
AX Servo Drive(CM55) PROFINET Manual

Version: 105

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1. PROFIdrive basic concepts

1.1. Supported telegrams

Telegram	Standard telegram 1		Siemens telegram 352		Standard telegram 3	
Control Mode	Speed control mode		Speed control mode		Speed control mode	
Application Class	AC1		AC1		AC4	
No.	2	2	6	6	5	9
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOLL_A	NIST_A	NSOLL_A	NIST_A_GLATT	NSOLL_B	NIST_B
PZD3	--	--	User	IAIST_GLATT		
PZD4	--	--	User	MIST_GLATT	STW2	ZSW2
PZD5	--	--	User	WARN_CODE	G1_STW	G1_ZSW
PZD6	--	--	User	FAULT_CODE	--	G1_XIST1
PZD7	--	--	--	--	--	
PZD8	--	--	--	--	--	G1_XIST2
PZD9	--	--	--	--	--	
PZD10	--	--	--	--	--	--

Telegram	Siemens telegram 102		Siemens telegram 105		Siemens telegram 111	
Control Mode	Speed control mode		Position control mode		Position control mode	
Application Class	AC4		AC4		AC3	
No.	6	10	10	10	12	12
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOLL_	NIST_B	NSOLL_B	NIST_B	POS_STW1	POS_ZSW1
PZD3	B				POS_STW2	POS_ZSW2
PZD4	STW2	ZSW2	STW2	ZSW2	STW2	ZSW2
PZD5	MOMRE D	MELDW	MOMRED	MELDW	OVERRIDE	MELDW
PZD6	G1_STW	G1_ZSW	G1_STW	G1_ZSW	MDI_TARPOS	XIST_A
PZD7	--	G1_XIST1	XERR	G1_XIST1		
PZD8	--				MDI_VELOCITY	NIST_B
PZD9	--	G1_XIST2	KPC	G1_XIST2	MDI_ACC	
PZD10	--					
PZD11	--	--	--	--	MDI_DEC	WARN_CODE
PZD12	--	--	--	--	User	User

Telegram	Supplementary telegram 750		Supplementary telegram 4		Supplementary telegram 8		Supplementary telegram 14	
No.	3	1	4	4	8	8	14	14
PZD1	M_ADD1	M_ACT	RPZD1	TPZD1	RPZD1	TPZD1	RPZD1	TPZD1
PZD2	M_LIMIT_POS	--	RPZD2	TPZD2	RPZD2	TPZD2	RPZD2	TPZD2
PZD3	M_LIMIT_NEG	--	RPZD3	TPZD3	RPZD3	TPZD3	RPZD3	TPZD3
PZD4	--	--	RPZD4	TPZD4	RPZD4	TPZD4	RPZD4	TPZD4
PZD5	--	--	--	--	RPZD5	TPZD5	RPZD5	TPZD5
PZD6	--	--	--	--	RPZD6	TPZD6	RPZD6	TPZD6
PZD7	--	--	--	--	RPZD7	TPZD7	RPZD7	TPZD7
PZD8	--	--	--	--	RPZD8	TPZD8	RPZD8	TPZD8
PZD9	--	--	--	--	--	--	RPZD9	TPZD9
PZD10	--	--	--	--	--	--	RPZD10	TPZD10
PZD11	--	--	--	--	--	--	RPZD11	TPZD11
PZD12	--	--	--	--	--	--	RPZD12	TPZD12
PZD13	--	--	--	--	--	--	RPZD13	TPZD13
PZD14	--	--	--	--	--	--	RPZD14	TPZD14

* One PZD = one word

* PZD12 of telegram 111 is used to configure the user-defined function.

* Siemens telegram 105 supports DSC function (Dynamic Servo Control)

* The maximum number of RPZDS for all telegram is 26, and the maximum number of TPZDS for all telegram is 26.

* The upper limit of RPZDS that the bus adapter can be equipped with is 16, and the upper limit of TPZDS that the bus adapter can be equipped with is 16. The following table is the number of PZDS in the bus adapter occupied by each telegram.

Telegram	Use the bus adapter RPZD No.	Use the bus adapter TPZD No.
Standard telegram 1	2	2
Siemens telegram 352	6	6
Standard telegram 3	1	0
Siemens telegram 102	2	0
Siemens telegram 105	2	0
Siemens telegram 111	2	1
Supplementary telegram 750	3	1
Supplementary telegram 4	4	4
Supplementary telegram 8	8	8
Supplementary telegram 14	14	14

1.2. Process parameter description

Signal	Description	Receive word/ Transmit word	Data type	Scaling
STW1	Control word 1	R	U16	
STW2	Control word 2	R	U16	
ZSW1	Status word 1	T	U16	
ZSW2	Status word 2	T	U16	
NSOLL_A	Speed setpoint A (16 bit)	R	I16	[C05.31 1 and 352 velocity base value] - [D00.05 Motor rated speed], default 4000hex
NSOLL_B	Speed setpoint B (32 bit)	R	I32	40000000hex - [D00.05 Motor rated speed]
NIST_A	Speed actual value A (16 bit)	T	I16	[C05.31 1 and 352 velocity base value] - [D00.05 Motor rated speed], default 4000hex
NIST_B	Speed actual value B (32 bit)	T	I32	40000000hex - [D00.05 Motor rated speed]
G1_STW	Encoder 1 control word	R	U16	
G1_ZSW	Encoder 1 status word	T	U16	
G1_XIST1	Encoder 1 actual position 1	T	U32	Incremental position
G1_XIST2	Encoder 1 actual position 2	T	U32	Absolute position and encoder fault code
MOMRED	Torque reduction	R	I16	Torque limiter (NM)= 300.0% * [D00.10 Motor rated torque] * (1 - MOMRED / 16384)
MELDW	Message word	T	U16	
KPC	Position controller gain factor	R	I32	DSC parameter
XERR	Position deviation	R	I32	Encoder unit, DSC related
MDI_TARPOS	MDI position	R	I32	1hex-1LU
MDI_VELOCITY	MDI velocity	R	I32	1hex-1000LU/min
MDI_ACC	MDI acceleration override	R	I16	4000hex-100%
MDI_DEC	MDI deceleration override	R	I16	4000hex-100%
XIST_A	Position actual value A	T	I32	1hex-1LU
OVERRIDE	Position velocity override	R	I16	4000hex-100%
FAULT_CODE	Fault code	T	U16	[P12.03 Current failure]
WARN_CODE	Alarm code	T	U16	[P12.04 Current alarm]
POS_STW1	Position Control word 1	R	U16	

POS_STW2	Position Control word 2	R	U16	
POS_ZSW1	Position Status word 1	T	U16	
POS_ZSW2	Position Status word 2	T	U16	
NIST_A_GLATT	Speed actual value	T	I16	4000hex-[D00.05 Motor rated speed]
IAIST_GLATT	Current actual value	T	I16	4000hex-[D00.03 Motor rated current]
MIST_GLATT	Torque actual value	T	I16	4000hex-[D00.10 Motor rated torque]
M_ADD1	Supplementary torque	R	U16	[B02.03 Torque control Torque setting selection]
M_LIMIT_POS	Positive torque limit	R	U16	[B06.10 Selection of torque upper limit]
M_LIMIT_NEG	Negative torque limit	R	U16	[B06.11 Selection of torque lower limit]
M_LIMIT_ACT	Actual torque	T	U16	[P06.11 Output torque]

1.3. Control word

STW1 control word(Standard telegram 1, 3,Siemens telegram 102, 105 ,352)

Signal	Description
STW1.0	OFF1, ↑ = ON (pulses can be enabled), 0=OFF1(deceleration and shutdown)
STW1.1	OFF2,1= No OFF2 (enable is possible),0=OFF2(free shutdown)
STW1.2	OFF3,1= No OFF3 (enable is possible) 0=OFF3(Emergency shutdown)
STW1.3	1= Enable operation,0= Inhibit operation
STW1.4	1= the ramp-function generator can be enabled 0= Inhibit ramp-function generator
STW1.5	1= Continue ramp-function generator 0= Freeze ramp-function generator
STW1.6	1= Enable setpoint 0= Inhibit setpoint (set the ramp-function generator input to zero)
STW1.7	↑ = Acknowledge faults
STW1.8	1=JOG1(1/352 telegram)
STW1.9	1=JOG2(1/352 telegram)
STW1.10	1 = Control via PLC
STW1.11	1 = Setpoint inversion (Manually configure the function code). [B00.06 Custom speed command negate SRC]Set to[P02.11].
STW1.12 ~ STW1.13	Reserved
STW1.14	1: Enable closed-loop torque (the drive switches to torque mode) 0: No closed-loop torque
STW1.15	Reserved

STW1 control word (Siemens telegram 111)

Signal	Description
STW1.0	OFF1, ↑ = ON (pulses can be enabled) 0=OFF1(deceleration and shutdown)
STW1.1	OFF2,1= No OFF2 (enable is possible),0=OFF2(free shutdown)
STW1.2	OFF3,1= No OFF3 (enable is possible) 0=OFF3(Emergency shutdown)
STW1.3	1= Enable operation,0= Inhibit operation
STW1.4	1 = Do not reject traversing task 0 = Reject traversing task (ramp-down with the maximum deceleration)
STW1.5	1 = No intermediate stop,0 = Intermediate stop
STW1.6	↑ = Activate traversing task
STW1.7	↑ = Acknowledge faults
STW1.8	1=Jog 1 signal source
STW1.9	1=Jog 2 signal source
STW1.10	1=Control via PLC
STW1.11	1 = Start referencing,0 = Stop referencing
STW1.12	Reserved
STW1.13	↑ = External block change
STW1.14	1: Enable closed-loop torque (the drive switches to torque mode) 0: No closed-loop torque
STW1.15	Reserved

STW2 control word (Standard telegram 3, Siemens telegram 102, 105 ,111)

Signal	Description
STW2~ STW2.7	Reserved
STW2.8	1 = Travel to fixed stop
STW2.9 ~ STW2.11	Reserved
STW2.12	Master sign-of-life, bit 0
STW2.13	Master sign-of-life, bit 1
STW2.14	Master sign-of-life, bit 2
STW2.15	Master sign-of-life, bit 3

G1_STW encoder 1 control word

Signal	Description
G1_STW.0~ G1_STW.12	Reserved
G1_STW.13	1 = Request value cyclic transfer of the absolute position value in Gn_XIST2
G1_STW.14	1 = Request parking encoder
G1_STW.15	↑ :Acknowledge encoder fault

POS_STW1 positioning control word

Signal	Description
POS_STW1.0	Traversing block selection, bit 0
POS_STW1.1	Traversing block selection, bit 1
POS_STW1.2	Traversing block selection, bit 2
POS_STW1.3	Traversing block selection, bit 3
POS_STW1.4~ POS_STW1.7	Reserved
POS_STW1.8	1= Absolute positioning is selected 0= Relative positioning is selected
POS_STW1.9	0= Absolute positioning through the shortest distance 1= Absolute positioning/MDI direction selection, positive
POS_STW1.10	2= Absolute positioning/MDI direction selection, negative 3= Absolute positioning through the shortest distance
POS_STW1.11	Reserved
POS_STW1.12	1 = Continuous transfer 0 = Activate MDI block change with ↑ of a traversing task (STW1.6)
POS_STW1.13	Reserved
POS_STW1.14	1 = Signal setting-up selected, 0 = Signal positioning selected
POS_STW1.15	1 = MDI selection

POS_STW2 positioning control word

Signal	Description
POS_STW2.0	Reserved
POS_STW2.1	1: Set reference point
POS_STW2.2	1: Reference cam active
POS_STW2.3~ POS_STW2.4	Reserved
POS_STW2.5	0: Jogging, incremental active 1: Jogging, velocity active
POS_STW2.6~ POS_STW2.8	Reserved
POS_STW2.9	0: Start the search for reference in the negative direction

	1: Start the search for reference in the positive direction
POS_STW2.10~ POS_STW2.13	Reserved
POS_STW2.14	1: Software limit switch activation; Consistent function with [G03.13 Soft limit setting]
POS_STW2.15	1: STOP cam active

1.4. Status word

ZSW1 status word (Standard telegram 1, Siemens telegram 352)

Signal	Description
ZSW1.0	1= Ready for servo on
ZSW1.1	1= Ready for operation
ZSW1.2	1= Operation enabled
ZSW1.3	1= Fault present
ZSW1.4	1= No coast down active (OFF2 inactive)
ZSW1.5	1= No fast stop active (OFF3 inactive)
ZSW1.6	1= Switching on inhibited active
ZSW1.7	1= Alarm present
ZSW1.8	1= Speed setpoint - actual value deviation within tolerance t_off. [B06.30 Excessive speed DEV test value] [B06.31 Excessive speed DEV test time]
ZSW1.9	1= Control requested
ZSW1.10	1= for ncomparison value reached/exceeded. [B06.32 CV reaches detection value], [B06.33 CV reaches detection lag value], [B06.34 CV reachese the detection time]
ZSW1.11	1= I, M, or P limit reached
ZSW1.12	1= Open the holding brake
ZSW1.13	1= Motor forward
ZSW1.14	Reserved
ZSW1.15	Reserved

ZSW1 status word 1(Standard telegram 3,Siemens telegram 102, 105)

Signal	Description
ZSW1.0	1= Ready for servo on
ZSW1.1	1= Ready for operation
ZSW1.2	1= Operation enabled
ZSW1.3	1= Fault present
ZSW1.4	1= No coast down active (OFF2 inactive)
ZSW1.5	1= No fast stop active (OFF3 inactive)
ZSW1.6	1= Switching on inhibited active
ZSW1.7	1= Alarm present

ZSW1.8	1= Speed setpoint - actual value deviation within tolerance t _{off} . [B06.30 Excessive speed DEV test value] [B06.31 Excessive speed DEV test time]
ZSW1.9	1= Control requested
ZSW1.10	1= f or n comparison value reached/exceeded. [B06.32 CV reaches detection value],[B06.33 CV reaches detection lag value],[B06.34 CV reachese the detection time]
ZSW1.11 ~ ZSW1.13	Reserved
ZSW1.14	1: Closed-loop torque control active
ZSW1.15	Reserved

ZSW1 status word (Siemens telegram 111)

Signal	Description
ZSW1.0	1= Ready for switching on
ZSW1.1	1= Ready for operation
ZSW1.2	1= Operation enabled
ZSW1.3	1= Fault present
ZSW1.4	1= No coast down active (OFF2 inactive)
ZSW1.5	1= No fast stop active (OFF3 inactive)
ZSW1.6	1= Switching on inhibited active
ZSW1.7	1= Alarm present
ZSW1.8	1= Following error within tolerance. [G03.03 Excessive POS DEV fault value(C)]
ZSW1.9	1= Control requested
ZSW1.10	1= Target position reached. [G00.24 POS complete output COND]
ZSW1.11	1= Reference point set
ZSW1.12	↑ = Acknowledgement traversing block activated
ZSW1.13	1= Setpoint fixed
ZSW1.14	1: Closed-loop torque control active
ZSW1.15	Reserved

ZSW2 status word (Standard telegram 3, Siemens telegram 102, 105,111)

Signal	Description
ZSW2.0 ~ ZSW2.7	Reserved
ZSW2.8	1 = Active to fixed endstop
ZSW2.9 ~ ZSW2.11	Reserved
ZSW2.12	Slave sign-of-life, bit 0
ZSW2.13	Slave sign-of-life, bit 1
ZSW2.14	Slave sign-of-life, bit 2

ZSW2.15	Slave sign-of-life, bit 3
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POS_ZSW1 positioning status word

Signal	Description
POS_ZSW1.0	Active Traversing Block Bit 0
POS_ZSW1.1	Active Traversing Block Bit 1
POS_ZSW1.2	Active Traversing Block Bit 2
POS_ZSW1.3	Active Traversing Block Bit 3
POS_ZSW1.4 ~ POS_ZSW1.7	Reserved
POS_ZSW1.8	1= STOP cam minus active
POS_ZSW1.9	1= STOP cam plus active
POS_ZSW1.10	1= Jogging active
POS_ZSW1.11	1= Reference point approach active
POS_ZSW1.12	Reserved
POS_ZSW1.13	1= Traversing Block active
POS_ZSW1.14	Reserved
POS_ZSW1.15	1= MDI active

POS_ZSW2 positioning status word

Signal	Description
POS_ZSW2.0	Reserved
POS_ZSW2.1	1= Velocity limiting active [P13.15 Positive maximum speed][P13.16 Negative maximum speed]
POS_ZSW2.2	Reserved
POS_ZSW2.3	Reserved
POS_ZSW2.4	1= Axis moves forward
POS_ZSW2.5	1= Axis moves backwards
POS_ZSW2.6	1= Software limit switch minus reached
POS_ZSW2.7	1= Software limit switch plus reached
POS_ZSW2.8 ~ POS_ZSW2.11	Reserved
POS_ZSW2.12	1 = Fixed stop reached
POS_ZSW2.13	1 = Fixed stop clamping torque reached
POS_ZSW2.14	1 = Travel to fixed stop active
POS_ZSW2.15	Reserved

G1_ZSW encoder 1 status word

Signal	Description
G1_ZSW.0 ~ G1_ZSW10	Reserved
G1_ZSW.11	1= Acknowledge encoder fault active
G1_ZSW.12	Reserved

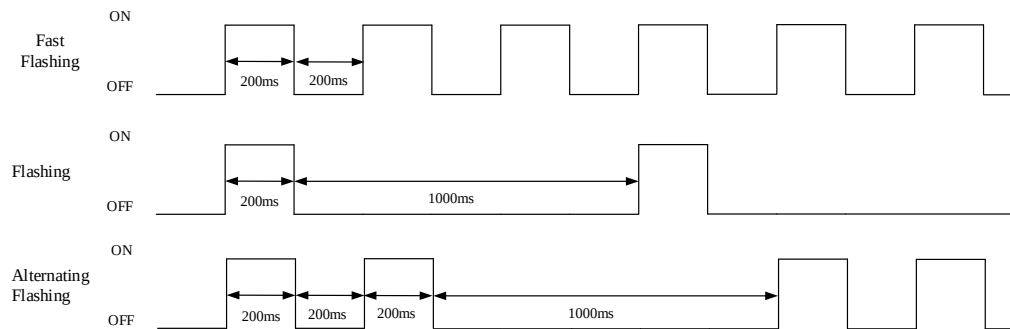
G1_ZSW.13	1= Absolute value is cyclically transferred
G1_ZSW.14	1= Parking encoder active
G1_ZSW.15	1= Encoder fault, the fault is in Gn_XIST2

MELDW status word

Signa	Description
MELDW.0	Reserved
MELDW.1	0= Torque limit reaches. Torque mode: [P01.50 Reaching the upper torque limit] [P01.51Reached lower torque limit]. Other modes: [P01.52 Output torque reaches limiter]
MELDW.2~ MELDW.10	Reserved
MELDW.11	1 = Controller enable
MELDW.12	1= Drive ready [P01.01 Ready for run]
MELDW.13	1= Pulses enabled [P01.02 Run]
MELDW.14 ~ MELDW.15	Reserved

2. Establish PROFINET communication

2.1. LINK1 and LINK2 description



LINK1(RUN)	LINK2 (ERR)	Description
Off	Off	Communication not established
Fast flashing	—	AR establishment
On	—	Process data communication
Flashing	Flashing	DCP request
—	On	XHIF Interface communication error
—	Fast flashing	Communication application layer error
Alternating flashing	—	Burning

2.2. PROFINET function code parameters

2.2.1. Common parameters

No.	Parameter name	Read /write	Description
C05.00	Telegram type	RO	0: The telegram is invalid 1: Standard telegram 1, PZD-2/2 2: Standard telegram 3, PZD-5/9 3: Siemens telegram 102, PZD-6/10 4: Siemens telegram 105, PZD-10/10 5: Siemens telegram 111, PZD-12/12 6: Siemens telegram 352, PZD-6/6
C05.01	Communication status	RO	0: Communication not established 1: AR establishment 2: Process data communication 3: flashing the communication firmware

			4: Loss of life signal 5: AR build error 6: Restoring factory parameters 7: Communication timeout 8: The bus adapter exceeds 16 9: PZD exceeds 26
C05.02	Supplementary telegram type 1	RO	0: The telegram is invalid 1: supplementary telegram 750, PZD-3/1 2: supplementary telegram 4, PZD-4/4 3: supplementary telegram 8, PZD-8/8 4: supplementary telegram 14, PZD-14/14
C05.03	Diagnostic information is valid	RW	0: Invalid 1: Valid (Drive fault information, upload PLC diagnostic information)
C05.04	Software version	RO	Software version of PROFINET communication
C05.05	Communication error code	RO	Reasons for disconnection of AR connection
C05.06	Send Clock	RO	PROFINET send clock
C05.07	Heartbeat monitoring tolerance value	RW	0: invalid
C05.08	Sync jitter	RO	Real-time synchronization jitter value, 125/3000 us (INT16)
C05.09	Maximum sync jitter	RW	Write 0 to clear, 125/3000 us(INT16)
C05.10	Special function selection	RW	0: Invalid 1: Flash communication firmware 2: Restore communication defaults
C05.11	PROFIdrive state machine	RO	0: Power On 1: Idle 2: S1: Switching On Inhibited 3: S2: Ready For Switching On 4: S3: Switched On 5: S4: Operation 6: S41: Pos Operation 7: S42: Pos Jog 8: S43: Pos Brake Max 9: S441: Pos Homing Run 10: S442: Pos Homing Ready 11: S451: Pos TrvTask Act 12: S452: Pos TrvTask Brake 13: S453: Pos TrvTask Intermediate 14: Ramp Stop 15: Quick Stop 16: Error 17:S421:Pos JogPosOk
C05.12	Encoder state machine	RO	0: Idle

			1:SD1: Normal Operation 2:SD2: Error Acknowledgement 3:SD3: Error 4:SD4: Reference value 5:SD5: Wait Reference Mark 6:SD6: Unused 7:SD7: Set Homing Position 8:SD8: Unused 9:SD9: Unused 10:SD10: Wait Measured Value 11:SD11: Load Measured Value 12:SD12: Parking 13:SD13: Parking Error 14:SD14: Parking Error Ack 15: Error
C05.13	Tdc_Tsc	RO	IRT parameters
C05.14	Sync status	RO	0: Idle 1:C-LS0 2:C-LS1 3:C-LS2 4:C-LS3 5:C-LS4 6:C-LS5 7:C-LS6 8:C-LS7 9:C-LS8 10:C-LS9 11:C-LS10 12:C-LS11 13:C-LS12 14:C-LS13 15:C-LS14 16:C-LS15 17:D-LS0 18:D-LS1 19:D-LS2 20:D-LS3 21:D-LS4 22:D-LS5 23:D-LS6 24:D-LS7 25:D-LS8 26:D-LS9 27:D-LS10

			28:D-LS11 29:D-LS12 30:D-LS13 31:D-LS14 32:D-LS15 33: Operation
C05.15	1 and 352 telegram modes	RW	0: Standard telegram 1: Free PZD configuration Power-on again after modification
C05.16	Input Reduction Ratio	RO	
C05.17	Output Reduction Ratio	RO	
C05.18	IP address is valid	RW	0: invalid 1: valid
C05.19	IP address 1	RW	192
C05.20	IP address 2	RW	168
C05.21	IP address 3	RW	0
C05.22	IP address 4	RW	2
C05.24	subnet mask 1	RW	255
C05.25	subnet mask 2	RW	255
C05.26	subnet mask 3	RW	255
C05.27	subnet mask 4	RW	0
C05.28	Supplementary PZD input address can be configured	RO	Input starting PZD of supplementary telegrams 4, 8, and 14
C05.29	Supplementary PZD output address can be configured	RO	Output starting PZD of supplementary telegrams 4, 8, and 14
C05.30	750 torque base value	RW	Corresponding rated torque
C05.31	1 and 352 speed base value	RW	Corresponding rated speed
C05.33	MAC address is valid	RW	0: invalid 1: valid
C05.34	MAC address 1	RW	0xD478 (78-D4-F1-A2-01-10)
C05.35	MAC address 2	RW	0xA2F1
C05.36	MAC address 3	RW	0x1001
C05.37	Supplementary telegram type 2	RO	0: The telegram is invalid 1: supplementary telegram 750, PZD-3/1 2: supplementary telegram 4, PZD-4/4 3: supplementary telegram 8, PZD-8/8 4: supplementary telegram 14, PZD-14/14
C05.38	Actual IP address 1	RO	192
C05.39	Actual IP address 2	RO	168
C05.40	Actual IP address 3	RO	0

C05.41	Actual IP address 4	RO	2
C05.42	Actual subnet mask 1	RO	255
C05.43	Actual subnet mask 2	RO	255
C05.44	Actual subnet mask 3	RO	255
C05.45	Actual subnet mask 4	RO	0
C05.50	Actual MAC address 1	RO	0xD478 (78-D4-F1-A2-01-10)
C05.51	Actual MAC address 2	RO	0xA2F1
C05.52	Actual MAC address 3	RO	0x1001
C05.53	Tdc	RO	us
C05.54	Ti	RO	us
C05.55	To	RO	us
C05.56	Cacf	RO	
C05.57	Debugging parameters 1	RO	PROFINET communication status word Bit0: Create AR Bit1: Process data communication Bit2: Communication error Bit3: Burn communication firmware Bit4: DCP request Bit5: Reset communication factory parameters (device name and IP, etc.) Bit6: Activate IRT Bit7: Request IRT Bit8: Process data output is valid Bit9: reserved Bit10-Bit15:AR error code
C05.58	Debugging parameters 2	RO	Reserve
C05.59	Debugging parameters 3	RO	Reserve
C05.60	Debugging parameters 4	RO	Reserve
C05.61	Debugging parameters 5	RO	Reserve
C00.66	RPZD1		Displays the PZD 1(setpoints) in the word format received from the fieldbus controller (PLC).
C00.67	RPZD2		Displays the PZD 2(setpoints) in the word format received from the fieldbus controller (PLC).
C00.68	RPZD3		Displays the PZD 3(setpoints) in the word format received from the fieldbus controller (PLC).
C00.69	RPZD4		Displays the PZD 4(setpoints) in the word format received from the fieldbus controller (PLC).
C00.70	RPZD5		Displays the PZD 5(setpoints) in the word format received from the fieldbus controller (PLC).
C00.71	RPZD6		Displays the PZD 6(setpoints) in the word format received from the fieldbus controller (PLC).
C00.72	RPZD7		Displays the PZD 7(setpoints) in the word format received from the fieldbus controller (PLC).

C00.73	RPZD8		Displays the PZD 8(setpoints) in the word format received from the fieldbus controller (PLC).
C00.74	RPZD9		Displays the PZD 9(setpoints) in the word format received from the fieldbus controller (PLC).
C00.75	RPZD10		Displays the PZD 10(setpoints) in the word format received from the fieldbus controller (PLC).
C00.76	RPZD11		Displays the PZD 11(setpoints) in the word format received from the fieldbus controller (PLC).
C00.77	RPZD12		Displays the PZD 12(setpoints) in the word format received from the fieldbus controller (PLC).
C00.78	RPZD13		Displays the PZD 13(setpoints) in the word format received from the fieldbus controller (PLC).
C00.79	RPZD14		Displays the PZD 14(setpoints) in the word format received from the fieldbus controller (PLC).
C00.80	RPZD15		Displays the PZD 15(setpoints) in the word format received from the fieldbus controller (PLC).
C00.81	RPZD16		Displays the PZD 16(setpoints) in the word format received from the fieldbus controller (PLC).
C00.50	TPZD1		Displays the PZD 1(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.51	TPZD2		Displays the PZD 2(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.52	TPZD3		Displays the PZD 3(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.53	TPZD4		Displays the PZD 4(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.54	TPZD5		Displays the PZD 5(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.55	TPZD6		Displays the PZD 6(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.56	TPZD7		Displays the PZD 7(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.57	TPZD8		Displays the PZD 8(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.58	TPZD9		Displays the PZD 9(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.59	TPZD10		Displays the PZD 10(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.60	TPZD11		Displays the PZD 11(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.61	TPZD12		Displays the PZD 12(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.62	TPZD13		Displays the PZD 13(actual values) in the word format that are sent to the fieldbus controller (PLC).

C00.63	TPZD14		Displays the PZD 14(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.64	TPZD15		Displays the PZD 15(actual values) in the word format that are sent to the fieldbus controller (PLC).
C00.65	TPZD16		Displays the PZD 16(actual values) in the word format that are sent to the fieldbus controller (PLC).

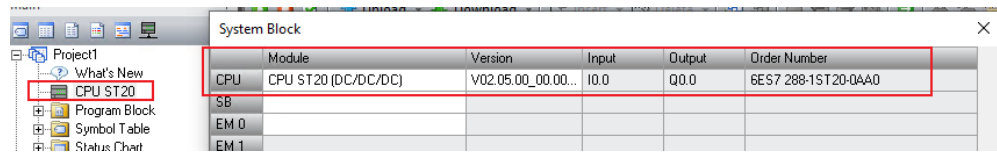
2.2.2. Monitoring parameters

No.	Parameter name	Read /write	Description
P11.38	STW1	RO	You can monitor and trace those parameters with Boneng DriveSoft 100.
P11.39	ZSW1	RO	
P11.40	STW2	RO	
P11.41	ZSW2	RO	
P11.42	G1_STW	RO	
P11.43	G1_ZSW	RO	
P11.68	POS_STW1	RO	
P11.69	POS_ZSW1	RO	
P11.70	POS_STW2	RO	
P11.71	POS_ZSW2	RO	
P11.72	AxisStateMachine	RO	PROFIdrive state machine
P11.73	EposALword Lo	RO	EPOS application layer adaptation word Bit0: MDI trigger bit. Bit1: Multi-segment trigger bit. Bit2: homing trigger bit. Related to STW1.11 Bit3: Jog1 trigger bit Bit4: Jog2 trigger bit Bit5: homing cancel bit Bit6: Task cancel bit. Bit7: Pause bit. Bit8: Jog mode. 0: speed jog; 1: position jog. Bit9: Position arrival flag. Bit10: homing completion flag. Bit11: The reference point flag has been set. Bit12: Encoder information initialization completion flag after power-on Bit13: Under MDI, command effective mode. 1: Continuous changes to the set value take effect immediately. 0: The command takes effect after triggering Bit14: Positive hardware limit status Bit15: Negative hardware limit status
P11.74	EposALword Hi	RO	Bit0: Minimum software limit status

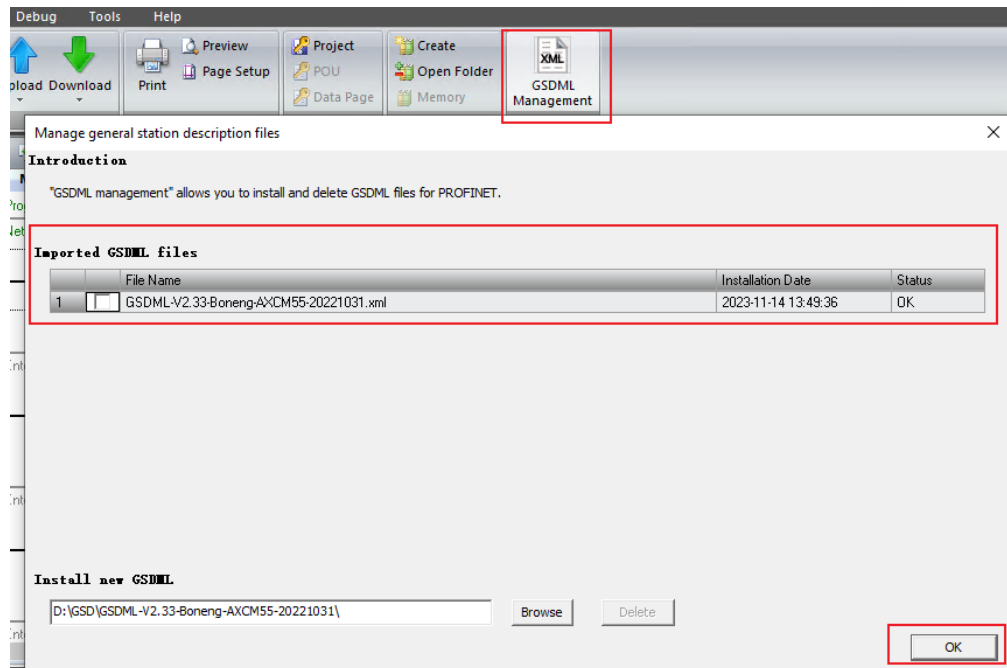
			Bit1: Maximum software limit status Bit2, Bit3: Actual movement direction of the axis. 0: Stop; 1: The axis moves forward; 2: The axis moves backward. Bit4: Reached speed limit flag.
P13.45	DeltaVelocity (AC4/DSC)	RO	Delta of speed
P13.47	NIST_B	RO	Speed actual value B
P13.49	111:MDI_VELOCITY 3/102/105:G1_XIST2	RO	111: MDI velocity 3/102/105: Absolute position and encoder fault code
P13.51	111: MDI_TARPOS 105: XERR	RO	111: MDI position 105: Encoder unit, DSC related
P13.53	111: XIST_A 105: KPC	RO	111: Position actual value A 105: Position controller gain factor
P13.55	111: AccTime 3/102/105:G1_XIST1	RO	111: Time to accelerate to calibrated speed 1000rpm(ms) 3/102/105: Incremental position
P13.57	111: DecTime 3/102/105:NSOLL_B	RO	111: Time to decelerate to calibrated speed 1000rpm(ms) 3/102/105: Speed setpoint B
P13.59	111: CancelTime 105: DeltaPosCmd(DSC)	RO	111: When the task is canceled, Time from calibrated speed 1000rpm to stop. 105: Position command delta
P13.61	111Velocity(RPM)	RO	111: Speed set value (RPM).After calculation by OVERRIDE(INT16)
P13.64	Synchronization deviation	RO	125/3000 us(INT16)
P13.65	Torque output upper limit	RO	1000 – 100%
P13.66	Torque output lower limit	RO	-1000 – -100%
P13.67	PROFIdrive Torque limiter (102/105)	RO	$3 \cdot 4096 \cdot ((16384 - \text{MOMRED}) / 16384)$ 4096 – 100%
P01.50	Reached the upper limit of torque	RO	In torque mode, reaching the torque positive limit
P01.51	Reached the lower limit of torque	RO	In torque mode, reaching the negative torque limit
P01.52	Reaches the limit of output torque	RO	In speed and position mode, torque limit reached
P01.90	Reference point is set	RO	Under Siemens telegram 111, 1=completed by actively homing or directly setting the home

2.3. S7-200 SMART configuration example

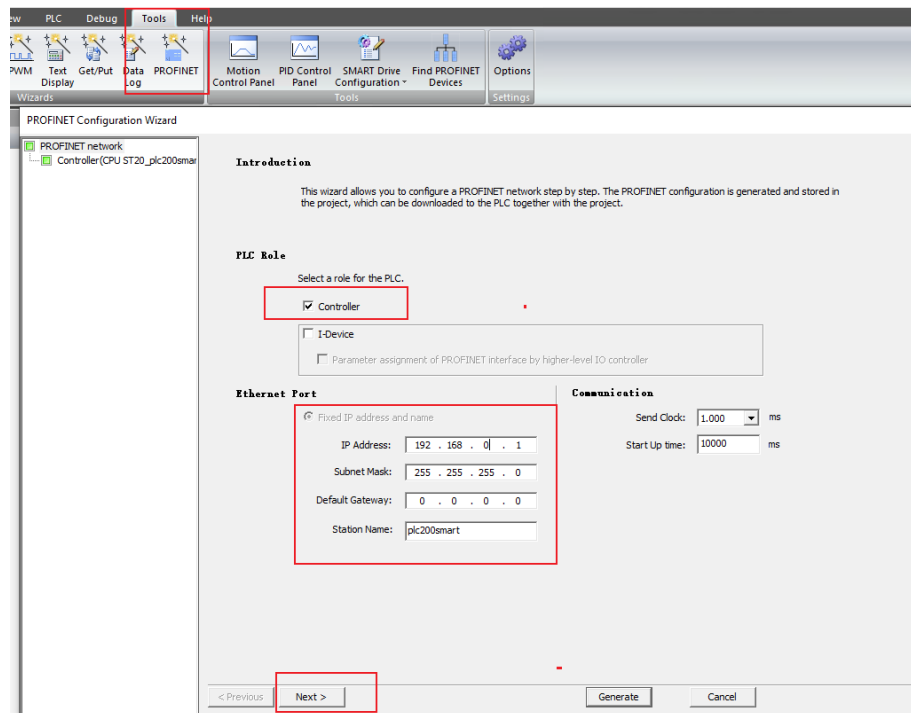
First use STEP 7-MicroWIN SMART software to create a project and select the PLC model.



Import GSDML of CM55.

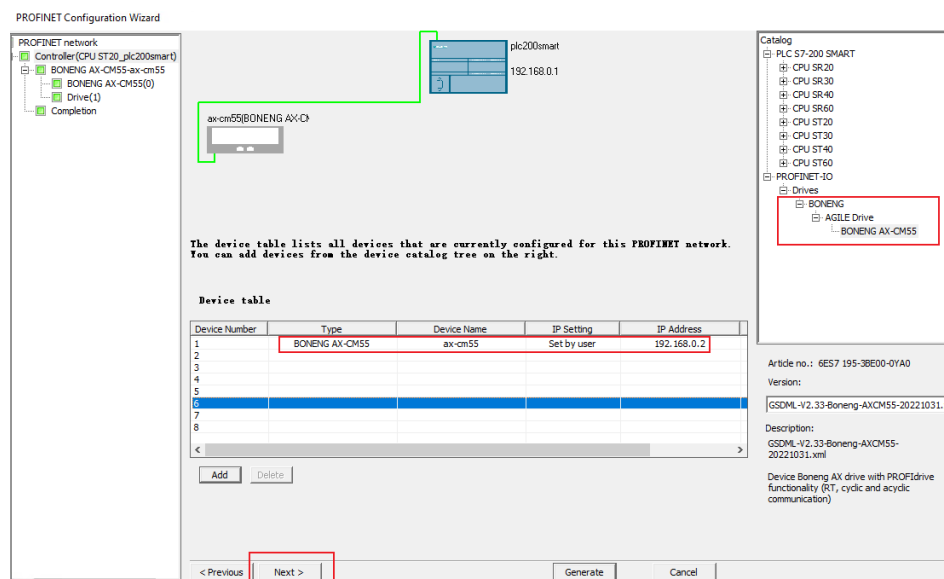


Through the wizard function, configure PROFINET communication parameters and telegram, select PLC as the PROFINET controller, configure the IP address of the PLC (it needs to be in the same network segment as the IP address of the drive configured later), and then click

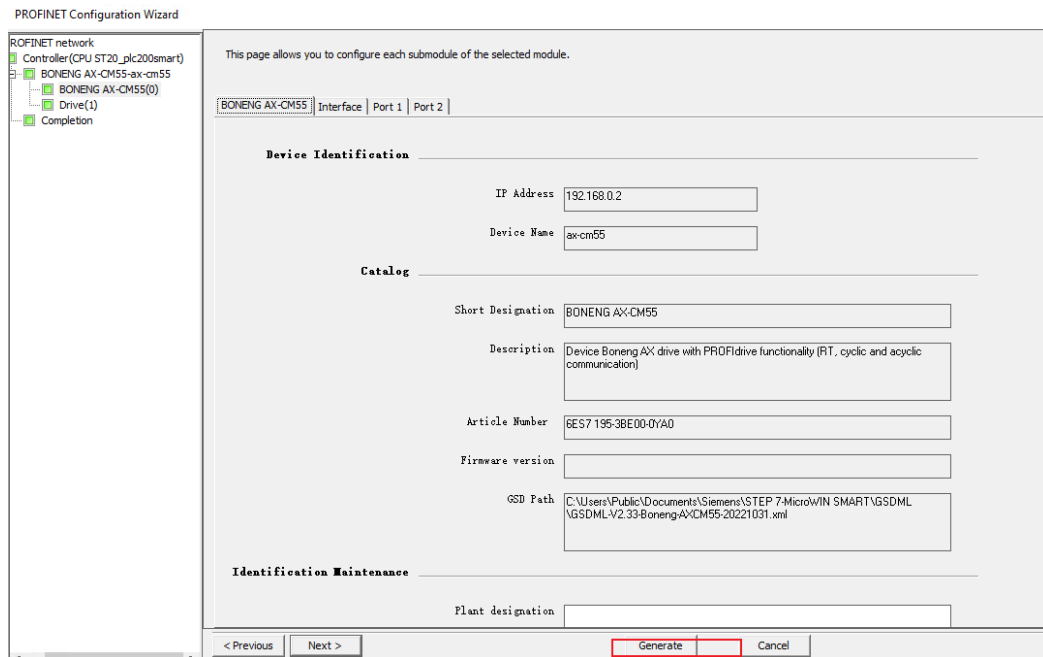


Next.

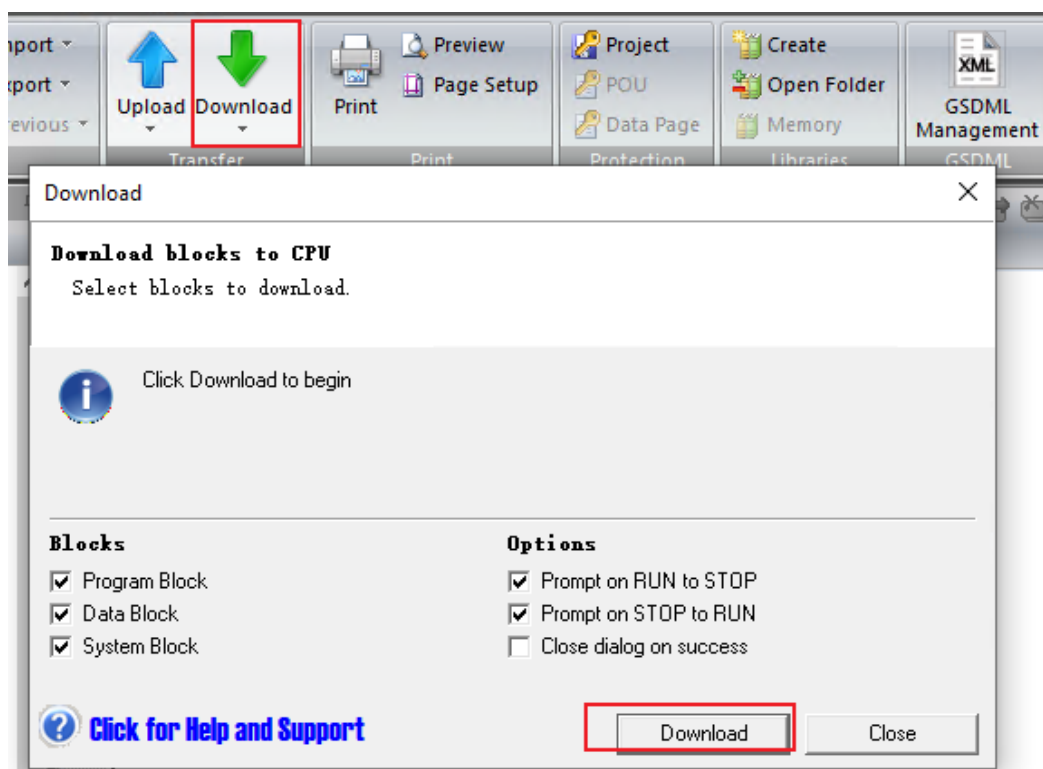
Add the drive from the device directory on the right, modify the device name to "ax-cm55", and then set the IP to "192.168.0.2".



After checking that the configured device information is correct, click Generate.

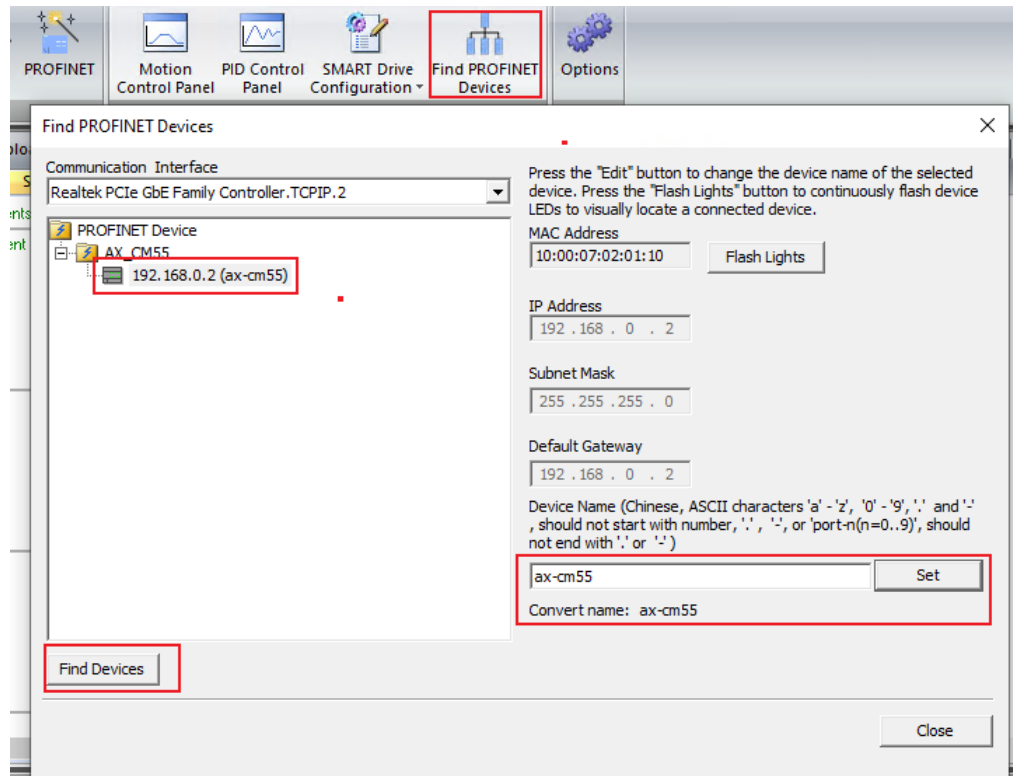


Download PLC program



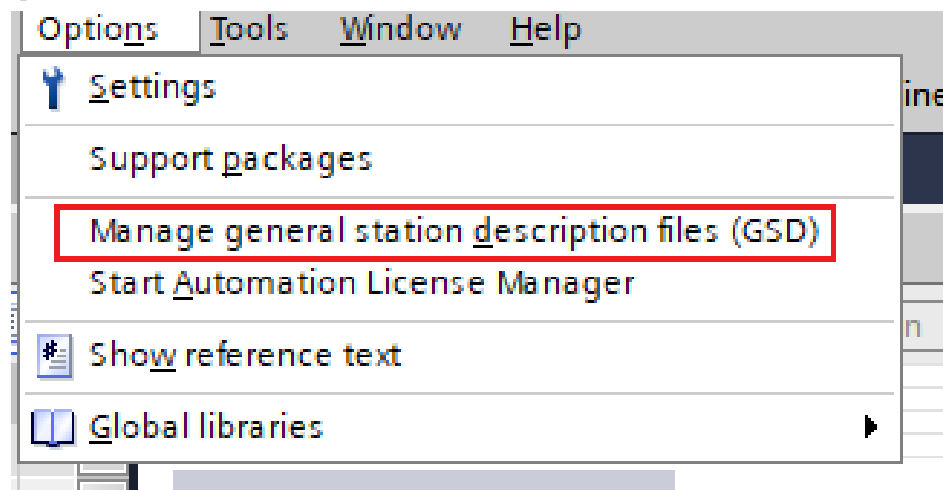
Find devices and assign device names. If the communication between the PLC and the drive is not established after the program is downloaded (the LINK1 light of the drive is always on indicating that the communication is established), it is mostly because the actual device name in the device is inconsistent with the device name in the configuration. Select "Find PROFINET Devices", then select "Find Devices", if the actual device name found is inconsistent with the configured device name (the configured device name is set to "ax-cm55" when adding a drive device in the wizard), you need to manually enter the

configured device name and click "Set" to complete the assignment of the device name. The PROFINET communication between S7-200 SMART and ax-cm55 is established.

