M6-F Series Servo System

User Manual

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Shenzhen Megmeet Electrical Co., Ltd. provides comprehensive technical support for our valued customers. Please contact your nearest Megmeet office or service center, or connect directly with Megmeet headquarters if any assistance is needed.

Address: 5th Floor, Block B, Unisplendour Information Harbor, Langshan Road, Nanshan District, Shenzhen, 518057, China
Website: www.megmeet.com
Tel: +86-755-86600500
Fax: +86-755-86600562
Service email: driveservice@megmeet.com

Foreword

Thank you for choosing Megmeet M6-F Series Servo System.

M6-F series servo system is engineered on an innovative hardware-design platform, and adopts the latest generation of control algorithms. It delivers comprehensive functionality and superb performance based on a compact layout, and offers incomparable convenience in installation, commissioning, and maintenance, making this series highly cost-efficient for the OEM and general-purpose servo drive markets. All models support PROFINET communication protocol and multi-servo-system topology when coordinated with the host device. Key functions, such as rigidity setting, inertia identification, and vibration suppression, further enhance the ease of use in industrial sectors that require fast and precise control of position, speed, and torque, including machine tool servo feed axis, printing machine, textile processing machine, cutting machine, manipulator, punching press, semiconductor welding machine, etc.

M6-F series delivers faster response and higher precision when working with low-inertia servo motors, and higher mechanical time constant and operation stability with mid-to-high inertia servo motors. This series also supports 23-bit multi-turn absolute encoders and incremental encoders.

This user manual provides instructions and precautions for the installation, wiring, parameter setting, and fault diagnosis/removal of the product. To ensure the correct installation and operation of the M6-F series servo system and maximize its capabilities, please read this manual thoroughly before installation. This manual shall be kept properly and delivered to the actual users of the product.

Unboxing inspection

When unboxing the product, please make sure to check the following:

- whether there is any damage to the product;
- Whether the rotating shaft of the servo motor rotates smoothly (except for the motor with brake);
- Whether the servo drive and the rated values on the nameplate are consistent with your order requirement;
- Whether there is any damage to the cables and wiring, and whether the cables and wiring can work properly.

Our company has implemented strict inspection on the product's manufacturing and packaging. If there is still any error, please contact us or the local distributor.

We are engaged in the continuous improvement of our servo drive products. The relevant manuals provided by us are subject to changes without notice.

Safety precautions

Indicates that failure to comply with the notice can result in death or severe personal injuries.

Indicates that failure to comply with the notice may result in moderate or minor personal injuries, or property damages.

- Install the product on incombustible materials such as metal. Failure to comply will result in a fire.
- Do not place combustible objects near the installed product. Failure to comply will result in a fire.
- Do not install the product in places with explosive gases. Failure to comply will result in an explosion.
- The wiring work must be carried out by sufficiently qualified personnel. Otherwise, there is a risk of electric shock.
- Before wiring, make sure that the power supply input is completely cut off. Otherwise, there is a risk of electric shock.
- Make sure to reliably ground the servo drive. Otherwise, there is a risk of electric shock.
- Properly install the covers of the drive enclosure before powering on. Otherwise, there is a risk of electric shock and explosion.
- When powering on a drive product that has been idle/stored for more than 2 years, employ a voltage regulator to gradually turn up the input voltage to the required level. Otherwise, there is a risk of electric shock or explosion.
- Do not touch any terminals with bare hands when the drive is powered on. Otherwise, there is a risk of electric shock.
- Do not operate the servo drive with wet hands. Otherwise, there is a risk of electric shock.
- Before maintenance, make sure the drive has been powered off for at least 10 minutes, and that the charging indicator is completely off or the bus negative/positive voltage is below 36 V. Failure to comply will result in an electric shock.
- Parts/Components replacement must be carried out by sufficiently qualified personnel. Do not leave any wire residue or foreign metal inside the drive. Failure to comply will result in a fire.
- The bare parts of the terminal lugs in the main circuit must be properly wrapped with insulation tape. Otherwise, electric shock may occur.

WARNING

- Install the product on a place that can bear its weight. Failure to comply will result in personal injuries or equipment damage.
- Do not install the drive near water pipes or other places capable of water splashing. Otherwise, there is a risk of property damage.
- Do not allow screws, gaskets, metal bars, and the like to fall into the servo drive. Failure to comply may result in a fire or property damage.
- If the servo drive is damaged or lacks components, do not install or run the drive. Failure to comply may result in a fire or personal injuries.
- Do not install the product in places with direct sunlight exposure. Otherwise, there is a risk of property damage.
- Cable lugs must be firmly connected to the terminals of the main circuit. Otherwise, there is a risk of property damage.
- When handling the servo motor, do not drag the machine by pulling the cables or holding the rotating shaft. Otherwise, there is a risk of machine dropping that may cause personal injuries or property damage.
- Do not impact the shaft with direct striking or pounding as such actions may cause damage to the shaft and the encoder attached to the opposite side of the shaft. Failure to comply may result in property damage.
- Do not store the servo motor in the place with vibration beyond the limit in the requirement. Otherwise, there is a risk of property damage.

Content

Chapter 1 M6-F Series Model Selection

1.1 Servo motor and drive models

1.1.1 Servo motor model

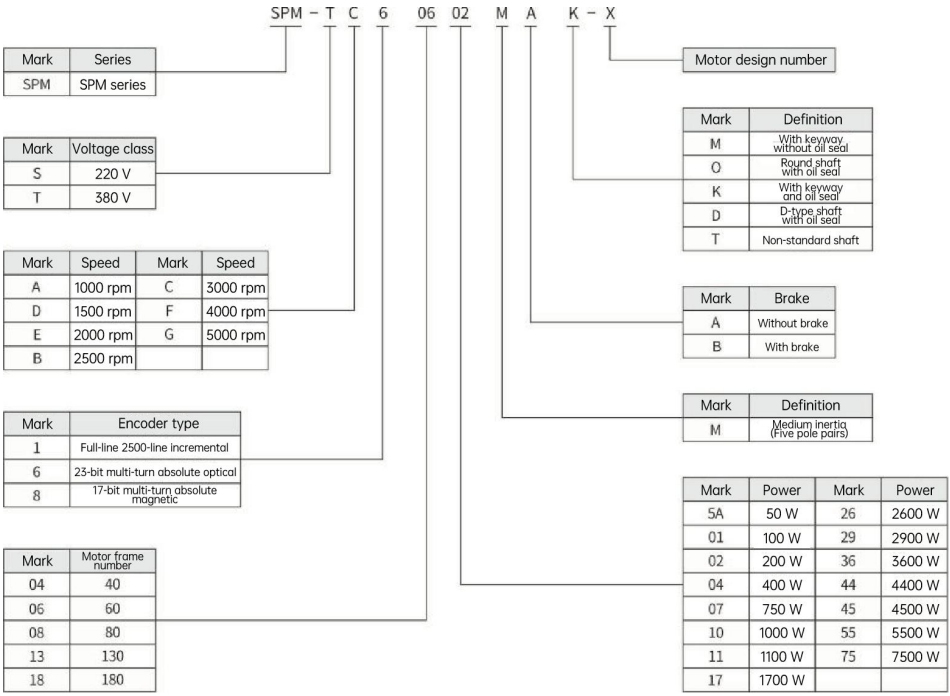


Figure 1-1 Servo motor model explanation

1.1.2 Servo motor nameplate

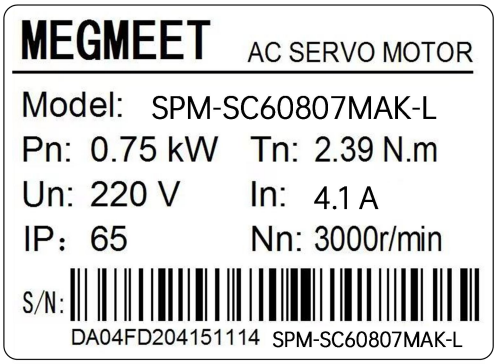


Figure 1-2 Servo motor nameplate

1.1.3 Servo drive model

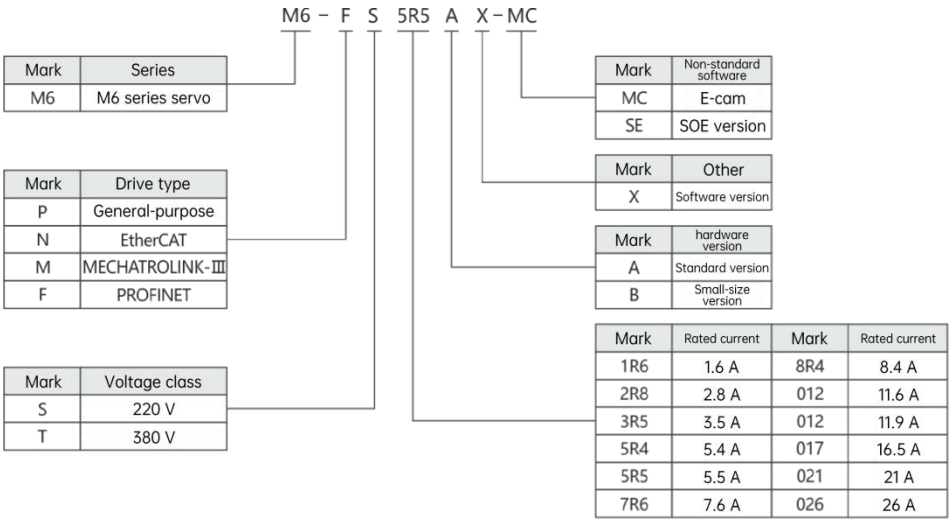


Figure 1-3 Servo drive model explanation

1.1.4 Servo drive nameplate

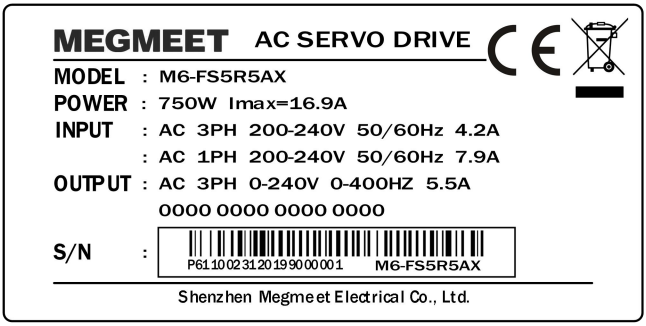
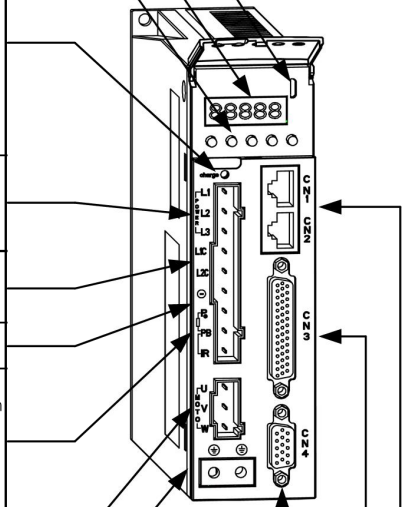


Figure 1-4 M6-F series servo drive nameplate

1.1.5 Names and descriptions of the drive interface

Interface name	Interface description
CN5 Micro USB communication port	Used for the connection with the computer USB to facilitate the drive parameter setting and commissioning
LED digital tube	Five-digit eight-segment digital tube for status monitoring and parameter display & setting
Operating key	Five keys, used for parameter setting and display status switchover
CHARGE Bus power supply indicator	Used for indicating the status of the bus power supply. When the indicator is on, it indicates that the bus capacitor is charged; do not touch the power supply terminal in the circumstances even if the main power supply has been cut off; otherwise, there is a risk of electric shock.
L1, L2, L3 Main power supply input	Main power supply input, 220 V or 380 V, single-phase or three-phase. Refer to the section 2.1.1 for detailed specifications.
L1C, L2C Control power supply input	Single-phase 220 V control power supply input
⊖、P⊕ DC bus terminal	DC bus terminal, for connection under common bus
P⊕ , PB, IR Braking resistor wiring terminal	Braking resistor wiring terminals. Please short-circuit PB and IR when an internal braking resistor is applied; when an external braking resistor is applied, install it between P⊕ and PB.
U、V、W Servo motor power terminal	Servo motor UVW power terminals
⏚ Ground terminal	Ground terminal. Please short-circuit to ground and the motor
CN4 Encoder interface	DB15 female connector for connecting the motor encoder
CN3 Control I/O interface	DB44 female connector, control I/O interface, used for connecting with the external I/O and the host controller
CN1、CN2 Communication interface	Two RJ45 ports in parallel for Profinet communication



1.2 Servo system configuration specifications

Table 1-1 220 V medium-inertia servo motor configuration specifications

Voltage	Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor	Rated torque (N·m)	Motor frame number	Matching drive	Drive size
220 V	3000	6000	50	SPM-SC6045AM**-L	0.16	40	M6-*S1R6AX	A
	3000	6000	50	SPM-SC8045AM**-L	0.16	40	M6-*S1R6AX	A
	3000	6000	100	SPM-SC60401M**-L	0.32	40	M6-*S1R6AX	A
	3000	6000	100	SPM-SC80401M**-L	0.32	40	M6-*S1R6AX	A
	3000	6500	200	SPM-SC60602M**-L	0.64	60	M6-*S1R6AX	A
	3000	6500	200	SPM-SC80602M**-L	0.64	60	M6-*S1R6AX	A
	3000	5000	400	SPM-SC60604M**-L	1.27	60	M6-*S2R8AX	A
	3000	5000	400	SPM-SC80604M**-L	1.27	60	M6-*S2R8AX	A
	3000	5000	750	SPM-SC60807M**-L	2.39	80	M6-*S5R5AX	A
	3000	5000	750	SPM-SC80807M**-L	2.39	80	M6-*S5R5AX	A
	3000	5000	1000	SPM-SC60810M**-L	3.19	80	M6-*S7R6AX	A
	3000	5000	1000	SPM-SC80810M**-L	3.19	80	M6-*S7R6AX	A
	3000	5000	1700	SPM-SC61317M**-W	5.399	130	M6-*S012AX	B
	2000	4000	1100	SPM-SE61311M**-W	5.39	130	M6-*S7R6AX	B
	2000	4000	1700	SPM-SE61317M**-W	8.34	130	M6-*S012AX	B

Table 1-2 380V medium-inertia servo motor configuration specifications

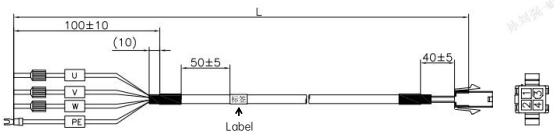
Voltage	Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor	Rated torque (N·m)	Motor frame number	Matching drive	Drive size
380 V	2000	4000	1100	SPM-TE61311M**-W	5.39	130	M6-*T5R4AX	B
	2000	4000	1700	SPM-TE61317M**-W	8.34	130	M6-*T8R4AX	B
	2000	4000	2400	SPM-TE61324M**-W	9.5	130	M6-*T017AX	C
	2000	4000	3000	SPM-TE61330M**-W	14.3	130	M6-*T017AX	C

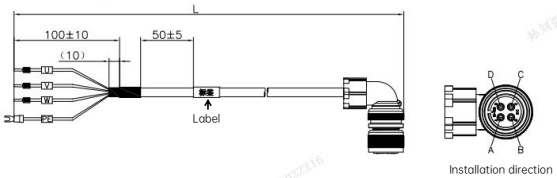
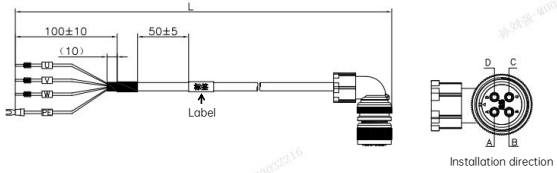
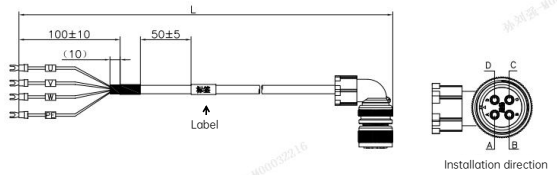
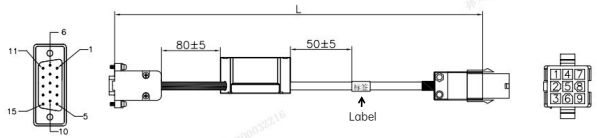
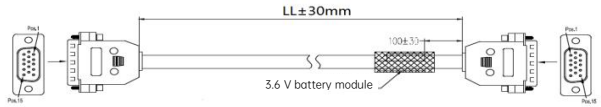
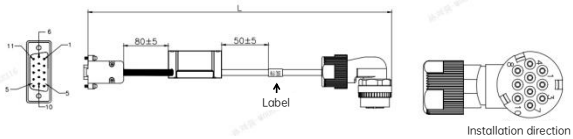
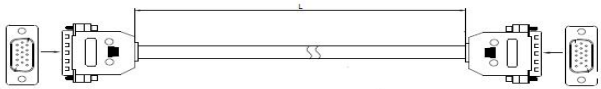
Voltage	Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor	Rated torque (N·m)	Motor frame number	Matching drive	Drive size
	3000	5000	1700	SPM-TC61317M**-W	5.399	130	M6-*T8R4AX	B
	3000	5000	2600	SPM-TC61326M**-W	8.34	130	M6-*T012AX	B
	3000	5000	3600	SPM-TC61336M**-W	11.5	130	M6-*T012AX	B
	3000	5000	4500	SPM-TC61345M**-W	14.3	130	M6-*T017AX	C
	1500	3000	2900	SPM-TD11829M**-P	18.6	180	M6-*T012AX	B
	1500	3000	2900	SPM-TD61829M**-P	18.6	180	M6-*T012AX	B
	1500	3000	4400	SPM-TD11844M**-P	28.4	180	M6-*T017AX	C
	1500	3000	4400	SPM-TD61844M**-P	28.4	180	M6-*T017AX	C
	1500	3000	5500	SPM-TD11855M**-P	35	180	M6-*T021AX	C
	1500	3000	5500	SPM-TD61855M**-P	35	180	M6-*T021AX	C
	1500	3000	7500	SPM-TD11875M**-P	48	180	M6-*T026AX	C
	1500	3000	7500	SPM-TD61875M**-P	48	180	M6-*T026AX	C

1.3 Matching cables

The selection of matched cables for the servo system is listed below.

Table 1-3 Servo system cable selection

Cable name	Cable model	Cable diagram
Main motor cable (Frame number 60/80)	SPL-MA04-xx-x	
Main motor cable (Frame number 60/80)	SPL-MA01-xx-x	

Cable name	Cable model	Cable diagram
Main motor cable (Frame number 130)	SPL-MC04-xx-x	
Main motor cable (Frame number 180)	SPL-MD01-xx-x	
Main motor cable (Frame number 180)	SPL-MD02-xx-x	
Single-turn absolute encoder cable	SPL-E09-xx-x	
Multi-turn absolute encoder cable	SPL-E07-xx-x	
23-bit absolute encoder cable (Frame number 60/80)	SPL-E01-xx-x	
23-bit absolute encoder cable (Frame number 130/180, medium-inertia)	SPL-E02-xx-x	
Incremental encoder cable (Frame number	SPL-E11-xx-x	

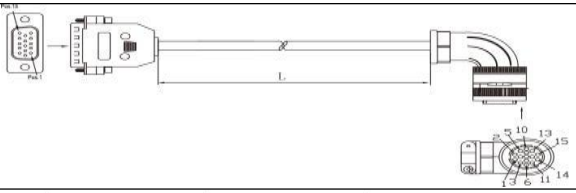
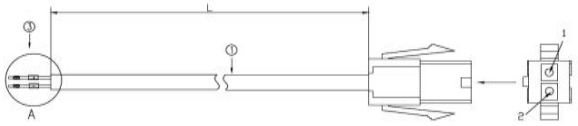
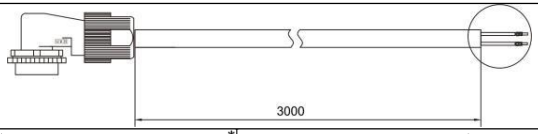
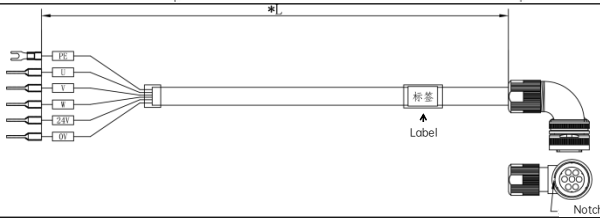
Cable name	Cable model	Cable diagram
60/80)		
Incremental encoder cable (Frame number 130/180, medium-inertia)	SPL-E12-xx-x	
Brake cable (Frame number 60/80)	SPL-B01-xx-x	
Brake cable (Frame number 130/180, medium-inertia)	SPL-B02-xx-x	
Brake/Power integrated cable (Frame number 130, medium-inertia)	SPL-BMC04-xx-x	

Table 1-4 Cable description

No.	Model	Name	Description	Length	Diameter (mm^2)
1	SPL-MA04-xx-x	Main motor cable (Frame number 60/80)	Main motor cable; AMP female connector at the motor side	3 m / 5 m / 10 m	0.75
2	SPL-MA01-xx-x	Main motor cable (Frame number 60/80)	Main motor cable; straight-pin aviation plug at the motor side	3 m / 5 m / 10 m	0.75
3	SPL-MC04-xx-x	Main motor cable (Frame number 130)	Main motor cable; straight-pin aviation plug at the motor side	3 m / 5 m / 10 m	1.0
4	SPL-MD01-xx-x	Main motor cable (Frame number 180)	AMP 4-pin female connector at one end, and straight-type terminal (size B) at the other end	3 m / 5 m / 10 m	1.5
5	SPL-MD02-xx-x	Main motor cable (Frame number 180)	AMP 4-pin female connector at one end, and U-type terminal (size C) at the other end	3 m / 5 m / 10 m	2.5

No.	Model	Name	Description	Length	Diameter (mm^2)
6	SPL-E09-xx-x	Single-turn absolute encoder cable	3-row 15-pin DB male connector at one end, and 3-row 7-pin AMP female connector at the other end	3 m / 5 m / 10 m	—
7	SPL-E07-xx-x	Multi-turn absolute encoder cable	3-row 15-pin DB male connector at one end, and 3-row 7-pin AMP female connector at the other end	3 m / 5 m / 10 m	—
8	SPL-E01-xx-x	23-bit absolute encoder cable (Frame number 60/80)	3-row 15-pin DB male connector at one end, and 3-row 15-pin DB male connector at the other end	3 m / 5 m / 10 m	—
9	SPL-E02-xx-x	23-bit absolute encoder cable (Frame number 130/180, medium-inertia)	3-row 15-pin DB male connector at one end, and 10-pin aviation female connector at the other end	3 m / 5 m / 10 m	—
10	SPL-E11-xx-x	Incremental encoder cable (Frame number 60/80)	3-row 15-pin DB male connector at one end, and 3-row 15-pin DB male connector at the other end	3 m / 5 m / 10 m	—
11	SPL-E12-xx-x	Incremental encoder cable (Frame number 130/180, medium-inertia)	3-row 15-pin DB female connector at one end, and 15-pin aviation connector (SUNCHU) at the other end	3 m / 5 m / 10 m	—
12	SPL-B01-xx-x	Brake cable (Frame number 60/80)	AMP 2-pin female connector at one end, and straight-type terminal at the other end	3 m / 5 m / 10 m	0.5
13	SPL-B02-xx-x	Brake cable (Frame number 130/180, medium-inertia)	3-pin female straight-type aviation plug at one end, and straight-type terminal at the other end	3 m / 5 m / 10 m	0.5
14	SPL-BMC04-xx-x	Brake/Power integrated cable (Frame number 130, medium-inertia)	Main motor cable; straight-pin aviation plug at the motor side; with brake	3 m / 5 m / 10 m	1.0

Note:

The mark "xx" indicates the cable length; "x" indicates the flexible wire, which refers to the flexible wire (5-million bends) when marked with "R1" and the flexible wire (10 million bends) when marked with "R2".

Chapter 2 Servo System Specifications

2.1 Standard specifications of servo drives

2.1.1 Electrical specifications of servo drives

220 V class servo drive models and electrical specifications

Tabel 2-1 Models and electrical specifications of 220 V class servo drives

Voltage class	220 V					
Model	FS1R6AX	FS2R8AX	FS5R5AX	FS7R6BX	FS7R6AX	FS012AX
Power class	200 W	400 W	750 W	1 kW	1 kW	1.5 kW
Size	SIZE A				SIZE B	
Phase	Single-phase		Single-phase, three-phase	Three-phase		
Rated input current (A)	2.2	4	7.6/4.2	5.1	5.1	8
Rated output current (A)	1.6	2.8	5.5	7.6	7.6	11.6
Max. output current (A)	5.8	9.3	16.9	17	22	28
Main circuit power supply	200 to 240 V, -10% to +10%, 50/60 Hz			200 to 240 V, -15% to +10%, 50/60 Hz		
Control circuit power supply	Single-phase, 200 to 240 V, -15% to +10%, 50/60 Hz					
Braking resistor	No built-in braking resistor		Built-in braking resistor			

380 V class servo drive models and electrical specifications

Tabel 2-2 Models and electrical specifications of 380 V class servo drives

Voltage class	380 V						
Model	FT3R5AX	FT5R4AX	FT8R4AX	FT012AX	FT017AX	FT021AX	FT026AX
Power class	0.85 kW	1.3 kW	2.0 kW	2.9 kW	4.4 kW	5.5 kW	7.5 kW

Size	SIZE B				SIZE C		
Phase	Three-phase						
Rated input current (A)	2.4	3.6	5.5	8	12	16	21
Rated output current (A)	3.5	5.4	8.4	11.9	16.5	21	26
Max. output current (A)	8.5	14	22	28	42	55	65
Main circuit power supply	Three-phase, 380 to 440 V, -15% to +10%, 50/60 Hz						
Control circuit power supply	Single-phase, 200 to 240 V, -15% to +10%, 50/60 Hz						
Braking resistor	Built-in braking resistor				No built-in braking resistor		

2.1.2 Basic specifications of servo drives

Tabel 2-3 Basic specifications of servo drives

Basic specifications			
Basic specifications	Control mode		IGBT, PWM control, and sine wave current drive mode
	Encoder	Rotary motor	Absolute encoder
			Incremental encoder (Full-line, line-saving)
			Sin/Cos encoder (Under development)
		Linear motor	Absolute encoder, incremental encoder, and sin/cos encoder (Under development)
Control I/O	DI	Various functions defined by parameters	Four channels of general input, optocoupler isolation, NPN and PNP inputs for selection Input voltage ranging from 20 to 30 V; input impedance of 3.9 K
	DO	Various functions defined by parameters	Three channels of general output, optocoupler isolation, NPN and PNP outputs for selection
			Operating voltage up to 30 V, current up to 100 mA

Communication	RS485	Modbus communication protocol, available for M6-P series only
	CAN	CANopen communication protocol, in compliance with CiA 402 profile, available for M6-P series only
	EtherCAT	CoE and SoE communication protocols, in compliance with CiA 402 profile, available for M6-N series only
	MECHATROLINK-III	MECHATROLINK-III bus communication protocol, available for M6-M series only
	PROFINET	PROFINET bus communication protocol, with PROFIdrive profile integrated, available for M6-F series only
	USB port	For connection between the computer and the servo drive to facilitate servo commissioning and tuning
Other terminals	Key	Five keys
	LED display	Five-digit eight-segment LEDs
	Power indication	CHARGE indicator
	Safety function	General STO function, optional
	Expansion card port	For expansion of motion-control card
General functions	Automatic adjustment	The host computer outputs an action command to run the motor, during which the load's moment of inertia ratio is estimated in real time and the rigidity level is automatically set.
	Multiple control modes switchover	Position mode; speed mode; torque mode; position/speed mode switchover; speed/torque mode switchover; position/torque mode switchover, PROFINET mode
	Protection function	Overvoltage, undervoltage, overcurrent, overspeed, stall, overheat, overload, encoder abnormality, input phase loss, excessive position deviation
	High-frequency vibration suppression	Four sets of notch filters for the suppression of vibration between 0 and 4000 Hz; one set of speed reference filter for the suppression of vibration between 0 and 1000 Hz
	End vibration suppression	Two sets of filters for the suppression of low-frequency end vibration between 1 and 100 Hz
	Homing mode	Multiple homing modes
	Gantry control	Gantry synchronization

	Reverse clearance compensation	Used to minimize the response delay when the traveling direction of the machine is reversed		
	Mechanical analyzer	Used for analyzing the frequency characteristics of the mechanical system via the host computer software		
	Inertia identification	Offline and online identification of system inertia		
	Torque observer	Load torque observation and compensation		
	E-cam	512-point electronic cam curve		
	Friction compensation	System friction compensation		
Position control	Control input	Deviation counter reset, electronic gear switchover, etc.		
	Control output	Positioning completed		
	Position reference	PROFINET		
		Electronic gear	Four sets of electronic gear ratio; online	
Speed control	Performance	Speed variation rate	Load variation rate	0 to 100% load: Below 0.5% (at the rated speed)
			Voltage variation rate	Rated voltage ±10%: 0.5% (at the rated speed)
			Temperature variation rate	25 ±25℃: below 0.5% (at the rated speed)
		Speed control range	1 to 6000	
		Speed-loop response characteristics	2.6 kHz	
		Soft start time	0 to 6000 ms	
	Control input	Internal speed command selection 1/2/3/4, zero speed clamp, etc.		
	Control output	Speed arrival, etc.		
Torque control	Performance	Torque control precision	±1%	
		Frequency characteristics	3 kHz	

	Control input	Zero speed clamp, torque command symbol input, etc.
	Control output	Speed arrival, etc.
	Speed limit function	Set the speed limit according to parameters.

2.2 Standard specifications of servo motors

2.2.1 Basic specifications of servo motors

Tabel 2-4 Basic specifications of servo motors

Items of basic specifications for servo motors	
IP rating	IP65
Ambient temperature	-20℃ to +40℃
Ambient humidity	Relative humidity <90% (Frost-free)
Installation method	Flange mounting
Insulation resistance	50 MΩ (500 V)
Insulation voltage	1500 V (220 V motor) 1800 V (380 V motor)
Insulation class	F
Altitude	Normal use under 1000 m; derated use above 1000 m
Installation site	The product shall be installed in an open place free from corrosive/flammable/explosive gases and liquids; Motors with the oil seal shall be selected for places with metal powder, grinding fluid, oil mist, and cutting fluid, etc.; It is forbidden to use the motor in enclosed high-temperature environments as such conditions would significantly impact the service life of the motor.

2.2.2 Rated specifications of servo motors

Tabel 2-5 Standard specifications of frame 40/60/80 medium-inertia servo motors

Motor model	Rated voltage (V)	Rated power (W)	Rated speed (rpm)	Max. Speed (rpm)	Rated torque (N·m)	Peak torque (N·m)	Rated current (A)	Peak current (A)	Rotor inertia (10^{-4}kg·m^2)
SPM-SC6045AM**-L	220	50	3000	6000	0.16	0.48	0.93	2.88	0.036 (0.046)
SPM-SC8045AM**-L	220	50	3000	6000	0.16	0.48	0.93	2.88	0.036 (0.046)
SPM-SC60401M**-L	220	100	3000	6000	0.32	0.95	0.92	2.85	0.062 (0.072)
SPM-SC80401M**-L	220	100	3000	6000	0.32	0.95	0.92	2.85	0.062 (0.072)
SPM-SC60602M**-L	220	200	3000	6500	0.64	1.91	1.5	4.66	0.28 (0.3)
SPM-SC80602M**-L	220	200	3000	6500	0.64	1.91	1.5	4.66	0.28 (0.3)
SPM-SC60604M**-L	220	400	3000	5000	1.27	3.81	2.1	6.5	0.56 (0.58)
SPM-SC80604M**-L	220	400	3000	5000	1.27	3.81	2.1	6.5	0.56 (0.58)
SPM-SC60807M**-L	220	750	3000	5000	2.39	7.17	4.1	13.4	1.5 (1.65)
SPM-SC80807M**-L	220	750	3000	5000	2.39	7.17	4.1	13.4	1.5 (1.65)
SPM-SC60810M**-L	220	1000	3000	5000	3.19	9.56	5.7	17.7	2 (2.15)
SPM-SC80810M**-L	220	1000	3000	5000	3.19	9.56	5.7	17.7	2 (2.15)

Tabel 2-6 Standard specifications of frame 130/180 medium-inertia servo motors

Motor model	Rated voltage (V)	Rated power (W)	Rated speed (rpm)	Max. Speed (rpm)	Rated torque (N·m)	Peak torque (N·m)	Rated current (A)	Peak current (A)	Rotor inertia (10^{-4}kg·m^2)
SPM-SE61311M**-W	220	1100	2000	4000	5.39	16.17	7.5	22.5	10.9 (12.3)
SPM-SE61317M**-W	220	1700	2000	4000	8.34	25.22	12	36	16.9 (18.3)
SPM-SC61317M**-W	220	1700	3000	5000	5.399	10.78	9.5	19	10.9 (12.3)
SPM-TE61311M**-W	380	1100	2000	4000	5.39	16.17	4.5	13.5	10.9 (12.3)
SPM-TE61317M**-W	380	1700	2000	4000	8.34	25.2	6.6	19.8	16.9 (18.3)
SPM-TE61324M**-W	380	2400	2000	4000	9.5	28.5	11.5	34.5	21.4 (22.6)
SPM-TE61330M**-W	380	3000	2000	4000	14.3	40	11.5	32.2	27.1 (28.4)

Motor model	Rated voltage (V)	Rated power (W)	Rated speed (rpm)	Max. Speed (rpm)	Rated torque (N·m)	Peak torque (N·m)	Rated current (A)	Peak current (A)	Rotor inertia (10^{-4}kg·m^2)
SPM-TC61317M**-W	380	1700	3000	5000	5.399	10.78	9.5	19	10.9 (12.3)
SPM-TC61326M**-W	380	2600	3000	5000	8.34	16.7	9.5	19	16.9 (18.3)
SPM-TC61336M**-W	380	3600	3000	5000	11.5	23	12	24	18.3 (21.4)
SPM-TC61345M**-W	380	4500	3000	5000	14.3	28.6	14.5	29	27.1 (28.4)
SPM-TD11829M**-P	380	2900	1500	3000	18.6	54	11.9	34.5	44 (59)
SPM-TD61829M**-P	380	2900	1500	3000	18.6	54	11.9	34.5	44 (59)
SPM-TD11844M**-P	380	4400	1500	3000	28.4	71	16.5	41.3	66 (80)
SPM-TD61844M**-P	380	4400	1500	3000	28.4	71	16.5	41.3	66 (80)
SPM-TD11855M**-P	380	5500	1500	3000	35	87.5	21	52.5	102 (110)
SPM-TD61855M**-P	380	5500	1500	3000	35	87.5	21	52.5	102 (110)
SPM-TD11875M**-P	380	7500	1500	3000	48	96	25.5	51	146 (156)
SPM-TD61875M**-P	380	7500	1500	3000	48	96	25.5	51	146 (156)

Note:

The parameters in parentheses are the parameters of the motor with brake.

