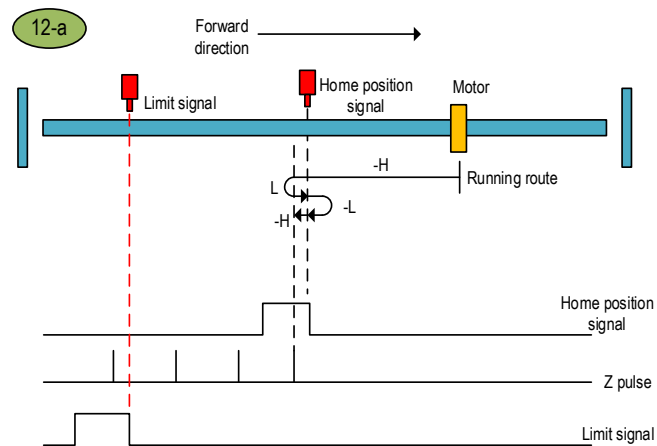
c. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Touch the reverse limit → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in forward direction



Home position return method 11-c

### 3.1.12 Home position return method 12

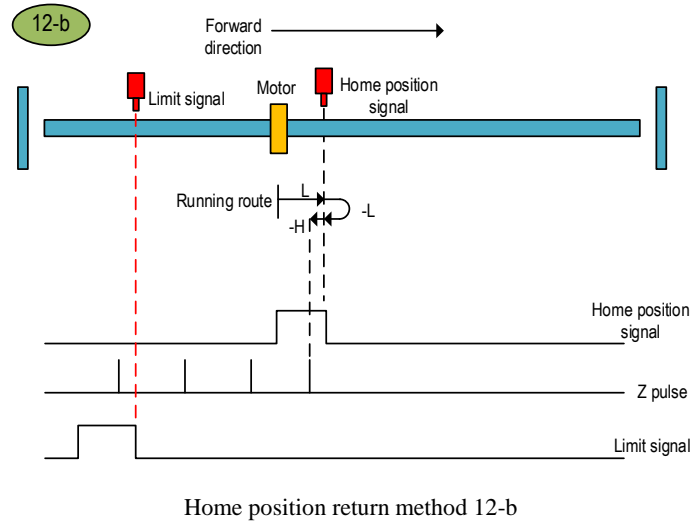
a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



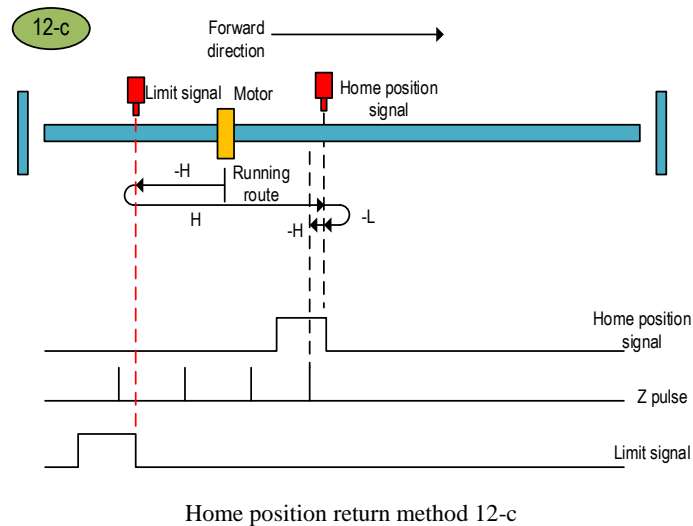
Home position return method 12-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed forward direction → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



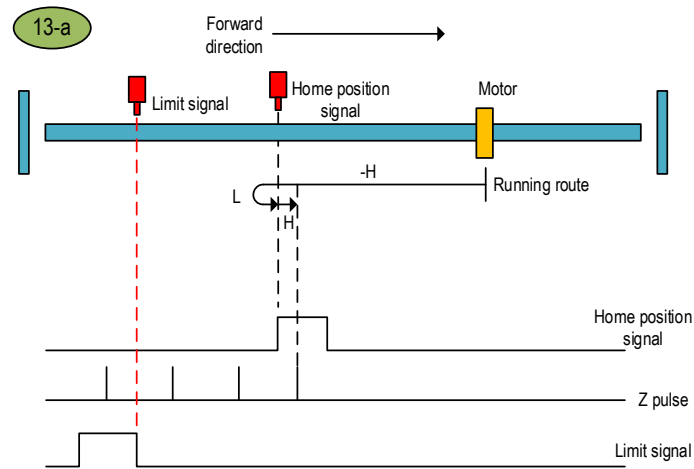


c. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Touch the reverse limit → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



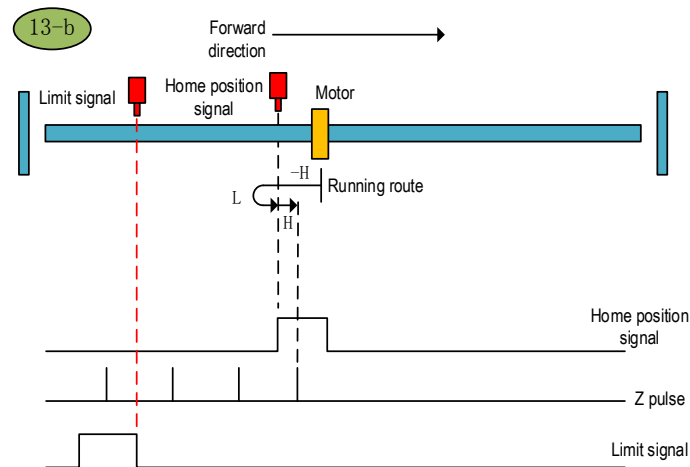
### 3.1.13 Home position return method 13

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



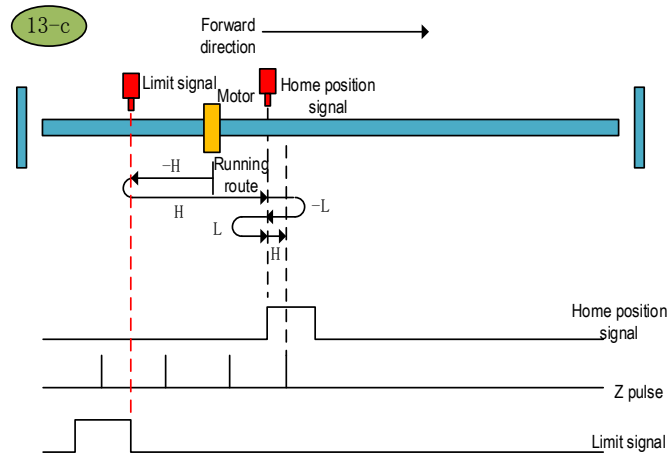
Home position return method 13-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 13-b

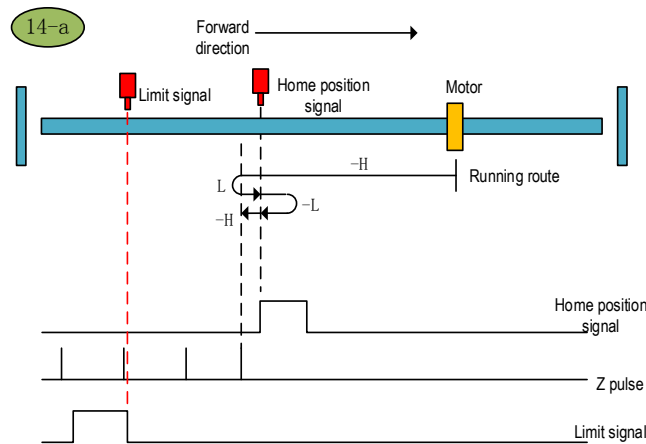
c. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Touch the reverse limit → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Search for the rising edge of home position at low speed forward direction → Search for the Z pulse in forward direction



Home position return method 13-c

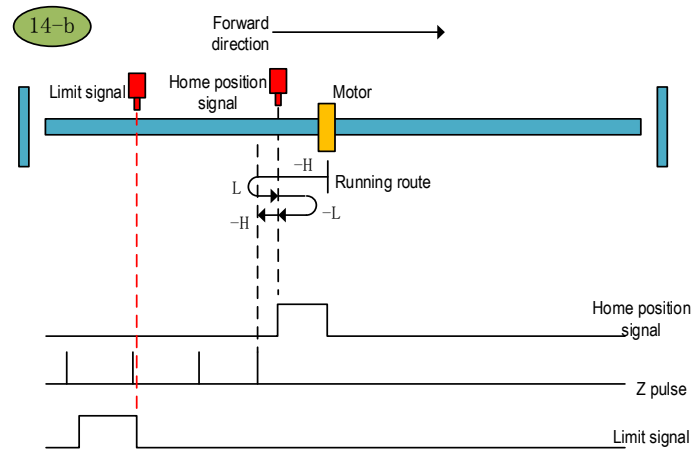
### 3.1.14 Home position return method 14

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



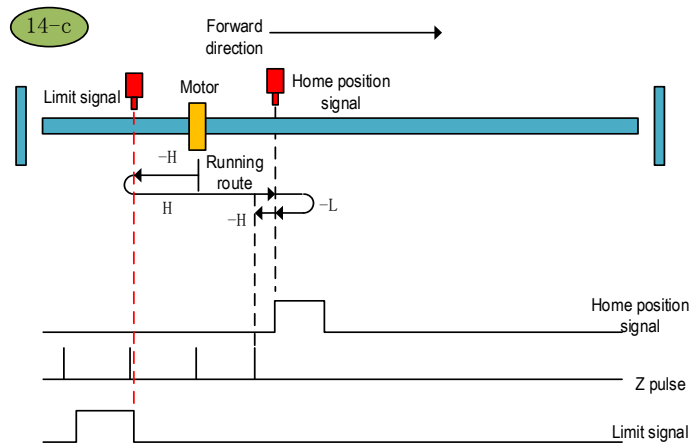
Home position return method 14-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 14-b

c. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Touch the reverse limit → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Search for the Z pulse in reverse direction



Home position return method 14-c

### 3.1.15 Home position return method 15

Reserved

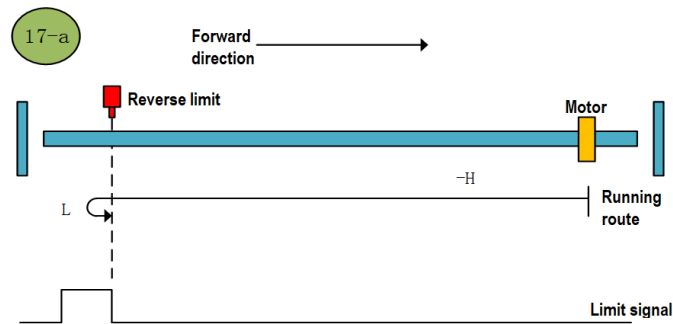
### 3.1.16 Home position return method 16