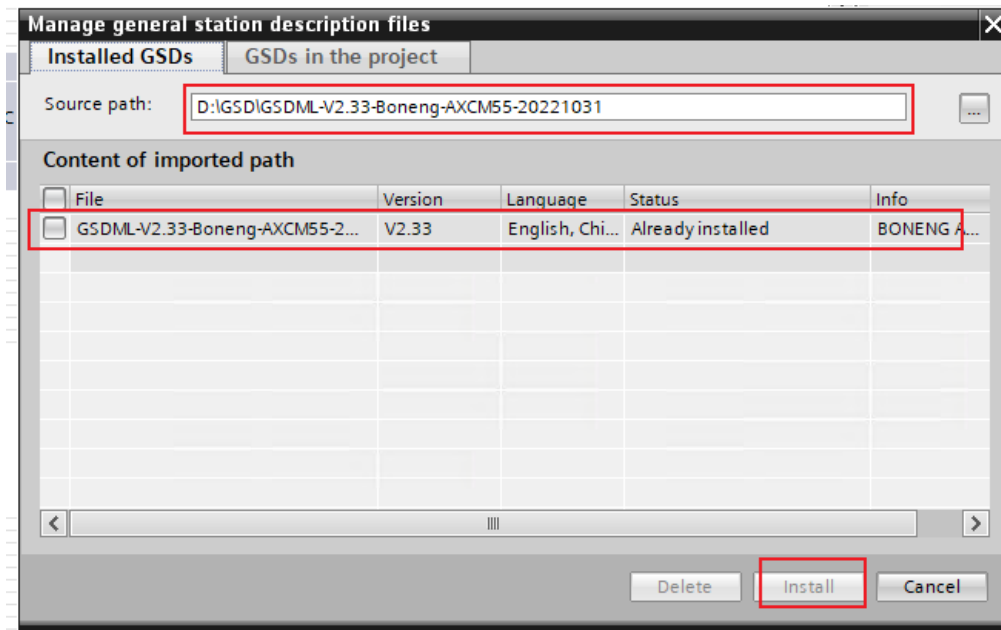


2.4. S7-1200/S7-1500 configuration example

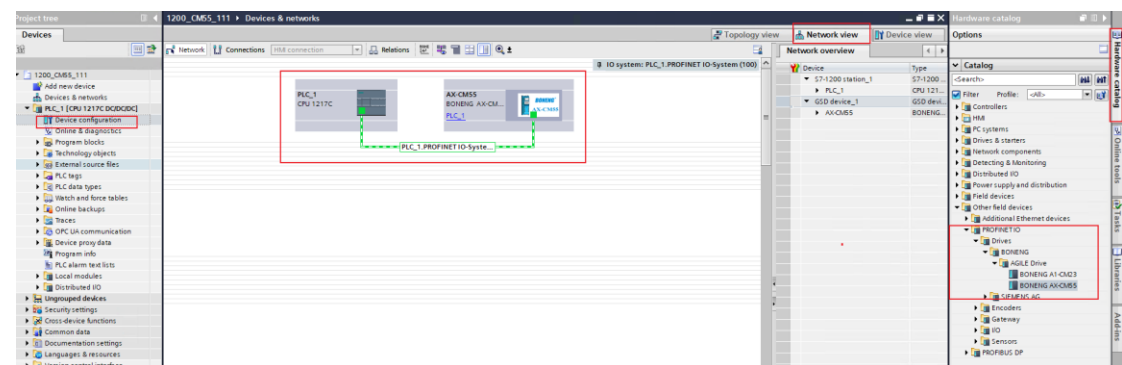
1. Input the V90 PN GSD file.



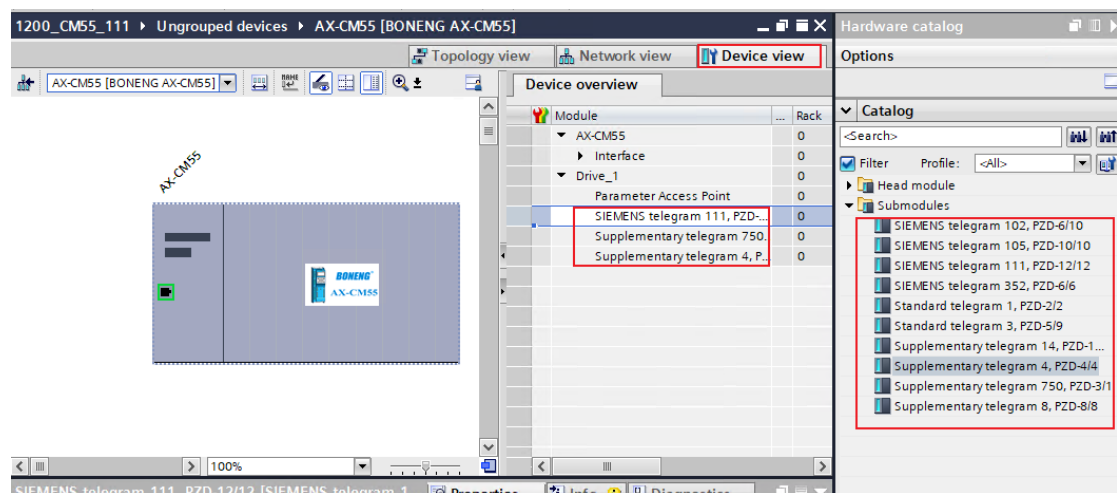
2. Find the GSD file and select it. Press the "Install" button to install it.



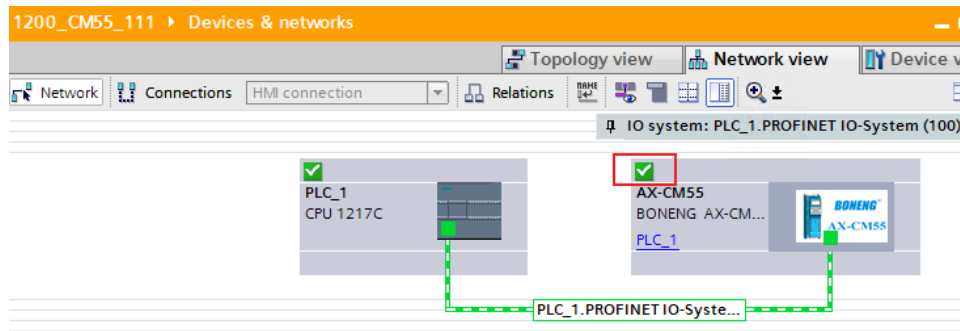
3. Select [Device and Network], find the AX-CM55 device in [Other Field Devices], drag it into [Network View], and then connect the network port of the CM55 and the network port of the PLC together with a cable.



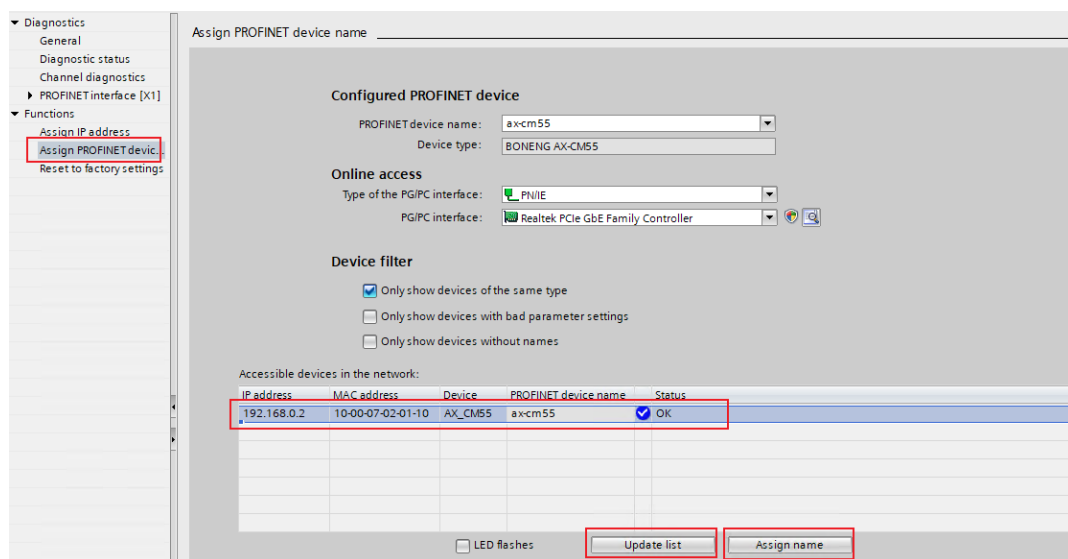
4. Under [Device View], configure the required telegram type.



5. Under [Device View], check the device name and IP address configured in the project.



8. In [Function] -> [Assign PROFINET device name], read out the actual IP address and device name of the CM55 device. If it is inconsistent with the configuration in the project, you can change the inconsistent device name or IP address in the device online to be consistent with the configuration.



3. PROFIdrive telegram application

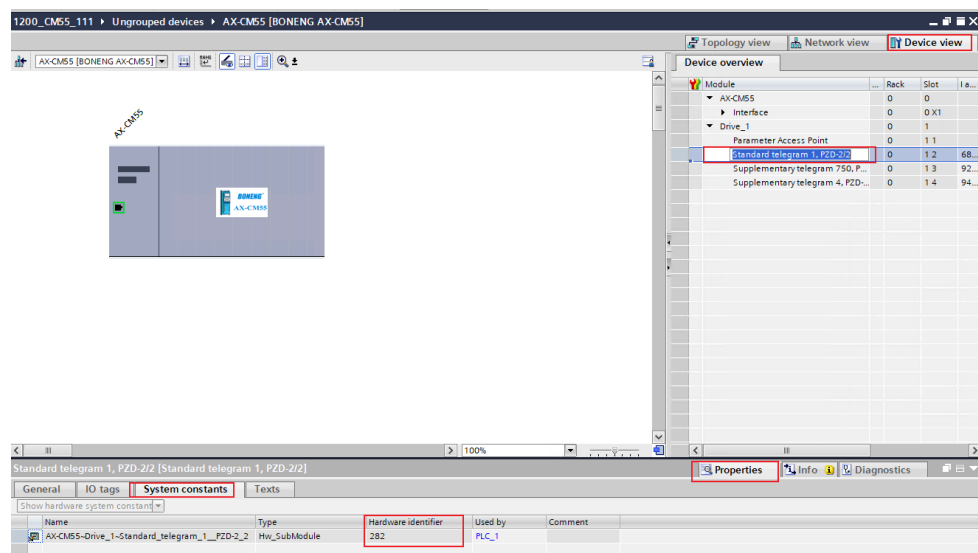
3.1. Standard telegram 1

Function code	Parameter	Description
B00.00	1:Custom control module	
B00.01	interconnect to P02.00	OFF1 comes from bus adapter A.PZD 1.0
B00.02	interconnect to P02.01	OFF2 comes from bus adapter A.PZD 1.1
B00.03	interconnect to P02.02	OFF3 comes from bus adapter A.PZD 1.2
B00.04	interconnect to P02.03	Operation is allowed from bus adapter A.PZD 1.3
B00.05	interconnect to P02.07	Fault reset comes from bus adapter A.PZD 1.7
B00.07	interconnect to P02.08	JOG1 from bus adapter A.PZD 1.8
B00.08	interconnect to P02.09	JOG2 from bus adapter A.PZD 1.9

B00.15	interconnect to P02.04	Ramp-function generator inhibit from bus adapter A.PZD 1.4
B00.16	interconnect to P02.05	Ramp-function generator pause from bus adapter A.PZD 1.5
B00.17	interconnect to P02.06	The ramp function generator reference is set to 0 from bus adapter A.PZD 1.6
B02.00	9:bus adapter A-PZD2	Speed control comes from PZD2
C00.35	[C05.31 1 and 352 velocity base value]	Corresponding to the rated speed, the default is 4000HEX
C00.02	interconnect to P12.07	Status word 1 is associated with PZD1
C00.03	interconnect to P13.00	The actual speed of the motor is linked to PZD2
C00.19	[C05.31 1 and 352 velocity base value]	Corresponding to the rated speed, the default is 4000HEX

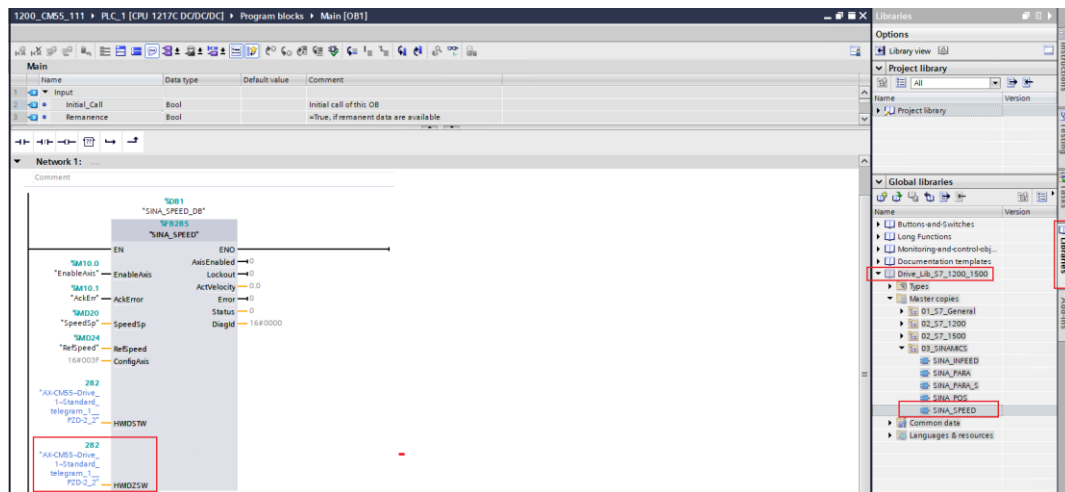
3.1.1. SINA_SPEED FB285 speed control

Configure "Standard telegram 1, PZD-2/2". Under [Device View], configure "Standard Telegram 1". After the configuration is completed, double-click "Standard telegram 1, PZD-2/2" in the red box and view the [Hardware Identifier] of the "AX-CM55~Drive_1~Standard_telegram_1_PZD-2_2" submodule in [Properties]->[System Constants] below.



Add the SINA_SPEED function block from [Library]. Double-click to select [Main [OB1]], select [Library], find the SINA_SPEED function block from [Drive_Lib_S7_1200_1500], and drag it into Main.

Note: The [Drive_Lib_S7_1200_1500] library needs to be added separately. Obtain the installation file of the library from the Siemens official website. Note that it needs to match the version of TIA.



Input interface

Input signal	Type	Meaning
EnableAxis	BOOL	"EnableAxis" = 1 → switching on the drive
AckError	BOOL	Acknowledgement of axis fault → "AckFlt"=1
SpeedSp	REAL	Speed setpoint
RefSpeed	REAL	Rated speed of the drive. Function code [D00.05 motor rated speed].
ConfigAxis	WORD	16#003F
HWDZSW	HW_IO	Symbolic name or HW ID/IO address on the setpoint slot (SetPoint)
HWDZSW	HW_IO	Symbolic name or HW ID/IO address on the setpoint slot (SetPoint)

ConfigAxis bit description

bit	Default	Meaning
0	1	OFF2, interconnect to STW1.1
1	1	OFF3, interconnect to STW1.2
2	1	Inverter enable, interconnect to STW1.3
3	1	0=Ramp-function generator enable, interconnect to STW1.4
4	1	0=Continue ramp-function generator, interconnect to STW1.5
5	1	0=Speed setpoint enable, interconnect to STW1.6
6	0	Reserve, interconnect to STW1.11
7	0	Reserve, interconnect to STW1.12
8	0	Reserve, interconnect to STW1.13
9	0	Reserve, interconnect to STW1.14
10	0	Reserve, interconnect to STW1.8
11	0	Reserve, interconnect to STW1.9
12	0	Reserve, interconnect to STW1.15

Output interface

Output signal	Type	Meaning
AxisEnabled	BOOL	Operating mode is executed or enabled
Lockout	BOOL	1 = switch-on inhibit active
ActVelocity	REAL	Current velocity → depending on the normalization factor RefSpeed
Error	BOOL	1 = group fault present
Status	INT	16#7002: No error – block is being processed 16#8401: Error in drive 16#8402: Switching on inhibited 16#8600: Error DPRD_DAT 16#8601: Error DPWR_DAT
DiagId	WORD	Expanded communication error → SFB call error

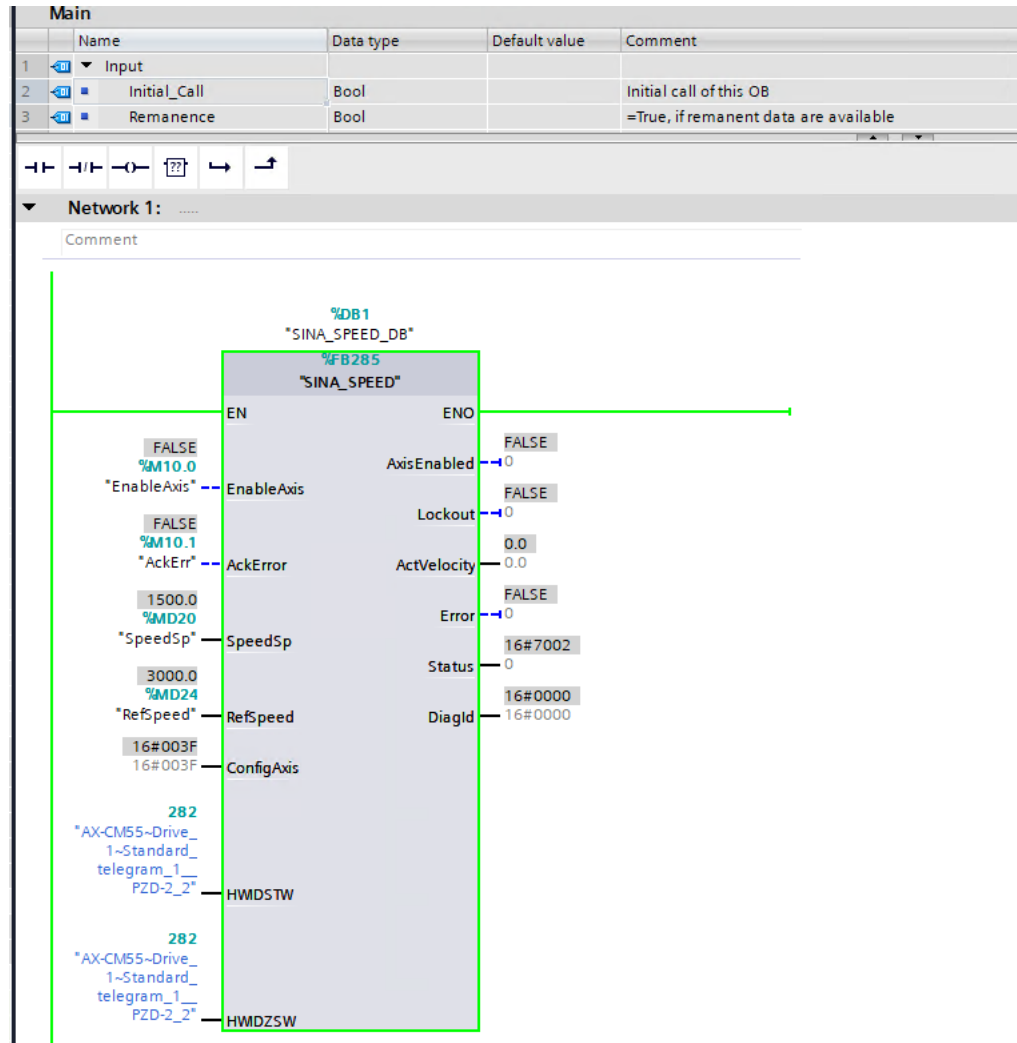
RefSpeed is the rated speed of the motor.

D00.05	Motor rated speed	3000	rpm
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The minimum unit of SpeedSp and RefSpeed is 0.1 RPM.

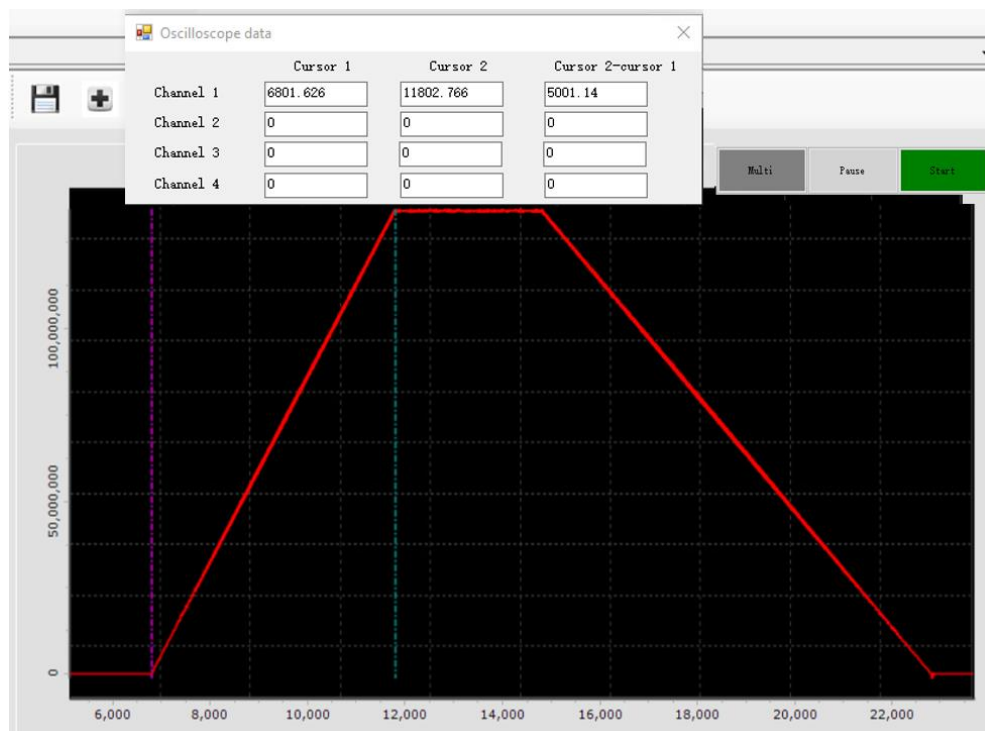
The acceleration and deceleration time of the slope can be set through B04.02 and B04.03.

For example:

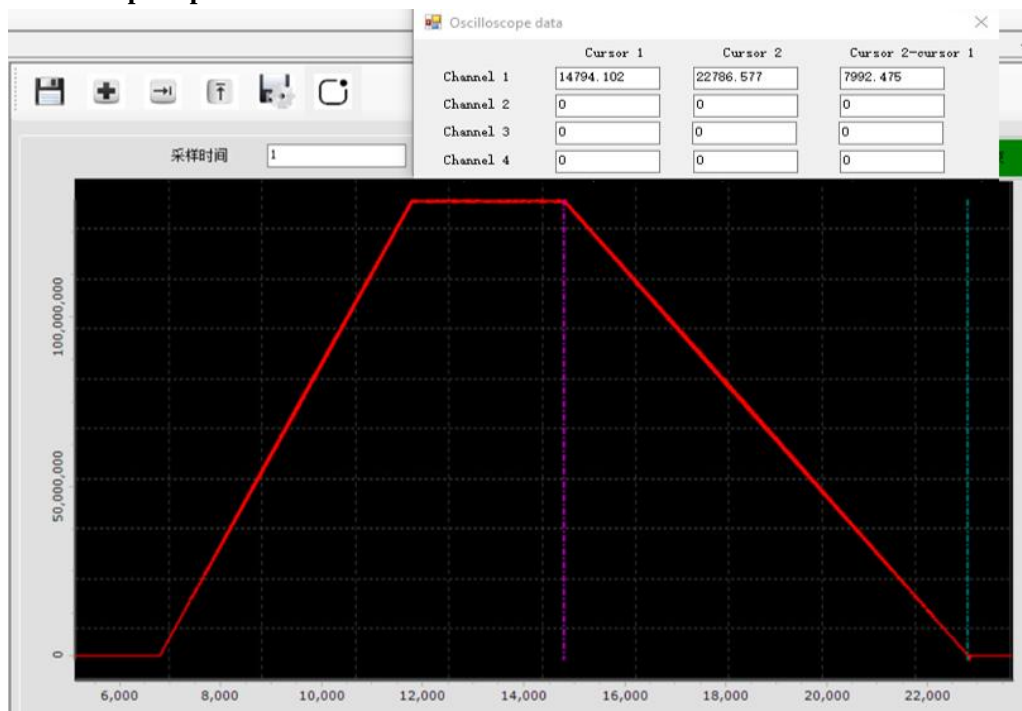


Set [D00.05 motor rated speed]=3000 rpm, [B04.02 ramp 1 acceleration time]=10.0 s, [B04.03 ramp 1 deceleration time]=16.0s. In FB285 SINA_SPEED, set RefSpeed=3000.0 SpeedSp=1500.0, then theoretical calculation, acceleration time =10000ms *(1500.0 rpm / 3000.0 rpm) =5000 ms; deceleration time =16000ms *(1500.0 rpm / 3000.0 rpm) =8000 ms.

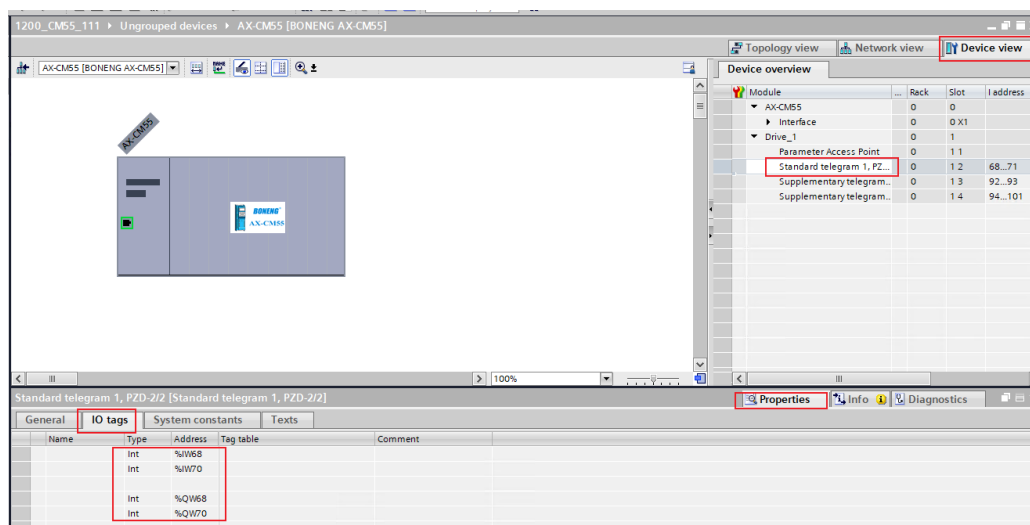
Oscilloscope capture acceleration time



Oscilloscope captures deceleration time



3.1.2. Direct assignment control



Data direction	PLC I/O address	Process data	type of data
PLC->Drive	QW0	Control word 1 (STW1)	unsigned integer 16 bits
	QW2	Speed set value (NSOLL_A)	Signed integer 16 bits
Drive->PLC	IW0	Status word 1 (ZSW1)	unsigned integer 16 bits
	IW2	Actual speed value (NIST_A)	Signed integer 16 bits

S7-1500 periodically sends control word 1 (STW1) and main set value (NSOLL_A) to the drive through PROFINET PZD communication, and the drive sends status word 1 (ZSW1) and actual speed (NIST_A) to S7-1500.

Control word: Commonly used control words are as follows. For detailed definition of control word 1 (STW1), please refer to the “[Control Word](#)” chapter.

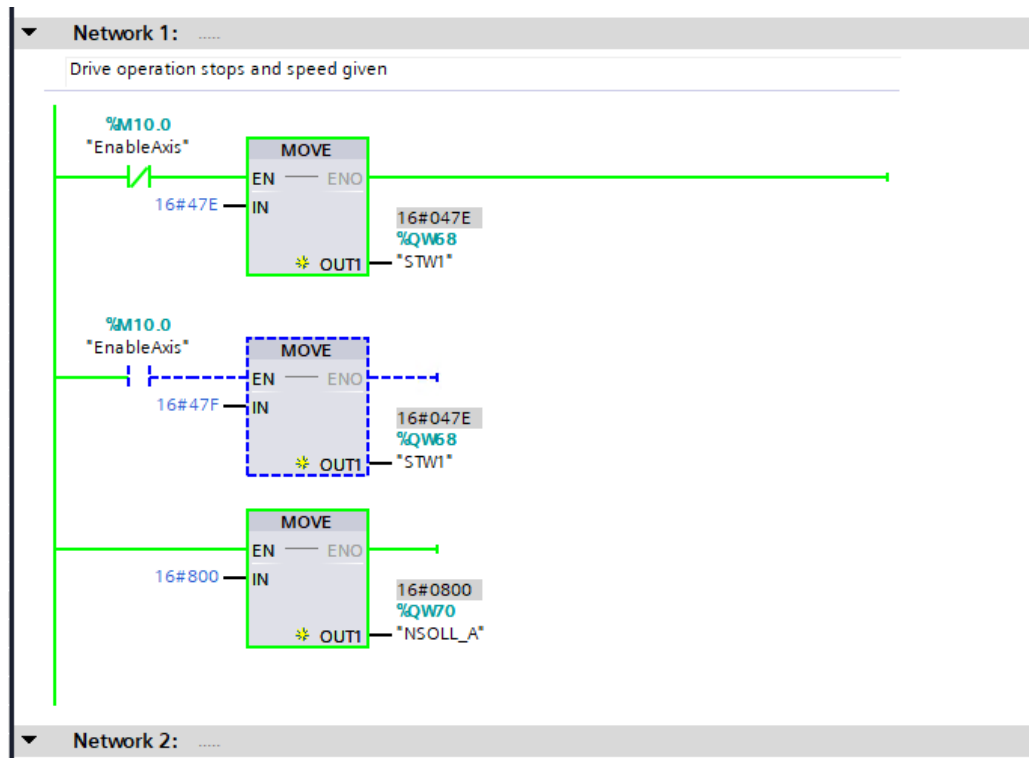
047E (hexadecimal) – OFF1 stop

047F (hexadecimal) – forward rotation start

Main setting value: The speed setting value must be standardized. The drive receives a decimal signed integer 16384 (4000H hexadecimal) corresponding to 100% of the rated speed [D00.05 Motor rated speed].

For detailed definition of feedback status words, please refer to the "[Status Words](#)" chapter.

The feedback actual speed also needs to be standardized, and the method is the same as the main set value.



✧ boot drive

When starting the inverter for the first time, you need to write control word 1 ([STW1](#)) 16#047E into QW0 to make the drive ready for operation, and then write 16#047F into QW0 to start the drive.

✧ Stop drive

Write 16#047E to QW0 to stop the drive;

✧ Adjust motor speed

Write the main setting value (NSOLL_A) 16#800 into QW2 and set the motor speed to $3000 \text{ rpm} \times (16\#800 / 16\#4000) = 375 \text{ rpm}$.

✧ Read the drive status word and motor actual speed

Reading IW0 and IW2 can monitor the drive status word and motor actual speed.

	Name	Address	Display format	Monitor value	Modify value	
1	*ZSW1*	%IW68	Hex	16#A037		☐
2	*NIST_A*	%IW70	Hex	16#07F4		☐
3		<Add new>				☐

✧ Drive fault reset

Write 16#0080 to QW0 to reset the drive fault

3.2. Siemens telegram 352

[C05.15 1 and 352 telegram mode] is set to 0: standard telegram, the drive will automatically associate the following parameters according to the configuration in the PLC. If set to 1: Custom telegram, you need to configure the parameter interconnection of the bus adapter according to the requirements.

Function code	Parameter	Description
B00.00	1:Custom control module	
B00.01	interconnect to P02.00	OFF1 comes from bus adapter A.PZD 1.0
B00.02	interconnect to P02.01	OFF2 comes from bus adapter A.PZD 1.1
B00.03	interconnect to P02.02	OFF3 comes from bus adapter A.PZD 1.2
B00.04	interconnect to P02.03	Operation is allowed from bus adapter A.PZD 1.3
B00.05	interconnect to P02.07	Fault reset comes from bus adapter A.PZD 1.7
B00.07	interconnect to P02.08	JOG1 from bus adapter A.PZD 1.8
B00.08	interconnect to P02.09	JOG2 from bus adapter A.PZD 1.9
B00.15	interconnect to P02.04	Ramp-function generator inhibit from bus adapter A.PZD 1.4
B00.16	interconnect to P02.05	Ramp-function generator pause from bus adapter A.PZD 1.5
B00.17	interconnect to P02.06	The ramp function generator reference is set to 0 from bus adapter A.PZD 1.6
B02.00	9:bus adapter A-PZD2	Speed control comes from PZD2
C00.35	From [C05.31 1 and 352 speed base]	Corresponding to the rated speed, the default is 4000HEX
C00.02	interconnect to P12.07	Status word 1 interconnect to PZD1
C00.03	interconnect to P13.00	Actual speed of the motor interconnect to PZD2
C00.19	From [C05.31 1 and 352 speed base]	Corresponding to the rated speed, the default is 4000HEX
C00.04	interconnect to P06.08	Output current interconnect to PZD3
C00.20	4000HEX	4000 HEX corresponds to rated current
C00.05	interconnect to P06.11	Output torque interconnect to PZD4
C00.21	4000 HEX	4000 HEX corresponds to rated torque
C00.06	interconnect to P12.04	Current alarm interconnect to PZD5
C00.07	interconnect to P12.03	Current fault interconnect to PZD6

For how to use Siemens telegram 352, please refer to [Direct assignment control](#) of Standard telegram 1.

3.3. Siemens telegram 111

PLC can connect to the drive through PROFINET communication, and the drive will automatically switch modes and match parameters according to the telegram configured by the PLC. The drive function block SINA_POS (FB284) is provided in the PLC and used in conjunction with the Siemens telegram 111 to achieve the basic positioning control of the drive.

3.3.1. SINA_POS FB284 block

3.3.1.1. S7-1200/S7-1500 Input and output interface

signal	Type	Default	Meaning
Input signal			
ModePos	INT	0	Operating mode: 1 = relative positioning 2 = absolute positioning 3 = positioning as setup 4 = approach reference point 5 = set reference point 6 = traversing block 0~15 7 = speed jogging 8 = incremental jogging
EnableAxis	BOOL	0	Switching command: 0=OFF, 1=ON
CancelTraversing	BOOL	1	0 = reject active traversing task, 1 = do not reject
IntermediateStop	BOOL	1	0 = active traversing command is interrupted, 1 = no intermediate stop
Positive	BOOL	0	Positive direction
Negative	BOOL	0	Negative direction
Jog1	BOOL	0	Jog signal source 1
Jog2	BOOL	0	Jog signal source 2
FlyRef	BOOL	0	This input is not valid for the drive
AckError	BOOL	0	Acknowledging errors
ExecuteMode	BOOL	0	Activate traversing task / setpoint activate reference function
Position	DINT	0[LU]	Position setpoint in [LU] for direct setpoint input/ MDI mode OR traversing block number for traversing block mode
Velocity	DINT	0[1000LU/min]	Velocity in [1000 LU/min] for MDI mode
OverV	INT	100[%]	Velocity override active for all modes: 0-199%
OverAcc	INT	100[%]	Acceleration override active 0-100%

OverDec	INT	100[%]	Deceleration override active 0-100%																		
ConfigEPos	DWORD	0	With this interface, the following bit functions of telegram 111 can be transmitted:																		
			<table><tr><th>ConfigEPos bit</th><th>Meaning</th></tr><tr><td>ConfigEPos.%X0</td><td>STW1.1 OFF2: 1 = no pulse inhibit</td></tr><tr><td>ConfigEPos.%X1</td><td>STW1.2 OFF3: 1 = no pulse inhibit</td></tr><tr><td>ConfigEPos.%X2</td><td>POS_STW2.14 (Software limit switch: 1 = active)</td></tr><tr><td>ConfigEPos.%X3</td><td>POS_STW 2.15 (hardware limit switch:1 = active)</td></tr><tr><td>ConfigEPos.%X6</td><td>POS_STW 2.2 (signal source reference mark)</td></tr><tr><td>ConfigEPos.%X7</td><td>STW1.13 (External block change)</td></tr><tr><td>ConfigEPos.%X8</td><td>POS_STW1.12 ModePos=2,3 (continuous setpoint transfer MDI: 1 = active) Position,Velocity,OverV,OverAcc, OverDec, any changes to these parameters will take effect immediately.</td></tr><tr><td>ConfigEPos.%X16</td><td>STW1.14 Switch to closed loop torque mode</td></tr></table>	ConfigEPos bit	Meaning	ConfigEPos.%X0	STW1.1 OFF2: 1 = no pulse inhibit	ConfigEPos.%X1	STW1.2 OFF3: 1 = no pulse inhibit	ConfigEPos.%X2	POS_STW2.14 (Software limit switch: 1 = active)	ConfigEPos.%X3	POS_STW 2.15 (hardware limit switch:1 = active)	ConfigEPos.%X6	POS_STW 2.2 (signal source reference mark)	ConfigEPos.%X7	STW1.13 (External block change)	ConfigEPos.%X8	POS_STW1.12 ModePos=2,3 (continuous setpoint transfer MDI: 1 = active) Position,Velocity,OverV,OverAcc, OverDec, any changes to these parameters will take effect immediately.	ConfigEPos.%X16	STW1.14 Switch to closed loop torque mode
			ConfigEPos bit	Meaning																	
			ConfigEPos.%X0	STW1.1 OFF2: 1 = no pulse inhibit																	
			ConfigEPos.%X1	STW1.2 OFF3: 1 = no pulse inhibit																	
			ConfigEPos.%X2	POS_STW2.14 (Software limit switch: 1 = active)																	
			ConfigEPos.%X3	POS_STW 2.15 (hardware limit switch:1 = active)																	
			ConfigEPos.%X6	POS_STW 2.2 (signal source reference mark)																	
			ConfigEPos.%X7	STW1.13 (External block change)																	
			ConfigEPos.%X8	POS_STW1.12 ModePos=2,3 (continuous setpoint transfer MDI: 1 = active) Position,Velocity,OverV,OverAcc, OverDec, any changes to these parameters will take effect immediately.																	
ConfigEPos.%X16	STW1.14 Switch to closed loop torque mode																				
Notice:If this variable is allocated in the program, the initial value must be 3(ConfigEPos.%X0 =1 and ConfigEPos.%X1 =1,otherwise OFF2 and OFF3 stops are always active)																					
HWIDSTW	HW_IO	0	Hardware identifier of telegram 111 in the device view of the drive																		
HWIDZSW	HW_IO	0	Hardware identifier of telegram 111 in the device view of the drive																		
Output signal																					
AxisEnabled	BOOL	0	Drive is ready and switched on																		
AxisPosOk	BOOL	0	Target position of the axis reached																		
AxisSpFixed	BOOL	0	Setpoint is stationary																		
AxisRef	BOOL	0	Reference point set																		
AxisWarn	BOOL	0	Drive has alarm																		
AxisError	BOOL	0	Drive has fault																		
Lockout	BOOL	0	Switching-on inhibit																		

			Check whether bit0 and bit1 of ConfigEPos are 1.
ActVelocity	DINT	0	Actual velocity (16#40000000=[D00.05 Motor rated speed])
ActualPosition	DINT	0[LU]	Actual position in LU
ActMode	INT	0	Currently active mode
EPosZSW1	WORD	0	Status of POS_ZSW1
EPosZSW2	WORD	0	Status of POS_ZSW2
ActWarn	WORD	0	Actual alarm number
ActFault	WORD	0	Actual fault active
Error	BOOL	0	1 = group fault active
Status	WORD	0	16#7002: No fault – block is being executed 16#8401: Drive fault 16#8402: Switching-on inhibit 16#8403: flying referencing could not be started 16#8600: DPRD_DAT Error 16#8601: DPWR_DAT Error 16#8202: incorrect operating mode selected 16#8203: incorrect setpoints parameterized 16#8204: incorrect traversing block number selected
DiagID	WORD	0	Extended communication error ->error during SFB call

Correspondence table between ConfigEPos bits and control words

1		2	
ConfigEPos.%X0	STW1.%X1	ConfigEPos.%X16	STW1.%X14
ConfigEPos.%X1	STW1.%X2	ConfigEPos.%X17	STW1.%X15
ConfigEPos.%X2	POS_STW2.%X14	ConfigEPos.%X18	POS_STW1.%X6
ConfigEPos.%X3	POS_STW2.%X15	ConfigEPos.%X19	POS_STW1.%X7
ConfigEPos.%X4	POS_STW2.%X11	ConfigEPos.%X20	POS_STW1.%X11
ConfigEPos.%X5	POS_STW2.%X10	ConfigEPos.%X21	POS_STW1.%X13
ConfigEPos.%X6	POS_STW2.%X2	ConfigEPos.%X22	POS_STW2.%X3
ConfigEPos.%X7	STW1.%X13	ConfigEPos.%X23	POS_STW2.%X4
ConfigEPos.%X8	POS_STW1.%X12	ConfigEPos.%X24	POS_STW2.%X6
ConfigEPos.%X9	STW2.%X0	ConfigEPos.%X25	POS_STW2.%X7
ConfigEPos.%X10	STW2.%X1	ConfigEPos.%X26	POS_STW2.%X12
ConfigEPos.%X11	STW2.%X2	ConfigEPos.%X27	POS_STW2.%X13
ConfigEPos.%X12	STW2.%X3	ConfigEPos.%X28	STW2.%X5
ConfigEPos.%X13	STW2.%X4	ConfigEPos.%X29	STW2.%X6
ConfigEPos.%X14	STW2.%X7	ConfigEPos.%X30	STW2.%X8
ConfigEPos.%X15	STW1.%X12	ConfigEPos.%X31	STW2.%X9

The hardware identifier of HWIDSTW can be found in [System Constants] under [Device View].

1200_CM5_111 ▶ Ungrouped devices ▶ AX-CM55 [BONENG AX-CM55]

AX-CM55

AX-CM55 [BONENG AX-CM55]

Topology view Network view **Device view**

Device overview

Module	Rack	Slot	I address
AX-CM55	0	0	
▶ Interface	0	0 X1	
▶ Drive_1	0	1	
Parameter Access Point	0	1 1	
SIEMENS telegram 111, P...	0	1 2	68..91
Supplementary telegram...	0	1 3	92..93
Supplementary telegram...	0	1 4	94..101

SIEMENS telegram 111, PZD-12/12 [SIEMENS telegram 111, PZD-12/12]

General IO tags **System constants** Texts

Show hardware system constant

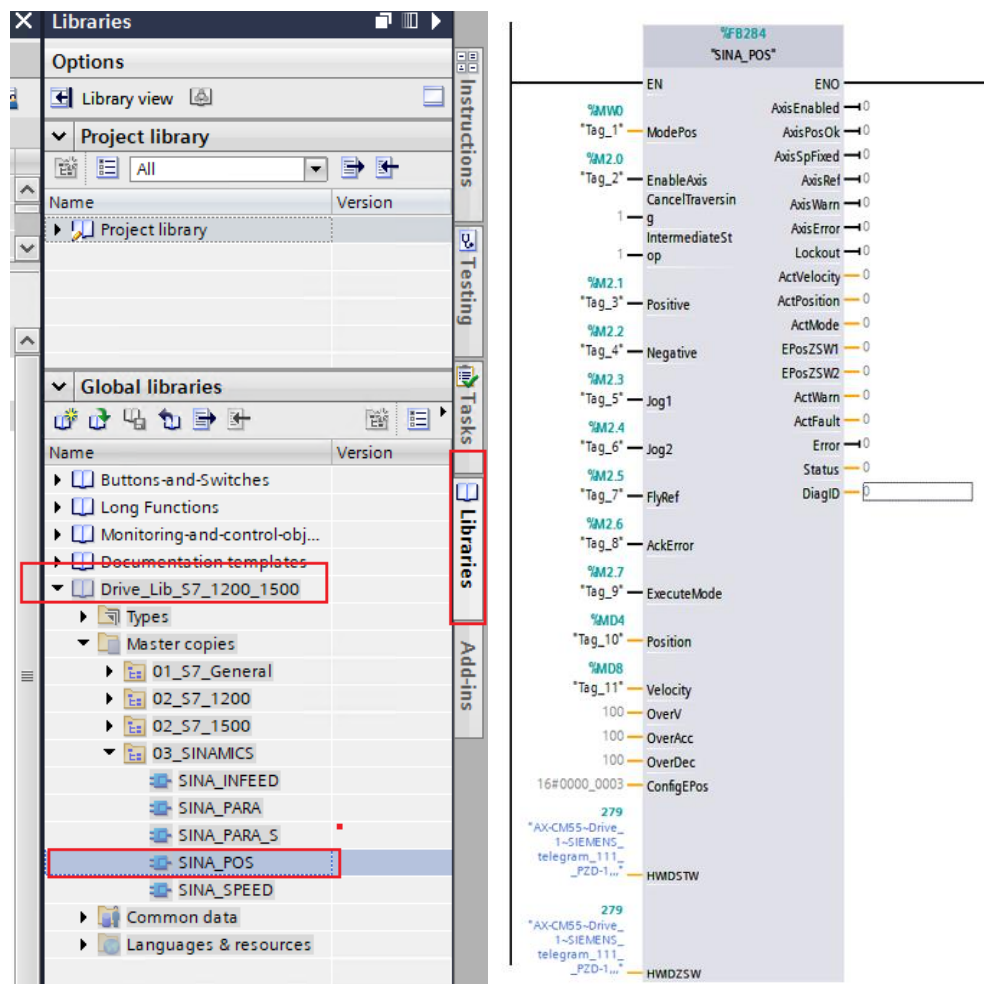
Name	Type	Hardware identifier	Used by	Comment
AX-CM55-Drive_1-SIEMENS_telegram_111_PZD...	Hw_SubModule	279	PLC_1	

3.3.1.2. S7-1200/S7-1500 program example

For PROFINET configuration and telegram selection, please refer to the operations in the "[Establishing PROFINET Communication](#)" chapter.

The FB284 function block needs to download the drivelib library from the Siemens official website, after the installation is complete, it can be found in Botu's library.

Note: The [Drive_Lib_S7_1200_1500] library needs to be added separately, note that it needs to match the version of TIA.



3.3.1.3. S7-200 SMART Input and output interface

This function block can be used with the basic positioning functions in the drive.

signal	Type	Meaning
ModePos	INT	Operating mode: 1 = relative positioning 2 = absolute positioning 3 = positioning as setup 4 = approach reference point 5 = set reference point 6 = traversing block 0~15 7 = speed jogging 8 = incremental jogging

Position	DINT	Position setpoint in [LU] for direct setpoint Input/ MDI mode OR traversing block number for traversing block mode
Velocity	DINT	Velocity in [1000 LU/min] for MDI mode
EnableAxis	BOOL	Switching command: 0=OFF, 1=ON
CancelTraversing	BOOL	0 = reject active traversing task, 1 = do not reject
IntermediateStop	BOOL	0 = active traversing command is interrupted, 1 = no intermediate stop
Execute	BOOL	Activate traversing task / setpoint activate reference function
St_I_add	DWORD	Pointer to the starting address of the PROFINET communication telegram I storage area, for example &IB128
St_Q_add	DWORD	Pointer to the starting address of the PROFINET communication telegram Q storage area, for example &QB128
Control_table	DWORD	Pointer to the starting address of Control_table, for example &VD8000
Status_table	DWORD	Pointer to the starting address of Status_table, for example &VD7500
ActVelocity	DWORD	Actual velocity (16#40000000= [D00.05 Motor rated speed])
ActPosition	DWORD	Actual position in LU
Warn_code	WORD	Actual alarm number
Fault_code	WORD	Actual fault active
Done	BOOL	Target position of the axis reached

Control_table parameter

Byte offset	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserve	Reserve	AckError	Reserve	Jog2	Jog1	Negative rotate	Positive rotate
1	Reserve							
2	OverV: Set speed 0~199%.							
3								
4	OverAcc: Set acceleration 0~100% when ModePos=1, 2, 3							
5								
6	OverDec: Set acceleration 0~100% when ModePos=1, 2, 3							
7								
8	ConfigEpos							
9								
10								
11								

ConfigEpos: Use this parameter to control basic positioning-related functions. The

corresponding relationship between bits is as shown in the following table.