2.3 Servo drive outline and dimensions

1. SIZE A (Applicable for drive models: FS1R6AX, FS2R8AX, FS5R5AX, FS7R6BX)

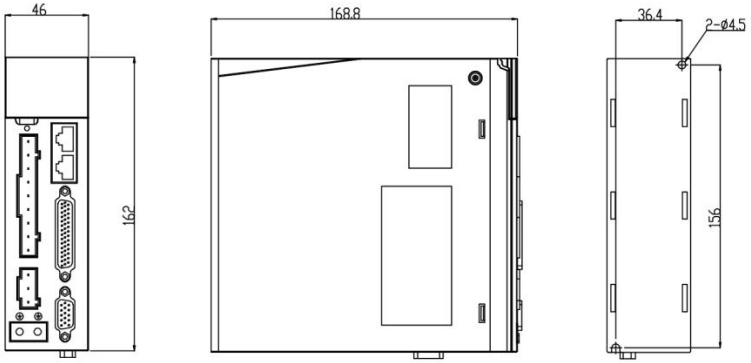


Figure 2-1 SIZE A outline and dimensions

2. SIZE B (Applicable for drive models: FS7R6AX, FS012AX, FT3R5AX, FT5R4AX, FT8R4AX, FT012AX)

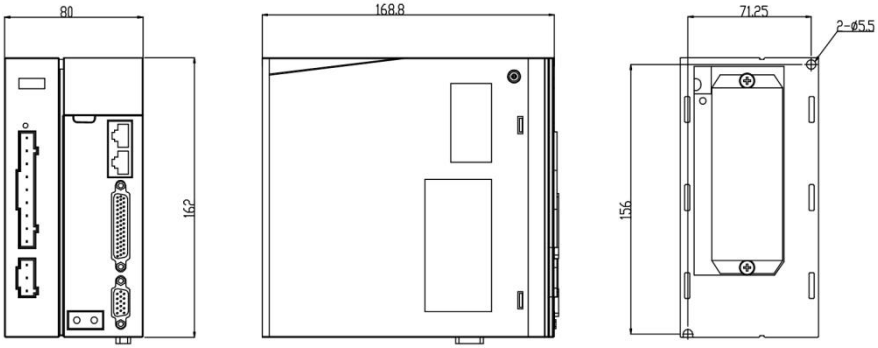


Figure 2-2 SIZE B outline and dimensions

3. SIZE C (Applicable for drive models: FT017AX, FT021AX, FT026AX)

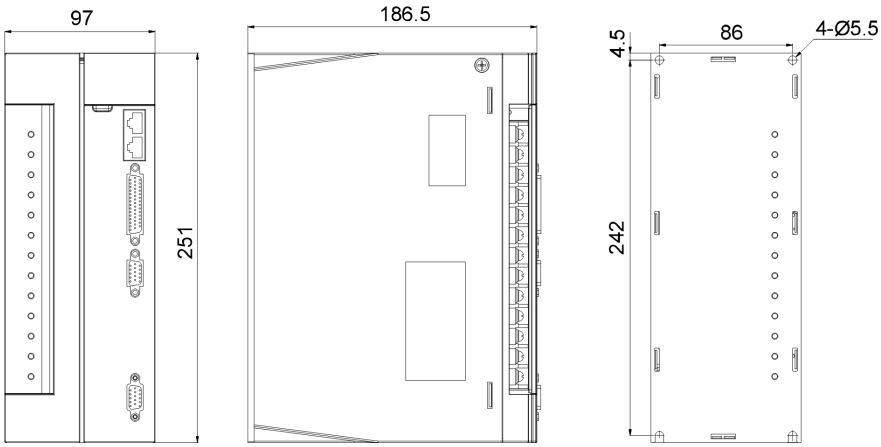


Figure 2-3 SIZE C outline and dimensions

2.4 Servo motor outline, dimensions, and interface definitions

2.4.1 Frame No. 40 medium-inertia servo motor

2.4.1.1 Outline and dimensions

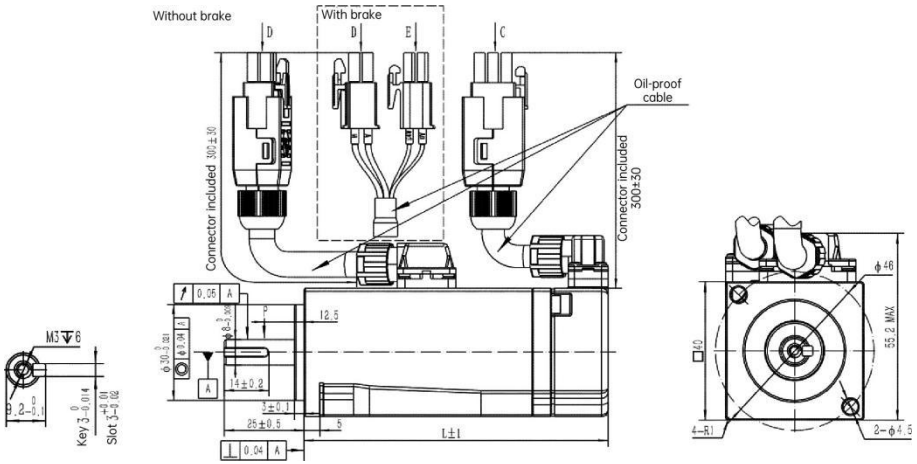


Figure 2-4 Outline and dimensions of frame No. 40 medium-inertia servo motor

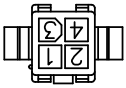
Tabel 2-7 Dimensions of frame No. 40 medium-inertia servo motor

Model	L (mm)
SPM-SC6045AM**-L	56 (84)
SPM-SC8045AM**-L	56 (84)
SPM-SC60401M**-L	67.7 (95)
SPM-SC80401M**-L	67.7 (95)

Note:

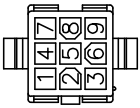
The parameters in parentheses are the parameters of the motor with brake.

2.4.1.2 Interface definitions



Motor power terminal interface definitions	
Signal	Pin
U	1
V	3
W	2
PE	4

Motor brake terminal interface definitions	
Signal	Pin
24 V	1
GND	2



Interface definition of the absolute encoder terminal	
Signal	Pin
E- (Battery-)	7
E+ (Battery+)	6
SD+	4
SD-	5
GND	3
5 V	2
PE	1

2.4.2 Frame No. 60 medium-inertia servo motor

2.4.2.1 Outline and dimensions

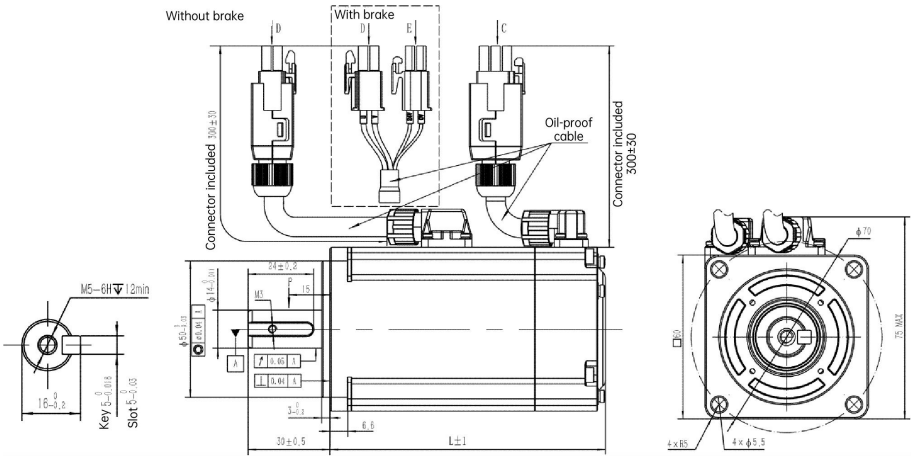


Figure 2-5 Outline and dimensions of frame No. 60 medium-inertia servo motor

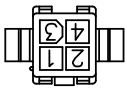
Tabel 2-8 Dimensions of frame No. 60 medium-inertia servo motor

Model	L (mm)
SPM-SC60602M**-L	71.8 (101.2)
SPM-SC80602M**-L	71.8 (101.2)
SPM-SC60604M**-L	88.8 (118.2)
SPM-SC80604M**-L	88.8 (118.2)

Note:

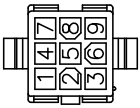
The parameters in parentheses are the parameters of the motor with brake.

2.4.2.2 Interface definitions



Motor power terminal interface definitions	
Signal	Pin
U	1
V	3
W	2
PE	4

Motor brake terminal interface definitions	
Signal	Pin
24 V	1
GND	2



Interface definition of the absolute encoder terminal	
Signal	Pin
E- (Battery-)	7
E+ (Battery+)	6
SD+	4
SD-	5
GND	3
5 V	2
PE	1

2.4.3 Frame No. 80 medium-inertia servo motor

2.4.3.1 Outline and dimensions

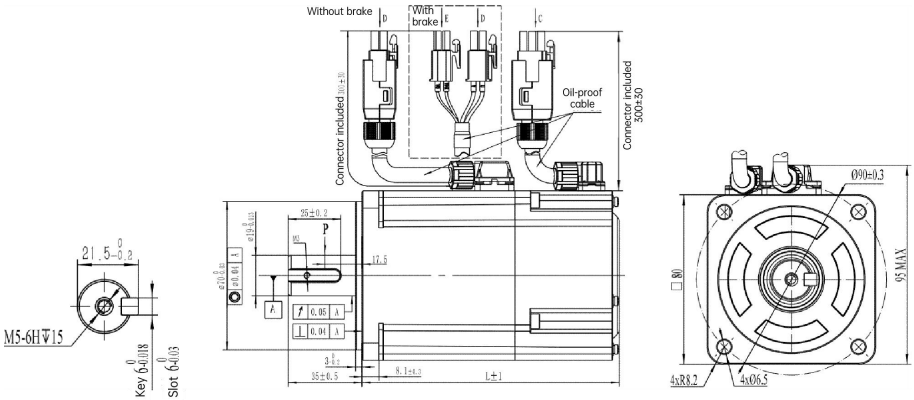


Figure 2-6 Outline and dimensions of frame No. 80 medium-inertia servo motor

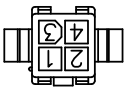
Tabel 2-9 Dimensions of frame No. 80 medium-inertia servo motor

Model	L (mm)
SPM-SC60807M**-L	90 (121.9)
SPM-SC80807M**-L	90 (121.9)
SPM-SC60810M**-L	103.9 (134.9)
SPM-SC80810M**-L	103.9 (134.9)

Note:

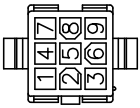
The parameters in parentheses are the parameters of the motor with brake.

2.4.3.2 Interface definitions



Motor power terminal interface definitions	
Signal	Pin
U	1
V	3
W	2
PE	4

Motor brake terminal interface definitions	
Signal	Pin
24 V	1
GND	2



Interface definition of the absolute encoder terminal	
Signal	Pin
E-(Battery-)	7
E+(Battery+)	6
SD+	4
SD-	5
GND	3
5 V	2
PE	1

2.4.4 Frame No. 130 medium-inertia servo motor

2.4.4.1 Outline and dimensions

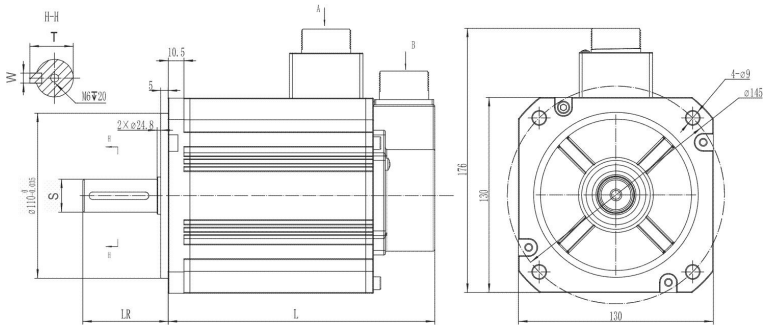


Figure 2-7 Outline and dimensions of frame No. 130 medium-inertia servo motor

Tabel 2-10 Dimensions of frame No. 130 medium-inertia servo motor

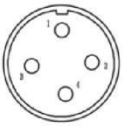
Model	L (mm)	LR (mm)	Φ S (mm)	W (mm)	T (mm)
SPM-SE61311M**-W	135 (187)	57	22	6	24.5
SPM-SE61317M**-W	152.5 (204)	57	22	6	24.5
SPM-SC61317M**-W	135 (187)	57	22	6	24.5
SPM-TE61311M**-W	135 (187)	57	22	6	24.5
SPM-TE61317M**-W	152.5 (204)	57	22	6	24.5
SPM-TE61324M**-W	170 (222)	57	22	6	24.5
SPM-TE61330M**-W	200 (252)	57	22	6	24.5
SPM-TC61317M**-W	135 (187)	57	22	6	24.5
SPM-TC61326M**-W	152.5 (204)	57	22	6	24.5
SPM-TC61336M**-W	170 (222)	57	22	6	24.5
SPM-TC61345M**-W	200 (252)	57	22	6	24.5

Note:

The parameters in parentheses are the parameters of the motor with brake.

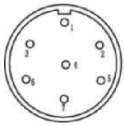
2.4.4.2 Interface definitions

Power cable



Plug model	YD28J4Z-E			
Pin	1	2	3	4
Definition	PE	U	V	W

Encoder cable



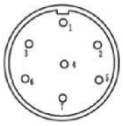
Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	E-	E+	SD-	0V	SD+	+5v

Power terminal interface definition of the motor without brake	
Signal	Pin
PE	1
U	2
V	3
W	4

Power cable

Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	U	V	W	Brk+	Brk-	/

Encoder cable



Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	E-	E+	SD-	0V	SD+	+5v

Power terminal interface definition of the motor with brake	
Signal	Pin
PE	1
U	2
V	3

Power terminal interface definition of the motor with brake	
Signal	Pin
W	4
24 V	5
0V	6

Interface definition of the absolute encoder terminal	
Signal	Pin
E- (Battery-)	2
E+ (Battery+)	3
SD+	6
SD-	4
0V	5
+5 V	7
PE	1

2.4.5 Frame No. 180 medium-inertia servo motor

2.4.5.1 Outline and dimensions

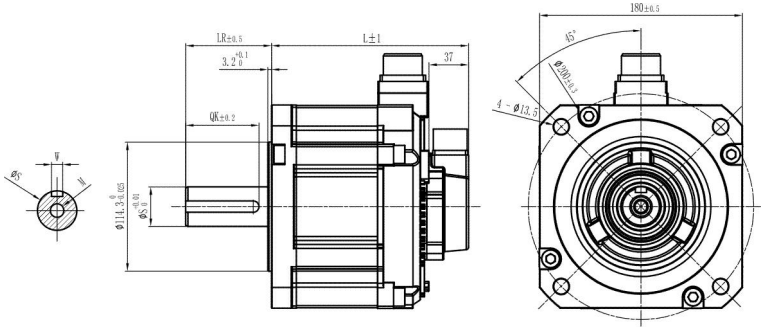


Figure 2-8 Outline and dimensions of frame No. 180 medium-inertia servo motor

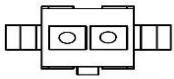
Tabel 2-11 Dimensions of frame No. 180 medium-inertia servo motor

Model	L (mm)	LR (mm)	Φ S (mm)	W (mm)
SPM-TD11829M**-P	176 (224)	79	35	10
SPM-TD61829M**-P	176 (224)	79	35	10
SPM-TD11844M**-P	200 (248)	79	35	10
SPM-TD61844M**-P	200 (248)	79	35	10
SPM-TD11855M**-P	237 (285)	113	42	12
SPM-TD61855M**-P	237 (285)	113	42	12
SPM-TD11875M**-P	283 (331)	113	42	12
SPM-TD61875M**-P	283 (331)	113	42	12

Note:

The parameters in parentheses are the parameters of the motor with brake.

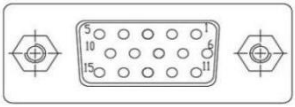
2.4.5.2 Interface definitions



Interface definition at the side of the motor with brake		
Pin	Signal	Color
1	+	Blue
2	-	Black

Interface definition at the motor side		
Pin	Signal	Color
1	FG	Yellow and green
2	U	Red

Interface definition at the motor side		
Pin	Signal	Color
3	V	Blue
4	W	Black



Interface definition of full-line incremental encoder		
Pin	Signal	Color
Enclosure	FG	Shielded cable
1	A+	Blue
2	A-	Blue and black
3	B+	Green
4	B-	Green and black
5	Z+	Yellow
6	Z-	Yellow and black
7	U+	Brown
8	U-	Brown and black
9	V+	Gray
10	V-	Gray and black
11	W+	White
12	W-	White and black
13	5 V	Red
14	GND	Black
15	NC	

Interface definition of line-saving incremental encoder		
Pin	Signal	Color
Enclosure	FG	Shielded cable
1	A+	Blue
2	A-	Blue and black
3	B+	Green
4	B-	Green and black
5	Z+	Yellow
6	Z-	Yellow and black
13	5 V	Red
14	GND	Black

Interface definition of the absolute encoder		
Pin	Signal	Color
Enclosure	FG	Shielded cable
2	E-	Blue
3	E+	Blue and black
4	SD-	Green
5	GND	Green and black
6	SD+	Yellow
7	5 V	Yellow and black

Chapter 3 Installation Instruction

3.1 Servo drive installation

3.1.1 Place for installation

- The product shall be installed inside a cabinet shielded from direct sunlight exposure, rain, and water dropping;
- Do not install the product in places with high temperature, high humidity, or excessive exposure to dust or metal powder;
- Do not install the product in places with corrosive, explosive, or flammable gases present;
- The place for installation shall be without vibration.

3.1.2 Environmental requirements for installation

Table 3-1 Environmental requirements for M6-F servo drive installation

Item		Requirements
Operating conditions	Place for installation	Vertical mounting on a solid and stable indoor base; at least 5 cm spacing for air inlet and outlet; at least 4 cm spacing for the right and left sides of the enclosure; air cooling
	Ambient temperature	0 to +45℃; temperature change rate less than 0.5℃/min; derated use above 45℃ with adequate ventilation; max. working temperature at 55℃ (Operation allowed with less than 25% load)
	Humidity	Relative humidity <90% (Non-condensing)
	Other climate conditions	Non-condensing, non-freezing, and no rain, snow, hail, etc.; solar radiation less than 700 W/m^2; air pressure ranging from 70 to 106 kPa
	Salt and corrosive gas content	Pollution degree 2
	Dust and solid particle content	Pollution degree 2
	IP rating	IP20
	Altitude	Normal use below 1000 m; derated use above 1000 m; derated by 6% for each increase of 1000 m

	Vibration resistance	Below 4.9 m/s^2
	Impact resistance	Below 19.6 m/s^2

3.1.3 Installation precautions

This servo drive product shall be properly installed at an adequately-ventilated indoor location. Installation inside a cabinet is preferred. It shall adopt a vertical mounting method, and be secured to the mounting surface via the two fixing holes of the drive.

1. Installation drawing

- SIZE A installation requirements

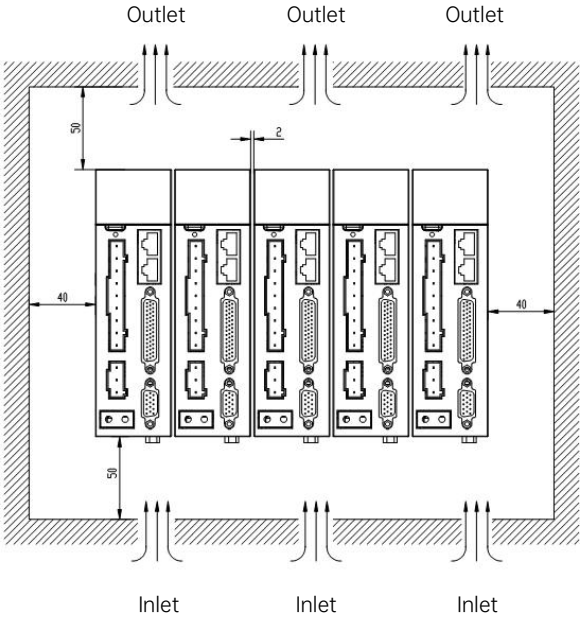


Figure 3-1 SIZE A installation drawing

- SIZE B/C installation requirements

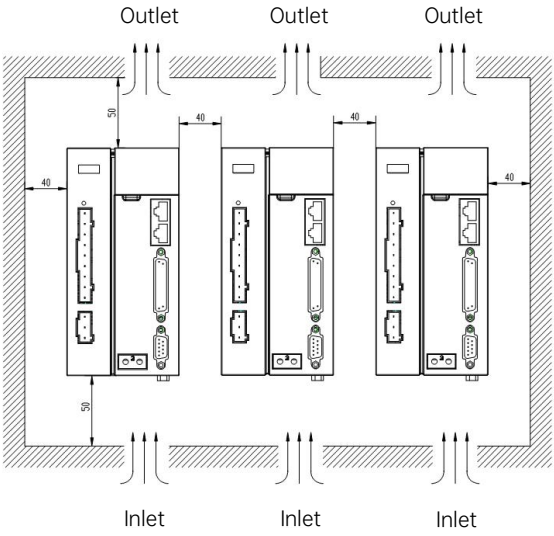


Figure 3-2 SIZE B/C installation drawing

2. Side-by-side installation

As shown in the two drawings above, different group installation methods shall be adopted to suit the cooling methods of different enclosures. When installed side by side, there is no need for spacing between two SIZE A models, while at least 40 mm spacing shall be applied between two SIZE B/C models.

3. Convection cooling

To ensure effective cooling via natural convection and drive fans, it is required to place the air inlets on the lower cover and the air outlets on the upper cover of the cabinet inside which the drive is installed, and the exhaust fans shall be applied at the top of the cabinet. The drive models installed inside the cabinet shall be kept at least 50 mm away from the upper and lower covers.

4. Grounding requirements

To ensure optimal EMC performance and prevent electric shock, the drive and motor shall be reliably grounded, and the GND terminals of both the drive and the motor shall be directly short-circuited.

3.2 System wiring diagram

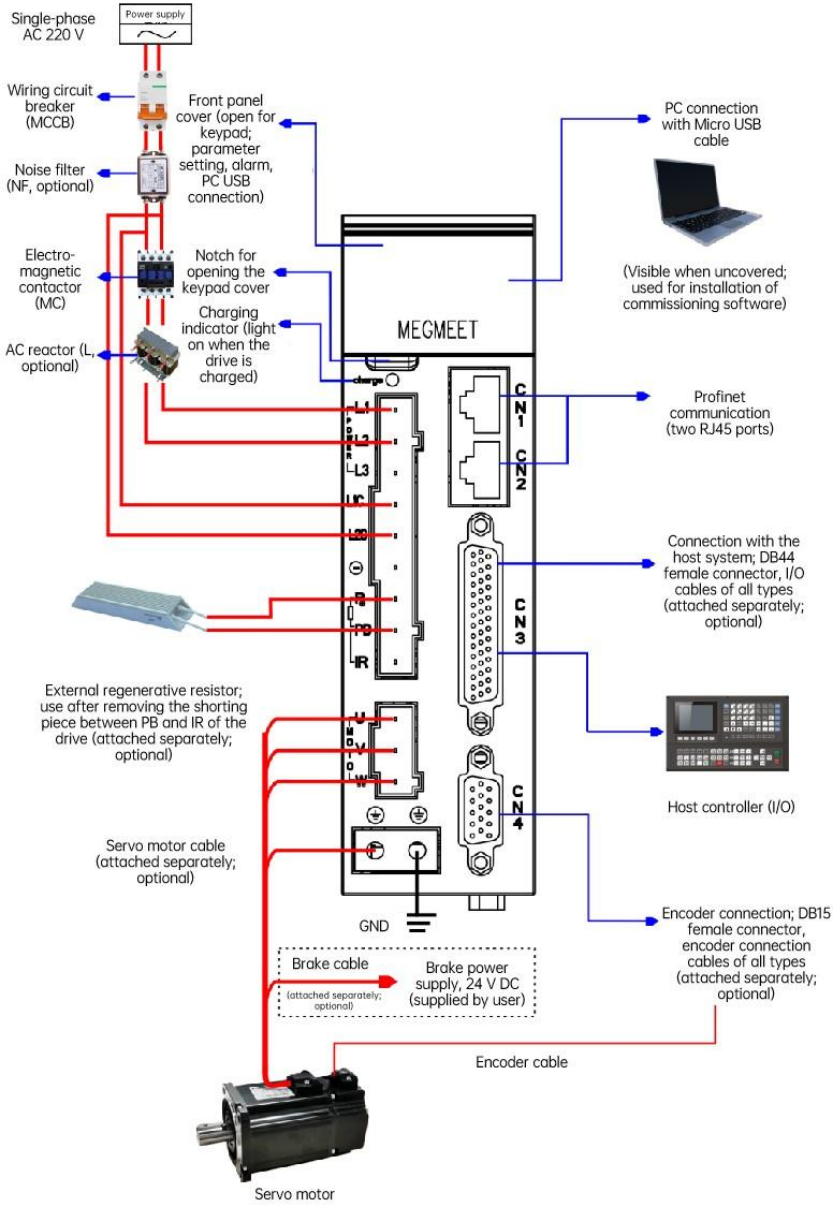


Figure 3-3 220 V single-phase servo system wiring

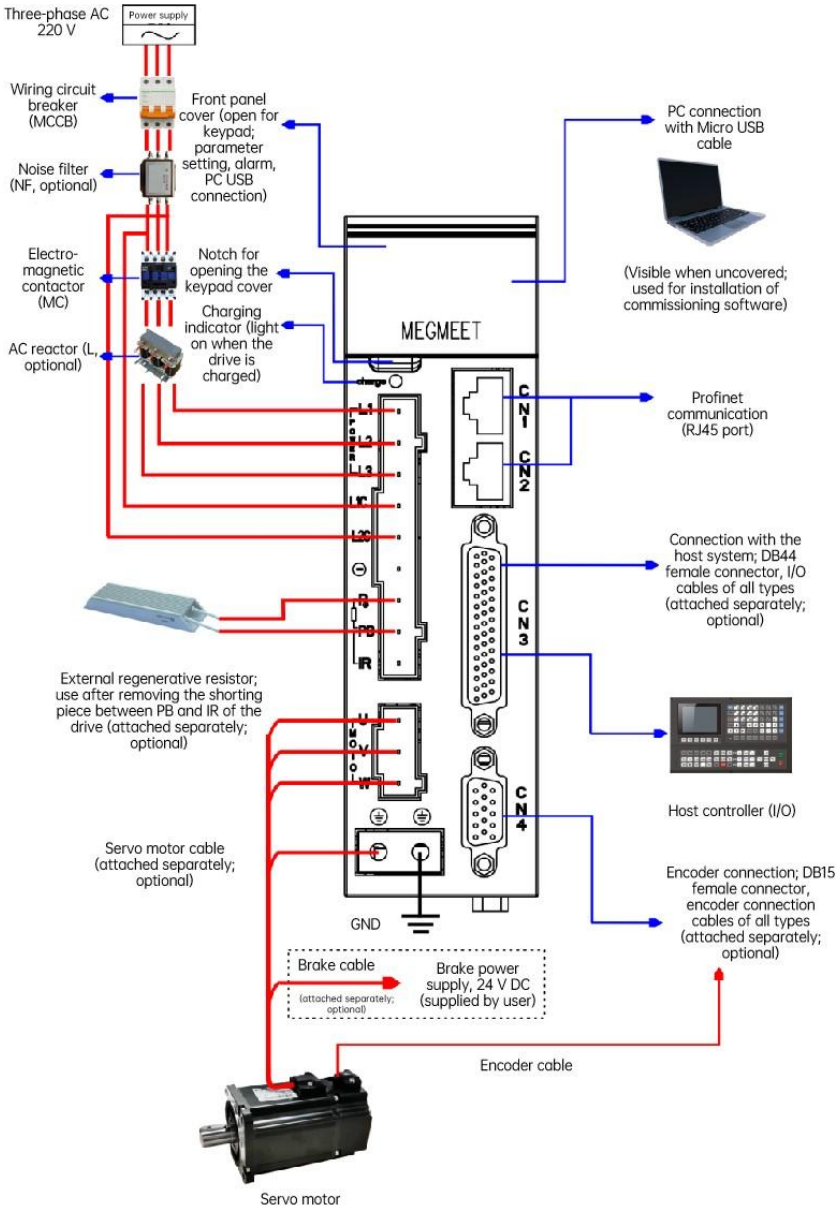


Figure 3-4 220 V three-phase servo system wiring

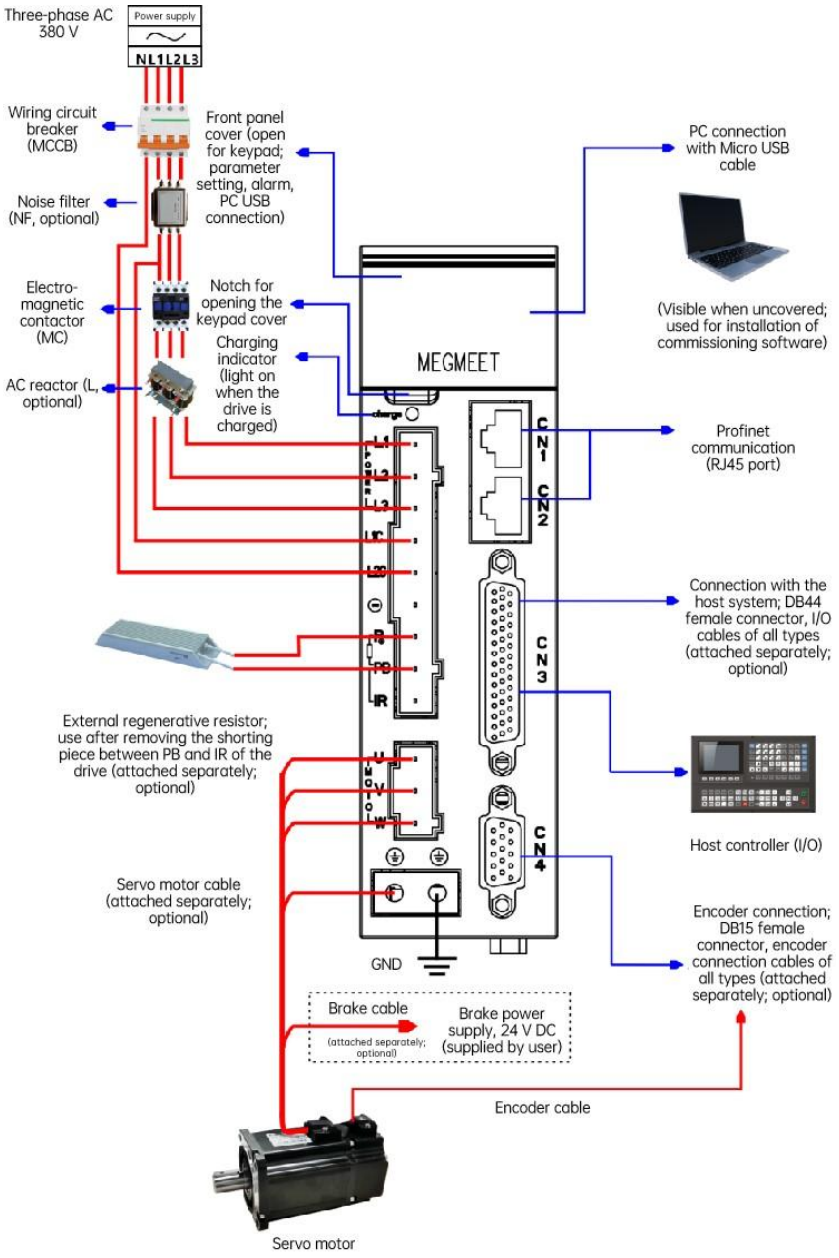


Figure 3-5 380 V three-phase servo system wiring

Note:

The 220 V single-phase system wiring method is applicable only for FS5R5AX and other 220 V models with a lower power class; the 220 V three-phase system wiring method is applicable only for FS5R5AX and other 220 V models with a higher power class.

During system wiring, pay attention to the followings:

- Make sure the power supply specifications and wiring of L1, L2, L3, L1C, and L2C are correct to avoid damage to the drive and to minimize the risks of danger;
- Make sure the motor output U, V, W phase sequence is correct during wiring; otherwise, it may cause abnormal motor rotation;
- When using an external braking resistor, it is required to remove the shorting piece between PB and IR, and install the resistor between P and PB; if an internal braking resistor is used, directly short-circuit PB and IR;
- To protect the drive system and prevent cross-device electric shock, please use a circuit breaker or fuse at the power supply input side. The recommended specifications of the circuit breaker and fuse are shown in Table 3-3;
- The drive does not have a built-in grounding protection circuit; please use a leakage circuit breaker dedicated for both overload and short circuit protection, or a leakage circuit breaker dedicated for grounding protection;
- It is strictly forbidden to directly use the electromagnetic contactor for the operation and shutdown of the motor. The motor is a large-inductance device, and the instantaneous high voltage generated may break down the contactor and other components;
- To ensure reliable operation of the system and reduce interference to the power grid system, it is recommended to add a filter at the input side.

3.3 Recommended specifications for circuit breakers and fuses

Table 3-2 Recommended specifications for circuit breakers and fuses

Drive model	Circuit breaker	Fuse
M6-FS1R6AX	4 A	10 A
M6-FS2R8AX	10 A	15 A
M6-FS5R5AX	16 A / 6 A	20 A / 10 A
M6-FS7R6BX	10 A	20 A
M6-FS7R6AX	10 A	25 A
M6-FS012AX	16 A	35 A

Drive model	Circuit breaker	Fuse
M6-FT3R5AX	4 A	15 A
M6-FT5R4AX	6 A	20 A
M6-FT8R4AX	10 A	20 A
M6-FT012AX	16 A	35 A
M6-FT017AX	20 A	50 A
M6-FT021AX	25 A	70 A
M6-FT026AX	32 A	100 A

3.4 Specifications of braking resistors

The specifications of braking resistors are shown in the table below.

Table 3-3 Specifications of braking resistors

Servo drive model M6-[][][][][][][]X		Built-in braking resistor specification		Min. allowable resistance of external braking resistor (Ω)	Max. braking energy absorbed by capacitor (J)
		Resistance (Ω)	Capacity (W)		
Single-phase 220 V	FS1R6AX	—	—	45	11
	FS2R8AX	—	—	45	22
Single-phase or three-phase 220 V	FS5R5AX	50	50	45	31
Three-phase 220 V	FS7R6BX	50	50	45	31
	FS7R6AX	25	80	20	47
	FS012AX	25	80	20	64
Three-phase 380 V	FT3R5AX	50	80	45	26
	FT5R4AX	50	80	45	53
	FT8R4AX	50	80	35	53
	FT012AX	50	80	35	106
	FT017AX	—	—	25	106

Servo drive model M6-[][][][][][][]X		Built-in braking resistor specification		Min. allowable resistance of external braking resistor (Ω)	Max. braking energy absorbed by capacitor (J)
		Resistance (Ω)	Capacity (W)		
	FT021AX	—	—	25	128
	FT026AX	—	—	25	128

Note:

1. The drive operates with PB and IR short-circuited by default; the internal braking resistor is applied under the circumstances.
2. In case the internal braking resistor can not deliver adequate capacity, please disconnect PB and IR, and install an external braking resistor between PB and P.
3. For external braking resistors, please contact us for technical support.
4. The symbol "—" in the table above indicates that there is no built-in braking resistor for the corresponding model.

Chapter 4 Wiring of Servo System

This chapter provides the wiring instructions for the servo drive and the related precautions.

DANGER

- Do not open the drive cover until the power supply of the drive has been completely cut off for at least 10 minutes.
- Even if the power supply is cut off, high voltage may remain inside the servo drive. To prevent electric shock, do not touch the power terminals. After discharging is completed, the CHARGE indicator will turn off. Make sure that the wiring and inspection be conducted only when the CHARGE indicator is off.
- Only the well-trained and authorized personnel are allowed to perform the internal wiring of the servo drive.
- Check the wiring carefully when connecting the emergency stop or safety circuit.
- Check the voltage class of the servo drive before powering on; otherwise, personal injury, death, or equipment damage may occur.

WARNING

- Check carefully whether the rated input voltage of the servo drive is consistent with the AC power voltage before powering on.
- The servo drive has passed the dielectric withstand test before leaving the factory. Do not conduct this test again.
- Do not connect AC power supply to the U, V, or W phase.
- The diameter of the copper core used in the grounding cables shall be larger than 3.5 mm, and the grounding resistance shall be less than 10 Ω.
- There is leakage current inside the servo drive and the value of the leakage current depends on the operating conditions. To ensure safety, the drive and the motor must be grounded and a Residual Current Detector (i.e. RCD) is required. The type-B RCD is recommended. The permissible value of the leakage current is 300 mA.
- To provide the over-current protection for the input side and facilitate the power-off maintenance, the servo drive shall be connected to the AC power supply through an air switch or a fuse.