Reserved

### 3.1.17 Home position return method 17

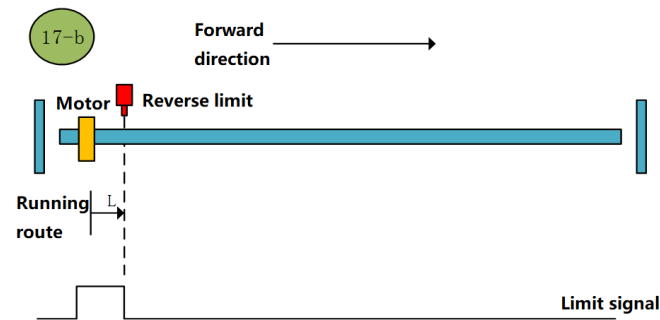
a. Start the home position return → Search for the reverse limit at high speed reverse direction

→ Touch the rising edge of reverse limit → Decelerate to 0 → Stop after searching for the falling edge of reverse limit at low speed forward direction



Home position return method 17-a

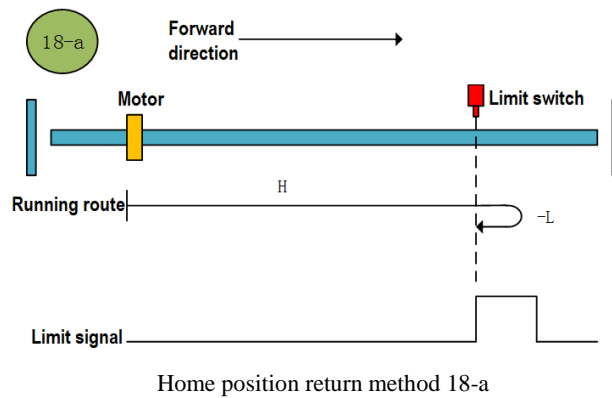
b. Start the home position return → Reverse limit valid → Stop after searching for the falling edge of reverse limit at low speed forward direction



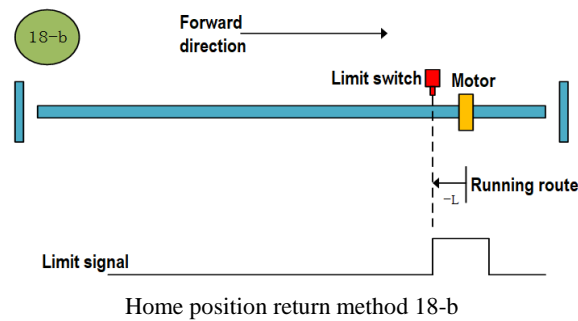
Home position return method 17-b

### 3.1.18 Home position return method 18

a. Start the home position return → Search for the forward limit at high speed forward direction → Touch the rising edge of forward limit → Decelerate to 0 → Stop after searching for the falling edge of forward limit at low speed reverse direction

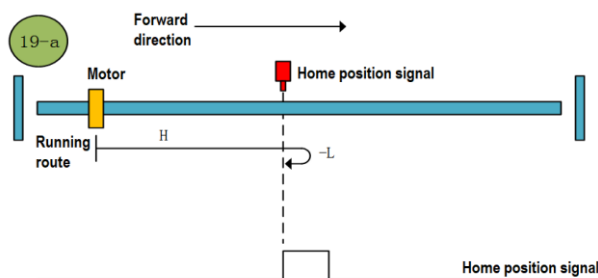


b. Start the home position return → Forward limit valid → Stop after searching for the falling edge of forward limit at low speed reverse direction

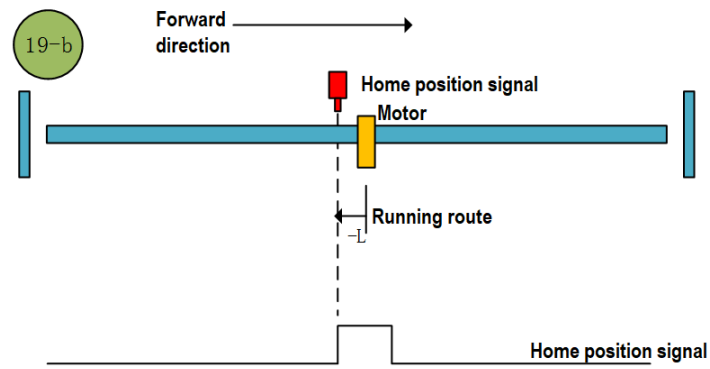


### 3.1.19 Home position return method 19

a. Start the home position return → Search for the home position at high speed forward direction → Touch the rising edge of home position → Decelerate to 0 → Stop after searching for the falling edge of home position at low speed reverse direction



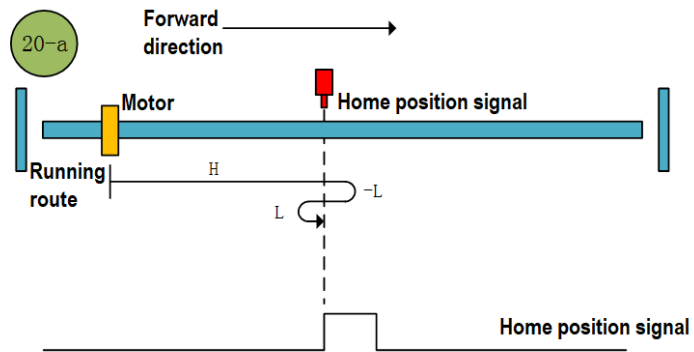
b. Start the home position return → Home position valid → Stop after searching for the falling edge of home position at low speed reverse direction



Home position return method 19-b

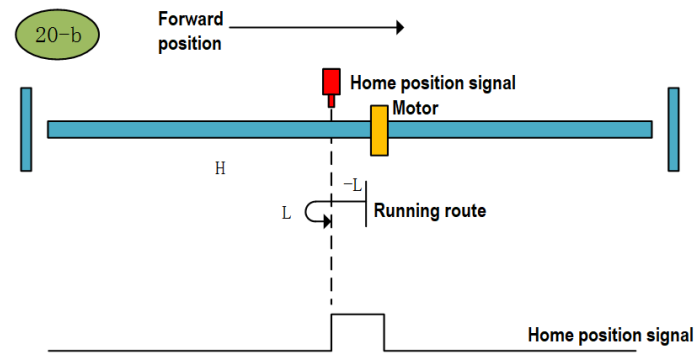
### 3.1.20 Home position return method 20

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 20-a

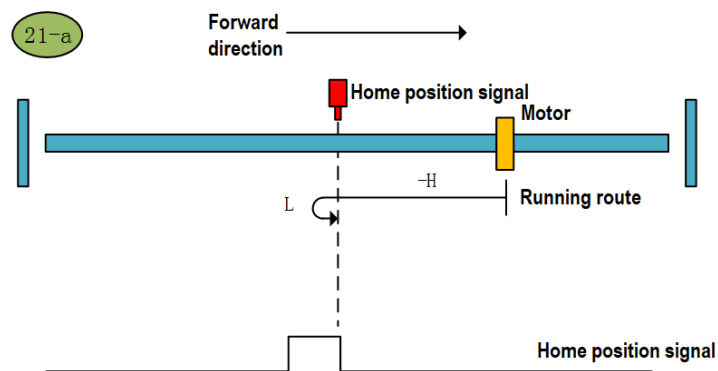
b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed reverse direction → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 20-b

### 3.1.21 Home position return method 21

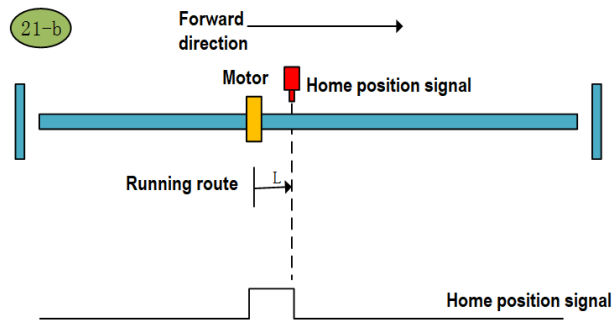
a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 21-a



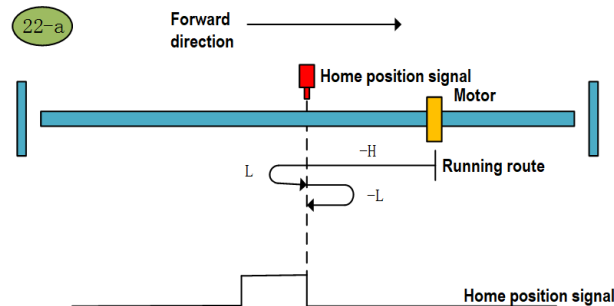
b. Start the home position return → Home position signal ON → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 21-b

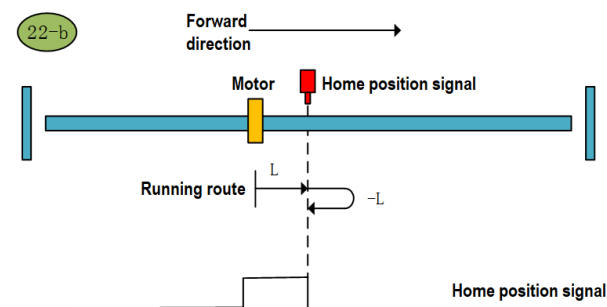
### 3.1.22 Home position return method 22

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 22-a

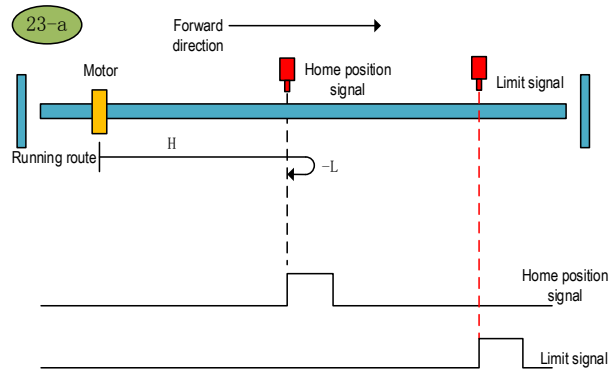
b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed forward direction → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 22-b

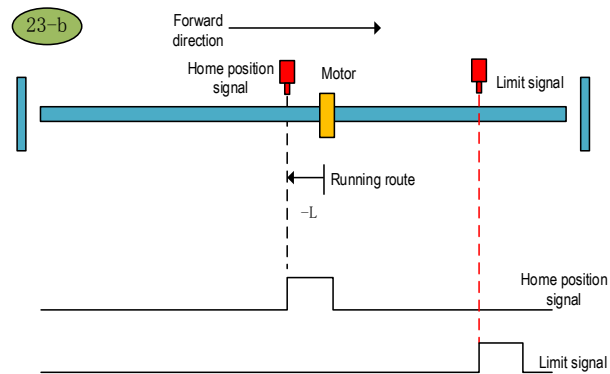
### 3.1.23 Home position return method 23

