

This chapter provides details for the required parameter settings when the servo communicates with the controller through PROFINET communication.

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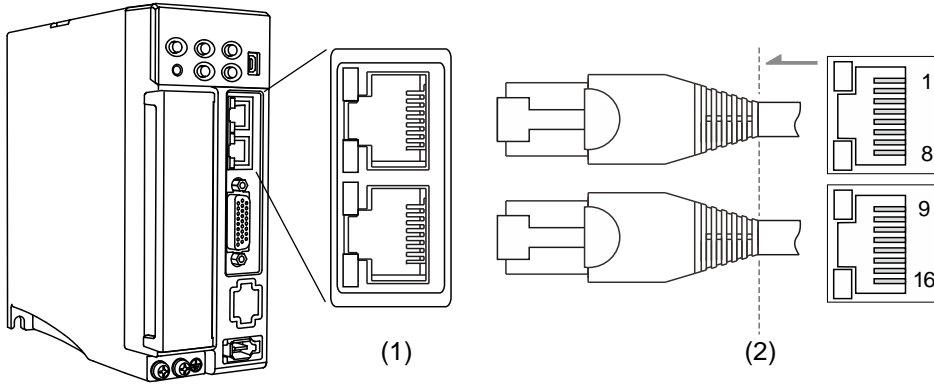
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13.1 Basic configuration

13.1.1 Hardware configuration

The CN6 connector of the B3A-P models allows you to connect the servo drive to the controller using standard RJ45 connectors and shielded network cables, controlling the position and speed of the motor, as well as accessing or monitoring the servo status with Siemens' PROFINET system.

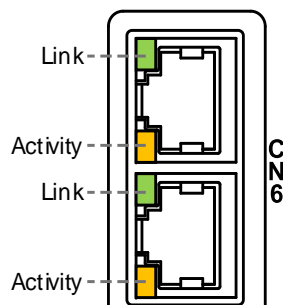


(1) CN6 connector (female); (2) CN6 connector (male)

Pin assignment:

Pin No.	Signal	Description
1, 9	TX+	Transmit +
2, 10	TX-	Transmit -
3, 11	RX+	Receive +
4, 12	-	Reserved
5, 13	-	Reserved
6, 14	RX-	Receive -
7, 15	-	Reserved
8, 16	-	Reserved

Description of each indicator for the CN6 connector:



Name	Color	Status	Description
Link	Green	On	Network is connected.
		Off	No connection or connection error.
Activity	Orange	On	Data exchange in progress.
		Off	No data exchange.

13.1.2 GSD file import

The PROFINET motion control fieldbus is an open standard that requires using the GSD (General Station Description) file to configure the functions and related object properties for each slave device. Generally, the GSD file is a standard XML file (GSDML).

Integration with Siemens SIMATIC S7-1200/1500 controllers

Import the GSD file of the slave into the Siemens TIA Portal software, so the controller can recognize and control each slave device according to the configuration in the GSD file.

Download the GSD file from Delta's website and make sure the file version is V2.41 or above.

Follow these steps to import the GSD file:

1. Open the Siemens TIA Portal software, and then click **Project view** in the lower left of the software screen.
2. In the editing page, go to the toolbar and click **Options > Manage general station description files (GSD)**.
3. In the Manage general station description files window, click "..." to select the source path, and then the following area shows the GSD file(s) in that source path. Select the check box and then click **Install** to import the GSD file.

After being imported into TIA Portal, the GSD file is stored in the following path:

C:\Users\user_name\Automaiton\project_name\AdditionalFiles\GSD

Note: refer to the controller manufacturer's instruction manuals for the actual storage path.

13.1.3 Install DriveLib

Install the DriveLib library in the Siemens TIA Portal software for the controller to access the servo data using the library function blocks. Download the DriveLib file from Siemens' website.

13.1.4 Servo firmware version

Make sure the servo firmware version is v3109 sub8387 or above. You can check the firmware version and subversion with the servo parameters P0.000 and P5.000. To update the servo firmware successfully, use the Firmware Update Tool of the version V3.0.0.33.

13.1.5 Parameter settings of PROFINET mode

Follow these steps to connect the controller and the servo drive:

1. Set the servo to PROFINET mode by setting P1.001.YX to 0C.
2. Set P3.012.Z to 1 to enable the non-volatile setting for the parameters.

Note: setting P3.012.Z to 0 is not available in the PROFINET mode.

Function	P3.012 = 0x0100 (Z = 1)	
	Servo parameter	Default
Motor stop mode	P1.032	0x0000
S-curve acceleration constant	P1.034	200
Zero speed range	P1.038	100 (0.1 rpm)
E-Gear ratio - numerator N1	P1.044	16777216
E-Gear ratio - denominator M	P1.045	100000
Speed reached (DO.SP_OK) range	P1.047	10 (1 rpm)
Accumulated time to reach desired speed	P1.049	0
Maximum speed limit	P1.055	Depending on the motor (1 rpm)
Excessive deviation warning condition of Position command	P2.035	50331648 (pulse)
Positive software limit	P5.008	2147483647 (PUU)
Negative software limit	P5.009	-2147483648 (PUU)

Note:

1. The setting of P6.001 (Origin definition) is volatile, so you need to define the origin when executing homing.
2. Unit conversion: $PUU = \text{pulse} \times \frac{P1.044}{P1.045}$

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Set the following parameters based on the application requirements.

P2.121	Special bit register 6		Address: 02E0H 02E1H
Default:	0x00000000	Control mode:	All
Unit:	-	Setting range:	0x00000000 - 0x000001FF
Format:	HEX	Data size:	32-bit

Settings:

Bit	Function	Description
Bit 1	[PROFINET] Behavior after homing in communication mode	0: after homing, execute absolute positioning to the position with the offset distance set in PNU11. 1: decelerate to a stop after homing.
Bit 2	[PROFINET] Definition of the settings for Origin definition (P6.001) and Home offset (PNU11) in communication mode	0: origin definition (P6.001) = - (setting of PNU11) 1: origin definition (P6.001) = PNU11
Bit 3	[PROFINET] Unit of Homing speeds (PNU12, PNU13) in communication mode	0: 0.1 rpm 1: 1 rpm
Bit 5	[PROFINET] Unit selection for Homing speeds (PNU12, PNU13), Homing acceleration (PNU14), Profile acceleration (PNU15), and Profile deceleration (PNU16) in communication mode	0: the unit of PNU12 and PNU13 is determined by the setting of P2.121 [Bit 3]; the unit of PNU14, PNU15, and PNU16 is ms (0 - 3000 rpm) When P2.121 [Bit 3] = 0, the unit of PNU12 and PNU13 is 0.1 rpm. When P2.121 [Bit 3] = 1, the unit of PNU12 and PNU13 is 1 rpm. 1: the unit of PNU12 and PNU13 is PUU/sec; the unit of PNU14, PNU15, and PNU16 is PUU/sec ² .

P3.011	CANopen / DMCNET / PROFINET options		Address: 0316H 0317H
Default:	0x0000	Control mode:	CANopen / DMCNET / PROFINET
Unit:	-	Setting range:	Shown as follows
Format:	HEX	Data size:	16-bit

Settings:



U Z Y X

X	Store parameters in EEPROM or not	Z	Reserved
Y	Reserved	U	Reserved

- X: store parameters in EEPROM or not

0: not to store parameters in EEPROM.

1: when writing parameters with packets through cyclic synchronous communication, store parameters in EEPROM.

Note: if you set X to 1 and continuously write parameters with packets through cyclic synchronous communication, it shortens the lifetime of the EEPROM.

13.2 Communication function

13.2.1 Specifications

Physical layer	100BASE-TX
Communication interface	RJ45 x 2
Network protocol	Serial connection
Baud rate	2 x 100 Mbps (full duplex)
Transmission distance	When multiple servo drives are connected, the maximum distance between each drive is 50 m (164.04 ft).
Transmission cable	CAT5e STP cables with metal connectors
Number of controllable slaves	Maximum 65,535 slaves; the actual number is determined by the controller.
Data frame size	Maximum 1,440 bytes
RT / IRT mode	IRT mode (synchronous): 1 ms RT mode (asynchronous): 1 ms
Communication service	Cyclic I/O data transmission Acyclic I/O data transmission
Application layer	Meets the definitions in the PROFIdrive application profile, supporting the application classes AC1, AC3, and AC4.
Supported topology	<ul style="list-style-type: none"> ■ Line topology ■ Star topology ■ Ring topology ■ Tree topology ■ Hybrid topology

13.2.2 RT / IRT mode

PROFINET communication supports two types of real-time data transmission: Real-Time (RT) mode and Isochronous Real-Time (IRT) mode.

13.2.2.1 Real-Time (RT) mode

The master and slave(s) run asynchronously in the RT mode. The slave clock runs independently of the master clock. That is, the clocks are not synchronized. The command and feedback between the master and slave(s) are transmitted sequentially rather than synchronously.

13.2.2.2 Isochronous Real-Time (IRT) mode

There is precise time synchronization between the master and slave(s) in the IRT mode. The master executes the control program and sends packets at a fixed time cyclically according to the synchronization clock, transmitting the command to and receiving the feedback from the slave(s). The slave(s) receives and updates the data at a fixed time according to the synchronization clock.

Note: in IRT mode, the Topology view in the Siemens TIA Portal software must be configured according to the actual wiring.

13.3 PROFINET application classes

Among the PROFINET application profiles, PROFIdrive is applicable to motion control. PROFIdrive is the standard profile for drive control on the data exchange between the controller and the servo drive. The PROFIdrive profile defines 6 application classes, AC1 to AC6, and the B3A-P model is currently applicable to AC1, AC3, and AC4.

13.3.1 AC1

In AC1, the servo drive is in Profile Velocity mode, where the motion planning is done using telegram 1 of the controller. The controller specifies the speed command and sets the acceleration / deceleration conditions, and then the trajectory generator in the servo drive plans the motion path according to these conditions. This mode is suitable for applications that do not require high responsiveness.

13.3.2 AC3

In AC3, the servo drive is in Profile Position mode, where the motion planning is done using telegram 111 of the controller. After receiving the position command from the controller, the servo drive controls the servo motor to reach the target position.

In Profile Position mode, the controller only informs the servo drive of the target position, speed command, and acceleration / deceleration settings at the beginning. The motion planning from command triggering to the arrival of the target position is performed by the trajectory generator in the servo drive. This mode is suitable for applications of single-axis positioning.

13.3.3 AC4

In AC4, the servo drive is in the Cyclic Synchronous Velocity mode, where the motion planning is done using telegram 3, 102, or 105 of the controller. The controller transmits the motion command to the servo drive cyclically. This mode is suitable for applications of multi-axis synchronization, motion path planning, and interpolation control.

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13.4 Supported telegrams

1. Directly change the telegram from the controller. Setting the servo parameters additionally is not necessary.
2. If you **change** the telegram when power is supplied to the servo, cycle power to the servo drive to have the change take effect.
3. This servo drive supports the following standard telegrams. Make sure the controller supports these telegrams before using them.

Telegram	RT / IRT mode	Maximum number of PZD	
		Receive word	Send word
Telegram 1	RT	2	2
Telegram 3	IRT / RT	4	9
Telegram 102	IRT / RT	6	10
Telegram 105	IRT	10	10
Telegram 111	RT	12	12

Note:

1. PZD is the process data for cyclic data transmission; one PZD is one word (16-bit).
2. Telegrams 3 and 102 currently do not support RT mode.

Telegrams used for speed control:

Telegram	1		3		102		105					
Application Class	AC1		AC4		AC4		AC4					
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1				
PZD2	NSOLL_A	NIST_A	NSOLL_B	NIST_B	NSOLL_B	NIST_B	NSOLL_B	NIST_B				
PZD3	Receive telegram from PROFINET	Send telegram to PROFINET										
PZD4			STW2	ZSW2	STW2	ZSW2	STW2	ZSW2				
PZD5			G1_STW	G1_ZSW	MOMRED	MELDW	MOMRED	MELDW				
PZD6			-	G1_XIST1	G1_STW	G1_ZSW	G1_STW	G1_ZSW				
PZD7				G1_XIST2					-	G1_XIST1	XERR	G1_XIST1
PZD8										G1_XIST2	KPC	G1_XIST2
PZD9			-	-	-	-	-	-				
PZD10									-	-	-	-

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Telegrams used for position control:

Telegram	111	
Application Class	AC3	
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

Note: the PZDs in gray are not yet supported.

13.4.1 Descriptions of PZD (Process Data)

The following describes the PZDs of telegrams 1, 3, 102, 105, and 111.