4.1 Servo drive main circuit connection

4.1.1 Main circuit specifications

The names and functions of the servo drive main circuit terminals are as shown in Table 4-1, and the cable specifications are shown in Table 4-2.

Table 4-1 Terminal names and functions of the M6-F series servo drive main circuit

Terminal name	Terminal symbol	Drive model M6FxxxxxX	Terminal function
Main circuit power supply input terminals	L1, L2	FS1R6AX, FS2R8AX	Main circuit single-phase 220 V power supply input
	L1, L2, L3	FS5R5AX, FS7R6BX, FS7R6AX, FS012AX	Main circuit three-phase 220 V power supply input
		FT3R5AX, FT5R4AX, FT8R4AX, FT012AX, FT017AX, FT021AX, FT026AX	Main circuit three-phase 380 V power supply input
Control circuit input terminal	L1C, L2C	Control power supply input, single-phase AC 220 V input	
DC bus terminals	P, ⊖	Servo DC bus terminal, used for multi-device common-bus connection	
Braking resistor connection terminals	P, PB, IR	FS1R6AX, FS2R8AX, FT017AX, FT021AX, FT026AX	In case the braking resistor can not deliver adequate capacity, please install an external braking resistor between PB and P. Please refer to the recommendations for specifications of the external braking resistor.
		FS5R5AX, FS7R6BX, FS7R6AX, FS012AX, FT3R5AX, FT5R4AX, FT8R4AX, FT012AX	Terminals PB and IR are short-circuited by default, and the built-in braking resistor is applied under the circumstances; In case the braking resistor can not deliver adequate capacity, please disconnect PB and IR, and install an external braking resistor between P and PB. Please refer to the recommendations for specifications of the external braking resistor.
Servo motor connection terminals	U, V, W	Used for connection with the servo motor	

Terminal name	Terminal symbol	Drive model M6FxxxxxX	Terminal function
Grounding terminals (Two)	PE	For connection with the power supply grounding terminal and the servo motor grounding terminal for grounding	

Note:

For models with the built-in braking resistor, terminals PB and IR are short-circuited by default.

4.1.2 Main circuit cable dimensions

Recommended main circuit cable dimensions for servo drives are shown in the table below.

Table 4-2Recommended main circuit cable specifications for M6-F series drives

Drive model M6-F[][][][][][]X		Power supply input L1, L2, L3	Control power supply input L1C, L2C	Power output U, V, W	Grounding PE	Braking resistor PB, P
SIZE A	FS1R6AX	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)
	FS2R8AX	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)	20AWG (0.5 mm^2)
	FS5R5AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
	FS7R6BX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
SIZE B	FS7R6AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
	FS012AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
	FT3R5AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
	FT5R4AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
	FT8R4AX	18AWG	18AWG	18AWG	18AWG	18AWG

Drive model M6-F[][][][][][]X		Power supply input L1, L2, L3	Control power supply input L1C, L2C	Power output U, V, W	Grounding PE	Braking resistor PB, P
		(0.75 mm^2)	(0.75 mm^2)	(0.75 mm^2)	(0.75 mm^2)	(0.75 mm^2)
	FT012AX	18AWG (0.75 mm^2)	20AWG (0.5 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)	18AWG (0.75 mm^2)
SIZE C	FT017AX	14AWG (1.5 mm^2)	20AWG (0.5 mm^2)	14AWG (1.5 mm^2)	14AWG (1.5 mm^2)	14AWG (1.5 mm^2)
	FT021AX	12AWG (2.5 mm^2)	20AWG (0.5 mm^2)	12AWG (2.5 mm^2)	12AWG (2.5 mm^2)	12AWG (2.5 mm^2)
	FT026AX	12AWG (2.5 mm^2)	20AWG (0.5 mm^2)	12AWG (2.5 mm^2)	12AWG (2.5 mm^2)	12AWG (2.5 mm^2)

4.2 Servo motor encoder signal connection (CN4)

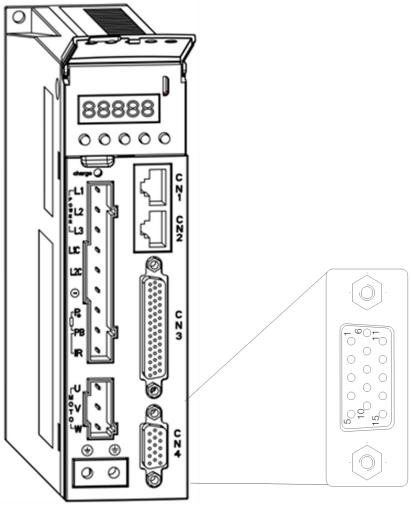


Figure 4-1 Servo motor encoder signal connection diagram

The motor encoder interface of the M6-F series servo drive supports three types of encoders, namely the 23-bit multi-turn absolute encoder, the incremental encoder, and the sin/cos encoder. The interfaces for the three types are integrated in a single DB15 port, and the interface signal definition is explained as shown in Table 4-3, Table 4-4, Table 4-5, and Table 4-6.

Table 4-3 Multi-turn absolute encoder interface definition

Connection port: CN4, DB15 three-row female connector		
Pin	Signal name	Signal description
3	SD+	Encoder communication signal (+)
8	SD-	Encoder communication signal (-)
14	GND	Power supply grounding
15	5 V	Power supply +5 V
Enclosure	PE	Shield layer

Table 4-4 Line-saving incremental encoder interface definition

Connection port: CN4, DB15 three-row female connector		
Pin	Signal name	Signal description
1	A+	Incremental differential A+ signal
2	B+	Incremental differential B+ signal
3	Z+	Incremental differential Z+ signal
6	A-	Incremental differential A- signal
7	B-	Incremental differential B- signal
8	Z-	Incremental differential Z- signal
14	GND	Power supply grounding
15	5 V	Power supply +5 V
Enclosure	PE	Shield layer

Table 4-5 Full-line incremental encoder interface definition

Connection port: CN4, DB15 three-row female connector		
Pin	Signal name	Signal description
1	A+	Incremental differential A+ signal
2	B+	Incremental differential B+ signal

Connection port: CN4, DB15 three-row female connector		
Pin	Signal name	Signal description
3	Z+	Incremental differential Z+ signal
4	U+	Phase differential U+ signal
5	V+	Phase differential V+ signal
6	A-	Incremental differential A- signal
7	B-	Incremental differential B- signal
8	Z-	Incremental differential Z- signal
9	U-	Phase differential U- signal
10	V-	Phase differential V- signal
11	W+	Phase differential W+ signal
12	W-	Phase differential W- signal
14	GND	Power supply grounding
15	5 V	Power supply +5 V
Enclosure	PE	Shield layer

Table 4-6 Sin/Cos encoder interface definition

Connection port: CN4, DB15 female connector		
Pin	Signal name	Signal description
4	COS+	Sin/Cos COS+ signal
5	SIN+	Sin/Cos SIN+ signal
9	COS-	Sin/Cos COS- signal
10	SIN-	Sin/Cos SIN- signal
11	REF+	Sin/Cos zero position + signal
12	REF-	Sin/Cos zero position - signal
14	GND	Power supply grounding
15	5 V	Power supply +5 V
Enclosure	PE	Shield layer

4.3 Control signal interface definition

Control signal includes the digital input and output signals. The connection mode is DB44. There is a DB44 female connector at the drive end.

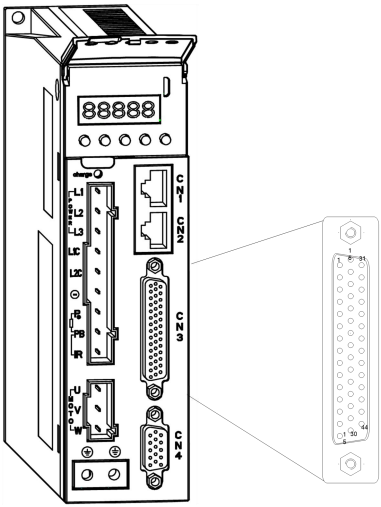


Figure 4-2 Control signal terminal definition diagram

Control signal definitions are explained in the table below.

Table 4-7 Control signal definition table

Pin	Signal name	Pin	Signal name	Pin	Signal name
1	-	16	-	31	-
2	DO1+	17	DO1-	32	-
3	DO2+	18	DO2-	33	DI1
4	DO3+	19	DO3-	34	DI2
5	-	20	-	35	DI3
6	-	21	-	36	DI4
7	-	22	-	37	-
8	-	23	DICOM	38	-
9	-	24	-	39	-

Pin	Signal name	Pin	Signal name	Pin	Signal name
10	-	25	-	40	-
11	-	26	-	41	-
12	-	27	-	42	-
13	-	28	-	43	-
14	-	29	-	44	-
15	-	30	-		

4.3.1 DI/DO signal

The DI and DO signals are described in the table below.

Table 4-8 DI and DO signals

Signal name		Default function	Pin	Default function
General	DI1	/SON	33	Servo enable
	DI2	/ARST	34	Fault reset
	DI3	/SPD1	35	Multi-segment running reference 1
	DI4	/SPD2	36	Multi-segment running reference 2
	DICOM	DI common terminal	23	DI common terminal (Connected to power supply or ground of power supply)
	DO1+	/SRDY	2	Servo ready
	DO1-		17	
	DO2+	/ALM	3	Fault output
	DO2-		18	
	DO3+	/BRK	4	Brake output
	DO3-		19	

4.3.1.1 Digital input circuit

M6-F series servo has four DI terminals in total. The DI common terminal can be connected to power supply or ground, and supports dry contact input, NPN input, and PNP input.

M6-F series servo does not provide 24 power supply to the outside, and the connection of DI uses external power supply.

The following example is based on DI1, and the same method applies to the interface circuits of DI1 to DI4.

(1) Dry contact mode

The dry contact wiring method is shown in Figure 4-3.

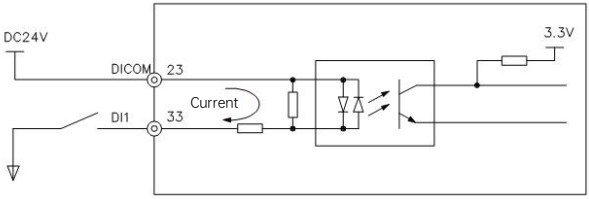


Figure 4-3 DI terminal dry contact connection mode

(2) NPN (Sinking) mode

The external controller adopts the NPN common emitter output. The wiring method is shown in Figure 4-4.

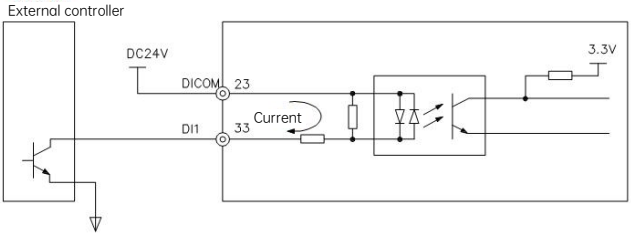


Figure 4-4 DI terminal NPN connection mode

(3) PNP (Sourcing) mode

The external controller adopts the PNP common emitter output. The wiring method is shown in Figure 4-5.

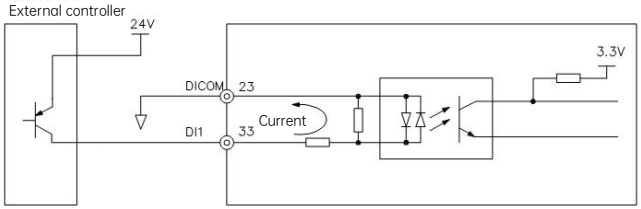


Figure 4-5 DI terminal PNP connection mode

Note:

Do not mix NPN and PNP modes on the DI terminals of the same drive.

4.3.1.2 Digital output circuit

The DO terminal adopts double-ended output and multiple output modes. It is required to use external power supply since no internal power supply is offered. The following example is based on DO1, and the same method applies to the interface circuits of DO1, DO2, and DO3.

(1) The host device is relay input

When the external device adopts relay input, the wiring method is shown in Figure 4-6.

Warning:

The inductive load (Such as relay) shall be anti-parallel with the fly-wheel diode!

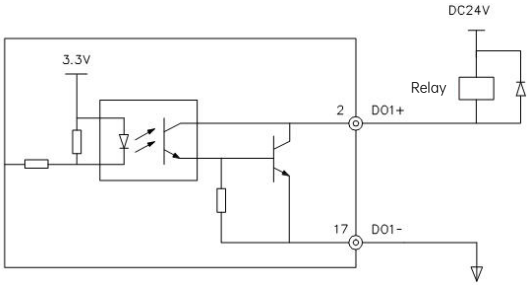


Figure 4-6 Wiring mode for connection between DO terminal and relay

(2) Sink (NPN) output

When the controller adopts sink input, the wiring method is shown in Figure 4-7.

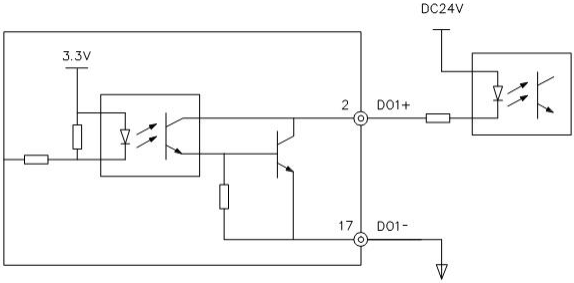


Figure 4-7 DO terminal sink (NPN) output wiring mode

(3) Source (PNP) output

When the controller adopts source input, the wiring method is shown in Figure 4-8.

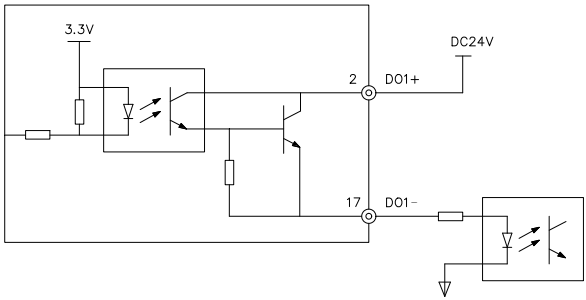


Figure 4-8 DO terminal source (PNP) output wiring mode

4.4 Communication interface wiring

M6-F series servo supports PROFINET communication. The communication ports are CN1 and CN2.

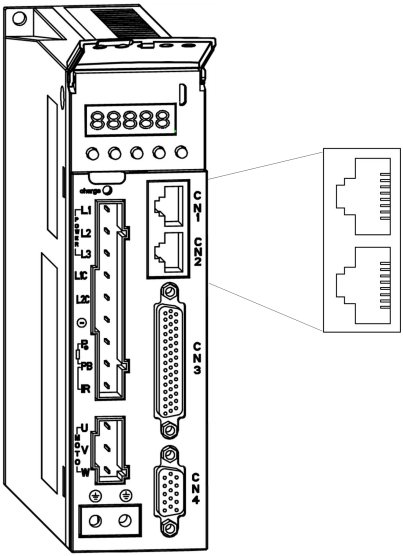


Figure 4-9 Communication interface wiring

Table 4-9 Communication interface signal definition

Pin	Definition	Description
1	TX+	Data transmit +
2	TX-	Data transmit -
3	RX+	Data receive +
6	RX-	Data receive -
Enclosure	PE	Shield
4/5/7/8	Undefined	

Chapter 5 Operation Panel

5.1 Interface introduction

M6-F series servo drive offers an operation panel that consists of five LED digital tubes and 5 keys for operational status display and parameter setting.

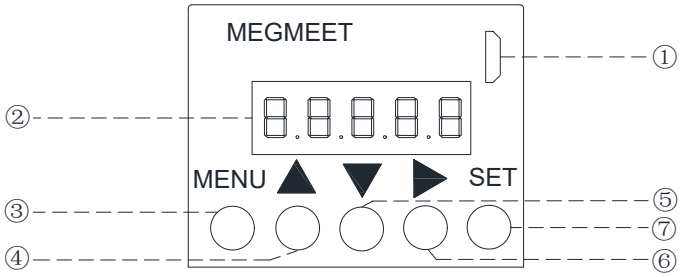


Figure 5-1 Appearance of the panel interface

Panel key functions are described in the table below.

Table 5-1 Panel key function

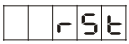
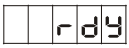
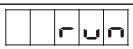
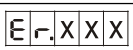
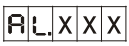
Key	Key name	Function
MENU	Menu/Exit key	When the interface is in the operational status display mode or monitoring parameter menu mode, this key serves as the switchover between the operational status display and the parameter setting level 1 menu, or between the monitoring parameter menu and the parameter setting level 1 menu. When the interface is in the parameter setting level 2 menu, this key serves as the return key to the upper-level menu.
▸	Switch/Shift/Page key	When the interface is in the operational status display mode, this key serves as the switchover between the operational status display and the monitoring parameter menu. When the interface is in the parameter setting mode, this key serves to shift to the next blinking digit on the left. When the parameter value is greater than 5 digits and unmodifiable, this key serves to scroll the parameter value display.
▲	Increase key	When the interface is in the monitoring parameter menu mode, this key serves to select the specific monitoring parameter. When the interface is in the parameter setting mode, this key serves to

Key	Key name	Function
		increase the value of the blinking digit (Hold the key for faster increase).
▼	Decrease key	When the interface is in the monitoring parameter menu mode, this key serves to select the specific monitoring parameter. When the interface is in the parameter setting mode, this key serves to decrease the value of the blinking digit (Hold the key for faster decrease).
SET	Enter/Confirm/Reset key	When the interface is in the parameter setting mode, this key serves to enter the lower-level menu, or to confirm the setting of the parameter value and return to the upper-level menu. When the interface is in the fault status display mode, this key serves to reset the fault.

5.2 Operational status display

M6-F series servo drive offers display of the following operational status.

Table 5-2 Servo drive function status and display

Graphics in LED display	Symbol	Status description
	"rst"	State of initialization upon powering on, indicating the system is in the state of start or reset.
	"nrd"	Indicating the start or reset is completed and that the servo is not ready.
	"rdy"	Indicating the servo system is in the normal state through self-inspection and ready for the command from the host device.
	"run"	State of servo running
	"Er.xxx"	State of servo error
	"AL..xxx"	State of servo alarm

5.3 Operational status display & parameter setting flowchart

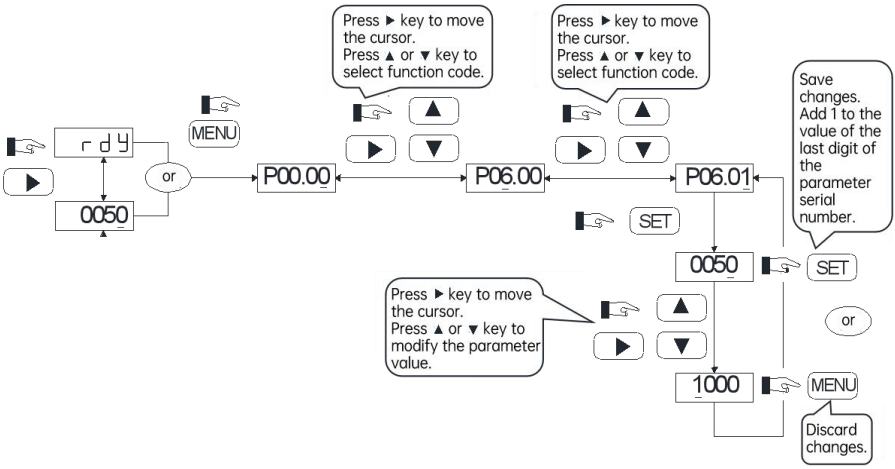


Figure 5-2 Flowchart of operational status display and parameter setting

1. When the servo drive initialization upon powering on is completed, the panel enters the operational status display mode by default. If the system is determined to be normal by self-inspection, the LED will display "rdy".
2. When the interface is in the operational status display mode, press ▸ key to switch between the operational status display mode and the monitoring parameter menu mode.
3. When the interface is in the monitoring parameter menu mode, press ▼/▲ key to select the monitoring parameter.
4. When the interface is in the operational status display mode or monitoring parameter menu mode, press MENU key to switch between the present mode and the parameter setting level 1 menu.
5. When the interface is in the parameter setting level 1 menu, press ▸ key to move the cursor to the parameter group or the parameter serial number.
6. When the interface is in the parameter setting level 1 menu, press ▼/▲ key to select the parameter group and the parameter serial number required.
7. When the interface is in the parameter setting level 1 menu, press SET key to enter the parameter setting level 2 menu and display the present value of the selected parameter. If the value is currently open for modification, the last digit will blink.
8. When the interface is in the parameter setting level 2 menu, press ▸ key to select the digit requiring modification, and press ▼/▲ key to increase or decrease the value.
9. When the value is modified, press SET key to save the changes and return to the upper-level menu, or press MENU key to discard changes and return to the upper-level menu.

5.4 Parameter value display

1. Display of parameter values of 5 digits and below

The parameter value which ranges from -9999 to 99999 can be displayed/edited on the same page.

2. Display of parameter values above 5 digits

When the parameter value is beyond the range from -9999 to 99999, it is required to turn the page for value display and editing. This system supports value display up to three pages. The following figure illustrates the page display logic. For example, the parameter value -21474836.48 can be displayed in three pages, with the value divided into [-21], [4748], and [36.48] on each page, as shown in the figure below.

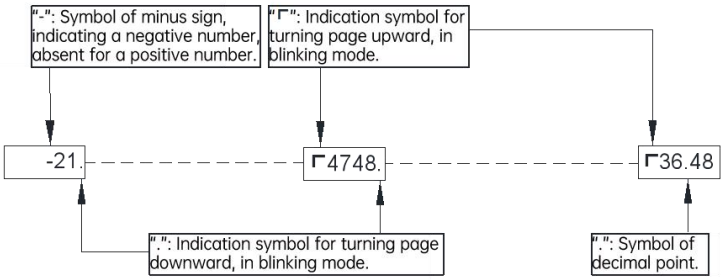


Figure 5-3 Page display logic for parameter values

If the parameter value is currently open for modification, press ▸ key to shift and select the digit requiring modification. If modification of values is not available, the ▸ key serves only for display page turning.

Chapter 6 Instruction on Commissioning

6.1 Inspection before operation

Disconnect the servo motor from its load, and remove the coupling and its related components from the connected shaft of the servo motor. Check whether the servo motor operates normally without load. To prevent potential risks, load the servo motor again only when the no-load operation is determined to be normal.

Before operation, check and make sure:

(1) There is no obvious sign of damage on the exterior of the servo drive;

(2) The wiring terminals have been insulated;

(3) There are no conductive foreign objects, such as screws or metal pieces, or combustible objects inside the servo drive, and there are no conductive foreign objects around the wiring terminals;

(4) The servo drive and external braking resistor are not placed on combustible objects;

(5) The wiring is completed fully and correctly:

- Power cables, auxiliary power cables, and grounding cables of the servo drive are properly wired;
- All control signal cables are properly and reliably wired;
- Limit switches and protection signals are properly connected;

(6) The servo drive enable switch is in OFF state;

(7) The power circuit is cut off, and the emergency stop circuit is ON;

(8) And that the external voltage reference of the servo drive is correct.

Power on the servo drive when no operation command is sent by the controller.

Check and make sure:

(1) The servo motor works properly without vibration or excessive noise.

(2) All parameters are correctly set. Unexpected actions may occur due to different mechanical characteristics. Please do not set the parameters to extreme values

(3) The bus voltage indicator and the digital display work normally.

6.2 Start and trial run

After the wiring is completed, perform jog commissioning to check whether the servo motor can operate normally and whether there is abnormal vibration or noise when rotating. Jog commissioning can be conducted via the panel or two external DI terminals, and the rotation speed is set by P06.05.

a. Jog commissioning via panel

Select P02.00 on the panel for control mode selection and set the function code to 0. Select P06.05 to set the jog running rotation speed. Afterward, select P06.06 and press SET key to display the present speed. Choose forward/reverse jog running via the ▼/▲ key. Press SET/MENU key to exit the jog running mode.

b. Jog commissioning via DI terminal

Configure two external DI terminals and set them to FunIN.17 and FunIN.18 functions respectively. After setting the jog running speed via P06.05, choose forward/reverse jog running through adjusting the DI terminal state.

6.3 Electronic gear

With the electronic gear function enabled, the movement amount of the workpiece corresponding to a single command pulse can be designated to an arbitrary value, and there is no need to consider the mechanical reduction ratio or the encoder pulses during system control.

1) Procedure of electronic gear ratio setting

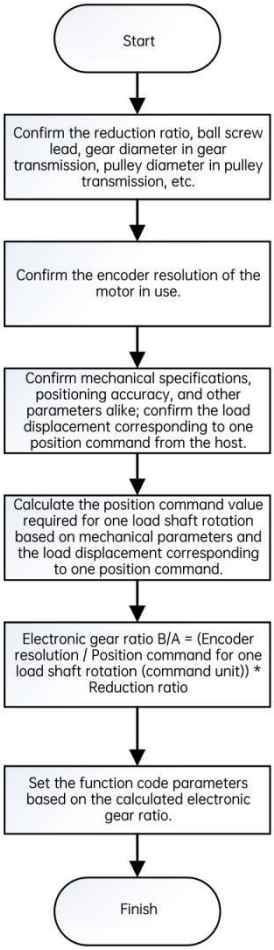


Figure 6-1 Procedure of electronic gear ratio setting

The parameter function of the electronic gear ratio is illustrated as below:

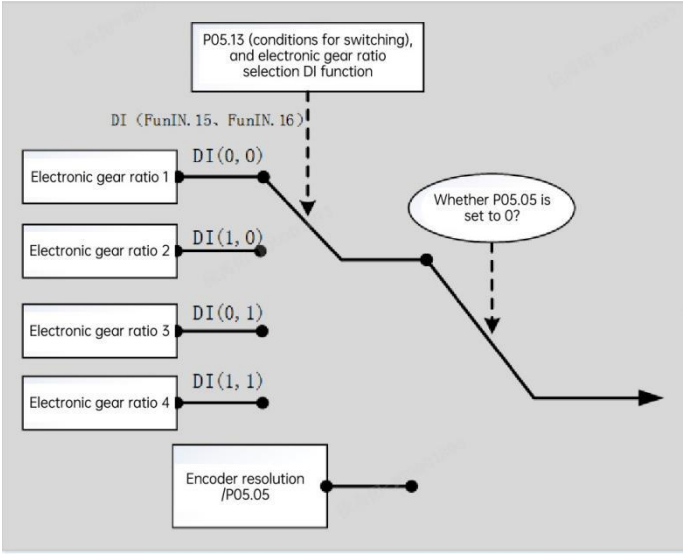


Figure 6-2 Electronic gear ratio function diagram

When P05.05 is set to a non-0 value, the electronic gear ratio formula is

$$\frac{B}{A} = \frac{\text{Electronic gear ratio}}{\text{P05.05}}.$$

The electronic gear ratio 1 to 4 are invalid under such circumstances.

2) Related function codes

a. Electronic gear ratio parameter value setting:

Function code	Name	Range	Min. unit	Default	Effective time	Property	Function
P05.05	Command pulses per motor revolution	0 to 8388608 P/r	1 P/r	10000	Immediate	At stop	It is used to set the number of position commands for one motor revolution.
P05.08	Electronic gear numerator	1 to 1073741824	1	8388608	Immediate	At stop	It is used to set the numerator of the electronic gear ratio.
P05.09	Electronic gear denominator 1	1 to 1073741824	1	10000	Immediate	At stop	It is used to set the denominator of the first electronic gear ratio.

Function code	Name	Range	Min. unit	Default	Effective time	Property	Function
P05.10	Electronic gear denominator 2	1 to 1073741824	1	10000	Immediate	At stop	It is used to set the denominator of the second electronic gear ratio.
P05.11	Electronic gear denominator 3	1 to 1073741824	1	10000	Immediate	At stop	It is used to set the denominator of the third electronic gear ratio.
P05.12	Electronic gear denominator 4	1 to 1073741824	1	10000	Immediate	At stop	It is used to set the denominator of the fourth electronic gear ratio.

Note:

1. The range of the electronic gear ratio is

$$0.001<\frac{B}{A}<30000.$$

   Otherwise, a fault Er.061 (Electronic gear ratio setting error) will occur.

2. For serial absolute encoders, the resolution = 2^n, of which n refers to the encoder bits. The standard absolute encoder bits of the M6-F series is 23, which means the encoder resolution is calculated as 2^{23}=8388608. For incremental encoders, the resolution = Number of encoder lines * 4. For example, the resolution of a 2500-line incremental encoder is calculated as 2500*4=10000.

b. Electronic gear ratio switchover setting

When P05.05 is set to 0, the electronic gear ratio switchover function is enabled. The switchover among the four electronic gear ratios shall be determined by the mechanical operation conditions, and it is required to set the switching conditions for the electronic gear ratio. There shall be only one electronic gear ratio effective at any time.

Related function codes

Function code	Name	Range	Min. unit	Default	Effective time	Property	Function
P05.13	Electronic gear ratio switchover conditions	0: Switchover after 3 ms delay when the position command is 0 1: Real-time switchover	1	0	Immediate	At stop	It is used to set the switching conditions for the electronic gear ratio.

At the same time, set the two DI terminals of the servo drive to functions 15 and 16 (FunIN.15 and FunIN.16), and determine the active logic of the DI terminals. Refer to the table below for electronic gear ratio selection. When no DI is set to FunIN.15 or FunIN.16, FunIN.15 and FunIN.16 are disabled by default.

P05.05	P05.13	DI level of FunIN15	DI level of FunIN16	Electronic gear ratio B/A
0	0 or 1	Inactive	Inactive	P05.08/P05.09
		Active	Inactive	P05.08/P05.10
		Inactive	Active	P05.08/P05.11
		Active	Active	P05.08/P05.12
1 to 8388608	---			Encoder resolution / P05.05

3) Calculation method of the electronic gear ratio

When the machine reduction ratio between the motor shaft and the load side is m/n (When the motor rotates for m circles, the load shaft rotates for n circles), the setting value of the electronic gear ratio can be obtained by the following formula:

$$\text{Electronic gear ratio } \frac{B}{A} = \frac{\text{Encoder resolution}}{\text{Movement amount (command unit) per load revolution}} \times \frac{m}{n}$$

a. Confirm the mechanical parameters and the servo motor encoder resolution

Confirm the mechanical parameters, including the reduction ratio, ball screw lead, pulley transmission ratio, etc., and confirm the servo motor encoder resolution.

b. Confirm the positioning precision (i.e. pulse equivalent)

Pulse equivalent refers to the minimum movement unit of the load corresponding to a single pulse command signal. Pulse equivalent can be represented by forms of 0.001 mm, 0.1°, or 0.01 inch, which means when a pulse is input, a load movement in distance or angle corresponding to the pulse equivalent will be implemented.

For example, when the pulse equivalent is set to 0.001 mm, if the input command pulse reaches 50000, the load movement amount will be (50000 * 0.001 mm) = 50 mm.

c. Calculate the number of position commands required for one load shaft rotation

Calculate the position command count required for one rotation of the load shaft using the mechanical parameters and the pulse equivalent.

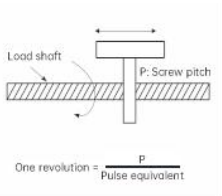
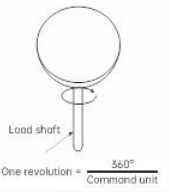
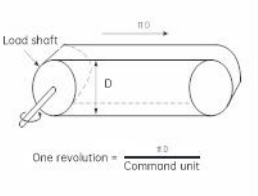
For example, if the ball screw pitch sits at 5 mm, and the pulse equivalent sits at 0.001 mm, the number of position commands for the load displacement (Command bits) of one shaft rotation = 5 mm / 0.001 mm = 5000.

d. Calculate the electronic gear ratio

When the reduction ratio between the motor shaft and the load shaft is represented by m/n (i.e. the load shaft rotates for n circles when the motor shaft rotates for m circles), the formula is

$$\text{Electronic gear ratio } = \frac{P05.08}{P05.09} = \frac{\text{Encoder resolution}}{\text{Movement amount (command unit) per load shaft revolution}} \times \frac{m}{n}$$

4) Example of electronic gear ratio setting is shown below.

Step	Content	Mechanical unit		
		Ball screw	Disc	Belt pulley
				
1	Mechanical structure	Screw lead: 5 mm Reduction ratio: 1/1	Angle for one rotation: 360° Reduction ratio: 1/100	Pulley diameter: 100 mm (Pulley circumference: 314 mm) Reduction ratio: 1/50
2	Encoder resolution	8388608 (23-bit)	8388608 (23-bit)	8388608 (23-bit)
3	Load displacement corresponding to one command unit	0.001 mm	0.01°	0.005 mm
4	Number of position commands for one load rotation	5 mm / 0.001 mm = 5000	360°/0.01° = 36000	314 mm / 0.005 mm = 62800 mm
5	Electronic gear ratio	$\frac{B}{A}=\frac{8388608}{5000}\times\frac{1}{1}=$	$\frac{B}{A}=\frac{8388608}{36000}\times\frac{100}{1}=$	$\frac{B}{A}=\frac{8388608}{62800}\times\frac{50}{1}=$
6	Parameter	P05.08=8388608 P05.09 =5000	P05.08=838860800 P05.09 =36000	P05.08=419430400 P05.09=62800

6.4 Brake setting

6.4.1 Wiring diagram of servo motor brake

The brake signal connection does not involve polarity. User shall prepare a 24 V power supply. The standard wiring of the brake signal BK and the brake power supply is illustrated below.

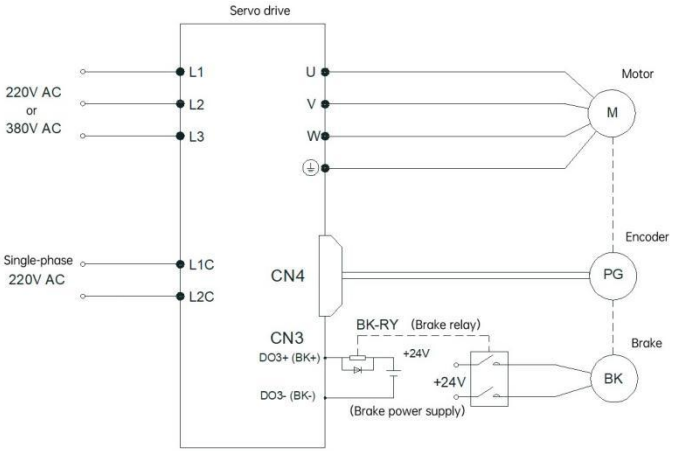


Figure 6-3 Brake wiring diagram

Note:

It is not recommended for the brake to share its power supply with other electrical units. Such measures are intended to prevent brake malfunctions caused by voltage/current drop resulted from the operation of other electrical units.

6.4.2 Time sequence of brake

For servo motors with brake, it is required to set one DO terminal of the servo drive to function 18 (Brake output signal), and determine the active logic of the DO terminal.

Based on the present state of the servo drive, the working time sequence of the brake unit offers two modes: "normal state" brake time sequence, and "fault state" brake time sequence of the servo drive.

There are two scenarios for the brake time sequence in normal state: static motor scenario, and rotating motor scenario.

a. Static motor: actual motor rotating speed less than P02.12;

b. Rotating motor: actual motor rotating speed higher than P02.12.

6.4.3 Brake time sequence for static motor

When the servo enable is switched from ON to OFF, if the present rotating speed of the motor is lower than P02.12, the drive will act in static motor time sequence.