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Stop after searching for the falling edge of home position at low speed reverse direction



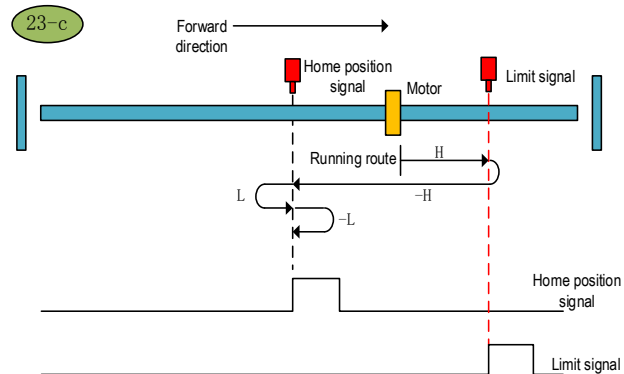
Home position return method 23-a

b. Start the home position return → Home position signal ON → Stop after searching for the falling edge of home position at low speed reverse direction



Home position return method 23-b

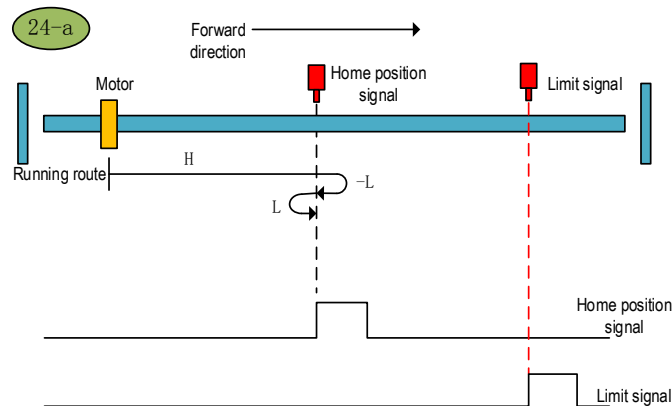
c. Start the home position return → Home position OFF → Search for the rising edge of home position at high speed forward direction → Touch the forward limit → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Stop after searching for the falling edge of home position at low speed reverse direction



Home position return method 23-c

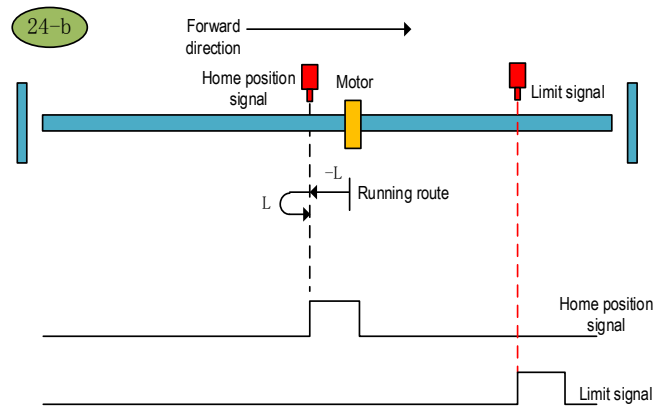
### 3.1.24 Home position return method 24

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Stop after searching for the rising edge of home position at low speed forward direction



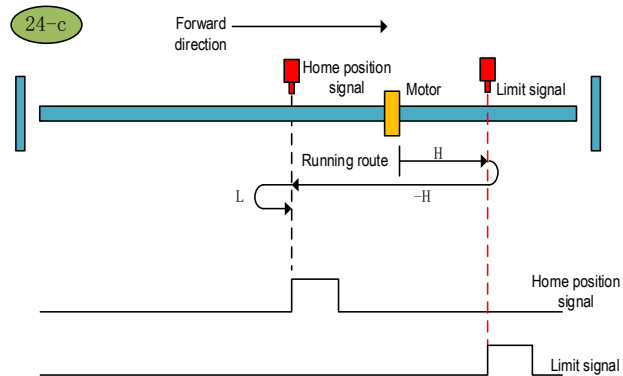
Home position return method 24-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed reverse direction → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 24-b

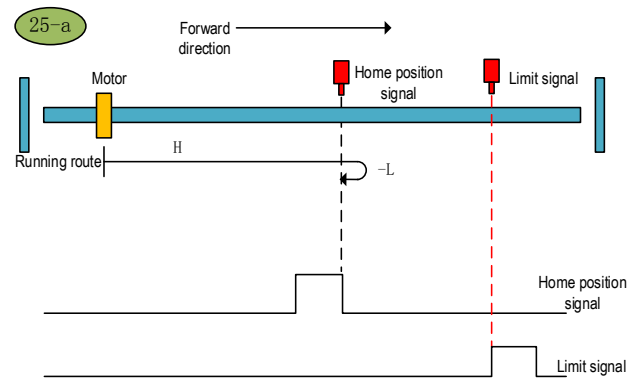
c. Start the home position return → Home position OFF → Search for the rising edge of home position at high speed forward direction → Touch the forward limit → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 24-c

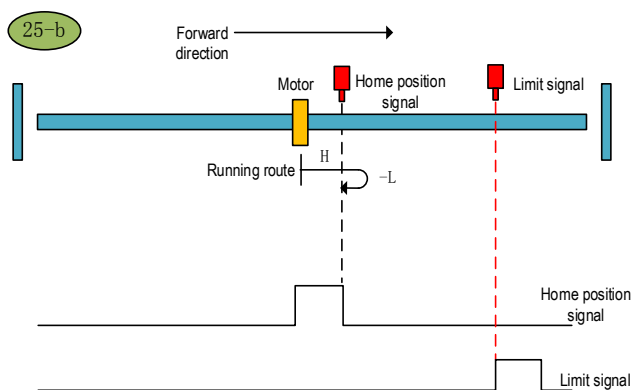
### 3.1.25 Home position return method 25

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed reverse direction



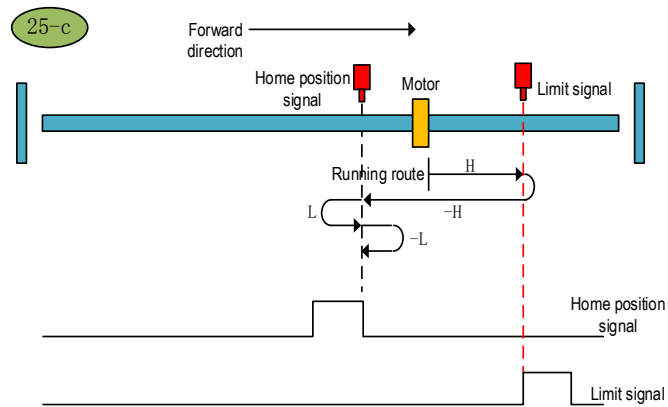
Home position return method 25-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 25-b

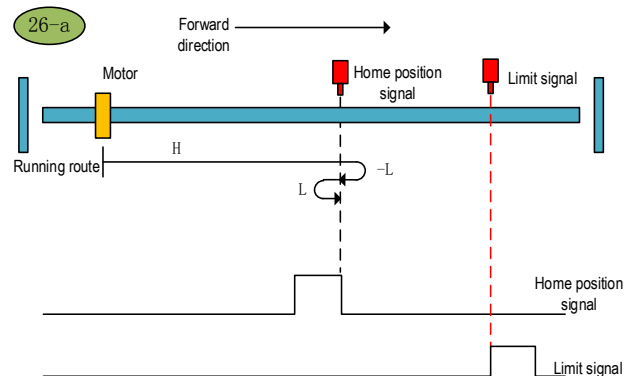
c. Start the home position return → Home position OFF → Search for the falling edge of home position at high speed forward direction → Touch the forward limit → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 25-c

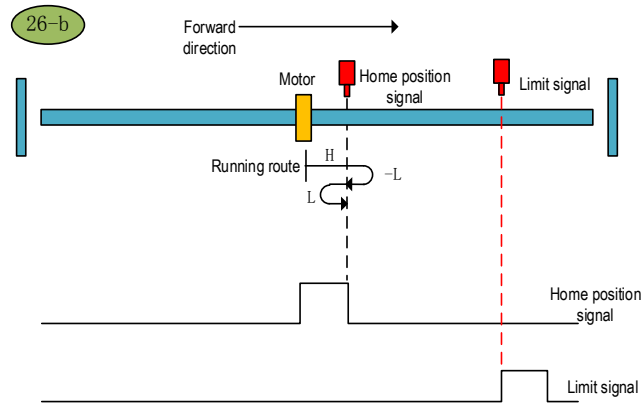
### 3.1.26 Home position return method 26

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Stop after searching for the falling edge of home position at low speed forward direction



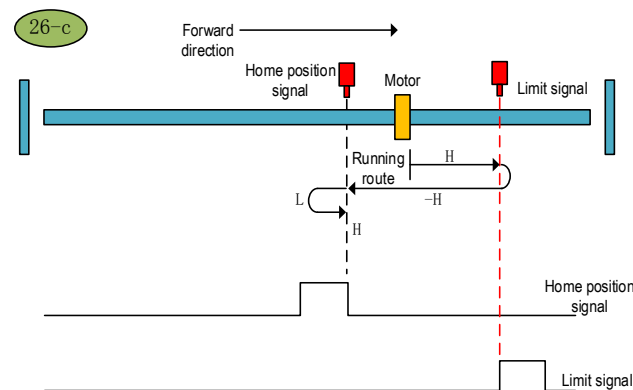
Home position return method 26-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Search for the rising edge of home position at low speed reverse direction → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 26-b

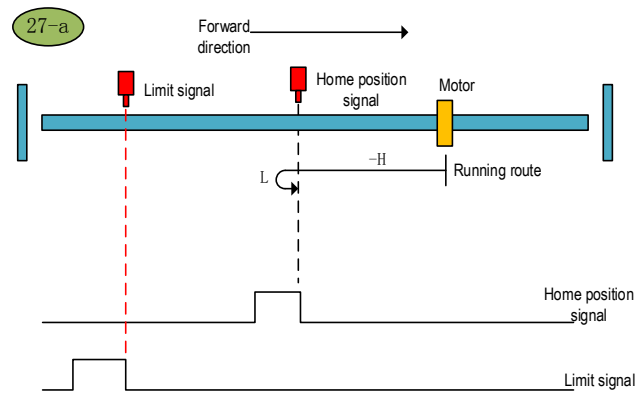
c. Start the home position return → Home position OFF → Search for the falling edge of home position at high speed forward direction → Touch the forward limit → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 26-c

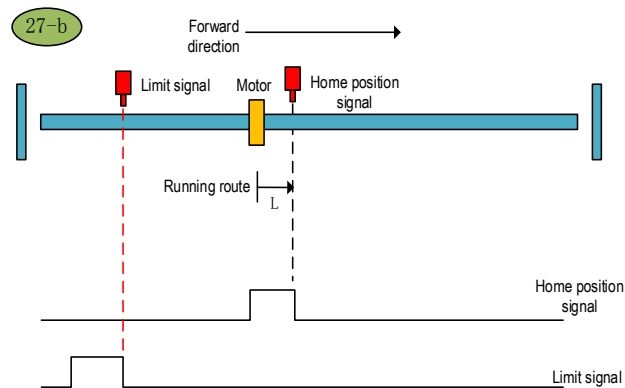
### 3.1.27 Home position return method 27