PZD	Description	Received word / Send word	Data type
STW1	Control word 1	Receive word	U16
STW2	Control word 2	Receive word	U16
NSOLL_A	Speed setpoint A (16-bit)	Receive word	I16
NSOLL_B	Speed setpoint B (32-bit)	Receive word	I32
MDI_TARPOS	MDI position	Receive word	I32
MDI_VELOCITY	MDI velocity	Receive word	I32
OVERRIDE	Position velocity override	Receive word	I16
MDI_ACC	MDI acceleration override	Receive word	I16
MDI_DEC	MDI deceleration override	Receive word	I16
POS_STW1	Positioning control word 1	Receive word	U16
POS_STW2	Positioning control word 2	Receive word	U16
G1_XIST2	Actual position 2	Send word	U32
ZSW1	Status word 1	Send word	U16
ZSW2	Status word 2	Send word	U16
NIST_A	Speed actual value A (16-bit)	Send word	I16
NIST_B	Speed actual value B (32-bit)	Send word	I32
XIST_A	Position actual value A	Send word	I32
FAULT_CODE	Alarm code	Send word	U16
WARN_CODE	Warning code	Send word	U16

13.4.2 Control word definition

STW1 control word 1 (for telegrams 1, 3, 102, 105)

Important: STW1.10 must be set to 1 first for the servo to allow requests from the controller.

Signal	Function	Description
STW1.0	Servo On / Off	0: Servo Off 1: Servo On
STW1.1	Free-run stop (AL013 triggering; OFF2)	0: trigger servo alarm AL013 1: when STW1.2 is also set to 1, the servo can be switched to On
STW1.2	PFQS (AL35F triggering; OFF3)	0: trigger servo alarm AL35F 1: when STW1.1 is also set to 1, the servo can be switched to On
STW1.3	Enable / disable operation	0: disable operation 1: enable operation
STW1.4	Quick stop	0: servo is in the Quick stop state 1: disable the function
STW1.5	Halt	0: halt the command; once the function is disabled, the operation continues until the command is complete 1: disable the function
STW1.6	Trigger	0: disable the function 1: trigger the command
STW1.7	Fault reset	0: disable the function 1: reset the servo alarm
STW1.8 to 1.9	Reserved	-
STW1.10	Servo allows requests from controller	0: servo does not allow requests from the controller 1: servo allows requests from the controller
STW1.11 to 1.15	Reserved	-

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STW1 control word 1 (for telegram 111)

Important: STW1.10 must be set to 1 first for the servo to allow requests from the controller.

Signal	Function	Description
STW1.0	Servo On / Off	0: Servo Off 1: Servo On
STW1.1	Free-run stop (AL013 triggering; OFF2)	0: trigger servo alarm AL013 1: when STW1.2 is also set to 1, the servo can be switched to On
STW1.2	PFQS (AL35F triggering; OFF3)	0: trigger servo alarm AL35F 1: when STW1.1 is also set to 1, the servo can be switched to On
STW1.3	Enable / disable operation	0: disable operation 1: enable operation
STW1.4	Reject	0: reject the command; the command must be issued again 1: disable the function
STW1.5	Halt	0: halt the command; once the function is disabled, the operation continues until the command is complete 1: disable the function
STW1.6	Trigger	0: disable the function 1: trigger the command
STW1.7	Fault reset	0: disable the function 1: reset the servo alarm
STW1.8 to 1.9	Jog	00: disable the function 01: jog in forward direction (Jog1) 10: jog in reverse direction (Jog2) 11: disable the function
STW1.10	Servo allows requests from controller	0: servo does not allow requests from the controller 1: servo allows requests from the controller
STW1.11	Homing	0: disable the function 1: start homing
STW1.12 to 1.15	Reserved	-

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POS_STW1 positioning control word 1 (for telegram 111)

Signal	Function	Description
POS_STW1.0 to 1.7	Reserved	-
POS_STW1.8	MDI positioning mode	0: relative positioning 1: absolute positioning
POS_STW1.9	MDI direction selection	When ModePos = 2 (absolute positioning)* ¹ : 01: positioning command in forward direction 10: positioning command in reverse direction When ModePos = 3 (positioning as setup)* ² : 00: stop operation 01: forward operation 10: reverse operation 11: stop operation
POS_STW1.10		
POS_STW1.11 to 1.13	Reserved	-
POS_STW1.14	Working mode	0: signal positioning 1: signal setting-up
POS_STW1.15	MDI selection	0: disable the MDI function 1: enable the MDI function

Note:

1. When STW1.8, STW1.9, STW1.11, POS_STW1.8, and POS_STW1.14 are all set to 0, ModePos = 2.
2. When STW1.8, STW1.9, and STW1.11 are set to 0, and POS_STW1.8 and POS_STW1.14 are set to 1, ModePos = 3.
3. The MDI (Manual Data Input) positioning function enables the controller to inform the servo of the target position, speed, and acceleration / deceleration for the servo to perform the calculation.

POS_STW2 positioning control word 2 (for telegram 111)

Signal	Function	Description
POS_STW2.0	Reserved	-
POS_STW2.1	Set current feedback position as origin	0: disable the function 1: set the current feedback position as the origin
POS_STW2.2 to 2.4	Reserved	-
POS_STW2.5	Jog mode setting	0: incremental jogging (ModePos = 8) 1: jog (ModePos = 7)
POS_STW2.6 to 2.13	Reserved	-
POS_STW2.14	Software limit switch (ConfigEPos [Bit 2])	0: disable the function 1: enable the software limit switch
POS_STW2.15	Hardware limit switch (ConfigEPos [Bit 3])	0: disable the function 1: enable the hardware limit switch

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13.4.3 Status word definition

ZSW1 status word 1 (for telegrams 1, 3, 102, 105)

Signal	Function	Description
ZSW1.0	Switched On	0: not ready for Servo On 1: ready for Servo On
ZSW1.1	Ready for operation	0: operation disabled 1: operation enabled
ZSW1.2	Operation enabled	0: Servo Off 1: Servo On
ZSW1.3	Fault present	0: no servo alarm (ALM) 1: servo alarm (ALM) occurs
ZSW1.4	Free-run stop (AL013 triggering; OFF2)	0: servo alarm AL013 triggered 1: servo alarm AL013 cleared
ZSW1.5	PFQS (AL35F triggering; OFF3)	0: servo alarm AL35F triggered 1: servo alarm AL35F cleared
ZSW1.6	Switching on inhibited	0: operation allowed 1: operation inhibited
ZSW1.7	Warning present	0: servo warning triggered 1: servo warning cleared
ZSW1.8	Speed deviation within tolerance	0: speed deviation exceeded tolerance 1: speed deviation within tolerance
ZSW1.9	Control requested	0: controller request not allowed 1: controller request allowed
ZSW1.10 to 1.15	Reserved	-

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ZSW1 status word 1 (for telegram 111)

Signal	Function	Description
ZSW1.0	Switched On	0: not ready for Servo On 1: ready for Servo On
ZSW1.1	Ready for operation	0: operation disabled 1: operation enabled
ZSW1.2	Operation enabled	0: Servo Off 1: Servo On
ZSW1.3	Fault present	0: no servo alarm (ALM) 1: servo alarm (ALM) occurs
ZSW1.4	Free-run stop (AL013 triggering; OFF2)	0: servo alarm AL013 triggered 1: servo alarm AL013 cleared
ZSW1.5	PFQS (AL35F triggering; OFF3)	0: servo alarm AL35F triggered 1: servo alarm AL35F cleared
ZSW1.6	Switching on inhibited	0: operation allowed 1: operation inhibited
ZSW1.7	Warning present	0: servo warning triggered 1: servo warning cleared
ZSW1.8	Speed deviation within tolerance	0: speed deviation exceeded tolerance 1: speed deviation within tolerance
ZSW1.9	Control requested	0: controller request not allowed 1: controller request allowed
ZSW1.10	Target reached	0: target not reached 1: target reached
ZSW1.11	Homing complete	0: homing not complete 1: homing complete
ZSW1.12 to 1.15	Reserved	-

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13.5 Using telegrams in PROFINET mode

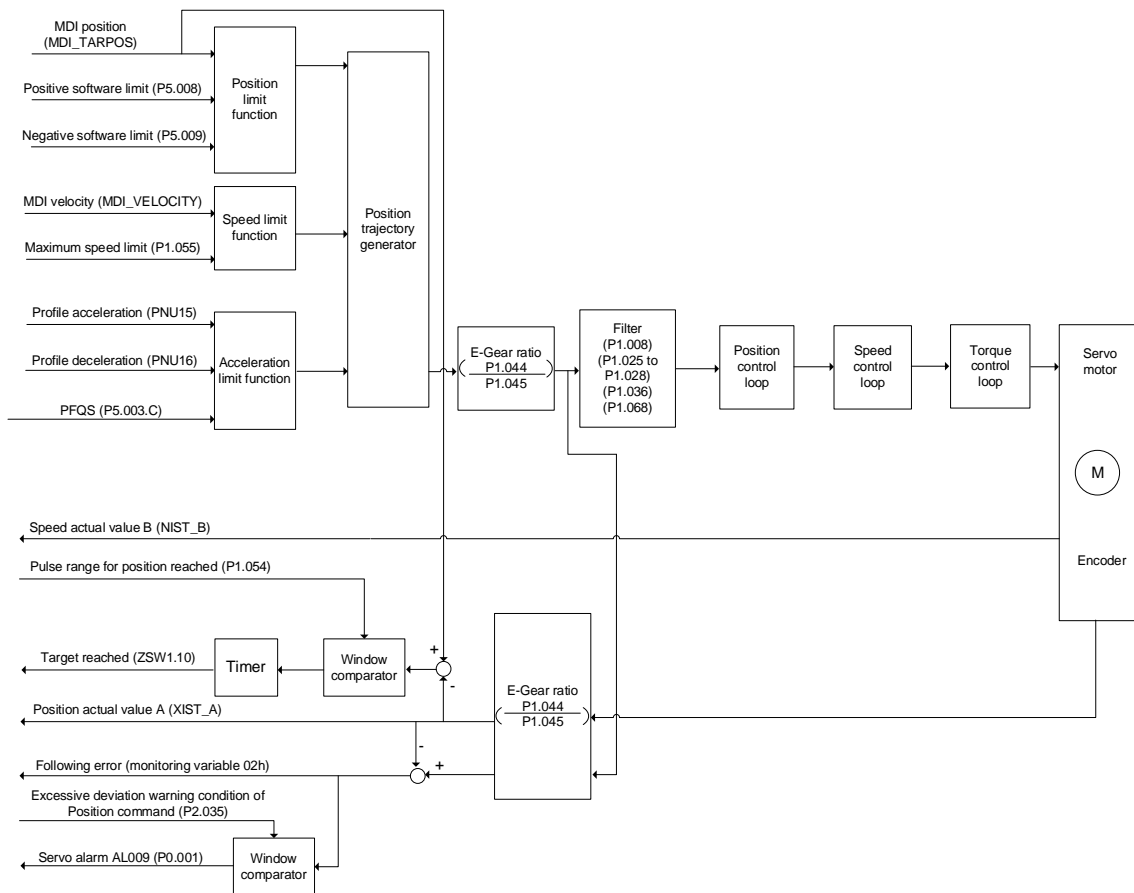
This section describes the use of telegrams in PROFINET mode. The content includes basic operation settings and related object descriptions.

13.5.1 Telegram 111 (Profile Position mode)

After receiving the position command from the controller, the servo drive controls the servo motor to reach the target position.

When telegram 111 is used, the controller only informs the servo drive of the target position, speed command, and acceleration / deceleration settings at the beginning. The motion planning from command triggering to the arrival of the target position is performed by the trajectory generator in the servo drive.

The following figure shows the Profile Position mode architecture of the servo drive when telegram 111 is used:



Using the function blocks in the DriveLib of TIA Portal can achieve the basic positioning control (SINA_POS, FB284) and access the PNU and servo parameters (SINA_PARA_S, FB287). The following are the examples of using these function blocks.

Note: refer to Section 13.6 for the descriptions of function block pins.

Jog / Incremental jogging

Operating condition: for FB284, the CancelTraversing and IntermediateStop pins must be set to 1 (disable the functions).

Step	FB	Pin	Input value	Description
1. Select the jog mode	FB284	ModePos	7	7: jog; continuous triggering (in units of 5000 PUU/s) 8: incremental jogging; rising-edge triggering (in units of 1000 PUU)
2. Set the servo to On	FB284	EnableAxis	1	0: Servo Off 1: Servo On
3. Execute jog operation				Jog1 and Jog2 cannot be set to 1 simultaneously.
♦ Execute jog in forward direction	FB284	Jog1	1	0: disable the function 1: jog in forward direction
♦ Execute jog in reverse direction	FB284	Jog2	1	0: disable the function 1: jog in reverse direction
4. Set jog speed override	FB284	OverV	-	Setting range: 1 - 199%

Note: changing the speed and position commands for the jog operation is not yet supported.

Read the servo data:

Step	FB	Pin	Read value	Description
1. Read the motor feedback position at present	FB284	ActPosition	-	Unit: PUU
2. Read the motor feedback speed at present	FB284	ActVelocity	-	Unit: 16#40000000h indicates 100% of the motor rated speed For example, when the read value is 16#60000000h, the feedback speed is the rated speed*150%.