Note:

- Do not input speed/position/torque command during the period defined by P02.10 when the brake

output is switched from OFF to ON; otherwise, a command loss or operation error may occur;

- When the servo is working with perpendicular shafts, the gravity of the mechanical part in motion or any external force may cause slight movement of the mechanical unit. When the servo motor is in the static state, if the servo enable is switched to OFF, the brake output will be switched to OFF immediately. However, within the time defined by P02.11, the motor will remain powered to prevent the mechanical part movement caused by gravity or external forces.

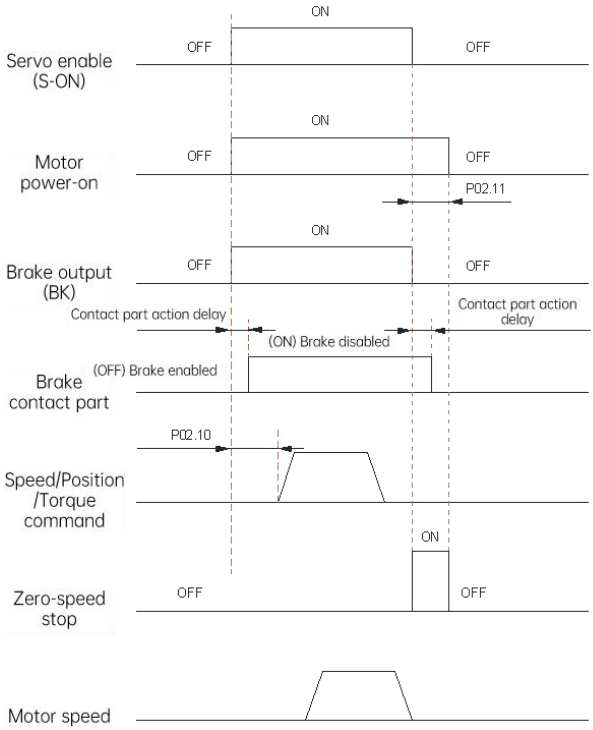


Figure 6-4 Brake time sequence for static motor

As shown in Figure 6-4, the brake function in static motor state is described below:

a. When the servo enable is ON, the brake output will be switched to ON, and the motor will enter the power-on state at the same time;

b. For the delay time of the brake contact part action, refer to the related motor specifications;

c. The time interval from the brake output being switched to ON to the command input shall be greater than the length defined by P02.10;

d. In the static servo motor state (The motor speed is less than the set value of P02.12), when the servo enable is switched to OFF, the brake output will be switched to OFF at the same time; P02.11 enables the setting of delay from the brake output being switched to OFF to the motor's entry into the non-powered state.

Parameter	Name	Range	Default	Effective time	Property
P02.10	Delay from the brake output being switched to ON to the command input	20 to 500 ms	250	Immediate	During running
P02.11	Delay from the brake output being switched to OFF to the motor's entry into the non-powered state	1 to 1000 ms	150	Immediate	During running

6.4.4 Brake time sequence for rotating motor

When the servo motor is in the rotating state, pay special attention to the followings:

- Do not input speed/position/torque command during the period defined by P02.10 when the brake output is switched from OFF to ON; otherwise, a command loss or operation error may occur;
- When the servo motor is rotating, if the servo enable is switched to OFF, the motor will enter the zero-speed stop state; however, the brake output will be switched to OFF only when any of the following prerequisites is met:

  a. The time defined by P02.13 is not reached when the motor speed is decreased to P02.12;

  b. The time defined by P02.13 is reached, but the motor speed remains higher than P02.12.
- After the brake output is switched from ON to OFF, the motor will remain powered during the following 40 ms; such measures are intended to prevent the unnecessary movement of the mechanical part caused by gravity or external forces.

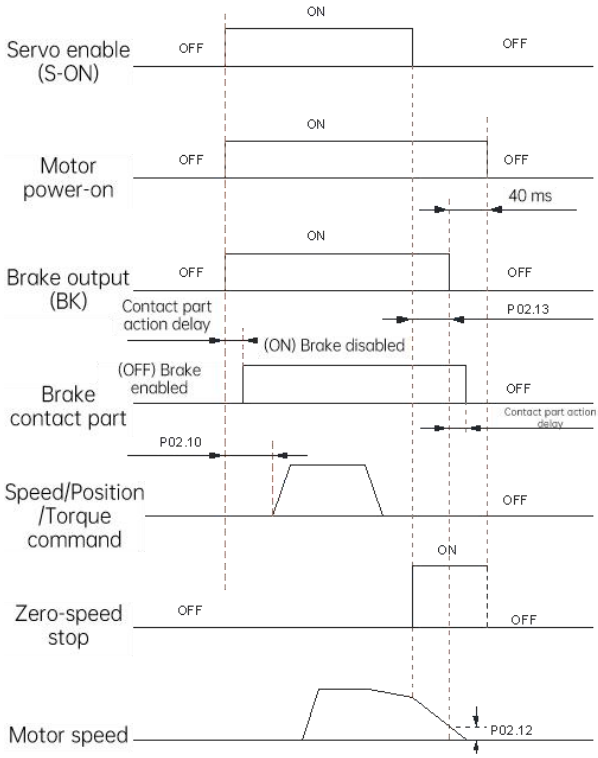


Figure 6-5 Brake time sequence for rotating motor

As shown in Figure 6-5, the brake function in rotating motor state is described below:

a. When the servo enable is ON, the brake output will be switched to ON, and the motor will enter the power-on state at the same time;

b. For the delay time of the brake contact part action, refer to the related motor specifications;

c. The time interval from the brake output being switched to ON to the command input shall be greater than the length defined by P02.10;

d. In the rotating servo motor state, when the servo enable is OFF, the brake output delay, which starts after the servo enable is switched to OFF, can be set via P02.12 and P02.13; the motor will enter the non-powered state only when the 50 ms delay is reached after the brake output is switched to OFF.

Parameter	Name	Range	Default	Effective time	Property
P02.12	Brake command output speed limit value	0 to 3000 rpm	10	Immediate	During running

Parameter	Name	Range	Default	Effective time	Property
P02.13	Delay from the servo enable being switched to OFF to the brake output being switched to OFF	1 to 30000 ms	500	Immediate	During running

6.4.5 Brake time sequence in fault state

Once a drive fault occurs, the motor enters the non-powered state immediately, and at the same time, the brake output will be switched from ON to OFF to disable the brake function.

Chapter 7 PROFINET Communication

PROFINET is an automation bus standard based on industrial Ethernet technology, which was introduced by PROFIBUS International (PI). In order to provide support for different types of applications, PROFINET offers two technical solutions: PROFINET IO, which is designed for the integration of simple, distributed field devices that use Ethernet communication and the time-critical applications, and PROFINET CBA (Component Based Automation), which is aimed at the integration of distributed automation systems based on components.

PROFINET IO specifies all the data exchange methods between the I/O controller and the I/O devices. It also defines the parameterization and diagnostic methods for the I/O controller and I/O devices. It conducts rapid data exchange based on the producer/consumer communication model.

PROFINET IO provides two real-time channels: PROFINET IO RT and PROFINET IO IRT. By adopting RT real-time communication to exchange process data, its clock cycle reaches the order of 10 milliseconds, which is very suitable for the distributed I/O communication system in factory automation. While PROFINET IO adopting isochronous synchronous communication IRT can make the clock cycle reach the order of 1 millisecond, and the M6-F series cycle can reach 500 microseconds, meeting the requirements of motion control.

7.1 PROFIdrive

PROFIdrive is a standard profile of PROFINET IO for drive technology applications, and is now widely used in the fields of production and process automation. The PROFIdrive profile enables users to run automation applications with PROFIBUS DP and PROFINET IO conveniently and quickly without any modification.

The PROFIdrive defines six application classes (AC):

AC1: Standard drive;

AC2: Standard drive with a distributed technology controller;

AC3: Single-axis positioning drive with local motion control;

AC4: Motion control with a central interpolation and speed setpoint interface;

AC5: Motion control with a central interpolation and position setpoint interface;

AC6: Motion control for clocked processes, or distributed synchronism.

7.2 Overview of telegrams

The M6-F series supports application classes AC1, AC3, and AC4, and the supported communication telegrams include 1, 3, 5, 7, 9, 102, 105, 111, and the Additional Telegram 750.

Telegram	Max. number of PZDs (One PZD = One word)		P17.01
	Receive word	Send word	
Standard Telegram 1	2	2	1
Standard Telegram 3	5	9	3
Standard Telegram 5	9	9	5/10005 (DSC)
Standard Telegram 7	2	2	7
Standard Telegram 9	10	5	9
Siemens telegram 102	6	10	102
Siemens telegram 105	10	10	105/10105 (DSC)
Siemens telegram 111	12	12	111
Siemens telegram 750	3	1	P17.02=750

Telegrams used for speed mode

Telegram	1		3		5		102		105	
Application class	1		1/4		4		1/4		4	
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	NSOLL_A	NIST_A	NSOLL_B	NIST_B	NSOLL_B	NIST_B	NSOLL_B	NIST_B	NSOLL_B	NIST_B
PZD3	Receive word	Send word								
PZD4			STW2	ZSW2	STW2	ZSW2	STW2	ZSW2	STW2	ZSW2
PZD5			G1_STW	G1_ZSW	G1_STW	G1_ZSW	MOMRED	MELDW	MOMRED	MELDW
PZD6				G1_XIST1	XERR	G1_XIST1	G1_STW	G1_ZSW	G1_STW	G1_ZSW
PZD7								G1_XIST1	XERR	G1_XIST1
PZD8				G1_XIST2	KPC	G1_XIST2				
PZD9								G1_XIST2	KPC	G1_XIST2
PZD10										

Telegrams used for position mode

Telegram	7		9		111	
Application class	3		3		3	
PZD1	STW1	ZSW1	STW1	ZSW1	STW1	ZSW1
PZD2	SATZANW	AKTSATZ	SATZANW	AKTSATZ	POS_STW1	POS_ZSW1
PZD3	Receive word	Send word	STW2	ZSW2	POS_STW2	POS_ZSW2
PZD4			MDI_TARPOS	XIST_A	STW2	ZSW2
PZD5					OVERRIDE	MELDW
PZD6			MDI_VELOCITY		MDI_TARPOS	XIST_A
PZD7						
PZD8			MDI_ACC		MDI_VELOCITY	NIST_B
PZD9			MDI_DEC			
PZD10			MDI_MOD		MDI_ACC	FAULT_CODE
PZD11					MDI_DEC	WARN_CODE
PZD12					USER	USER

The Additional Telegram 750 functions as torque control when used with the speed mode telegrams.

Telegram	750	
Application class	-	
PZD1	M_ADDI	M_ACT
PZD2	M_LIMIT_POS	
PZD3	M_LIMIT_NEG	

7.3 I/O data overview

I/O	Description	Receive word/Send word	Data Type	Scaling
STW1	Control word 1	Receive word	U16	-
STW2	Control word 2	Receive word	U16	-

I/O	Description	Receive word/Send word	Data Type	Scaling
ZSW1	Status word 1	Send word	U16	-
ZSW2	Status word 2	Send word	U16	-
NSOLL_A	Speed setpoint A (16-bit)	Receive word	I16	4000 hex == P01.06
NSOLL_B	Speed setpoint B (32-bit)	Receive word	I32	40000000 hex == P01.06
NIST_A	Speed actual value A (16-bit)	Send word	I16	4000 hex == P01.06
NIST_B	Speed actual value B (32-bit)	Send word	I32	40000000 hex == P01.06
G1_STW	Encoder 1 control word	Receive word	U16	-
G1_ZSW	Encoder 1 status word	Send word	U16	-
G1_XIST1	Encoder 1 actual position 1	Send word	U32	-
G1_XIST2	Encoder 1 actual position 2	Send word	U32	-
MOMRED	Torque reduction	Receive word	I16	4000 hex == P01.04
MELDW	Message word	Send word	U16	-
KPC	Position gain	Receive word	I32	-
XERR	Following error	Receive word	I32	-
SATZANW	Position segment selection	Receive word	U16	-
AKTSATZ	Selected position segment	Send word	U16	-
MDI_TARPOS	MDI target position	Receive word	I32	1 hex == 1 LU
MDI_VELOCITY	MDI target velocity	Receive word	I32	1 hex == 1000 LU/min
MDI_ACC	MDI acceleration override	Receive word	I16	4000 hex == 100%
MDI_DEC	MDI deceleration override	Receive word	I16	4000 hex == 100%
XIST_A	Position actual value A	Send word	I32	1 hex == 1 LU
OVERRIDE	Position velocity override	Receive word	I16	4000 hex == 100%
MDI_MODE	Position MDI mode	Receive word	U16	-
FAULT_CODE	Fault code	Send word	U16	-

I/O	Description	Receive word/Send word	Data Type	Scaling
WARN_CODE	Alarm code	Send word	U16	-
M_ADD1	Additional torque	Receive word	I16	4000 hex == P01.04
M_LIMIT_POS	Positive torque limit	Receive word	I16	4000 hex == P01.04
M_LIMIT_NGE	Negative torque limit	Receive word	I16	4000 hex == P01.04
M_ACT	Actual torque	Send word	I16	4000 hex == P01.04

7.4 Control word

7.4.1 STW1 control word (Telegram 1/3/5)

STW1.4, STW1.5, and STW1.6 are inhibited when Telegram 5 is in use.

STW1	Description
STW1.0	1 = ON (Pulses can be enabled) 0 = OFF1 (Braking with ramp-function generator)
STW1.1	1 = No OFF2 (Allow enable) 0 = OFF2 (Immediate pulse suppression, and switching on inhibited)
STW1.2	1 = No OFF3 (Allow enable) 0 = OFF3 (Braking with ramp-function generator, pulse suppression, and switching on inhibited)
STW1.3	1 = Enable operation (Pulses can be enabled) 0 = Inhibit operation (Suppress pulses)
STW1.4	1 = Operating conditions (The ramp-function generator can be enabled) 0 = Inhibit ramp-function generator (Set the ramp-function generator output to 0)
STW1.5	1 = Continue ramp-function generator 0 = Freeze ramp-function generator (Freeze ramp-function generator output)
STW1.6	1 = Enable setpoint 0 = Inhibit setpoint (Set the ramp-function generator input to 0)
STW1.7	↑ = ON. Acknowledge faults

STW1	Description
STW1.8	1 = JOG 1 signal source
STW1.9	1 = JOG 2 signal source
STW1.10	1 = Control via PLC
STW1.11	Reserved
STW1.12	Reserved
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

7.4.2 STW1 control word (Telegram 102/105)

STW1.4, STW1.5, and STW1.6 are inhibited when Telegram 105 is in use.

STW1	Description
STW1.0	↑ = ON (Pulses can be enabled) 0 = OFF1 (Braking with ramp-function generator)
STW1.1	1 = No OFF2 (Allow enable) 0 = OFF2 (Immediate pulse suppression, and switching on inhibited)
STW1.2	1 = No OFF3 (Allow enable) 0 = OFF3 (Braking with ramp-function generator, pulse suppression, and switching on inhibited)
STW1.3	1 = Enable operation (Pulses can be enabled) 0 = Inhibit operation (Suppress pulses)
STW1.4	1 = Operating conditions (The ramp-function generator can be enabled) 0 = Inhibit ramp-function generator (Set the ramp-function generator output to 0)
STW1.5	1 = Continue ramp-function generator 0 = Freeze ramp-function generator (Freeze ramp-function generator output)
STW1.6	1 = Enable setpoint 0 = Inhibit setpoint (Set the ramp-function generator input to 0)

STW1	Description
STW1.7	↑ = ON. Acknowledge faults
STW1.8	1 = JOG 1 signal source
STW1.9	1 = JOG 2 signal source
STW1.10	1 = Control via PLC
STW1.11	Reserved
STW1.12	Reserved
STW1.13	Reserved
STW1.14	1 = Closed-loop torque control active 0 = Closed-loop speed control active
STW1.15	Reserved

7.4.3 STW1 control word (Telegram 7/9/111)

STW1	Description
STW1.0	↑ = ON (Pulses can be enabled) 0 = OFF1 (Braking with ramp-function generator, pulse suppression, and ready for switching on)
STW1.1	1 = No OFF2 (Allow enable) 0 = OFF2 (Immediate pulse suppression, and switching on inhibited)
STW1.2	1 = No OFF3 (Allow enable) 0 = OFF3 (Braking with ramp-function generator, pulse suppression, and switching on inhibited)
STW1.3	1 = Enable operation (Pulses can be enabled) 0 = Inhibit operation (Suppress pulses)
STW1.4	1 = Do not reject traversing task 0 = Reject traversing task (Ramp decrease at max. deceleration value)
STW1.5	1 = No intermediate stop 0 = Intermediate stop
STW1.6	↑ = Activate traversing task
STW1.7	↑ = Acknowledge faults

STW1	Description
STW1.8	1 = JOG 1 signal source
STW1.9	1 = JOG 2 signal source
STW1.10	1 = Control via PLC
STW1.11	1 = Start to return to reference point 0 = Stop returning to reference point
STW1.12	Reserved
STW1.13	Reserved
STW1.14	Reserved
STW1.15	Reserved

7.4.4 STW2 control word (Telegram 3/5/102/105)

STW2	Description
STW2.0	Reserved
STW2.1	Reserved
STW2.2	Reserved
STW2.3	Reserved
STW2.4	Reserved
STW2.5	Reserved
STW2.6	Reserved
STW2.7	Reserved
STW2.8	1= Traverse to fixed endstop
STW2.9	Reserved
STW2.10	Reserved
STW2.11	Reserved
STW2.12	Main life sign, bit 0
STW2.13	Main life sign, bit 1
STW2.14	Main life sign, bit 2
STW2.15	Main life sign, bit 3

7.4.5 STW2 control word (Telegram 9/111)

STW2	Description
STW2.0	Reserved
STW2.1	Reserved
STW2.2	Reserved
STW2.3	Reserved
STW2.4	Reserved
STW2.5	Reserved
STW2.6	Reserved
STW2.7	Reserved
STW2.8	1 = Traverse to fixed endstop
STW2.9	Reserved
STW2.10	Reserved
STW2.11	Reserved
STW2.12	Reserved
STW2.13	Reserved
STW2.14	Reserved
STW2.15	Reserved

7.4.6 SATZANW control word

SATZANW	Description
SATZANW.0	1 = Traversing block selection, bit 0
SATZANW.1	1 = Traversing block selection, bit 1
SATZANW.2	1 = Traversing block selection, bit 2
SATZANW.3	1 = Traversing block selection, bit 3
SATZANW.4	1 = Traversing block selection, bit 4

SATZANW	Description
SATZANW.5	1 = Traversing block selection, bit 5
SATZANW.6	Reserved
SATZANW.7	Reserved
SATZANW.8	Reserved
SATZANW.9	Reserved
SATZANW.10	Reserved
SATZANW.11	Reserved
SATZANW.12	Reserved
SATZANW.13	Reserved
SATZANW.14	Reserved
SATZANW.15	1 = Activate MDI 0 = Do not activate MDI

7.4.7 MDI_MOD control word

MDI_MOD	Description
MDI_MOD.0	1 = Absolute positioning selected 0 = Relative positioning selected
MDI_MOD.1	Reserved
MDI_MOD.2	Reserved
MDI_MOD.3	Reserved
MDI_MOD.4	Reserved
MDI_MOD.5	Reserved
MDI_MOD.6	Reserved
MDI_MOD.7	Reserved
MDI_MOD.8	Reserved
MDI_MOD.9	Reserved

MDI_MOD	Description
MDI_MOD.10	Reserved
MDI_MOD.11	Reserved
MDI_MOD.12	Reserved
MDI_MOD.13	Reserved
MDI_MOD.14	Reserved
MDI_MOD.15	Reserved

7.4.8 POS_STW1 control word

POS_STW1	Description
POS_STW1.0	1 = Traversing block selection, bit 0
POS_STW1.1	1 = Traversing block selection, bit 1
POS_STW1.2	1 = Traversing block selection, bit 2
POS_STW1.3	1 = Traversing block selection, bit 3
POS_STW1.4	Reserved
POS_STW1.5	Reserved
POS_STW1.6	Reserved
POS_STW1.7	Reserved
POS_STW1.8	1 = Absolute positioning selected 0 = Relative positioning selected
POS_STW1.9	Reserved
POS_STW1.10	Reserved
POS_STW1.11	Reserved
POS_STW1.12	1 = Continuous transmission
POS_STW1.13	Reserved
POS_STW1.14	Reserved
POS_STW1.15	1 = Activate MDI 0 = Do not activate MDI

7.4.9 POS_STW2 control word

POS_STW2	Description
POS_STW2.0	Reserved
POS_STW2.1	1 = Set a reference point 0 = Do not set reference points
POS_STW2.2	1 = Reference cam active 0 = Reference cam not activated
POS_STW2.3	Reserved
POS_STW2.4	Reserved
POS_STW2.5	1 = Jog, incremental active (Not supported) 0 = Jog, velocity active
POS_STW2.6	Reserved
POS_STW2.7	Reserved
POS_STW2.8	Reserved
POS_STW2.9	Reserved
POS_STW2.10	Reserved
POS_STW2.11	Reserved
POS_STW2.12	Reserved
POS_STW2.13	Reserved
POS_STW2.14	Reserved
POS_STW2.15	Reserved

7.5 Status word

7.5.1 ZSW1 status word (1/3/5)

ZSW1	Description
ZSW1.0	1 = Ready for servo on 0 = Not ready for servo on
ZSW1.1	1 = Ready for operation 0 = Not ready for operation
ZSW1.2	1 = Enable operation 0 = Inhibit operation
ZSW1.3	1 = Fault present 0 = No fault
ZSW1.4	1 = Coast to stop inactive 0 = Coast to stop active
ZSW1.5	1 = Quick stop inactive 0 = Quick stop active
ZSW1.6	1 = Switching on inhibition active 0 = Switching on inhibition inactive
ZSW1.7	Reserved
ZSW1.8	1 = Speed error within tolerance P17.15 0 = Speed error exceeding tolerance P17.15
ZSW1.9	1 = Existing control request 0 = No control request
ZSW1.10	1 = Reaching or exceeding the reference speed P17.17 0 = Not reaching or exceeding the reference speed P17.17
ZSW1.11	Reserved
ZSW1.12	Reserved
ZSW1.13	Reserved
ZSW1.14	Reserved

ZSW1	Description
ZSW1.15	Reserved

7.5.2 ZSW1 status word (102/105)

ZSW1	Description
ZSW1.0	1 = Ready for servo on 0 = Not ready for servo on
ZSW1.1	1 = Ready for operation 0 = Not ready for operation
ZSW1.2	1 = Enable operation 0 = Inhibit operation
ZSW1.3	1 = Fault present 0 = No fault
ZSW1.4	1 = Coast to stop inactive 0 = Coast to stop active
ZSW1.5	1 = Quick stop inactive 0 = Quick stop active
ZSW1.6	1 = Switching on inhibition active 0 = Switching on inhibition inactive
ZSW1.7	Reserved
ZSW1.8	1 = Speed error within tolerance 0 = Speed error exceeding tolerance
ZSW1.9	1 = Existing control request 0 = No control request
ZSW1.10	1 = Reaching or exceeding the reference speed 0 = Not reaching or exceeding the reference speed
ZSW1.11	Reserved
ZSW1.12	Reserved

ZSW1	Description
ZSW1.13	Reserved
ZSW1.14	1 = Closed-loop torque control active 0 = Closed-loop torque control inactive
ZSW1.15	Reserved

7.5.3 ZSW1 status word (7/9/111)

ZSW1	Description
ZSW1.0	1 = Ready for servo on 0 = Not ready for servo on
ZSW1.1	1 = Ready for operation 0 = Not ready for operation
ZSW1.2	1 = Enable operation 0 = Inhibit operation
ZSW1.3	1 = Fault present 0 = No fault
ZSW1.4	1 = Coast to stop inactive 0 = Coast to stop active
ZSW1.5	1 = Quick stop inactive 0 = Quick stop active
ZSW1.6	1 = Switching on inhibition active 0 = Switching on inhibition inactive
ZSW1.7	Reserved
ZSW1.8	1 = Position error within tolerance 0 = Position error exceeding tolerance
ZSW1.9	1 = Existing control request 0 = No control request
ZSW1.10	1 = Target position reached 0 = Target position not reached
ZSW1.11	1 = A reference point is set 0 = No reference point is set
ZSW1.12	↑ = Traversing block acknowledge activated

ZSW1	Description
ZSW1.13	Reserved
ZSW1.14	Reserved
ZSW1.15	Reserved

7.5.4 ZSW2 status word

ZSW2	Description
ZSW2.0	Reserved
ZSW2.1	Reserved
ZSW2.2	Reserved
ZSW2.3	Reserved
ZSW2.4	Reserved
ZSW2.5	Reserved
ZSW2.6	Reserved
ZSW2.7	Reserved
ZSW2.8	1 = Traverse to fixed endstop
ZSW2.9	Reserved
ZSW2.10	1 = Enable pulses
ZSW2.11	Reserved
ZSW2.12	Reserved
ZSW2.13	Reserved
ZSW2.14	Reserved
ZSW2.15	Reserved

7.5.5 MELDW status word

MELDW	Description
MELDW.0	Reserved
MELDW.1	Reserved
MELDW.2	Reserved
MELDW.3	Reserved
MELDW.4	Reserved
MELDW.5	Reserved
MELDW.6	Reserved
MELDW.7	Reserved
MELDW.8	1 = Speed error within tolerance 0 = Speed error exceeding tolerance
MELDW.9	Reserved
MELDW.10	Reserved
MELDW.11	1 = Drive enabled 0 = Drive disabled
MELDW.12	1 = Drive ready 0 = Drive not ready
MELDW.13	Reserved
MELDW.14	Reserved
MELDW.15	Reserved

7.5.6 POS_ZSW1 status word

POS_ZSW1	Description
POS_ZSW1.0	1 = Traversing block activated, bit 0
POS_ZSW1.1	1 = Traversing block activated, bit 1

POS_ZSW1	Description
POS_ZSW1.2	1 = Traversing block activated, bit 2
POS_ZSW1.3	1 = Traversing block activated, bit 3
POS_ZSW1.4	Reserved
POS_ZSW1.5	Reserved
POS_ZSW1.6	Reserved
POS_ZSW1.7	Reserved
POS_ZSW1.8	Reserved
POS_ZSW1.9	Reserved
POS_ZSW1.10	1 = JOG activated 0 = JOG not activated
POS_ZSW1.11	1 = Reference point return activated 0 = Reference point return not activated
POS_ZSW1.12	Reserved
POS_ZSW1.13	Reserved
POS_ZSW1.14	Reserved
POS_ZSW1.15	1 = MDI activated 0 = MDI not activated

7.5.7 POS_ZSW2 status word

POS_ZSW2	Description
POS_ZSW2.0	Reserved
POS_ZSW2.1	Reserved
POS_ZSW2.2	Reserved
POS_ZSW2.3	Reserved
POS_ZSW2.4	Reserved
POS_ZSW2.5	Reserved

POS_ZSW2	Description
POS_ZSW2.6	Reserved
POS_ZSW2.7	Reserved
POS_ZSW2.8	Reserved
POS_ZSW2.9	Reserved
POS_ZSW2.10	Reserved
POS_ZSW2.11	Reserved
POS_ZSW2.12	1 = Fixed stop point reached 0 = Fixed stop point not reached
POS_ZSW2.13	1 = Have reached the clamping torque at the fixed stop point 0 = Have not reached the clamping torque at the fixed stop point
POS_ZSW2.14	1 = Fixed stop point activated 0 = Fixed stop point not activated
POS_ZSW2.15	Reserved

7.6 PN communication parameters

- Set P02.00 to 10 when choosing the PN mode;
- Telegram configuration (P17.01, and P17.02) shall be consistent with the configuration of the PLC program;
- The device name and IP configured by PRONETA shall be consistent with the configuration of the PLC program;
- When DSC function is enabled, the value of P17.01 = 10000 + Telegram number

Parameter number	Name	Range	Min. unit	Default	Effective time	Property	Description
P17: PN parameters							
P17.00	PN software version	0 to 9999	1	100	-	At display	
P17.01	Telegram number selection	0 to 65535	1	3	Power-on again	At stop	Telegram 1, 3, 5, 7, 9, 102, 105, 111, 10005 (DSC active), and

Parameter number	Name	Range	Min. unit	Default	Effective time	Property	Description
							10105 (DSC active) are supported.
P17.02	Additional Telegram	0 to 65535	1	0	Power-on again	At stop	Additional Telegram 750 is supported.
P17.03	IP address	0 to 0xFFFFFFFF	1	0	Power-on again	At stop	FF.FF.FF.FF
P17.04	Subnet mask	0 to 0xFFFFFFFF	1	0	Power-on again	At stop	FF.FF.FF.FF
P17.05	Default gateway	0 to 0xFFFFFFFF	1	0	Power-on again	At stop	FF.FF.FF.FF
P17.06	Heartbeat threshold	0 to 65535	1	5	Power-on again	At stop	
P17.07	Communication timeout	0 to 65535	1	1	Power-on again	At stop	Step size 0.1 (Unit: s)
P17.08	User receive word	0 to 65535	1	0	Power-on again	At stop	0: Function 1: Torque limit Others: PNU number used by Telegram 111
P17.09	User send word	0 to 65535	1	0	Power-on again	At stop	0: No function 1: Actual torque 2: Actual current 3: DI status Others: PNU number used by Telegram 111
P17.10	Homing offset type	0 to 65535	1	0	Power-on again	At stop	
P17.11	Homing offset	-2147483648 to 2147483647	1	0	Power-on again	At stop	
P17.12	Fixed endstop clamping torque	0 to 655.35	1	0	Immediate	At stop	

Parameter number	Name	Range	Min. unit	Default	Effective time	Property	Description
P17.13	Maximum following error of the fixed endstop	0 to 2147483647	1	10000	Immediate	At stop	
P17.14	Fixed endstop monitoring window	0 to 2147483647	1	100	Immediate	At stop	
P17.15	Speed tolerance	0.1 to 6000.0	1	0	Immediate	At stop	
P17.16	Time tolerance	0 to 65535	1	0	Immediate	At stop	
P17.17	Speed reference	0 to 6000.0	1	0	Immediate	At stop	
P17.18	MAC address	0 to 0xFFFFFF	1	0	-	At display	
P17.19	MAC address	0 to 0xFFFFFF	1	0	-	At display	
P17.20	Reserved	0 to 65535	1	0	Immediate	At stop	
P17.21	Reserved	0 to 65535	1	0	Immediate	At stop	
P17.22	Reserved	0 to 65535	1	0	Immediate	At stop	
P17.23	Reserved	0 to 65535	1	0	Immediate	At stop	
P17.24	Reserved	0 to 65535	1	0	Immediate	At stop	

7.7 RT mode configuration

Using the PROFINET RT network, the M6-F series can communicate with the Siemens PLC models (Including S7-1500, S7-1200, and S7-200 Smart) for speed/position/torque control.

7.7.1 S7-1500 configuration

There are two methods to realize position control when the M6-F series is communicating with S7-1500 PLC via PROFINET.

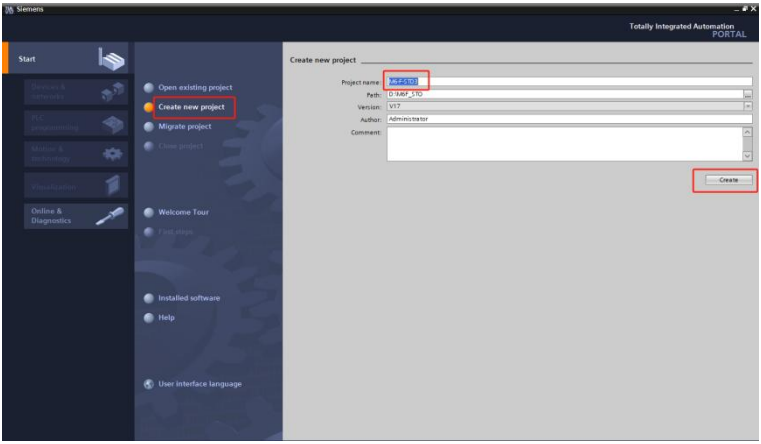
The PLC configures the position axis technology objects, the M6-F model uses Siemens Telegram 105 or Standard Telegram 3, and the control is achieved via PLC Open standard function blocks such as MC_Power or MC_MoveAbsolute. This control method is identified as the centralized control mode (The position control is calculated in PLC).

The PLC uses FB284 (SINA_POS) function block, the M6-F model uses Siemens Telegram 111, and the position control function (Including relative positioning, absolute positioning, etc.) is achieved. This control method is identified as the distributed control mode (The position control is calculated in the drive).

This section details the configuration of the S7-1500 PLC using the TIA Portal V17 engineering tool and the communication connection with the M6-F model via the PROFINET interface.

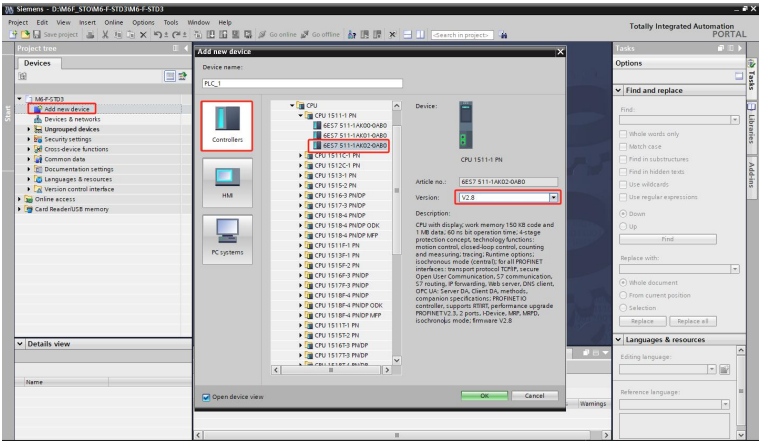
7.7.1.1 Create new project

Create a new project, set the name and path, and click "Create."



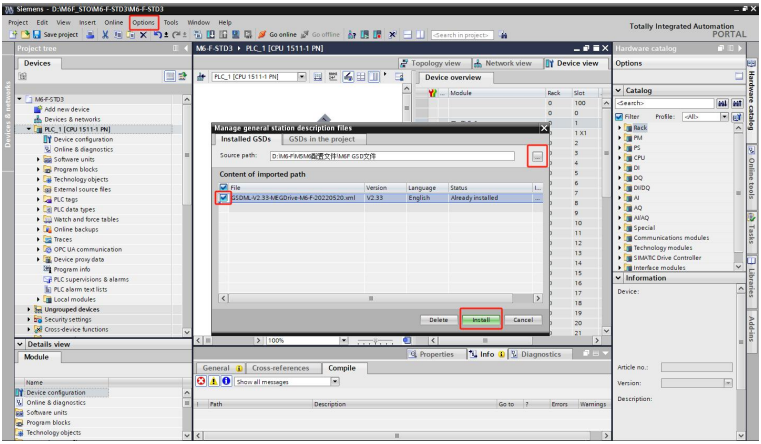
Add PLC device

Double click "Add new device" in the "Project tree" in the left side of the project view, and find the matching PLC device based on the PLC model. In this example, the PLC model is "6ES7 511-1AK02-0AB0". Select successively the following items: "Controllers"→"SIMATICS7-1500"→"CPU"→"CPU 1511-1 PN"→"6ES7 511-1AK0-0AB0"→"V2.8".



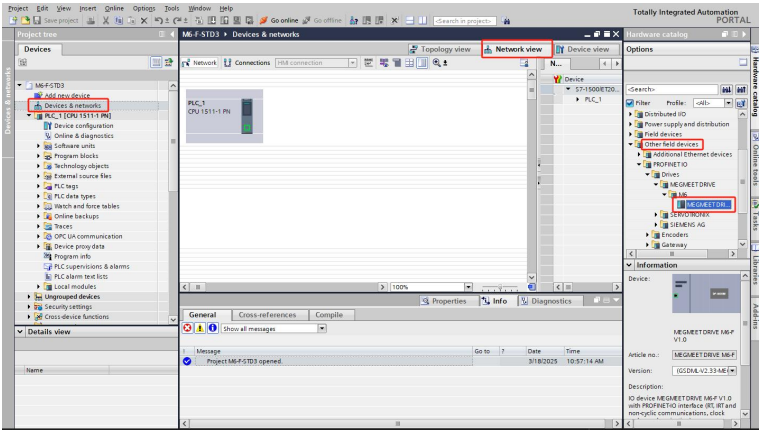
7.7.1.2 Install GSDML file

Install the GSDML file and add the M6-F device. Select successively the following items: "Options" →"Manage general station description files"→"Source path". Select the path of the GSDML file, and click "Install". It would be displayed as "Installed".