ConfigEPos bit	Function description
ConfigEPos.%X0	STW1.1 OFF2: 1 = no pulse inhibit
ConfigEPos.%X1	STW1.2 OFF3: 1 = no pulse inhibit
ConfigEPos.%X2	POS_STW2.14 (Software limit switch: 1 = active)
ConfigEPos.%X3	POS_STW 2.15 (hardware limit switch:1 = active)
ConfigEPos.%X6	POS_STW 2.2 (signal source reference mark)
ConfigEPos.%X7	STW1.13 (External block change)
ConfigEPos.%X8	ModePos=2,3 (continuous setpoint transfer MDI: 1 = active) Position,Velocity,OverV,OverAcc,OverDec, any changes to these parameters will take effect immediately.
ConfigEPos.%X16	STW1.14 Switch to closed loop torque mode

Notice:If this variable is allocated in the program, the initial value must be 3(ConfigEPos.%X0 =1 and ConfigEPos.%X1 =1,otherwise OFF2 and OFF3 stops are always active)

Correspondence table between ConfigEPos bits and control words

1		2	
ConfigEPos.%X0	STW1.%X1	ConfigEPos.%X16	STW1.%X14
ConfigEPos.%X1	STW1.%X2	ConfigEPos.%X17	STW1.%X15
ConfigEPos.%X2	POS_STW2.%X14	ConfigEPos.%X18	POS_STW1.%X6
ConfigEPos.%X3	POS_STW2.%X15	ConfigEPos.%X19	POS_STW1.%X7
ConfigEPos.%X4	POS_STW2.%X11	ConfigEPos.%X20	POS_STW1.%X11
ConfigEPos.%X5	POS_STW2.%X10	ConfigEPos.%X21	POS_STW1.%X13
ConfigEPos.%X6	POS_STW2.%X2	ConfigEPos.%X22	POS_STW2.%X3
ConfigEPos.%X7	STW1.%X13	ConfigEPos.%X23	POS_STW2.%X4
ConfigEPos.%X8	POS_STW1.%X12	ConfigEPos.%X24	POS_STW2.%X6
ConfigEPos.%X9	STW2.%X0	ConfigEPos.%X25	POS_STW2.%X7
ConfigEPos.%X10	STW2.%X1	ConfigEPos.%X26	POS_STW2.%X12
ConfigEPos.%X11	STW2.%X2	ConfigEPos.%X27	POS_STW2.%X13
ConfigEPos.%X12	STW2.%X3	ConfigEPos.%X28	STW2.%X5
ConfigEPos.%X13	STW2.%X4	ConfigEPos.%X29	STW2.%X6
ConfigEPos.%X14	STW2.%X7	ConfigEPos.%X30	STW2.%X8
ConfigEPos.%X15	STW1.%X12	ConfigEPos.%X31	STW2.%X9

Status_table parameter

Byte offset	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserve	Over range_Error	Axis Error	Axis Warn	Lockout Switching-on inhibit	AxisRef	AxisPosOk	Axise nable
1	Error_ID: Identify error types							
2	Actmode: Currently active operating mode							
3								
4	POS_ZSW1 : Status							
5								
6	POS_ZSW2 : Status							
7								

Error_ID Parameter error code

Error code	Description
0	No errors
1	Drive error detected
2	Drive disabled
3	The selected mode is not supported
4	The settings of parameters OverV, OverAcc and OverDec exceed the supported value range.
5	When ModPos=6, the set segment number is out of range.

3.3.1.4. S7-200 SMART Program example

Write the following program in the main program. Note that the addresses of St_I_add and St_Q_add must correspond to the IO address of the 111 telegram.

Symbol	Address	Comment
ActPosition	VD7020	
ActVelocity	VD7024	
Always_On	SM0.0	Always ON
Control_table	VD8000	
Done	V7032.0	
Enable	V7010.0	
Fault_code	VW7030	
Mode_setting	VW7000	
Non_pause	V7010.2	
Non_stop	V7010.1	
Position_setting	VD7002	
Start	V7010.3	
Status_table	VD7500	
Velocity_setting	VD7006	
Warn_code	VW7028	

Click the "Add" button to add a module for this device.

Submodule Name	Slot/Subslot	PNI Start Ad...	Input Size (B...	PNIQ Start A...	Output Size (...
1	0				
2	Interface	0 32768			
3	Port 1	0 32769			
4	Port 2	0 32770			
5	1				
6	Parameter Access Point	1 1			
7	SIEMENS telegram 111, PZD-12/12	1 2	128	128	24
8		1 3			
9		1 4			

Update Time (ms): 4.00 Data Hold: 3

Generate Cancel

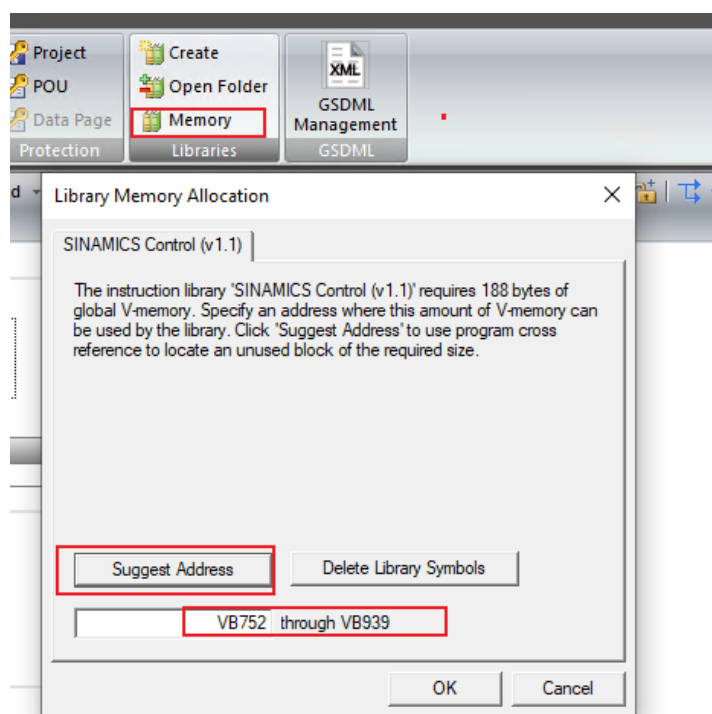
The symbol table address used in the program is defined as follows:

Parameter	Address
Mode_setting	VW7000
Position_setting	VD7002
Velocity_setting	VD7006
Enable	V7010.0
Non_stop	V7010.1
Non_pause	V7010.2
Start	V7010.3
Control_table	VD8000
Status_table	VD7500
ActPosition	VD7020
ActVelocity	VD7024
Warn_code	VW7028
Fault_code	VW7030
Done	V7032.0
OverV	VW8002
OverAcc	VW8004
OverDec	VW8006
ConfigEPos	VD8008

Function bit address:

Parameter	Address
Positive	V8000.0
Negative	V8000.1
JOG1	V8000.2
JOG2	V8000.3
AckError	V8000.5
ConfigEpos.%X0(OFF2)	V8011.0
ConfigEpos.%X1(OFF3)	V8011.1
ConfigEpos.%X2(Software limit switch)	V8011.2
ConfigEpos.%X3(hardware limit switch)	V8011.3
ConfigEpos.%X6(signal source reference mark)	V8011.6

Allocate the V address area used by the library:



Then you can download the program.

3.3.1.5. Parameter calculation and function setting

3.3.1.5.1. Operating conditions

1. ConfigEPos.%X0 and ConfigEPos.%X1 of FB284 must be 1, the drive's OFF2 and OFF3 are set to 1. The normal drive state will jump to the power-on preparation state. ([A00.00 Current state machine] = S5: Power on preparation). If OFF2 and OFF3 are not both set to 1, the drive will enter the power-on blocking state ([A00.00 current state machine] = S4: power-on blocking), FB284 will report a fault, Lockout=1, Status=16#8402: The drive is prohibited from starting. Under the condition that the current state machine of the drive enters the power-on preparation state, set EnableAxis=1 to enable the axis, the output parameter AxisEnabled becomes 1

2. The input signals "cancelTraversing" and "intermediateStop" are relevant in all operating modes except for jog and must be set to TRUE to operate the EPOS.

- Setting the "cancelTraversing" bit to FALSE leads to a ramp stop with a programmed delay of maximum deceleration. The job data is rejected, and the axis can be assigned with a new job from the standstill. In this state, a mode change is possible.
- Setting the "intermediateStop" bit to FALSE leads to a ramp stoppage of the axis with the currently applicable deceleration values. The job data is NOT rejected, which means that a setting of TRUE allows the axis to continue its motion. It is possible to change modes in a standstill.

If you use a hardware limit switch, you need to set the input parameter ConfigEPos.%X3 of FB284 to 1 to activate the drive's hardware limit function.

If the drive software limit function is set, the input parameter ConfigEPos.%X2 of FB284 needs to be set to 1 to activate the drive software limit function.

3.3.1.5.2. Velocity

[G00.04]≠0:

Given speed of motor (RPM)=Velocity * OverV%*1000/[G00.04]

[G00.04]=0:

Given speed of motor (RPM)=Velocity * OverV%*1000*Electronic gear ratio/encoder resolution.

3.3.1.5.3. ActVelocity

ActVelocity is a standardized parameter, which is the NIST_B parameter in siemens telegram 111.

Actual speed of motor (RPM)=[D00.05] * (ActVelocity/40000000 HEX)

3.3.1.5.4. OverAcc

Acceleration override.

Acceleration time (s)=Velocity* OverV%/(60*[G03.33 EPOS max acceleration]*OverAcc%)

3.3.1.5.5. OverDec

Deceleration override.

Deceleration time (s)=Velocity* OverV%/(60*[G03.35 EPOS max deceleration]*OverDec%)

3.3.1.5.6. IntermediateStop

When ModePos=1 relative positioning or ModePos=2 absolute positioning, the deceleration when the task is suspended is [G03.35 EPOS max deceleration] *OverDec%.

When ModePos=6 traversing block 0~15, the deceleration time when the task is suspended is [G04 group x segment displacement acceleration and deceleration time] (the range of x is 1~16).

3.3.1.5.7. CancelTraversing

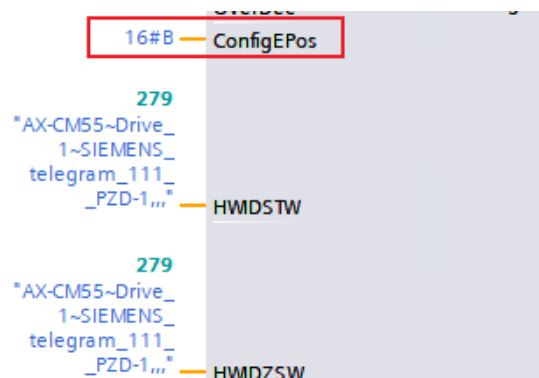
The deceleration when the task is canceled is

[G03.35EPOS max deceleration]*[G03.37 EPOS task cancellation deceleration multiplier].

3.3.1.5.8. Limit function

1)Activate hardware limit switch

If you use a hardware limit switch, you need to set ConfigEPos.%X3 of FB284 to 1 to activate the hardware limit function. If you set it to 0, the hardware limit function is invalid.



When ConfigEPos.%X3 is set to 1, the positive and negative limit switches can be connected to the DI input terminal of the drive, [G00.55 Positive limit command source selection] and [G00.56 Negative limit command source selection] to select positive and negative DI terminal corresponding to the limit. The status of DI and related settings can be viewed and

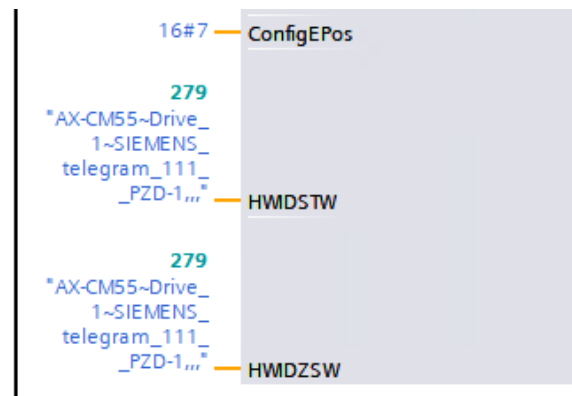
modified through group A05 parameters.

The status of the hardware limit can be viewed through [POS_ZSW1](#)

POS_ZSW1.8	1=Negative hardware limit triggered 0=Negative hardware limit is not triggered
POS_ZSW1.9	1=Forward hardware limit triggered 0=positive hardware limit not triggered

2)Activate software limit switch

If a software limit switch is used, ConfigEPos.%X2 of the FB284 function block needs to be set to 1 to activate the software limit function. ConfigEPos.%X2 has the same function as [G03.13 Software limit setting]. Setting either one to 1 enables the software limit function. When both are 0, software limit is disabled.



Enable the software limit and set [G03.14 Maximum software limit value] (positive limit position) and [G03.16 Minimum software limit value] (negative limit position).

The software limit status can be viewed through [POS_ZSW2](#).

POS_ZSW2.6	1= Negative software limit has been triggered [G03.16 software limit minimum value] 0=Negative software limit is not triggered
POS_ZSW2.7	1=Forward software limit has been triggered [G03.14 maximum software limit] 0=Forward software limit not triggered

3.3.1.5.9. Relative/absolute positioning

The operating mode selection ModePos=1 is relative positioning, and ModePos=2 is absolute positioning. Absolute positioning requires that the axis must have returned to zero and AxisRef=1.

EnableAxis=1

Specify the target position by inputting the parameter Position (LU), and specify the target speed by Velocity (1000LU/min).

Command pulse=Position

[G00.04] $\neq$ 0:

$$\text{Motor speed (RPM)} = \text{Velocity} * \text{OverV\%} * 1000 * / [\text{G00.04}]$$

Motor rotation number = Command pulse / [G00.04]
[G00.04] = 0:
Motor speed (RPM) = Velocity*OverV% *1000 *electronic gear ratio/encoder resolution
Motor rotation number = (Command pulse *electronic gear ratio) /encoder resolution
Motor acc time (s)=Velocity*OverV%/ (OverAcc%*[G03.33 EPOS max acc] *60)
Motor dec time (s)=Velocity*OverV%/ (OverDec%*[G03.35 EPOS max dec] *60)

3.3.1.5.10. Approach reference point

The approach reference point of the siemens telegram 111 is automatically planned within the servo (the rising edge of Execute is used as a signal to trigger the approach reference point operation.

When [G00.53 Origin switch source selection] is 0, the origin switch can be connected to the DI signal of the PLC and passed to ConfigEPos .%X6 of SINA_POS (FB284) through the program. ConfigEPos .%X6 passes the control word 2 of siemens telegram 111 (POS_STW2) bit2 is passed to the drive.

When [G00.53 Origin switch source selection] is not 0, you can manually select the DI terminal of the drive and connect the origin switch to the corresponding DI terminal of the drive.

[G00.50 Mechanical origin offset] is used as the position after approach reference point is completed. AxisRef is set to 1 after the first approach reference point. Even if the drive is powered off and restarted, AxisRef is still 1.

The direction of travel is determined by "positive" and "negative". When positive=1, the direction of travel is the positive direction. When negative=1, the direction of travel is the positive direction. (Note: Simultaneous selection is permitted, default is forward direction)

3.3.1.5.11. Incremental//Speed jog control

1)speed jogging

[B03.16 Multi-segment setting value 1] is the Jog1 speed value.

[B03.17 Multi-segment setting value 2] is the Jog2 speed value.

Jog's speed setting value needs to be multiplied by OverV%.

The acceleration and deceleration time setting comes from the B04 group parameters, and the default is [B04.02 Slope 1 acceleration time] and [B04.03 Slope 1 deceleration time].

In this mode, drive works in speed mode.

2)incremental jogging

[G03.20 Position JOG1 movement displacement]

[G03.22 Position JOG1 max speed]

[G03.23 Position JOG1 acc and dec time]

[G03.24 Position JOG2 movement displacement]

[G03.26 Position JOG2 max speed]

[G03.27 Position position JOG2 acc and dec time]

Jog's speed setting value needs to be multiplied by OverV%.

3.3.2. Relative positioning

- The axis does not have to be referenced.
- The operating mode is selected with modePos=1, Device switched on via "enableAxis".
- The traversing path and dynamic response are specified via the inputs "position", "velocity", "OverV" (velocity override), "acceleration", "deceleration".
- The velocity override refers to "velocity".
- The operating conditions "cancelTraversing" and "intermediateStop" must be set to TRUE.
- Traversing is started by a positive edge to "executeMode".
- In relative positioning, the direction of movement is determined by the positive or negative value set in "Position".
- After positioning is completed, "AxisPosOk" will be set to 1

The axis is in standstill if a mode higher than 3 is selected. It is possible to make a change within the MDI operating modes (1,2,3) at any time.

Signal	Value
ModePos	1
Position	Relative positioning (Unit:LU)
Velocity	(Unit:1000LU/min)
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
OverV	100
OverAcc	100
OverDec	100
ConfigEpos	3

3.3.3. Absolute positioning

- The axis must be homed.
- The operating mode is selected with "modePos"=2, Device switched on via "enableAxis".
- The traversing path and dynamic response are specified via the inputs "position", "velocity", "OverV" (velocity override), "acceleration", "deceleration".
- The velocity override refers to "velocity".
- The operating conditions "cancelTraversing" and "intermediateStop" must be set to TRUE.
- "jog1" and "jog2" have no effect and should be set to FALSE.
- Traversing is started by a positive edge to "executeMode".

The axis is in standstill if a mode higher than 3 is selected. It is possible to make a change

within the MDI operating modes (1,2,3) at any time.

Signal	Value
ModePos	2
Position	Relative positioning (Unit:LU)
Velocity	(Unit:1000LU/min)
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
OverV	100
OverAcc	100
OverDec	100
ConfigEpos	3

3.3.4. Positioning as setup

- The axis does not have to be referenced.
- The operating mode is selected with "modePos" = 3, Switch on device via "enableAxis".
- The traversing path and dynamic response are specified via the inputs "position", "velocity", "OverV" (velocity override), "acceleration", "deceleration".
- The velocity override refers to "velocity".
- The operating conditions "cancelTraversing" and "intermediateStop" must be set to TRUE.
- "jog1" and "jog2" have no effect and should be set to FALSE.
- The direction of travel is determined by "positive" and "negative". Simultaneous selection stops the axis without further alarms or faults.
- Traversing is started by a positive edge to "executeMode".

The axis is in standstill if a mode higher than 3 is selected. It is possible to make a change within the MDI operating modes (1,2,3) at any time.

Signal	Value
ModePos	3
Velocity	(Unit:1000LU/min)
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
OverV	100
OverAcc	100
OverDec	100
ConfigEpos	3
Positive	1
Negative	0

3.3.5. Approach reference point

- The operating mode is selected with "modePos" = 4, Switch on device via "enableAxis".
- Specify speed, acceleration and deceleration percentage by inputting parameters OverV, OverAcc, and OverDec
- The operating conditions "cancelTraversing" and "intermediateStop" must be set to TRUE. "jog1" and "jog2" have no effect and must be set to FALSE.
- Homing and traversing are started with a positive edge to "executeMode".
- The "axisRef" output signal is set when the homing cam is found and evaluated accordingly. If a fault occurs during the traversing movement, the "error" output signal is output.
- The direction of travel is determined by "positive" and "negative". Simultaneous selection is not permitted and will cause a fault. When both are 0 or both 1, Smart200 does not perform the operation (FB284 processing of Smart200).

Signal	Value
ModePos	4
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
OverV	100
OverAcc	100
OverDec	100
ConfigEpos	3
Positive	1
Negative	0
ConfigEpos.%X6	The signal source reference mark is connected to the PLC digital input, and the signal status is associated with V8011.6
Status_table(Axis Ref)	Approach reference point complete,AxisRef=1

3.3.6. Set reference point

The operating mode is selected with "modePos"=5, Axis is at a standstill and the home position is set by means of a positive edge for "executeMode".

Signal	Value
ModePos	5
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
ConfigEpos	3
Status table (AxisRef)	Setup completed, AxisRef=1

3.3.7. Traversing block

- The axis does not need to set a reference point.
- The operating mode is selected with "modePos" = 6, Switch on device via "enableAxis".
- Specify the traversing block (0~15) by inputting parameter Position.
- The traversing block function parameters are set in [G04 Group].
- The "overV" velocity override refers to the setpoint velocity stored in the traversing block.
- The acceleration and deceleration of the Traversing block are set in the drive.
- Traversing is started by a positive edge to "executeMode".

Parameter	Value
ModePos	6
Position	traversing block (0~15)
OverV	100
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
Execute	1
ConfigEpos	3

3.3.8. Speed jogging

- The axis does not have to be homed.
- The jog speed is specified via settings in the drive, the velocity override is also effective in the operating mode and is set via "overV".
- The operating mode is selected with "modePos" = 7, Switch on device via "enableAxis".
- The operating conditions "cancelTraversing" and "intermediateStop" are not relevant for the operating mode and can be set to TRUE by default.
- "jog1" and "jog2" are the signal sources for jog mode in EPOS. The direction of the traversing movement of the respective signal source is configured in the drive.

The speed of Jog1 comes from [B03.00 JOG1 given setting]. The default is from [B03.16 Multi-segment setting value 1], and the value is the percentage of the motor's rated speed.

The speed of Jog2 comes from [B03.01 JOG2 given setting].

The acc and dec time setting comes from the B04 group parameters, and the default is [B04.02 Slope 1 acc time] and [B04.03 Slope 1 dec time]. The acc time is the time it takes for the motor to go from 0 to rated speed, and the dec time is the time it takes for the motor to go from rated speed to 0.

In this mode, the drive works in speed mode.

Parameter	Value
ModePos	7
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
OverV	100
ConfigEpos	3
JOG1	1
JOG2	0

3.3.9. Incremental jogging

- The axis does not have to be homed
- The operating mode is selected with "modePos" = 8, Switch on device via "enableAxis".
- The velocity and position of jog are set in the drive, the velocity override is also effective in the operating mode and is set via "overV".
- The operating conditions "cancelTraversing" and "intermediateStop" are not relevant for the operating mode and can be set to TRUE by default
- "jog1" and "jog2" are the signal sources for jog mode in EPOS. The direction of the traversing movement of the respective signal source is configured in the drive

[G03.20 Position JOG1 movement displacement]

[G03.22 Position JOG1 max speed]

[G03.23 Position JOG1 acc and dec time]

[G03.24 Position JOG2 movement displacement]

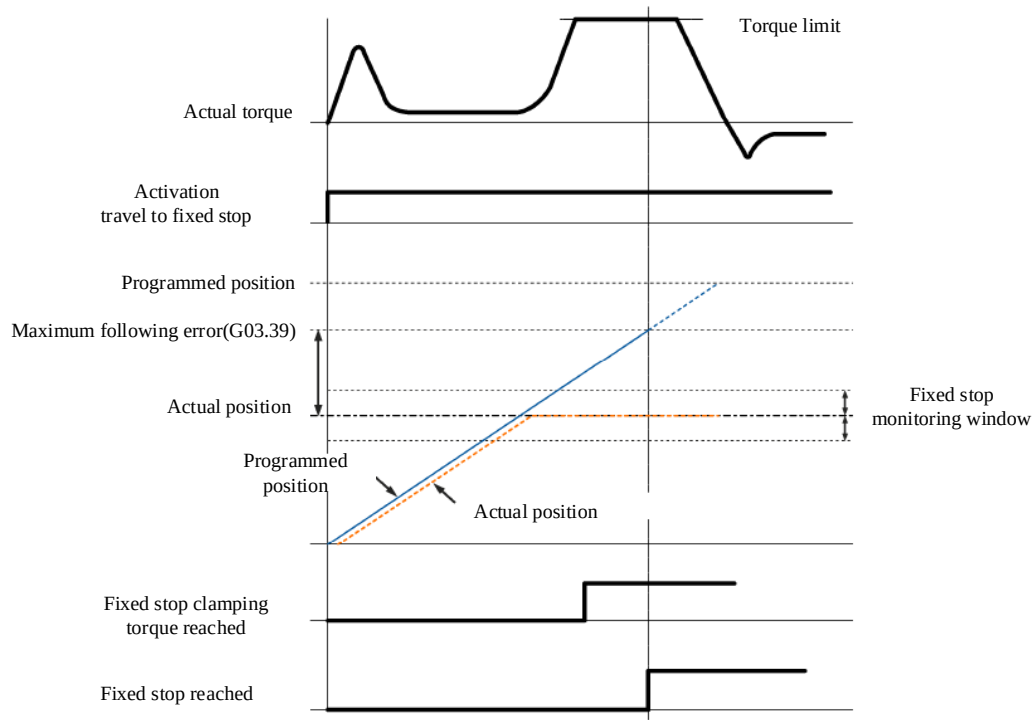
[G03.26 Position JOG2 max speed]

[G03.27 Position JOG2 acc and dec time]

Parameter	Value
ModePos	7
EnableAxis	1
CancelTraversing	1
IntermediateStop	1
OverV	100
ConfigEpos	3
JOG1	1
JOG2	0

3.4. Travel to fixed stop

The axis starts from the initial position and approaches the target position at the set speed. Fixed stop means that the workpiece must be located between the initial position of the axis and the target position. The set torque limit takes effect from the beginning, the torque limit is also used during the operation to the fixed stop.

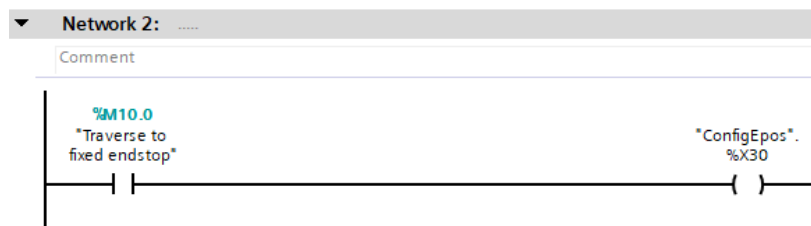


The relevant control words and status words are as follows:

Signal	Description
STW2.8	1= Travel to fixed stop
POS_ZSW2.14	1= Travel to fixed stop function activated
POS_ZSW2.13	1= Clamping at fixed stop
POS_ZSW2.12	1= Reach fixed stop

Write activation program

[G03.38 activates running to fixed stop] The default is "2: from PN-STW2.8". The command source comes from STW2.8. When using the FB284 function block, STW2.8 corresponds to ConfigEpos.%X30, which can Directly set ConfigEpos.%X30 to 1 to activate this function, and check the activation status through POS_ZSW2.14.



Fixed stop reached

When the axis presses the mechanical fixed stop, the closed-loop control in the driver will increase the torque value and continue to move the axis. When the value increases to the set torque limit value, the clamping torque status will be set when the fixed stop is reached. The actual position following error will be accumulated. When it exceeds [G03.39 Fixed stop maximum following error], the fixed stop status will be set to 1.

After the axis reaches the fixed stop and leaves the position and exceeds the monitoring window [G03.40 fixed stop monitoring window] set for this purpose, the driver will report fault 58: the fixed stop is outside the monitoring window, and will [G03. 40 Fixed stop monitoring window] is set to 0 to turn off the fixed stop point monitoring function.

Fixed stop not reached

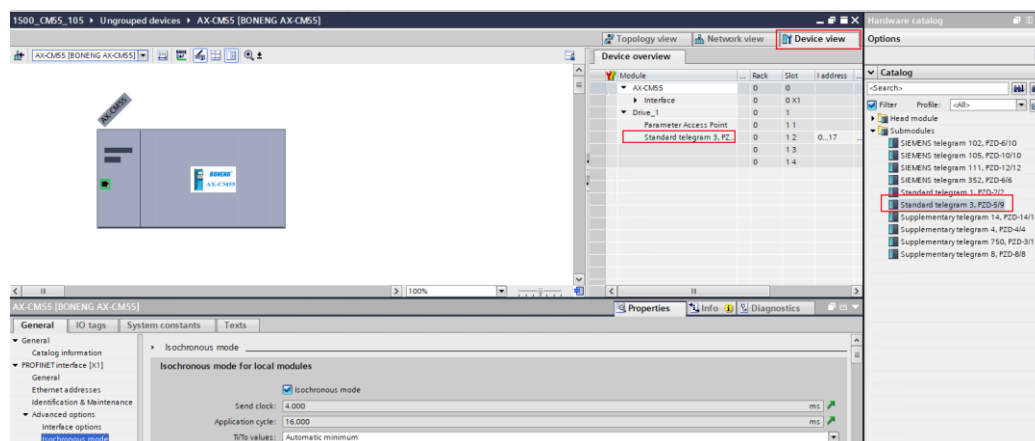
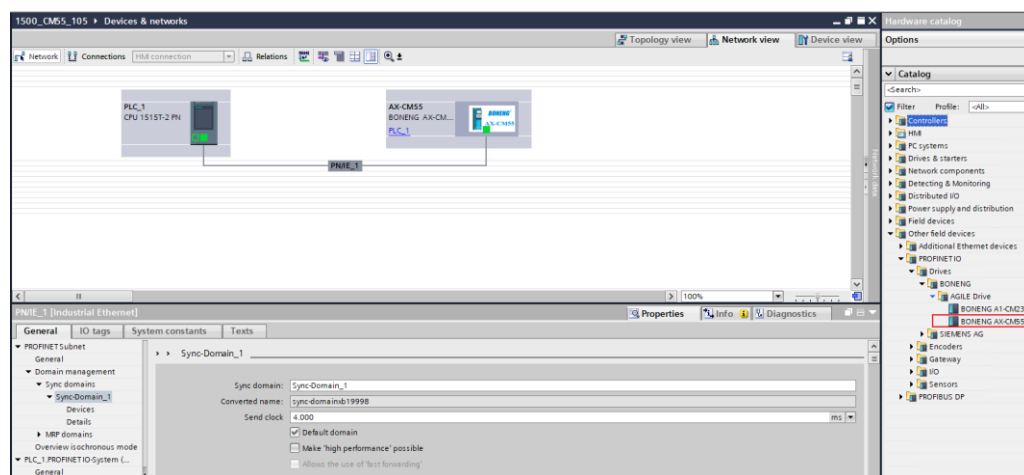
If the fixed stop is not reached until the braking action point, the drive will report a " fixed stop not reached " fault or warning. [G03.41 fixed stop not reached information selection] Select whether the drive reports a fault or a warning.

3.5. Standard telegram 3, Siemens telegram 102,105

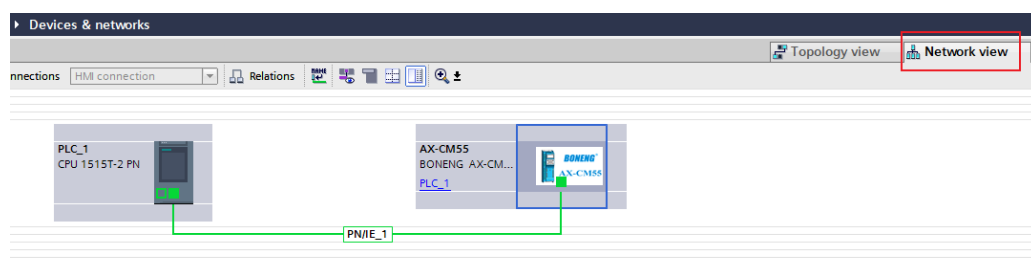
Configure the axis technology object in the PLC. CM55 uses Standard telegram 3 or Siemens telegram 102, 105 and is controlled through PLCOpen standard program blocks such as MC_Power and MC_MoveAbsolute. The trajectory planning and position control of the drive are calculated by the PLC, and the drive performs speed control. Compared with Standard telegram 3, Siemens telegram 102, 105 adds torque limit MC_TorqueLimiting.

3.5.1. Configure technology object

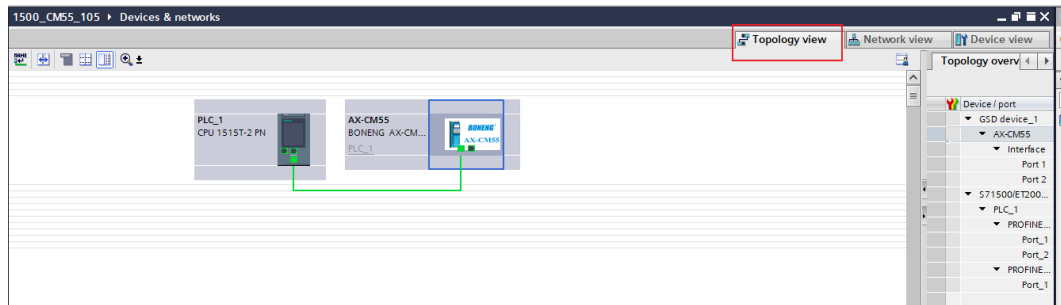
Take Standard telegram 3 as an example, first configure CM55 and add Standard telegram 3.



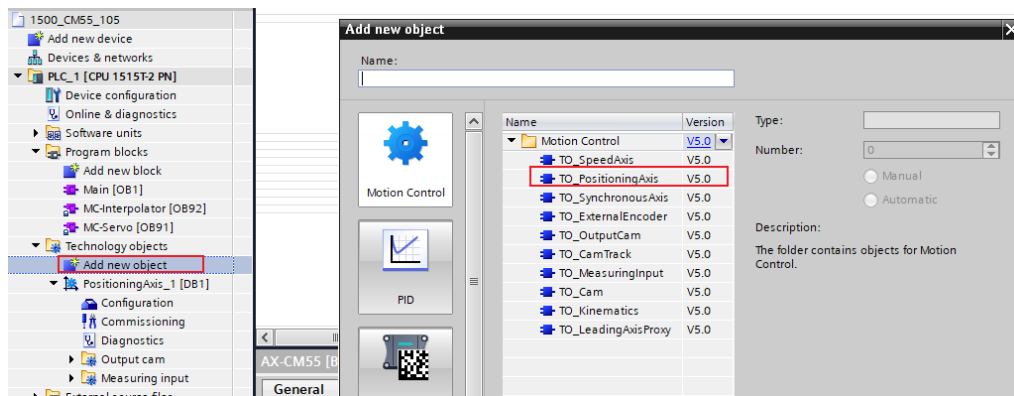
In the network view, click the “Not assign” and select “PLC_1.PROFINET Interface_1”, and the connected network view is shown as follows:



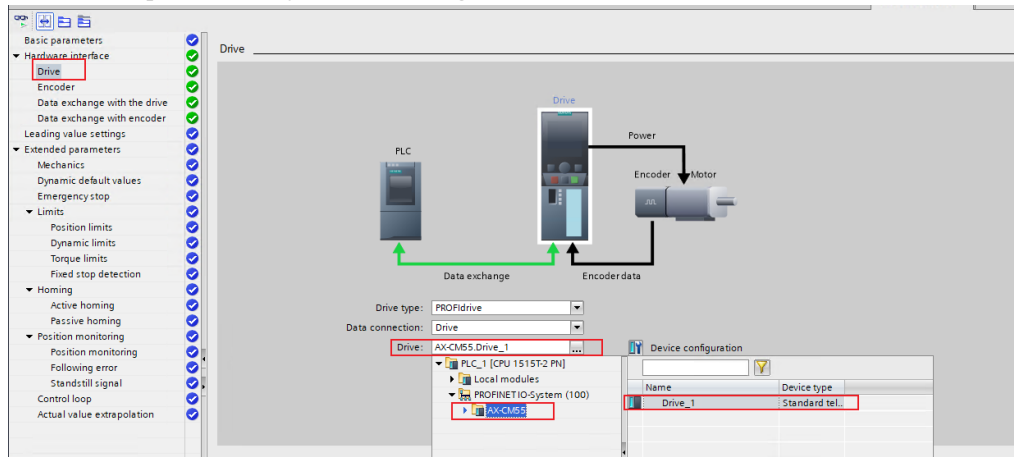
If only RT communication is performed (Default), the topology view does not need to be connected. If IRT communication between PLC and CM55 is required, the topology view must be connected, and the actual physical connection must be consistent with the configuration.



Add a new object by double-click “Add new object” from the project tree, select the “TO_Positioning” from the “Motion Control” list:



In this example, we firstly need to configure the drive under the hardware interface:

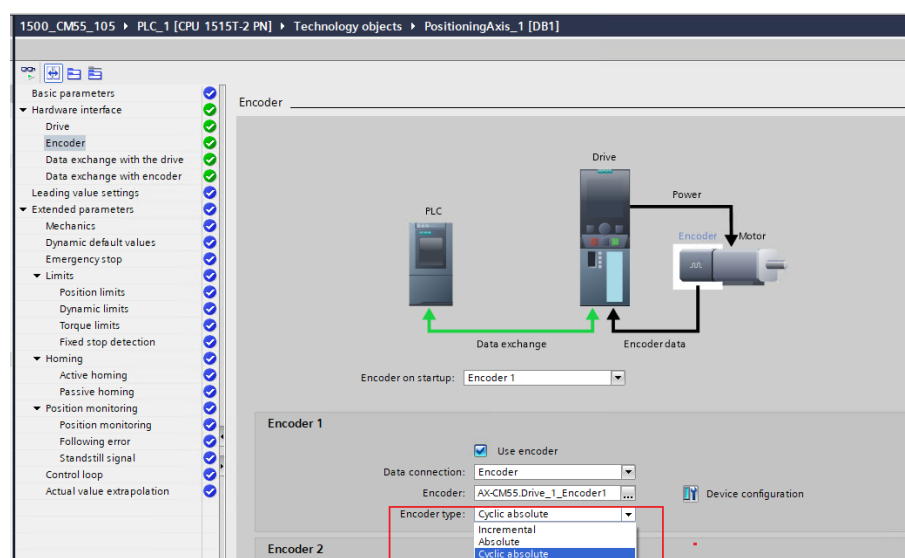


Select the encoder type and configure it according to the values of [D02.00 Encoder Type] and [G00.66 Encoder Position Feedback Mode Selection], refer to the table below.

Encoder type of drive		Technology object encoder configuration				
[D02.00 encoder type]	[G00.66 Encoder position feedback mode selection]	Encoder type	Increments per revolution	Number of revolutions	Fine resolution Bits in Gx_XIST1	Fine resolution Bits in Gx_XIST2
1: Ordinary/wire-saving ABZ encoder (DB15)	--	Incremental	[D02.04 Incremental encoder lines]*4	--	0	--
4: BISS-C communication encoder(1222)	1: Absolute position mode	Absolute/ Cyclic absolute	4194304	1024	0	0
	0: Incremental position mode	Incremental	4194304	--	0	--
5: RS485 communication encoder(1623)	1: Absolute position mode	Absolute/ Cyclic absolute	8388608	512	0	0
	0: Incremental position mode	Incremental	8388608	--	0	--

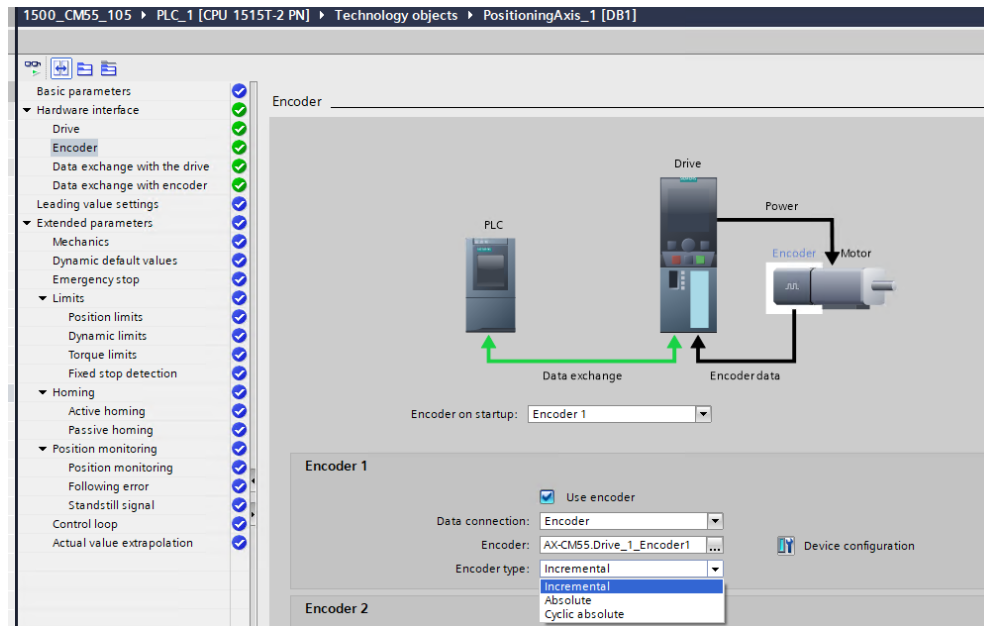
Absolute mode:

When [D02.00 Encoder Type] is 4: BISS-C communication encoder (1222) or 5: RS485 communication encoder (1623), and [G00.66 Encoder position feedback mode selection] is 1: Absolute position mode , then configure it as shown below.

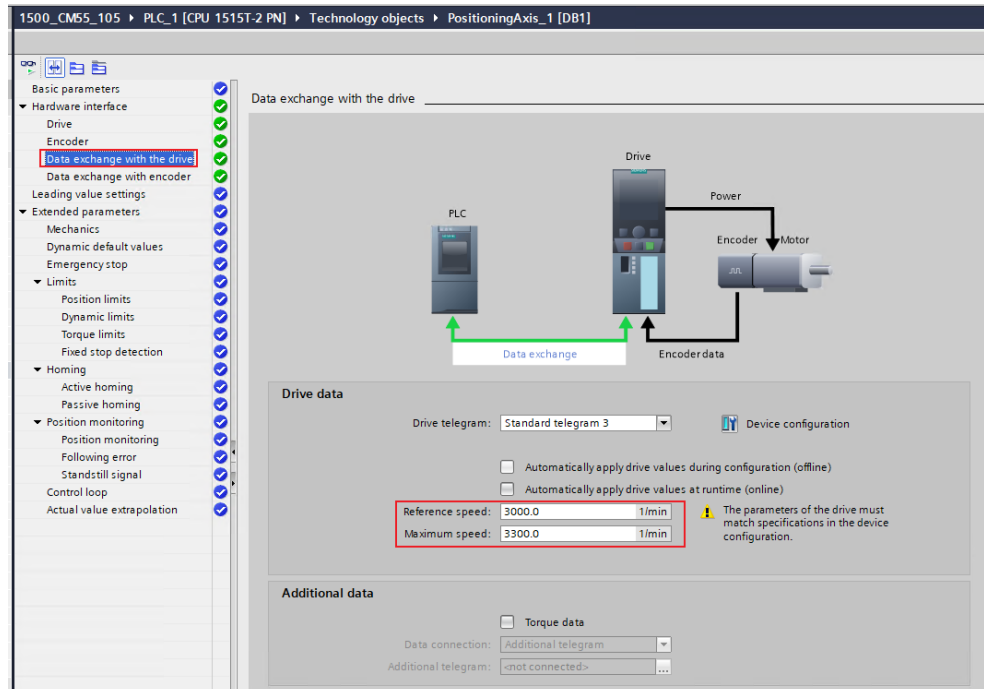


Incremental mode mode:

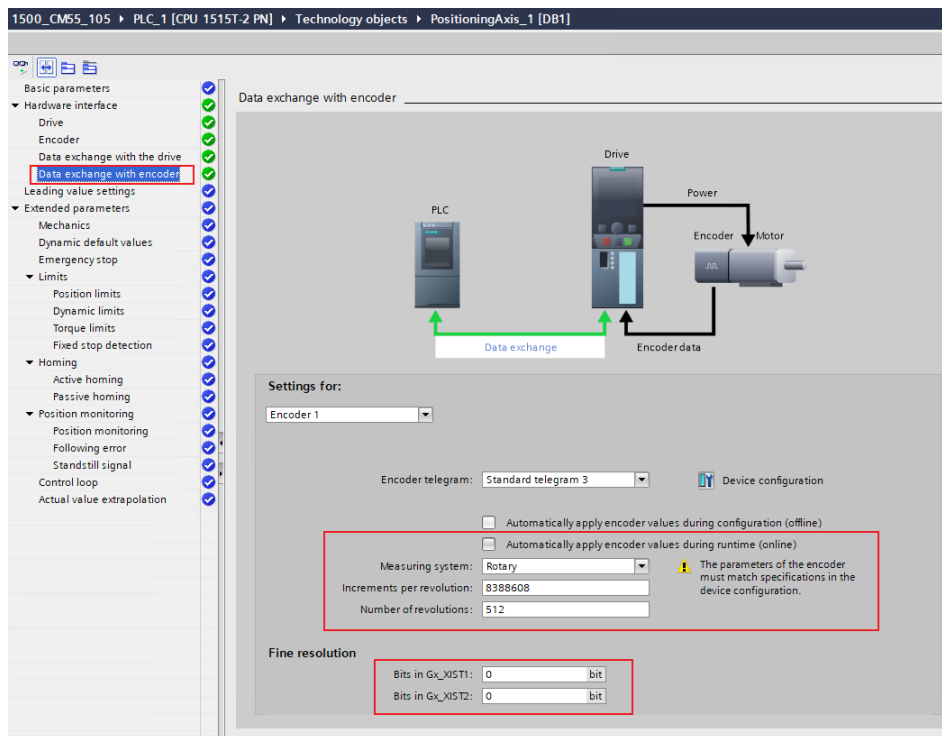
[D02.00 Encoder type] is 1: ordinary/wire-saving ABZ encoder (DB15), or [G00.66 Encoder position feedback mode selection] is 0: incremental position mode. Then configure it as shown below.



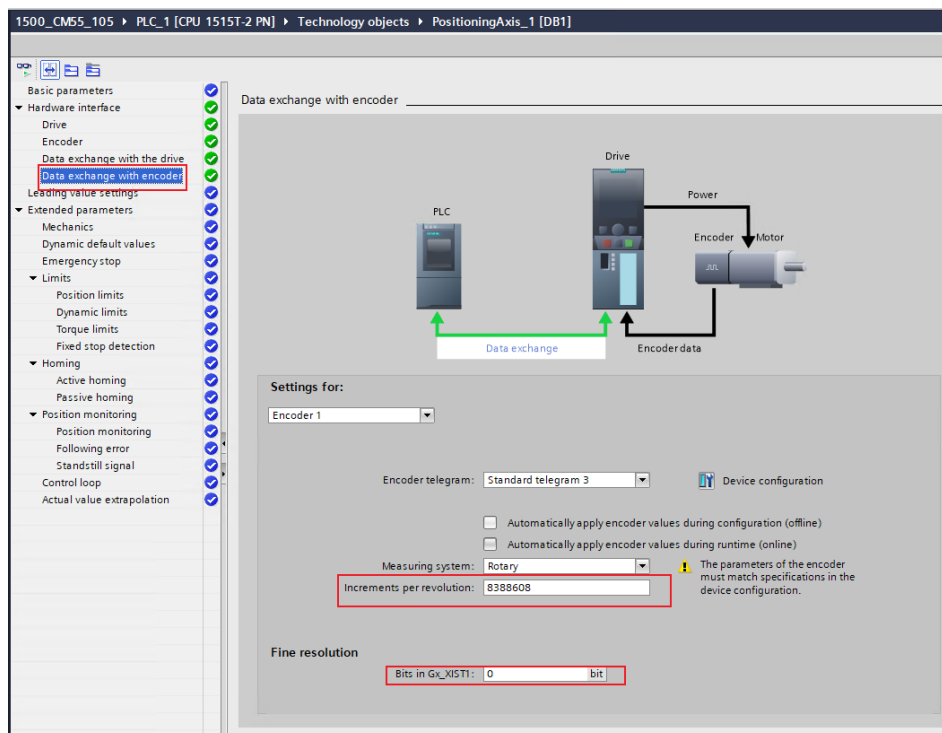
For the reference speed, maximum speed and base torque of the motor, "Automatically apply drive values at runtime" cannot be checked and must be set manually according to the drive parameters. The reference speed is the rated speed of the motor [D00.05 rated motor speed], the maximum speed [D00.06 motor max speed]*[D00.05 motor rated speed].



In "Data exchange with encoder", uncheck "Automatically apply encoder values at runtime". [D02.00 Encoder Type] is 5: RS485 communication encoder (1623), and [G00.66 Encoder Position Feedback Mode Selection] is 1: Absolute position mode, configure as shown below.



[D02.00 Encoder type] is 5: RS485 communication encoder (1623), and [G00.66 Encoder position feedback mode selection] is 0: incremental position mode, configured as shown below.



[D02.00 Encoder type] is 4: BISS-C communication encoder (1222), [G00.66 Encoder position feedback mode selection] is 1: absolute position mode, configure as shown below.

☐ Automatically apply encoder values during configuration (offline)
☐ Automatically apply encoder values during runtime (online)

Measuring system: Rotary

Increments per revolution: 4194304
 Number of revolutions: 1024

The parameters of the encoder must match specifications in the device configuration.

Fine resolution

Bits in Gx_XIST1: 0 bit
 Bits in Gx_XIST2: 0 bit

[D02.00 Encoder type] is 4: BISS-C communication encoder (1222), [G00.66 Encoder position feedback mode selection] is 0: incremental position mode, configure as shown below.

☐ Automatically apply encoder values during configuration (offline)
☐ Automatically apply encoder values during runtime (online)

Measuring system: Rotary

Increments per revolution: 4194304

The parameters of the encoder must match specifications in the device configuration.

Fine resolution

Bits in Gx_XIST1: 0 bit

[D02.00 Encoder Type] is 1: Ordinary/wire-saving ABZ encoder (DB15), configured as shown below.