Relative / Absolute positioning

Operating condition: for FB284, the CancelTraversing and IntermediateStop pins must be set to 1 (disable the functions), and the Jog1 and Jog2 pins must be set to 0 (disable the function).

Step	FB	Pin	Input value	Description
1. Select the positioning function	FB284	ModePos	2	1: relative positioning 2: absolute positioning
2. Set the target position	FB284	Position	-	Unit: PUU
3. Set the speed command	FB284	Velocity	-	Unit: 1000 PUU/min
4. Set the Profile acceleration (PNU15)				
4.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
4.2 Select PNU parameter	FB287	Parameter	15	15: Profile acceleration
4.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for acceleration from 0 rpm to 3000 rpm
4.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
5. Set the Profile deceleration (PNU16)				
5.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
5.2 Select PNU parameter	FB287	Parameter	16	16: Profile deceleration
5.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for deceleration from 3000 rpm to 0 rpm
5.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
6. Set the servo to On	FB284	EnableAxis	1	0: Servo Off 1: Servo On
7. Execute the command	FB284	ExecuteMode	↕	0: disable the function ↕: execute commands of signal positioning and signal setting-up

Note: PNU15 (Profile acceleration) and PNU16 (Profile deceleration time) are volatile parameters.

Read the servo data:

Step	FB	Pin	Read value	Description
1. Read the motor feedback position at present	FB284	ActPosition	-	Unit: PUU
2. Read the motor feedback speed at present	FB284	ActVelocity	-	Unit: 16#40000000h indicates 100% of the motor rated speed For example, when the read value is 16#60000000h, the feedback speed is the rated speed*150%.

Command to take immediate effect

When FB284 - ModePos = 2 (absolute positioning), you can have the command take effect immediately or not with the setting of FB284 - ConfigEPos [Bit 8].

Positioning as setup

Operating condition: for FB284, the CancelTraversing and IntermediateStop pins must be set to 1 (disable the functions), and the Jog1 and Jog2 pins must be set to 0 (disable the function).

Step	FB	Pin	Input value	Description
1. Select the mode of positioning as setup	FB284	ModePos	3	3: positioning as setup
2. Select the rotation direction				Positive and Negative cannot be set to 1 simultaneously.
<ul style="list-style-type: none"> Set to operate in positive direction 	FB284	Positive	0	0: disable the function 1: operate in positive direction
<ul style="list-style-type: none"> Set to operate in negative direction 	FB284	Negative	1	0: disable the function 1: operate in negative direction
3. Set the speed command	FB284	Velocity	-	Unit: 1000 PUU/min
4. Set the Profile acceleration (PNU15)				
4.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
4.2 Select PNU parameter	FB287	Parameter	15	15: Profile acceleration
4.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for acceleration from 0 rpm to 3000 rpm
4.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
5. Set the Profile deceleration (PNU16)				
5.1 Enable the writing function for PNU parameters	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
5.2 Select PNU parameter	FB287	Parameter	16	16: Profile deceleration
5.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for deceleration from 3000 rpm to 0 rpm
5.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
6. Set the servo to On	FB284	EnableAxis	1	0: Servo Off 1: Servo On
7. Execute the command	FB284	ExecuteMode	↕	0: disable the function ↕: execute commands of signal positioning and signal setting-up

Note: PNU15 (Profile acceleration) and PNU16 (Profile deceleration) are volatile parameters.

Read the servo data:




Step	FB	Pin	Read value	Description
1. Read the motor feedback position at present	FB284	ActPosition	-	Unit: PUU
2. Read the motor feedback speed at present	FB284	ActVelocity	-	Unit: 16#40000000h indicates 100% of the motor rated speed For example, when the read value is 16#60000000h, the feedback speed is the rated speed*150%.

Command to take immediate effect

When FB284 - ModePos = 2 (absolute positioning), you can have the command take effect immediately or not with the setting of FB284 - ConfigEPos [Bit 8].

Homing

Operating condition: for FB284, the CancelTraversing and IntermediateStop pins must be set to 1 (disable the functions), and the Jog1 and Jog2 pins must be set to 0 (disable the function).

Step	FB	Pin	Setting value	Description
1. Select the homing mode	FB284	ModePos	4	4: homing mode 5: regard the current feedback position as the origin Note: directly go to Step 8 when setting ModePos to 5.
2. Set the Home offset (PNU11)				
2.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
2.2 Select PNU parameter	FB287	Parameter	11	11: Home offset
2.3 Set the value to write	FB287	ValueWrite2	-	Unit: PUU
2.4 Start	FB287	Start		0: disable the function  : start accessing
3. Set the Homing method (PNU10)				
3.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
3.2 Select PNU parameter	FB287	Parameter	10	10: Homing method
3.3 Set the value to write	FB287	ValueWrite2	-	Refer to the description of PNU10
3.4 Start	FB287	Start		0: disable the function  : start accessing
4. Set Homing speeds 1 (PNU12)				
4.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
4.2 Select PNU parameter	FB287	Parameter	12	12: Homing speeds 1
4.3 Set the value to write	FB287	ValueWrite2	-	Unit: 0.1 rpm
4.4 Start	FB287	Start		0: disable the function  : start accessing
5. Set Homing speeds 2 (PNU13)				
5.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
5.2 Select PNU parameter	FB287	Parameter	13	13: Homing speeds 2
5.3 Set the value to write	FB287	ValueWrite2	-	Unit: 0.1 rpm
5.4 Start	FB287	Start		0: disable the function  : start accessing
6. Set Homing acceleration (PNU14)				
6.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
6.2 Select PNU parameter	FB287	Parameter	14	14: Homing acceleration
6.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for acceleration from 0 rpm to 3000 rpm and deceleration from 3000 rpm to 0 rpm
6.4 Start	FB287	Start		0: disable the function  : start accessing
7. Set the servo to On	FB284	EnableAxis	1	0: Servo Off 1: Servo On
8. Execute the command	FB284	ExecuteMode		0: disable the function  : command execution

Note: PNU10 (Homing method), PNU11 (Home offset), PNU12 (Homing speeds 1), PNU13 (Homing speeds 2), and PNU14 (Homing acceleration) are volatile parameters.

Read the servo data:

Step	FB	Pin	Read value	Description
1. Read the motor feedback position at present	FB284	ActPosition	-	Unit: PUU
2. Read the motor feedback speed at present	FB284	ActVelocity	-	Unit: 16#40000000h indicates 100% of the motor rated speed For example, when the read value is 16#60000000h, the feedback speed is the rated speed*150%.

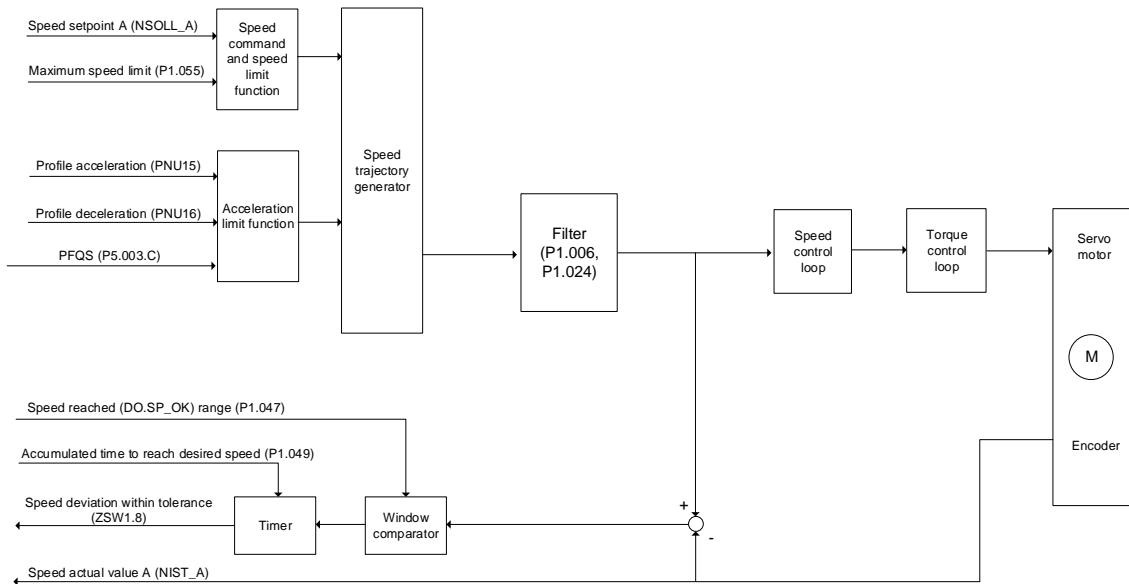
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13.5.2 Telegram 1 (Profile Velocity mode)

When telegram 1 is used, the controller specifies the speed command and sets the acceleration / deceleration conditions, and then the trajectory generator in the servo drive plans the motion path according to these conditions.

The following figure shows the Profile Velocity mode architecture of the servo drive when telegram 1 is used:



Using the function blocks in the DriveLib of TIA Portal can achieve the basic speed control (SINA_SPEED, FB285) and access the PNU and servo parameters (SINA_PARA_S, FB287).

The following is an example of using these function blocks.

Note: refer to Section 13.6 for the descriptions of function block pins.

Speed control

Operating condition: for FB285, the ConfigAxis pin must be set to 16#003F (default).

Step	FB	Pin	Setting value	Description
1. Set the rated speed	FB285	RefSpeed	-	Set the speed in units of rpm according to the motor specification.
2. Set the speed setpoint	FB285	SpeedSp	100	Unit: rpm
3. Set the Profile acceleration (PNU15)				
3.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
3.2 Select PNU parameter	FB287	Parameter	15	15: Profile acceleration
3.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for acceleration from 0 rpm to 3000 rpm
3.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
4. Set the Profile deceleration (PNU16)				
4.1 Enable the writing function for the PNU parameter	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
4.2 Select PNU parameter	FB287	Parameter	16	16: Profile deceleration
4.3 Set the value to write	FB287	ValueWrite2	-	Unit: ms; the time for deceleration from 3000 rpm to 0 rpm
4.4 Start	FB287	Start	↕	0: disable the function ↕: start accessing
5. Set the servo to On	FB285	EnableAxis	1	0: Servo Off 1: Servo On

Note: PNU15 (Profile acceleration) and PNU16 (Profile deceleration) are volatile parameters.

Read the servo data:

Step	FB	Pin	Read value	Description
1. Read the motor feedback speed at present	FB285	ActVelocity	-	Unit: rpm

Command to take effect

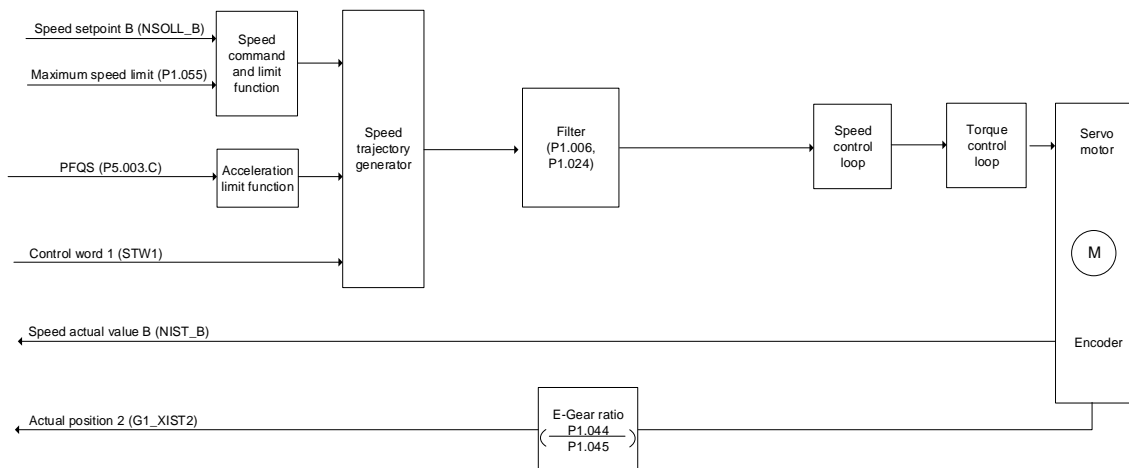
When telegram 1 is used, set FB285 - ConfigAxis [Bit 5] to have the command take effect or not.

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13.5.3 Telegrams 3, 102, 105 (Cyclic Synchronous Velocity mode)

When telegram 3 or 102 is used, the controller performs calculation for position control, and the servo drive is in charge of speed control. In this mode, when the controller transmits the PZD cyclically, it transmits the Speed setpoint B (NSOLL_B) and Control word 1 (STW1) data to the servo at the same time. Currently, telegram 102 does not support the torque limit setting, and telegram 105 does not support the torque limit setting and dynamic servo control (DSC).

The following figure shows the Cyclic Synchronous Velocity mode architecture of the servo drive when telegram 3, 102, or 105 is used:



In TIA Portal, you can set the Technology objects and MC function blocks for telegrams 3, 102, and 105 to perform motion control.