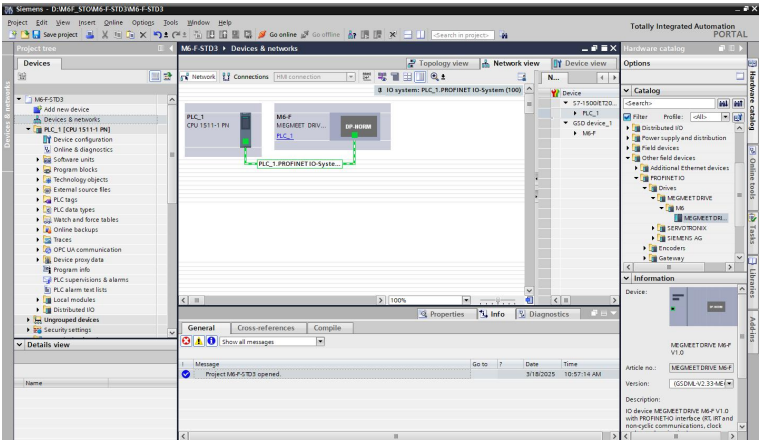


Add M6-F device.

Switch to "Network view" from "Device view". In the "Hardware catalog" to the right, select successively "Other field devices"→"PROFINET IO"→"Drives"→"MEGMEET DRIVE"→"M6"→"MEGMEET DRIVE M6-F V1.0".

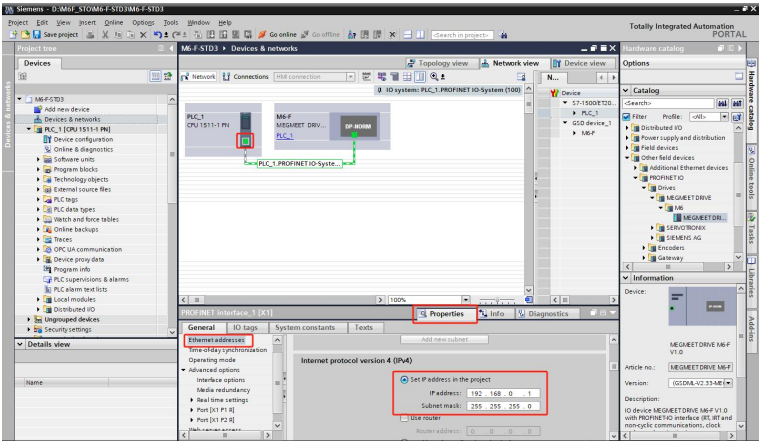


Click the "Unassigned" of the M6-F servo drive, select the I/O controller "PLC_1.PROFINET interface_1", and integrate the PLC and the M6-F into the same PROFINET subnet.

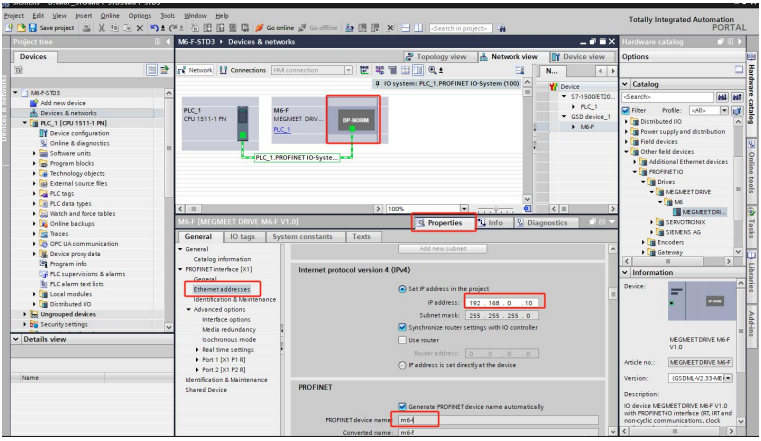


7.7.1.3 IP address and device name configuration

To set the PLC IP address, click the PLC_1 network port, and select successively the following items: "Properties"→"Ethernet addresses"→"Set IP address in the project".

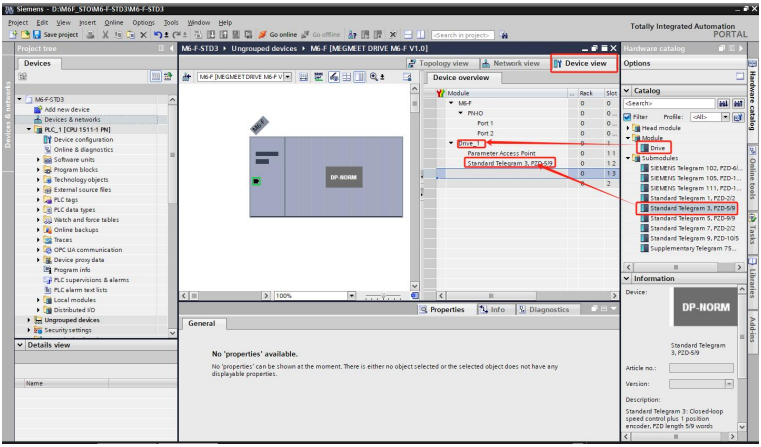


To set the M6-F IP address and device name, click the red frame on M6-F as shown in the image below, and select successively the following items: "Properties"→"Ethernet addresses"→"Set IP address in the project"→"PROFINET device name".



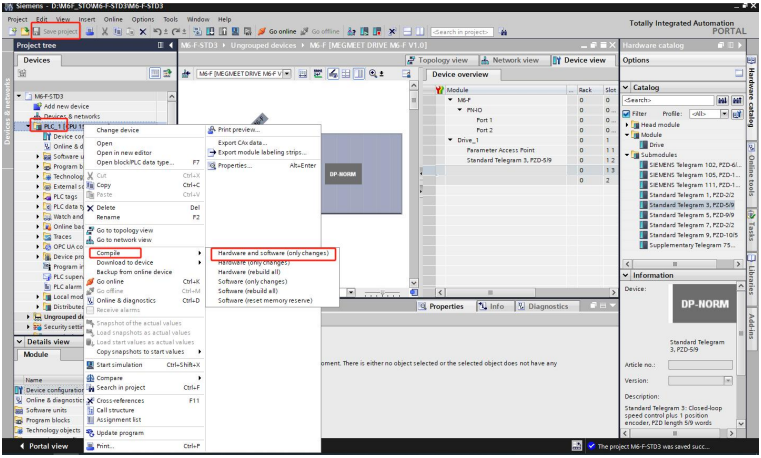
7.7.1.4 Add standard Telegram 3

The following image shows the method of adding the Standard Telegram 3 into the device view. The same method applies to the other standard telegrams and the Siemens telegrams.

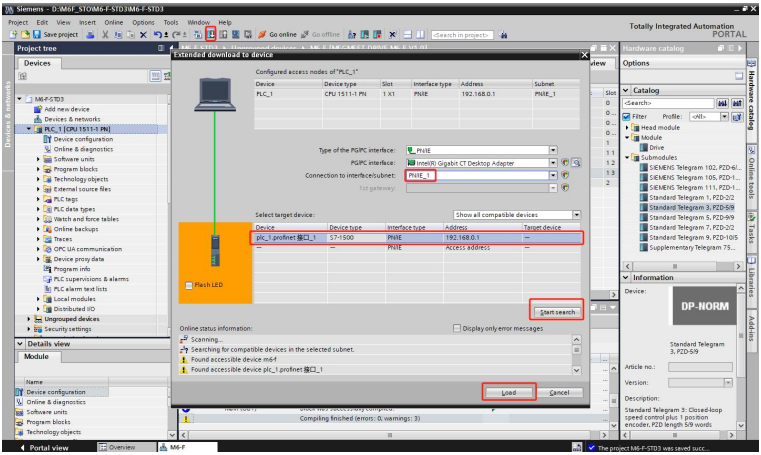


7.7.1.5 Save, compile, and download

Click “Save the project” to save the whole project settings after its configuration is finished. Right click “PLC_1[CPU 1511-1PN]” in the “Project tree” on the left, and select “Compile” in the pop-up list, then choose “Hardware and software (only changes)” to compile the whole project.



Click “Download to device”, and click “Start search” in the pop-up window. It will starts scanning and locating the PLC devices in the network. Select the needed PLC device in the search result list. Download the configuration information and programs into the PLC device by successively clicking “Load” →“Finish”.

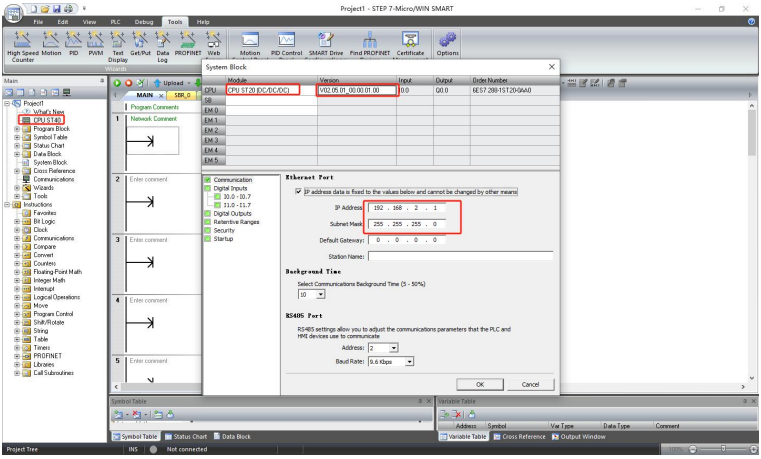


7.7.2 S7-200 SMART configuration

The M6-F series adopts the PROFINET RT and the Siemens Telegram 111 in the communication with the Siemens S7-200 SMART PLC. The configuration procedure of STEP7-Micro/WIN SMART software is as shown below.

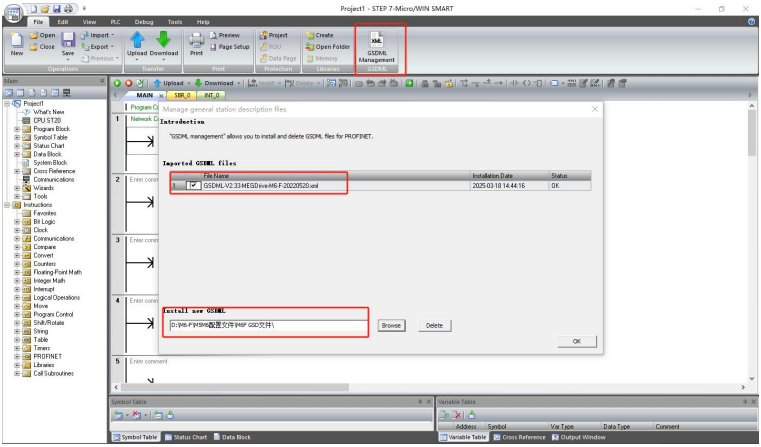
7.7.2.1 Create a project

Create a new project, and select the PLC model in use.



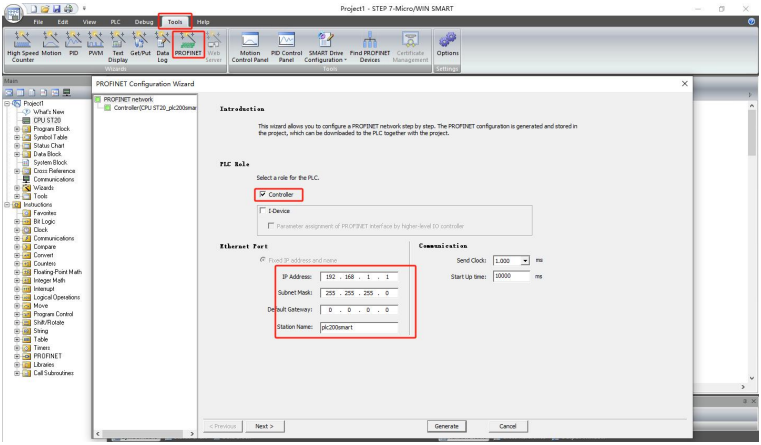
7.7.2.2 Load GSDML file

To load the GSDML files, select successively the following items: "GSDML Management"→"Browse"→ select the path of the GSDML file →"OK".

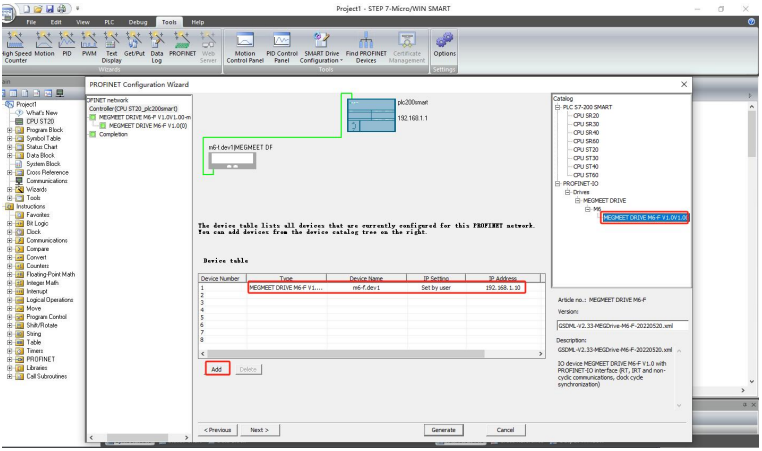


7.7.2.3 Configure the IP address and device name

Click successively "Tools" and "PROFINET", and select "Controller" in "PLC Role" for PROFINET.

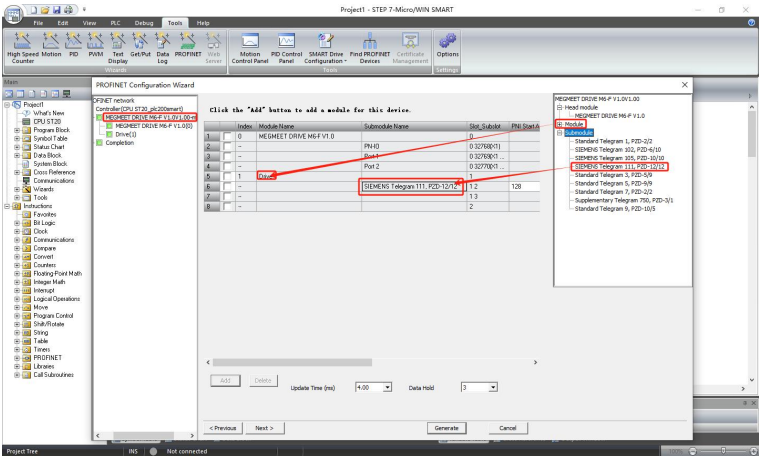


Click "NEXT" to set the IP address and device name for M6-F.



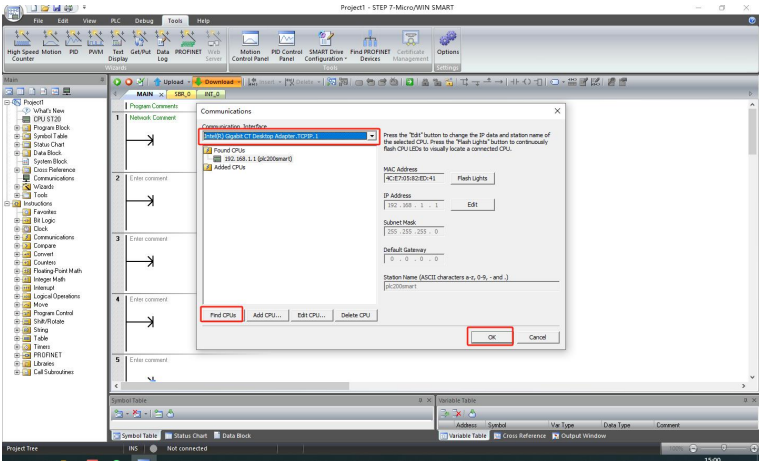
7.7.2.4 Add Siemens Telegram 111

Add “Drive” in the module list, and “SIEMENS Telegram 111” in the sub-module list.

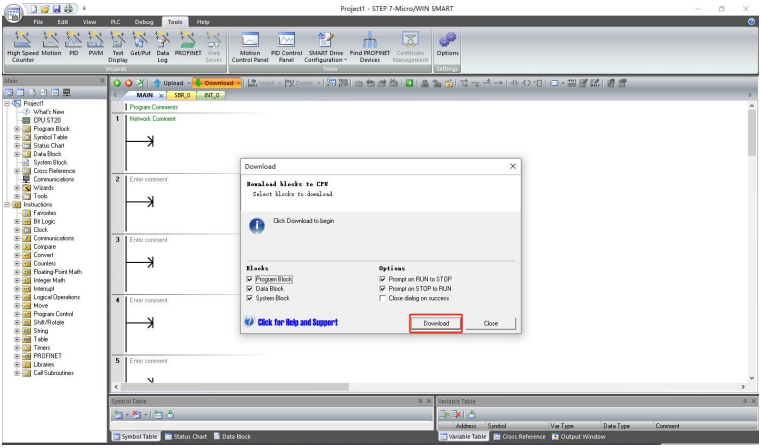


7.7.2.5 Save, compile, and download

Select a computer network card in the communication interface list. Select the PLC and click “OK”



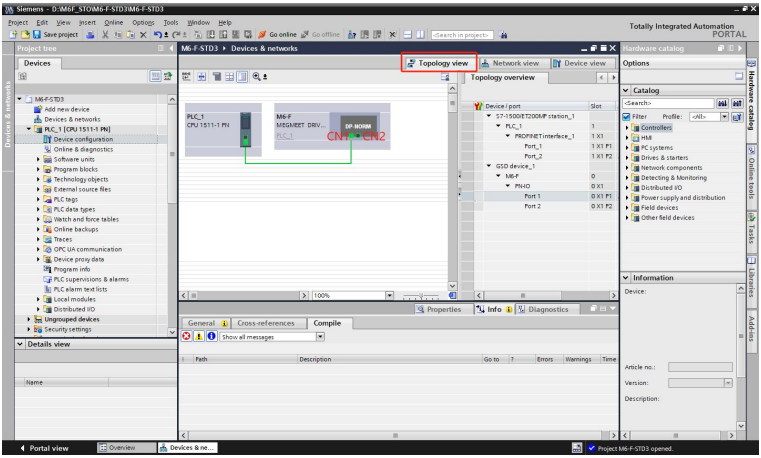
Download the complete project.



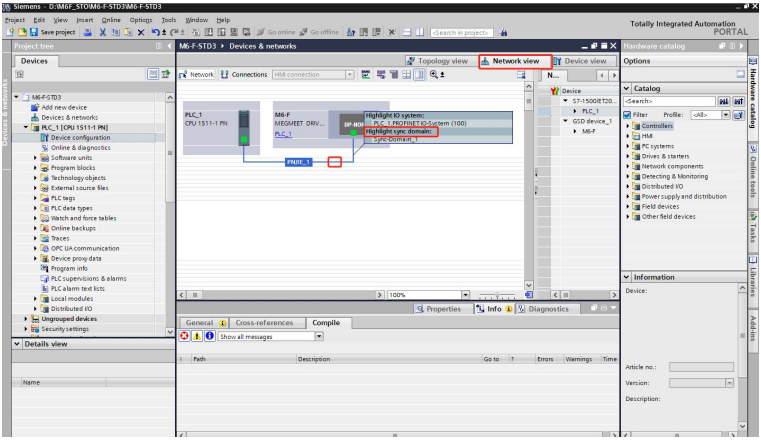
7.8 IRT mode configuration

Only PLC S7-1500 supports IRT configuration. An addition of the following configuration based on the configured RT mode enables the realization of IRT communication.

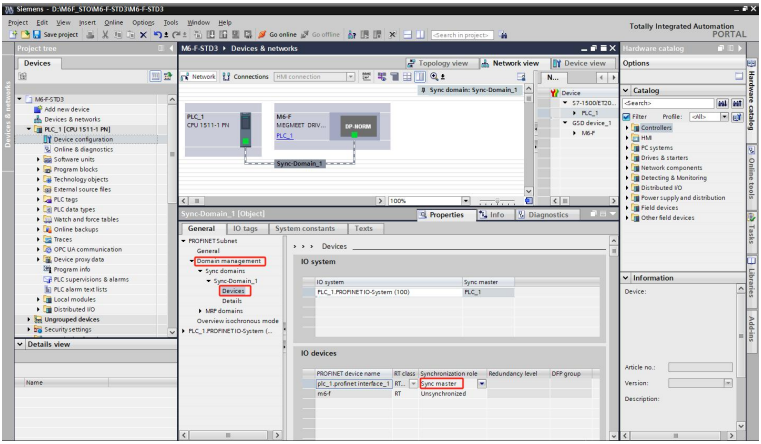
- In the IRT mode, the connection in the Topology view shall be configured in strict consistency with the actual physical connection. However, in the RT mode, there is no need of connection to be made in the Topology view.



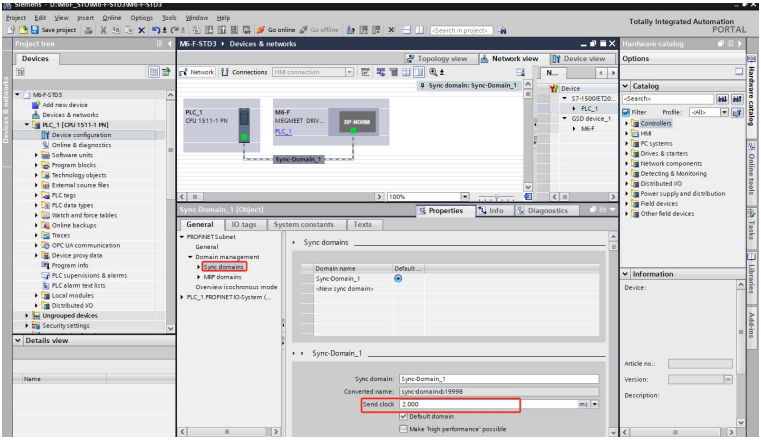
- Configure the synchronization time in the Network view. The minimum value for M6-F is 250 microseconds. Click “Network view”, then click the connecting cable in white and blue/green, and select “Highlight sync domain”.



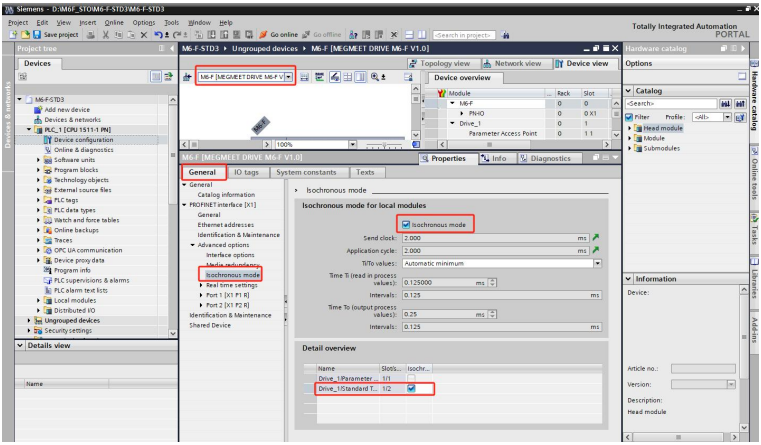
Double click “Sync-Domain_1”, and select successively the following items: “Domain management”→ “Sync domains”→“Sync-Domain_1”→“Devices”→“IO devices”→“Synchronization role”→“Sync master”.



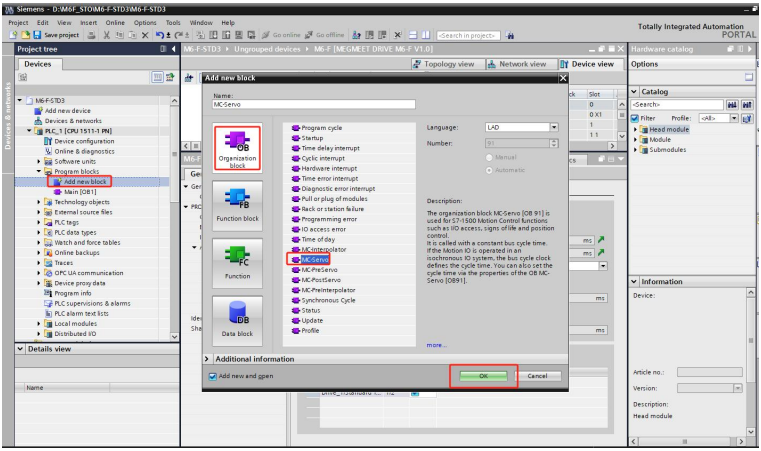
Configure the synchronization time based on the actual demands. Successively select and click the following items: "Domain management"→"Sync domains"→"Sync-Domain_1"→"Send clock".



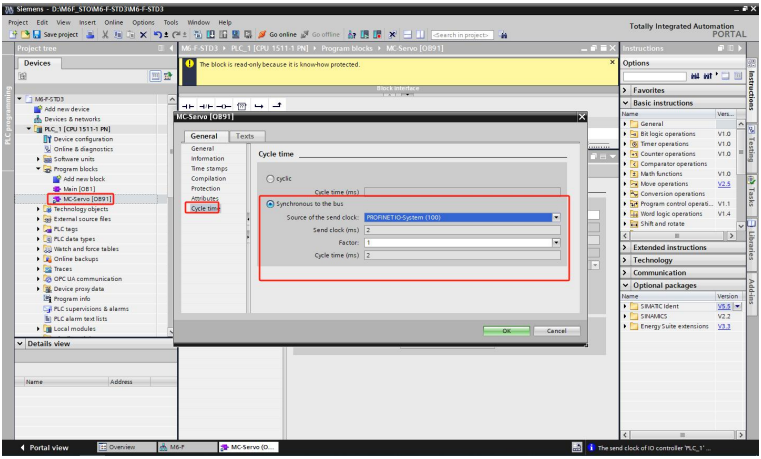
- Configure the M6-F synchronization mode in the Device view. Successively click "Device view"→"M6-F[MEGMEET DRIVE M6-F V1.0]"→"Advanced options"→"Isochronous mode", and tick the box of "Isochronous mode".



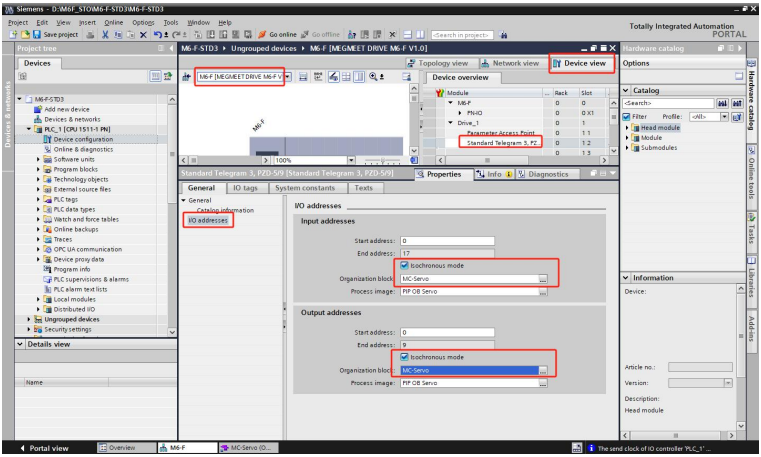
Successively select the following items: "Program blocks"→"Add new block"→"Organization block" →"MC-Servo"→"OK".



Right click "MC-Servo" to enter its property setting. Navigate to the "Cycle time" in the "General" view, select "Synchronous to the bus", and click "OK".



Click successively the following items: "Device view"→"M6-F[MEGMEET DRIVE M6-F V1.0]"→"Standard Telegram 3"→"I/O addresses". Tick the box "Isochronous mode".

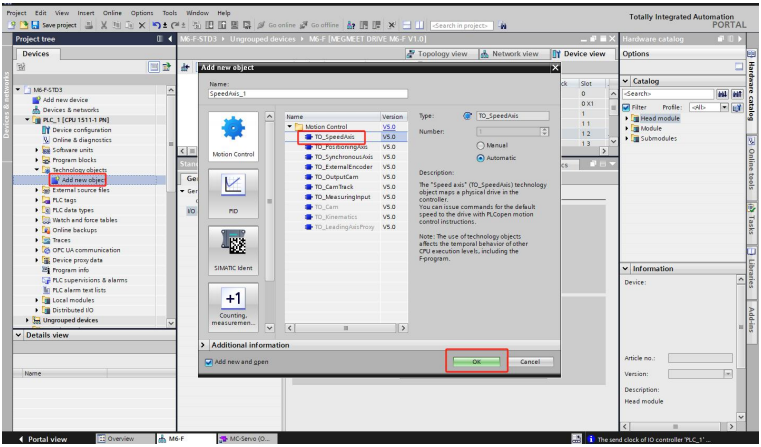


7.9 Axis technology object configuration

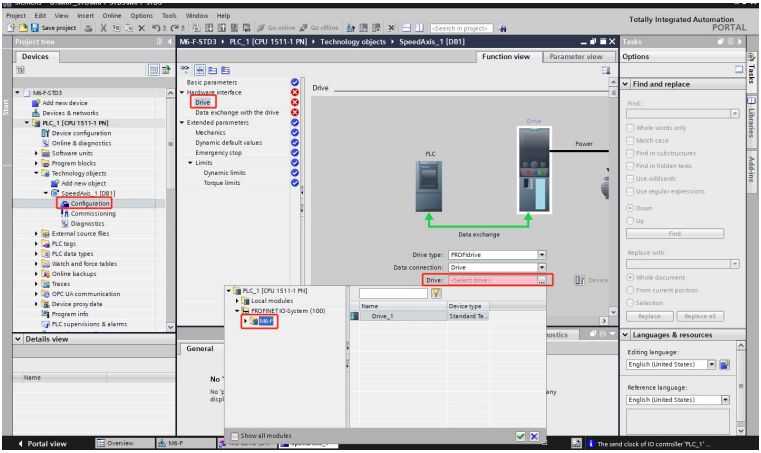
By the addition of axis technology objects, the M6-F series is enabled to use the Telegram 1, 3, 5, 102, and 105 in the configuration with the PLC, and to achieve motion control based on the PLC Open function blocks, such as MC_Power, MC_Reset, MC_Velocity, and MC_MoveRelative.

7.9.1 TO_SpeedAxis

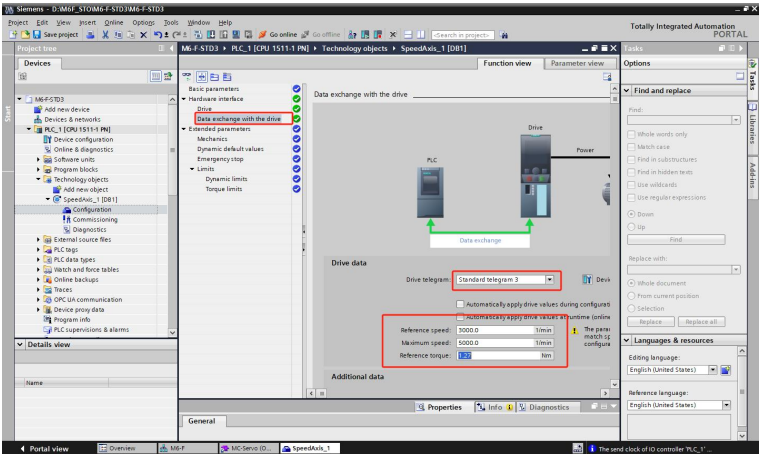
Click successively the following items: "Technology objects"→"Add new object"→"TO_SpeedAxis"→"OK".



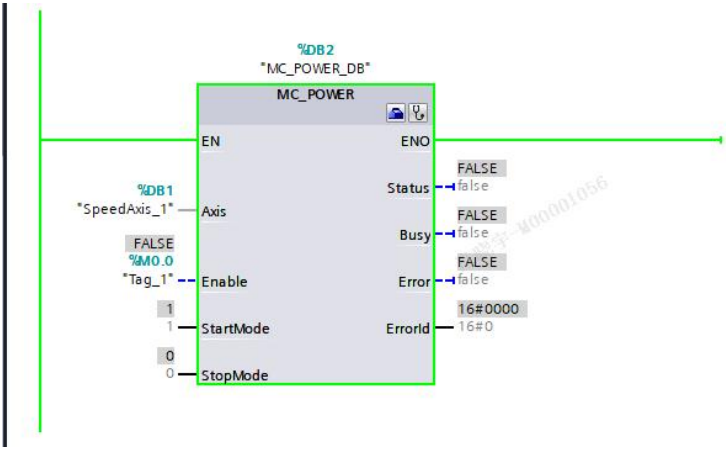
Select "M6-F" in the "Drive" view.

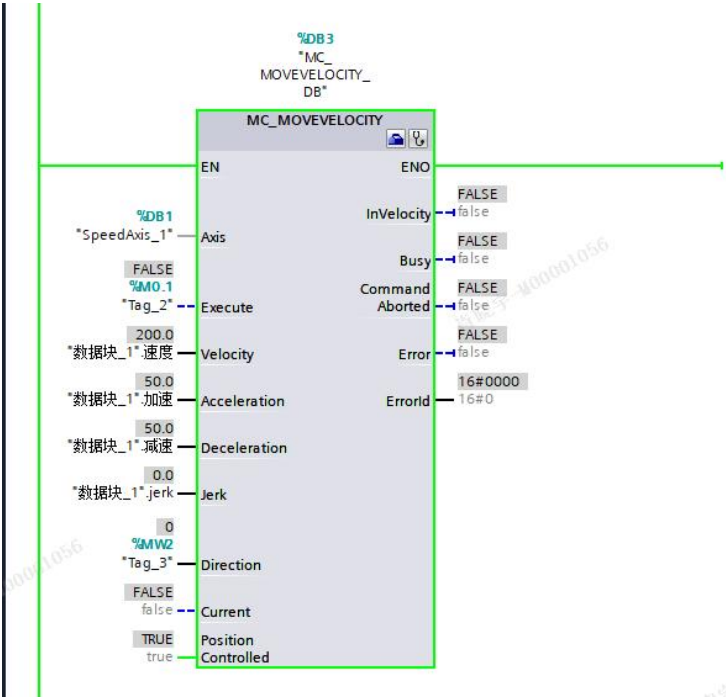


In the "Data exchange with the drive" view, set the values of "Reference speed", "Maximum speed", and "Reference torque" based on the settings of parameters P01.06, P01.07, and P01.04.



Function blocks for the speed axis include: MC_Power, MC_Reset, MC_Velocity, MC_Halt, and MC_MoveJog.