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 27-a

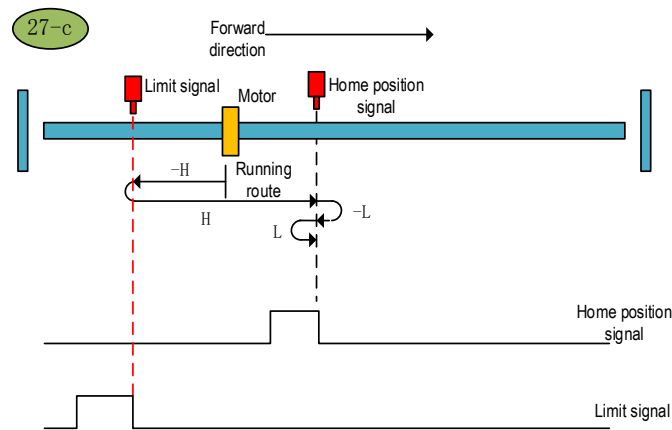
b. Start the home position return → Home position signal ON → Stop after searching for the falling edge of home position at low speed forward direction



Home position return method 27-b



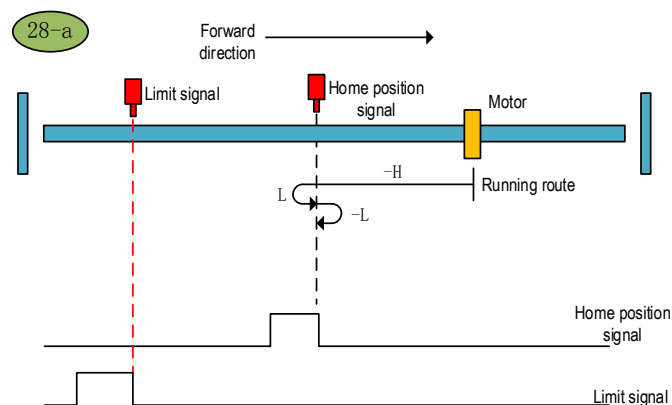
c. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Touch the reverse limit → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 27-c

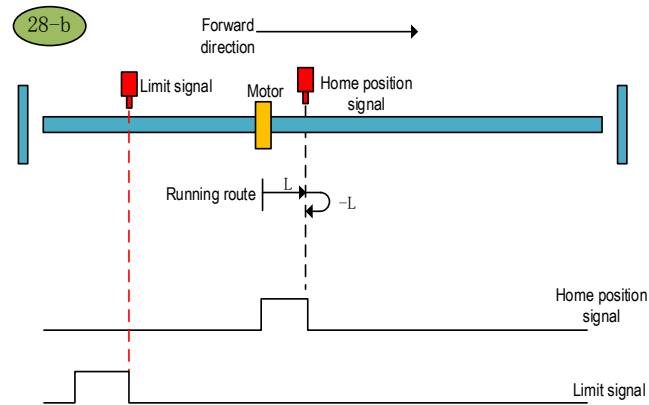
### 3.1.28 Home position return method 28

a. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Decelerate to 0 → Search for the falling edge of home position at low speed forward direction → Stop after searching for the rising edge of home position at low speed reverse direction



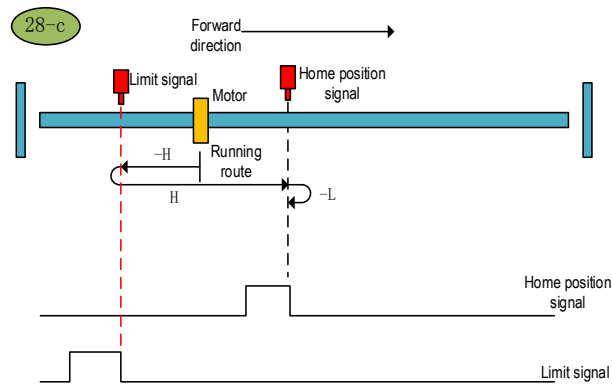
Home position return method 28-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at low speed forward direction → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 28-b

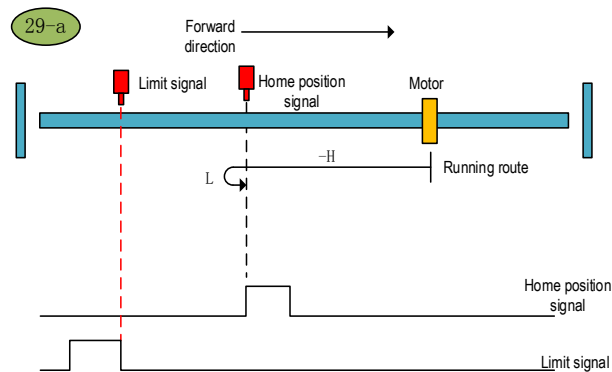
c. Start the home position return → Home position signal OFF → Search for the rising edge of home position at high speed reverse direction → Touch the reverse limit → Search for the falling edge of home position at high speed forward direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed reverse direction



Home position return method 28-c

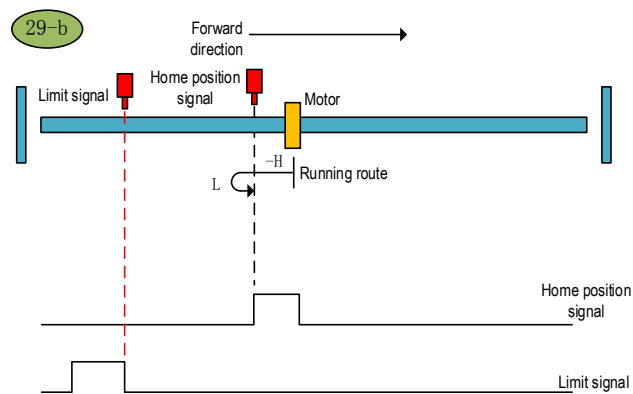
### 3.1.29 Home position return method 29

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed forward direction



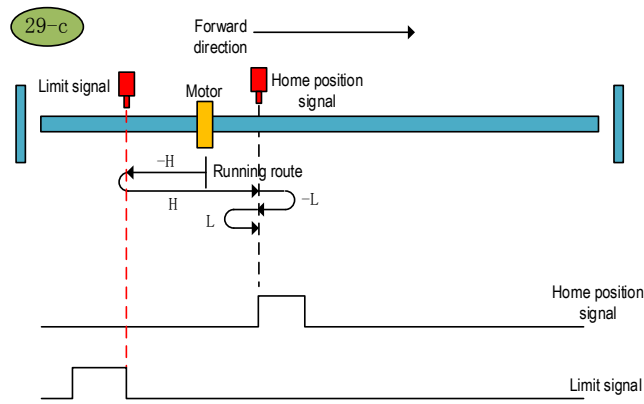
Home position return method 29-a

b. Start the home position return → Home position signal ON → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 29-b

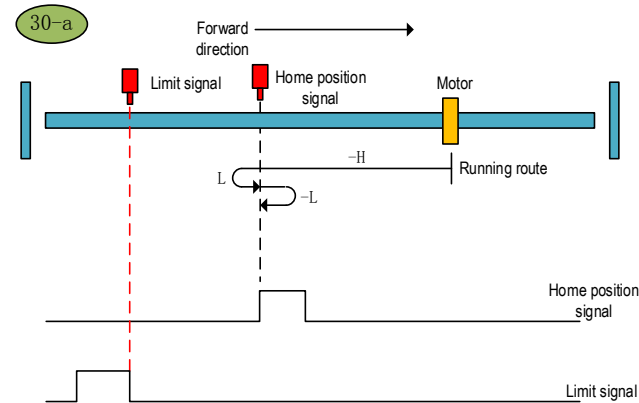
c. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Touch the reverse limit → Search for the rising edge of home position at high speed forward direction → Decelerate to 0 → Search for the falling edge of home position at low speed reverse direction → Stop after searching for the rising edge of home position at low speed forward direction



Home position return method 29-c

### 3.1.30 Home position return method 30

a. Start the home position return → Home position signal OFF → Search for the falling edge of home position at high speed reverse direction → Decelerate to 0 → Search for the rising edge of home position at low speed forward direction → Stop after searching for the falling edge of home position at low speed reverse direction



Home position return method 30-a

30-b

Forward direction →

Limit signal

Home position signal

Motor

Running route

Home position signal

Limit signal

The diagram illustrates a motorized cart (yellow rectangle) moving along a horizontal track (blue bar). A red dashed line indicates the 'Limit signal' position, and a red solid line indicates the 'Home position signal' position. The cart is currently at the home position. A 'Running route' is shown with a U-shaped path, labeled 'H' for the forward direction and '-L' for the reverse direction. Below the track, two signal waveforms are shown: the 'Home position signal' is a pulse that goes high when the cart reaches the home position and stays high until it reaches the limit; the 'Limit signal' is a pulse that goes high when the cart reaches the limit and stays high until it returns to the home position.

30-c

Forward direction →

Limit signal

Motor

Home position signal

Running route

-H

H

-L

Home position signal

Limit signal

The diagram illustrates a motor control system. A horizontal blue bar represents the motor's path. A yellow rectangle labeled 'Motor' is positioned on this bar. To the left of the motor is a red square labeled 'Limit signal'. To the right of the motor is another red square labeled 'Home position signal'. A dashed red vertical line extends from the limit signal to the bottom, and a dashed black vertical line extends from the home position signal to the bottom. A horizontal arrow at the top points right, labeled 'Forward direction'. Below the bar, a curved arrow labeled '-H' points left from the motor, and a curved arrow labeled 'H' points right from the limit signal. Another curved arrow labeled '-L' points left from the home position signal. At the bottom, two signal traces are shown: the top one is labeled 'Home position signal' and the bottom one is labeled 'Limit signal'. The 'Home position signal' trace is high between the limit and home positions. The 'Limit signal' trace is high to the left of the limit position and low to the right.

### 3.1.31 Home position return method 31

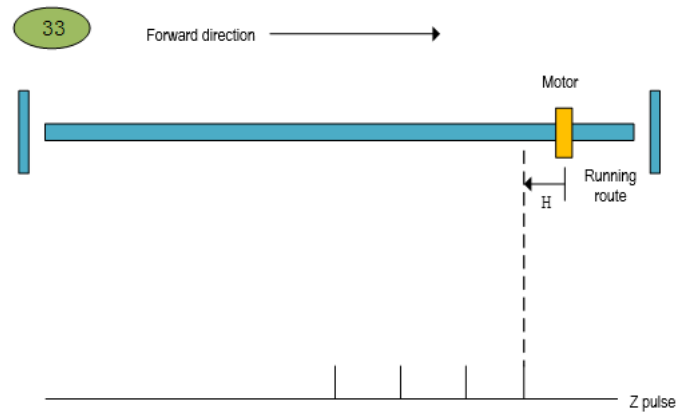
Reserved.