Note:

1. Only supports the Motion Control technology objects of V4.0.
2. Telegrams 3, 102, and 105 currently only support incremental encoders.
3. When data is exchanged with the drive, the function of **Automatically apply drive values at runtime** is not available.
4. When data is exchanged with the encoder, the function of **Automatically apply encoder values at runtime** is not available. The **Increments per revolution** must be set to 2048 and the **Bits in incr. actual value (Gx_XIST1)** must be set to 13.

Technology object configuration

Example:

1. Add new object → Add a new axis
2. Set the axis: Configuration → Hardware interface

(1) Drive

- Drive type: PROFIdrive
- Data connection: Drive
- Drive: [Drive device name].PROFIdrive Modul AC1,3,4

(2) Encoder

- Data connection: Encoder
- Encoder: [Drive device name].PROFIdrive Modul AC1,3,4
- Encoder type: Incremental

Note: in the Technology object configuration, the Encoder type currently only supports "Incremental".

(3) Data exchange with the drive

- Drive telegram: select telegram 3, 102, or 105
- Reference speed: corresponds to the rated speed of the rotary motor
- Maximum speed: corresponds to the maximum speed of the rotary motor

Note: the functions of **Automatically apply drive values at runtime** and **Torque data** are currently unavailable.

(4) Data exchange with encoder

- Encoder telegram: select telegram 3, 102, or 105
- Measuring system: Rotary
- Increments per revolution: 2048
- Bits in incr. actual value (Gx_XIST1): 13





Note: the function of **Automatically apply encoder values at runtime** is currently unavailable.

Motion command planning

You can add MC function blocks as required. The following briefly introduces the MC function blocks for planning the motion commands. Refer to the controller manual for detailed descriptions.

- MC_Power: enable or disable the technology object.
- MC_Reset: acknowledge the alarm and restart the technology object.
- MC_Home: execute homing for the technology object.
- MC_Halt: pause the axis.
- MC_MoveAbsolute: perform absolute positioning of the axis.
- MC_MoveRelative: perform relative positioning of the axis.
- MC_MoveVelocity: move the axis at a constant velocity.
- MC_MoveJog: move the axis with jog operation.
- MC_MoveSuperimposed: start a relative positioning command which is superimposed on the current positioning command.

Example of using the absolute positioning command:

Step	FB	Pin	Input value	Description
1. Enable or disable the technology object				
1.1 Set the axis	MC_Power	Axis	-	Axis name of the technology object
1.2 Set the servo to On	MC_Power	Enable	1	0: Servo Off 1: Servo On
2. Execute homing for the technology object				
2.1 Set the axis	MC_Home	Axis	-	Axis name of the technology object
2.2 Operating mode	MC_Home	Mode	-	Set the homing method according to the controller
2.3 Start	MC_Home	Execute		0: disable  : trigger the command
3. Perform absolute positioning of the axis				
3.1 Set the axis	MC_Move Absolute	Axis	-	Axis name of the technology object
3.2 Velocity setting	MC_Move Absolute	Velocity	-	Unit: the unit set by the controller/sec
3.3 Absolute target position	MC_Move Absolute	Position	-	Unit: the unit set by the controller
3.4 Start	MC_Move Absolute	Execute		0: disable  : trigger the command

13.5.4 Accessing servo parameters

When using telegram 1, 3, 102, 105, or 111, the controller can access the servo parameters by using the function block SINA_PARA_S (FB287).

Operation steps:

Access the servo parameters with PNU20 - PNU22 by following these steps.

Example 1: set the servo parameter P1.044 to 16777216

Step	FB	Pin	Input value	Description
1. Enable the writing function for parameters	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
2. Set the servo parameter group				
2.1 Select P parameter group	FB287	Parameter	20	20: P parameter group
2.2 Set the value to write	FB287	ValueWrite2	1	Servo parameter group number
2.3 Start	FB287	Start	↕	0: disable the function ↕: start accessing
3. Set the servo parameter number				
3.1 Select P parameter number	FB287	Parameter	21	21: P parameter number
3.2 Set the value to write	FB287	ValueWrite2	44	Servo parameter number
3.3 Start	FB287	Start	↕	0: disable the function ↕: start accessing
4. Set the servo parameter value				
4.1 Select P parameter value	FB287	Parameter	22	22: P parameter value
4.2 Set the value to write	FB287	ValueWrite2	16777216	Servo parameter value Note: the input value should be in decimal. If the parameter value is in hex, convert it into a decimal value.
4.3 Start	FB287	Start	↕	0: disable the function ↕: start accessing

Example 2: read the servo parameter P0.001

Step	FB	Pin	Input value	Description
1. Enable the writing function for parameters	FB287	ReadWrite	1	0: enable the reading function 1: enable the writing function
2. Set the servo parameter group				
2.1 Select P parameter group	FB287	Parameter	20	20: P parameter group
2.2 Set the value to write	FB287	ValueWrite2	0	Servo parameter group number
2.3 Start	FB287	Start	↕	0: disable the function ↕: start accessing
3. Set the servo parameter number				
3.1 Select P parameter number	FB287	Parameter	21	21: P parameter number
3.2 Set the value to write	FB287	ValueWrite2	1	Servo parameter number
3.3 Start	FB287	Start	↕	0: disable the function ↕: start accessing
4. Enable the reading function for parameters	FB287	ReadWrite	0	0: enable the reading function 1: enable the writing function
5. Set the servo parameter value				
5.1 Select P parameter value	FB287	Parameter	22	22: P parameter value
5.2 Start	FB287	Start	↕	0: disable the function ↕: start accessing

Read the servo data:

Step	FB	Pin	Read value	Description
1. Read the servo parameter value	FB284	ValueRead2	-	The read value is displayed in decimal. If the parameter value is in hex, it is converted into a decimal value.

13.6 SINA function blocks and PNU parameters

13.6.1 Position control (SINA_POS, FB284)

When using telegram 111, you can achieve the basic positioning control with FB284. The description of the function block is as follows.

13

SINA_POS (FB284)				
Input pin	Data type	Default	Function	Description
ModePos	INT	0	Operating mode	1: relative positioning 2: absolute positioning 3: positioning as setup 4: homing 5: regard the current feedback position as the origin 6: reserved 7: jog 8: incremental jogging
EnableAxis	BOOL	0	Servo On / Off	0: Servo Off 1: Servo On
CancelTraversing	BOOL	1	Cancel current command	0: cancel the current command 1: disable the function Note: when this pin = 0, you need to reissue the command.
IntermediateStop	BOOL	1	Pause current command	0: pause the current command 1: disable the function
Positive	BOOL	0	Direction for signal positioning and signal setting-up: positive	0: disable the function 1: operate in positive direction
Negative	BOOL	0	Direction for signal positioning and signal setting-up: negative	0: disable the function 1: operate in negative direction
Jog1	BOOL	0	Jog operation direction: forward	0: disable the function 1: jog in forward direction
Jog2	BOOL	0	Jog operation direction: reverse	0: disable the function 1: jog in reverse direction
FlyRef	BOOL	0	Reserved	-
AckError	BOOL	0	Servo alarm reset	0: disable the function ↕: reset the servo alarm
ExecuteMode	BOOL	0	Execute commands of signal positioning and signal setting-up	0: disable the function ↕: execute commands of signal positioning and signal setting-up
Position	DINT	0	Position setpoint when ModePos = 1 and 2	Unit: PUU
Velocity	DINT	0	Speed setpoint when ModePos = 1, 2, and 3	Unit: 1000 PUU/min
OverV	INT	100	Velocity override	Setting range: 1 - 199%
OverAcc	INT	100	Acceleration override	Setting range: 1 - 199%
OverDec	INT	100	Deceleration override	Setting range: 1 - 199%

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SINA_POS (FB284)				
Input pin	Data type	Default	Function	Description
ConfigEPos	DWORD	16#3	Control bit of telegram 111	The motor runs only when Bit 0 and Bit 1 are both 1.
			Bit 0: free-run stop (AL013 triggering; OFF2)	0: trigger servo alarm AL013 1: clear servo alarm AL013
			Bit 1: PFQS (AL35F triggering; OFF3)	0: trigger servo alarm AL35F 1: clear servo alarm AL35F
			Bit 2: software limit switch	0: disable the function 1: enable the software limit switch
			Bit 3: hardware limit switch	0: disable the function 1: enable the hardware limit switch
			Bit 4 - 7: reserved	-
			Bit 8: how the command becomes effective when ModePos = 2 or 3	0: effective when ExecuteMode is triggered 1: effective once the command setting value is changed
			Bit 9 - 15: reserved	-
HWIDSTW	HW_IO	0	Hardware ID of telegram 111	Hardware ID in the Device view; same as HWIDZTW.
HWIDZSW	HW_IO	0	Hardware ID of telegram 111	Hardware ID in the Device view; same as HWIDSTW.

SINA_POS (FB284)				
Output pin	Data type	Default	Function	Description
AxisEnabled	BOOL	0	Servo state	0: Servo Off 1: Servo On
AxisPosOk	BOOL	0	Target position reached	1: target position reached
AxisSpFixed	BOOL	0	Position setpoint reached	1: position setpoint reached
AxisRef	BOOL	0	Set reference point	1: reference point set
AxisWarn	BOOL	0	Servo error (warning)	1: servo error (warning)
AxisError	BOOL	0	Servo error (alarm)	1: servo error (alarm)
Lockout	BOOL	0	Servo switching-on inhibited	1: inhibited; check if Bit 0 and Bit 1 of ConfigEPos are both 1
ActVelocity	DINT	0	Actual velocity	The actual velocity. Read value (unit: 16#40000000h indicates 100% of the motor rated speed) * rotary motor rated speed / 16#40000000h = Actual velocity (unit: rpm)
ActPosition	DINT	0	Actual position	Actual position (unit: PUU)
ActMode	INT	0	Current operating mode	Displays the setting value of ModePos
EPosZSW1	WORD	0	Status of EPosZSW1	Displays the status of EPosZSW1
EPosZSW2	WORD	0	Status of EPosZSW2	Displays the status of EPosZSW2
ActWarn	WORD	0	Servo error code (Warning)	Displays the error code of the warning. For instance, when the servo displays AL013, the output is 16#0013h.
ActFault	WORD	0	Servo error code (Alarm)	Displays the error code of the alarm. For instance, when the servo displays AL02A, the output is 16#002Ah.
Error	BOOL	0	Controller error present	0: controller is in normal operation 1: controller is in error
Status	WORD	0	Status	16#7002: no error; function block is in execution 16#8401: servo is in error 16#8402: servo switching-on inhibited 16#8403: in operation; homing cannot be executed 16#8600: DPRD_DAT error 16#8601: DPWR_DAT error 16#8202: incorrect operating mode 16#8203: incorrect setpoints parameterized 16#8204: incorrect program block (the function is not yet supported)
DiagID	WORD	0	Communication error when SFB is called	SFB (system function block) is in error

13.6.2 Speed control (SINA_SPEED, FB285)

When using telegram 1, you can achieve the basic speed control with FB285. The description of the function block is as follows.

SINA_SPEED (FB285)				
Input pin	Data type	Default	Function	Description
EnableAxis	BOOL	0	Servo On / Off	0: Servo Off 1: Servo On
AckError	BOOL	0	Servo alarm reset	↕: reset the servo alarm
SpeedSp	REAL	0.0	Speed setpoint	Unit: rpm
RefSpeed	REAL	0.0	Motor rated speed	Unit: rpm
ConfigAxis	WORD	16#003F	Control bit of telegram 1	The motor runs only when Bit 0 and Bit 1 are both 1.
			Bit 0: free-run stop (AL013 triggering; OFF2)	0: trigger servo alarm AL013 1: when STW1.2 is also set to 1, the servo can be switched to On
			Bit 1: PFQS (AL35F triggering; OFF3)	0: trigger servo alarm AL35F 1: when STW1.1 is also set to 1, the servo can be switched to On
			Bit 2: ready for operation	0: disable operation 1: enable operation
			Bit 3: Quick stop	0: servo is in the Quick stop state 1: disable the function
			Bit 4: Halt	0: halt the operation; once the halt function is disabled, the operation continues until the command is complete 1: disable the function
			Bit 5: command triggering	0: disable the function 1: trigger the command
			Bit 6 - 15: reserved	-
HWIDSTW	HW_IO	0	Hardware ID of telegram 1	Hardware ID in the Device view; same as HWIDZSW.
HWIDZSW	HW_IO	0	Hardware ID of telegram 1	Hardware ID in the Device view; same as HWIDSTW.