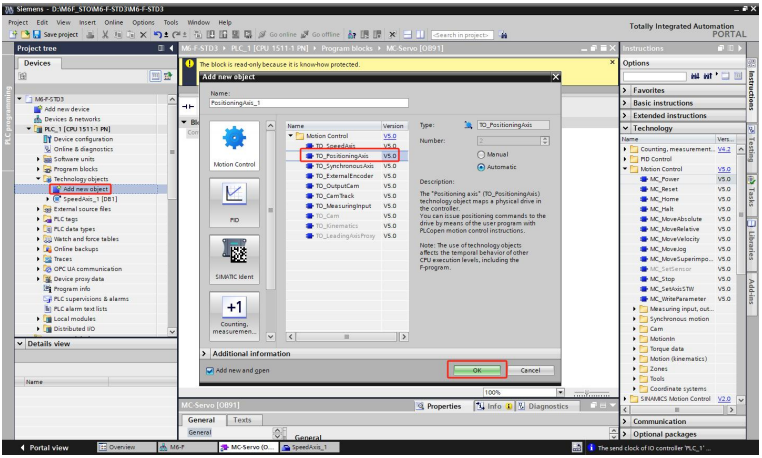




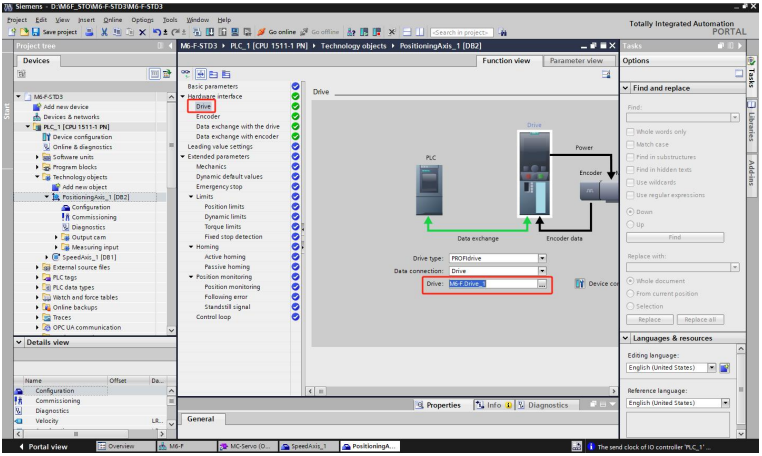
7.9.2 TO_PositioningAxis

7.9.2.1 S7-1500 configuration

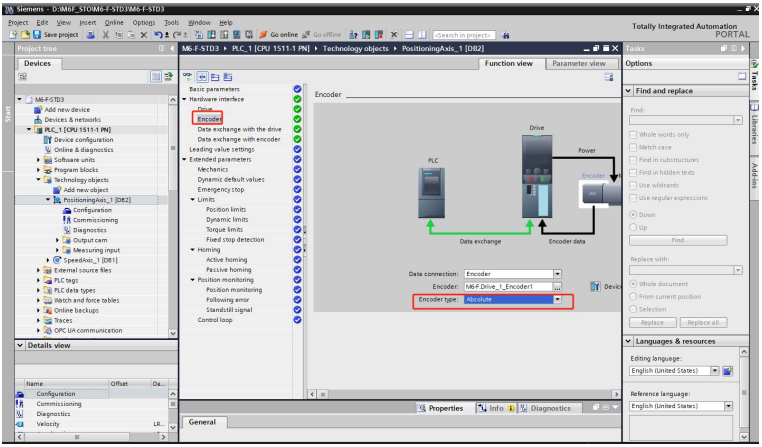
Click successively the following items: "Technology objects"→"Add new object"→"TO_PositioningAxis" →"OK".



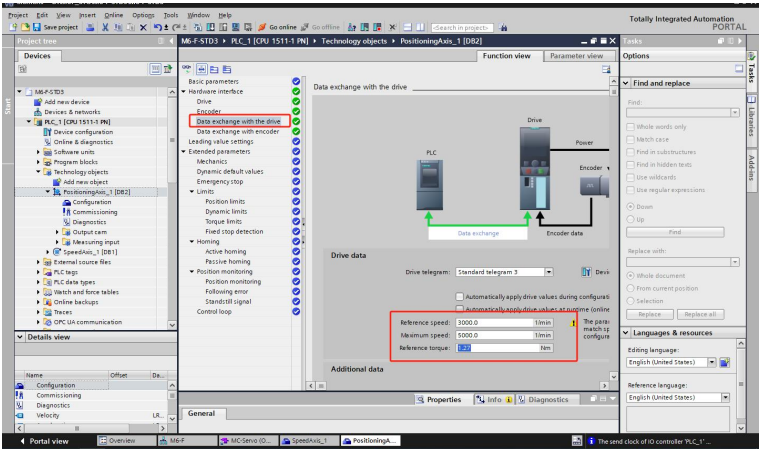
Select "M6-F" in the "Drive" view.



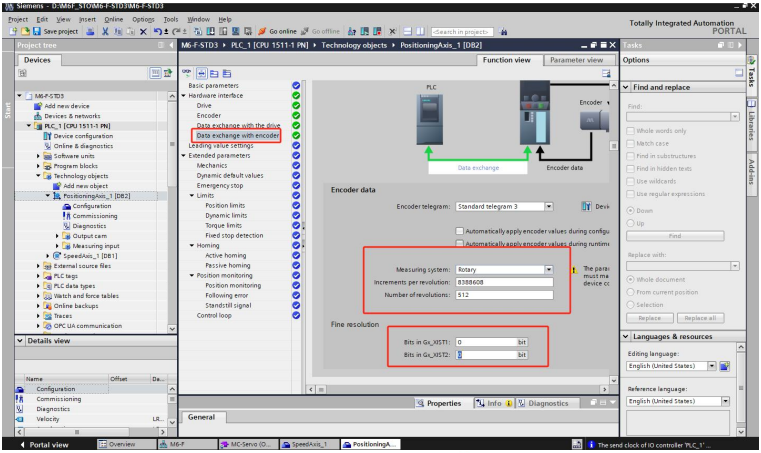
Select the encoder type (incremental/absolute) in accordance with the actual model.



In the "Data exchange with the drive" view, set the values of "Reference speed", "Maximum speed", and "Reference torque" based on the settings of parameters P01.06, P01.07, and P01.04.

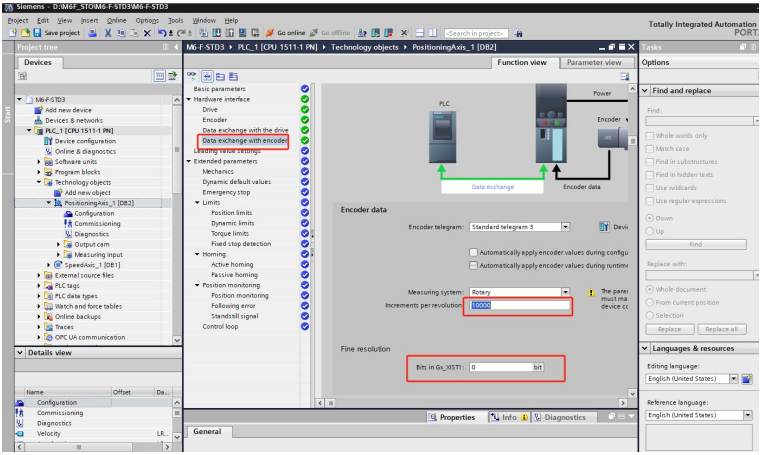


The settings for the 23-bit absolute encoder is as shown below.

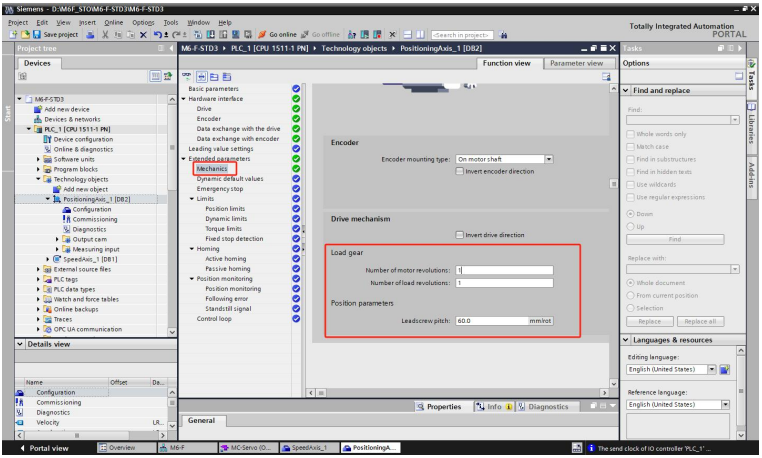


$$\text{Maximum number of revolutions} = \frac{2^{32}}{\text{Increments per revolution} * 2^{G1\_XIST1}}$$

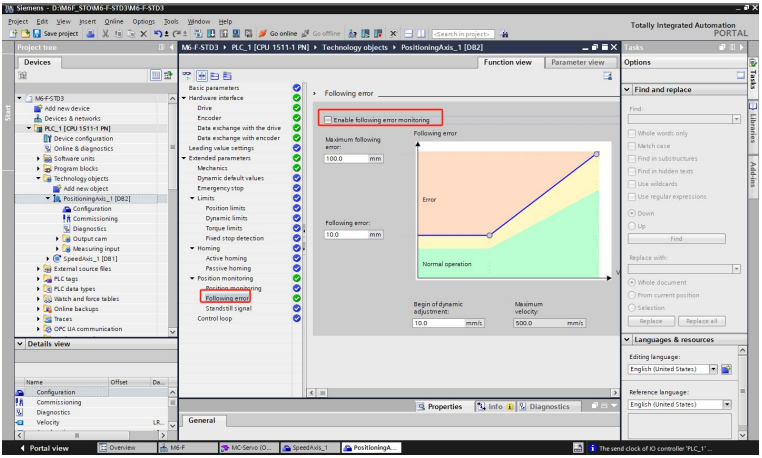
The settings for the 2500-line incremental encoder is as shown below.



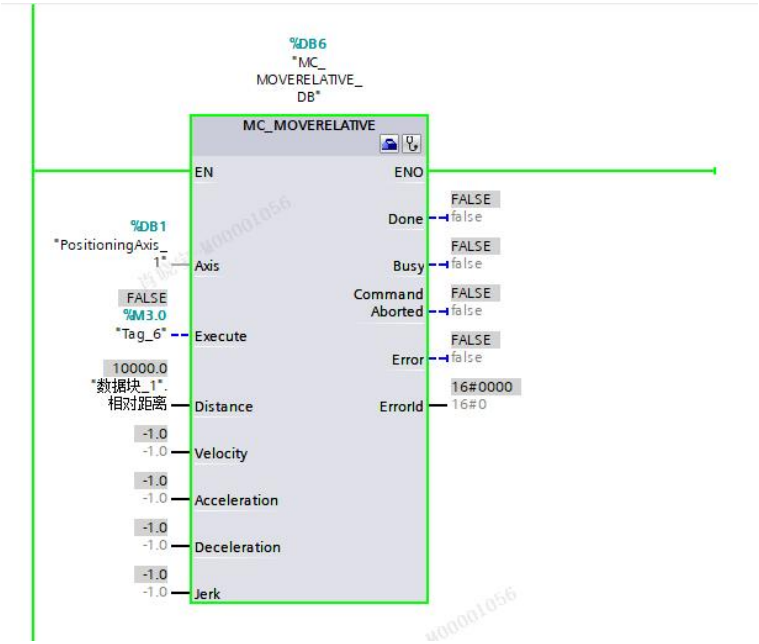
Set the values in the following image based on the corresponding items of the actual mechanical configuration.



The “Enable following error monitoring” selection can be canceled.

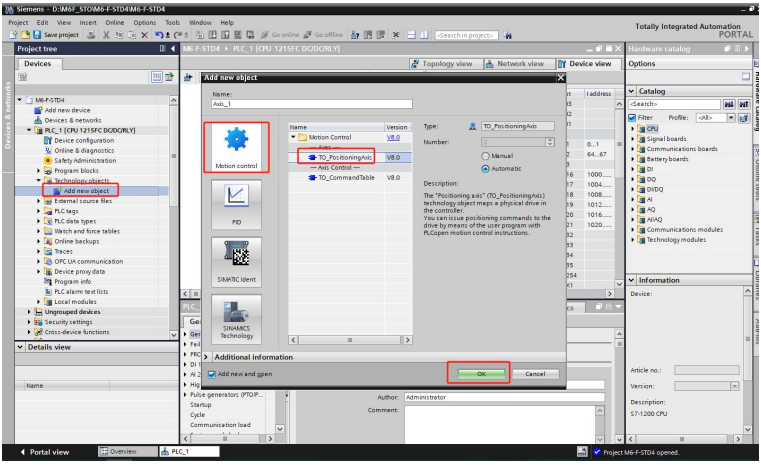


Function blocks for the position axis include: MC_Power, MC_Reset, MC_Velocity, MC_Halt, MC_MoveJog, MC_MoveRelative, and MC_MoveAbsolute.

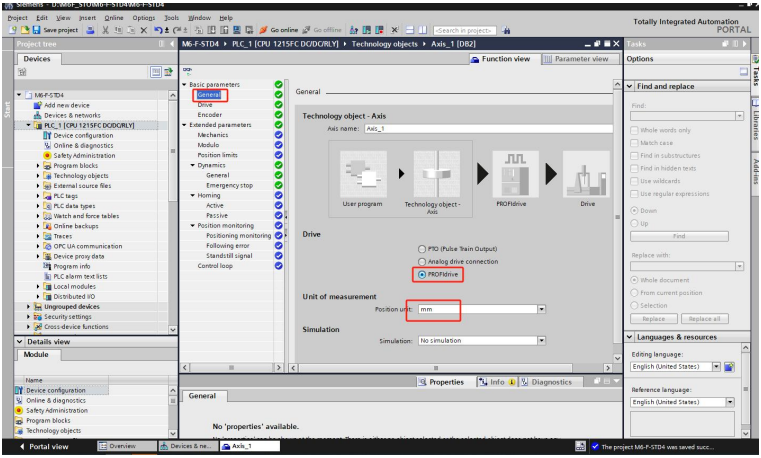


7.9.2.2 S7-1200 configuration

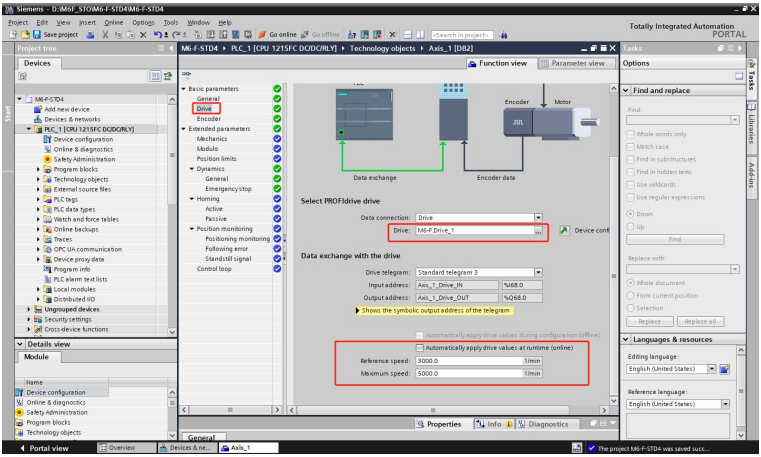
Click successively the following items: "Technology objects"→"Add new object"→"TO_PositioningAxis"→"OK".



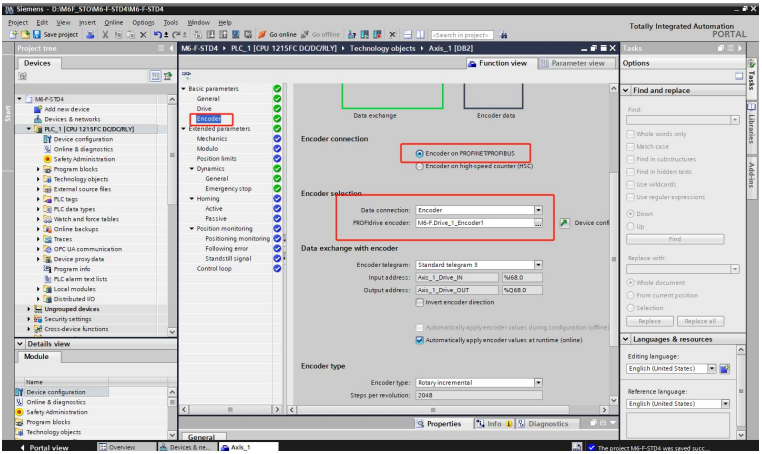
In the "General" view, select "PROFIdrive" and the unit in "Position unit".



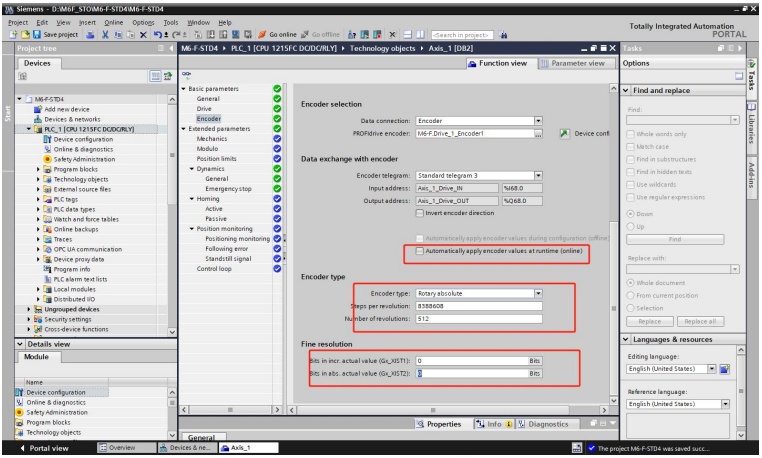
Select "M6-F.Drive_1" in the "Drive" view. Set the values of "Reference speed" and "Maximum speed" based on the settings of parameters P01.06 and P01.07.



Select "Encoder on PROFINET/PROFIBUS" in "Encoder connection". Select "M6-F_Drive_1_Encoder1" in "PROFIdrive encoder".

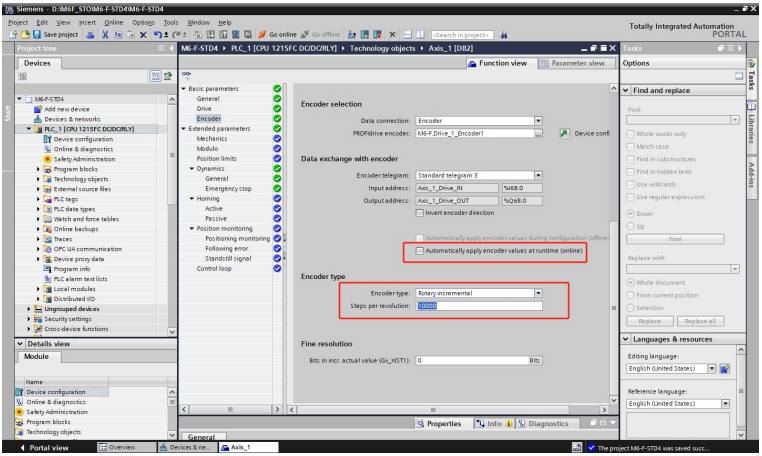


Cancel the selection of "Automatically apply encoder values at runtime (online)". The settings of the 23-bit absolute encoder are as shown below.

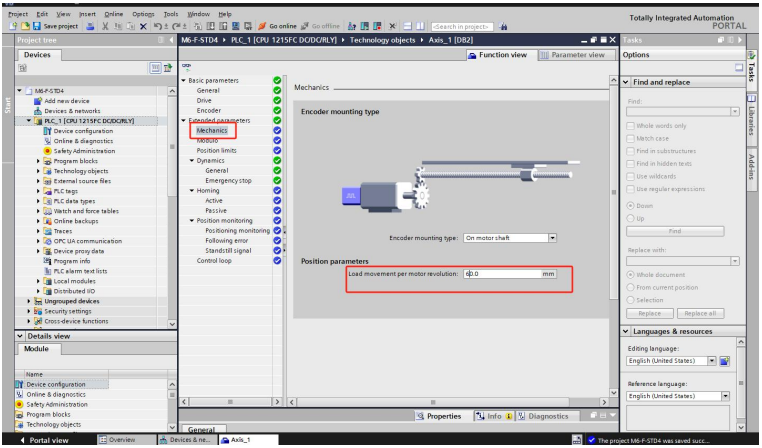


$$\text{Maximum number of revolutions} = \frac{2^{32}}{\text{Increments per revolution} * 2^{G1\_XIST1}}$$

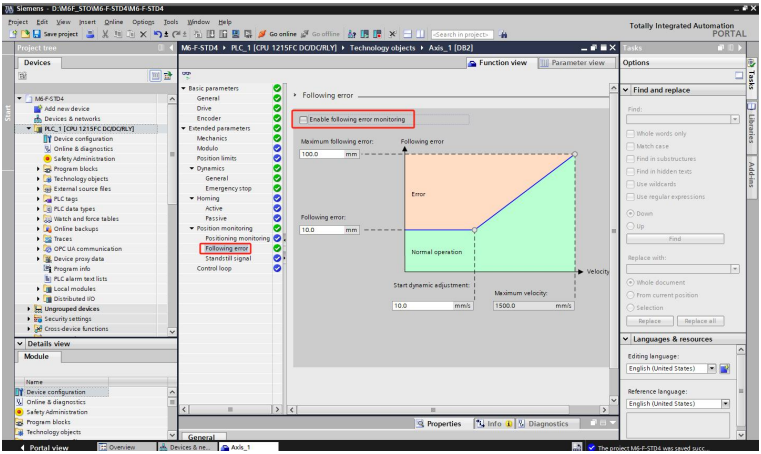
Cancel the selection of "Automatically apply encoder values at runtime (online)". The settings of the 2500-line incremental encoder are as shown below.



Set the value in the following image based on the corresponding item of the actual mechanical configuration.



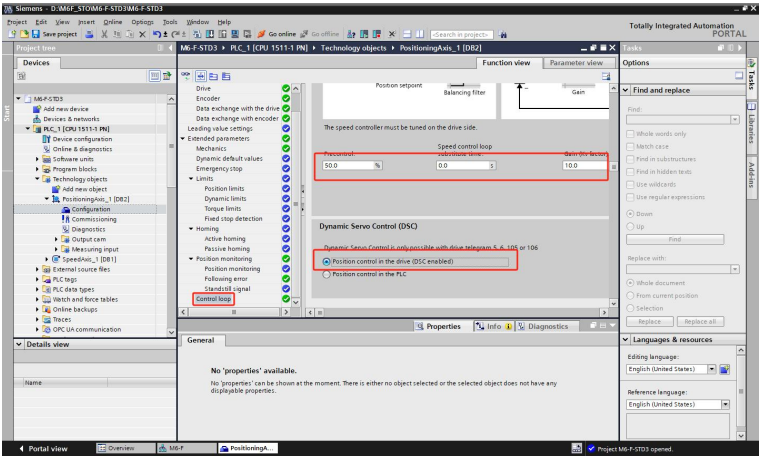
The “Enable following error monitoring” selection can be canceled.



Function blocks for the position axis include: MC_Power, MC_Reset, MC_Velocity, MC_Halt, MC_MoveJog, MC_MoveRelative, and MC_MoveAbsolute.

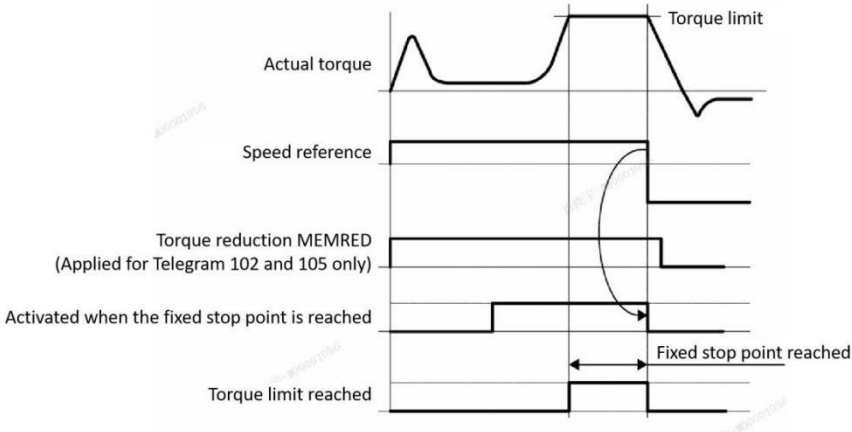
7.9.3 DSC

When configuring the positioning axis or the synchronous axis using the Standard Telegram 5 or the Siemens Telegram 105, the Dynamic Servo Control (DSC) can be applied. Parameter P17.01 = 10000 + telegram number. For example, when the Standard Telegram 5 is used with the DSC function, P17.01 is set to 10005, and, when the Siemens Telegram 105 is used with the DSC function, P17.01 is set to 10105.

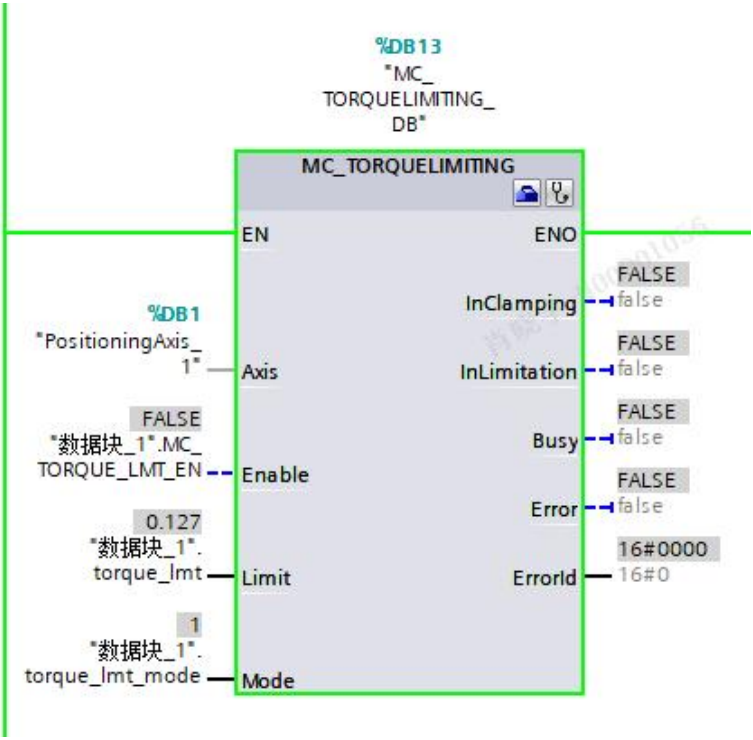


7.9.4 Fixed stop point mode

With the Siemens Telegram 102 or 105, PLC is able to apply the fixed stop point function for the axis technology object. The function block MC_Torquelimiting of "PLC open" is used for the purpose.



When using the MC_Torquelimiting block, the setting of mode = 1 will activate the fixed stop point function. Limit is used to set the torque limit value. MEMRED refers to the torque reduction value, where 0x4000 corresponds to 300% of the torque reduction value. When Limit is set to 0.127 and the torque limit is set to 10%, MEMRED = (3.81-0.127)*0x4000/3.81 = 15838.



7.10 Siemens Telegram 111

The PLC performs the basic positioning function of M6-F via the Siemens Telegram 111 and the function block SINA_POS (FB284). The running modes include: jog, homing, MDI relative positioning, MDI absolute positioning, continuous running, and traversing block.

7.10.1 FB284 introduction

Introduction of the FB284 function block port is as shown below.

	Type	Default	Description
Input			
ModePos	INT	0	Running mode: 1 = Relative positioning 2 = Absolute positioning

	Type	Default	Description
			3 = Constant-speed running (Setup mode) 4 = Active homing (Reference point approach) 5 = Home position direct setting (Set reference point) 6 = Traversing block (0 to 31) 7 = Jog (Velocity-dependent) 8 = Jog (Distance-dependent)
EnableAxis	BOOL	0	Servo running command: 0 = Stop (OFF1) 1 = Start
CancelTraversing	BOOL	1	0 = Cancel the currently running task 1 = Not cancel the currently running task
IntermediateStop	BOOL	1	Pause the running task: 0 = Pause the currently running task 1 = Not pause the currently running task
Positive	BOOL	0	Positive direction
Negative	BOOL	0	Negative direction
Jog1	BOOL	0	Jog signal 1
Jog2	BOOL	0	Jog signal 2
FlyRef	BOOL	0	0 = Not choose homing during running 1 = Choose homing during running
AckError	BOOL	0	Fault reset
ExecuteMode	BOOL	0	Mode of activating the request
Position	DINT	0 [LU]	Position reference when ModePos is set to 1 or 2 Program segment number when ModePos is set to 6
Velocity	DINT	0 [1000 LU/min]	Speed reference when ModePos is set to 1, 2, or 3
OverV	INT	100 [%]	Set the speed percentage 0 to 199%
OverAcc	INT	100 [%]	Set the acceleration percentage 0 to 100% when ModePos is set to 1, 2, or 3

<table>
<tr><th></th><th>Type</th><th>Default</th><th colspan="2">Description</th></tr>
<tr><td>OverDec</td><td>INT</td><td>100 [%]</td><td colspan="2">Set the deceleration percentage 0 to 100% when ModePos is set to 1, 2, or 3</td></tr>
<tr><td rowspan="9">ConfigEPOS</td><td rowspan="9">DWORD</td><td rowspan="9">0</td><td colspan="2">This parameter enables the relative functions for basic positioning. The corresponding functions of bits are shown below.</td></tr>
<tr><td>ConfigEPos</td><td>Bit function description</td></tr>
<tr><td>ConfigEPos.%X0</td><td>OFF2 stop</td></tr>
<tr><td>ConfigEPos.%X1</td><td>OFF3 stop</td></tr>
<tr><td>ConfigEPos.%X2</td><td>Activate software limit</td></tr>
<tr><td>ConfigEPos.%X3</td><td>Activate hardware limit</td></tr>
<tr><td>ConfigEPos.%X6</td><td>Zero position switch signal</td></tr>
<tr><td>ConfigEPos.%X7</td><td>External program block switchover</td></tr>
<tr><td>ConfigEPos.%X8 when ModePos = 2, or 3</td><td>It allows the continuous change of the reference values and allows the changes to take effect immediately.</td></tr>
<tr><td>HWIDSTW</td><td>HW_IO</td><td>0</td><td colspan="2">Hardware identifier of the Telegram 111 in the M6-F Device view</td></tr>
<tr><td>HWIDZSW</td><td>HW_IO</td><td>0</td><td colspan="2">Hardware identifier of the Telegram 111 in the M6-F Device view</td></tr>
<tr><td colspan="5">Output</td></tr>
<tr><td>AxisEnabled</td><td>BOOL</td><td>0</td><td colspan="2">Drive enabled</td></tr>
<tr><td>AxisPosOk</td><td>BOOL</td><td>0</td><td colspan="2">Target position reached</td></tr>
<tr><td>AxisSpFixed</td><td>BOOL</td><td>0</td><td colspan="2">Set position reached</td></tr>
<tr><td>AxisRef</td><td>BOOL</td><td>0</td><td colspan="2">Reference point set</td></tr>
<tr><td>AxisWarn</td><td>BOOL</td><td>0</td><td colspan="2">Drive alarm</td></tr>
<tr><td>AxisError</td><td>BOOL</td><td>0</td><td colspan="2">Drive fault</td></tr>
<tr><td>Lockout</td><td>BOOL</td><td>0</td><td colspan="2">The drive is in the connection prohibit state. Check whether Pin 0 and Pin 1 of the ConfigEPos control bit have been set to 1.</td></tr>
<tr><td>ActVelocity</td><td>DINT</td><td>0</td><td colspan="2">Actual speed [the hexadecimal 40000000h corresponding the speed value set via P01.07]</td></tr>
</table>

	Type	Default	Description
ActPosition	DINT	0	Present position LU
ActMode	INT	0	Currently activated running mode
EPosZSW1	WORD	0	EPOS ZSW1 status
EPosZSW2	WORD	0	EPOS ZSW2 status
ActWarn	WORD	0	Present alarm code of the drive
ActFault	WORD	0	Present fault code of the drive
Error	BOOL	0	1 = Existing error
Status	Word	0	16#7002: No existing error; the function block is working.
DiagID	WORD	0	Existing communication error; error occurred while executing the SFB call.

- Set EnableAxis to 1 to enable the axis. If the axis is ready and there is no existing error of the drive (AxisError = 0), the output AxisEnabled signal changes to 1.
- The input signal CancelTraversing and IntermediateStop are effective for all running modes except for jogging. Set the signal to 1 when running EPOS.
- If the program has executed the variable assignment on ConfigEPos, it is required to confirm that the initial value is set to 3 (That is to set ConfigEPos.%X0 and ConfigEPos.%X1 to 1; if not activated, OFF2 and OFF3 stop staying effective).
- Command unit:

  Position reference unit: PUU (User command unit)

  Speed reference unit: 1000 PUU/min

  Position feedback unit: PUU

  Speed feedback unit: 0.1 rpm

7.10.2 MDI relative positioning (Mode 1)

Steps and conditions:

1. Select the running mode ModePos = 1;
2. Set the drive running command EnableAxis = 1;
3. Set the target position and target speed via the input parameters Position and Velocity;
4. Set the percentage of speed, acceleration, and deceleration via the input parameters OverV, OverAcc, and OverDec; it is required to set the running conditions CancelTraversing and IntermediateStop to 1, and set Jog1 and Jog2 to 0;

5. In relative positioning, the running direction is determined by the positive/negative property of the set value of Position;
6. The positioning motion is triggered by the rising edge of ExecuteMode;
7. When the target position is reached, set to 1 via AxisPosOk.

7.10.3 MDI absolute positioning (Mode 2)

1. Select the running mode ModePos =2;
2. Set the drive running command EnableAxis = 1;
3. Set the target position and target speed via the input parameters Position and Velocity;
4. Set the percentage of speed, acceleration, and deceleration via the input parameters OverV, OverAcc, and OverDec; it is required to set the running conditions CancelTraversing and IntermediateStop to 1, and set Jog1 and Jog2 to 0;
5. In absolute positioning, the running direction is determined by the positive/negative property of the set value of Position;
6. The positioning motion is triggered by the rising edge of ExecuteMode;
7. When the target position is reached, set AxisPosOk to 1.

7.10.4 Constant-speed running (Setup mode; Mode 3)

1. Select the running mode ModePos =3;
2. Set the drive running command EnableAxis = 1;
3. Set the target speed via the input parameter Velocity;
4. Set the percentage of speed, acceleration, and deceleration via the input parameters OverV, OverAcc, and OverDec; it is required to set the running conditions CancelTraversing and IntermediateStop to 1, and set Jog1 and Jog2 to 0;
5. The running direction is determined by Positive and Negative;
6. The positioning motion is triggered by the rising edge of ExecuteMode;
7. When the target position is reached, set AxisPosOk to 1.

7.10.5 Active homing (Reference point approach; Mode 4)

1. Select the running mode ModePos =4;
2. Set the drive running command EnableAxis = 1;

3. The homing switch status is transmitted to M6-F through ConfigEPos.%X6, or obtained by directly setting the homing switch I/O function of M6-F;
4. Set the percentage of speed, acceleration, and deceleration via the input parameters OverV, OverAcc, and OverDec; it is required to set the running conditions CancelTraversing and IntermediateStop to 1, and set Jog1 and Jog2 to 0;
5. The method of homing is set via P12.01;
6. The positioning motion is triggered by the rising edge of ExecuteMode;
7. When the target position is reached, set AxisPosOk to 1.