### 3.1.32 Home position return method 32

Reserved.

### 3.1.33 Home position return method 33

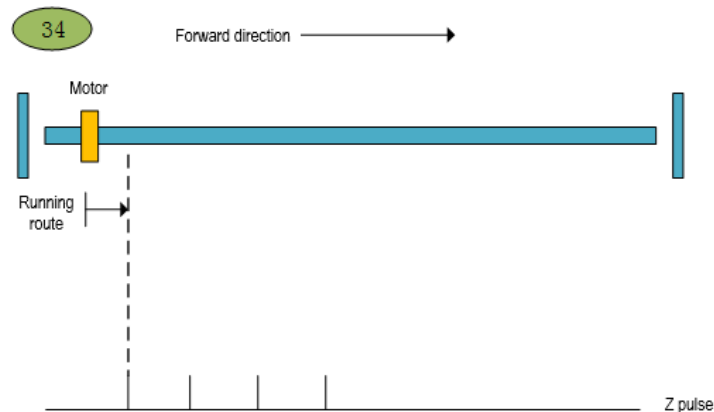
Start the home position return → Find the first Z pulse in the reverse direction



Home position return method 33

### 3.1.34 Home position return method 34

Start the home position return → Find the first Z pulse in the forward direction



Home position return method 34

### 3.1.35 Home position return method 35

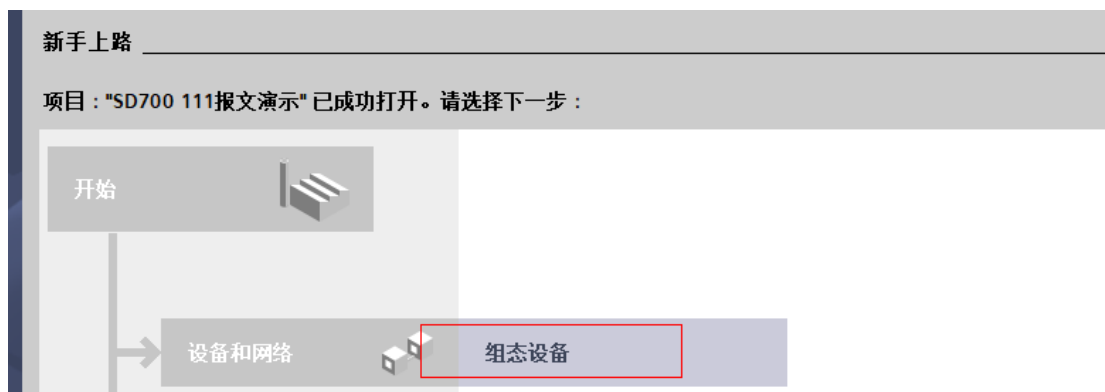
After triggering home position return, the current position is used as the mechanical home. After the home position return is completed, the current feedback position is the home position offset value.

## 3.2 Home Position Offset

The PnA34 function code is the home position offset value, and the WRREC allows the home offset to be written and stored. After the home position return, the feedback position will be the home offset value. The following is an example to write home offset.



Click on "Configuration Device"

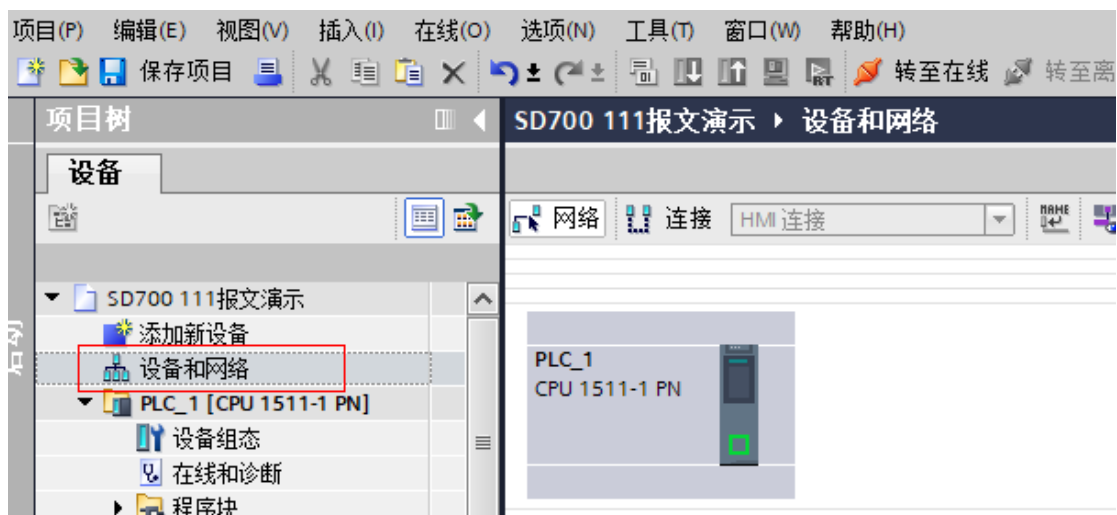


Click on "Add Device" and select the PLC model you are using.



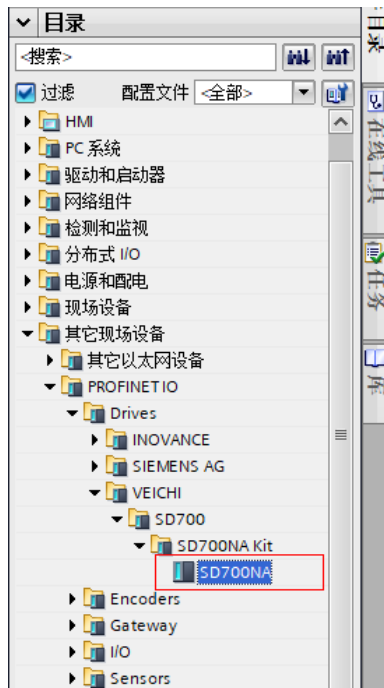
## 4.2 Configuration devices

Click on "Devices and Networks"

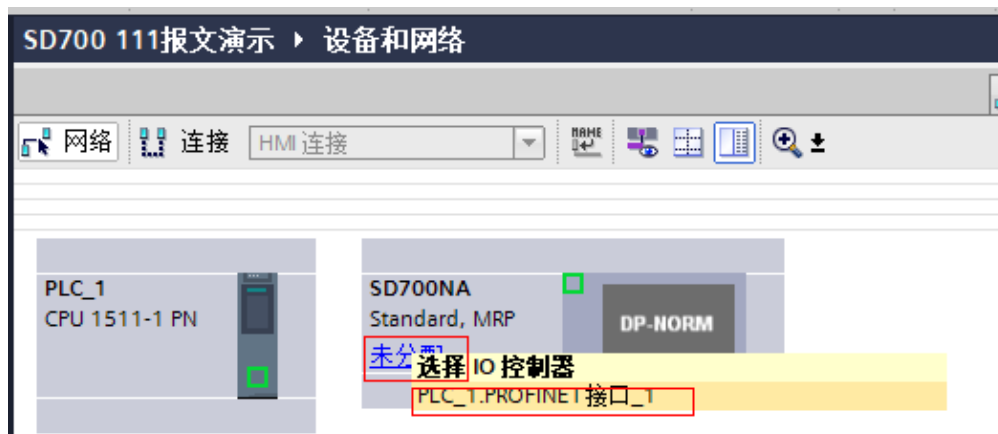


Find the SD700NA on the right side of the "hardware directory", double click or drag it into the "network view"

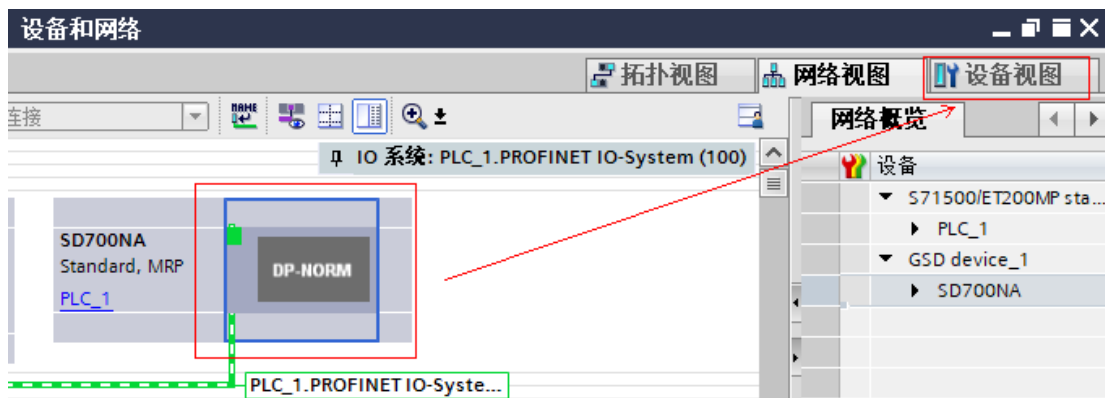




Click on "Unallocated" as follows



Right click, assign device name



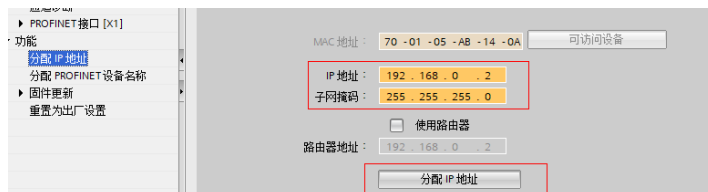
Double-click "PROFIdrive Module" in the right menu directory and add the 111 message to it.



Click "Update Accessible Devices" in "Online Access" and click "Online Diagnostics" on the scanned servo.