SINA_SPEED (FB285)				
Output pin	Data type	Default	Function	Description
AxisEnabled	BOOL	0	Axis enabled	0: disable 1: enable
Lockout	BOOL	0	Servo switching-on inhibited	0: disable 1: enable
ActVelocity	REAL	0.0	Actual velocity	Unit: rpm
Error	BOOL	0	Servo error present	0: servo is in normal operation 1: servo is in error
Status	INT	0	Status	16#7002: no error; function block is in execution 16#8401: servo is in error 16#8402: servo switching-on inhibited 16#8403: in operation; homing cannot be executed 16#8600: DPRD_DAT error 16#8601: DPWR_DAT error 16#8202: incorrect operating mode 16#8203: incorrect setpoints parameterized 16#8204: incorrect program block (the function is not yet supported)
DiagID	WORD	0	Communication error when SFB is called	SFB (system function block) is in error

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13.6.3 Acyclic reading / writing (SINA_PARA_S, FB287)

When using telegram 1, 3, 105, 102, or 111, you can read and write PNU parameters with FB287. The description of the function block is as follows.

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SINA_PARA_S (FB287)				
Input pin	Data type	Default	Function	Description
Start	BOOL	0	Start	0: disable the function 1: start accessing
ReadWrite	BOOL	0	Accessing	0: enable the reading function 1: enable the writing function
Parameter	INT	1	PNU parameter	PNU parameters are written through ValueWrite2 10: Homing method 11: Home offset 12: Homing speeds 1 13: Homing speeds 2 14: Homing acceleration 15: Profile acceleration 16: Profile deceleration Servo parameter definition: PA.B = C 20: P parameter group (A) 21: P parameter number (B) 22: P parameter value (C)
Index	INT	0	PNU parameter index	Refer to the description of each PNU parameter.
ValueWrite1	REAL	0.0	Field for writing the parameter value (REAL)	No need to use this pin.
ValueWrite2	DINT	0	Field for writing the parameter value (DINT)	Currently used for all PNU parameters.
AxisNo	INT	1	Axis number	No need to change the number.
hardwareId	HW_IO	0	Hardware ID	Hardware ID in the Device view

SINA_PARA_S (FB287)				
Output pin	Data type	Default	Function	Description
Ready	BOOL	0	Ready	1: ready to read / write parameters
Busy	BOOL	0	Command being processed	1: reading / writing parameters
Done	BOOL	0	Command complete	1: finished reading / writing parameters
ValueRead1	REAL	0	Field for reading the parameter value (REAL)	No need to use this pin.
ValueRead2	DINT	0	Field for reading the parameter value (DINT)	The read value of PNU parameter
Format	INT	0	Format of the read parameter	Parameter format code defined by the PROFIdrive profile
ErrorNo	INT	0	Display of error code	Error code defined by the PROFIdrive profile
Error	BOOL	0	Error present	1: controller error present
ErrorId	DWORD	0	Error ID	Contact the controller manufacturer.
DiagId	WORD	0	Communication error when SFB is called	SFB (system function block) is in error.

13.6.4 PNU parameters

Important: currently all PNU parameters are volatile.

PNU10: Homing method

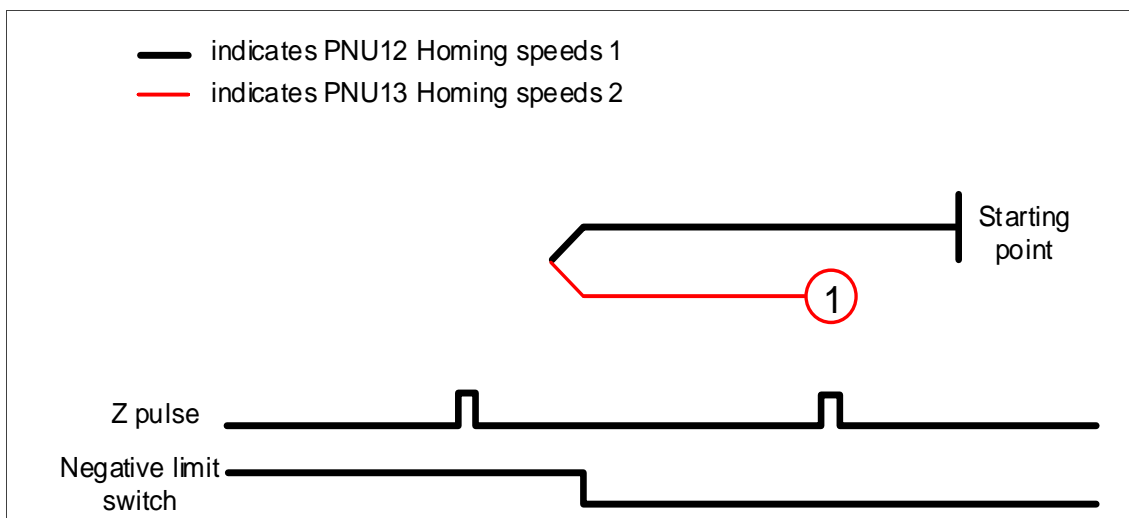
Index	0
Name	Homing method
Data type	INTEGER8
Access	RW
Setting range	0 - 35
Default	0

Function:

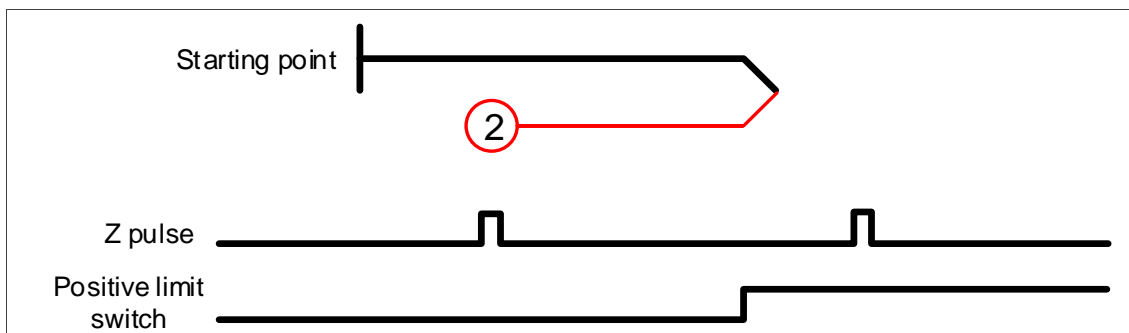
The homing methods include looking for the Z pulse (Methods 1 - 14, 33, 34), not looking for the Z pulse (Methods 17 - 30), and defining the current position as the origin (Method 35). Methods 15, 16, 31, and 32 are reserved.

To use Methods 1 to 35, set PNU10 as 1 to 35.

Method 1: homing on the negative limit switch and Z pulse

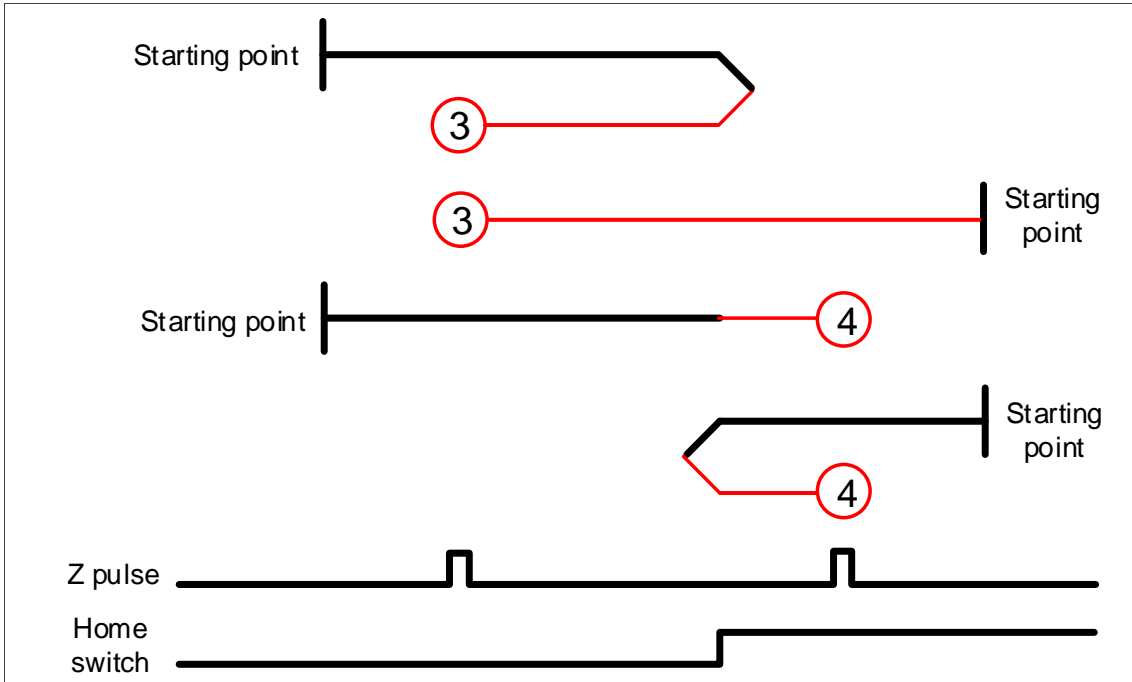


Method 2: homing on the positive limit switch and Z pulse

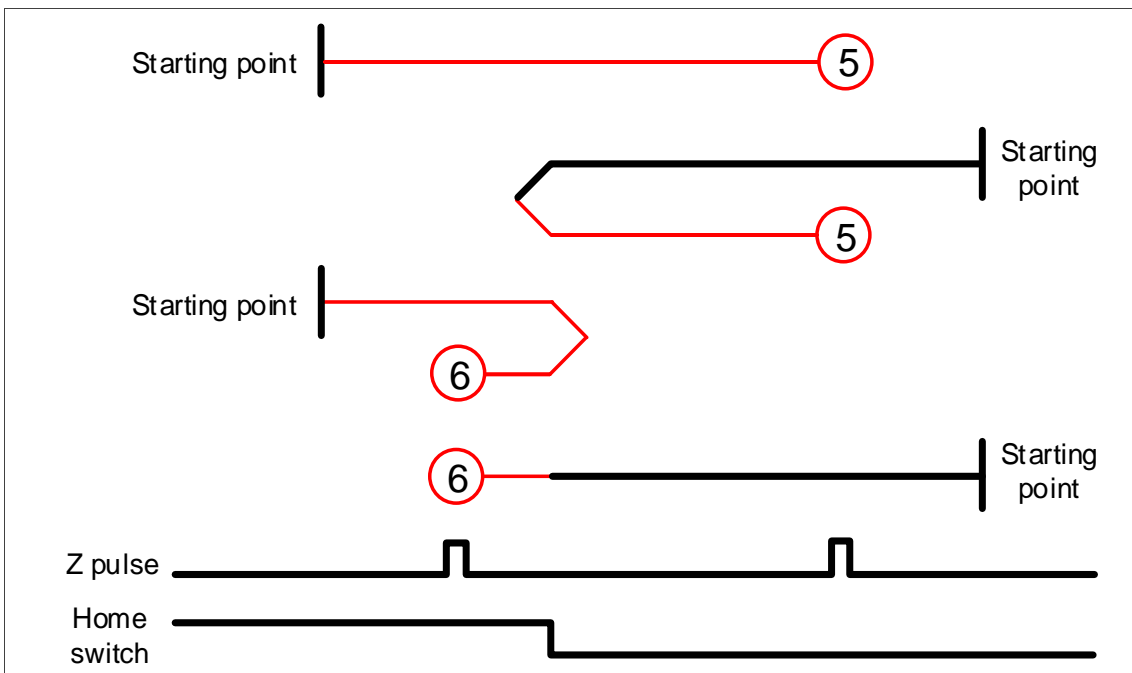


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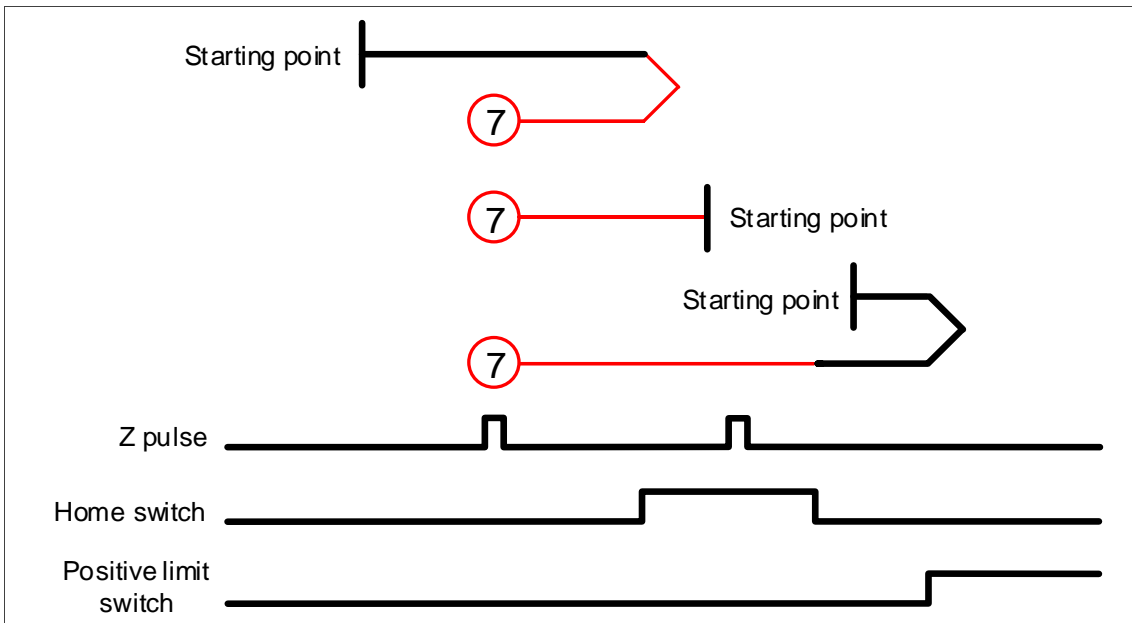
Methods 3 and 4: homing on the home switch and Z pulse