The asynchronous motor uses the ABZ encoder configuration, and [increment per revolution] is set to 4096 ([D02.04 incremental encoder harness]*4, because it is multiplied by 4, it needs to be multiplied by 4).

1500_CM55_105 > PLC_1 [CPU 1515T-2 PN] > Technology objects > PositioningAxis_1 [DB1]

Basic parameters
 Hardware interface
 Drive
 Encoder
 Data exchange with the drive
 Data exchange with encoder
 Leading value settings
 Extended parameters
 Mechanics
 Dynamic default values
 Emergency stop
 Limits
 Position limits
 Dynamic limits
 Torque limits
 Fixed stop detection
 Homing
 Active homing
 Passive homing
 Position monitoring
 Position monitoring
 Following error
 Standstill signal
 Control loop
 Actual value extrapolation

Data exchange with encoder

PLC Drive Encoder Motor
 Power
 Encoder data
 Data exchange

Settings for:
 Encoder 1

Encoder telegram: Standard telegram 3

☐ Automatically apply encoder values during configuration (offline)
☐ Automatically apply encoder values during runtime (online)

Measuring system: Rotary

Increments per revolution: 4096

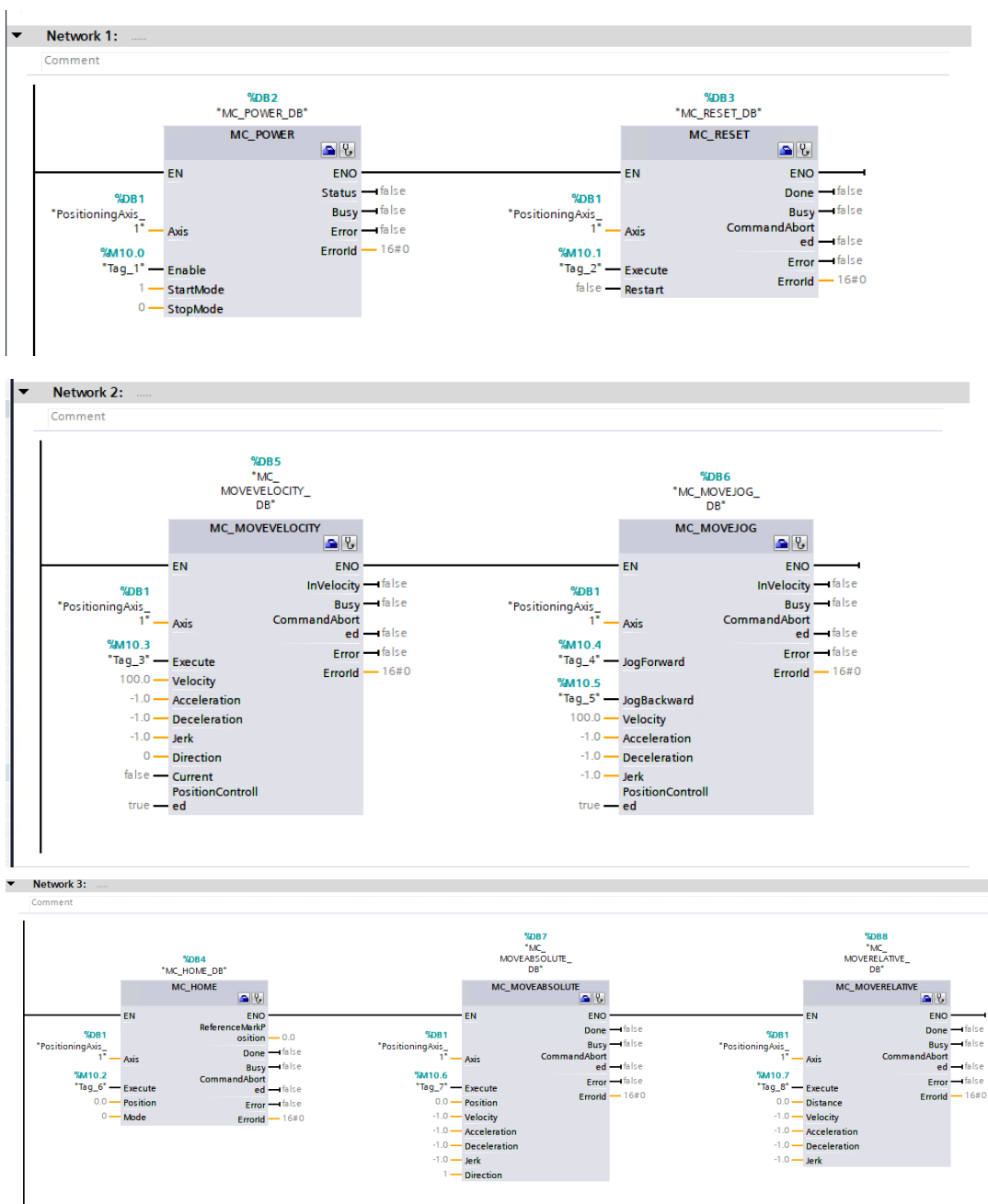
The parameters of the encoder must match specifications in the device configuration.

Fine resolution

Bits in Gx_XIST1: 0 bit

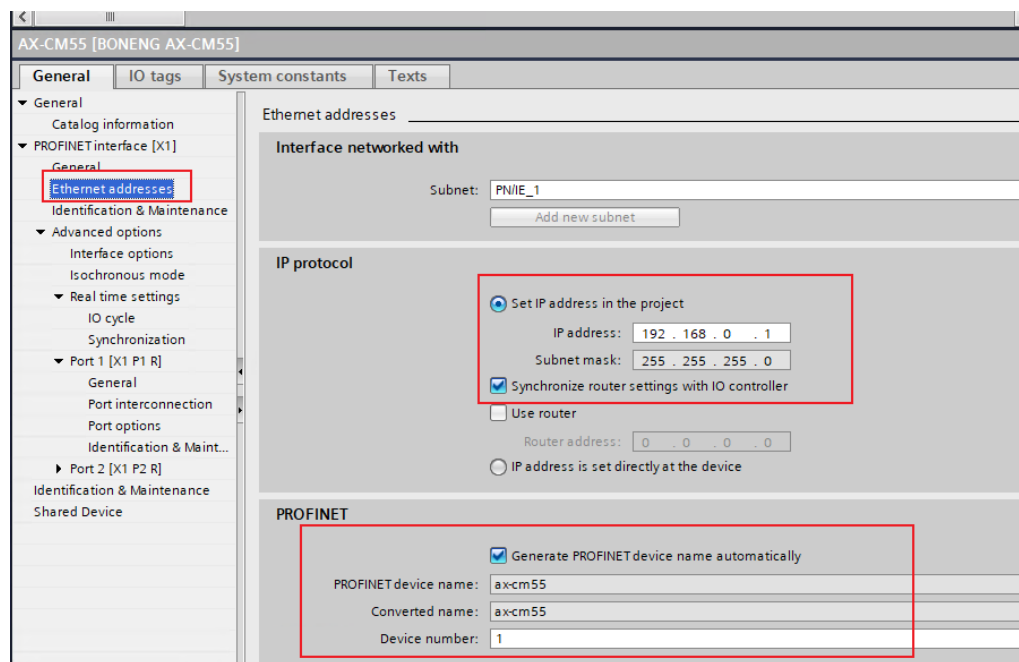
Funt...	Parameters	Current value	U
D02.00	Encoder type	1: Ordinary / Wire-saving ABZ encoder (DB15)	—
D02.01	Input AB phase sequence	0: Positive	—
D02.03	Input interface type	0: Differential	—
D02.04	Incremental encoder lines	1024	—
D02.10	Encoder zero POS angle	0.0	◊
D02.13	Speed FDBK PG DCN detection ...	500	m
D02.17	DB15 encoder power supply SEL	0:5V	—
D02.20	Encoder position reset source	0:Invalid	—

Write MC program:



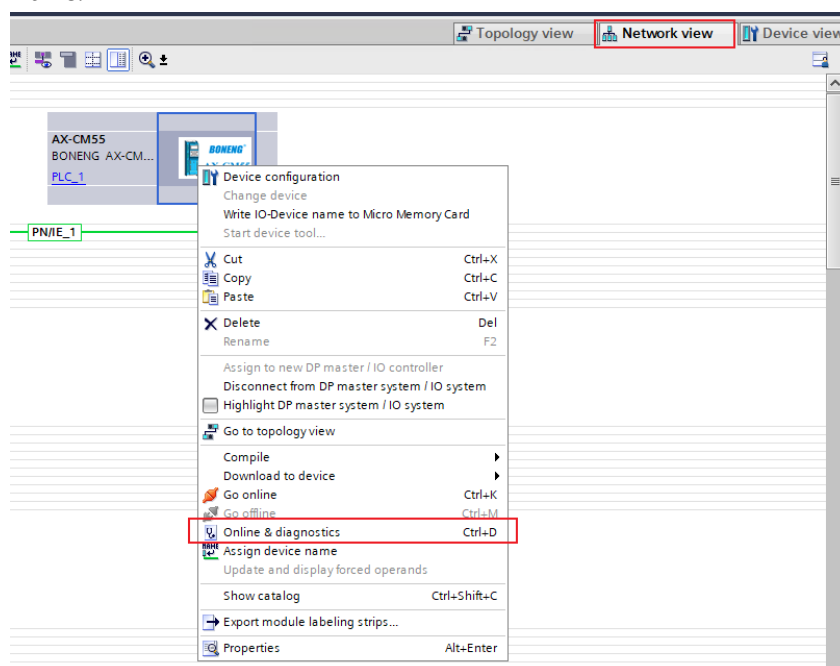
Then double-click the AX-CM55 drive in the device view to set the IP address and device

name for the drive.



Download PLC program

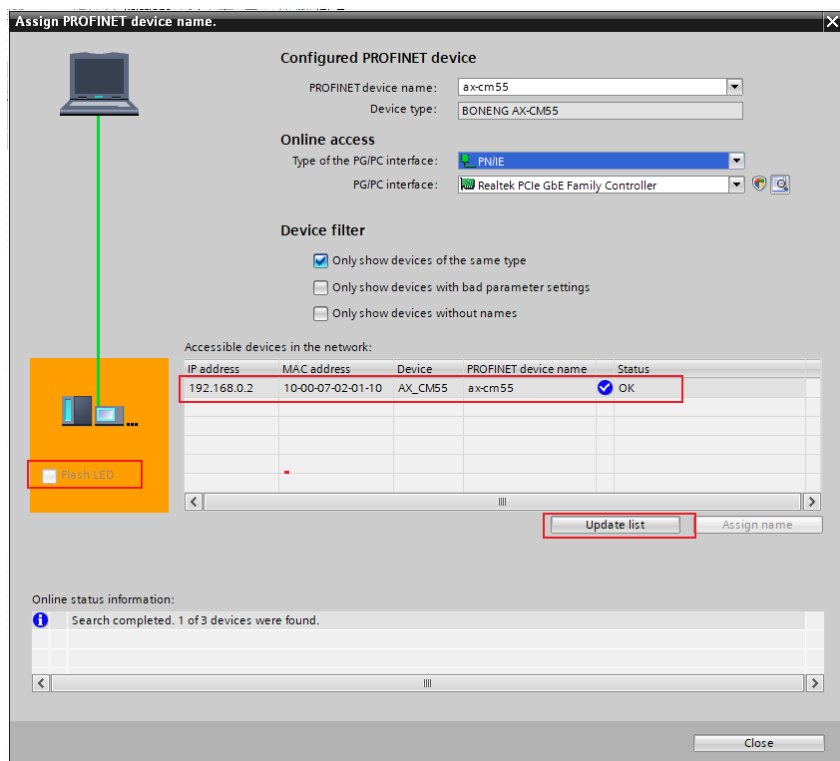
After the download is completed, monitor whether the PLC reports an error. If the PLC reports an error and the drive [C05.01 Communication Status] is 0: communication is not established, you need to right-click AX-CM55 in the device view and select Assign Device Name.



Finally, assign the device name to AX-CM55. First click "Update List", select the drive to be assigned, and then click "Assign Device Name". After completion, you can click "Update List" below to observe whether the device name has been modified. At the same time Check the drive and PLC status errors to see if they have been eliminated.

After selecting the drive, check "Flash LED", and the corresponding drive LINK1 and LINK2 lights will double flash at the same time to help the user determine which device is

currently being searched.



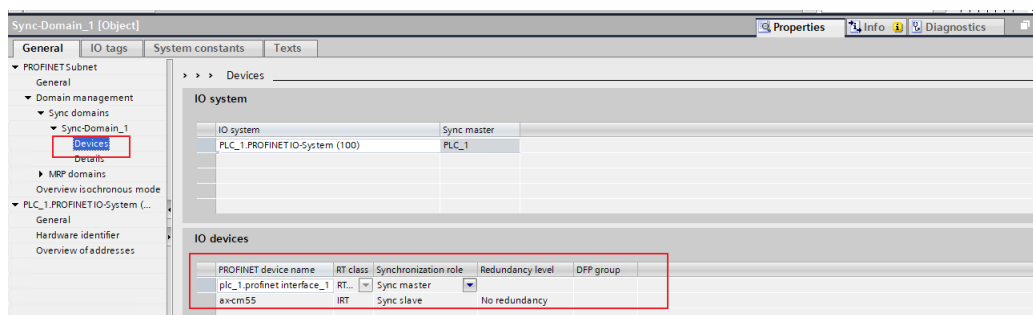
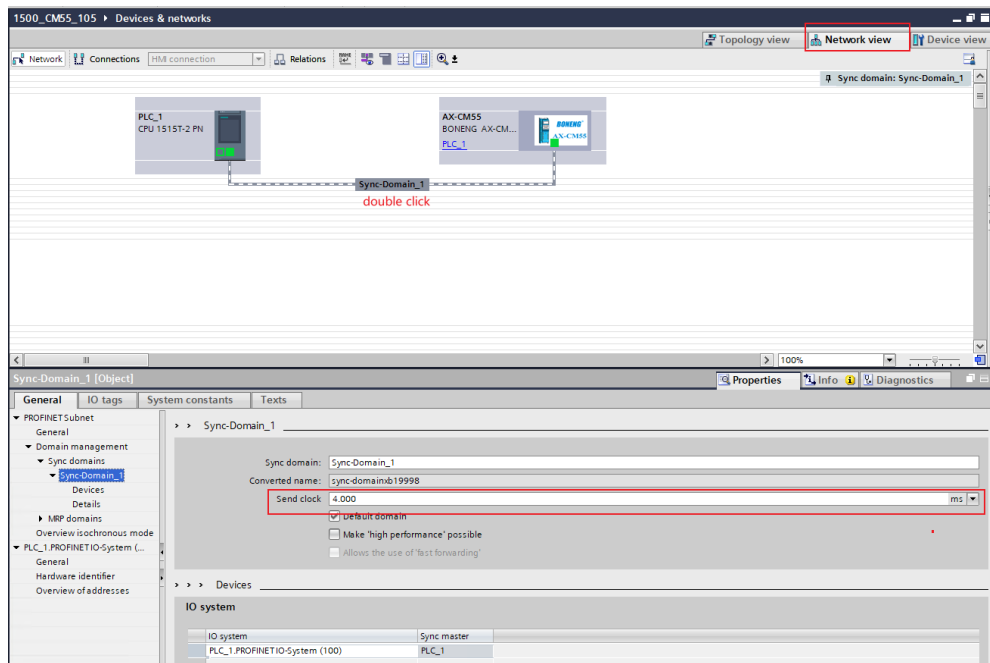
Standard telegram 3 configuration and programming are completed.

3.5.2. IRT mode configuration

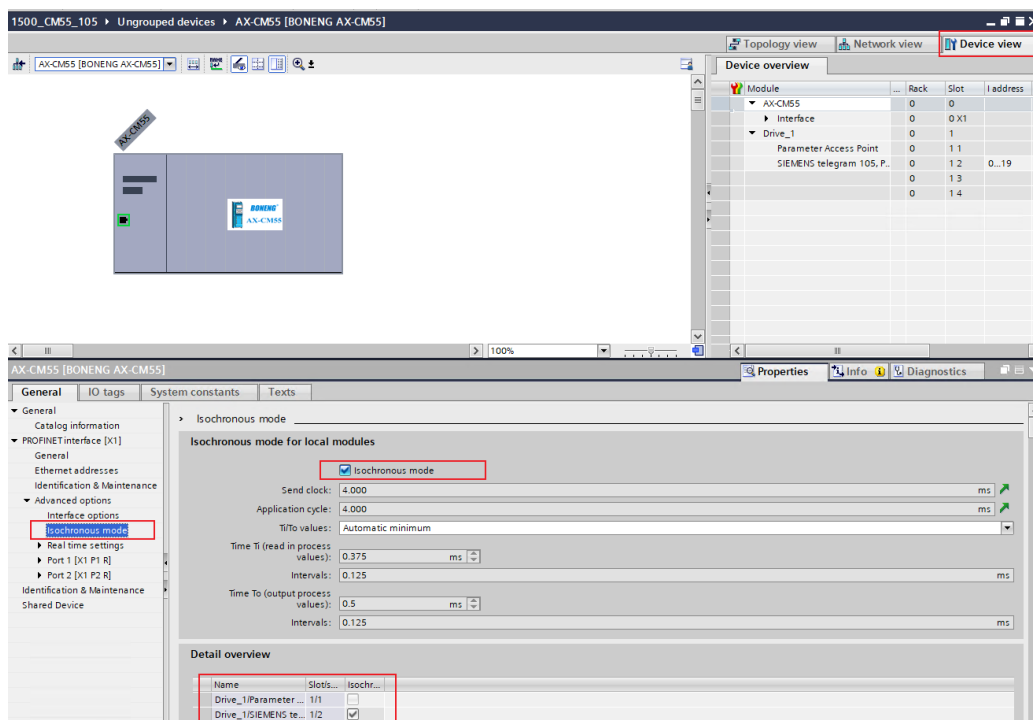
The topology view must be consistent with the actual network connections. In IRT mode, the topology view must be configured. Currently, Siemens S7-200SMART series and S7-1200 series do not support IRT communication; in RT mode, there is no need to configure the topology view.

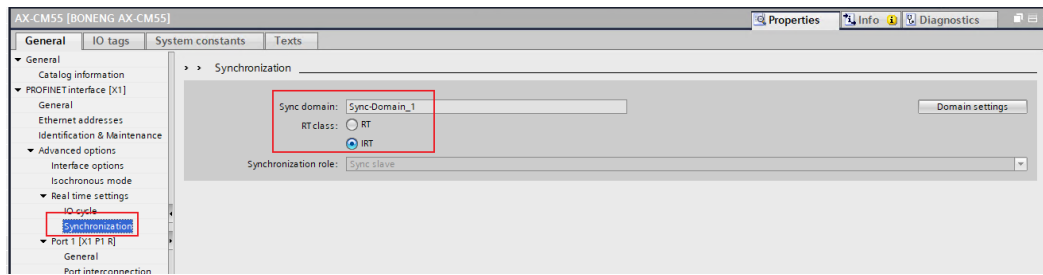


Modify the synchronization time: Configure PROFINET IRT communication in the network view. The current minimum synchronization period supported by CM55 is 1ms. Select “4 ms” from the selection list of send clock:



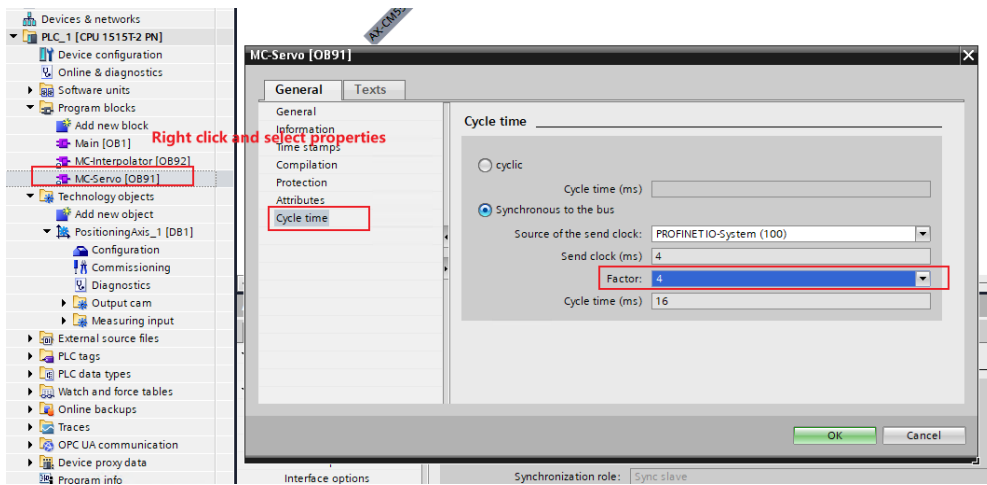
Select the checkbox of “Isochronous mode” from the tab of “Isochronous mode” to activate the IRT mode:





Double-click the “MC-Servo[OB91]” from the program block tree to open the properties of the program block OB91, select the option of “Synchronous to the bus”, select “PROFINET IO-System (100)” for the distributed I/O.

Note: If the performance of the PLC is low, the factor needs to be modulated by 4 or 8 to reduce the calculation cycle of the position loop in the PLC.

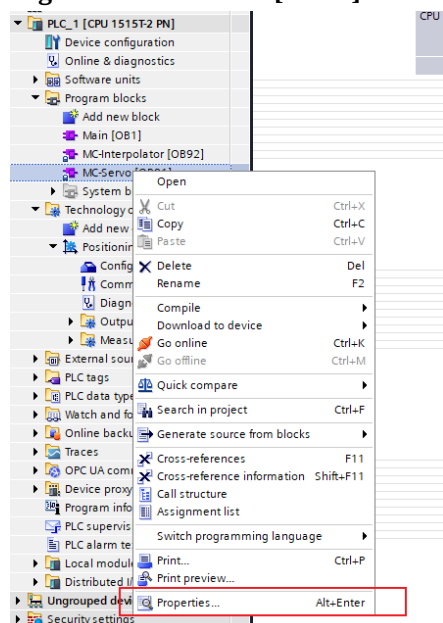


IRT configuration completed.

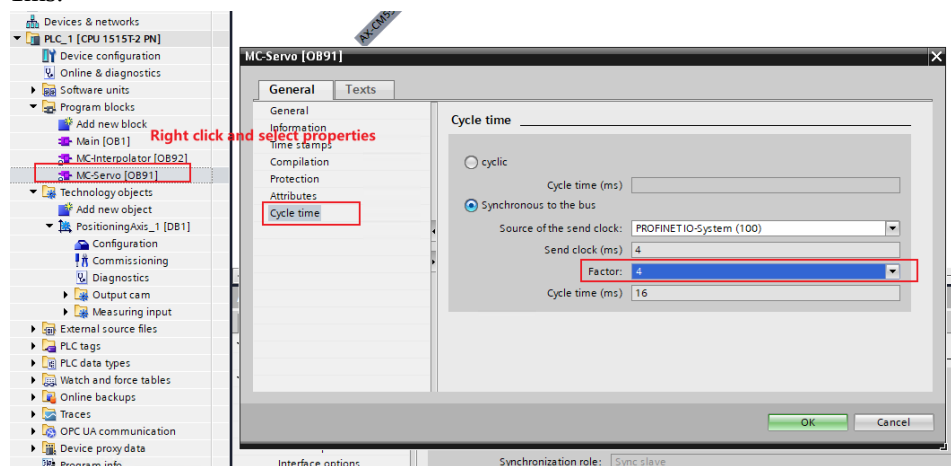
3.5.3. Application cycle time

When S7-1200/S7-1500PLC creates a closed-loop motion control technology object, it will automatically create a technology block for executing the technology object. MC_Servo [OB91] is used for the calculation of the position controller, and MC_Interpolator[OB92] is used to generate the device. Setting, evaluating motion control instructions and position monitoring functions. The frequency relationship between these two organization blocks is always 1:1, and MC_Servo[OB91] is always executed before MC_Interpolator[OB92]. The application cycle periodic calling time of MC_Servo[OB91] can be specified based on the control quality and system load requirements. If the cycle time is too short, it may cause CPU overflow and cause CPU shutdown. Right-click the OB91 organization block. In the pop-up OB91 properties dialog box, you can modify its cycle time. You can set the motion control application cycle according to the number of axes used. The motion control application cycle time = 2ms + (number of position control axes * 2ms)

Right-click MC-Servo[OB91]:

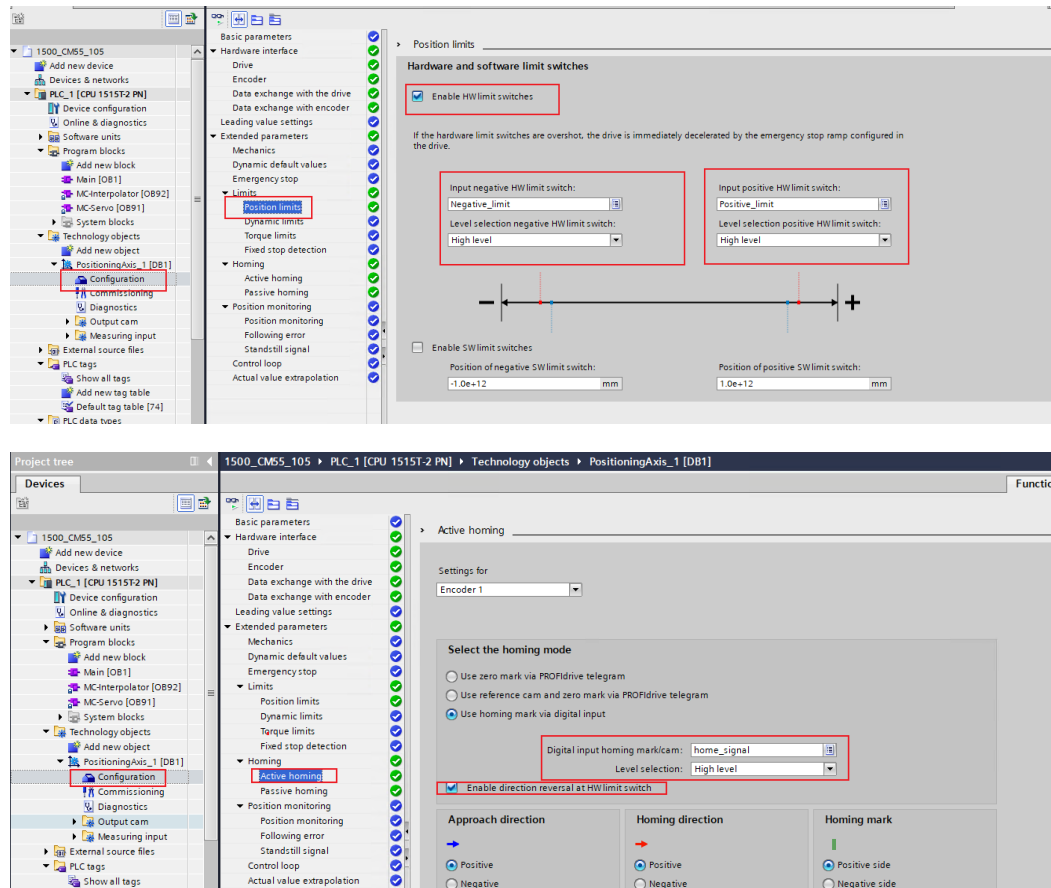


Select [Cycle time] and change the period by modifying the factor. The minimum period is 1ms.



3.5.4. MC_HOME

Standard telegram 3, Siemens telegram 102, 105 configures the homing through PLC. The homing trajectory planning is determined by the PLC, so the signals and limits of the homing need to be connected to the PLC.



MC_Home mode (S7-1500,S7-1500T)

Mode	Description
0	Direct homing (absolute) The current position of the technology object is set to the value of parameter "Position".
1	Direct homing (relative) The current position of the technology object is shifted by the value of parameter "Position".
2	Passive homing (without reset) Functions like "Mode" 8, with the difference that the "homed" status is not reset when the function is enabled.
3	Active homing The positioning axis/synchronous axis technology object performs a homing movement according to the configuration. After the completion of the motion, the axis is positioned at the value of the "Position" parameter.
5	Active homing ("Position" parameter has no effect) The positioning axis/synchronous axis technology object performs a homing movement according to the configuration. After completion of the motion, the axis is positioned at the home position configured under "Technology object > Configuration > Extended parameters > Homing > Active homing".

	(<TO>.Homing.HomePosition)
6	Absolute encoder adjustment (relative) The current position is shifted by the value of parameter "Position". The calculated absolute value offset is stored retentively in the CPU. (<TO>.StatusSensor[1..4].AbsEncoderOffset)
7	Absolute encoder adjustment (absolute) The current position is set to the value of parameter "Position". The calculated absolute value offset is stored retentively in the CPU. (<TO>.StatusSensor[1..4].AbsEncoderOffset)
8	Passive homing When the homing mark is detected, the actual value is set to the value of the "Position" parameter
10	Passive homing ("Position" parameter has no effect) When the homing mark is detected, the actual value is set to the home position configured under "Technology object > Configuration > Extended parameters > Homing > Passive homing". (<TO>.Homing.HomePosition)

Operating mode	Incremental encoder	absolute encoder
Active homing (Mode=3,5)	✓	✗
Passive homing (Mode=2,8,10)	✓	✗
Set actual position (Mode=0)	✓	✓
Relative offset to the actual position (Mode=1)	✓	✓
Absolute encoder adjustment (Mode=6,7)	✗	✓

Set the drive parameter [G00.66 Encoder position feedback mode selection] to 1 absolute position mode.

Mode=0:

Direct homing (absolute).

The current position of the technology object is set to the value of parameter "Position".

The encoder type of the axis is rotary absolute value: the position is lost after the PLC is powered off and on again, and is displayed after conversion to the value fed back by the encoder.

The encoder type of the axis is rotational increment: the position is lost and becomes 0 after the PLC is powered off and on again.

Mode=1:

Direct homing (relative)

The current position of the technology object is shifted by the value of parameter "Position".

The encoder type of the axis is rotary absolute value: the position is lost after the PLC is powered off and on again, the value of the superimposed parameter "Position" is lost, and is displayed after conversion to the value fed back by the encoder.

The encoder type of the axis is rotational increment: the position is lost and becomes 0 after the PLC is powered off and on again.

Mode=2:

Passive homing (without reset). The position value of the axis is the value of the parameter "Position"

Mode=3:

Active homing, The position value of the axis is the value of the parameter "Position"

In Modes 2 and 3, the encoder type can only be configured as rotational increment. If configured as rotational absolute value, an error will be reported. After the PLC is powered off and on again, the position is lost and becomes 0.

Mode=6:

Absolute encoder adjustment (relative)

The current position is shifted by the value of parameter "Position". The calculated absolute value offset is stored retentively in the CPU.

Only the encoder type can be configured as absolute value, and an error will be reported after configuring increment. The position is not lost after the PLC is powered off and on again, and the value of the superimposed parameter "Position" is retained.

Mode=7:

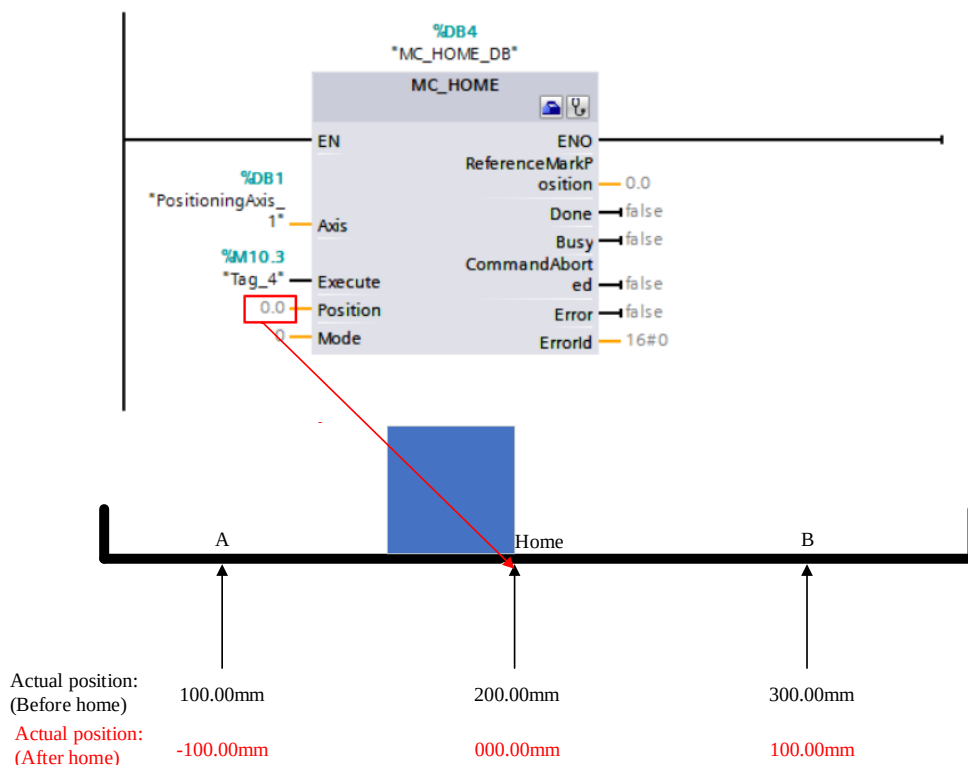
Absolute encoder adjustment (absolute)

The current position is set to the value of parameter "Position". The calculated absolute value offset is stored retentively in the CPU.

Only the encoder type can be configured as absolute value, and an error will be reported after configuring increment. The position is not lost after the PLC is powered off and on again.

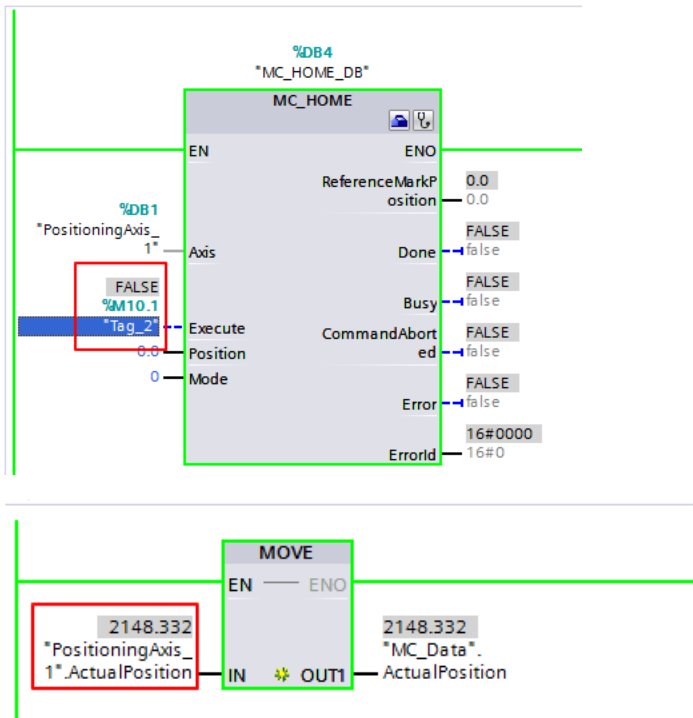
3.5.4.1. Mode=0 Direct homing (absolute)

When the MC_Home command in this mode is triggered, the axle does not move and does not search for the homing switch. The result after the instruction is executed: the coordinate value of the axis is directly updated to the "Position" value in MC_HOME. In the example, "Position"=0.0mm, then the current coordinate value of the axis is updated to 0.0 mm. This coordinate value belongs to "absolute" coordinate value, which means that the axis has established an absolute coordinate system and can perform absolute motion.

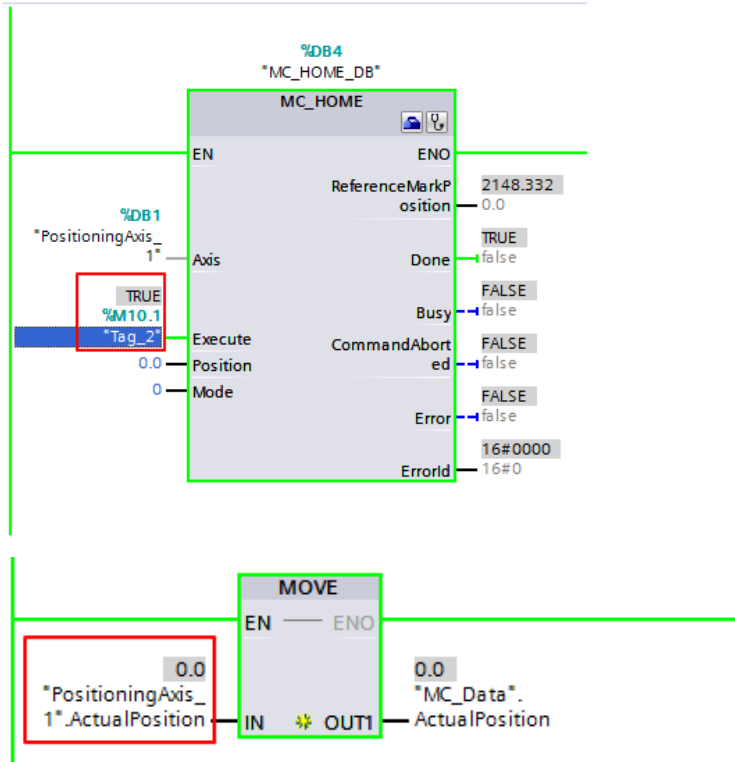


Mode=0, configure the axis encoder type as rotation absolute value, [G00.66 Encoder position feedback mode selection]=1: absolute position mode.

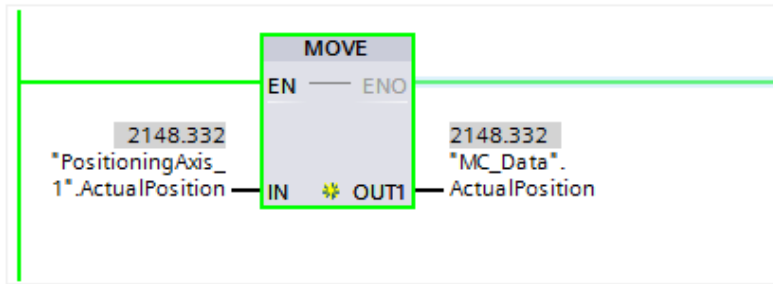
When the PLC is powered on, the initial position of the axis is 2148.332mm.



Mode=0, trigger MC_Home, the actual position of the axis becomes 0.

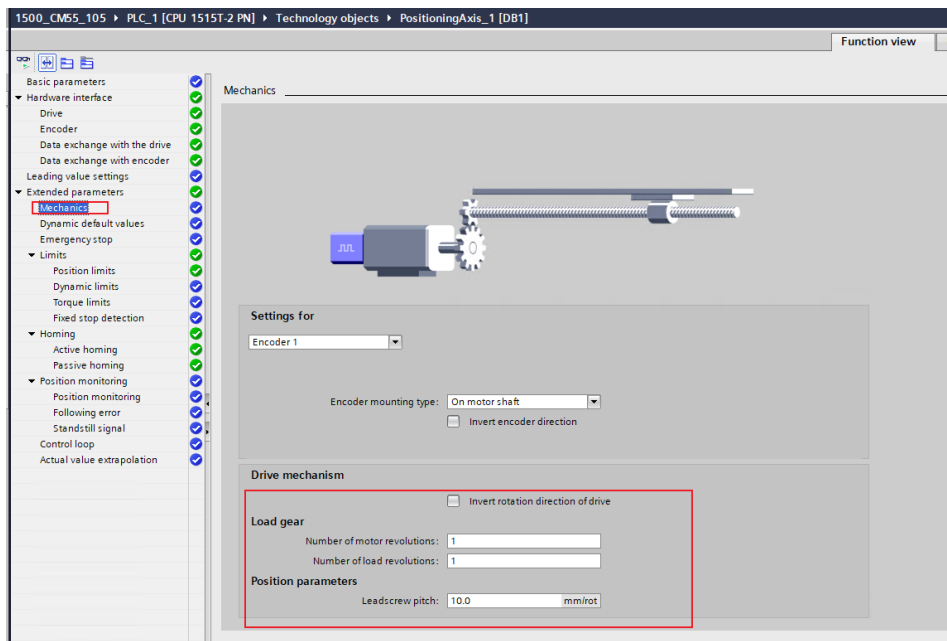


After the PLC is powered off and on, the current position of the axis is not 0, but still 2148.332

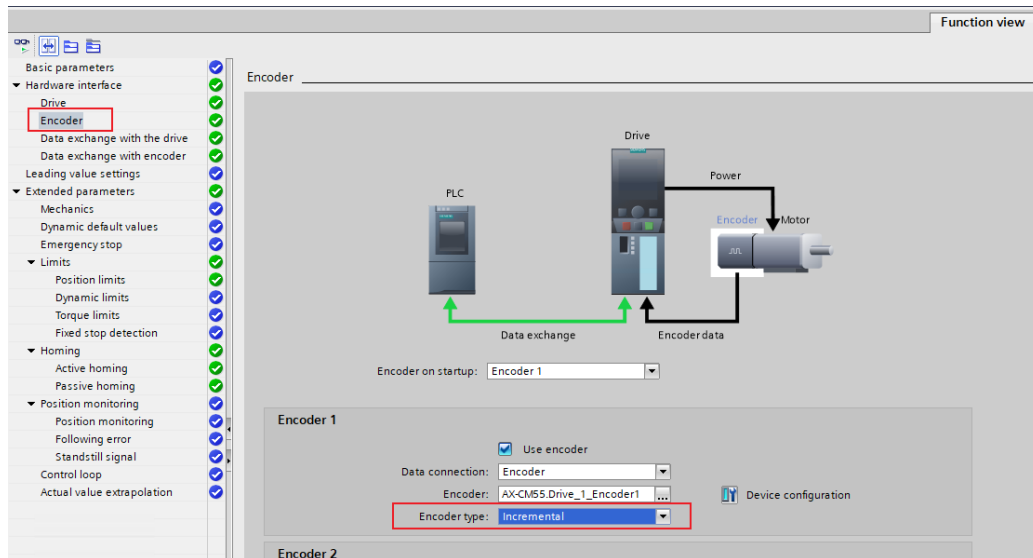


It can be seen from this that even if the PLC is homing before powering off, and then powered on again, the home position will still be lost. Why is it 2148.332mm? The number of feedback pulses [P14.04 Absolute position cumulative counter] = 1802151566, the PLC sets the load gear 1:1, the screw pitch 10.0mm/rot, so the calculated distance of the motor is: $(1802151566/8388608)*10.0=2148.332$, consistent with the displayed value.

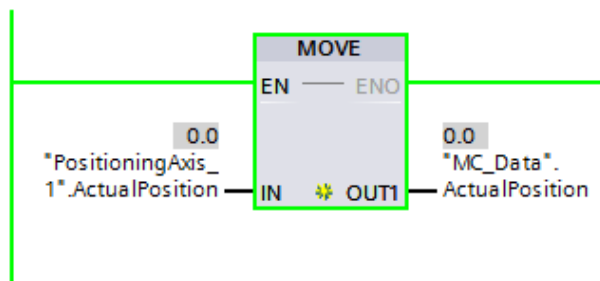
P14.04	ABS POS ACCU counter low(Pe1)	1802151566	-	I
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Summary: MC_Home's Mode=0, and the encoder type is set to: rotation absolute value. If the PLC is powered off and on again, the current position will be lost. The PLC will convert the number of pulses fed back by the encoder into a distance and display it. Mode=0, configure the axis encoder type as rotation incremental [G00.66 encoder position feedback mode selection] =0: incremental position mode



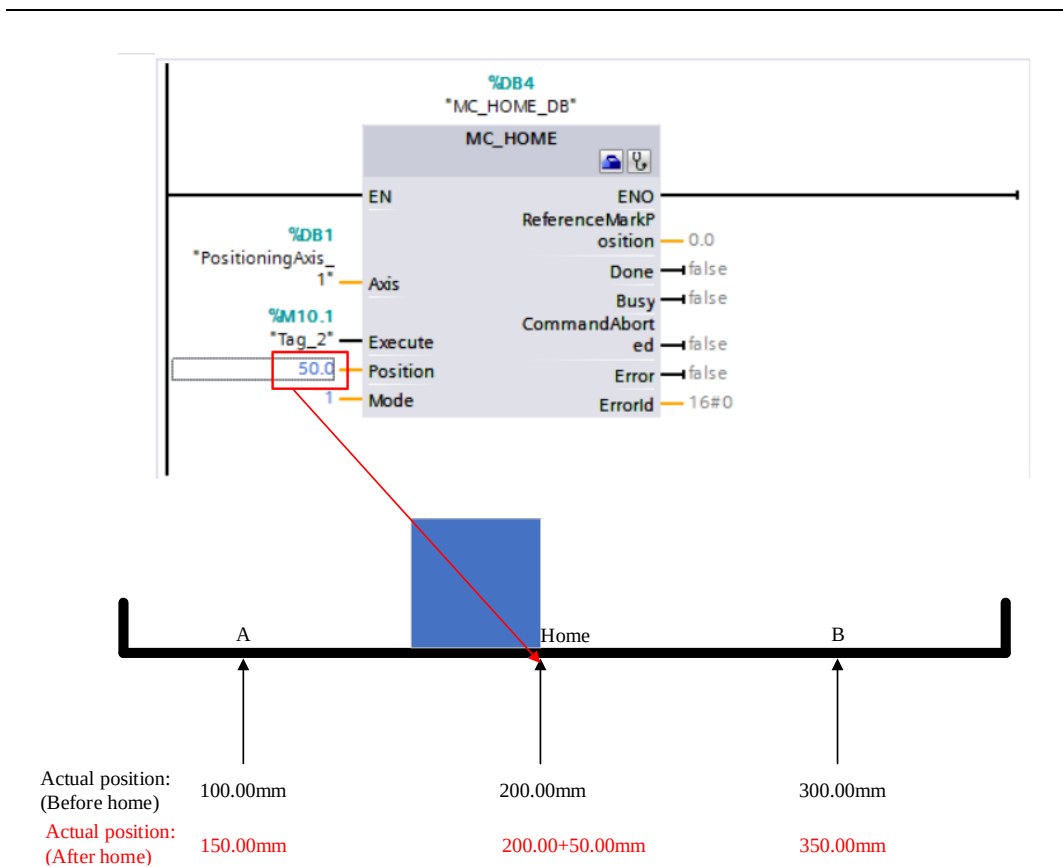
After the PLC is powered off and powered on, the current positions are all 0.



Summary: Mode=0 of MC_Home, the configured axis encoder type is rotation increment, if the PLC is powered off and on again, the current position will be lost and all will be changed to 0.

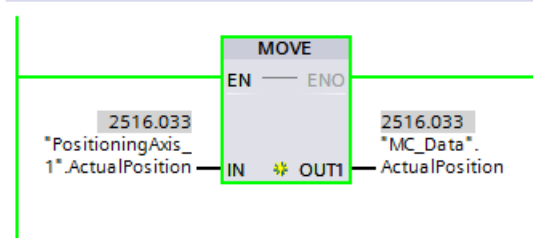
3.5.4.2. Mode=1 Direct homing (relative)

Same as Mode=0, the axis does not run after triggering the MC_Home instruction in this mode, but only updates the current position value of the axis. The update method is different from Mode=0, but the coordinate value obtained by adding the "Position" value to the initial coordinate value of the axis is used as the new value of the current position of the axis. As shown in the figure below, after triggering the MC_Home command, the axis position value becomes 250.0mm, and the corresponding coordinate position a and b are also updated to new values.

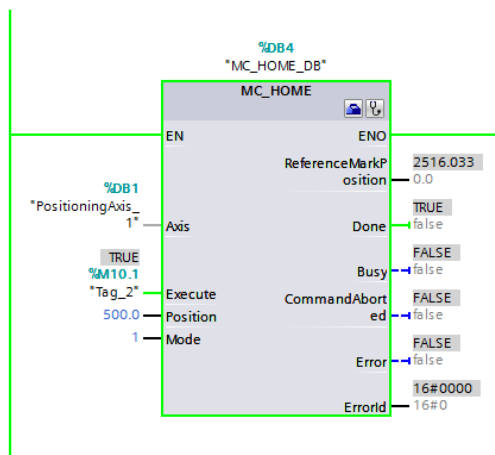


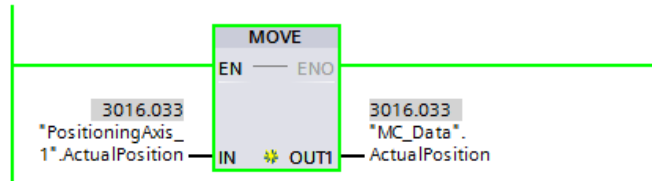
Mode=1, configure the axis encoder type as rotary absolute value

The PLC is powered on, and after moving a certain distance, the current position is displayed as 2516.033mm.