Assign the IP addresses and device names



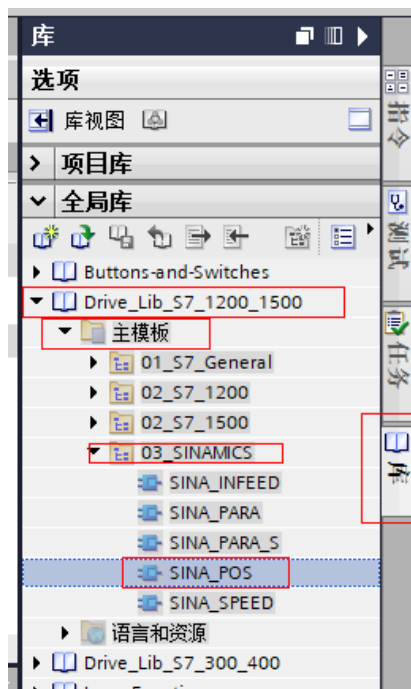


### 4.3 Add EPOS blocks

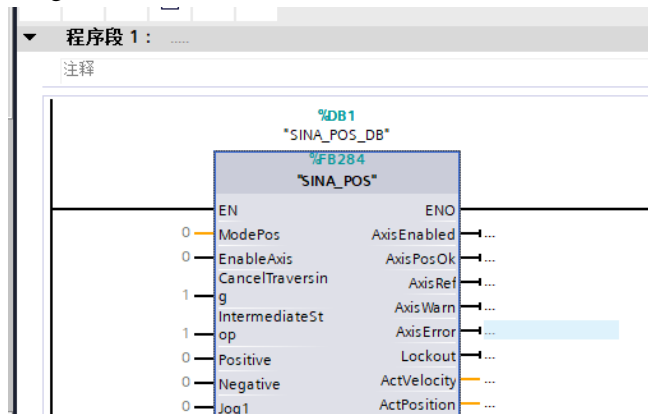
Double click on "Main[OB1]"



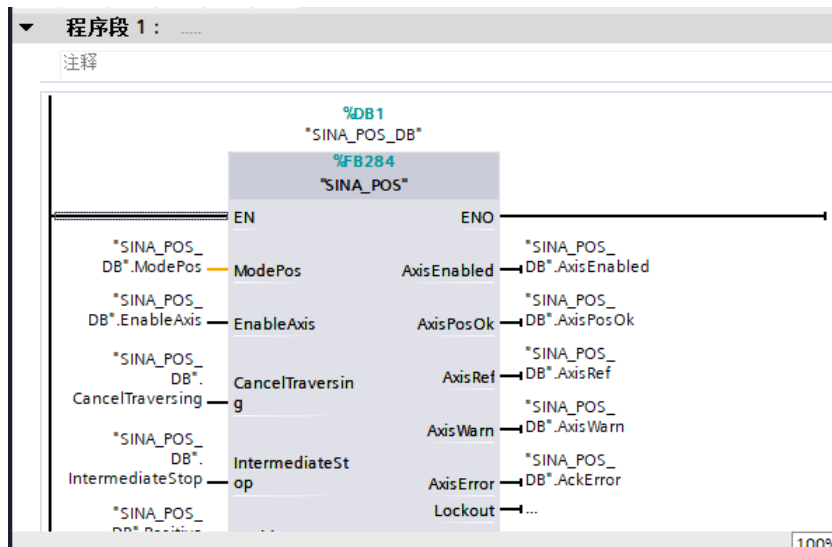
Select "Library" "Drive\_Lib\_S7\_1200\_1500" in the right menu, and select "SINA\_POS".



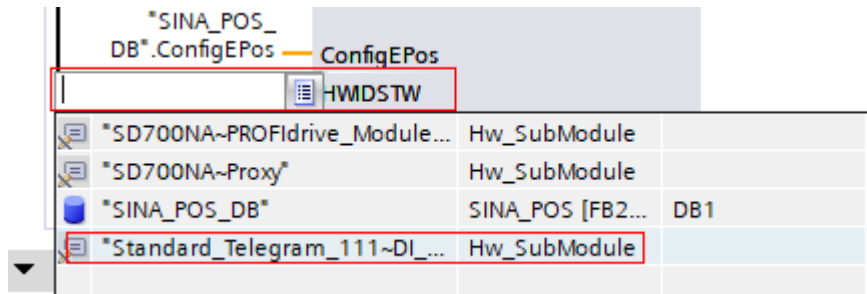
Drag "SINA\_POS" into "Main[OB1]", as shown below.



Docking variables for each interface as shown below.



The hardware representation is added as follows, adding "Standard\_Telegram\_111..."



After adding, compile and download.

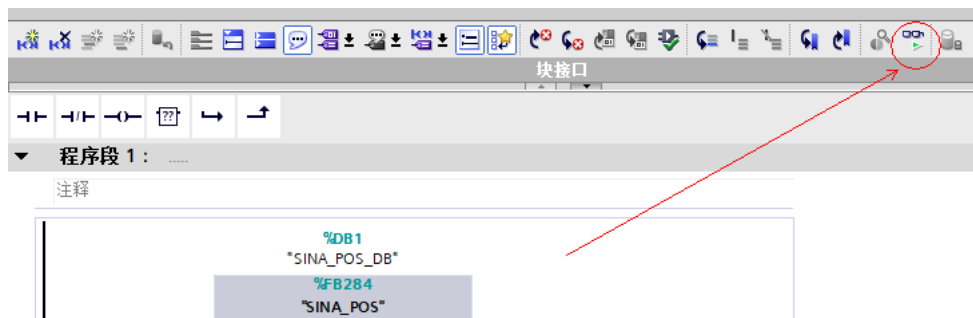


Click "Download"

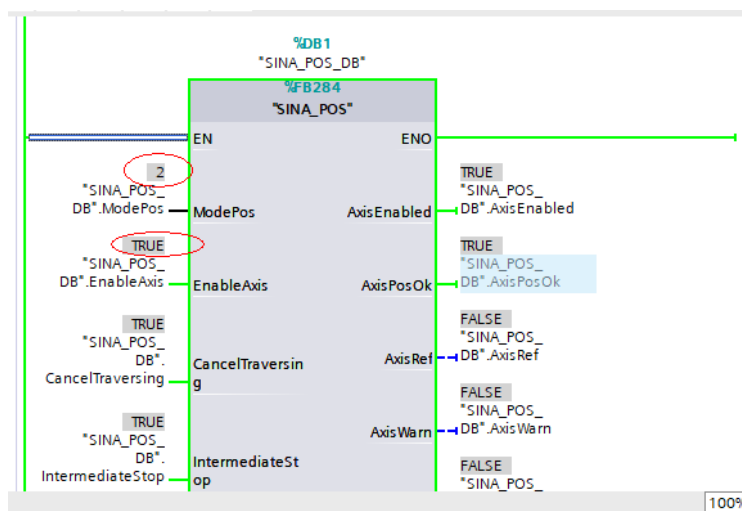


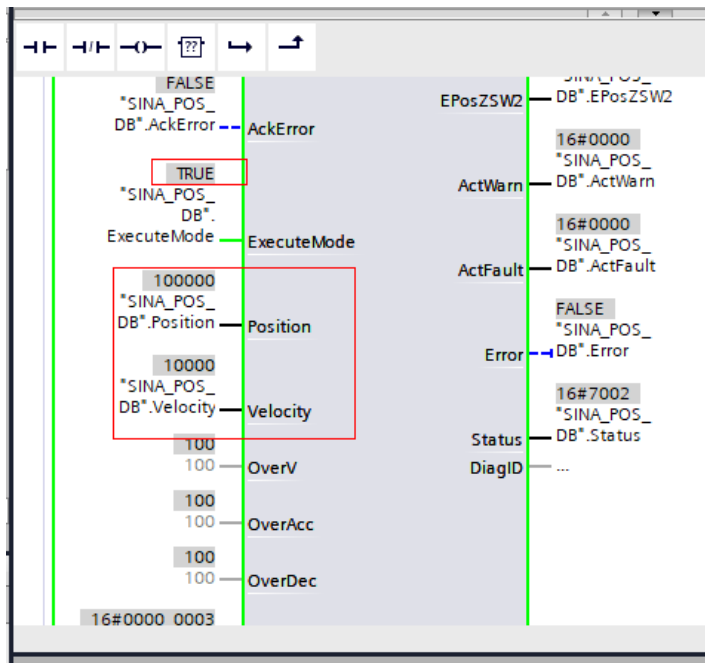
#### 4.4 Trial run

After downloading the program, click on "Enable/Disable Monitoring".



ModePos input 2 for absolute position operation. Click Enable, enter the target position and target speed, and trigger the rising edge "ExecuteMode" to run the motor.

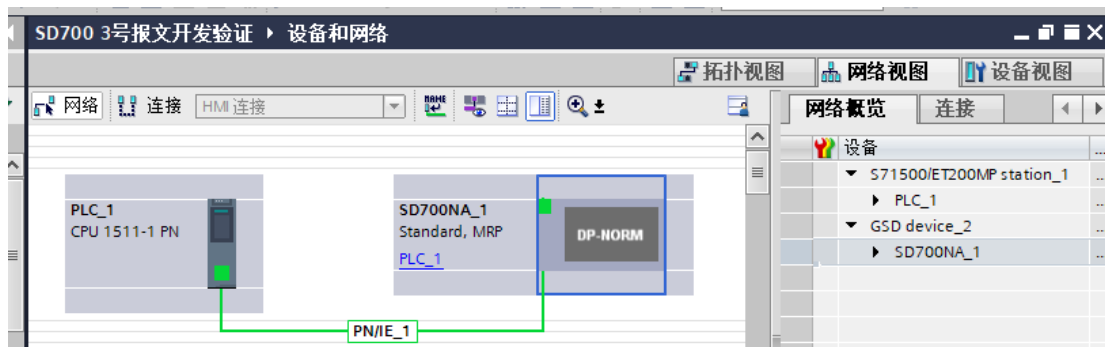




## 5. Example of message 3 operation

### 5.1 Add message 3

First configure the device correctly, add the PLC and SD700NA machine to the device view as described in Chapter 4.



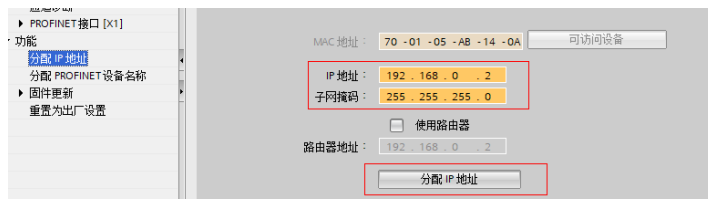
Add message 3

SD700 3号报文开发验证 > 未分组的设备 > SD700NA\_1 [Standard, MRP]

模块	机架	插槽	I 地址	Q 地址	类型
SD700NA_1	0	0			Standard, MRP
Interface	0	0 X1			SD700NA
PROFIdrive Module AC4_1	0	1			PROFIdrive Modul...
Parameter Access Point	0	1 1			Parameter Access ...
Standard Telegram 3	0	1 2	0...17	0...9	Standard Telegra...
	0	2			

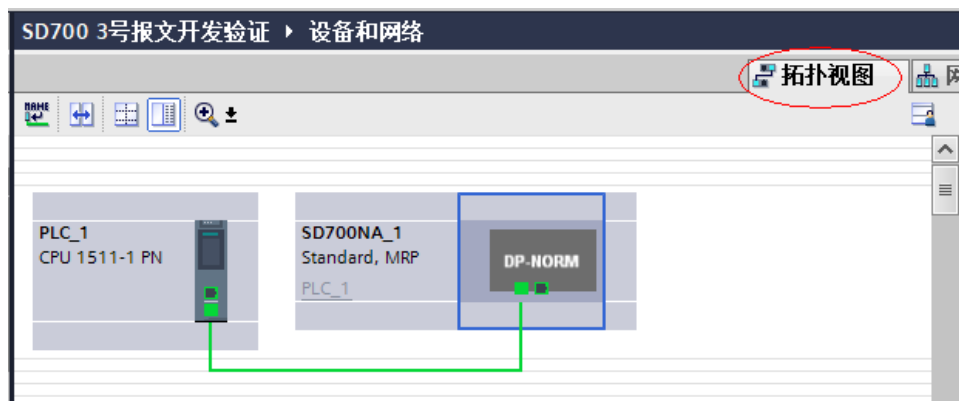
### 5.2 Assign device names and IP addresses