Methods 5 and 6: homing on the home switch and Z pulse

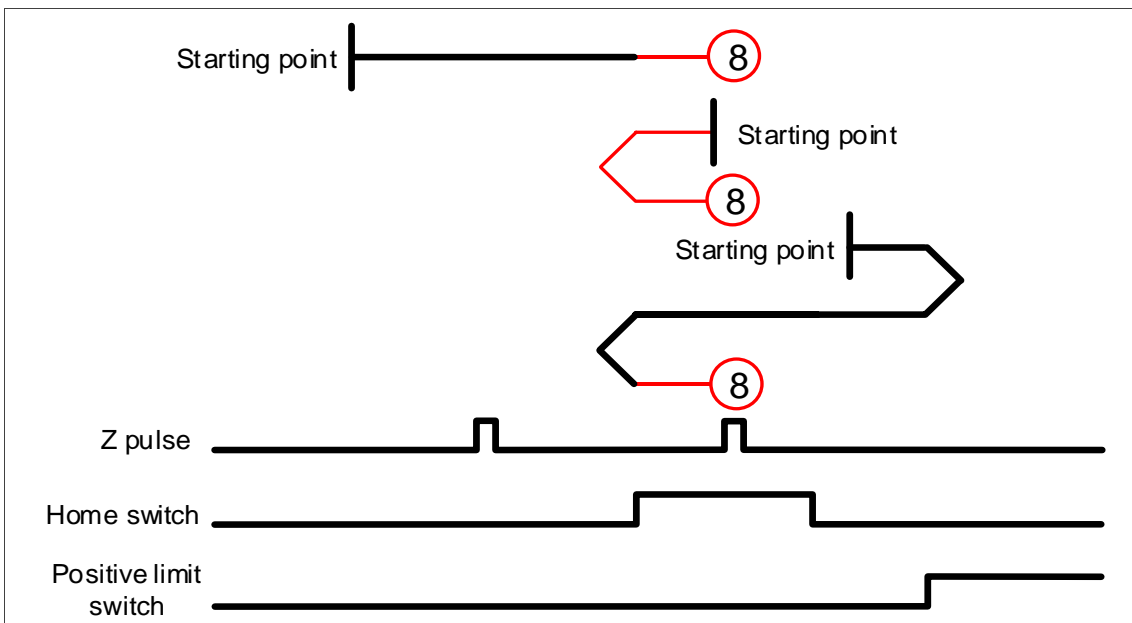


Method 7: homing on the positive limit switch, home switch, and Z pulse



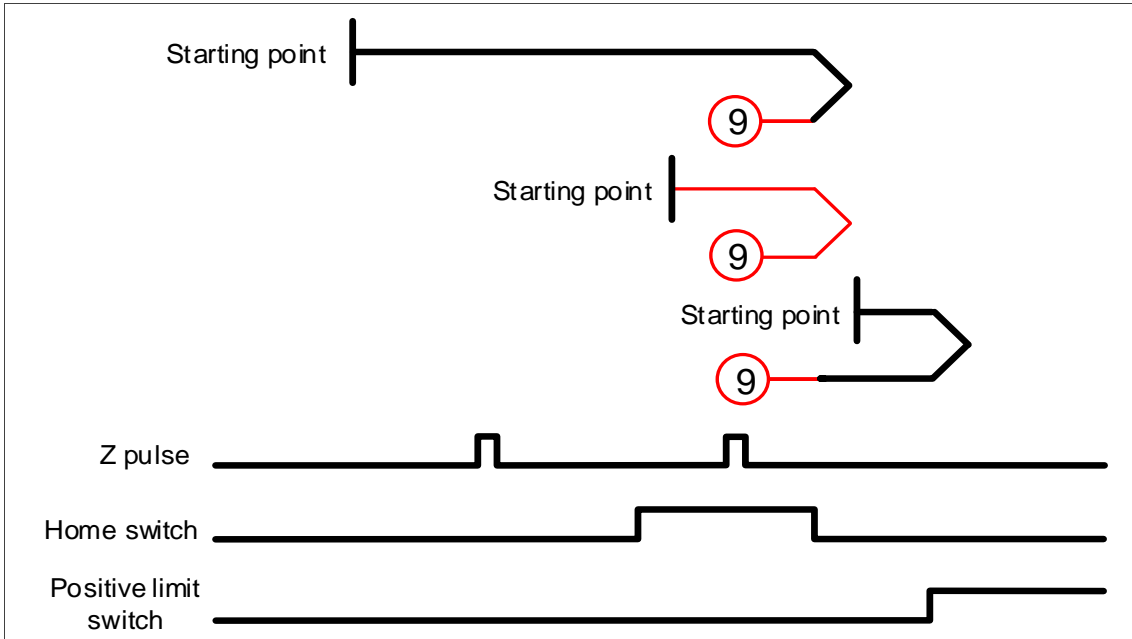
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Method 8: homing on the positive limit switch, home switch, and Z pulse

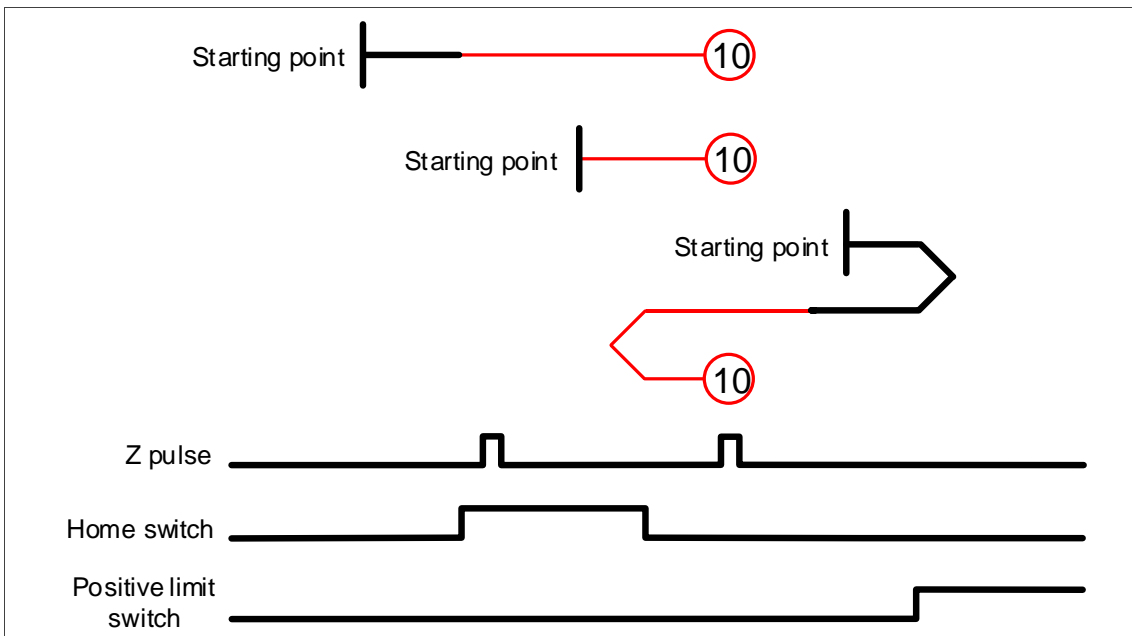


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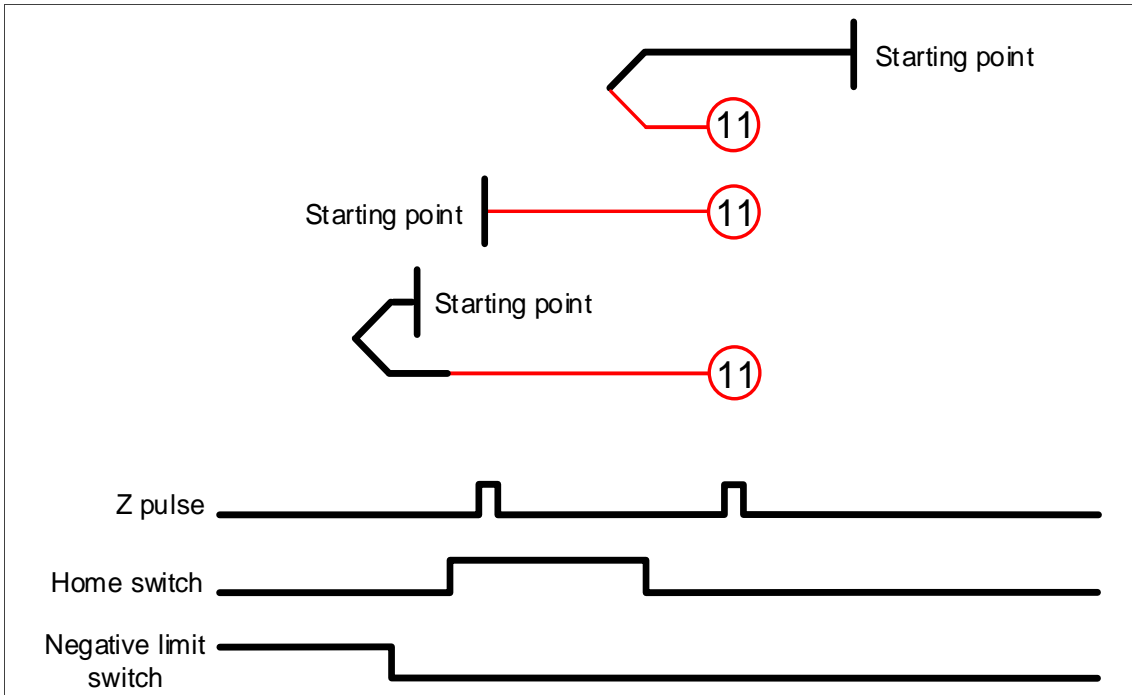
Method 9: homing on the positive limit switch, home switch, and Z pulse



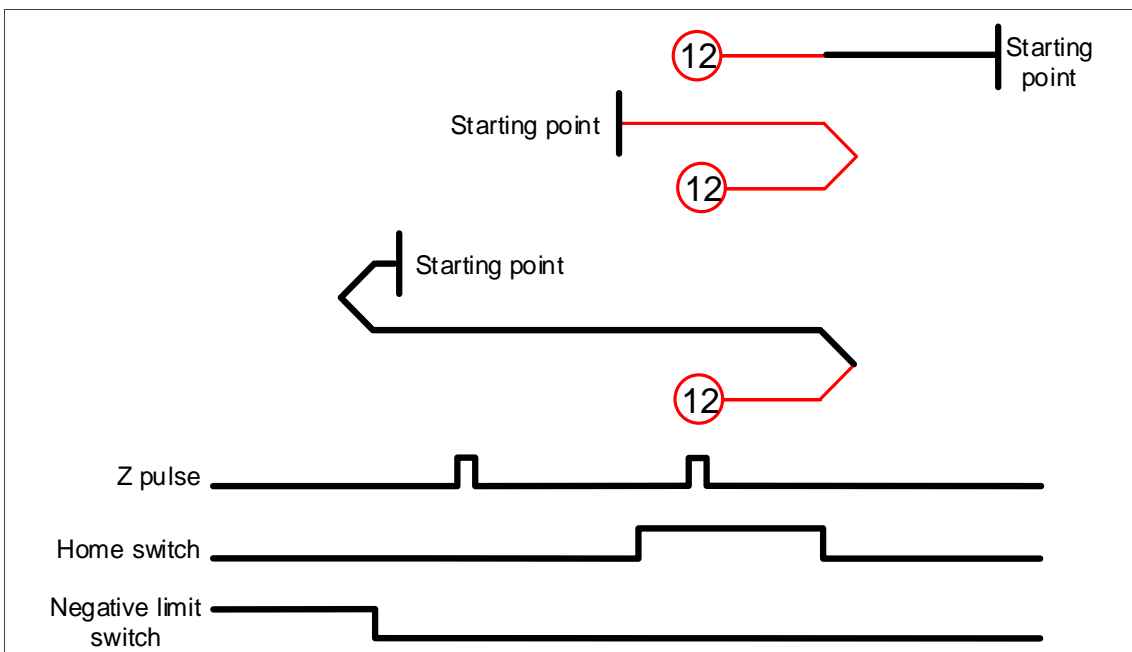
Method 10: homing on the positive limit switch, home switch, and Z pulse