P12.01	Homing mode	0: Homing in forward direction, and the home switch as the deceleration point and the home position; 1: Homing in backward direction, and the home switch as the deceleration point and the home position; 2: Homing in forward direction, and the motor Z pulse as the deceleration point and the home position; 3: Homing in backward direction, and the motor Z pulse as the deceleration point and the home position; 4: Homing in forward direction, the home switch as the deceleration point, and the motor Z pulse as the home position; 5: Homing in backward direction, the home switch as the deceleration point, and the motor Z pulse as the home position; 6: Homing in forward direction direction, and the positive limit switch as the deceleration point and the home position; 7: Homing in backward direction, and the negative limit switch as the deceleration point and the home position; 8: Homing in forward direction, the positive limit switch as the deceleration point, and the motor Z pulse as the home position; 9: Homing in backward direction, the negative limit switch as the deceleration point, and the motor Z pulse as the home position; 101 to 135: CiA402 homing mode (1 to 35) + 100

Parameters P17.10 (Homing offset type) and P17.11 (Homing offset) can be used in combination with the homing mode, as shown below:

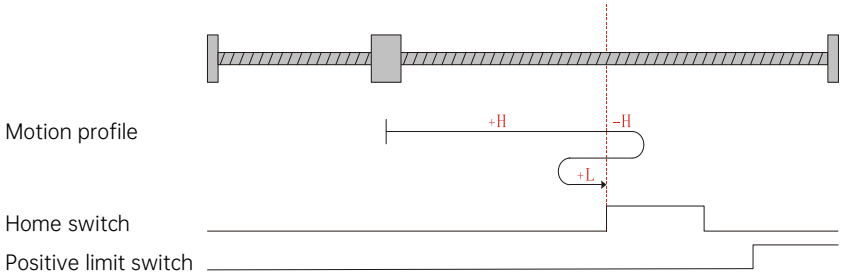
P17.10 = 0, absolute homing; when finished, the homing offset P17.11 is designated as the feedback position;

P17.10 = 1, relative homing; when finished, the added amount of the previous position and the homing offset P17.11 is designated as the feedback position

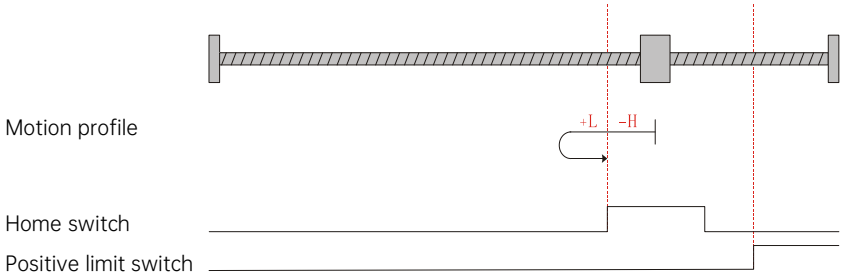
1) P12.01 = 0, homing mode 0

Homing in forward direction, and the home switch as the deceleration point and the home position.

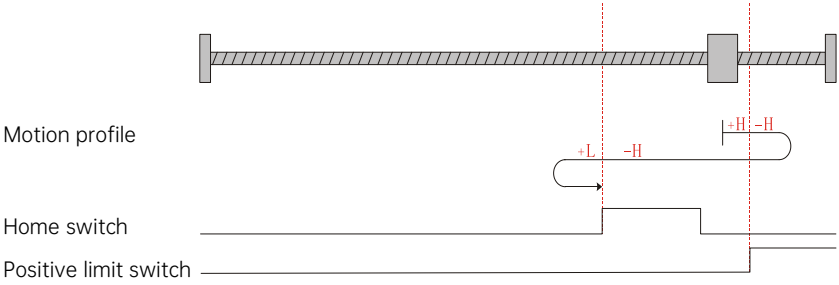
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a high speed and decelerates till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



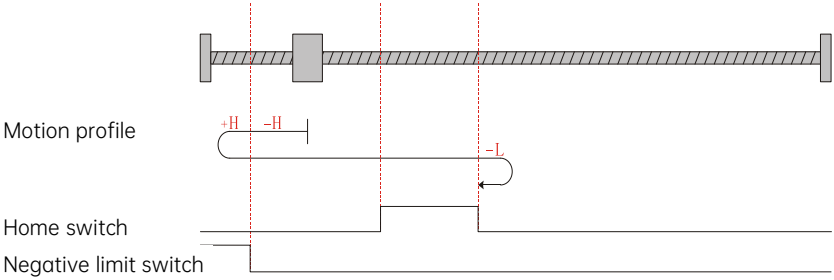
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



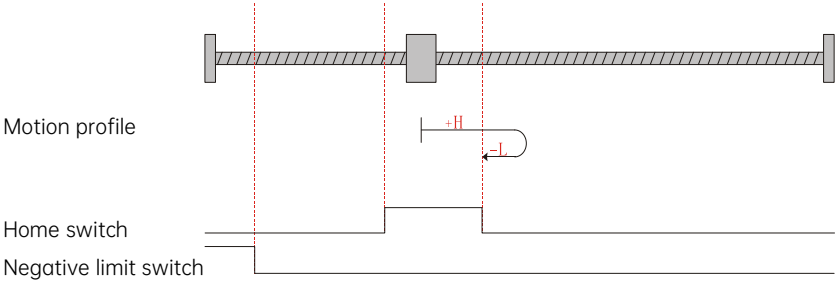
2) P12.01 = 1, homing mode 1

Homing in backward direction, and the home switch as the deceleration point and the home position.

The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stop when the motor reaches the rising edge of the home switch.

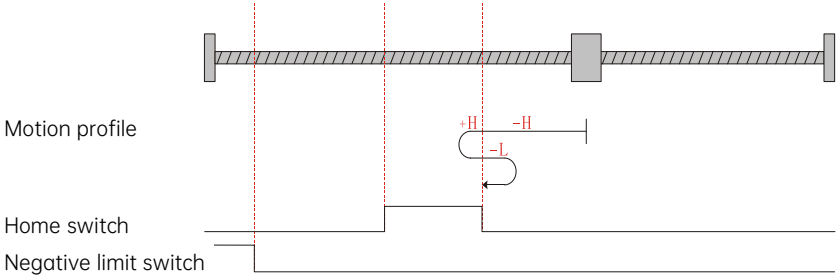


The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is between the home switch and the positive limit switch. When

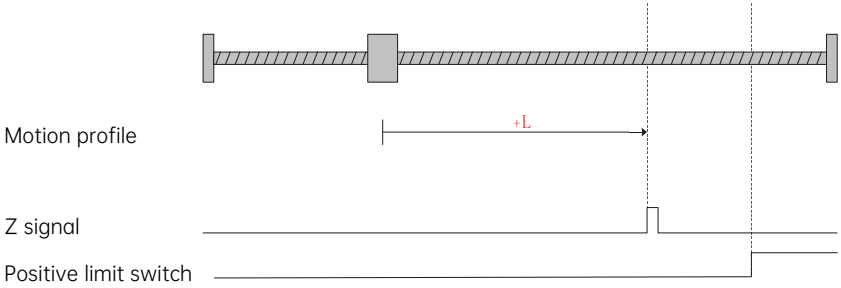
homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



3) P12.01 = 2, homing mode 2

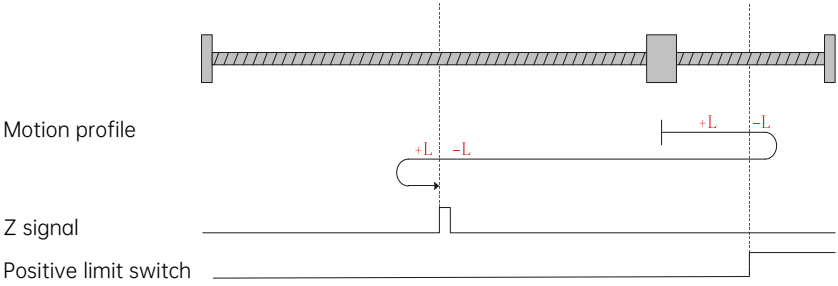
Homing in forward direction, and the Z signal as the deceleration point and the home position.

When there is at least one Z signal between the present motor position and the positive limit switch, homing will be processed in the forward direction at a low speed, and stop when the motor reaches the rising edge of the Z signal.



When the present motor position is at the Z signal, the homing enable will be triggered. The present position will be recognized as the home position immediately, and homing stops.

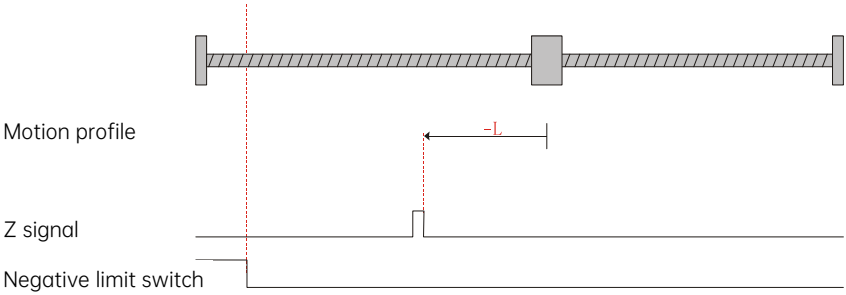
When there is no Z signal between the present motor position and the positive limit switch, homing will be processed in the forward direction at a low speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a low speed till it reaches the falling edge of the Z signal. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the Z signal.



4) P12.01 = 3, homing mode 3

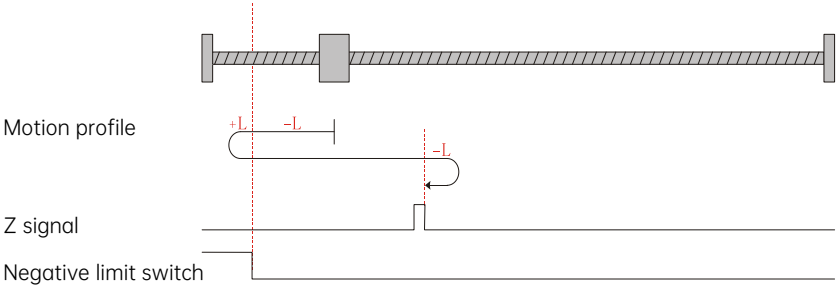
Homing in backward direction, and the motor Z signal as the deceleration point and the home position.

When there is at least one Z signal between the present motor position and the negative limit switch, homing will be processed in the backward direction at a low speed, and stop when the motor reaches the rising edge of the Z signal.



When the present motor position is at the Z signal, the homing enable will be triggered. The present position will be recognized as the home position immediately, and homing stops.

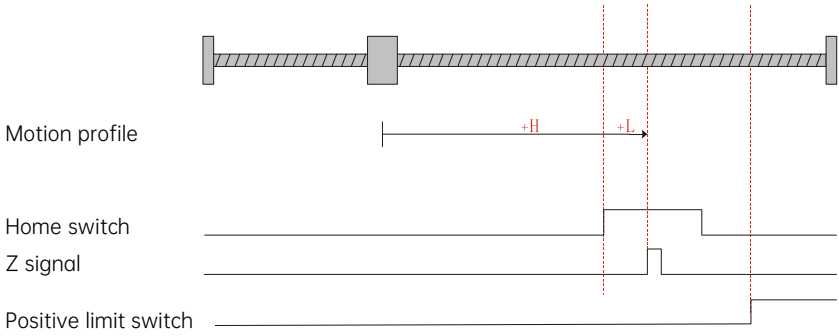
When there is no Z signal between the present motor position and the negative limit switch, homing will be processed in the backward direction at a low speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at low speed till it reaches the falling edge of the Z signal. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the Z signal.



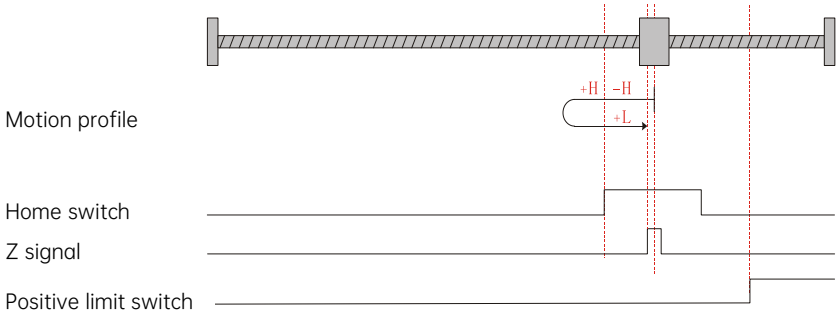
5) P12.01 = 4, homing mode 4

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

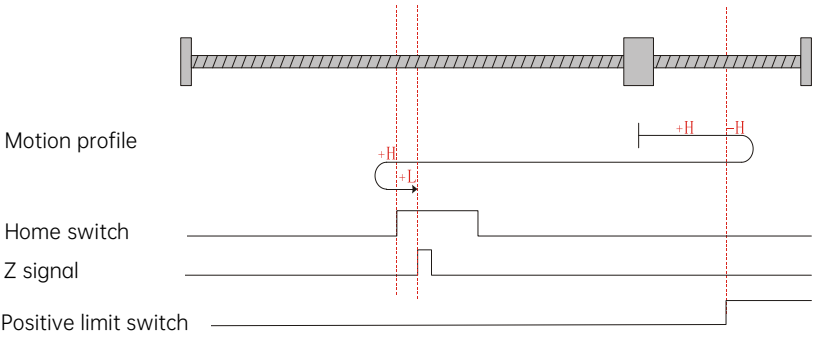
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a high speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing it processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



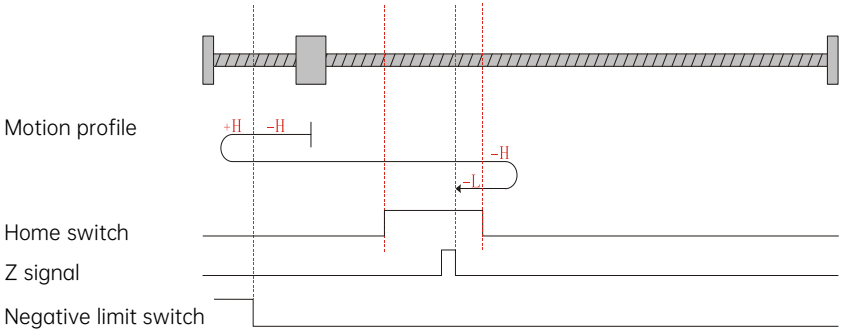
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Following that, homing continues in the forward direction at a low speed, and stops when the motor reached the rising edge of the Z signal.



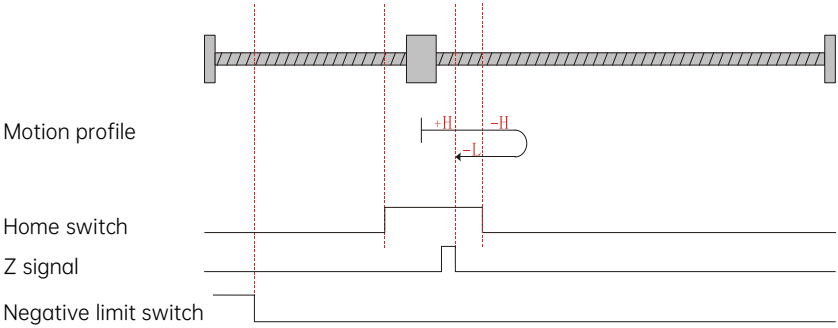
6) P12.01 = 5, homing mode 5

Homing in backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

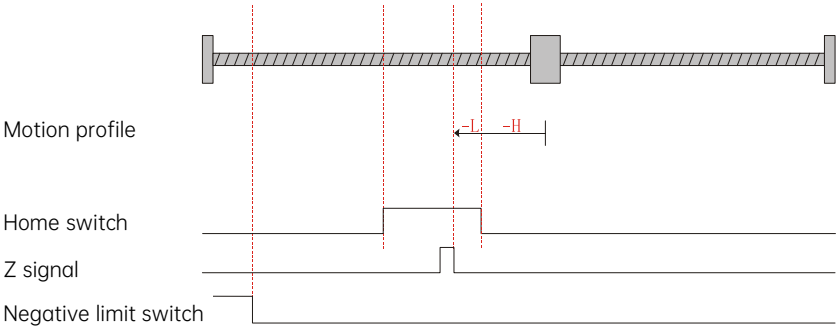
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Following that, homing continues at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



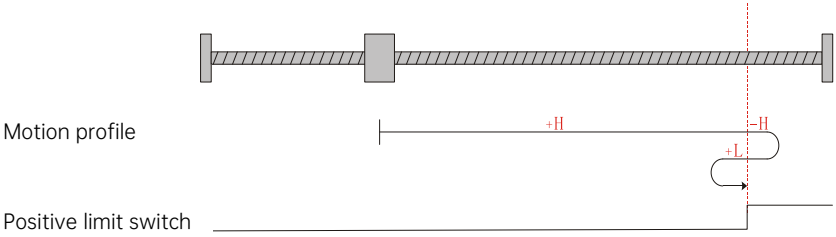
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a high speed and decelerates till it reaches the rising edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



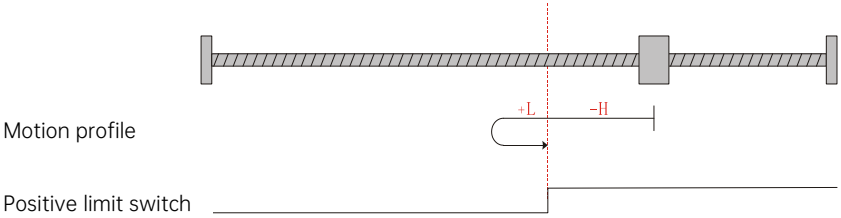
7) P12.01 = 6, homing mode 6

Homing in forward direction, and the positive limit switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the positive limit switch. When homing starts, the positive limit switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the positive limit switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the positive limit switch.



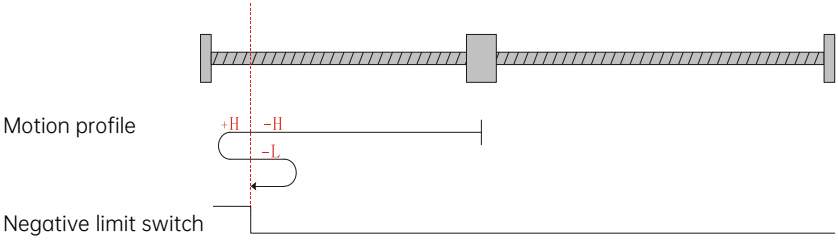
The present motor position is at the positive limit switch. When homing starts, the positive limit switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the positive limit switch. Then , homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the positive limit switch.



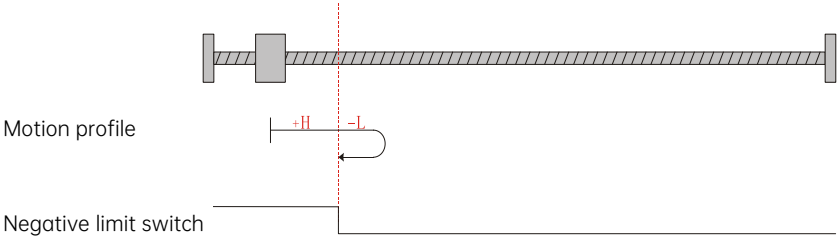
8) P12.01 = 7, homing mode 7

Homing in backward direction, and the negative limit switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the negative limit switch. When homing starts, the negative limit switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the negative limit switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the negative limit switch.



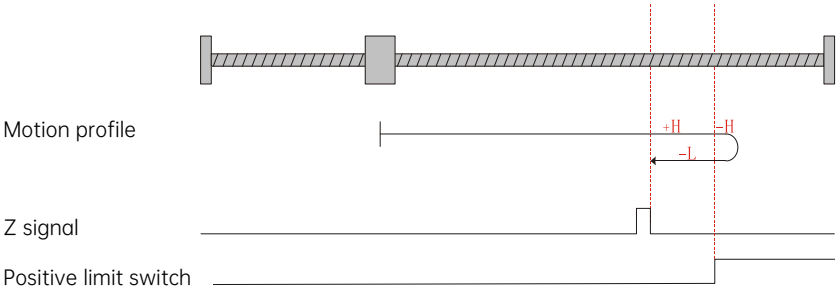
The present motor position is at the negative limit switch. When homing starts, the negative limit switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the negative limit switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the negative limit switch.



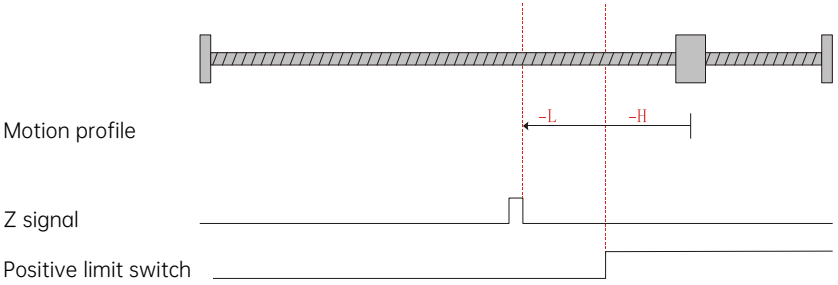
9) P12.01 = 8, homing mode 8

Homing in forward direction, the positive limit switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is in the non-effective zone of the positive limit switch. When homing starts, the positive limit switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the positive limit switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is at the positive limit switch. When homing starts, the positive limit switch is at a high level, and homing is processed in the backward direction at a high speed till ti reaches the falling edge of the positive limit switch. Then, homing continues in the backward direction in a low speed, and stops when the motor reaches the rising edge of the Z signal.

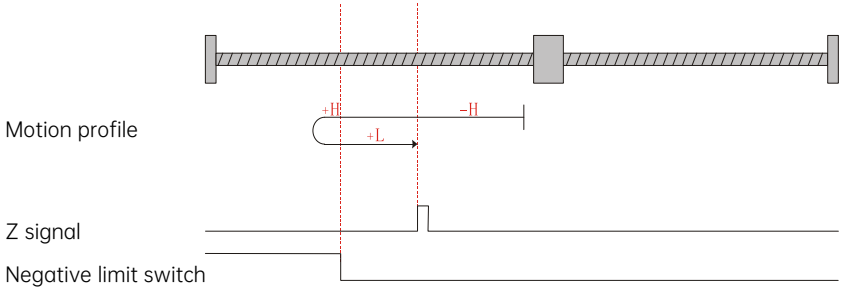


10) P12.01 = 9, homing mode 9

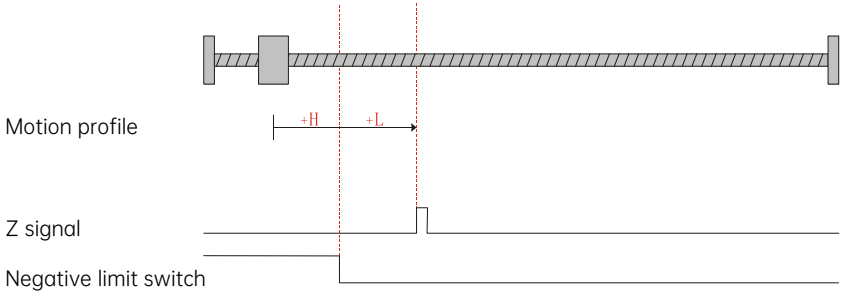
Homing in backward direction, the positive limit switch as the deceleration point, and the motor Z

signal as the home position.

The present motor position is in the non-effective zone of the negative limit switch. When homing starts, the negative limit switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the negative limit switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



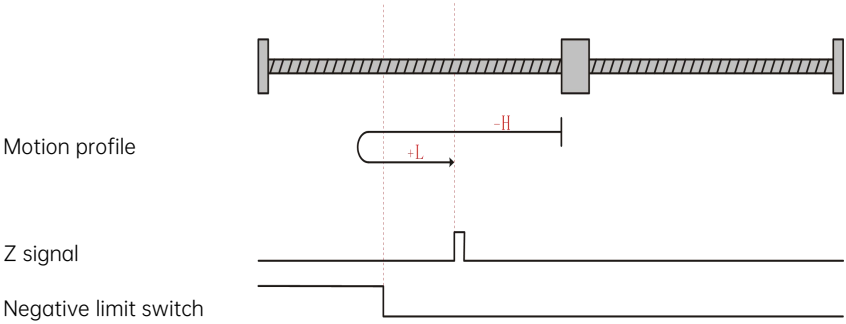
The present motor position is at the positive limit switch. When homing starts, the negative limit switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the negative limit switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



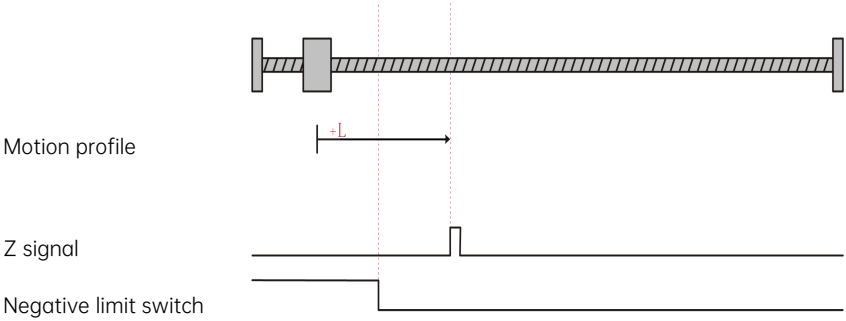
11) P12.01 = 101, homing mode 101

Homing in backward direction, the negative limit switch as the deceleration point, and the motor Z signal as the home position..

The present motor position is in the non-effective zone of the negative limit switch. When homing starts, the negative limit switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the negative limit switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



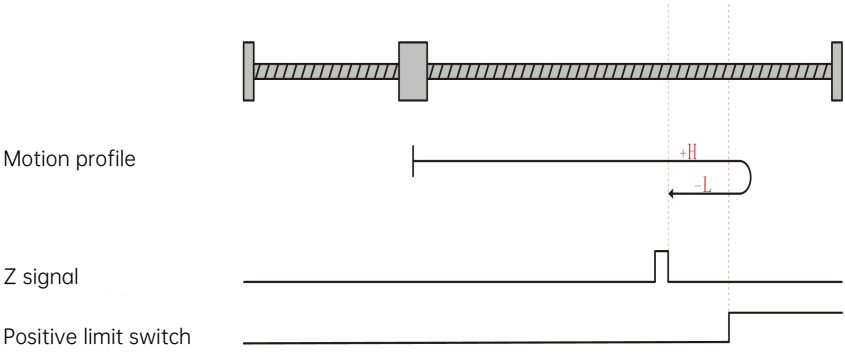
The present motor position is at the negative limit switch. When homing starts, the negative limit switch is at a high level, and homing is processed in the forward direction at a low speed till it reaches the falling edge of the negative limit switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



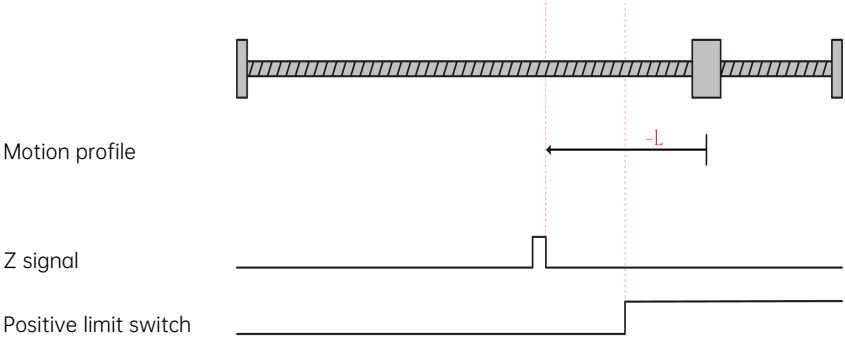
12) P12.01 = 102, homing mode 102

Homing in forward direction, the positive limit switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is in the non-effective zone of the positive limit switch. When homing starts, the positive limit switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a low speed till it reaches the falling edge of the positive limit switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



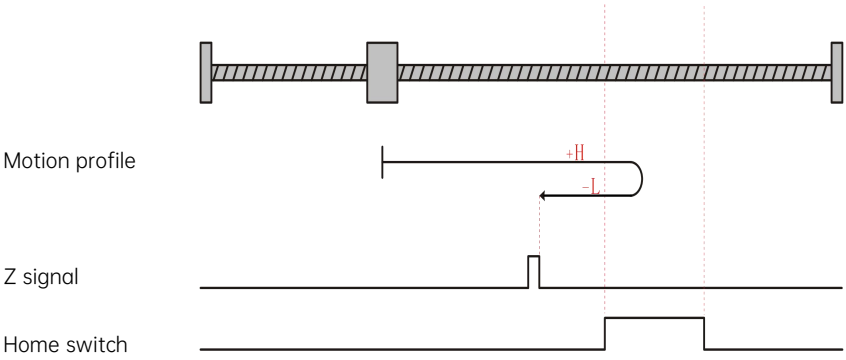
The present motor position is at the positive limit switch. When homing starts, the positive limit switch is at a high level, and homing is processed in the backward direction at a low speed till it reaches the falling edge of the positive limit switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



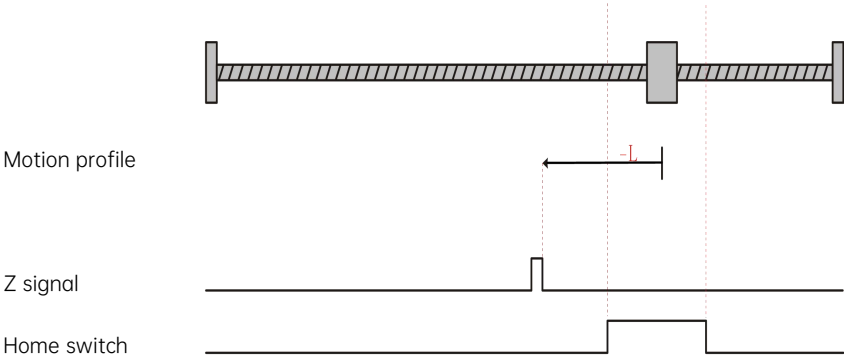
13) P12.01 = 103, homing mode 103

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a low speed till it reaches the falling edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



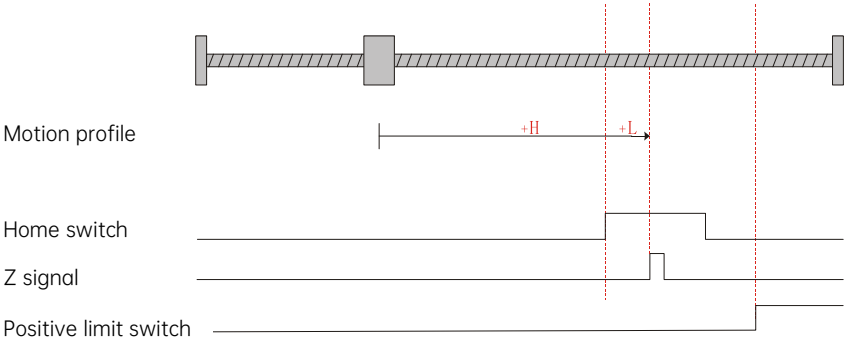
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed till it reaches the falling edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



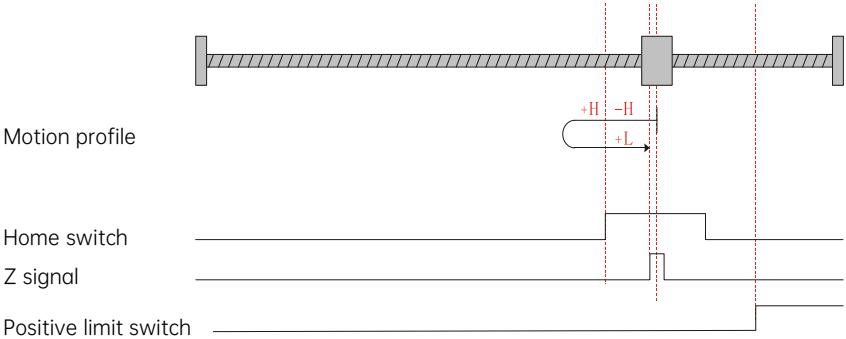
14) P12.01 = 104, homing mode 104

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

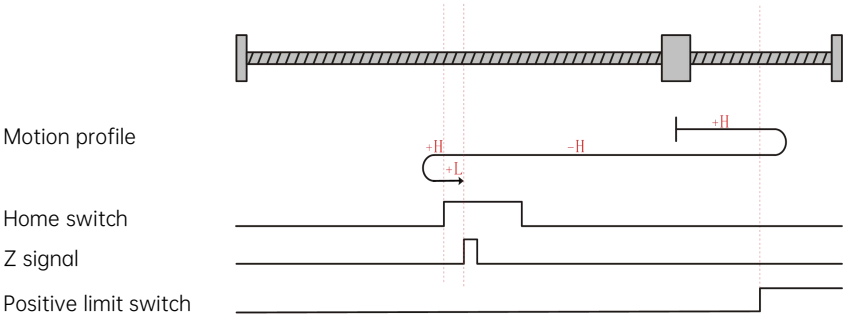
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is the in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



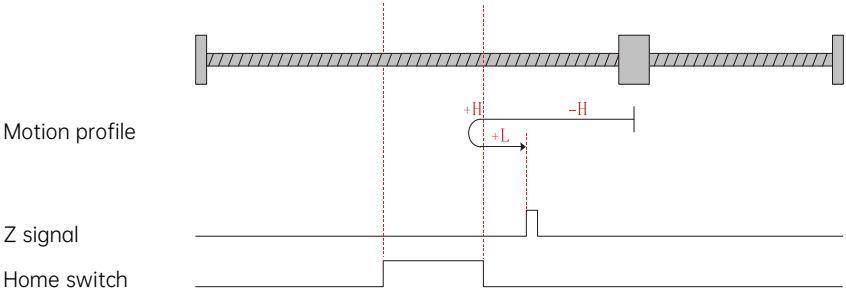
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Following that, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



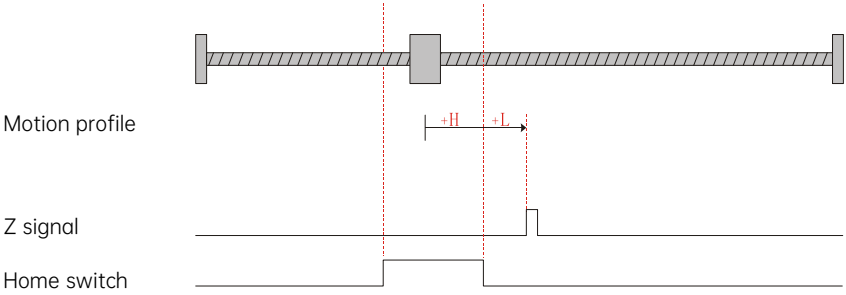
15) P12.01 = 105, homing mode 105

Homing in backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



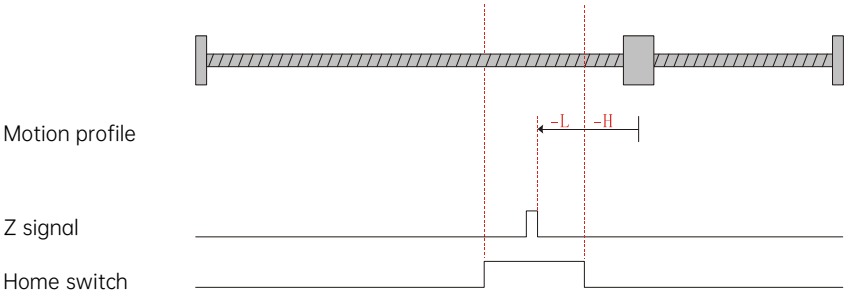
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



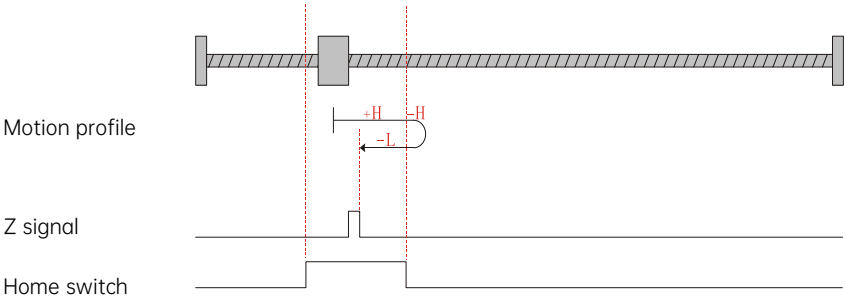
16) P12.01 = 106, homing mode 106

Homing in backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.