Same as Chapter 4, assign the device names and IP addresses



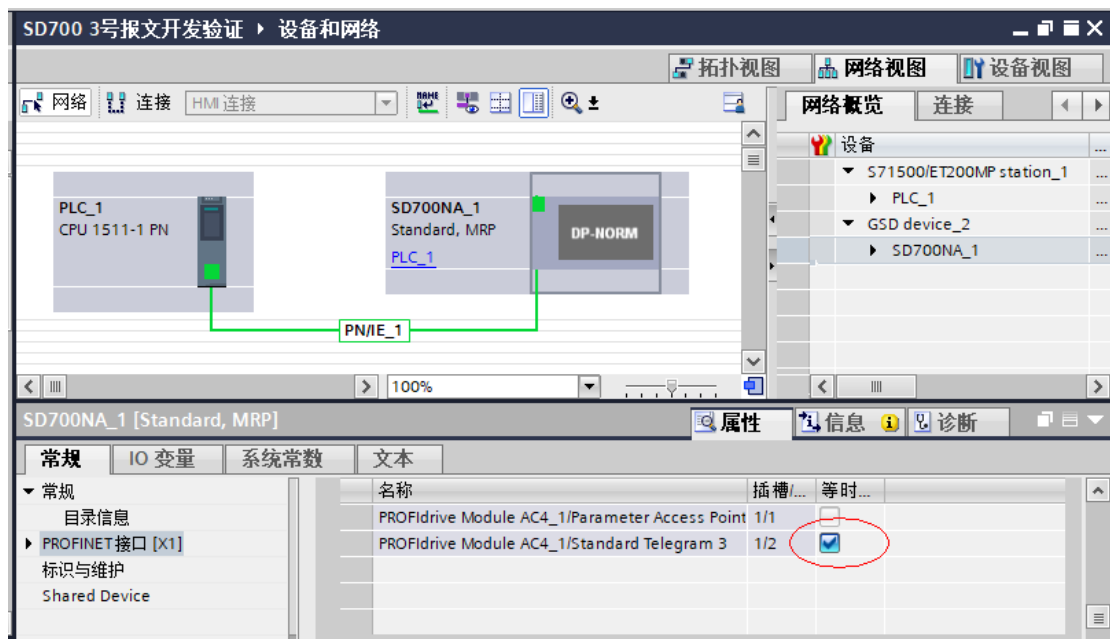
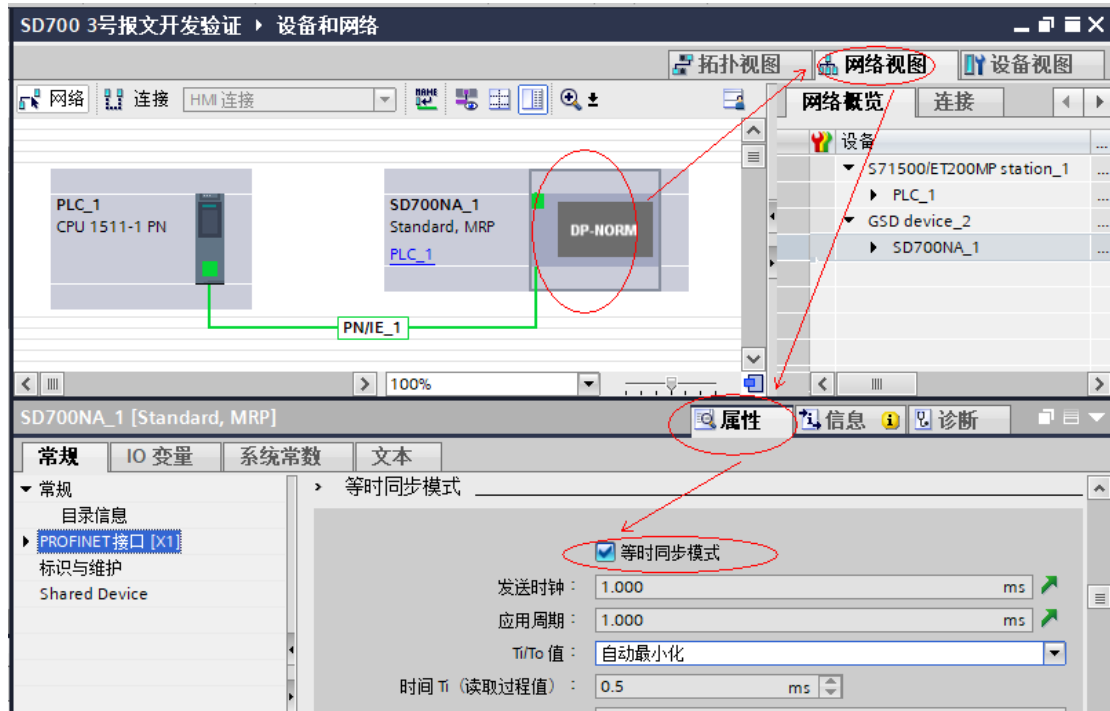
### 5.3 Connect the Topology View

Switch to the "Topology View" interface and connect the PLC and the device according to the physical wiring. The interface on the left side of the device corresponds to the upper port of the physical device.



### 5.4 Isochronous synchronization function setting

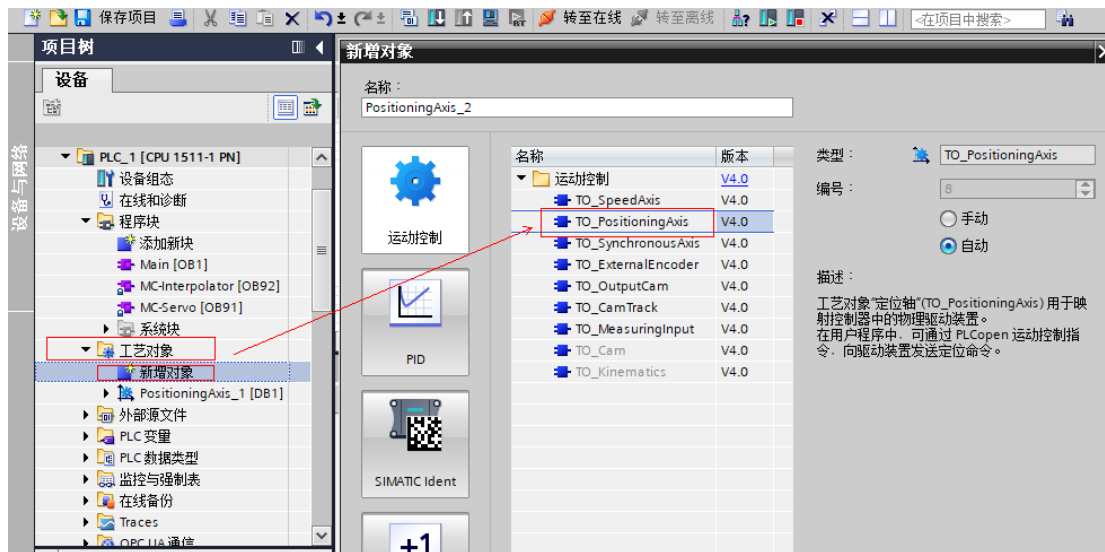
Find the isochronous sync as shown below and check the box.



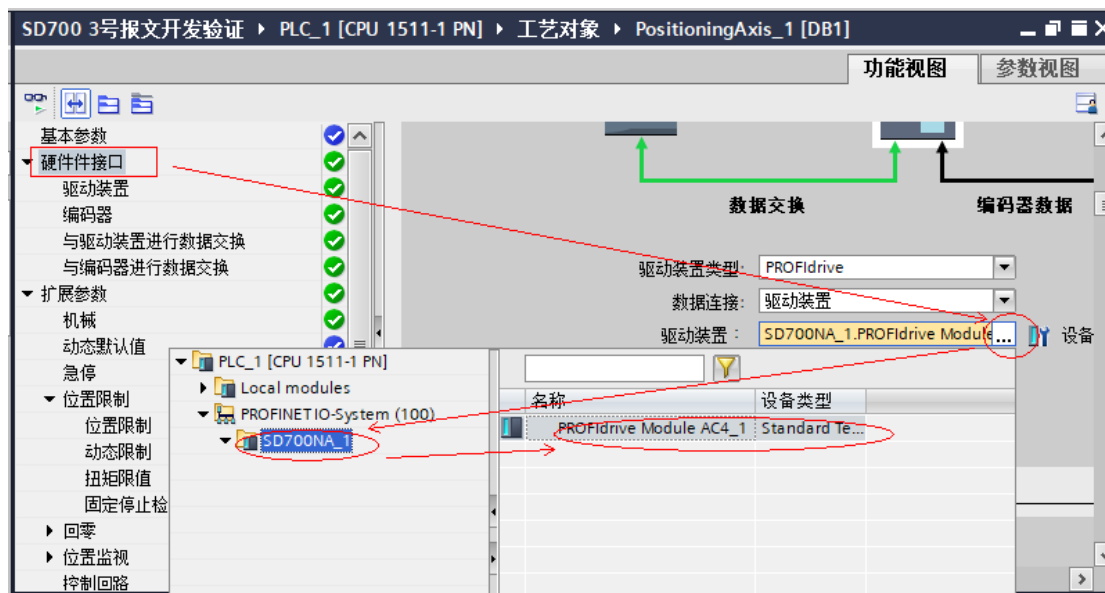
## 5.5 Add process objects

Click "Process Object" - "New Object", and add "TO\_PositioningAxis"