Method 11: homing on the negative limit switch, home switch, and Z pulse

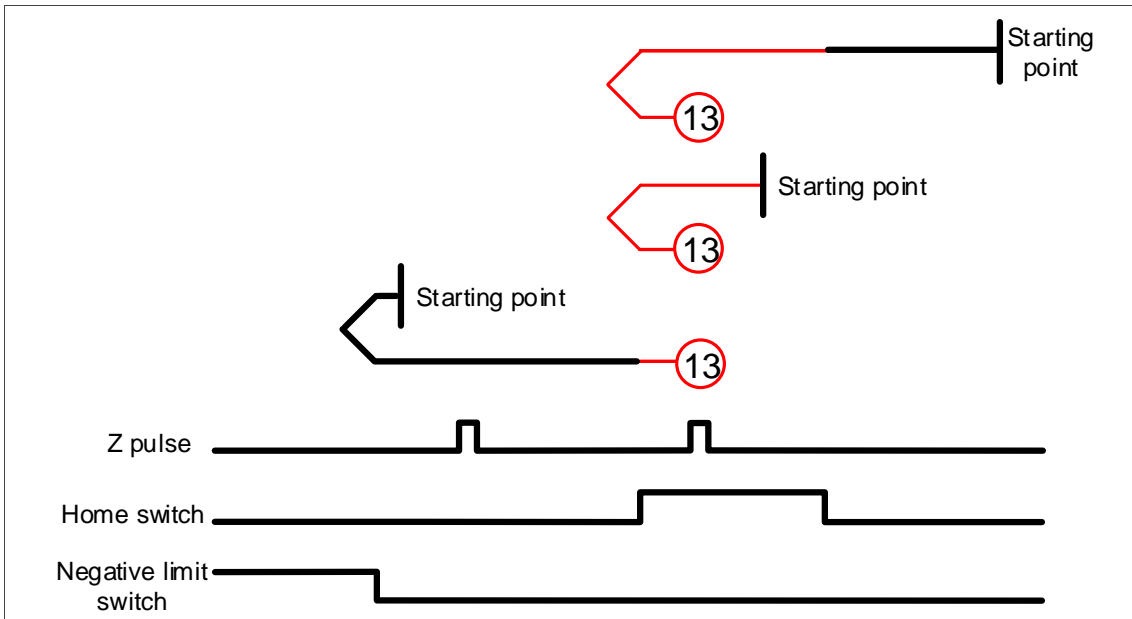


Method 12: homing on the negative limit switch, home switch, and Z pulse

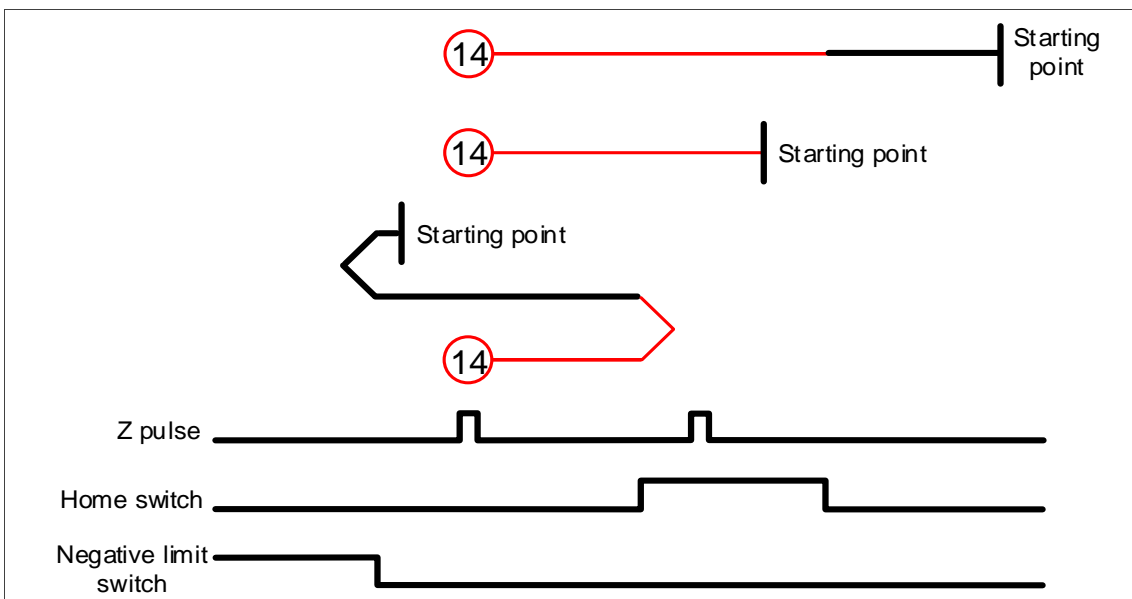


13

Method 13: homing on the negative limit switch, home switch, and Z pulse

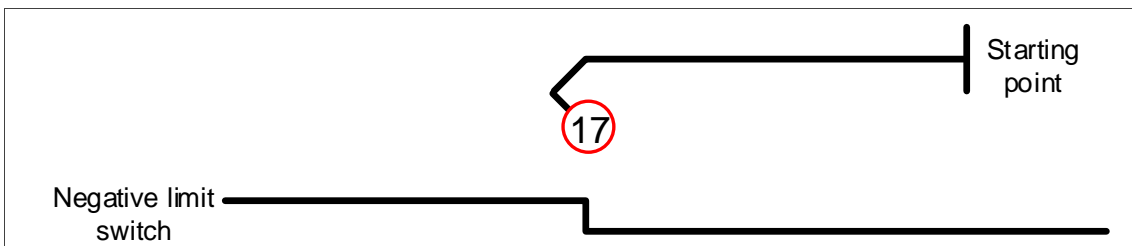


Method 14: homing on the negative limit switch, home switch, and Z pulse

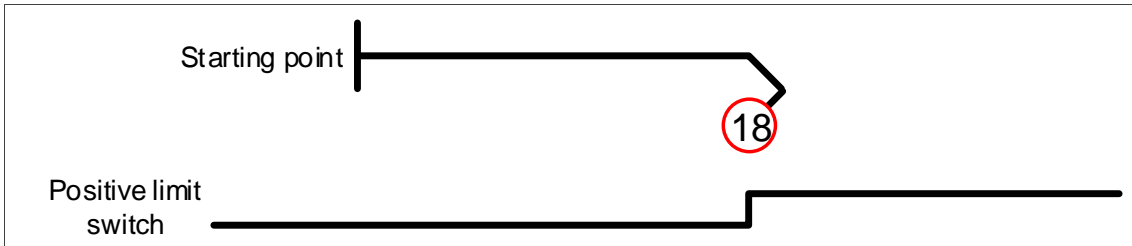


Methods 15 and 16: reserved

Method 17: homing on the negative limit switch

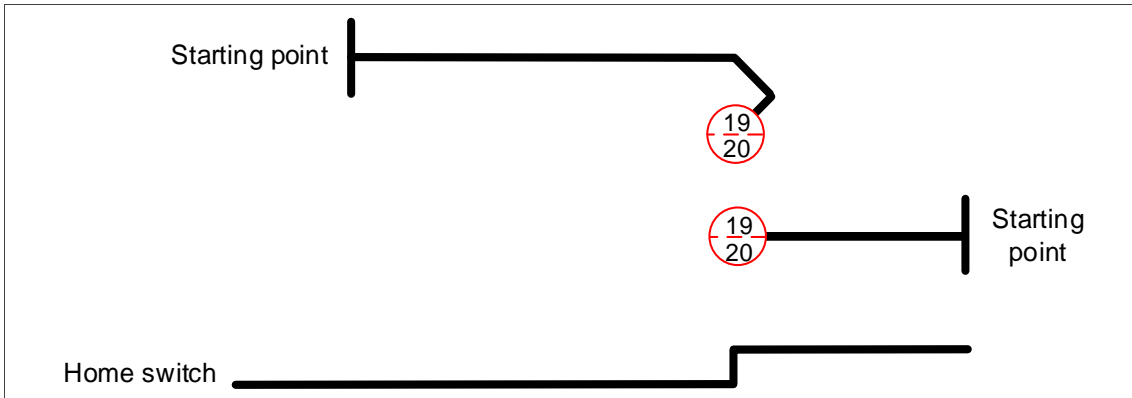


Method 18: homing on the positive limit switch

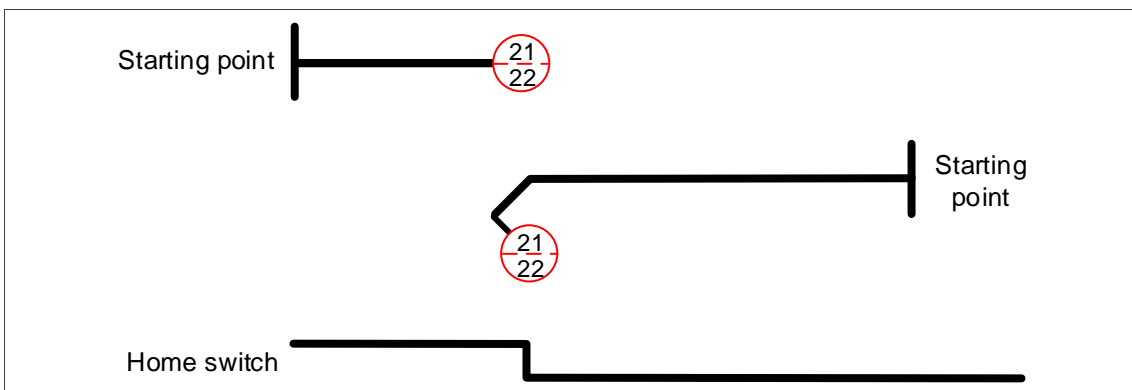


13

Methods 19 and 20: homing on the home switch

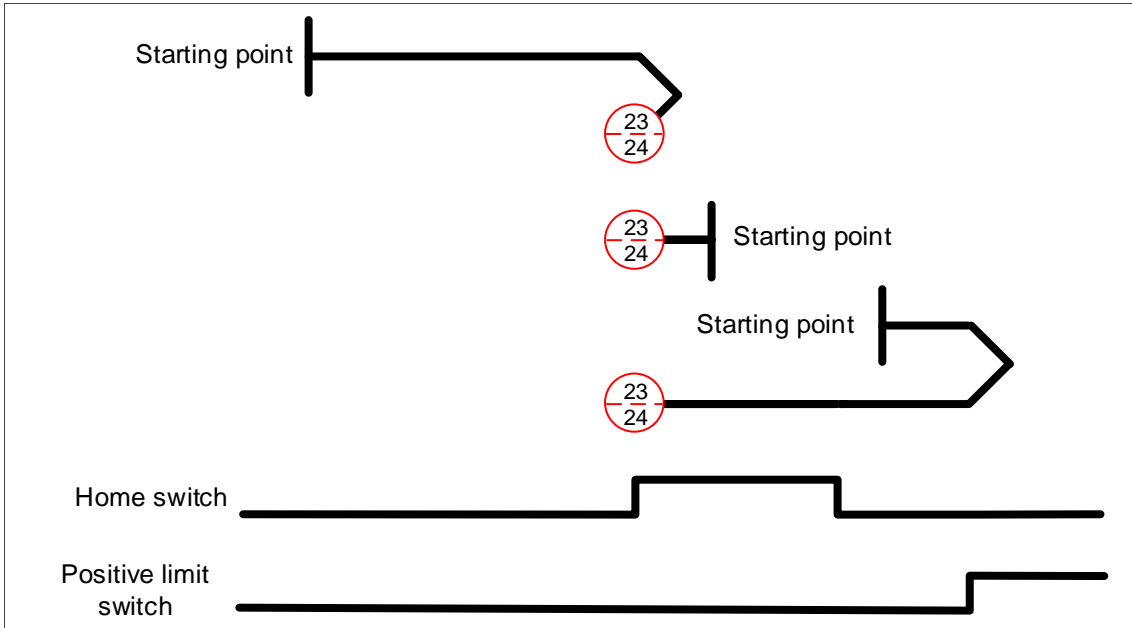


Methods 21 and 22: homing on the home switch

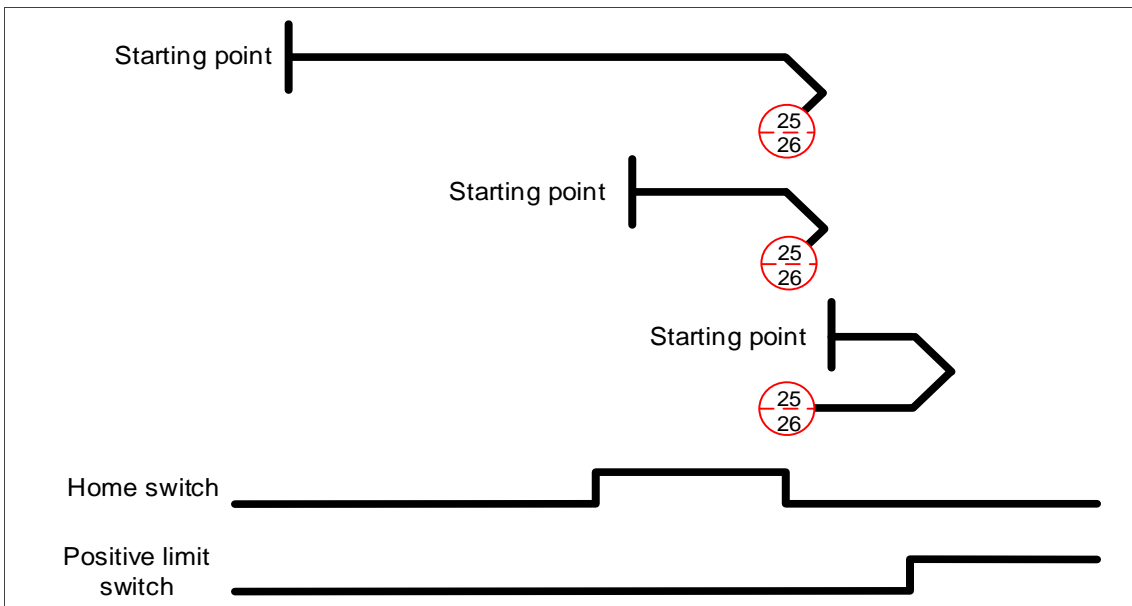


13

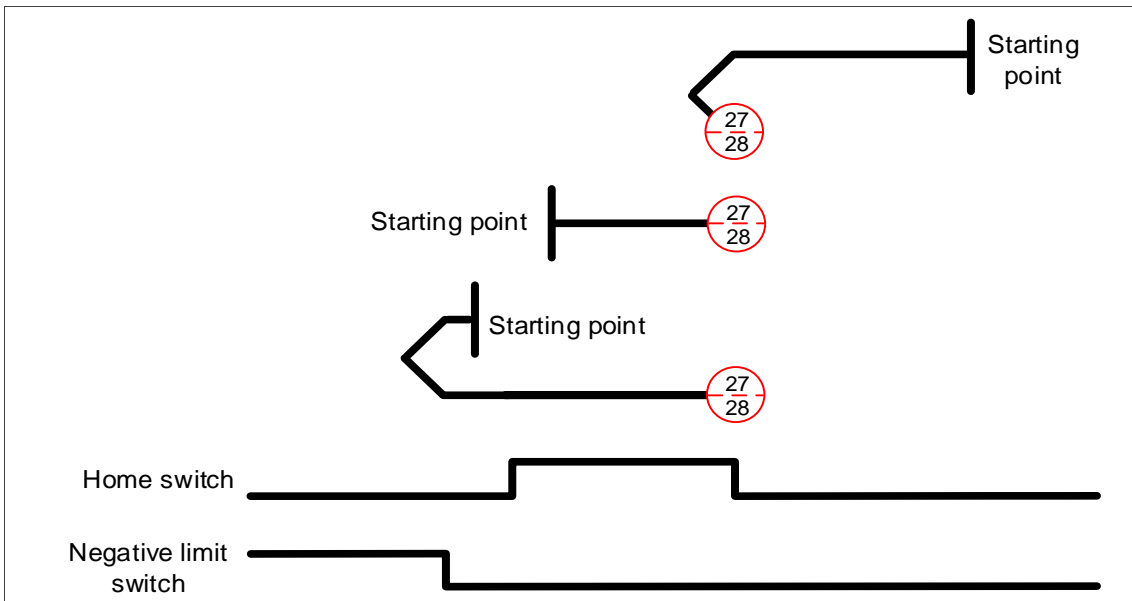
Methods 23 and 24: homing on the positive limit switch and home switch



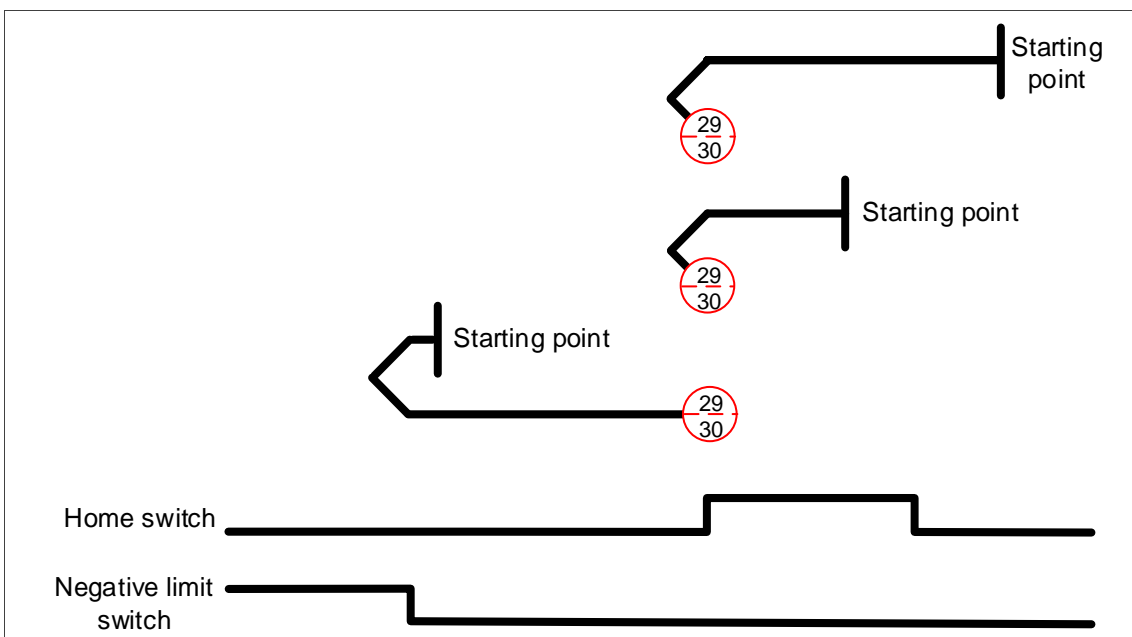
Methods 25 and 26: homing on the positive limit switch and home switch



Methods 27 and 28: homing on the negative limit switch and home switch

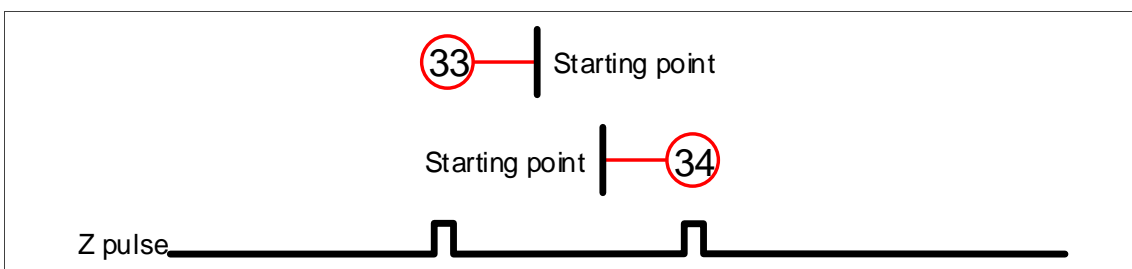


Methods 29 and 30: homing on the negative limit switch and home switch



Methods 31 and 32: reserved

Methods 33 and 34: homing on the Z pulse



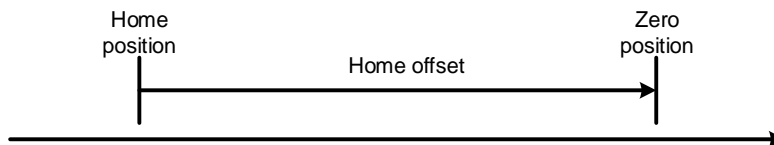
Method 35: define the current feedback position as the origin

PNU11: Home offset

Index	0
Name	Home offset
Data type	INTEGER32
Access	RW
Setting range	INTEGER32
Default	0
Unit	PUU

Function:

The origin reference point the system looks for during the homing procedure is Home Position, such as the origin sensor and Z pulse. When the origin reference point is found, the position offset from this point is the user-defined origin (Zero position), and the offset value is Home offset.



PNU12: Homing speeds 1

Index	0
Description	Speed during search for switch
Data type	UNSIGNED32
Access	RW
Setting range	1 - 20000
Default	100
Unit	0.1 rpm

PNU13: Homing speeds 2

Index	0
Description	Speed during search for zero
Data type	UNSIGNED32
Access	RW
Setting range	1 - 5000
Default	20
Unit	0.1 rpm

PNU14: Homing acceleration

Index	0
Name	Homing acceleration
Data type	UNSIGNED32
Access	RW
Setting range	1 - 65500
Default	100
Unit	ms

Function:

The time slope set by this parameter is the time required for the motor to accelerate from 0 rpm to 3,000 rpm and decelerate from 3,000 rpm to 0 rpm. This parameter only works in Homing mode when telegram 111 is used.

PNU15: Profile acceleration

Index	0
Name	Profile acceleration
Data type	UNSIGNED32
Access	RW
Setting range	1 - 65500
Default	200
Unit	ms

Function:

The time slope set by this parameter is the time required for the motor to accelerate from 0 rpm to 3,000 rpm. This parameter only works when telegram 111 (Profile Position mode) or telegram 1 (Profile Velocity mode) is used.

PNU16: Profile deceleration

Index	0
Name	Profile deceleration
Data type	UNSIGNED32
Access	RW
Setting range	1 - 65500
Default	200
Unit	ms

Function:

The time slope set by this parameter is the time required for the motor to decelerate from 3,000 rpm to 0 rpm. This parameter only works when telegram 111 (Profile Position mode) or telegram 1 (Profile Velocity mode) is used.

PNU20: P parameter group

Index	0
Name	P parameter group
Data type	UNSIGNED32
Access	RW
Parameter input pin of FB287	ValueWrite2
Setting range	1 - 7
Default	0
Unit	N/A

Function:

This parameter sets the servo parameter group number, shown in green as follows.

$$\text{P1.001} = \text{0x001}$$

PNU20
PNU21
PNU22

PNU21: P parameter number

Index	0
Name	P parameter number
Data type	UNSIGNED32
Access	RW
Parameter input pin of FB287	ValueWrite2
Setting range	0 - 16#7FFFFFFF
Default	0
Unit	N/A

Function:

This parameter sets the servo parameter number, shown in blue as follows.

$$\text{P1.001} = \text{0x001}$$

PNU20
PNU21
PNU22

PNU22: P parameter value

Index	0
Name	P parameter value
Data type	SIGNED32
Access	RW
Parameter input pin of FB287	ValueWrite2
Setting range	0 - 16#7FFFFFFF
Default	0
Unit	N/A

13

Function:

This parameter sets the servo parameter value, shown in orange as follows.

$$\begin{array}{c} \text{P1.001} \\ \text{PNU20} \quad \text{PNU21} \end{array} = \begin{array}{c} \text{0x001} \\ \text{PNU22} \end{array}$$

13.7 Troubleshooting

This section provides troubleshooting information related to communication or interference with the controller. For information about the servo alarms, refer to Chapter 14.

1. Query the PZD and PNU values

The PZD and PNU are mapped to the OD objects, so you can query their values using the Scope function of ASDA-Soft. The mapping data is as follows.

Name	Function	Mapping OD
MDI_TARPOS	MDI position	OD 607Ah
MDI_VELOCITY	MDI velocity	OD 6081h
NSOLL	Speed setpoint	OD 60FFh
XIST	Position actual value	OD 6064h
NIST	Speed actual value	OD 606Ch
PNU10	Homing method	OD 6098h
PNU11	Home offset	OD 607Ch
PNU12	Homing speeds 1	OD 6099h sub1
PNU13	Homing speeds 2	OD 6099h sub2
PNU14	Homing acceleration	OD 609Ah
PNU15	Profile acceleration	OD 6083h
PNU16	Profile deceleration	OD 6084h

2. Eliminate interference

Packets are particularly sensitive to interference in high-speed network communication applications. To achieve fast and high-precision control, the selection of the wire is extremely important. Use shielded cables for the communication wiring, and make sure that the shielded connector is firmly connected to the servo drive communication port. Also, ensure the ground wire is properly connected and grounded.

3. Device name in the PROFINET tool does not match the servo device name

The controller activates the servo by using a PROFINET tool (e.g., Siemens TIA Portal software) to connect to the servo and assign the servo device name based on DNS (Domain Name System). Therefore, the device name shown in the PROFINET tool (e.g., PROFINET device name in TIA Portal) must match the servo device name, and each device name must be unique.

If using the servo for the first time or desiring to change the servo via the controller, you have to assign the corresponding device name in the PROFINET tool.

4. Technology object error

Make sure you have cleared the check boxes of **Automatically apply drive values at runtime**, **Torque data**, and **Automatically apply encoder values at runtime**.