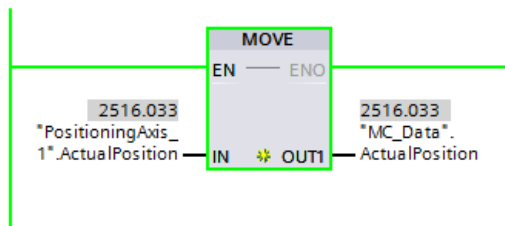


Trigger MC_Home, the motor does not rotate, the current position is superimposed on the initial 2516.033mm by 500.0mm, and the display is 3016.033





After the PLC is powered off and then powered on again, the current position becomes 2516.033 (the number of superimposed positions is gone. This value is converted from the value fed back by the encoder, $(2110602079/8388608)*10.0=2516.033$)

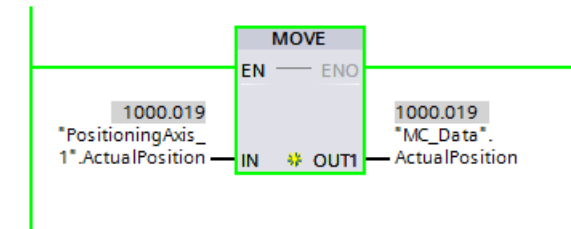


P14.04	ABS POS ACCU counter low(Pe1)	2110602079	-	Read onl...
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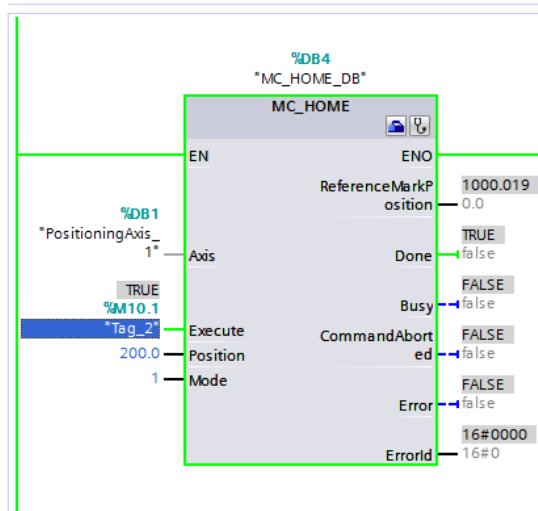
Summary: Mode=1 of MC_Home, and the configured axis encoder type is rotary absolute value. If the PLC is powered off and powered on again, the current position will be lost. The PLC will automatically convert the number of pulses fed back by the encoder into a distance and display it.

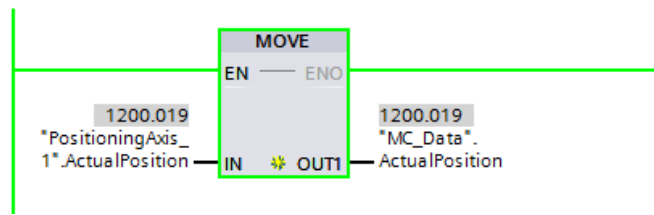
Mode=1, configure the axis encoder type as rotation incremental

The PLC is powered on, and after moving a certain distance, the current position is displayed as 1000.019mm.

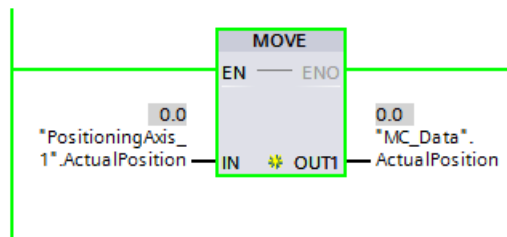


When MC_Home is triggered, the motor does not rotate. The current position is 200.0mm superimposed on the initial 1000.019mm, and is displayed as 1200.019mm.





After the PLC is powered off and then powered on again, the current position becomes 0 (because the configured axis encoder type is rotational increment)



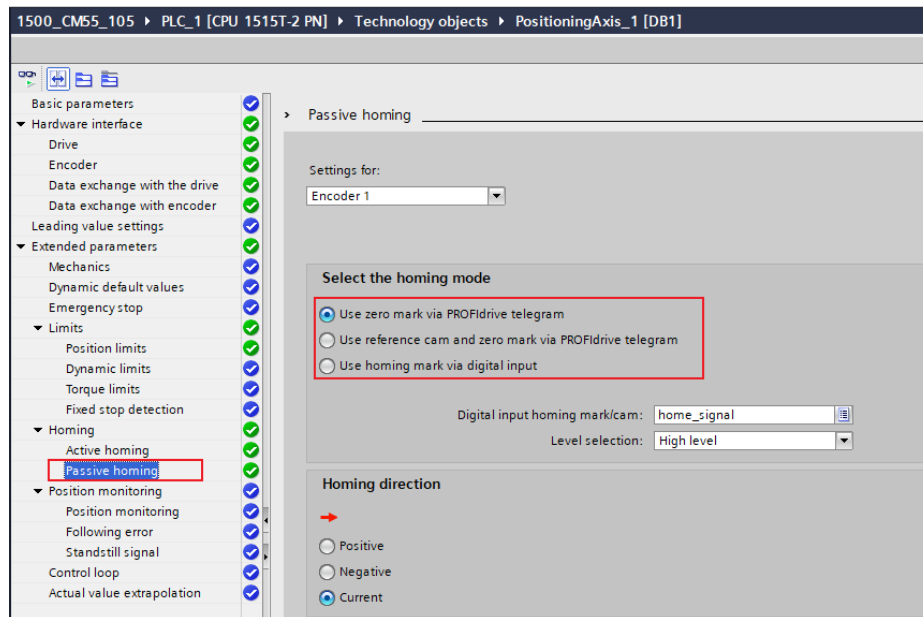
Summary: The Mode of MC_Home is 1, and the configured axis encoder type is rotation incremental. After the PLC is powered off and powered on again, the current position will be lost and the position will be 0.

3.5.4.3. Mode=2 Passive homing

When using this homing mode, the encoder can only select "incremental" when configuring the axis. If the axis encoder type is configured as rotation absolute value and mode 2 is used, an error will be reported when triggering.

Passive homing means that when the axis touches the homing switch during operation, the current position value of the axis will be set as the parameter "Position". When using Passive homing, the motor will not move when MC_Home is triggered. After the motor is run through other motion control instructions (such as MC_Movjog), MC_Home is triggered, and then the current position of the motor will change to the "Position" value after it touches the homing switch. That is, after detecting the homing signal during movement, the actual position will be automatically set to the "Position" value specified in MC_Home.

Passive homing needs to be configured in the technology object, as shown in the figure below. Passive homing also has 3 modes: use zero mark via PROFIdrive telegram (detect motor Z signal), use reference cam and zero mark via PROFIdrive telegram (use external digital signal as deceleration position, and then detect motor Z signal), use homing mark via digital input.



➤ **Use zero mark via PROFIdrive telegram (detect motor Z signal)**

The sequence of movements is as follows:

Trigger the motion control instruction MC_Home to start passive homing (Mode=2, 8, 10).

The motor is driven by motion control instructions. When the actual value of the axis or encoder moves in the specified homing direction, the homing mark detection (detection of the Z signal) is enabled.

When the motor Z signal is detected, the position of the axis or encoder will be set according to the configuration mode:

If Mode=2 or 8 in MC_Home, then position=the parameter value in "Position".

If Mode=10 in MC_Home, then position = parameter position in configuration.
variable value in <TO>.Homing.homePosition.

➤ **Use reference cam and zero mark via PROFIdrive telegram (use external digital signal as deceleration position, and then detect motor Z signal)**

The sequence of movements is as follows:

Trigger the motion control instruction MC_Home to start passive homing (Mode=2, 8, 10).

Drive the motor to move through motion control instructions and wait for the external input signal to be detected. After the external input signal is detected and left, the Z signal of the motor will be detected. When the Z signal of the motor is detected, the axis or encoding will be adjusted according to the configuration mode. Set the device location.

If Mode=2 or 8 in MC_Home, then position=the parameter value in "Position".

If Mode=10 in MC_Home, then position = parameter position in configuration.
(Variable value in <TO>.Homing.homePosition).

➤ **Use homing mark via digital input**

The sequence of movements is as follows

Trigger the motion control instruction MC_Home to start passive homing (Mode=2, 8, 10).

Drive the motor to move through motion control instructions and wait for the detection of external input signals.

When an external input signal is detected, the position of the axis or encoder will be set according to the configuration mode.

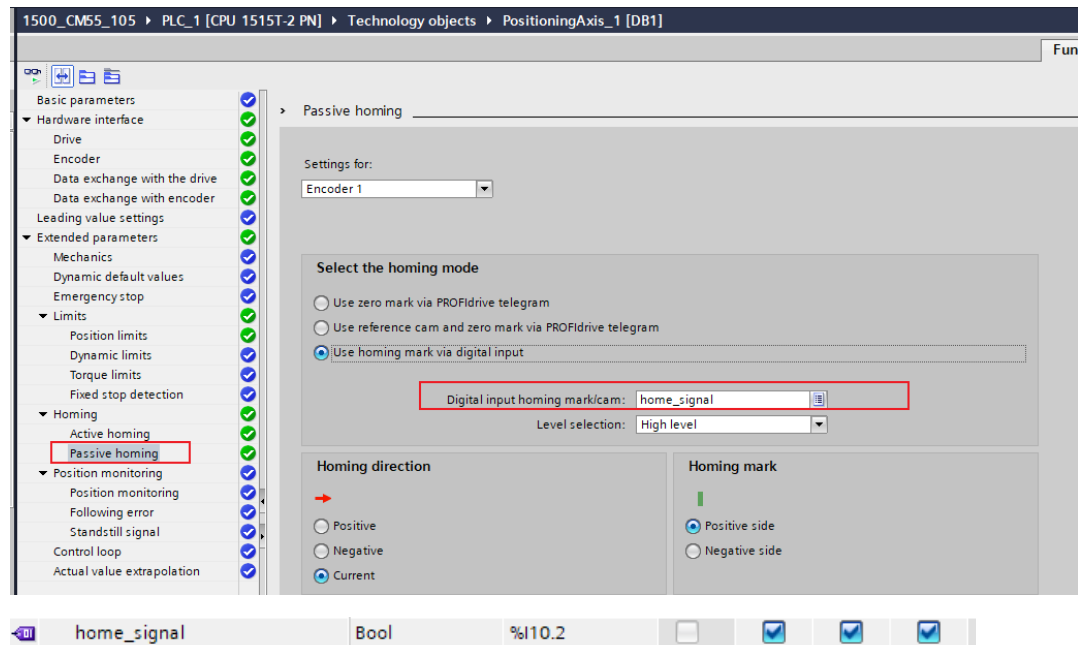
If Mode=2 or 8 in MC_Home, then position=parameter value in "Position"

If Mode=10 in MC_Home, then position = parameter position in configuration.

(variable value in <TO>.Homing.homePosition)

Passive homing

PLC configuration passive homing, and MC_Home uses mode 2, as shown in the figure below:



Set the MC_Home mode to Mode=2 to trigger the MC_Home function

Let the axis execute a relative motion command. The path set by this command allows the axis to pass the homing switch I10.2

When the motor encounters I10.2 during relative motion, observe that the current position of the motor instantly changes to 0, and then accumulates until the position where the operation stops.

When the axis encounters the valid edge of the homing switch while running at the speed specified by the MC_MoveRelative instruction, the axis immediately updates the coordinate position to the "Position" value on the MC_Home instruction. The axis does not stop during this process, nor does the operating speed change. The axis will not stop until it reaches the distance value of the MC_MoveRelative instruction.

Summary: The implementation of the passive homing function requires the MC_Home instruction to be used in conjunction with the MC_MoveRelative or MC_MoveAbsolute, MC_MoveVelocity, or MC_MoveJog instructions.

Passive homing requires homing switch.

Passive homing requires the axis to execute other commands and does not specifically perform the active homing function. Instead, the axis completes the homing function while executing other movements.

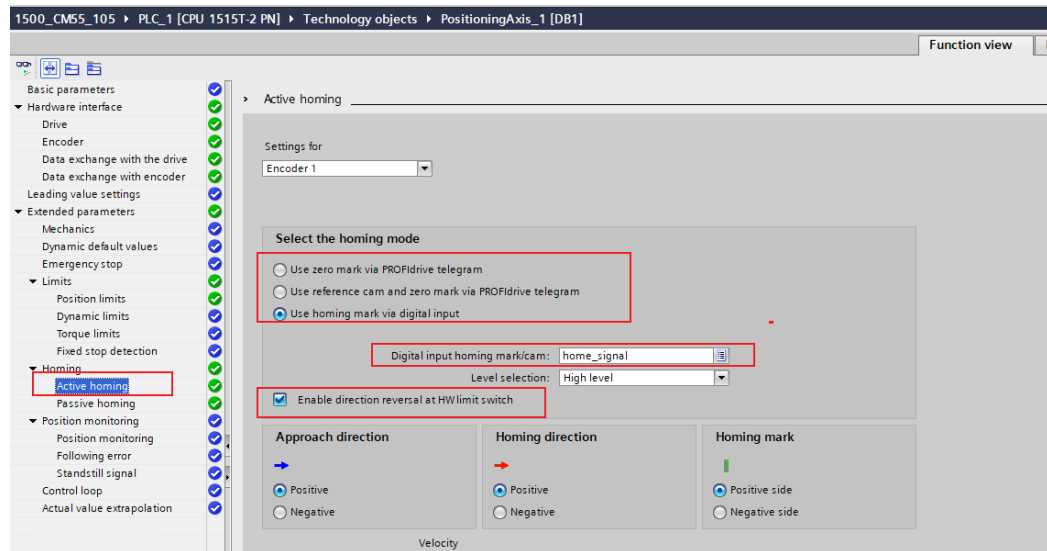
3.5.4.4. Mode=3 Active homing

When configuring the axis, the encoder can only select "incremental". If the encoder type of the axis configuration is "Cyclic absolute" and mode 3 is used, an error will be reported after

triggering.

Active homing means that after MC_Home is triggered, the motor will automatically run to complete the homing action.

Active homing needs to be configured in the technology object, as shown in the figure below. Active homing also has three modes: use zero mark via PROFIdrive telegram (detect motor Z signal), use reference cam and zero mark via PROFIdrive telegram (use external digital signal as deceleration position, and then detect motor Z signal), use homing mark via digital input.



Use zero mark via PROFIdrive telegram (detect motor Z signal)

Example: For forward homing and the configuration sets the forward starting position offset, the trajectory diagram is as follows:



The sequence of movements is as follows:

Trigger the motion control instruction MC_Home to start active homing (Mode=3, 5).

The motor looks for the Z signal during movement, when the Z signal is detected, the current position is immediately updated as follows:

If Mode=3 in MC_Home, then the current position = parameter value in "Position" - starting position offset in configuration

If Mode=5 in MC_Home, the current position = the origin position in the configuration - the starting position offset in the configuration.

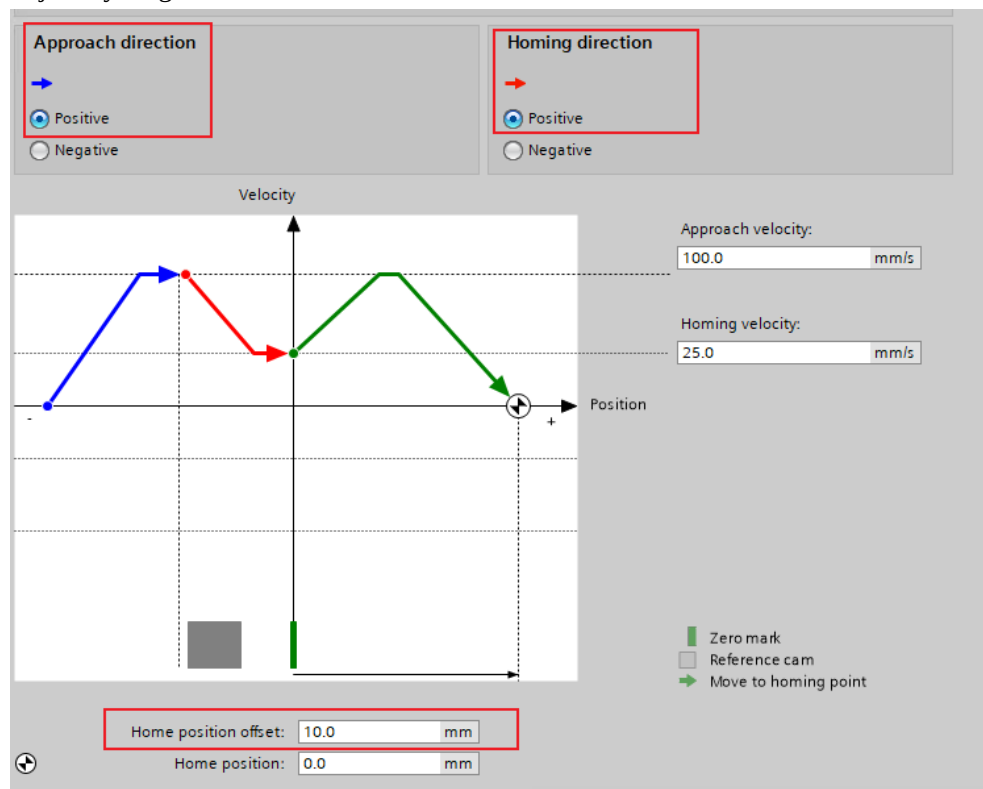
Then the motor will continue to run, and the running distance is the starting position offset set in the configuration. After completion, the current position of the motor will be updated:

If Mode=3 in MC_Home, the final stop position = parameter value in "Position";

If Mode=5 in MC_Home, the final stop position = the origin position in the configuration;

Use reference cam and zero mark via PROFIdrive telegram (use external digital signal as deceleration position, and then detect motor Z signal)

Example: Forward homing and the configuration sets the forward starting position offset, the trajectory diagram is as follows.



The sequence of movements is as follows:

Trigger the motion control instruction MC_Home to start active return to origin (Mode=3, 5).

The motor detects external input signals during movement.

When the external input signal is detected, the speed is reduced. After the falling edge of the external input signal is detected, the Z signal of the motor is detected;

When the motor Z signal is detected, the current position will be updated immediately as follows:

If Mode=3 in MC_Home, then the current position = the parameter value in "Position" - the

starting position offset in the configuration;

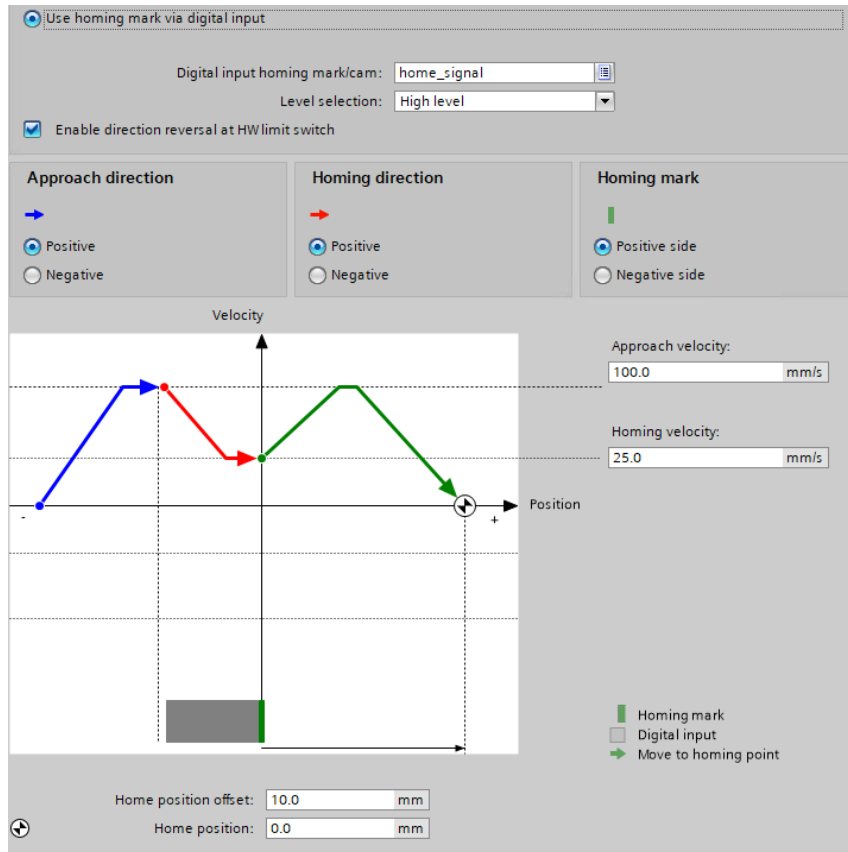
If Mode=5 in MC_Home, then the current position = the origin position in the configuration - the starting position offset in the configuration;

Then the motor will move for another period of the starting position offset set in the configuration. After the positioning is completed, the current position of the motor will be updated:

If Mode=3 in MC_Home, the final stop position = the parameter position in "Position".

If Mode=5 in MC_Home, the final stop position = the origin position in the configuration.

➤ **Use homing mark via digital input**



Example: Forward homing and the configuration sets the forward starting position offset, the trajectory diagram is as follows.

The sequence of movements is as follows.

Trigger the motion control instruction MC_Home to start active return to origin (Mode=3, 5).

The motor detects external input signals during movement.

When the rising edge of the external input signal is detected, the speed is reduced, and then when the falling edge of the external input signal is detected, the current position is immediately updated as follows:

If Mode=3 in MC_Home, then the current position = parameter value in "Position" - starting position offset in configuration.

If Mode=5 in MC_Home, then the current position = the origin position in the configuration - the starting position offset in the configuration.

Then the motor will move for another period of the starting position offset set in the configuration. After the positioning is completed, the current position of the motor will be

updated:

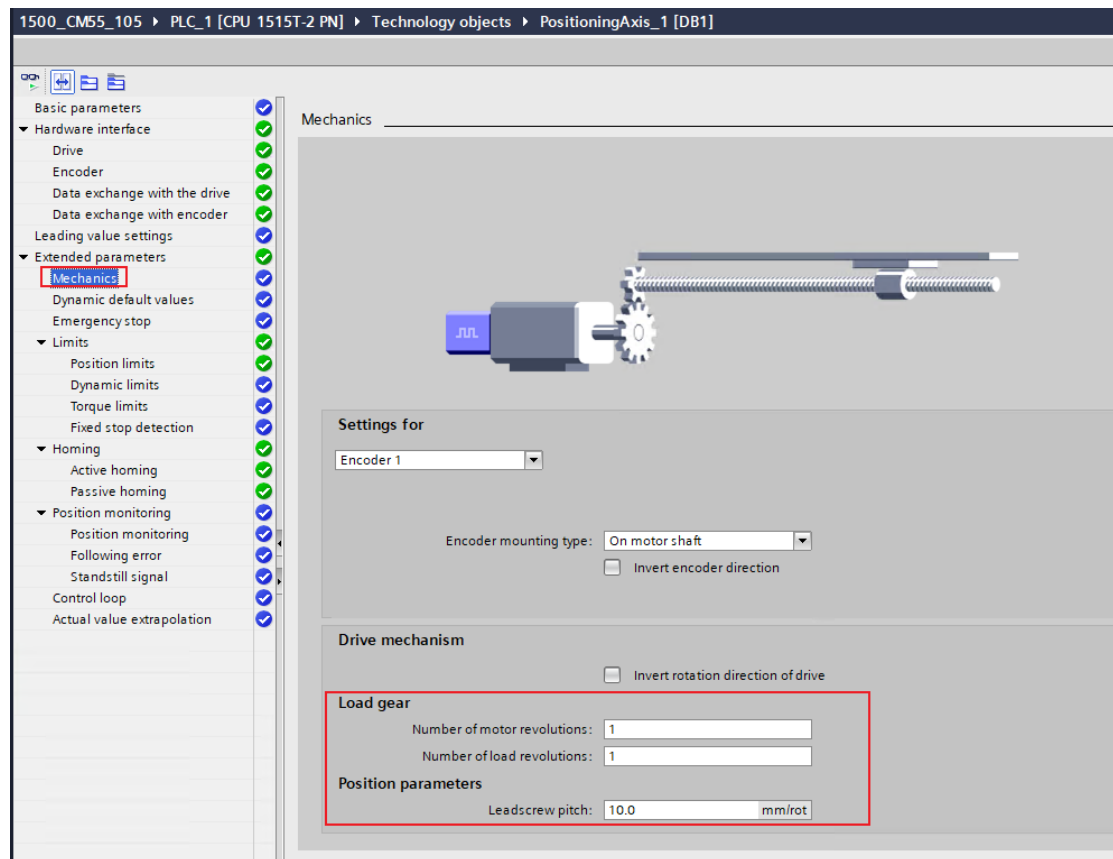
If Mode=3 in MC_Home, the final stop position = the parameter position in "Position".

If Mode=5 in MC_Home, the final stop position = the origin position in the configuration.

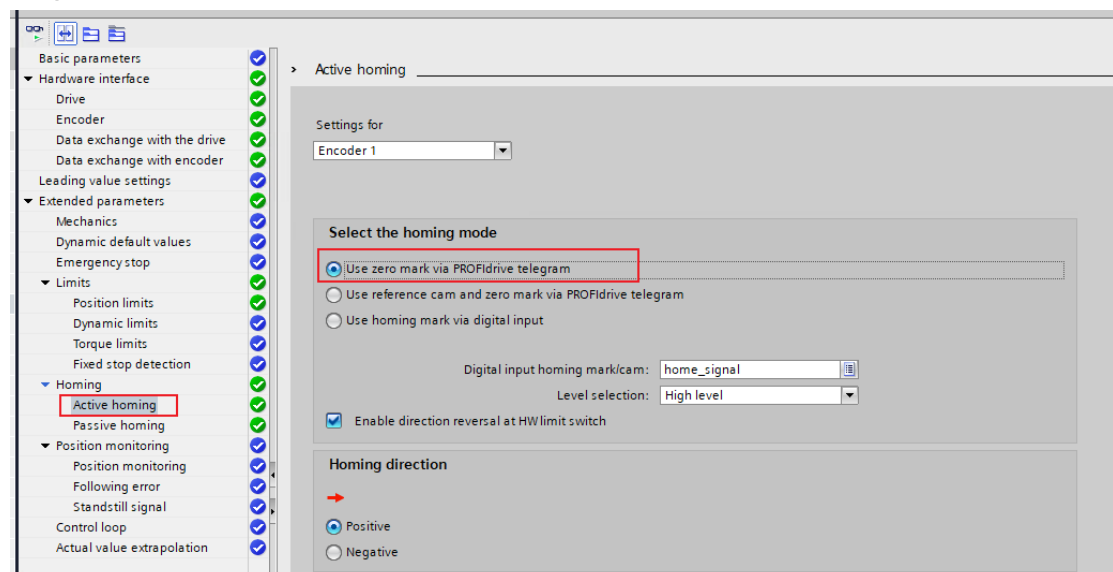
Active homing example

➤ Use zero mark via PROFIdrive telegram (detect motor Z signal)

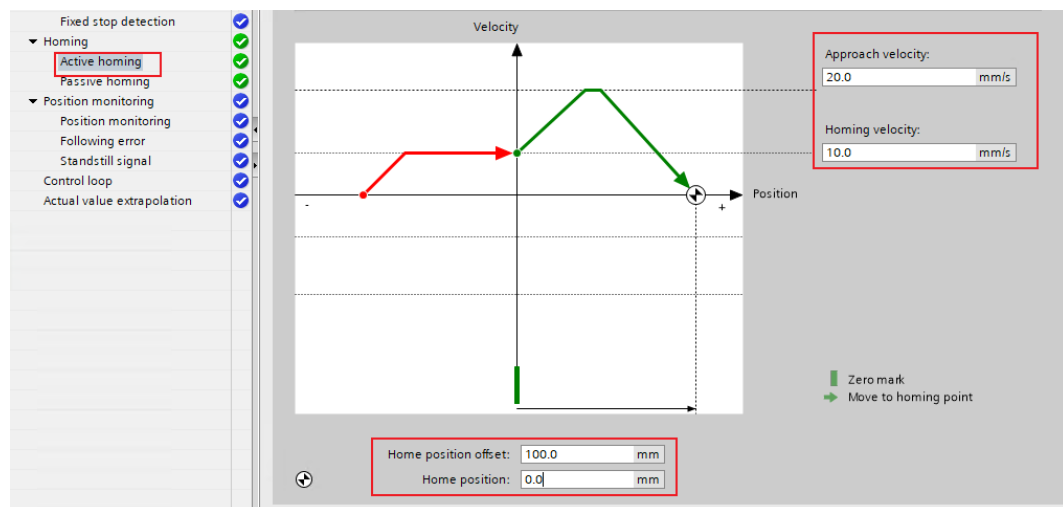
First, configure the leadscrew pitch to 10mm/rot.



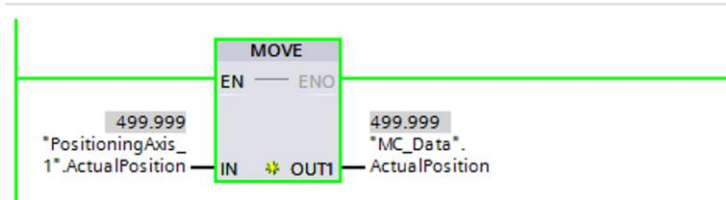
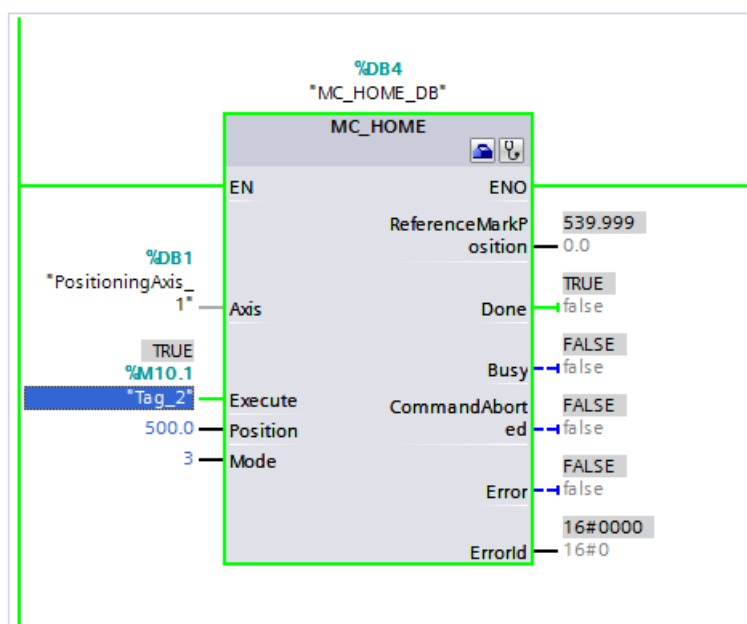
Set the active homing mode in the Configuration interface to "use zero mark via PROFIdrive telegram".



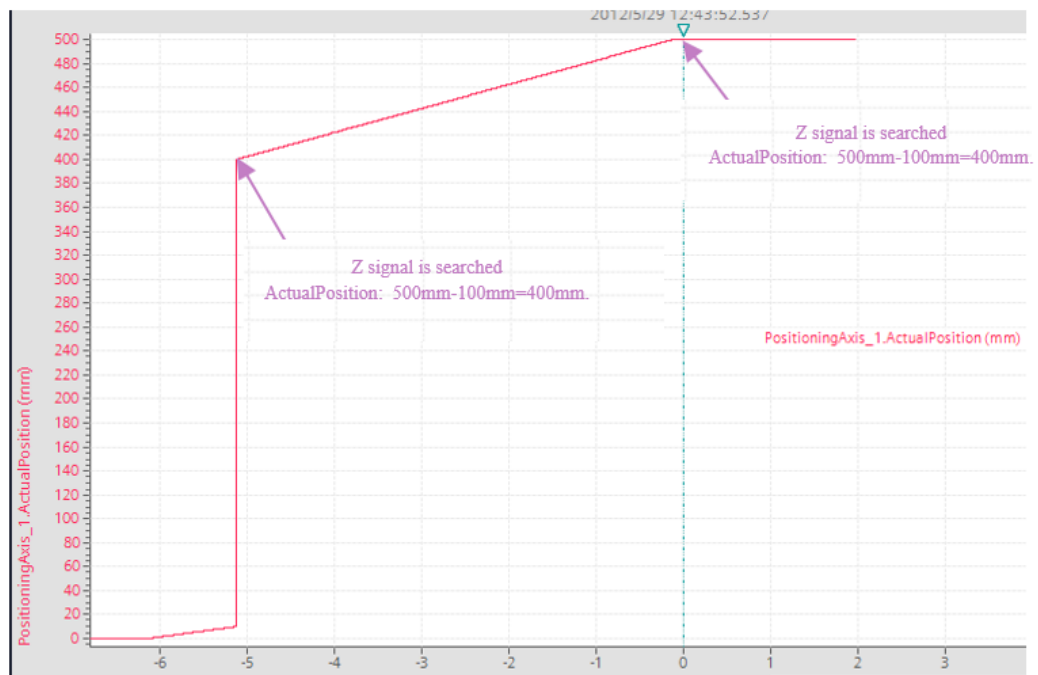
Set the approach velocity and homing velocity, and set the home position offset to 100mm. Set the approach velocity to 20.0mm/s and the homing velocity to 10.0mm/s.



Use the MC_Home function block in the program, set Mode=3, Position=500.0mm, and perform the homing operation.

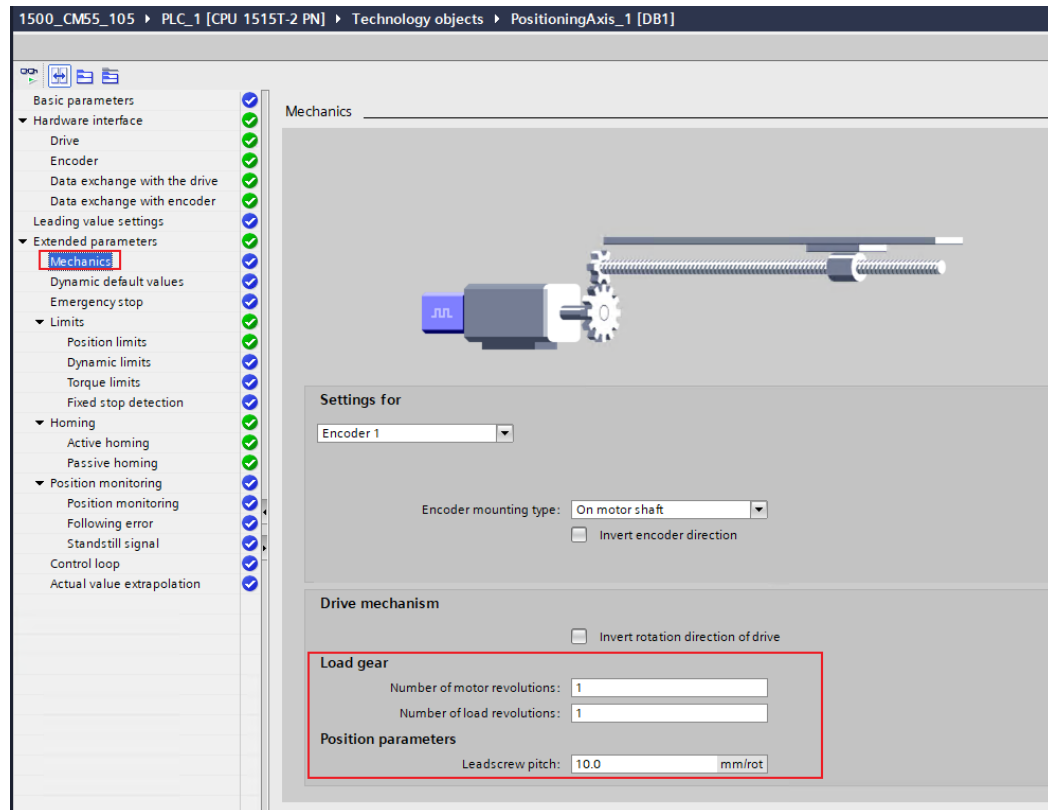


The entire trajectory is as follows: First, the motor searches for the motor Z signal at homing velocity. When the Z signal is searched, the ActualPosition changes to 500mm-100mm=400mm. Then the motor moves to the origin position offset of 100mm set in the configuration. After positioning is completed, the ActualPosition changes to 500mm, and the homing operation is completed.

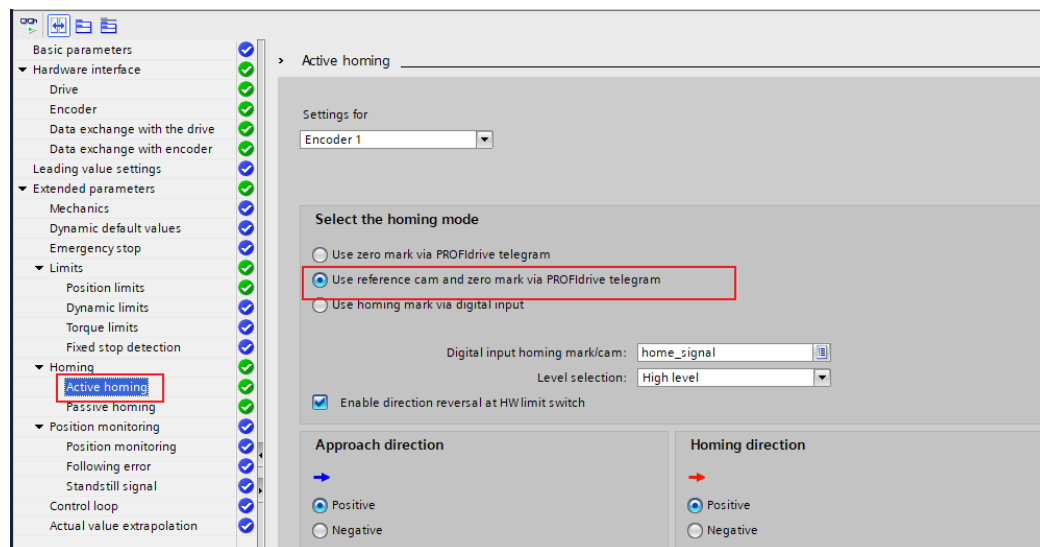


- use reference cam and zero mark via PROFIdrive telegram (use external digital signal as deceleration position, and then detect motor Z signal)

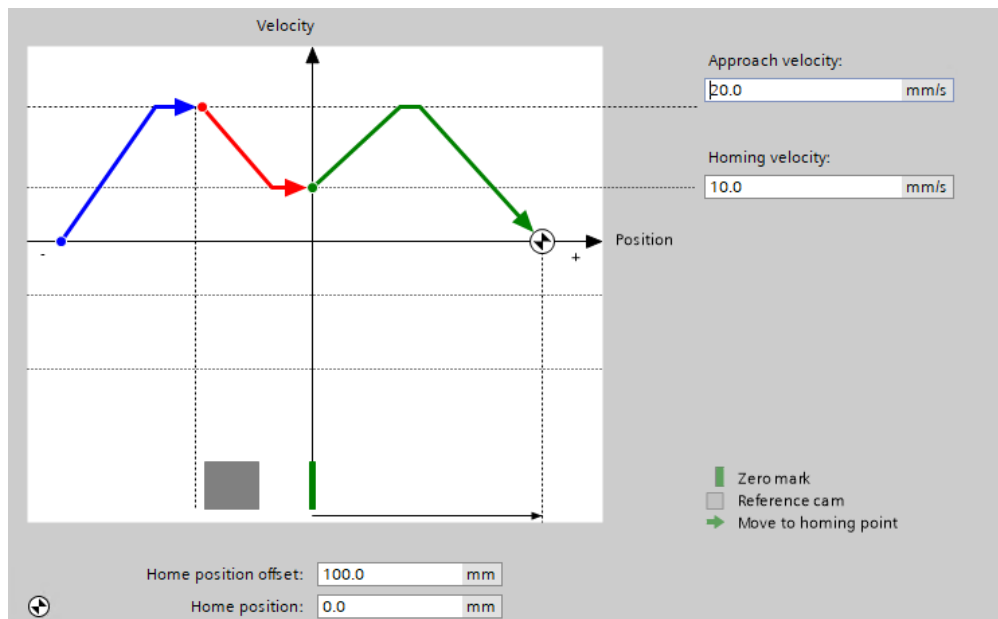
First, configure the leadscrew pitch to 10mm/rot.



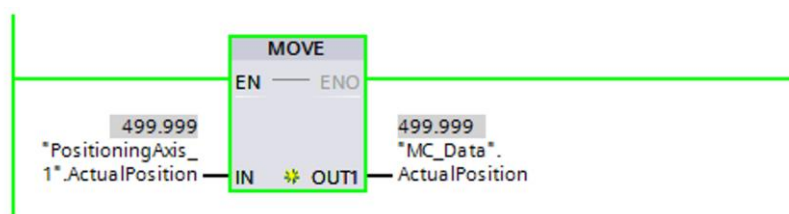
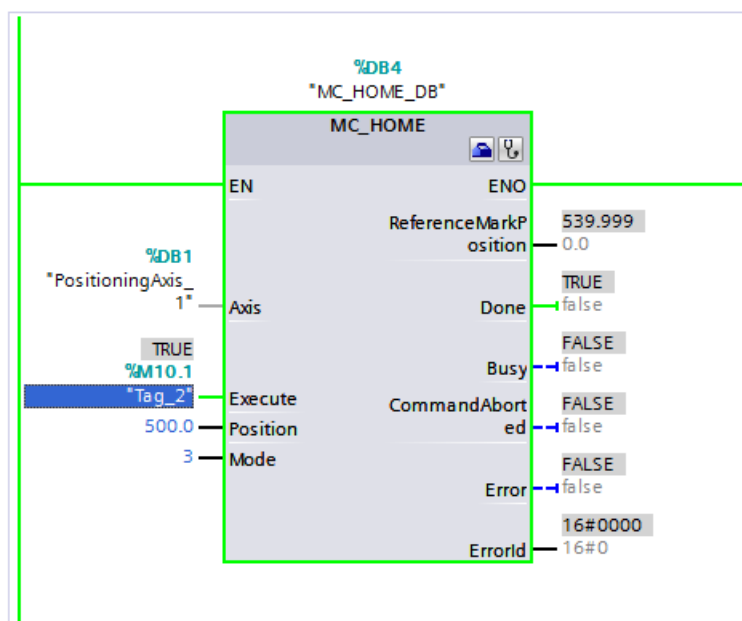
Set the homing configuration, select "use reference cam and zero mark via PROFIdrive telegram", and set the homing mark.



Set the approach velocity and homing velocity, and set the home position offset to 100mm. Set the approach velocity to 20.0mm/s and the homing velocity to 10.0mm/s.

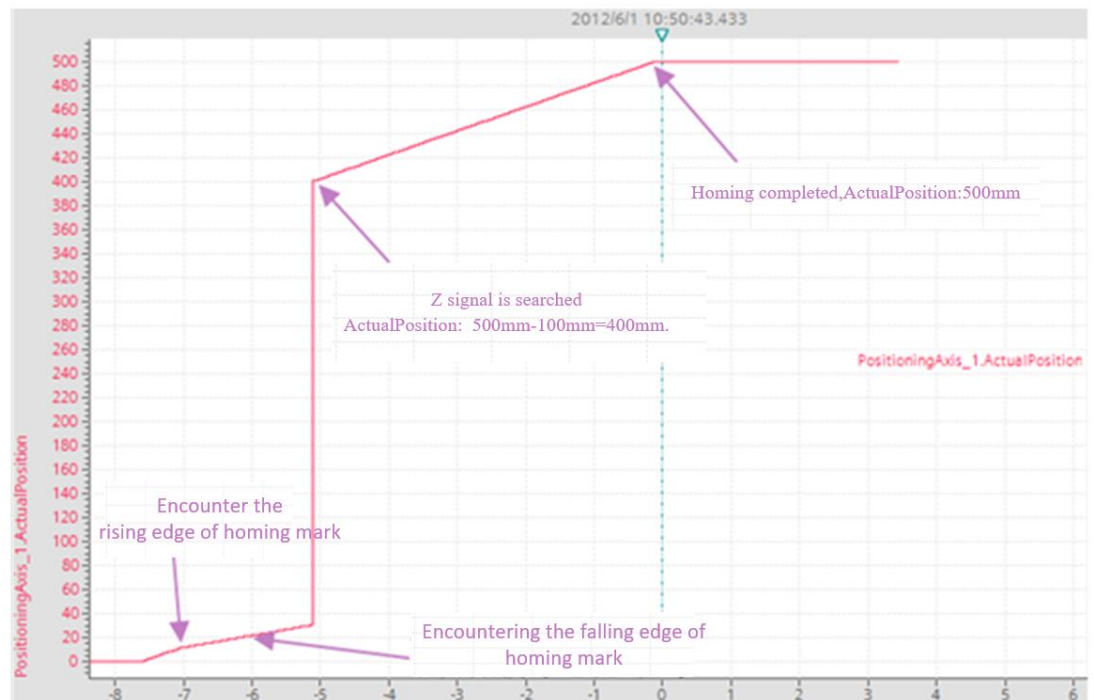
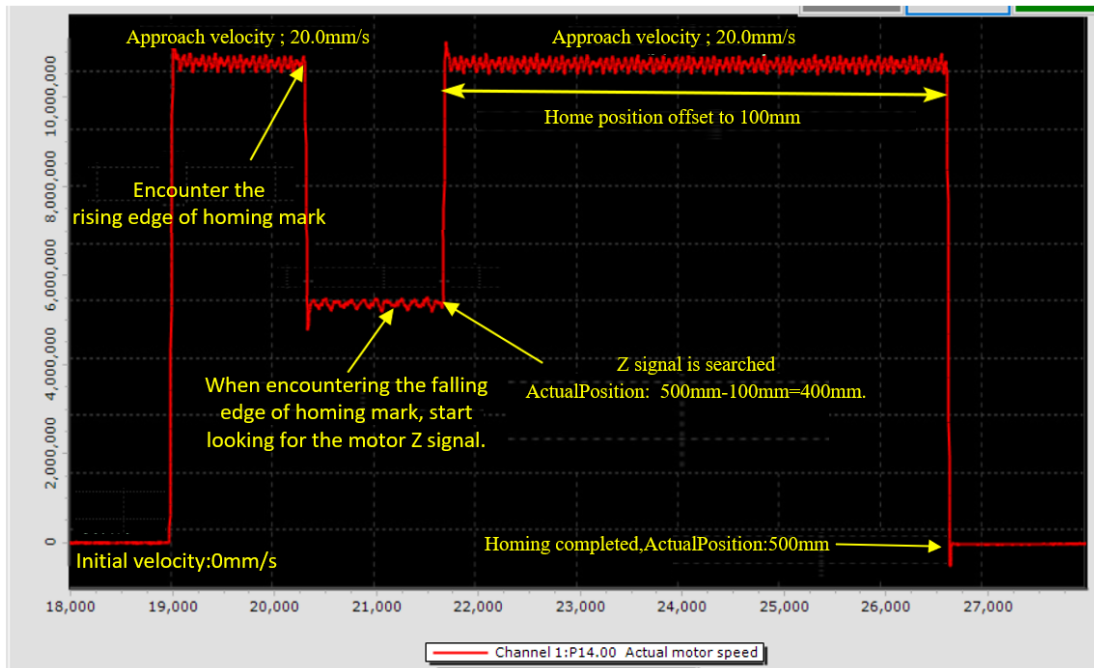


Use the MC_Home function block in the program, set Mode=3, Position=500.0mm, and perform the homing operation.