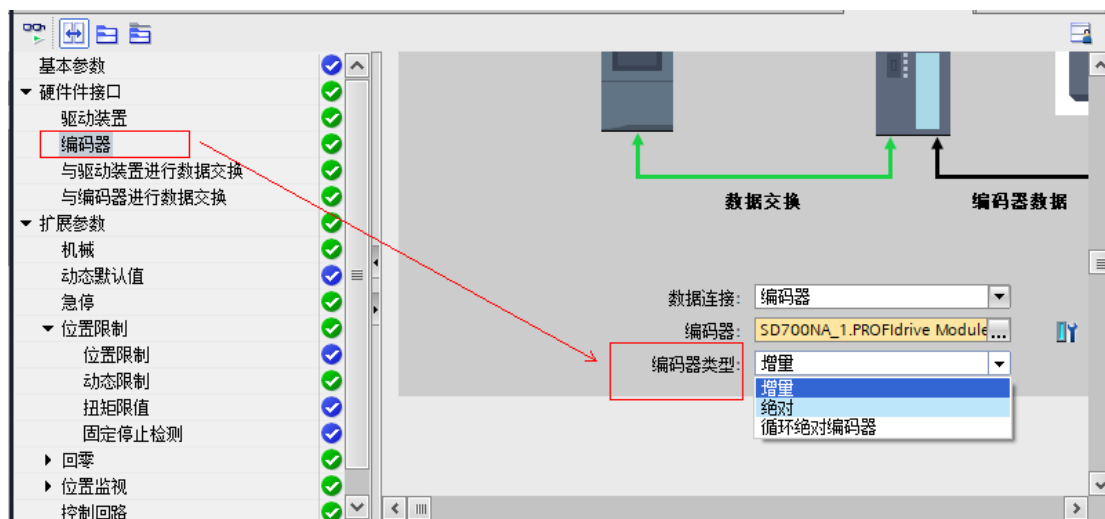




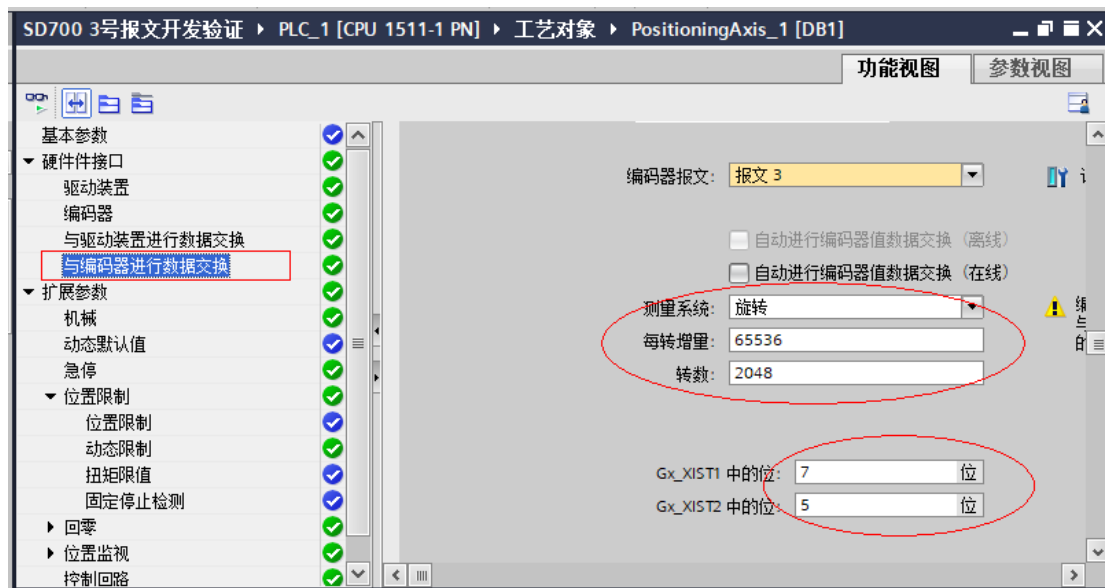
Add message 3 to the "Hardware Interface" as shown below:



Select the encoder type according to the encoder type set by Pn040.



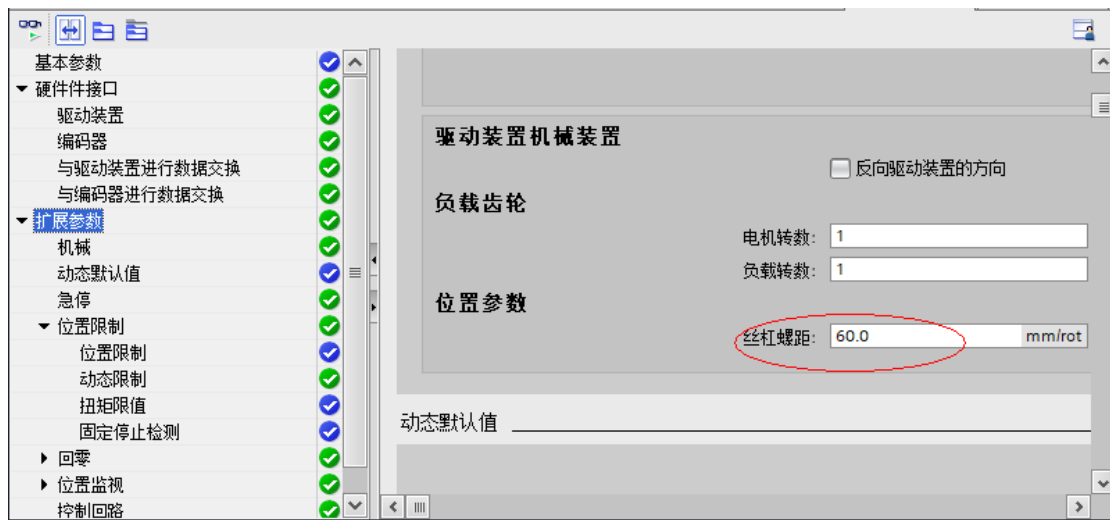
If an absolute encoder is used, set the following in the "Data exchange with encoder" section.



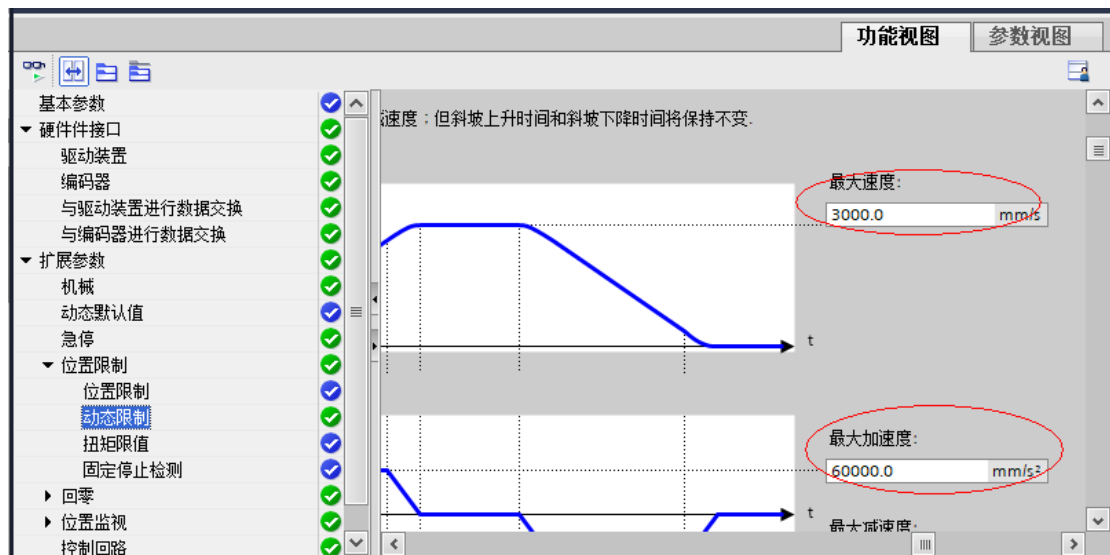
If an incremental encoder is used, set it according to the following diagram.



In the "extended parameters", you can set the screw lead to 60mm/rot.



At dynamic limits, set maximum speed and maximum acceleration.

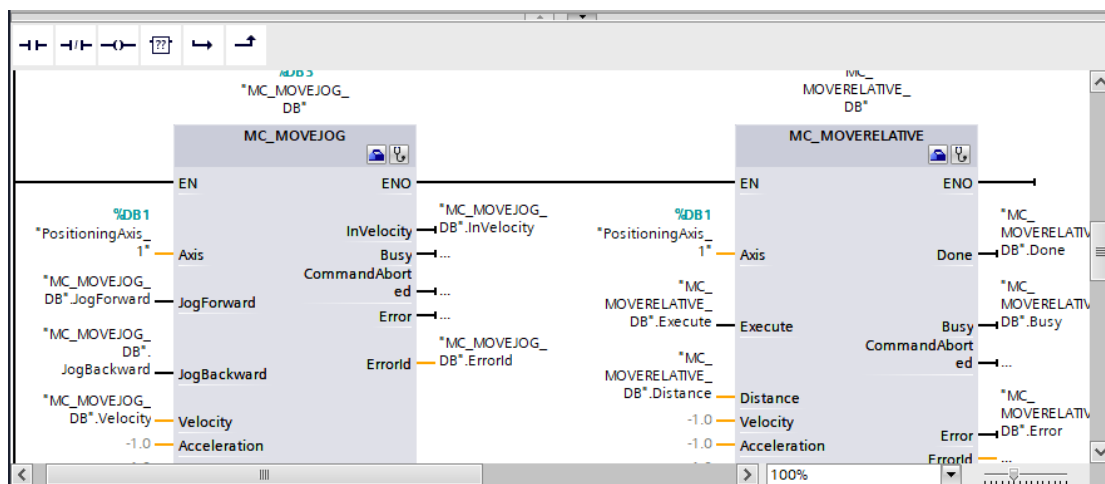
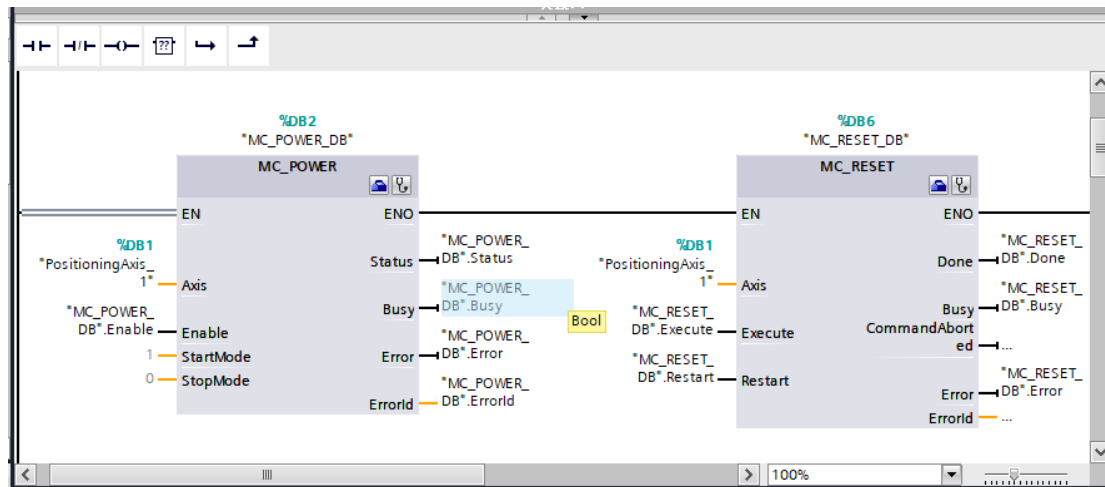


Do not check the "Enable follow error monitoring" box.



## 5.6 JOG run

Add the program block as shown below



Enable servo online and enter the jogging speed. JOG RUN