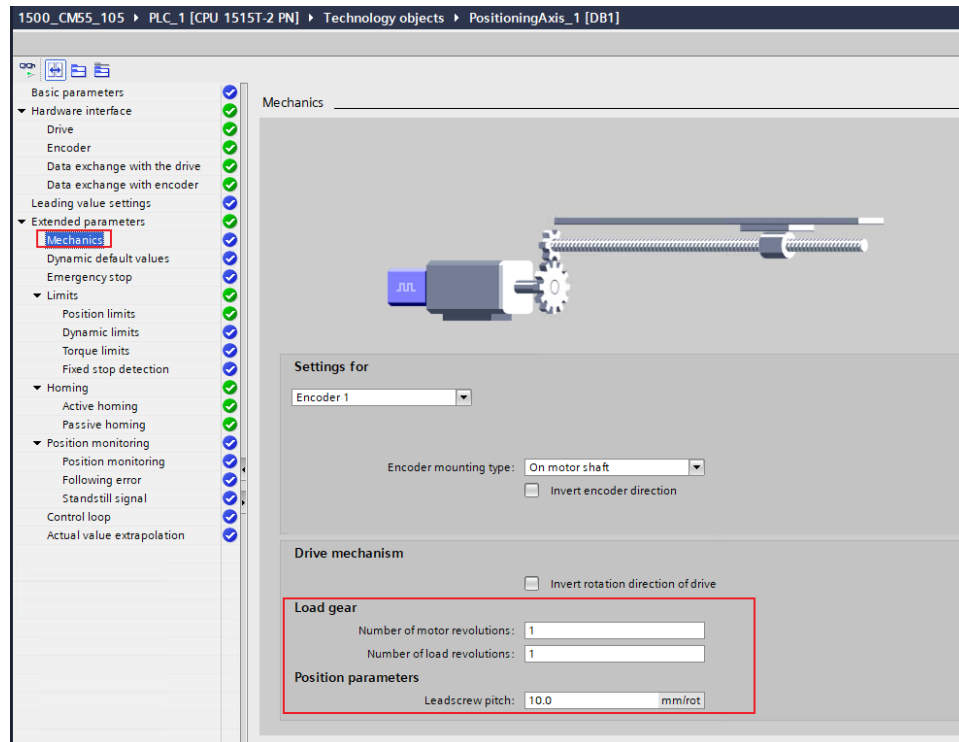
The entire trajectory is as follows: First, the motor searches for the homing mark at approach velocity 20.0mm/s. After encountering the rising edge of the homing mark, it decelerates to 10.0mm/s. After encountering the falling edge of the homing mark, it searches for the motor Z signal. After the Z signal, the value of ActualPosition immediately changes to 500mm-100mm=400mm, and then the motor moves to the home position offset 100mm set

in the configuration. After positioning is completed, the value of ActualPosition is 500mm, and the homing operation is completed.

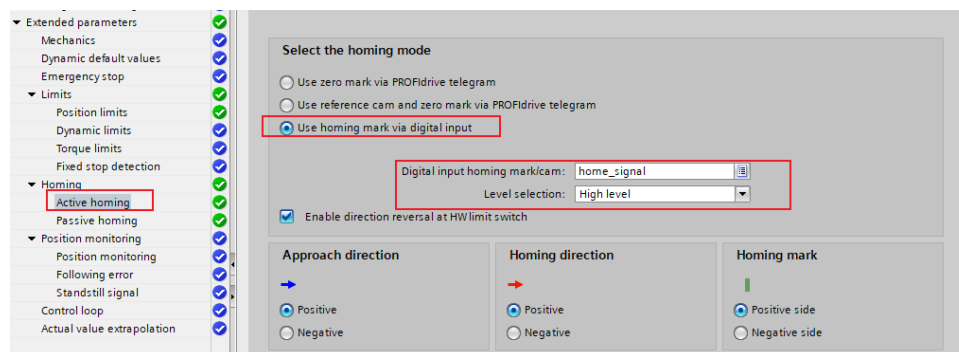


➤ **Use homing mark via digital input.**

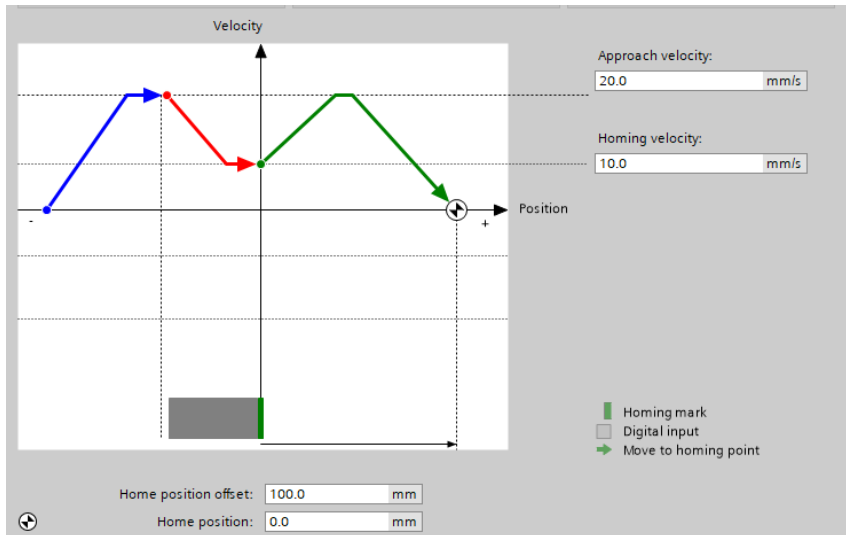
First, configure the leadscrew pitch to 10mm/rot.



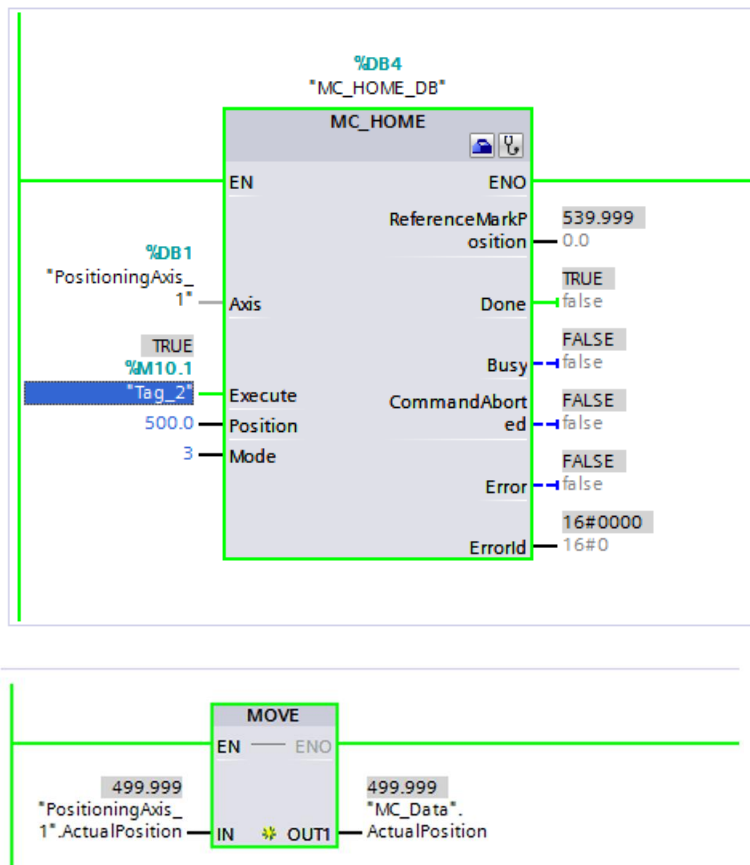
Set the homing configuration, select " use homing mark via digital input ", and set the homing mark.



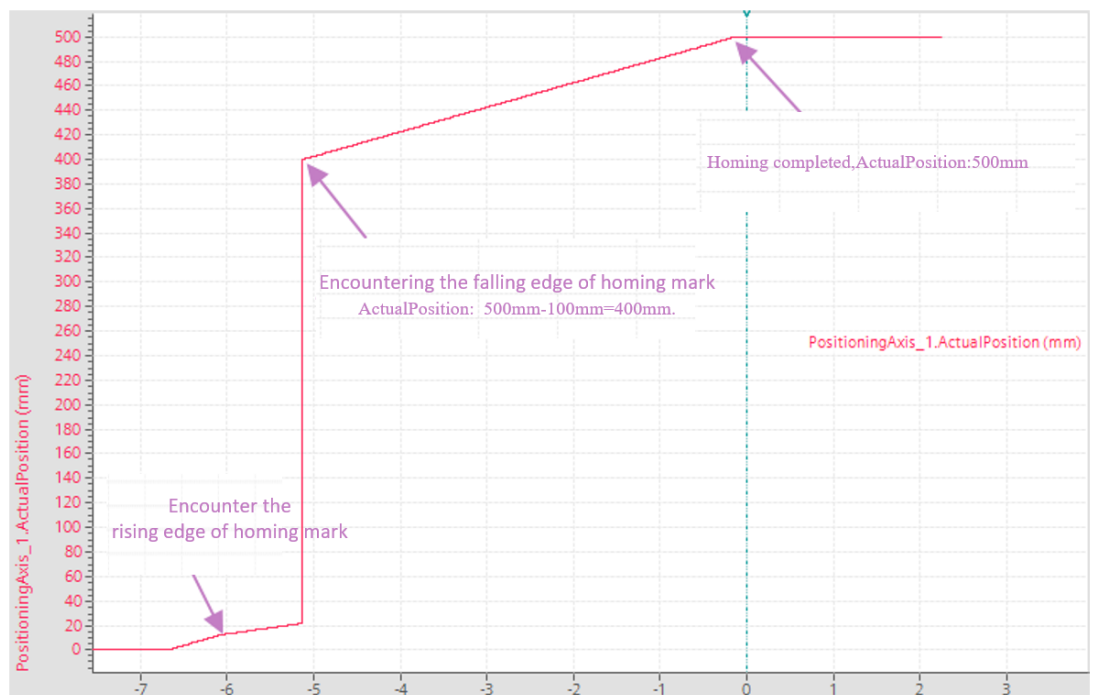
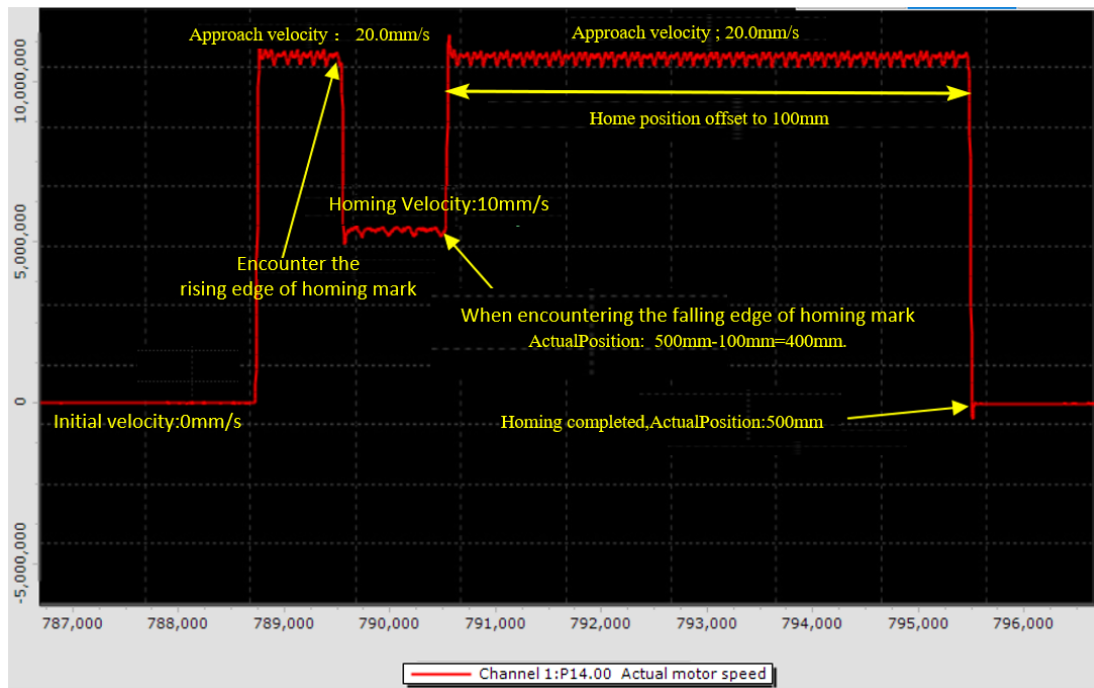
Set the approach velocity and homing velocity, and set the home position offset to 100mm. Set the approach velocity to 20.0mm/s and the homing velocity to 10.0mm/s.



Use the MC_Home function block in the program, set Mode=3, Position=500.0mm, and perform the homing operation.



The entire trajectory is as follows: First, the motor searches for the homing mark at approach velocity 20.0mm/s. When it encounters the rising edge of the homing mark, it runs at the homing velocity 10.0mm/s. After encountering the falling edge of the homing mark, the ActualPosition changes to 500mm - 100mm=400mm, then the motor moves to the home position offset 100mm set in the configuration. After the positioning is completed, the value of ActualPosition is 500mm, and the homing operation is completed.



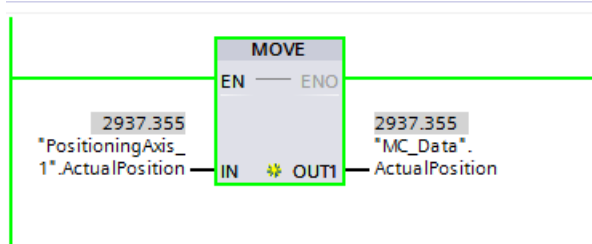
3.5.4.5. Mode=6 Absolute encoder adjustment (relative)

When using this homing mode, the encoder can only select "Cyclic absolute" during axis configuration. If the encoder type is "incremental" and mode 6 is used, the trigger will report an error.

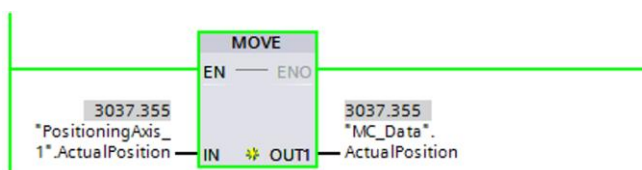
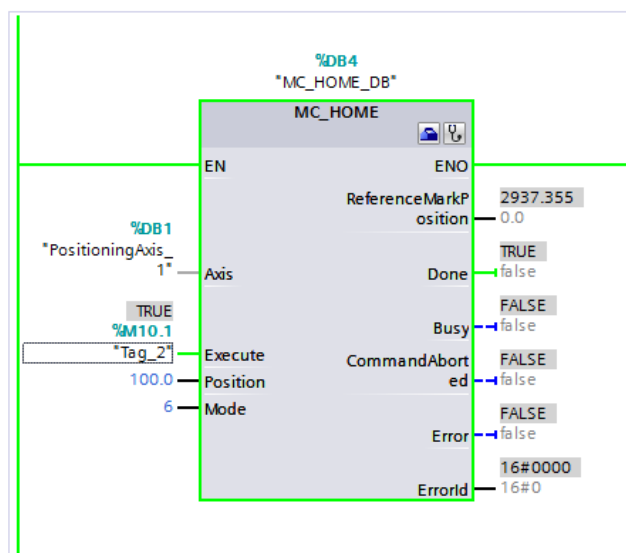
After MC_Home is triggered in mode 6, the ActualPosition = current position + parameter in "Position"

Example:

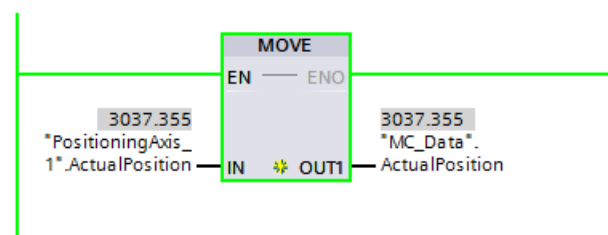
Initial ActualPosition=2937.355mm.



Set Mode=6 of MC_Home and trigger, the current ActualPosition will superimpose 100.0mm on the Initial ActualPosition



When the PLC is powered on again, the axis position is 3037.355mm, the value before the power off.

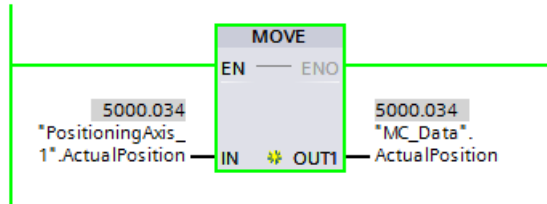


3.5.4.6. Mode=7 Absolute encoder adjustment (absolute)

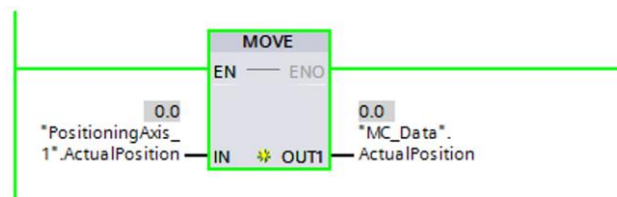
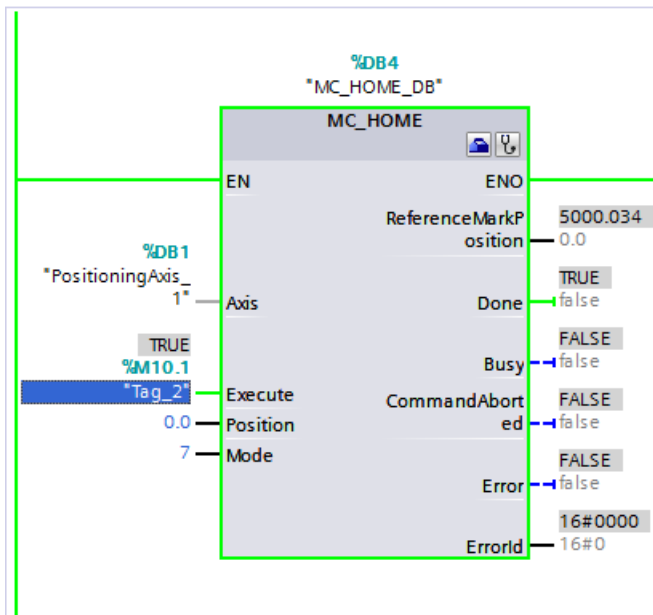
When using this homing mode, the encoder can only select "Cyclic absolute" during axis configuration. If the encoder type is "incremental" and mode 7 is used, the trigger will report an error.

After MC_Home is triggered in mode 7, the ActualPosition = parameter in "Position"

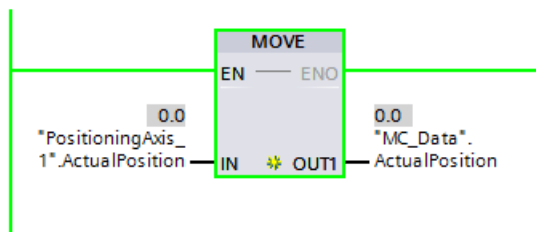
Initial ActualPosition=5000.034mm.



Set Mode=7 of MC_Home and trigger, the current ActualPosition= 0.0mm.



When the PLC is powered on again, the ActualPosition is 0mm, the value before the power off.



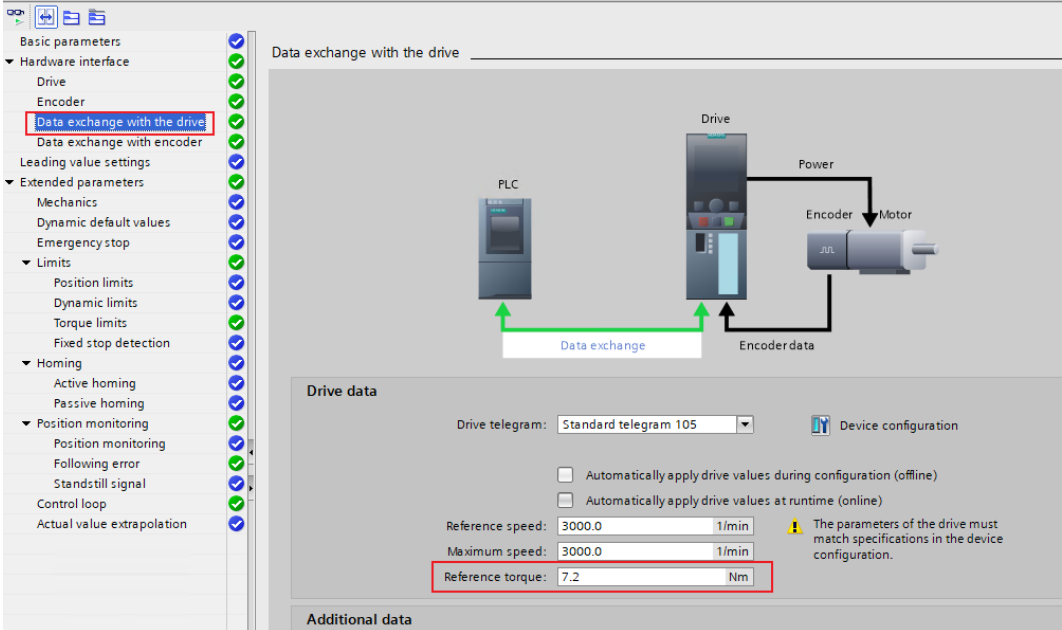
3.5.5. Torque reduction/ Fixed stop detection (102,105 telegram)

Using the MOMRED torque deceleration under Siemens 102 and 105 telegram, the torque limiting or fixed stop detection function can be realized through the control command "MC_TorqueLimiting".

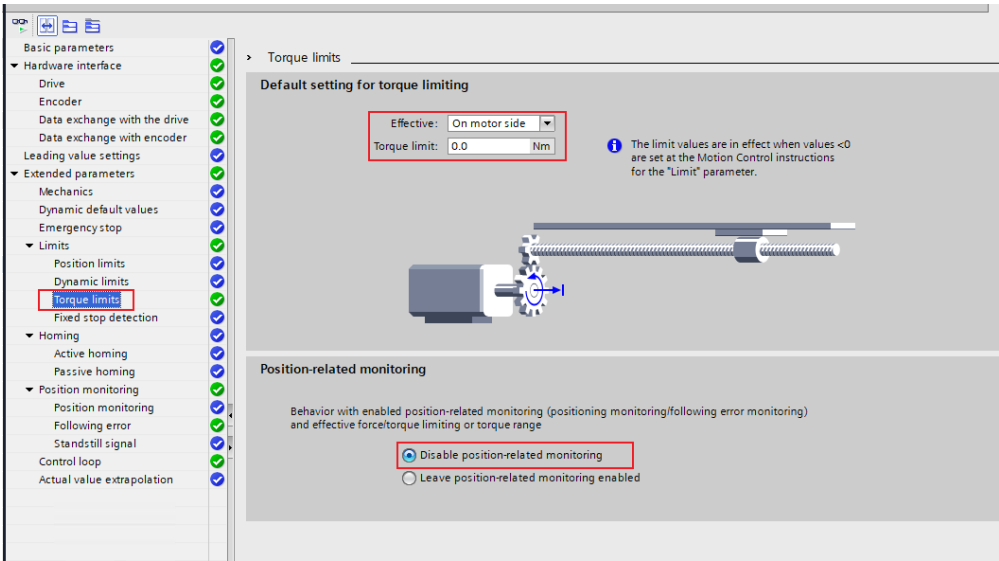
1. Configuration in technology object

When data exchange with the drive, manually fill in the reference torque and fill in 3 times the rated torque value of the drive.

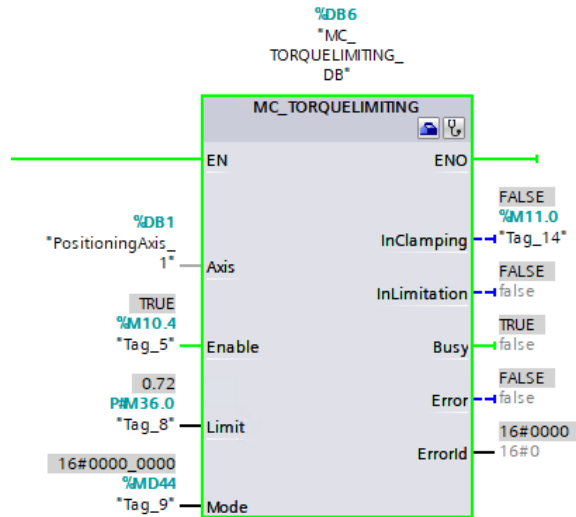
000.10	Motor rated torque	2.40	N.m
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2. Set relevant parameters in the "Extended Parameters-Limits-Torque Limit" screen of axis configuration, as shown in the figure below.



3. The following table lists the parameters of the motion control instruction "MC_TorqueLimiting"



Parameter	Data type	Description
Axis	TO_SpeedAxis TO_PositioningAxis TO_SynchronousAxis	Technology object
Enable	BOOL	TRUE Activate function corresponding to input parameter "Mode" FALSE disable function
Limit	LREAL	Value of force/torque limiting (in the configured unit of measurement). ≥ 0.0 The value specified at the parameter is used. < 0.0 The value configured in the "Torque limiting" configuration window is used. The TO variables for <0.0 are: - Tag Torque Limit: $\langle TO \rangle$.TorqueLimiting. Limit-Defaults.Torque - Tag Force Limit: $\langle TO \rangle$.TorqueLimiting. Limit-Defaults.Force Changes to input parameters "Limit" and "Mode" are also applied at the cyclic call of the Motion Control instruction when "Enable" = TRUE.
Mode	DINT	0 Force/torque limiting 1 Fixed stop detection Changes to input parameters "Limit" and "Mode" are also applied at the cyclic call of the Motion Control instruction when "Enable" = TRUE
InClamping	BOOL	For "Mode" = 0 (Force/torque limiting) always FALSE . TRUE : The drive is kept at the fixed stop (clamping). The axis position is within the positioning tolerance
InLimitation	BOOL	TRUE : The value specified at parameter "Limit" has exceeded the threshold value set in the drive.
Busy	BOOL	TRUE: The job is being processed.
Error	BOOL	TRUE : An error occurred while processing the job. The job is rejected. The cause of the error can be found in the "ErrorID" parameter.
ErrorID	WORD	Error ID for parameter "Error"

Example:

Set Mode = 0, Limit = 0.72NM, then it will work in the torque limiting mode, and the torque limit is 0.72NM.

The torque limit can be viewed through [P13.67 PROFIdrive torque limiter (102/105), 16#1000 is calibrated to 100% rated torque.

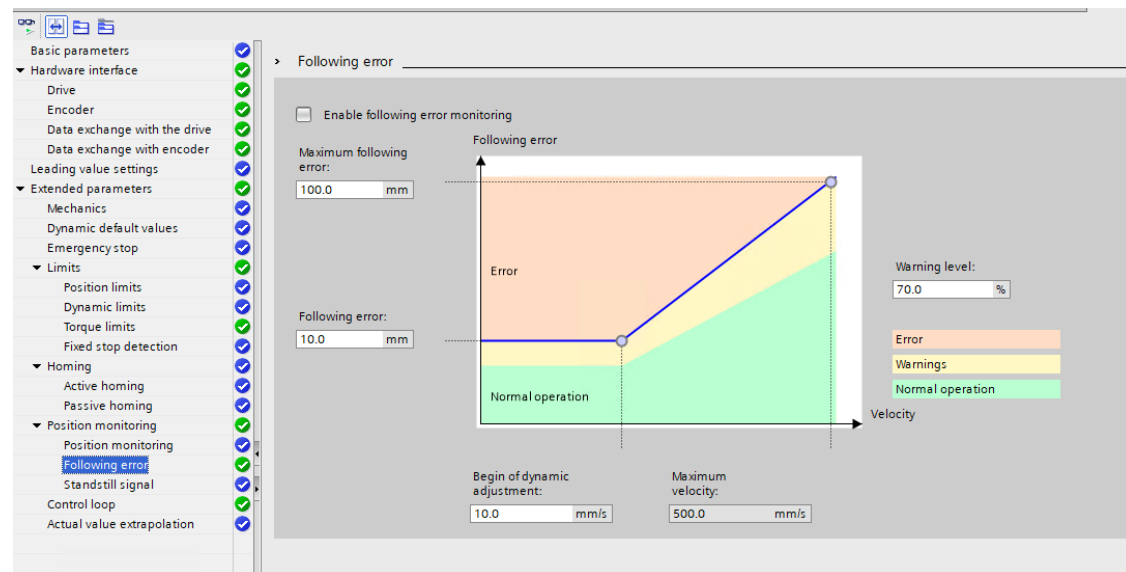
Torque limiter = [P13.67 PROFIdrive torque limiter] * [D00.10 Motor rated torque] / 4096
 = 1229 * 2.4 / 4096 = 0.72NM

As long as the "Enable" and "Busy" parameters are TRUE, the values currently specified at "Limit" and "Mode" are used. A new rising edge at "Enable" to accept new values is not necessary for "MC_TorqueLimiting".

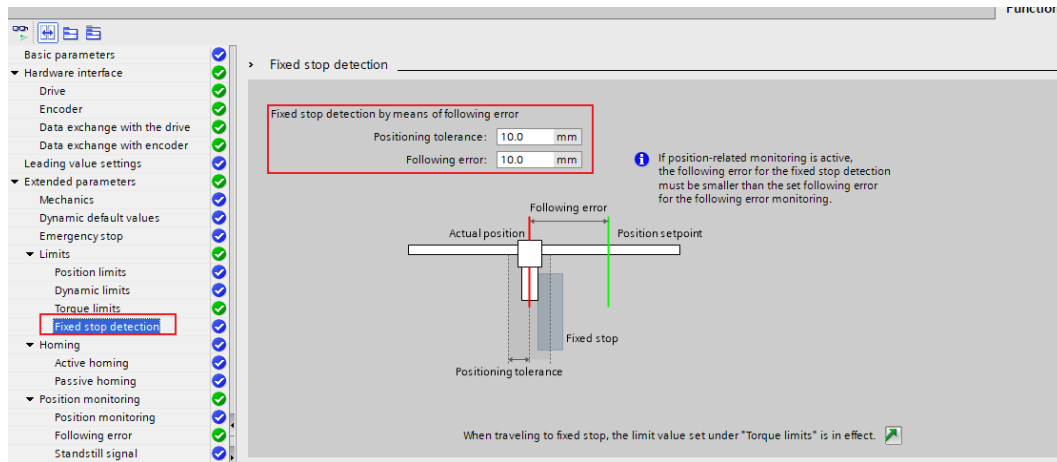
When the parameter InLimitation is True, it means that the drive is running under the condition of torque limiting. For 102 or 105 telegram, the torque limit reaching status can also be checked through the status word MELDW. 1. In speed and position mode, when the torque reaches the set torque limit, [P01.52 Output torque reaches limit] is valid. In torque mode, [P01.50 reaches the upper limit of torque] and [P01.51 reaches the lower limit of torque] are valid.

4. To use the fixed stop detection function, the following settings are required:

(1) Disable the following error monitoring function in the axis configuration "Extended parameters-Position monitoring-Following error" screen



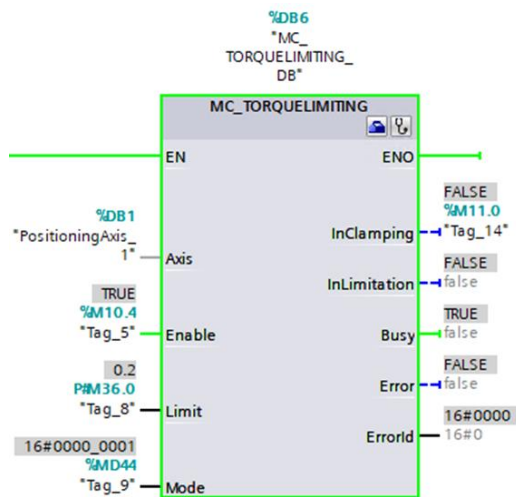
(2) Configure the fixed stop detection parameters in the axis configuration "Extended Parameters -Limit-Fixed Stop Detection" screen



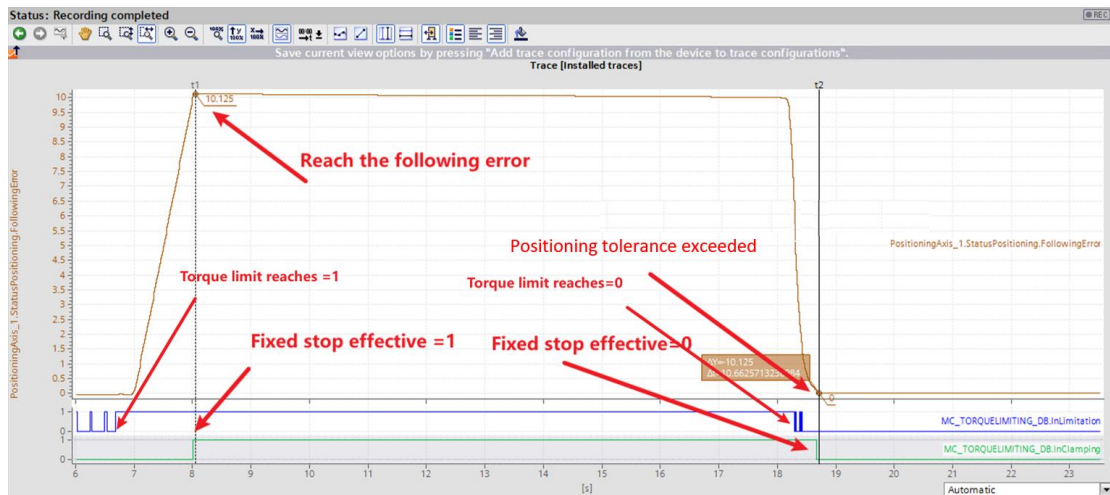
Positioning tolerance: Position tolerance for the clamping monitoring

FollowingErrorDeviation: Value of the following error starting from which the fixed stop is detected

(3) Use the "MC_TorqueLimiting" command to implement axis movement to fixed stop



Set the "Mode"=1 of the command, activate the fixed stop detection function through "Enable =1", and modify the torque value of the fixed stop in real time in the parameter; remove the fixed stop detection function through "Enable =0". When InClamping is True, it means that the drive has reached the fixed stop.



When the positioning tolerance is exceeded, an alarm will be triggered and the axis will be stopped. The return operation from the fixed stop can be performed in the opposite direction of the fixed stop. When the positioning tolerance is exceeded in the return direction, the function of clamping to the fixed stop will be terminated.

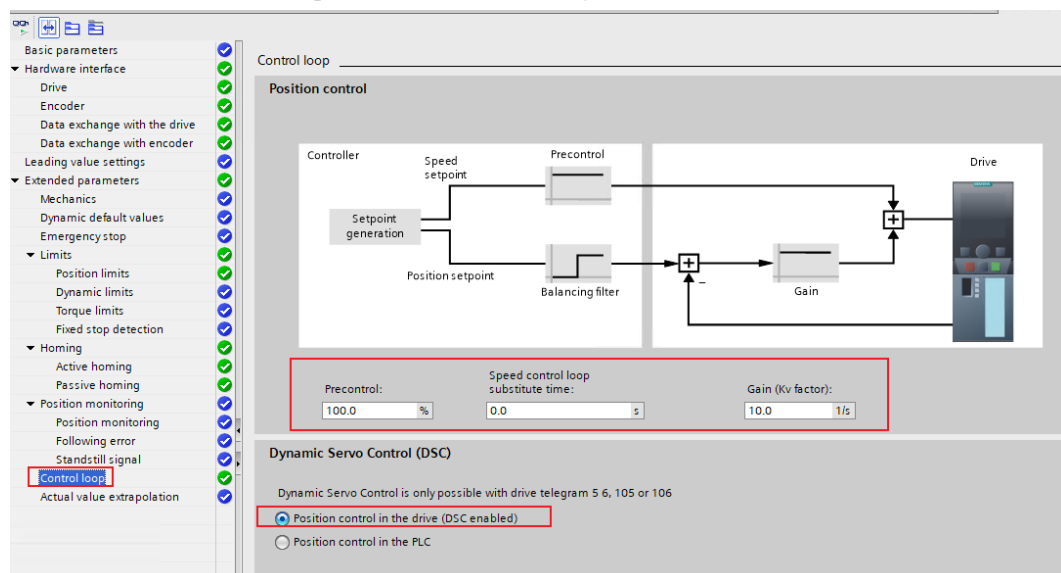
3.5.6. DSC(Siemens telegram 105)

3.5.6.1. DSC function introduction

A unique feature of Siemens telegram 105 is DSC. DSC (Dynamic Servo Control) uses the position loop calculation and interpolation in the drive through telegram, and uses the fast calculated speed control clock to improve the dynamic responsiveness of the servo and improve the stiffness of the servo. This function is suitable for highly dynamic and complex movements. Servo control tasks. If there is no DSC function, the long position loop control cycle will cause step changes in the speed given value, resulting in large pulsations in torque or current. If the DSC function is activated, the position loop is calculated in the drive, and its calculation cycle is greatly Shortened, the torque or current ripple is reduced.

3.5.6.2. DSC function configuration

In DSC mode, the drive receives the position loop gain KPC, position deviation Err and speed feedforward sent by the PLC. In non-DSC mode, the position regulator is in the PLC, and the drive receives the speed command issued by the PLC.



3.5.7. Siemens S7-1500/1500T synchronous function

3.5.7.1. MC_GearIn

S7-1500 only supports the establishment of relative synchronization between the master axis and the slave axis through the MC_GearIn command. It does not support specifying the absolute synchronization position, that is, the master axis position and the slave axis position after establishing synchronization are different. During the establishment of synchronization, the dynamic properties of the slave axis are defined using the parameters "Jerk", "Acceleration" and "Deceleration". The electronic gear ratio is specified as a relationship between two integers (numerator/denominator) using the parameters "RatioNumerator" and "RatioDenominator".

Input parameters		
Parameters	Data type	Description
Master	TO_Axis	Leading axis technology object
Slave	TO_SynchronousAxis	Following axis technology object
Execute	BOOL	Start job with a positive edge
Ratio Numerator	DINT	Gear ratio numerator
Ratio Denominator	DINT	Gear ratio denominator
Acceleration	LREAL	Acceleration
Deceleration	LREAL	Deceleration
Jerk	LREAL	Jerk
Output parameters		
InGear	BOOL	Synchronous operation reached The following axis is synchronized and moves synchronously to the leading axis.
Busy	BOOL	The job is being processed.
CommandAborted	BOOL	The job was aborted by another job during execution.
Error	BOOL	An error occurred while processing the job. The job is rejected. The cause of the error can be found in the "ErrorID" parameter.
ErrorID	BOOL	Error ID for parameter "ErrorID" You can find more detailed information in the "Error IDs" section of the "S7-1500/S7-1500T Motion Control alarms and error IDs" documentation.

The numerator of the gear ratio is specified as positive or negative.

This yields the following behavior:

- Positive gear ratio:

The leading and following axes move in the same direction.

- Negative gear ratio:

The following axis moves in the opposite direction to the leading axis.

The command description is as follows:

The synchronization duration and distance are related to the following parameters: start time of the "MC_GearIn" command, dynamic values of the slave axis at the start, dynamic parameter settings of the synchronization command, dynamic values of the master axis.

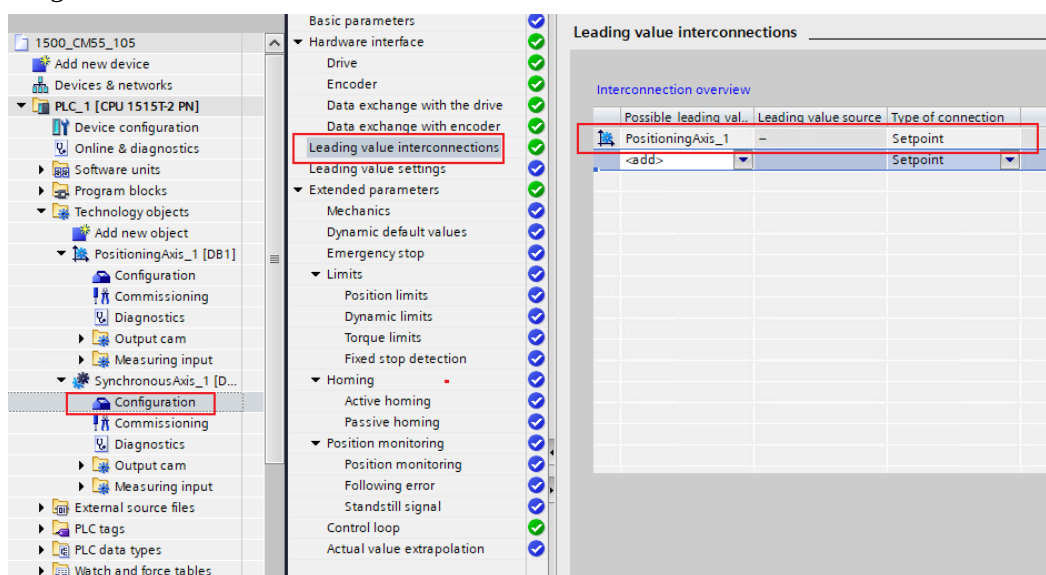
Gear ratios can be specified as positive or negative numbers. Positive number: the master and slave axes run in the same direction, negative number: the master and slave axes run in the reverse direction. Synchronous operation can be started when the spindle is stopped or in motion.

For input acceleration and deceleration parameters: When >0 , the input value is valid, $=0$ is not allowed, and when <0 , the configuration default value of the TO object is used (located in Technology object > Configuration > Extendedparameters > Dynamic defaults)

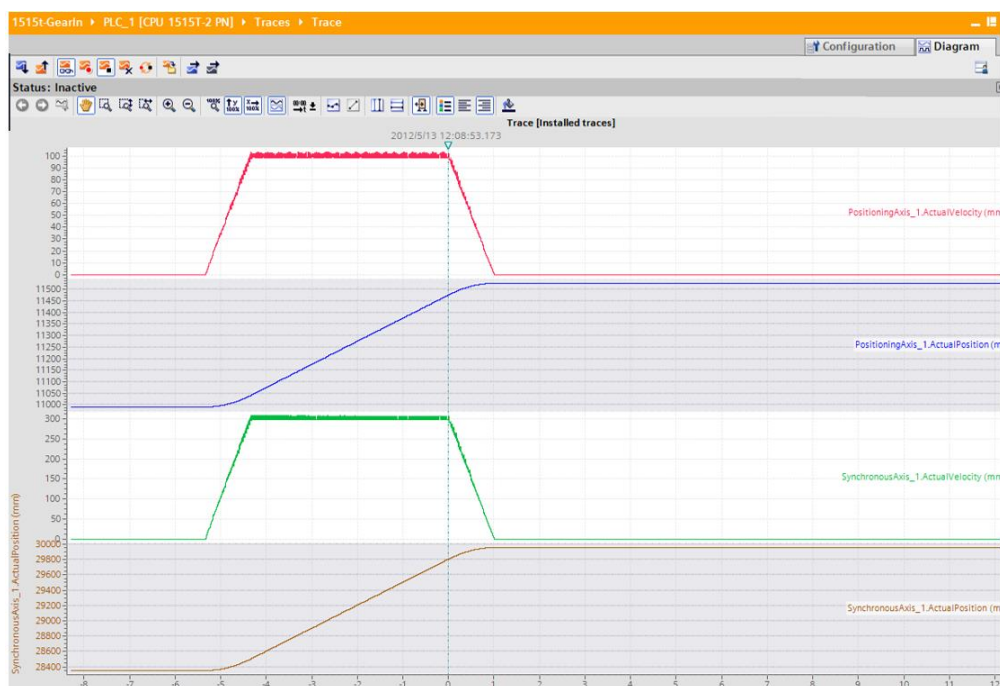
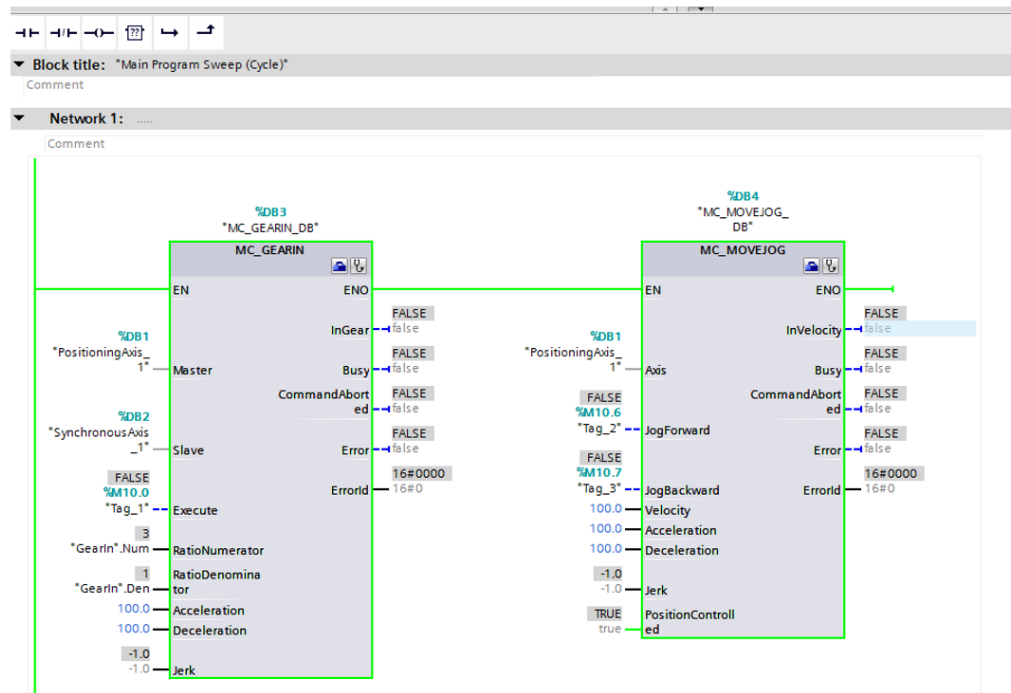
For input jerk parameters: >0 takes effect when entering a value, $=0$ uses a trapezoidal velocity profile, <0 uses the configured defaults of the TO object (located in Technology object > Configuration > Extendedparameters > Dynamic defaults).

Programming examples:

First, use S7-1500PLC to network with two AX servo drives, configure the technology objects of the master axis and slave axis in the program, and use Siemens telegram 102/105. The master axis is PositionAxis, and the slave axis is SynchronousAxis. The master value interconnection is performed in the configuration of the slave axis, and the master axis is assigned to the slave axis.



Then enable the two axes in the program, then use MC_GearIn, set the gear ratio to 3, set the main axis speed to 100mm/s, set the acceleration and deceleration to 100mm/s^2 , then the corresponding slave axis speed is 300mm /s, acceleration and deceleration are set to 300mm/s^2 .



3.5.7.2. MC_GearInPos

The command "MC_GearInPos" is used to start an absolute gear synchronization movement between the master and slave axes. You can specify the synchronization position, establish the synchronization process by specifying the spindle running distance or dynamic response value, and define the direction of synchronization.

Before executing the absolute synchronization command, special attention needs to be paid to the starting positions of the master axis and slave axis.

Input Parameters		
Parameters	Data type	Description
Master	TO_Axis	Leading axis technology object
Slave	TO_SynchronousAxis	Following axis technology object
Execute	BOOL	Start job with a positive edge
Ratio Numerator	DINT	Gear ratio numerator
Ratio Denominator	DINT	Gear ratio denominator
MasterSync Position	LREAL	Synchronous position of leading axis
SlaveSync Position	LREAL	Synchronous position of following axis
SyncProfileReference	DINT	The following types of synchronization are possible: =0 Synchronization in advance using dynamic parameters =1 Synchronization in advance using leading value distance
MasterStart Distance	LREAL	When "SyncProfileReference" = 1, 3: Leading value distance
Acceleration	LREAL	When "SyncProfileReference" = 0: Acceleration
Deceleration	LREAL	When "SyncProfileReference" = 0: Deceleration
Jerk	LREAL	When "SyncProfileReference" = 0: Jerk
SyncDirection	DINT	Direction of synchronization (in effect for axes with activated Modulo setting)
Output Parameters		
StartSync	BOOL	The following axis is synchronized to the leading axis.
InSync	BOOL	Synchronous operation reached. The following axis is synchronized and moves synchronously to the leading axis.
Busy	BOOL	The job is being processed.
CommandAborted	BOOL	The job was aborted by another job during execution.
Error	BOOL	An error occurred while processing the job. The job is rejected. The cause of the error can be found in the "ErrorID" parameter.
ErrorID	WORD	Error ID for parameter "ErrorID".

Command description:

The following types of synchronization are possible:

(4) Synchronization in advance using leading value distance("SyncProfileReference" = 1)

When the main axis running position reaches "MasterSyncPosition - MasterStartDistance", the slave axis starts to move. When the main axis runs the "MasterStartDistance" distance, the position reaches "MasterSyncPosition" and the slave axis position reaches "SlaveSyncPosition",

the slave axis synchronizes with the main axis in the same running speed.

(2) Synchronization in advance using dynamic parameters ("SyncProfileReference" = 0)

The system starts the slave axis according to the input dynamic parameters. When the master axis runs to "MasterSyncPosition" and the slave axis position reaches "SlaveSyncPosition", the slave axis synchronizes with the master axis and runs at the same speed.

The synchronization operation synchronizes before the specified synchronization position for the master and slave axes.

Use the parameters "RatioNumerator" and "RatioDenominator" to specify the gear ratio as a relationship between two integers (numerator/denominator).

The numerator of the gear ratio is specified as positive or negative number. Positive gear ratio: the leading and following axes move in the same direction, negative gear ratio: the following axis moves in the opposite direction of the leading axis.

Synchronous operation can be started when the spindle is stopped or in motion.

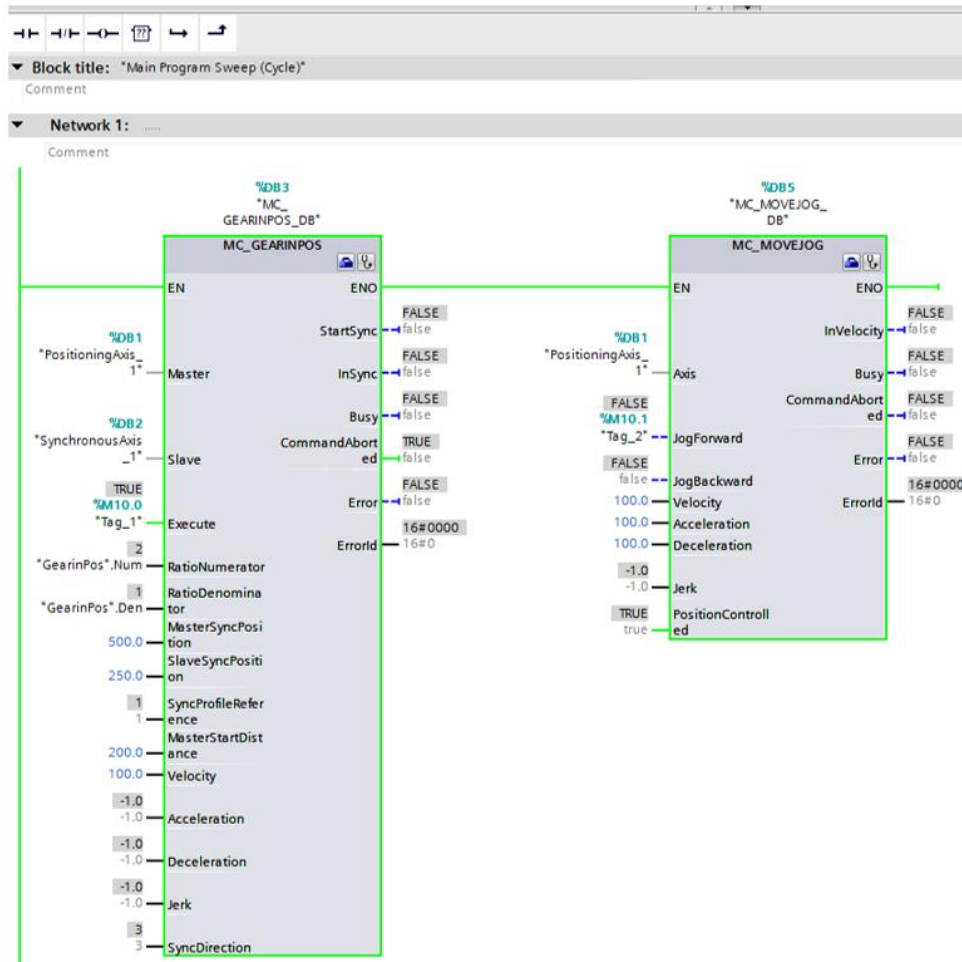
For input acceleration and deceleration parameters: When >0, the input value is valid, =0 is not allowed, and when <0, the configuration default value of the TO object is used (located in Technology object > Configuration > Extendedparameters > Dynamic defaults).

For the input jerk parameter: >0 takes effect as the entered value, =0 uses the trapezoidal velocity profile, <0 uses the configured defaults of the TO object (located in Technology object > Configuration > Extendedparameters > Dynamic defaults).

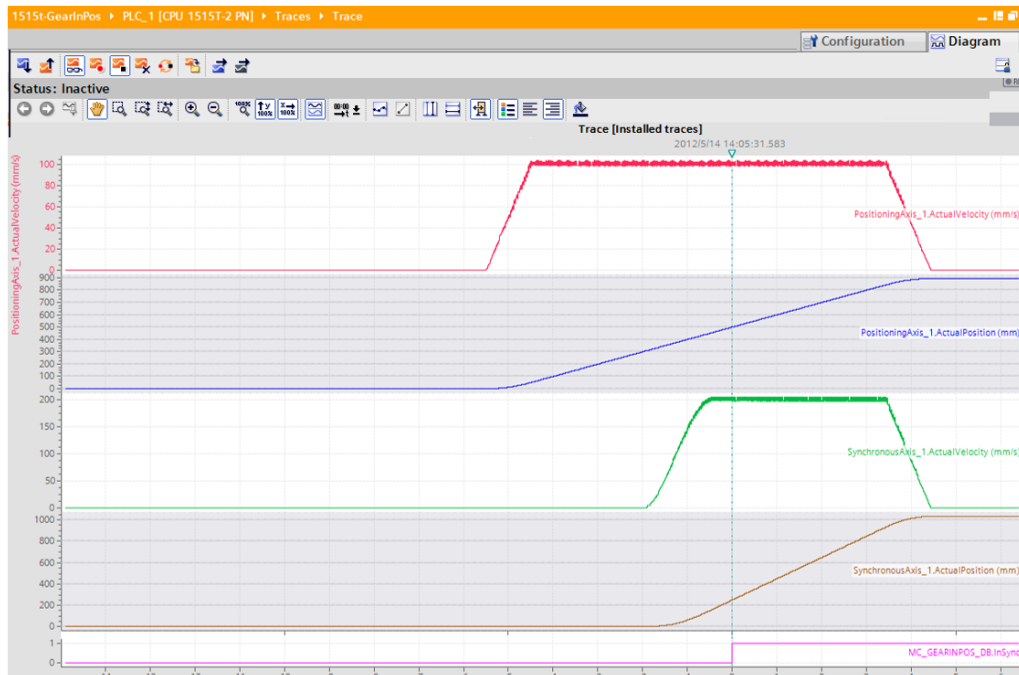
Programming examples

[Case 1] Synchronization in advance using leading value distance("SyncProfileReference" = 1)

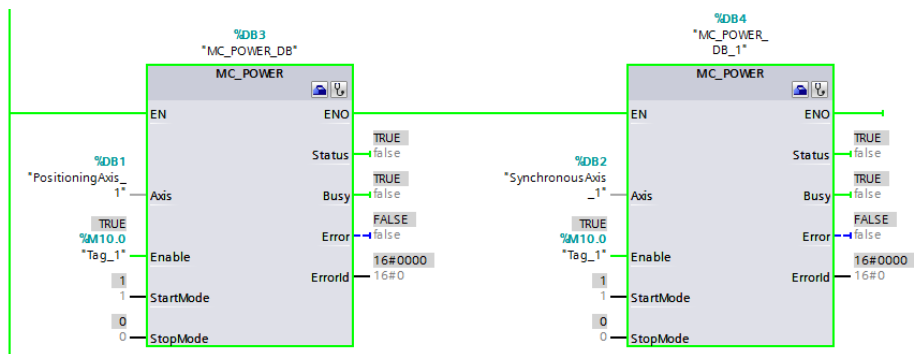
Use the MC_GearinPos function block in the program, set the gear ratio to 2, MasterSync Position to 500mm, SlaveSync Position to 250mm, and MasterStart Distance to 200mm. Use the MC_MoveJog function block of the master, set the master speed to 100mm/s, and the acceleration and deceleration time to 1s. At the same time, the current position of the main axis is 0mm, and the current position of the slave axis is 0mm.

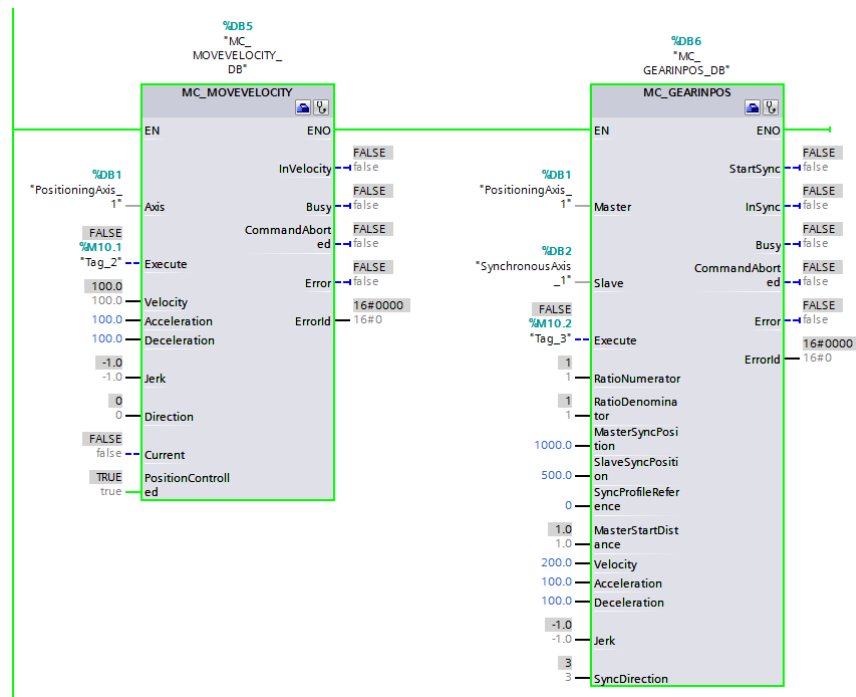


It can be seen from the collected Trace waveform that the speed of the master axis has always been 100mm/s. When moving from the current 0mm position to the 300mm (500mm-200mm) position, the slave axis starts to move from the current 0mm position. When the master axis moves to the synchronization starting position of 500mm, the slave axis also moves to the Sync Position of 250mm. The speed of the slave axis before reaching the Sync Position is automatically planned by the PLC. After synchronization, the speed of slave axis is 200mm/s.

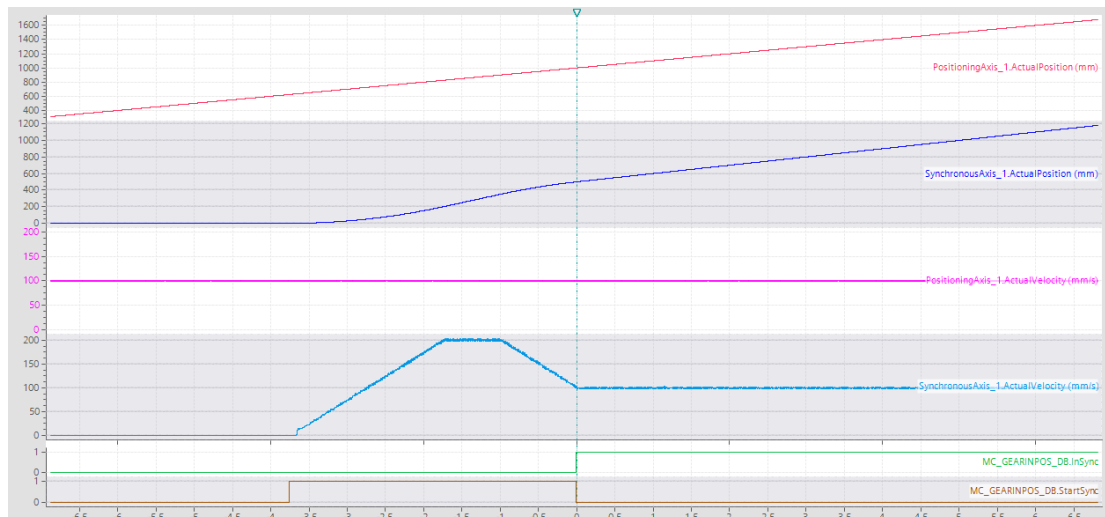


[Case 2] Synchronization in advance using dynamic parameters ("SyncProfileReference" = 0)
 Use the MC_GearInPos function block in the program, set the gear ratio to 1, set the MasterSync Position to 1000mm, set the SlaveSync Position to 500mm, set the dynamic adjustment speed before slave axis synchronization to 200mm/s, and set the acceleration and deceleration time to 2s. Use the MC_MoveVelocity function block of the master axis to set the speed to 100mm/s and the acceleration and deceleration time to 1s. At the same time, the Start Distance of the master axis and slave axis is 0mm.





Trigger MC_MoveVelocity and collect motion trajectory waveforms. It can be seen from the waveform that the speed of the master axis has always been 100mm/s. Before the master axis reaches 1000mm and the slave axis reaches the Sync Position of 500mm, the slave axis dynamically adjusts the speed to 200mm/s, the acceleration time is 2s, and the plan the distance required for synchronization. After reaching the Sync Position, the speed of the master and slave axes both maintains 100mm/s.



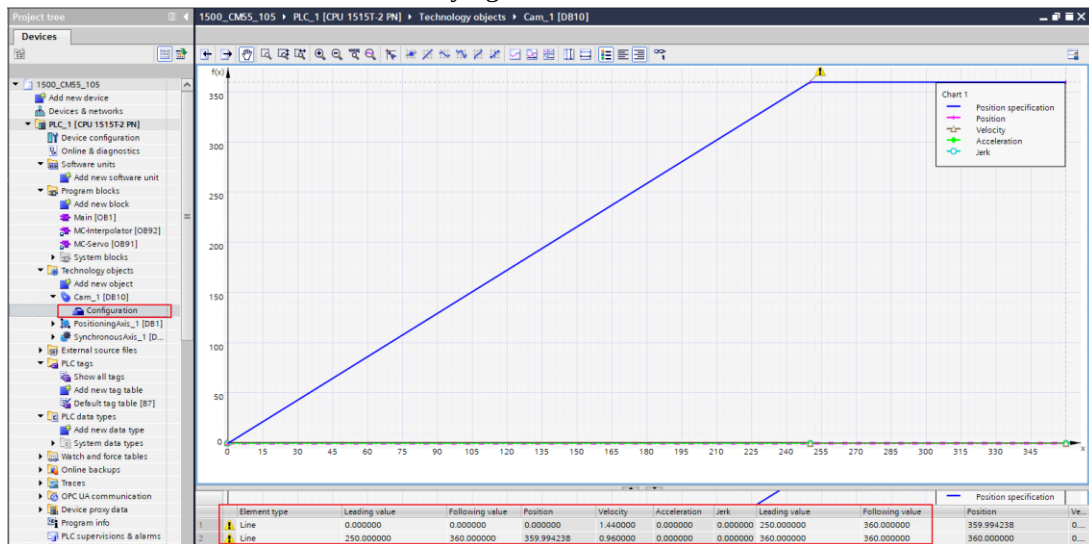
3.5.7.3. MC_CamIn

In mechanical design, cam mechanisms can complete various complex movements, including linear motion, swing, constant speed motion and non-speed motion, and can be used in various industries; electronic cam (ECAM) uses constructed cam curves to simulate machinery cam. During camming, the leading and following axes are coupled via the synchronized operating function (specified via the cam). All cams used can be scaled and shifted according to the relevant operation. To use a cam for camming, interpolation is

necessary. With the Motion Control instruction "MC_CamIn", you start a camming operation between a leading axis and a following axis.

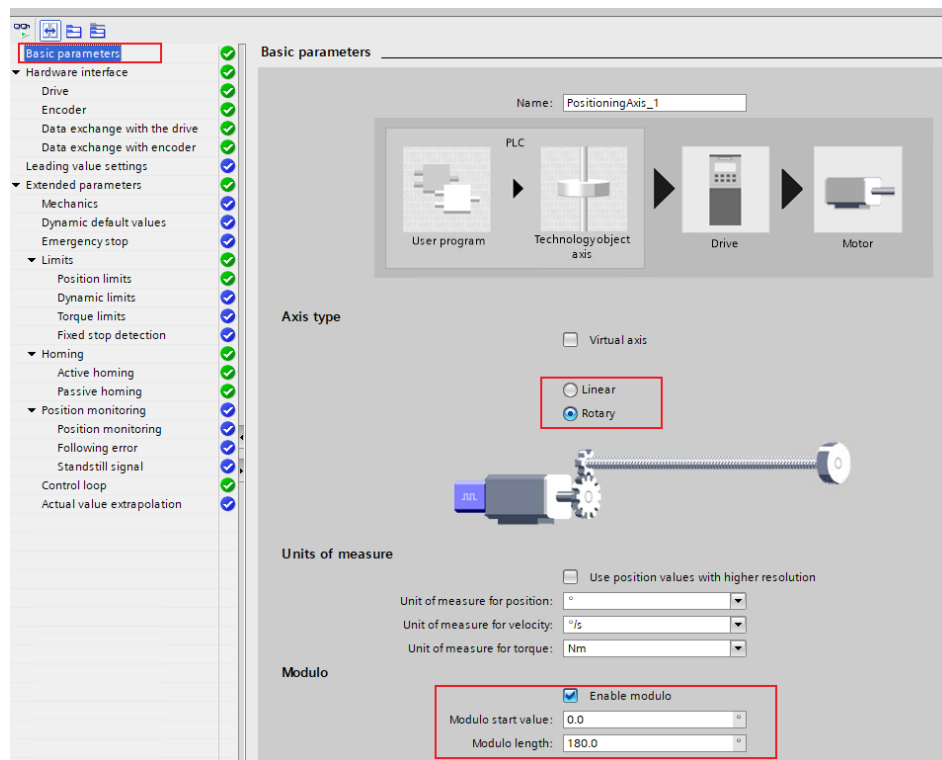
New add cam

In this example, line is used for simulation, the leading axis is between 0-180°, and the following axis is rotated by 360°. The leading axis continues to rotate at 180-360, and the following axis waits. The leading axis completes one cycle and enters the next cycle. This function is similar to an action of flying shear.



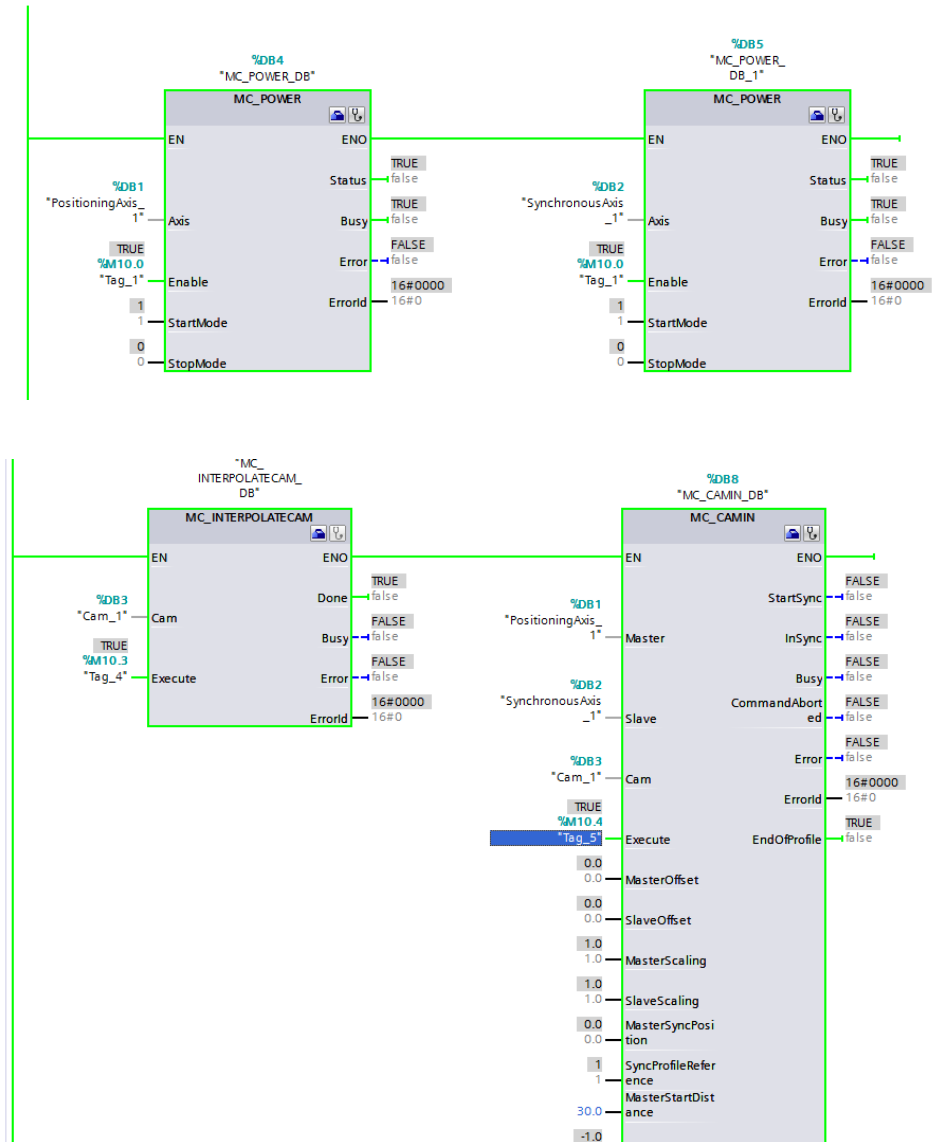
Axis configuration

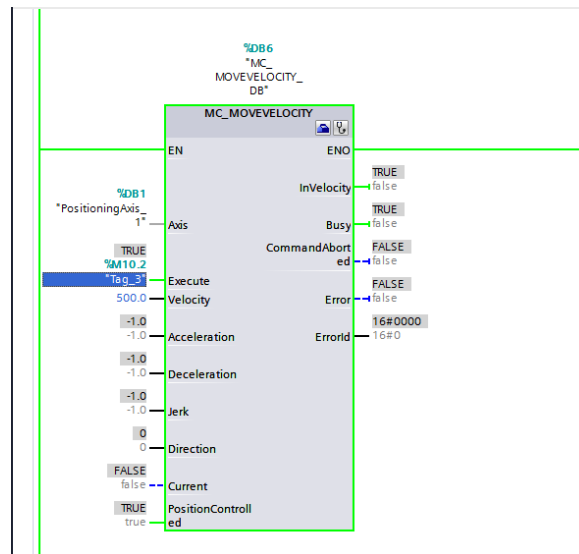
Configure the axis type to "Rotary", select "Modulo", and configure the modulo start value to 0-180°.



Write function blocks

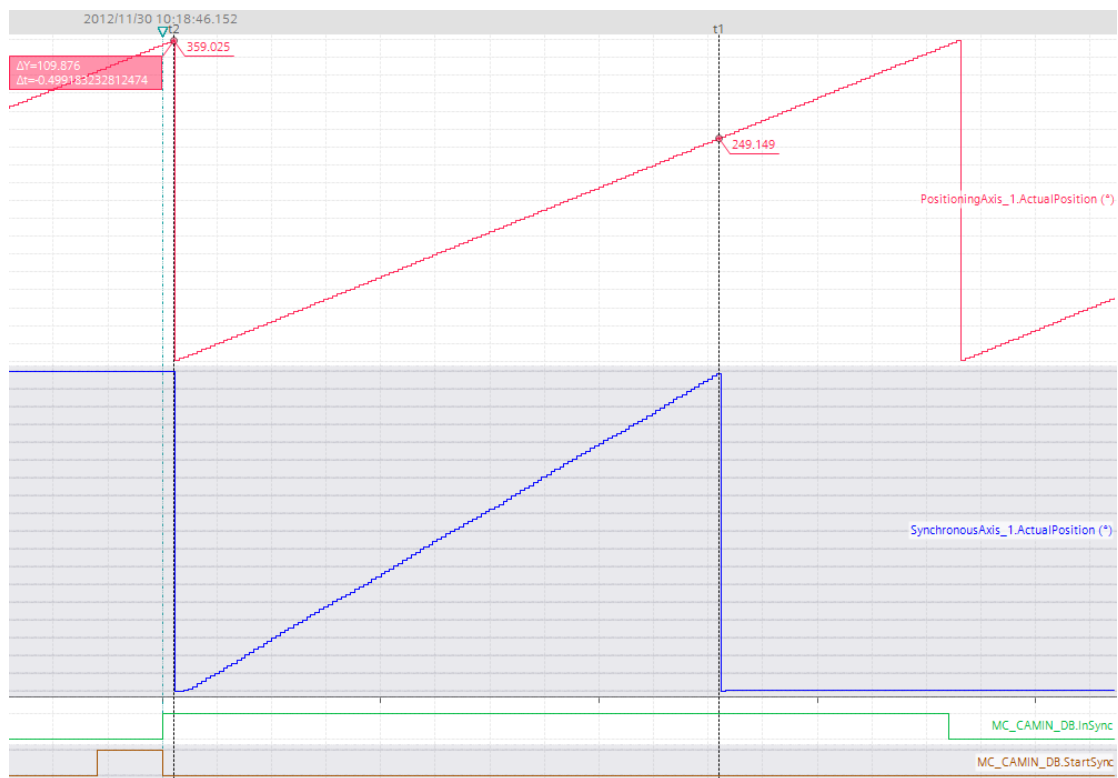
"MC_POWER" enables the leading axis and following axis, and the leading axis uses "MC_Velocity" to run cyclically at fixed speed. First, the "Execute" of the "MC_InterpolateCam" motion control instruction is triggered to interpolate the cam, and then the "Execute" of the "MC_CamIn" motion control instruction is triggered to start synchronous motion, and the start of Cam synchronization is displayed through the "StartSync" output parameter. The following axis synchronizes with the leading axis within a set range through specific dynamic parameters. The "InSync" output parameter signals that the following axis has been synchronized with the leading axis.





Trace waveform

"StartSync" is set to 1 to indicate that the following axis and the leading axis are synchronizing the process segment. "InSync" is set to 1 to indicate that the following axis and the leading axis have completed the process segment synchronously.



3.6. Supplementary telegram

[C05.04 Software version]=103xx support supplementary telegram.

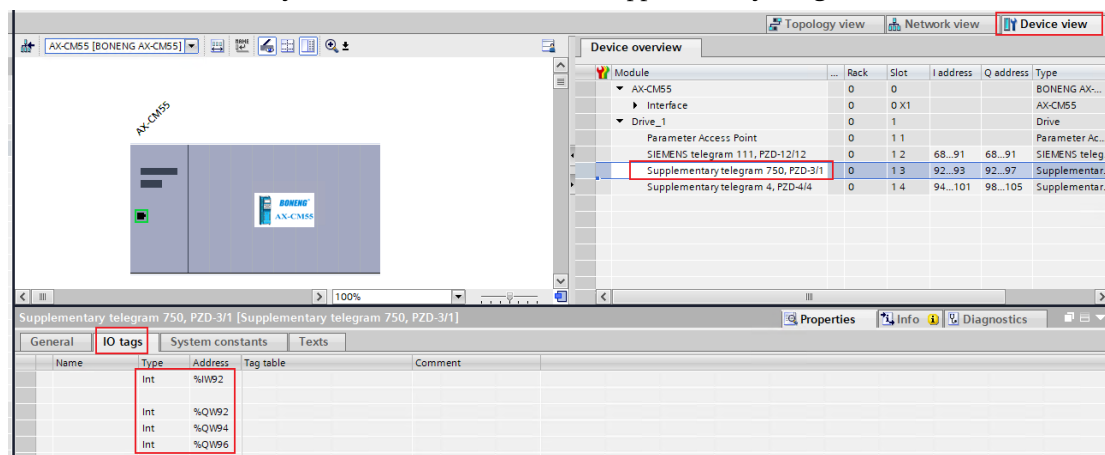
3.6.1. Supplementary telegram 750

The supplementary telegram 750 can only be added in subslot 3.

[C05.30 750 torque base value] corresponds to the rated torque of motor. The default 16384 corresponds to the rated torque of motor.

C05.30 750 torque base value 16384 -

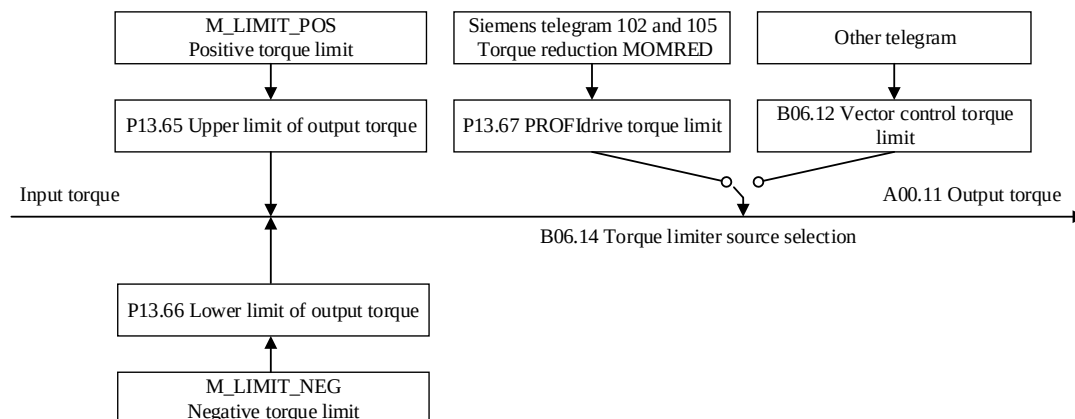
In the device view, you can view the address of supplementary telegram 750.



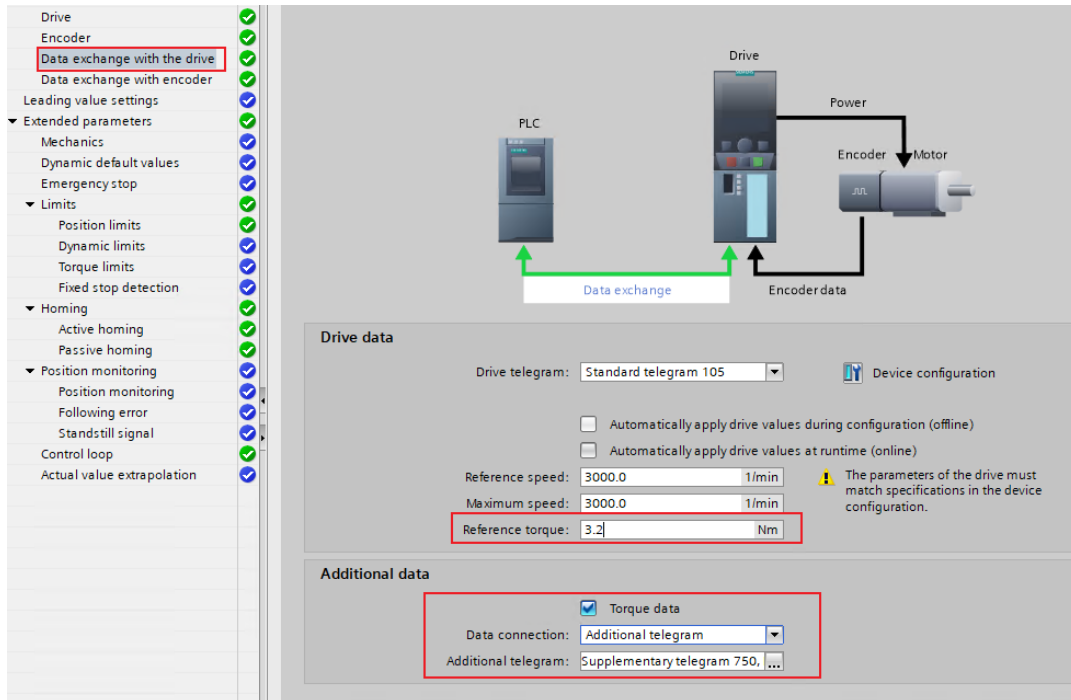
PZD	Description	Address	Drive internal parameter association
M_ADD1	Supplementary torque	%QW92	[B02.03 Torque control torque setting selection]
M_LIMIT_POS	Positive torque limit	%QW94	[B06.10 Torque upper limit given selection]
M_LIMIT_NEG	Negative torque limit	%QW96	[B06.11 Torque lower limit given selection]
M_LIMIT_ACT	Actual torque	%IW92	[P06.11 Output torque]

The actual effective positive torque limit value is the min value of the torque positive limit value and the torque limiter.

The actually effective negative torque limit value is the absolute value of the negative torque limit value and the minimum value of the torque limiter.



Select supplementary telegram 750 in the technology object and set the reference torque according to the required torque range. There are examples below.

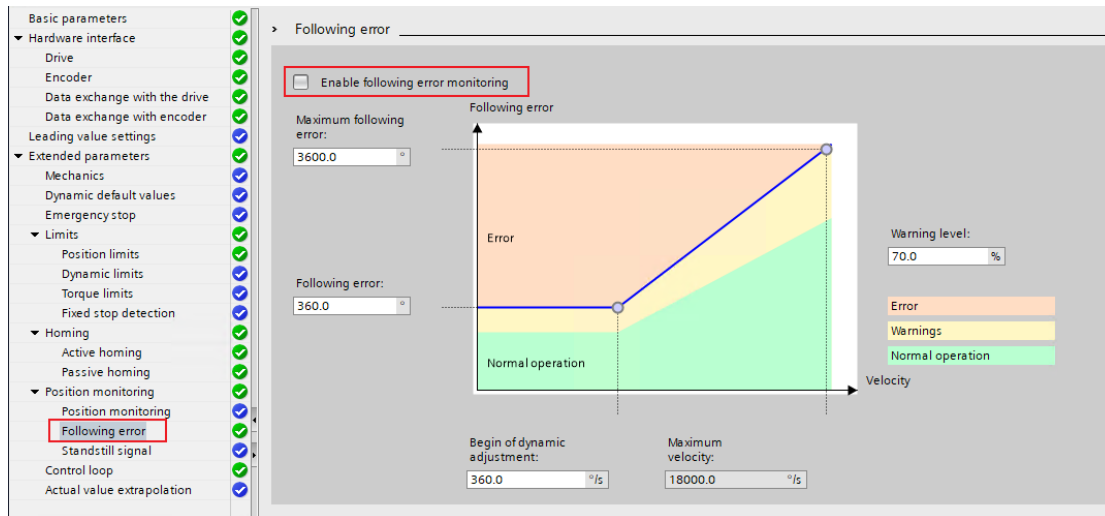


Funtl...	Parameters	Current value	Unit	Mod
D00.00	Motor type selection	1: Permanent magnet ...	—	Rev
D00.01	Motor rated power	0.42	kW	Rev
D00.02	Motor rated voltage	307	V	Rev
D00.03	Motor rated current	1.00	A	Rev
D00.04	Motor rated frequency	200.00	Hz	Rev
D00.05	Motor rated speed	3000	rpm	Rev
D00.06	Motor MAX speed	110.0	%	Rev
D00.07	Motor MIN speed	0.0	%	Rev
D00.09	Motor pole pairs	4	—	Res
D00.10	Motor rated torque	1.30	N.m	Rev
D00.16	Motor control method	2: FVC	—	Rev

The max torque of the drive is 3 times the rated torque, which can be set according to the required torque range [C05.30 750 torque base value].

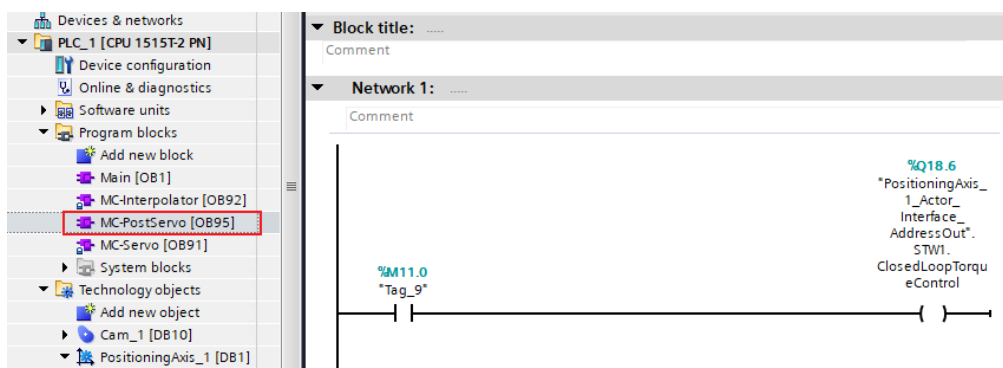
Torque range	[C05.30 750 torque base value]	Reference torque in technology object
16#0 to 16#4000 Corresponding to 0%-100% rated torque	16384	[D00.10 Motor rated torque]
16#0 to 16#4000 Corresponding to 0%-200% rated torque	8192	[D00.10 Motor rated torque]*2
16#0 to 16#4000 Corresponding to 0%-300% rated torque	5461	[D00.10 Motor rated torque]*3
16#0 to 16#4000 Corresponding to 0%-400% rated torque	4096	[D00.10 Motor rated torque]*4

In torque mode, "Enable following error monitoring" cannot be checked.



Add OB to the program, select MC_PostServo, and turn on the closed-loop torque control mode in it. Bit14 of STW1 controls torque mode switching, corresponding to Q0.6 in the PLC. Bit14=1, the drive enters torque mode; Bit14=0, the drive exits torque mode.

Note: When Bit14 of STW1=0, the drive must be disabled before switching from torque mode, otherwise the drive will run at max speed to the position before switching from other modes to torque mode.



Read the actual torque through Axis.StatusTorqueData.ActualTorque
 (Axis.StatusTorqueData.ActualTorque= Reference torque *(%IW20/16384))

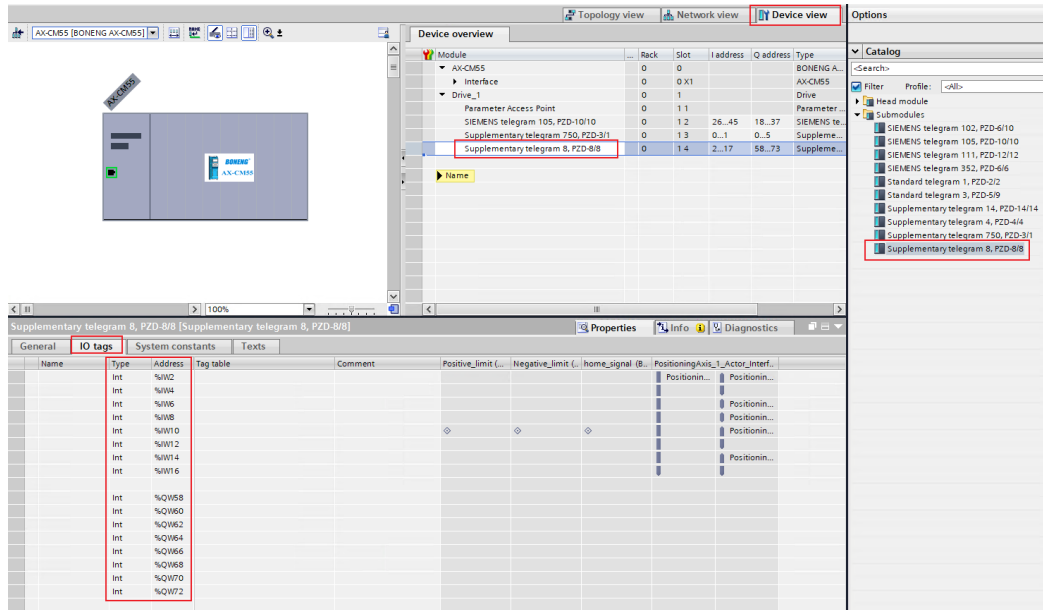
The torque reaches the set torque limit, which can be read through Bit1 of MELDW. In torque mode, [P01.50 reaches torque upper limit] and [P01.51 reaches torque lower limit] are valid. In speed and position mode, when the torque reaches the set torque limit, [P01.52 Output torque reaches limit] is valid.

3.6.2. Supplementary telegram 4/8/14

The PZD in the supplementary telegram 4/8/14 can be parameterized via the bus adapter. Check the starting address of the PZD input in the bus adapter in [C05.28 Additional configurable PZD input address], and check the starting address of the PZD output in the bus adapter in [C05.29 Additional configurable PZD output address].

For example

1. Use "supplementary telegram 8" for configuration, add "supplementary telegram 8" to the configuration, and check the IO allocation address of the PLC.



2. Compile and download the program for PLC
3. Check the starting address of the PZD in the bus adapter at C05.28 and C05.29.

C05.28	ADDT CONFG PZD input ADDR	4:PZD5
C05.29	ADDT CONFG PZD output ADDR	1:PZD2

The corresponding relationship is as follows:

PLC address	Correspond to pzd
QW26	A-PZD5
QW28	A-PZD6
-----	-----
QW40	A-PZD12
IW22	PZD output 2
IW24	PZD output 3
-----	-----
IW36	PZD output2 9

4. Configure in the Boneng Drivesoft as required.

- 1) The QW26 is configured for torque control forward speed limit:

Find the source of B02.06 torque control forward speed limit in the Boneng Drivesoft, and select "Others: Analog interconnection parameters", "P07: Communication (Analog connect)", "P07.04 bus adapter A.PZD5" .

Funt...	Parameters	Current value	Unit	Modifica
B02.00	Speed Ctrl main setting SEL	1:Multi-stage settin...	-	Revise a
B02.01	Speed Ctrl AUX setting SEL	0:0	-	Revise a
B02.02	Additional speed reference	0:0	-	Revise a
B02.03	Torque Ctrl torque setting SEL	0:0	-	Revise a
B02.04	Torque Ctrl ramp time	0.00	s	Be revis
B02.05	Torque Ctrl filtering time	0.00	s	Be revis
B02.06	Torque Ctrl forward speed limit	Connection parameters	-	Revise a
B02.07	Torque Ctrl reverse speed limit	0:0	-	Revise a
B02.08	Torque Ctrl the speed ramp time	2:AIO	s	Be revis
B02.09	Additional torque setting 1 SEL	3:Reserved	-	Revise a
B02.10	Additional torque setting 1 SEL	4:Reserved	-	Revise a
		5:Reserved		
		6:Multi-segment value gi	%	Revise a
		7:Electric potentiometer		
		8:Reserved		
		9:Bus Adapter A-PZD2		
		10:Bus Adapter A-PZD2		
		Others:Analog interconne		

Parameter	Value
P06:State and Peripheral(Analog connect)	
P07:Communication(Analog connect)	
P07.00 Bus adapter A.PZD1	
P07.01 Bus adapter A.PZD2	
P07.02 Bus adapter A.PZD3	
P07.03 Bus adapter A.PZD4	
P07.04 Bus adapter A.PZD5	
P07.05 Bus adapter A.PZD6	
P07.06 Bus adapter A.PZD7	
P07.07 Bus adapter A.PZD8	
P07.08 Bus adapter A.PZD9	
P07.09 Bus adapter A.PZD10	
P07.10 Bus adapter A.PZD11	
P07.11 Bus adapter A.PZD12	
P07.12 Bus adapter A.PZD13	
P07.13 Bus adapter A.PZD14	
P07.14 Bus adapter A.PZD15	
P07.15 Bus adapter A.PZD16	
P07.50 DriveLink PZD1	
P07.51 DriveLink PZD2	
P07.52 DriveLink PZD3	
P07.53 DriveLink PZD4	
P07.54 DriveLink PZD5	
P07.55 DriveLink PZD6	
P07.56 DriveLink PZD7	
P07.57 DriveLink PZD8	
P07.60 Bus adapter A.PZD 1+2	
P07.62 Bus adapter A.PZD 2+3	
P07.64 Bus adapter A.PZD 3+4	
P07.66 Bus adapter A.PZD 4+5	
P07.68 Bus adapter A.PZD 5+6	
P07.70 Bus adapter A.PZD 6+7	
P07.72 Bus adapter A.PZD 7+8	

2) The IW22 is configured to feedback the output current

Find C00.03 PZD output 2 in the Boneng Drivesoft, and select "Others: Analog interconnection parameters", "P06: status and peripherals (analog connect)", and "P06.08 output current".

Funt...	Parameters	Current value	Unit	Modifica
C00.00	Bus adapter supporting bus type	4: PROFINET	-	Be revis
C00.01	Data handling after COMM fault	1: Data clear	-	Be revis
C00.02	PZD output 1	0:0	-	Be revis
C00.03	PZD output 2	Connection parameters	-	Be revis
C00.04	PZD output 3	Others:Analog interconne	-	Be revis
C00.05	PZD output 4	0:0	-	Be revis
C00.06	PZD output 5	0:0	-	Be revis
C00.07	PZD output 6	0:0	-	Be revis
C00.08	PZD output 7	0:0	-	Be revis
C00.09	PZD output 8	0:0	-	Be revis
C00.10	PZD output 9	0:0	-	Be revis
C00.11	PZD output 10	0:0	-	Be revis
C00.12	PZD output 11	0:0	-	Be revis
C00.13	PZD output 12	0:0	-	Be revis
C00.14	PZD output 13	0:0	-	Be revis
C00.15	PZD output 14	0:0	-	Be revis
C00.16	PZD output 15	0:0	-	Be revis
C00.17	PZD output 16	0:0	-	Be revis
C00.18	PZD output 1 COMM base value	0	-	Be revis
C00.19	PZD output 2 COMM base value	0	-	Be revis
C00.20	PZD output 3 COMM base value	0	-	Be revis
C00.21	PZD output 4 COMM base value	0	-	Be revis
C00.22	PZD output 5 COMM base value	0	-	Be revis

Parameter	Value
P06:State and Peripheral(Analog connect)	
P06.00 Current state machine	
P06.01 Target frequency	
P06.02 Given frequency	
P06.03 Output frequency	
P06.04 Target speed	
P06.05 Given speed	
P06.06 Motor speed	
P06.07 Output voltage	
P06.08 Output current	
P06.09 Output power	
P06.10 Given torque	
P06.11 Output torque	
P06.12 System reservation	
P06.13 System reservation	
P06.14 DC-link voltage(V)	
P06.15 Radiator temperature(°C)	
P06.16 Encoder feedback frequency	
P06.17 VF separation voltage give	
P06.18 Motor temperature(X5, °C)	
P06.19 Motor temperature(X11, °C)	
P06.20 AIO conversion result	
P06.36 Physical state of DI input	
P07:Communication(Analog connect)	
P08:Word Bit Conversion Module(Analog connect)	
P09:Technology Utilization(Analog connect)	
P10:PM Internal Variables(Analog connect)	
P11:CM Internal Variables(Analog connect)	
P12:System Control and State(Analog connect)	
P13:System Setting and Feedback(Analog connect)	
P14:Servo 32bit Variable(Analog connect)	
P15:Servo 16bit Variable(Analog connect)	

C00.18 to C00.49 are the PZD input/output base values. When set to 0, it means 4096 is 100% of the corresponding parameter. It can be set manually. When set to 10000, it means 10000 is 100% of the corresponding parameter. For example, here is 0, QW26 is 4096, which means the torque control forward speed is limited to 100% rated speed, and IW22 is 4096, which means 100% rated current.

Summary of commonly used parameters:

Parameter name	Configuration instructions
Torque control forward speed limit	[B02.06 Torque control forward speed limit source] interconnected to "P07.x bus adapter A.PZDx"
Torque control negative speed limit	[B02.07 Torque control reverse speed limit source] interconnected to "P07.x bus adapter A.PZDx"
DO output (DIO20)	Use word transposition function [F02.00 word index function A input selection] interconnected to "P07.x bus adapter A.PZDx" [A10.00 DIO20 function configuration] Select "1: Digital output" [A10.14 DIO20 is selected as the DO signal source] interconnected to "P04.00 word bit function A output bit0"
Drive fault code	[C00.x PZD output x] interconnected to "P12.03 current fault"
Drive output current	[C00.x PZD output x] interconnected to "P06.08 output current"
Drive DI status	[C00.x PZD output x] interconnected to "P12.16 DI status"

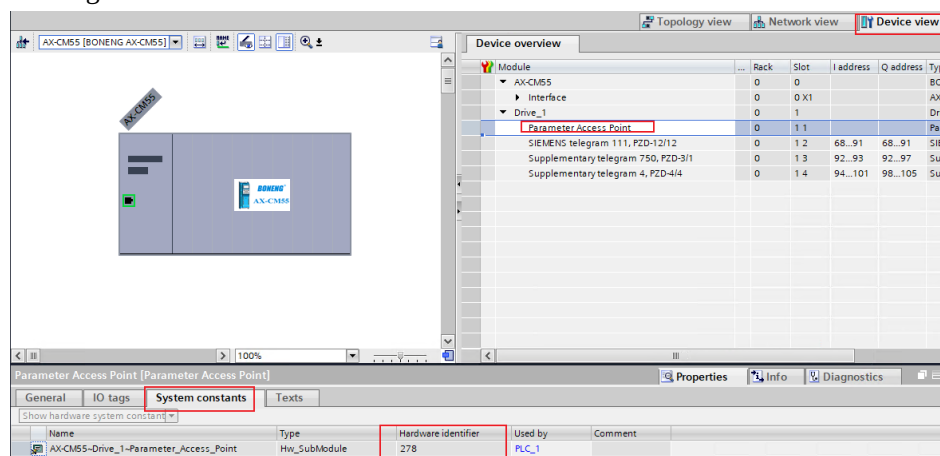
3.7. Acyclic parameter access

The Drive_lib library contains acyclic communication blocks "SINA_PARA" (FB286) and "SINA_PARA_S" (FB287), which can realize the read/write operation of drive parameters. The user only needs to specify the parameter number, parameter subscript, and the parameter value to be written (for write operations only), after executing the program, read and write accordingly.

3.7.1. SINA_PARA FB286

Terminal	Type	Description
Start	BOOL	Start of the job
ReadWrite	BOOL	Job type: 0=read, 1=write
ParaNo	INT	Number of parameters: 1 to 16
hardwareId	HW IO	Hardware ID of the module access points/actual value telegram slot of the axis or drive
AxisNo	BYTE	Axis number/axis ID/DO number in multi-axis system Default is 1
Ready	BOOL	Checkback signal for connecting in LacycCom environment; 1 = job ended or job canceled (one cycle long)
Error	BOOL	Group error active: Error=1
ErrorId	DWORD	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault
Busy	BOOL	Job being processed: Busy=1
Done	BOOL	Job completed without error: edge change from 0 to 1
DiagId	WORD	Extended communication error: error during SFB call

Hardware ID of the actual value telegram slot or diagnostics address of the axis or drive can be assigned to it.



siParaNo=Modbus address of group A-F parameters.

siParaNo=1000HEX+lower 12 bits of Modbus address of group P parameters. (Simple summary, replace the high 4 bits of hexadecimal E with 1).

3.7.1.1. Read parameters

ReadWrite=0, Read parameters

ParaNo=4, Read 4 parameters

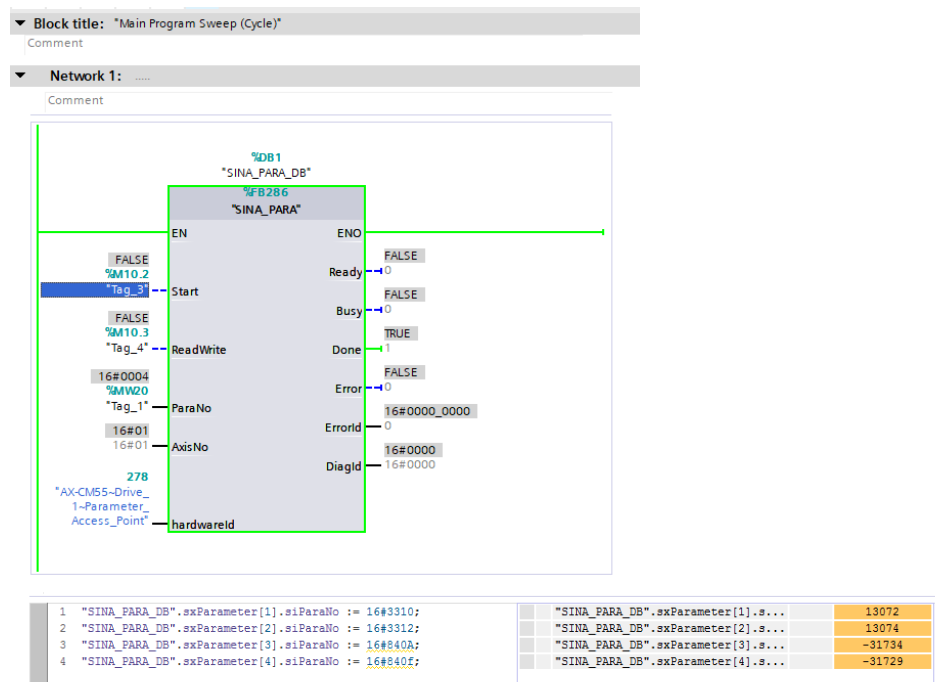
"SINA_PARA_DB".sxParameter[1].siParaNo=, first parameter number

"SINA_PARA_DB".sxParameter[1].siIndex=0, all index values default to 0

"SINA_PARA_DB".sxParameter[1].srValue:the value of the 16-bit parameter read

"SINA_PARA_DB".sxParameter[1].sdValue:the value of the 32-bit parameter read

"SINA_PARA_DB".sxParameter[1].syFormat:the read parameter length, 16#42 represents 16-bit parameters, and 16#43 represents 32-bit parameters. 16#44 indicates an error in reading parameters.



Parameter	Subparameters	Data	Description
SINA_PARA_DB.sxParameter[1]	siParaNo	13072(3310 HEX)	[B03.16 Multisegment set point 1]
	siIndex	0	The index values are all 0
	srValue	100.0	The value is 10 (One decimal place)
	sdValue	0	--
	syFormat	16#42	16-bit parameters
	swErrorNo	0	Error message
SINA_PARA_DB.sxParameter[2]	siParaNo	13074(3312 HEX)	[B03.18 Multisegment set point 3]
	siIndex	0	The index values are all 0
	srValue	300.0	The value is 30 (One decimal place)
	sdValue	0	--

SINA_PARA_DB.sx Parameter[3]	syFormat	16#42	16-bit parameters
	swErrorNo	0	Error message
	siParaNo	-31734(840A HEX)	[G04.10 Movement displacement of segment 1]
	siIndex	0	The index values are all 0
	srValue	0.0	--
	sdValue	10000	The value is 10000 (Parameters have no decimals)
	syFormat	16#43	32-bit parameters
SINA_PARA_DB.sx Parameter[4]	swErrorNo	0	Error message
	siParaNo	-31729(840F HEX)	[G04.15 Movement displacement of segment 2]
	siIndex	0	The index values are all 0
	srValue	0.0	--
	sdValue	10000	The value is 10000 (Parameters have no decimals)
	syFormat	16#43	32-bit parameters
	swErrorNo	0	Error message

▼ sxParameter	Array[1..16] of Struct		
▼ sxParameter[1]	Struct		
siParaNo	Int	0	13072
siIndex	Int	0	0
srValue	Real	0.0	100.0
sdValue	DInt	0	0
syFormat	Byte	BYTE#16#00	16#42
swErrorNo	Word	WORD#16#0000	16#0000
▼ sxParameter[2]	Struct		
siParaNo	Int	0	13074
siIndex	Int	0	0
srValue	Real	0.0	300.0
sdValue	DInt	0	0
syFormat	Byte	BYTE#16#00	16#42
swErrorNo	Word	WORD#16#0000	16#0000
▼ sxParameter[3]	Struct		
siParaNo	Int	0	-31734
siIndex	Int	0	0
srValue	Real	0.0	0.0
sdValue	DInt	0	10000
syFormat	Byte	BYTE#16#00	16#43
swErrorNo	Word	WORD#16#0000	16#0000
▼ sxParameter[4]	Struct		
siParaNo	Int	0	-31729
siIndex	Int	0	0
srValue	Real	0.0	0.0
sdValue	DInt	0	10000
syFormat	Byte	BYTE#16#00	16#43
swErrorNo	Word	WORD#16#0000	16#0000

R03.16	Multisegment set point 1	10.0	%	Be revis...	Effective i...	-600.0	600.0	10.0	0x3310
R03.17	Multisegment set point 2	20.0	%	Be revis...	Effective i...	-600.0	600.0	20.0	0x3311
R03.18	Multisegment set point 3	30.0	%	Be revis...	Effective i...	-600.0	600.0	30.0	0x3312
R03.19	Multisegment set point 4	-10.0	%	Be revis...	Effective i...	-600.0	600.0	-10.0	0x3313

G04.10	1st segment moving DP	10000	p	Be revis...	Effective i...	-1073...	10737...	10000	0x840A
G04.12	MAX speed of the first stage DP	200	rpm	Be revis...	Effective i...	1	6000	200	0x840C
G04.13	1st stage DP ACC/DEC time	10	ms	Be revis...	Effective i...	0	65535	10	0x840D
G04.14	Time after 1st stage DP is COMP	10	-	Be revis...	Effective i...	0	10000	10	0x840E
G04.15	2st segment moving DP	10000	p	Be revis...	Effective i...	-1073...	10737...	10000	0x840F
G04.17	2st DP maximum running speed	200	rpm	Be revis...	Effective i...	1	6000	200	0x8411

Error code

Error code	Description
00 HEX	Parameter does not exist, siParaNo error
0B HEX	Manufacturer parameters, no permission to access

Change SINA_PARA_DB.sxParameter[2].siParaNo to 16#5C00 (this group of parameters does not exist), and SINA_PARA_DB.sxParameter[3].siParaNo to 16#2407 (this parameter is manufacturer parameter). The access results are shown in the figure below.

Note that this value is under the sxRespParaMulti parameter.

■	▼ sxRespParaMulti	Struct		
■	▼ sxHeader	Struct		
■	syReqRef	Byte	16#00	16#04
■	syReqId	Byte	16#00	16#01
■	syAxisNo	Byte	16#00	16#01
■	syParaNo	Byte	16#00	16#04
■	▼ sxData	Array[1..96] of Byte		
■	sxData[1]	Byte	16#0	16#42
■	sxData[2]	Byte	16#0	16#01
■	sxData[3]	Byte	16#0	16#00
■	sxData[4]	Byte	16#0	16#64
■	sxData[5]	Byte	16#0	16#44
■	sxData[6]	Byte	16#0	16#01
■	sxData[7]	Byte	16#0	16#00
■	sxData[8]	Byte	16#0	16#00
■	sxData[9]	Byte	16#0	16#44
■	sxData[10]	Byte	16#0	16#01
■	sxData[11]	Byte	16#0	16#00
■	sxData[12]	Byte	16#0	16#0B
■	sxData[13]	Byte	16#0	16#43
■	sxData[14]	Byte	16#0	16#01
■	sxData[15]	Byte	16#0	16#00
■	sxData[16]	Byte	16#0	16#00
■	sxData[17]	Byte	16#0	16#27
■	sxData[18]	Byte	16#0	16#10
■	sxData[19]	Byte	16#0	16#00
■	sxData[20]	Byte	16#0	16#00

3.7.1.2. Write parameters

The four parameter values that need to be modified are as follows:

[B03.16 Multisegment set point 1]=20.0

[B03.18 Multisegment set point 3]=50.0

[G04.10 1st segment moving displacement]=20000

[G04.15 2st segment moving displacement]=30000

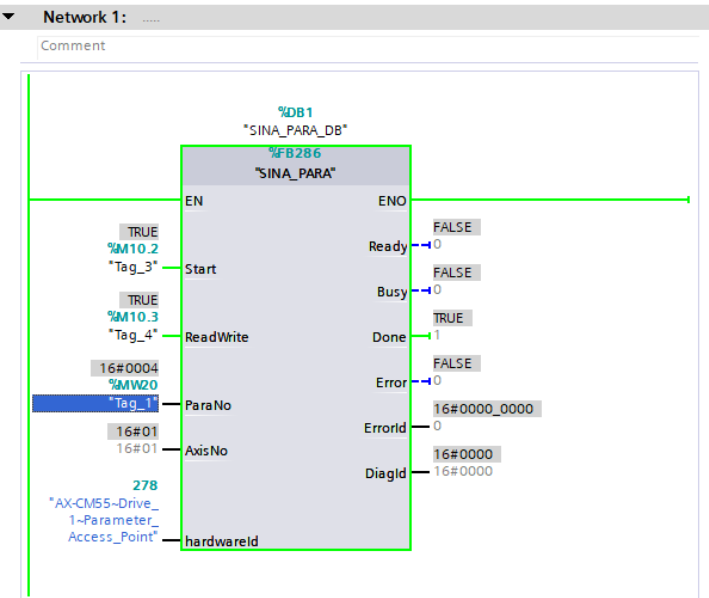
Set the parameters of FB286 to the following values:

ReadWrite=1, write request.

ParaNo=4, 4 parameters need to be written.

Modify the following variables in the corresponding data block of FB286 through the monitoring table:

SINA PARA_DB.sxParameter[1].siParaNo=16#3310
SINA PARA_DB.sxParameter[1].srValue=200.0
SINA PARA_DB.sxParameter[2].siParaNo=16#3312
SINA PARA_DB.sxParameter[2].srValue=500.0
SINA PARA_DB.sxParameter[3].siParaNo=16#840A
SINA PARA_DB.sxParameter[3].sdValue=20000
SINA PARA_DB.sxParameter[4].siParaNo=16#840F
SINA PARA_DB.sxParameter[4].sdValue=30000



1	"SINA PARA_DB".sxParameter[1].siParaNo := 16#3310;	"SINA PARA_DB".sxParameter[1].s...	13072
2	"SINA PARA_DB".sxParameter[1].srValue := 200.0;	"SINA PARA_DB".sxParameter[1].s...	200.0
3	"SINA PARA_DB".sxParameter[2].siParaNo := 16#3312;	"SINA PARA_DB".sxParameter[2].s...	13074
4	"SINA PARA_DB".sxParameter[2].srValue := 500.0;	"SINA PARA_DB".sxParameter[2].s...	500.0
5	"SINA PARA_DB".sxParameter[3].siParaNo := 16#840A;	"SINA PARA_DB".sxParameter[3].s...	-31734
6	"SINA PARA_DB".sxParameter[3].sdValue := 20000;	"SINA PARA_DB".sxParameter[3].s...	20000
7	"SINA PARA_DB".sxParameter[4].siParaNo := 16#840F;	"SINA PARA_DB".sxParameter[4].s...	-31729
8	"SINA PARA_DB".sxParameter[4].sdValue := 30000;	"SINA PARA_DB".sxParameter[4].s...	30000

45		■ sxParameter	Array[1..16] of ...		
46		■ ■ sxParameter[1]	Struct		
47		■ siParaNo	Int	0	13072
48		■ siIndex	Int	0	0
49		■ srValue	Real	0.0	200.0
50		■ sdValue	DInt	0	0
51		■ syFormat	Byte	BYTE#16#00	16#42
52		■ swErrorNo	Word	WORD#16#0000	16#0000
53		■ ■ sxParameter[2]	Struct		
54		■ siParaNo	Int	0	13074
55		■ siIndex	Int	0	0
56		■ srValue	Real	0.0	500.0
57		■ sdValue	DInt	0	0
58		■ syFormat	Byte	BYTE#16#00	16#42
59		■ swErrorNo	Word	WORD#16#0000	16#0000
60		■ ■ sxParameter[3]	Struct		
61		■ siParaNo	Int	0	-31734
62		■ siIndex	Int	0	0
63		■ srValue	Real	0.0	0.0
64		■ sdValue	DInt	0	20000
65		■ syFormat	Byte	BYTE#16#00	16#43
66		■ swErrorNo	Word	WORD#16#0000	16#0000
67		■ ■ sxParameter[4]	Struct		
68		■ siParaNo	Int	0	-31729
69		■ siIndex	Int	0	0
70		■ srValue	Real	0.0	0.0
71		■ sdValue	DInt	0	30000
72		■ syFormat	Byte	BYTE#16#00	16#43
73		■ swErrorNo	Word	WORD#16#0000	16#0000

Error code

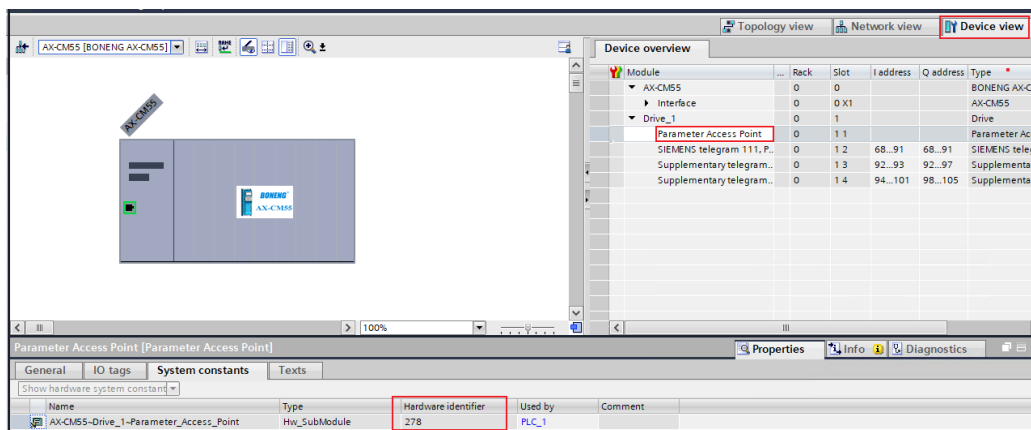
Write illegal parameters [B03.16 multisegment set point 1]=800.0 (exceeding the upper limit of the parameter), [A00.03 motor frequency]=100 (write read-only parameter), the result of writing is as follows:

44	[-] [01] [v] sxRespParaMulti	Struct		
45	[-] [01] [v] sxHeader	Struct		
46	[-] [01] [v] sxData	Array[1..96] of Byte		
47	[-] [01] [v] sxData[1]	Byte	16#0	16#44
48	[-] [01] [v] sxData[2]	Byte	16#0	16#02
49	[-] [01] [v] sxData[3]	Byte	16#0	16#00
50	[-] [01] [v] sxData[4]	Byte	16#0	16#02
51	[-] [01] [v] sxData[5]	Byte	16#0	16#00
52	[-] [01] [v] sxData[6]	Byte	16#0	16#00
53	[-] [01] [v] sxData[7]	Byte	16#0	16#44
54	[-] [01] [v] sxData[8]	Byte	16#0	16#02
55	[-] [01] [v] sxData[9]	Byte	16#0	16#00
56	[-] [01] [v] sxData[10]	Byte	16#0	16#01
57	[-] [01] [v] sxData[11]	Byte	16#0	16#00
58	[-] [01] [v] sxData[12]	Byte	16#0	16#00

3.7.2. SINA_PARA_S FB287

Terminal	Type	Description
Start	BOOL	Start of the job
ReadWrite	BOOL	Job type: 0=read, 1=write
Parameter	UINT	Parameter number
Index	UINT	Index of the parameter
ValueWrite1	REAL	Parameter value of 16 bit to be written (REAL format)
ValueWrite2	DINT	Parameter value of 32 bit to be written (DINT format)
AxisNo	Byte	Axis number/axis ID/DO number in multi-axis system
hardwareID:	HW IO	Hardware ID of the module access point/actual value telegram slot of the axis or drive
Ready	BOOL	Checkback signal for connecting in LacycCom environment; 1 = job ended or job canceled (one cycle long)
BUSY	BOOL	Job in progress if "Busy"=1
DONE	BOOL	Job completed without errors means edge change from 0 → 1
ValueRead1	REAL	Read the actual value of the 16-bit parameter (REAL format)
ValueRead2	DINT	Read the actual value of the 32-bit parameter (DINT format)
Format	Byte	Format of read parameter, 42=16bit, 43=32bit
ErrorNo	Word	Error number according to PROFIdrive profile
ERROR	BOOL	Error indication bit, 0= no error, 1=there is an error
ErrorId	DWord	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault.
DiagId	WORD	Extended communication error: error during SFB call.

The HardwareID hardware identifier can be viewed in the following ways:



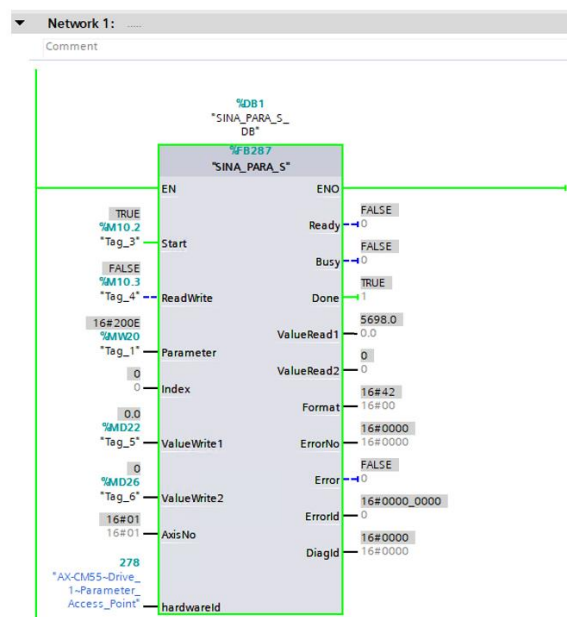
Parameter of group A-F =Modbus address.

Parameter of group P =1000HEX+lower 12 bits of Modbus address. (Simple summary, replace the high 4 bits of hexadecimal E with 1).

3.7.2.1. Read 16-bit parameters

Group A parameter reading:

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	0	0=read
Parameter	8206(200E HEX)	[A00.14 DC bus voltage]
Index	0	Parameter index
ValueWrite1	0.0	Write parameter value(REAL format)
ValueWrite2	0	Write parameter value(DINT format)
AxisNo	1	Axis number,default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value

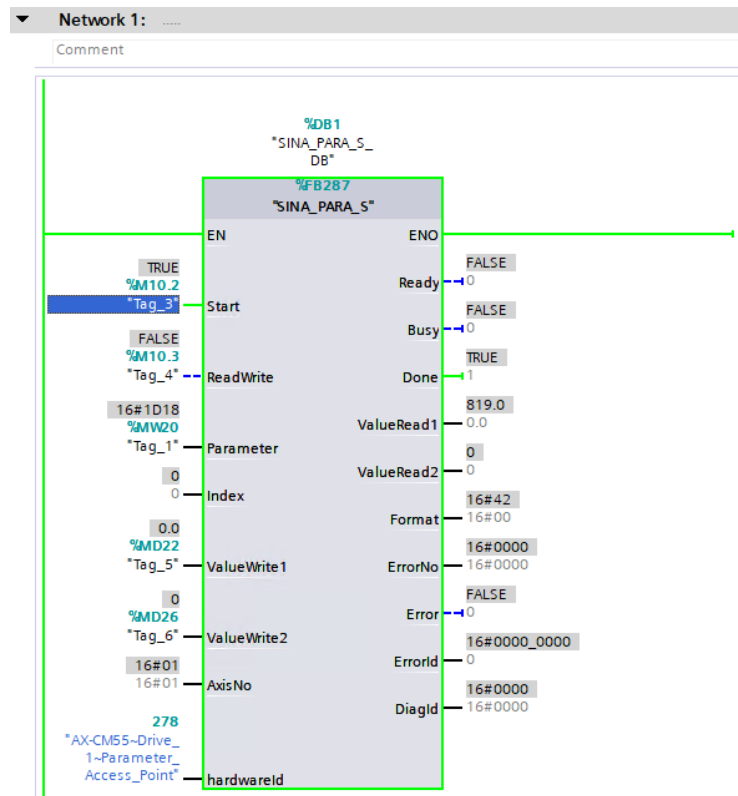


The reading results are as follows:

Terminal	Data	Description
Ready	0	The program block does not perform read or write tasks and is in a ready state
BUSY	0	Job being processed: Busy=1
DONE	1	Job completed without error: edge change from 0 to 1
ValueRead1	5698.0	[A00.14 DC bus voltage] =5698.0/10=569.8V(One decimal place)
ValueRead2	0	Read the actual value(DINT format)
Format	42	The format of reading parameters
ERROR	0	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault.
DiagId	0	Extended communication error: error during SFB call.

Group P parameter reading:

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	0	0=read
Parameter	7448(1D18 HEX)	[P13.24 Multiple setting values 1]
Index	0	Parameter index
ValueWrite1	0.0	Write parameter value(REAL format)
ValueWrite2	0	Write parameter value(DINT format)
AxisNo	1	Axis number,default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value



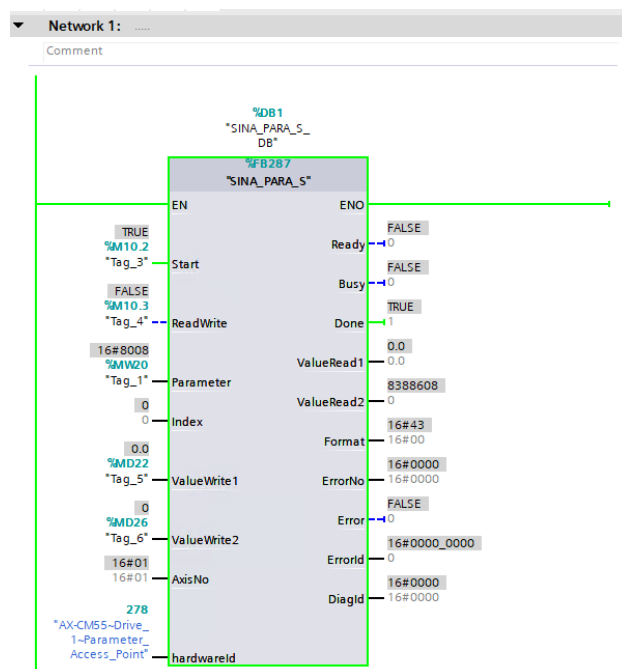
The reading results are as follows:

Terminal	Data	Description
Ready	0	The program block does not perform read or write tasks and is in a ready state
BUSY	0	Job being processed: Busy=1
DONE	1	Job completed without error: edge change from 0 to 1
ValueRead1	819.0	[P13.24 Multiple setting values 1]=819
ValueRead2	0	Read the actual value(DINT format)
Format	42	The format of reading parameters
ERROR	0	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault.
DiagId	0	Extended communication error: error during SFB call.

3.7.2.2. Read 32-bit parameters

Group G parameter reading:

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	0	0=read
Parameter	32776(8008 HEX)	[G00.08 Electronic gear ratio 1 (DEN)]
Index	0	Parameter index
ValueWrite1	0.0	Write parameter value(REAL format)
ValueWrite2	0	Write parameter value(DINT format)
AxisNo	1	Axis number, default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value

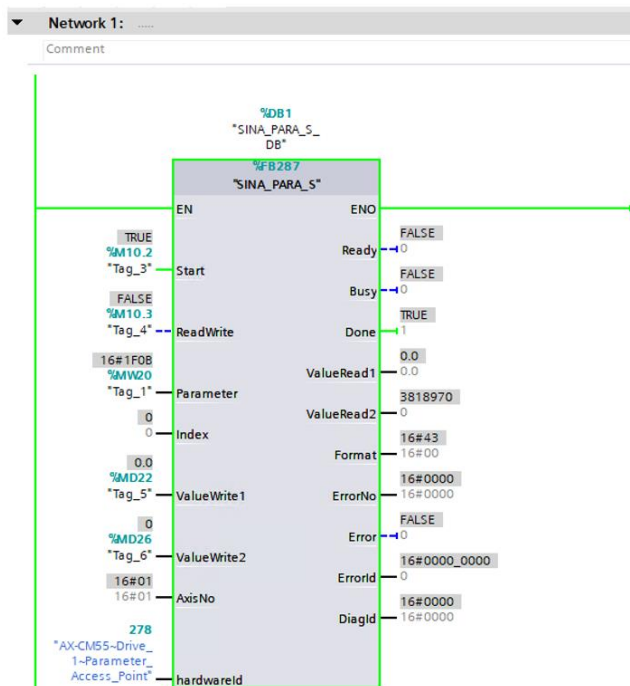


The reading results are as follows:

Terminal	Data	Description
Ready	0	The program block does not perform read or write tasks and is in a ready state
BUSY	0	Job being processed: Busy=1
DONE	1	Job completed without error: edge change from 0 to 1
ValueRead1	0.0	Read the actual value(REALformat)
ValueRead2	8388608	[G00.08 Electronic gear ratio 1 (DEN)]=8388608
Format	43	The format of reading parameters
ERROR	0	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault.
DiagId	0	Extended communication error: error during SFB call.

Group P parameter reading:

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	0	0=read
Parameter	7947(1F0B HEX)	[P15.11 Encoder position feedback value]
Index	0	Parameter index
ValueWrite1	0.0	Write parameter value(REAL format)
ValueWrite2	0	Write parameter value(DINT format)
AxisNo	1	Axis number, default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value

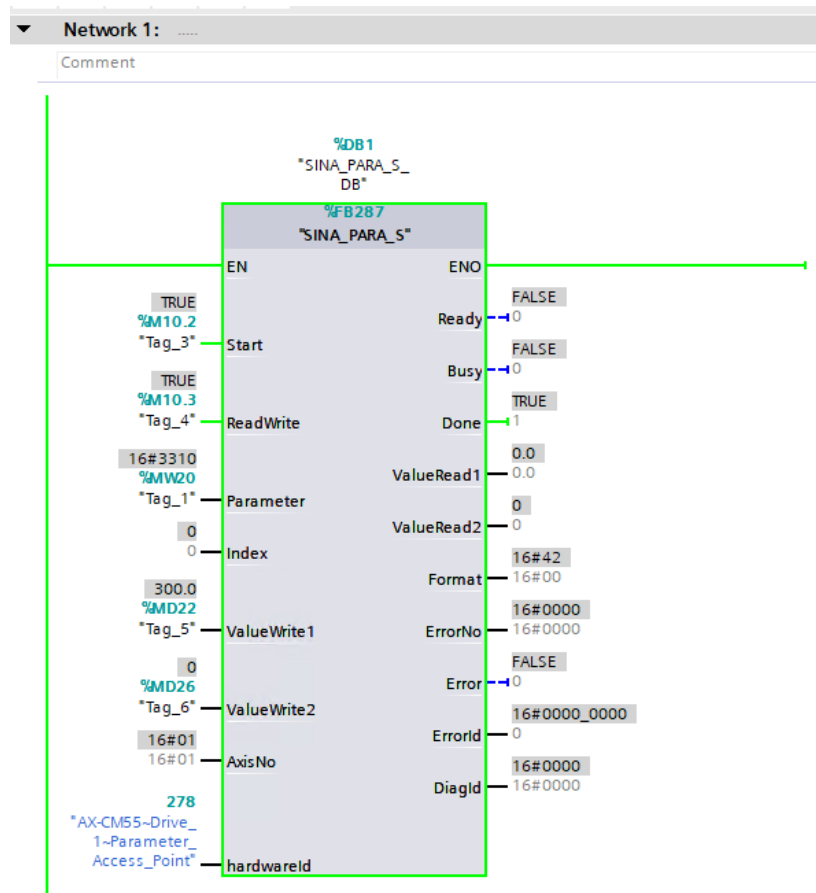


The reading results are as follows:

Terminal	Data	Description
Ready	0	The program block does not perform read or write tasks and is in a ready state
BUSY	0	Job being processed: Busy=1
DONE	1	Job completed without error: edge change from 0 to 1
ValueRead1	0.0	Read the actual value (REAL format)
ValueRead2	3818970	[P15.11 Encoder position feedback value] =3818970
Format	43	The format of reading parameters
ERROR	0	Error ID. The first word indicates which parameter has an error in accessing it (bit indication). The second word indicates the type of fault.
DiagId	0	Extended communication error: error during SFB call.

3.7.2.3. Write 16-bit parameters

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	1	1=Write
Parameter	13072(3310 HEX)	[B03.16 Multisegment set point 1]
Index	0	Parameter index
ValueWrite1	300.0	[B03.16 Multisegment set point 1] =300.0/10=30 (One decimal place)
ValueWrite2	0	Write parameter value (DINT format)
AxisNo	1	Axis number, default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value

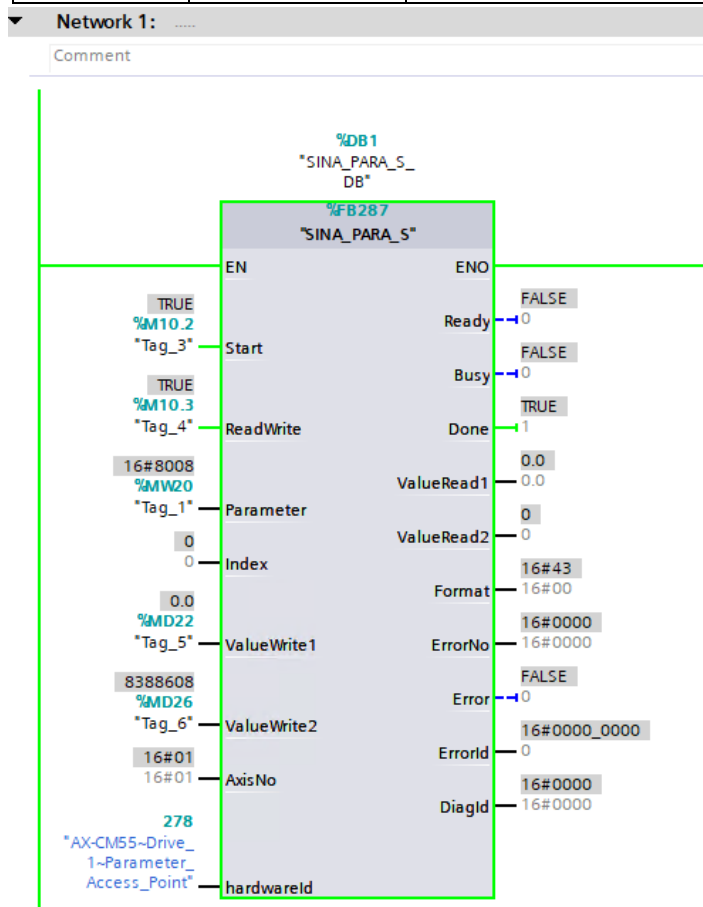


Done=1, Error=0 means the writing is completed without errors. View through the Boneng Drivesoft [B03.16 Multisegment set point 1]

ADDRESS	MULTISEGMENT SETPOINT VALUE UNIT	UNIT	SETPOINT	MAXIMUM VALUE	MINIMUM VALUE	UNIT	UNIT	UNIT	UNIT
B03.16	Multisegment set point 1	30.0	%	Be revis...	Effective i...	-600.0	600.0	10.0	0x3310
B03.17	Multisegment set point 2	20.0	%	Be revis...	Effective i...	-600.0	600.0	20.0	0x3311
B03.18	Multisegment set point 3	50.0	%	Be revis...	Effective i...	-600.0	600.0	30.0	0x3312
B03.19	Multisegment set point 4	-10.0	%	Be revis...	Effective i...	-600.0	600.0	-10.0	0x3313

3.7.2.4. Write 32-bit parameters

Terminal	Data	Description
Start	1	Start of the job
ReadWrite	1	1=Write
Parameter	32776(8008 HEX)	[G00.08 G00.08 Electronic gear ratio 1 (DEN)]
Index	0	Parameter index
ValueWrite1	0.0	Write parameter value (REAL format)
ValueWrite2	8388608	[G00.08 G00.08 Electronic gear ratio 1 (DEN)] =8388608
AxisNo	1	Axis number, default is 1
hardwareID:	278	Parameter access point hardware identifier, set according to actual value



Done=1, Error=0 means the writing is completed without errors. View [G00.08 Electronic gear ratio 1 (DEN)] through the Boneng drivesoft:

G00.06	Electronic gear ratio 1 (MDL)	1	p/r	Revise a...	Effective i...	1	10737...	1	0x8006
G00.08	Electronic gear ratio 1 (DEN)	8388608	p/r	Revise a...	Effective i...	1	10737...	1	0x8008
G00.16	COMD pulse shape	2: A phase + B ph...	-	Revise a...	Power on ag...	0	3	2	0x8010
G00.18	Pulse COMD input prohibition...	0: Invalid	-	Revise a...	Effective i...	0	10	0	0x8012
G00.19	POS COMD input prohibited SRC	0: Invalid	-	Revise a...	Effective i...	0	10	0	0x8013

4. F&Q

Question 1:

Using Siemens telegram 111, FB284 block reports a fault, Status=16#8402, the drive is prohibited from starting?

Reply:

Check whether the input parameters HWDSTW and HWDZSW of FB284 are correct.

Check if the drive is faulty.

Check ConfigEPos.%X0=1 and ConfigEPos.%X1=1 of FB284, and set OFF2 and OFF3 of the drive to 1. Otherwise the drive is blocked.

Question 2:

How to change the direction of rotation of the motor?

Reply:

Modify [G00.22 motor rotation direction selection] to change the rotation direction of the motor. Facing the motor shaft, the shaft is in the positive direction counterclockwise.

Question 3:

How to achieve torque control?

Reply:

Siemens telegram 352: Control mode selection Torque control [B05.01 system control mode]=1: Torque control, after the PROFINET communication is established, select [B02.03 torque control torque setting selection], “9: Bus adapter A-PZD3” or select “Other: Analog interconnection parameters” associated with the PZD of the P07 group.

Siemens telegram 102/105: Set the torque limiter by setting the torque deceleration MOMRED.

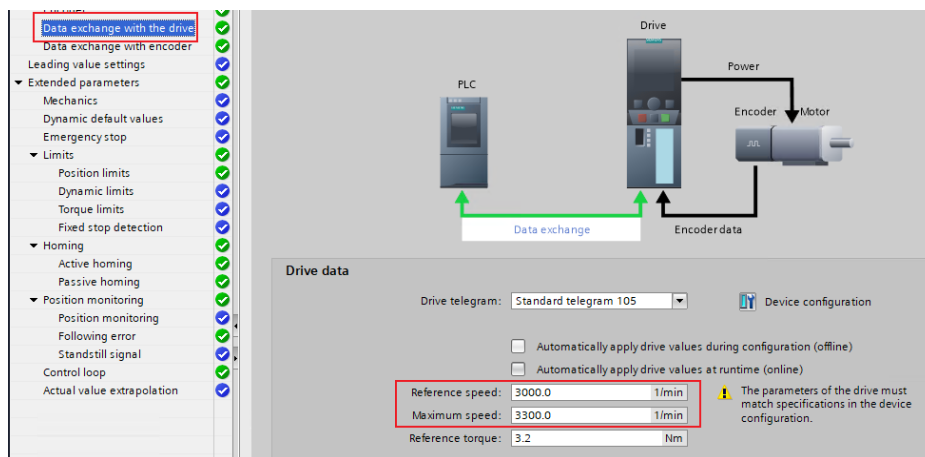
Supplementary telegram 750: A given value of torque, positive torque limit, negative torque limit. The shaft is in a stationary state, and the Bit14 of STW1 is set to 1 to switch the drive mode to torque mode.

Question 4:

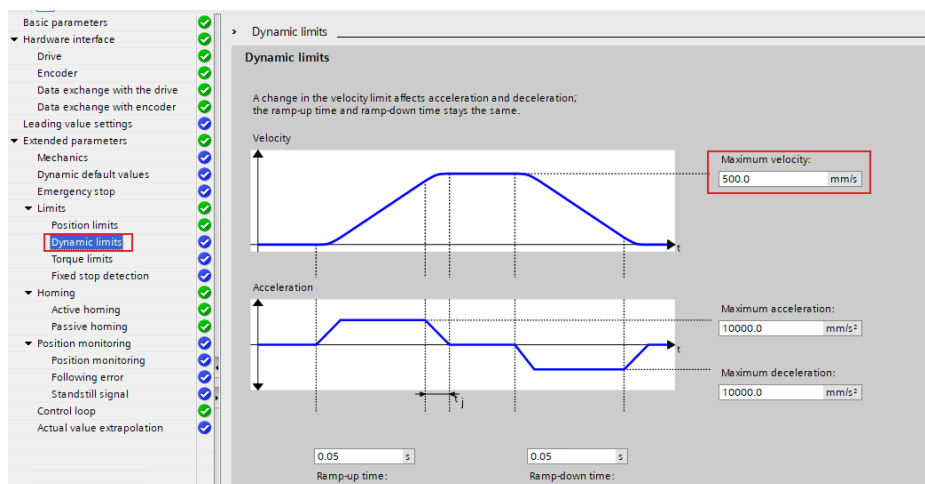
With Standard telegram 3 and positioning axis configured, the motor cannot run to the max velocity?

Reply:

Check whether the max velocity and rated velocity of the motor set in the technology object are consistent with those set in the drive. The reference velocity is the rated velocity of the motor [D00.05 motor rated velocity], the max speed [D00.06 motor max velocity]*[D00.05 motor rated velocity].



Check whether the maximum velocity in the dynamic limit is the max velocity of the motor. Note that after modifying this value, after re-downloading the program, the PLC will be powered off and powered on again.



Question 5:

There is no fault in the drive, but the PLC cannot control the drive enable?

Reply:

Check that [B00.00 start and stop control command source] is set to "1: Customized control module", and [C00.00 bus adapter supporting bus type] selects "4: PROFINET".

Question 6:

The drive and PLC cannot establish communication, LINK1 flashes, and [C05.01 Communication Status] displays AR established?

Reply:

1. Check whether [C05.04 software version] matches the device description

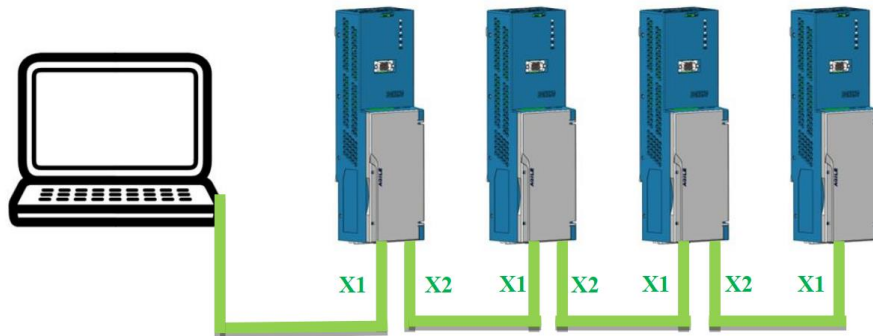
[C05.04 software version]	GSDML
10105	GSDML-V2.33-Boneng-A1CM55-20201123
10210	GSDML-V2.33-Boneng-A1CM55-20211115
103XX	GSDML-V2.33-Boneng-AXCM55-20221031

2. Under IRT, check whether the physical connection of the network cable in the topology view of the PLC configuration is the same as the actual one.

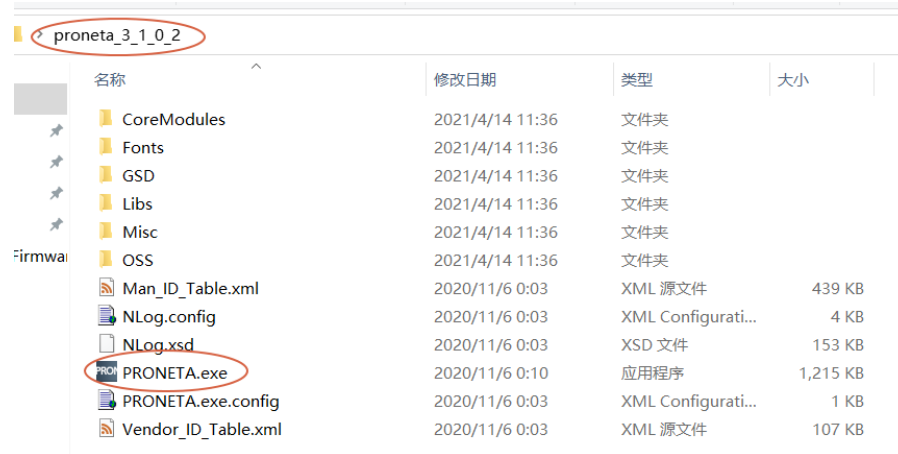
Appendix

1. PRONETA Diagnose network configuration

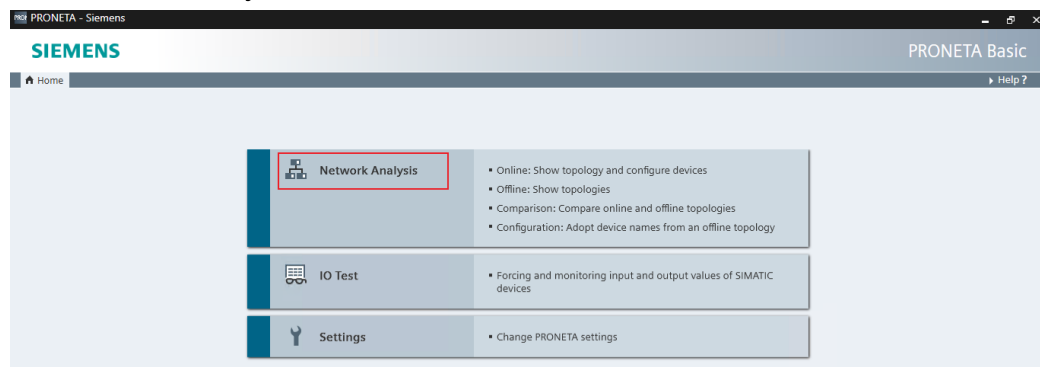
First put the CM55 GSDML into the \proneta_3_1_0_2\GSD folder, then cascade the drives together with network cables and connect the computer to the network.



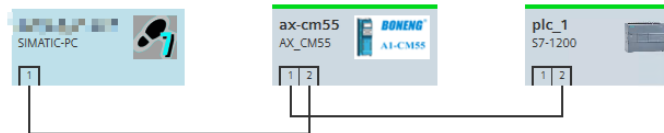
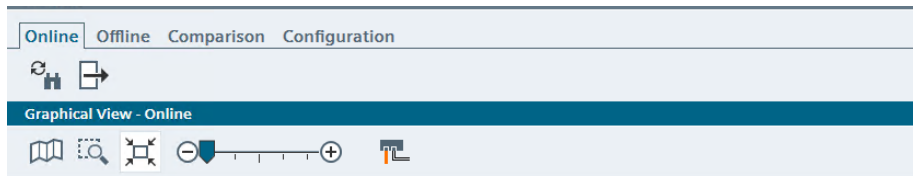
Open PRONETA software



Click [Network Analysis] to enter.

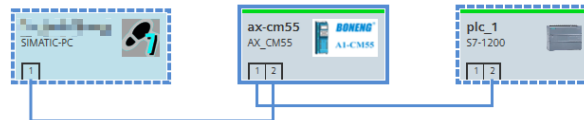
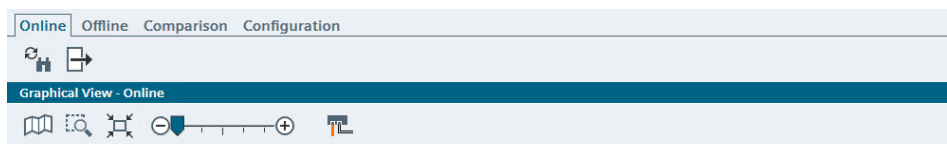


In the view, you can view and modify the device name, IP address, subnet mask, network communication status and other information of the devices in the network.



Device Table - Online								
#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number
1	ax-cm55	AX_CM55	192.168.0.2	255.255.255.0	10:00:07:02:01:10	Device	JVL A/S	6ES7 195-3BE00-0YA0
2	plc_1	S7-1200	192.168.0.1	255.255.255.0	e0:dca0:55:74:73	Controller	SIEMENS AG	6ES7 217-1AG40-0XB0

IP address and device name can be modified.



Device Table - Online									
#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version
1	ax-cm55	AX_CM55	192.168.0.2	255.255.255.0	10:00:07:02:01:10	Device	JVL A/S	6ES7 195-3BE00-0YA0	V4.6.0
2	plc_1	S7-1200	192.168.0.1	255.255.255.0	e0:dca0:55:74:73	Controller	SIEMENS AG	6ES7 217-1AG40-0XB0	V4.4.1

Refresh to confirm that the IP address or device name has been successfully written to the drive.

Online Offline Comparison Configuration

Graphical View - Online

Device Table - Online

#	Name	Device Type	IP Address	Subnet Mask	MAC Address	Role	Vendor Name	Order Number	Firmware Version
1	ax-cm55	AX_CM55	192.168.0.2	255.255.255.0	10:00:07:02:01:10	Device	JVL A/S	6ES7 195-3BE00-0YA0	V4.6.0
2	plc_1	S7-1200	192.168.0.1	255.255.255.0	e0:dca0:55:74:73	Controller	SIEMENS AG	6ES7 217-1AG40-0XB0	V4.4.1

2.Set the IP address on Boneng DriveSoft 100

- Open the manufacturer parameters. Enter the manufacturer password in A04.03, select manufacturer parameters in A04.03.
(Manufacturer password: [A02.00 cm-arm software version] *1000)
- Open the C05 group and set the drive IP address to 192.168.0.2, set the subnet mask to 255.255.255.0, and set [C05.18 IP address valid] to 1: valid.

C05.18	IP address is valid	1: Valid	-
C05.19	IP address 1	192	-
C05.20	IP address 2	168	-
C05.21	IP address 3	0	-
C05.22	IP address 4	2	-
C05.23	Subnet mask is valid	0	-
C05.24	Subnet mask 1	255	-
C05.25	Subnet mask 2	255	-
C05.26	Subnet mask 3	255	-
C05.27	Subnet mask 4	0	-

- Power on the drive again and the settings will take effect. Check the [Actual IP address] to confirm that the setting is successful.

C05.38	Actual IP address 1	192	-
C05.39	Actual IP address 2	168	-
C05.40	Actual IP address 3	0	-
C05.41	Actual IP address 4	2	-
C05.42	Actual subnet mask 1	255	-
C05.43	Actual subnet mask 2	255	-
C05.44	Actual subnet mask 3	255	-
C05.45	Actual subnet mask 4	0	-