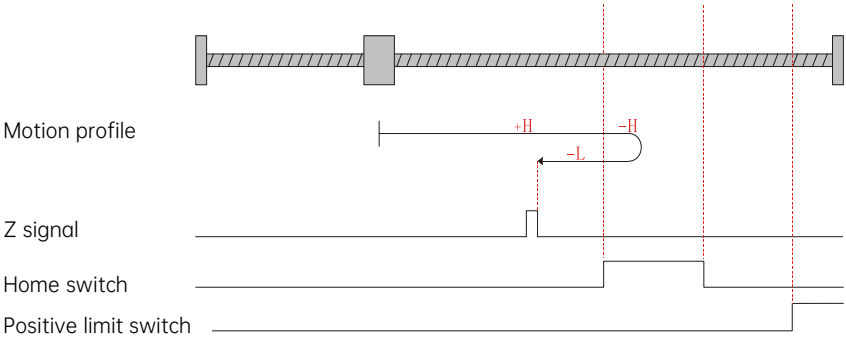


17) P12.01 = 107, homing mode 107

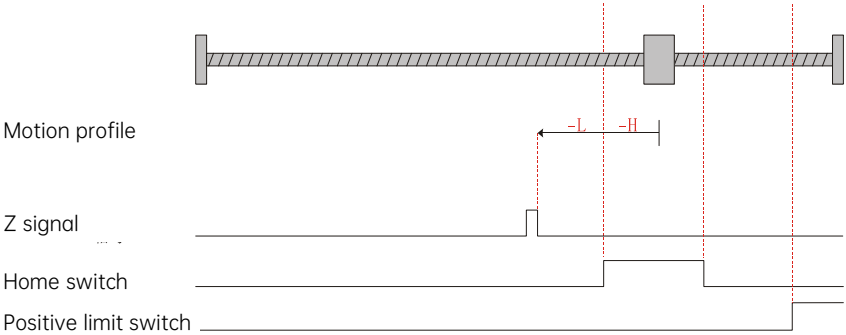
Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the

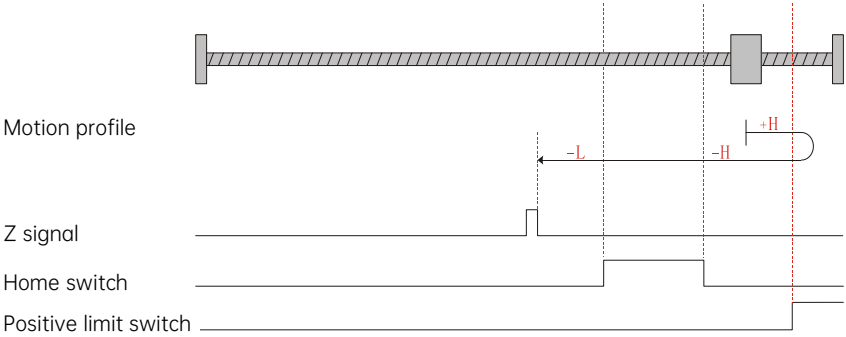
rising edge of the Z signal.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



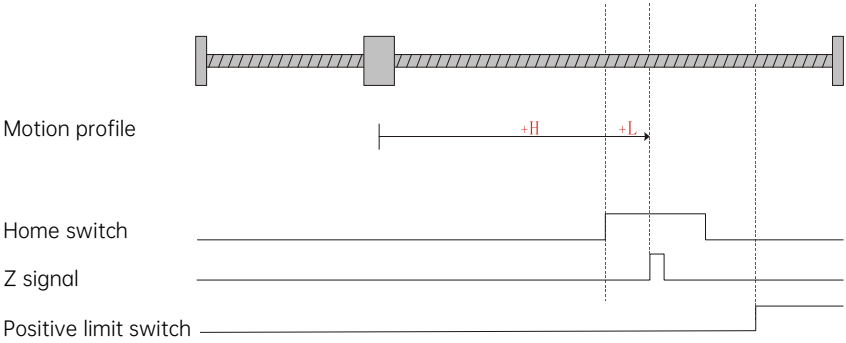
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



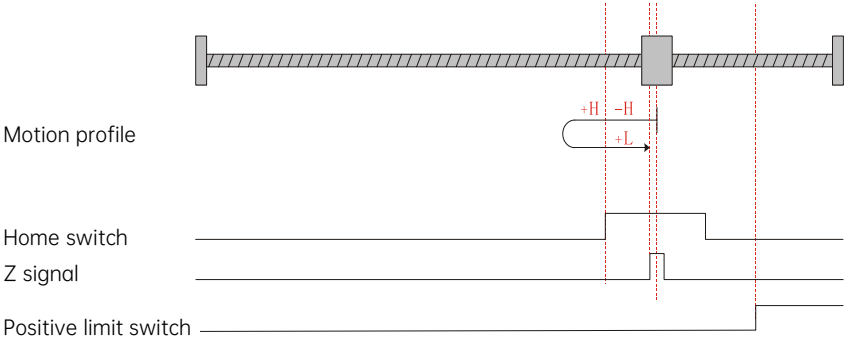
18) P12.01 = 108, homing mode 108

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

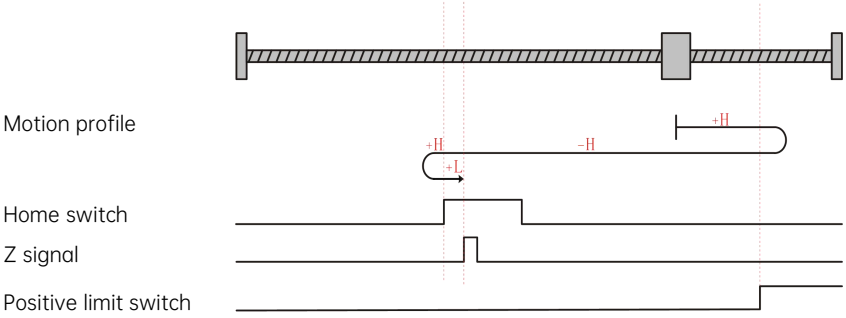
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



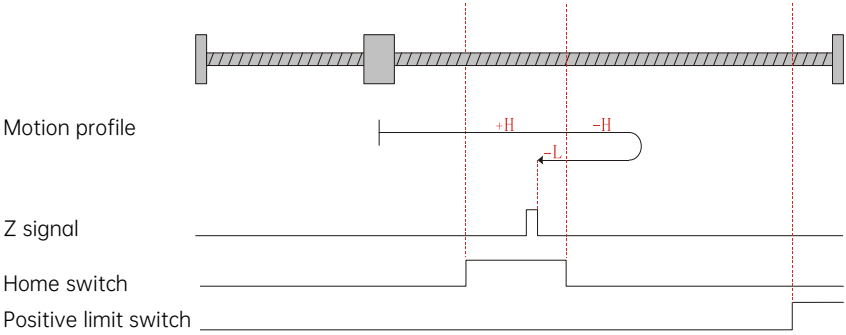
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Following that, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



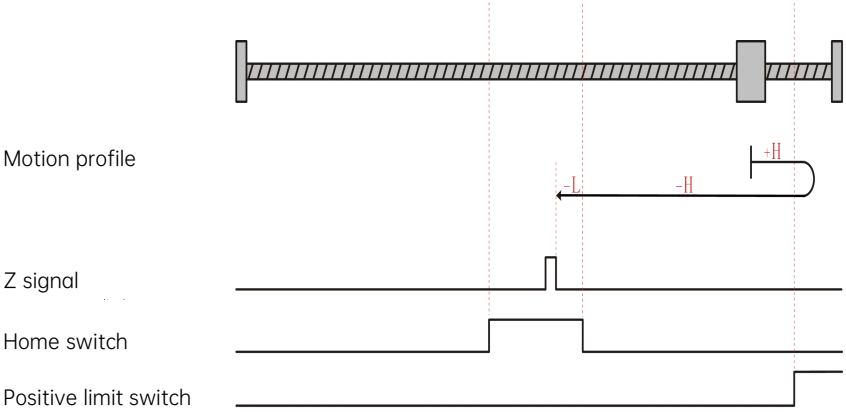
19) P12.01 = 109, homing mode 109

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

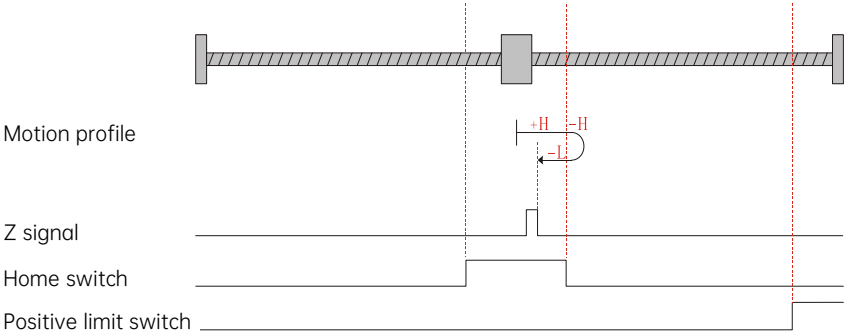
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



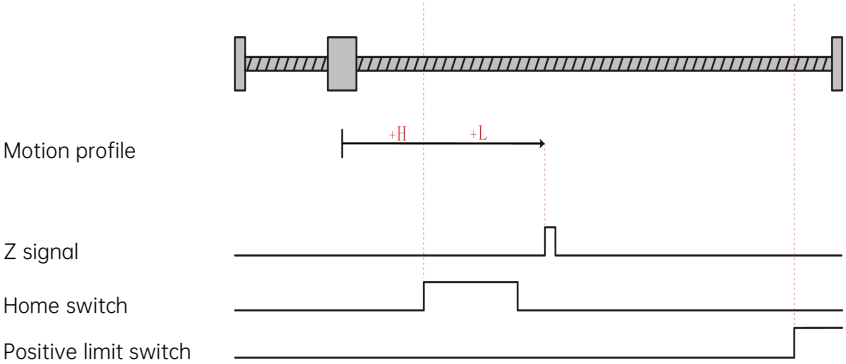
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



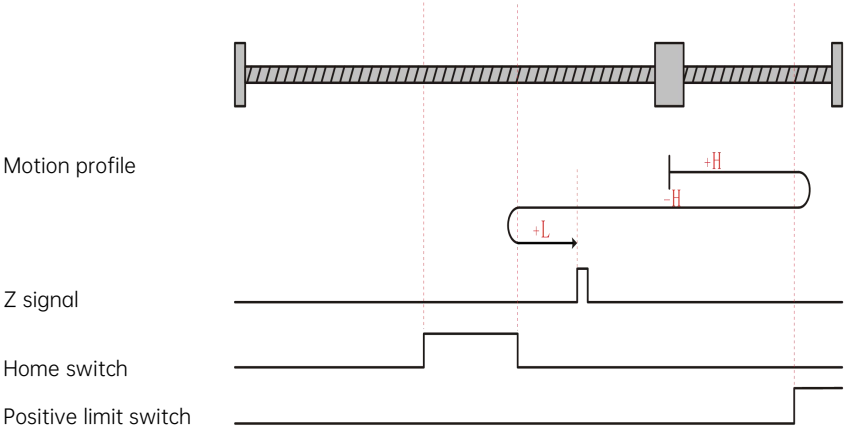
20) P12.01 = 110, homing mode 110

Homing in forward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

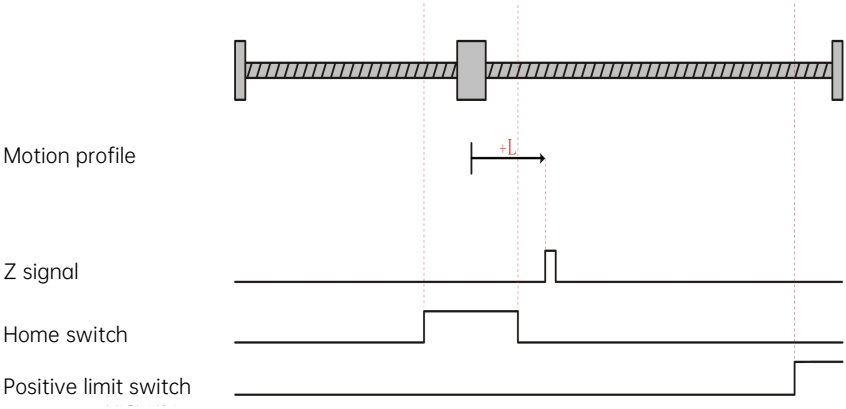
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



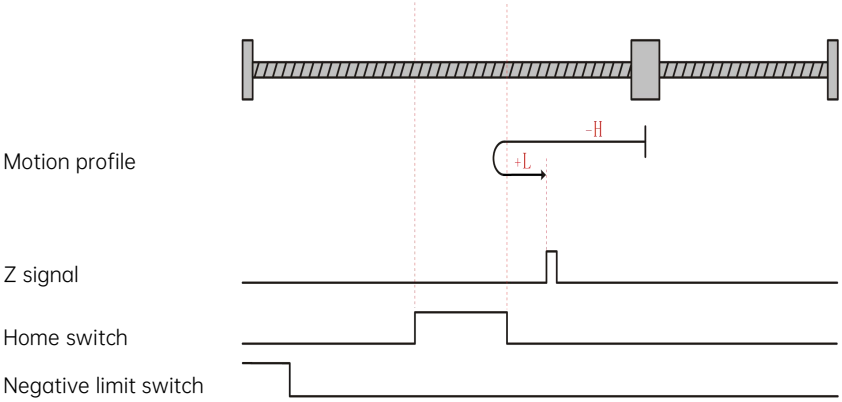
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the rising edge of the Z signal.



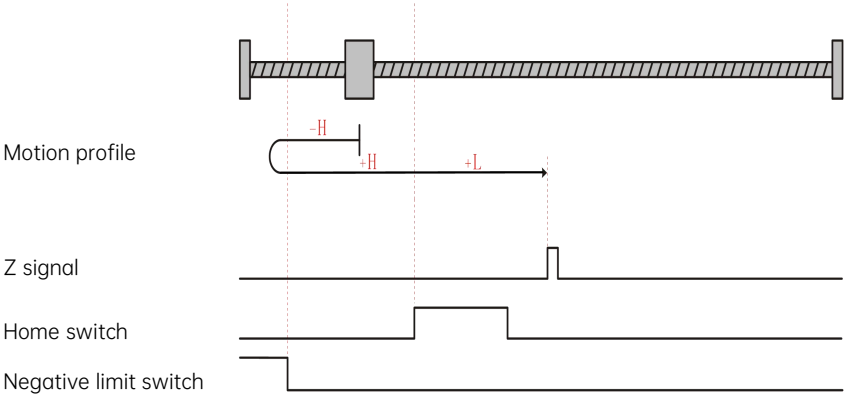
21) P12.01 = 111, homing mode 111

Homing in backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

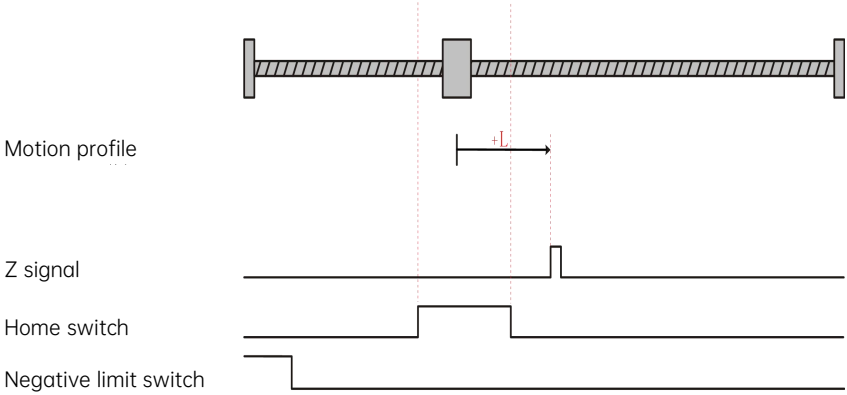
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



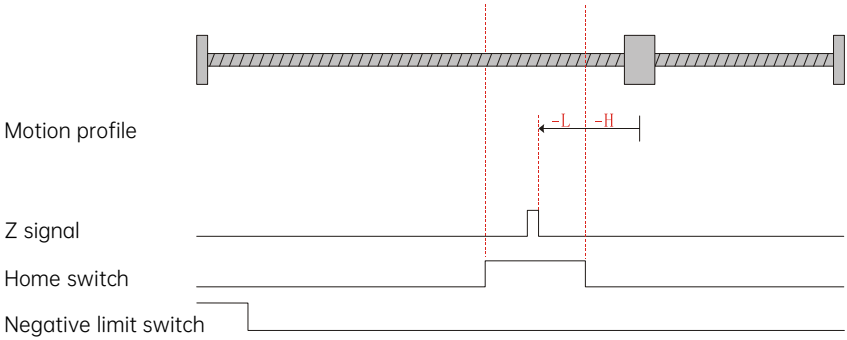
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the rising edge of the Z signal.



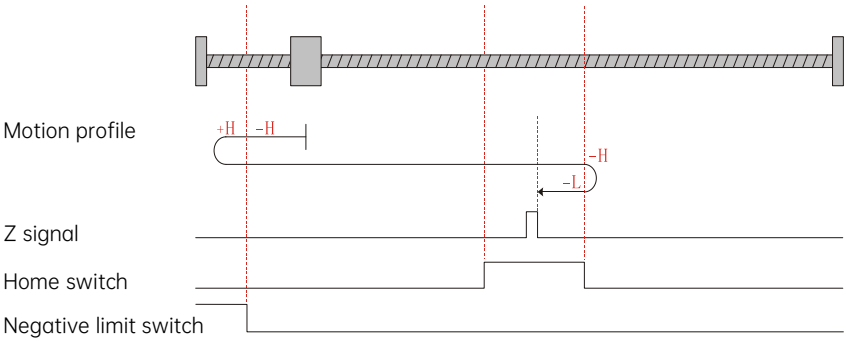
22) P12.01 = 112, homing mode 112

Homing in backward direction, the home switch as he deceleration point, and the motor Z signal as the home position.

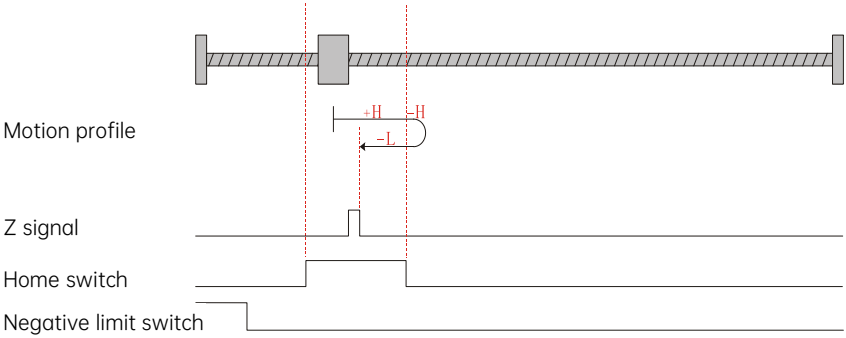
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Following that, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



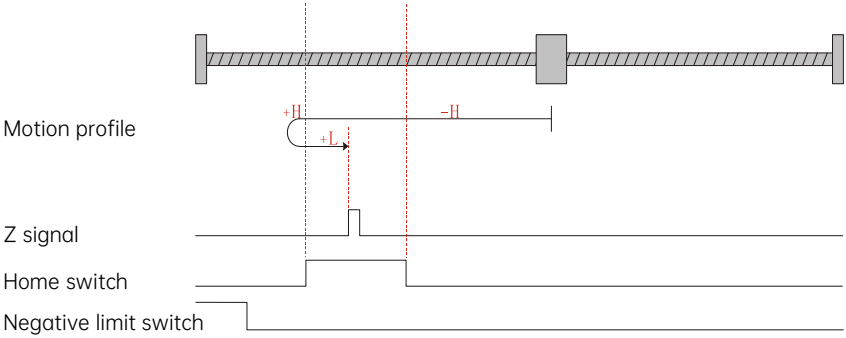
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



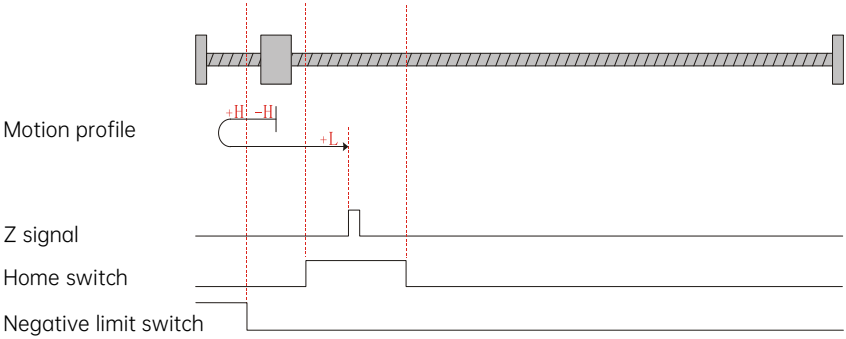
23) P12.01 = 113, homing mode 113

Homing in the backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

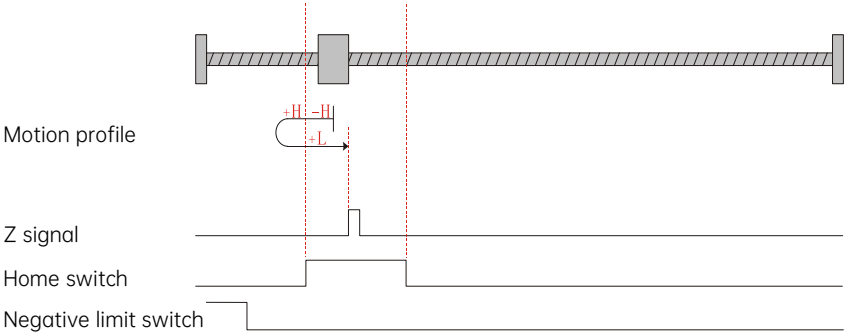
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



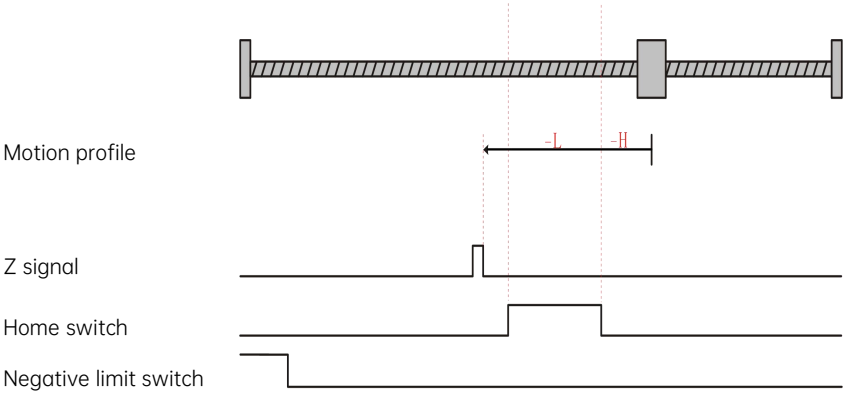
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



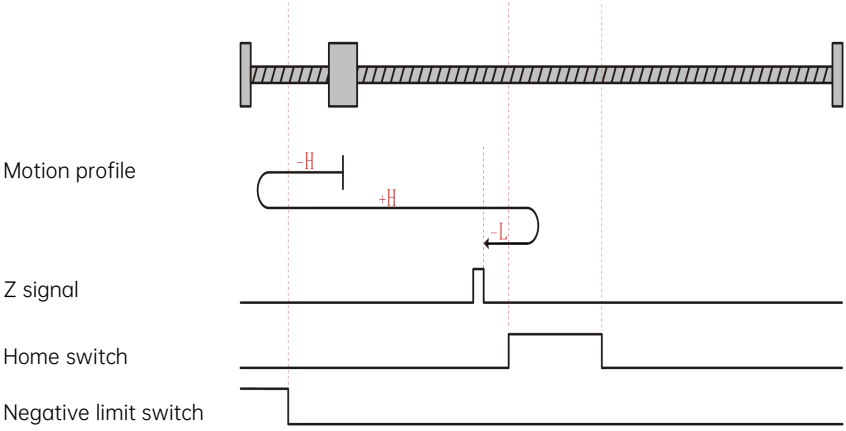
24) P12.01 = 114, homing mode 114

Homing in backward direction, the home switch as the deceleration point, and the motor Z signal as the home position.

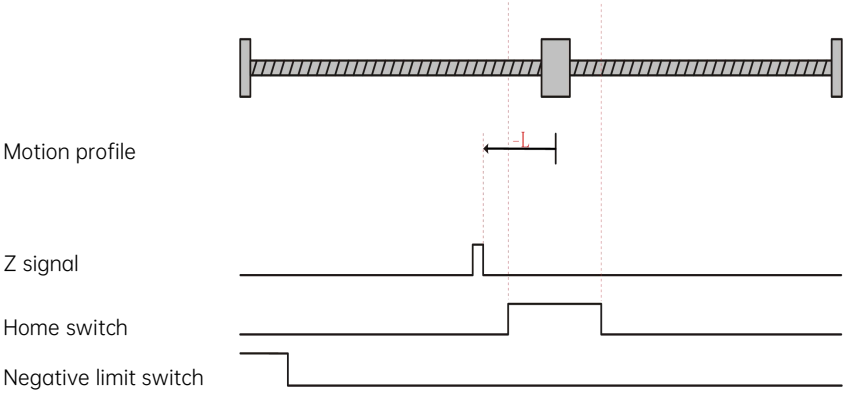
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the Z signal.



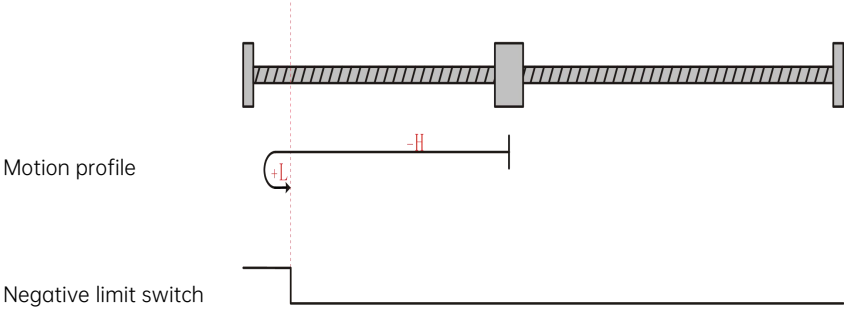
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed. Homing stops when the motor reaches the rising edge of the Z signal.



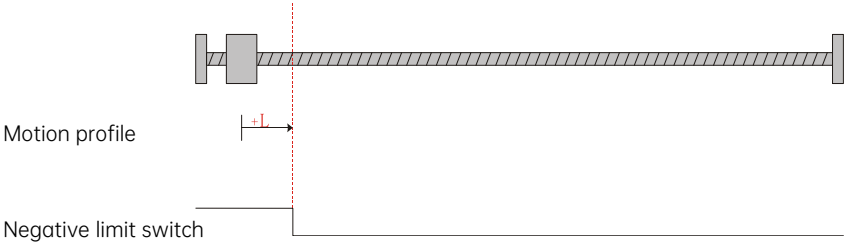
25) P12.01 = 115, homing mode 115

Homing in backward direction, and the negative limit switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the negative limit switch. When homing starts, the negative limit switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then ,homing is processed in the forward direction at a low speed, and stops when the motor reaches the falling edge of the negative limit switch.



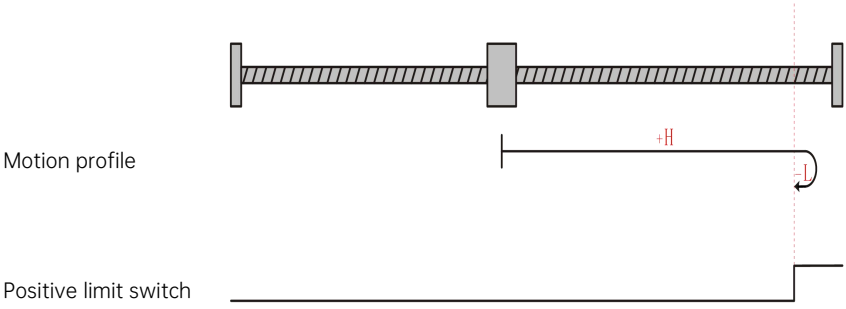
The present motor position is in the effective zone of the negative limit switch. When homing starts, the negative limit switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the falling edge of the negative limit switch.



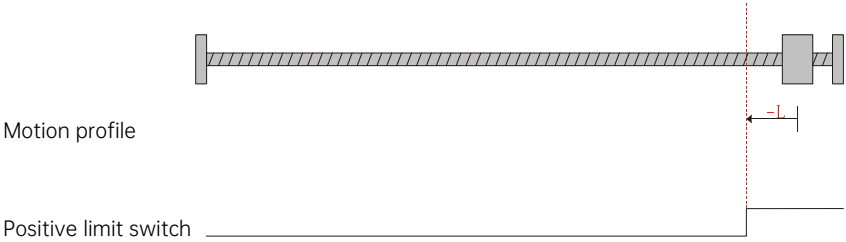
26) P12.01 = 118, homing mode 118

Homing in forward direction, and the positive limit switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the positive limit switch. When homing starts, the positive limit switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the falling edge of the positive limit switch.



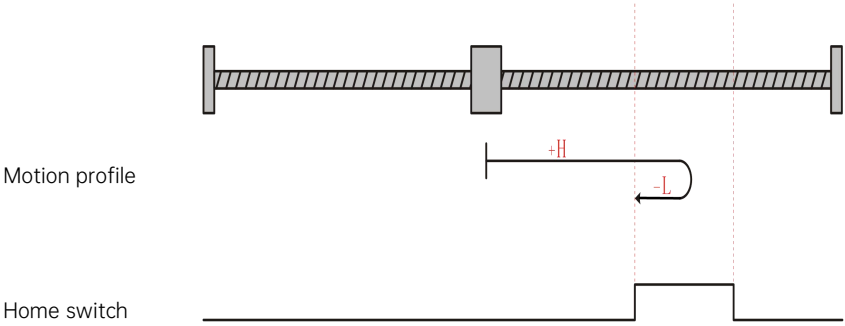
The present motor position is in the effective zone of the positive limit switch. When homing starts, the positive limit switch is at a high level, and homing is processed in the backward direction at a low speed. Homing stops when the motor reaches the falling edge of the positive limit switch.



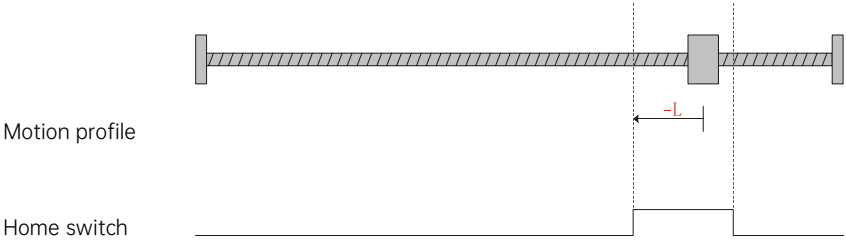
27) P12.01 = 119, homing mode 119

Homing in forward direction, and the home switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.

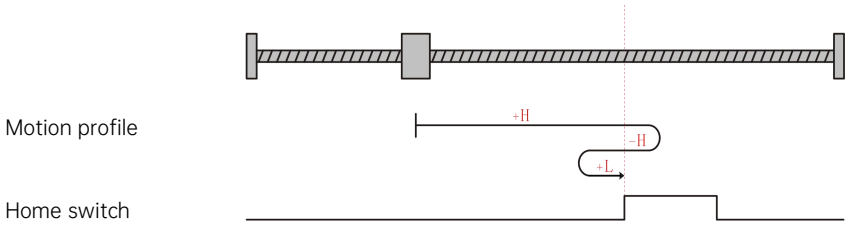


28) P12.01 = 120, homing mode 120

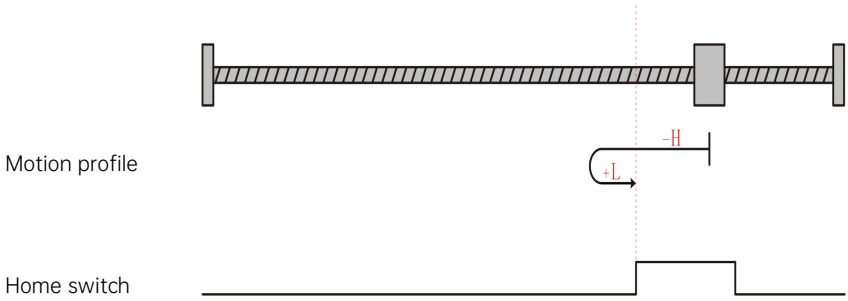
Homing in forward direction, and the home switch as the deceleration point and the home position.

The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction

at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



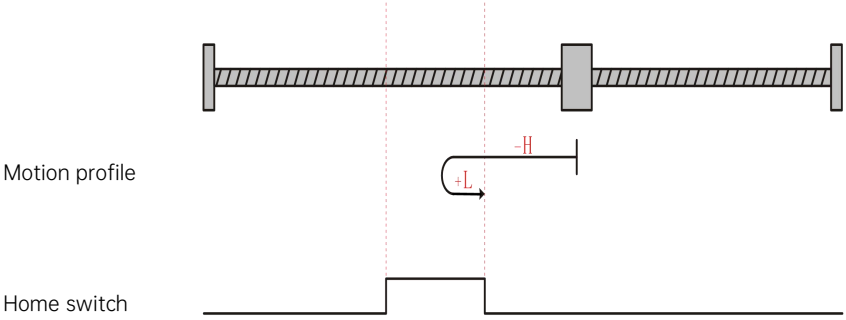
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a low level, and stops when the motor reaches the rising edge of the home switch.



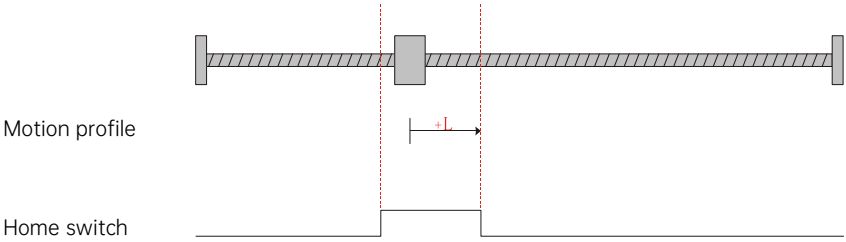
29) P12.01 = 121, homing mode 121

Homing in backward direction, and the home switch as the deceleration point and the home position.

The present motor position is in the non-effective zone of the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



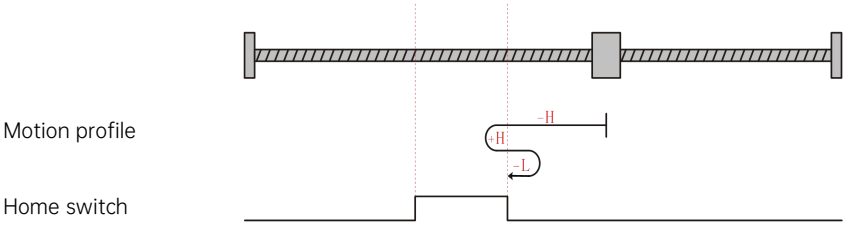
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.



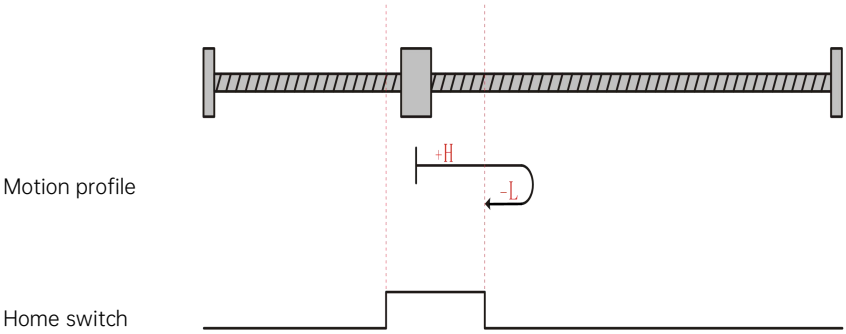
30) P12.01 = 122, homing mode 122

Homing in backward direction, and the home switch as the deceleration point and the home position.

The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



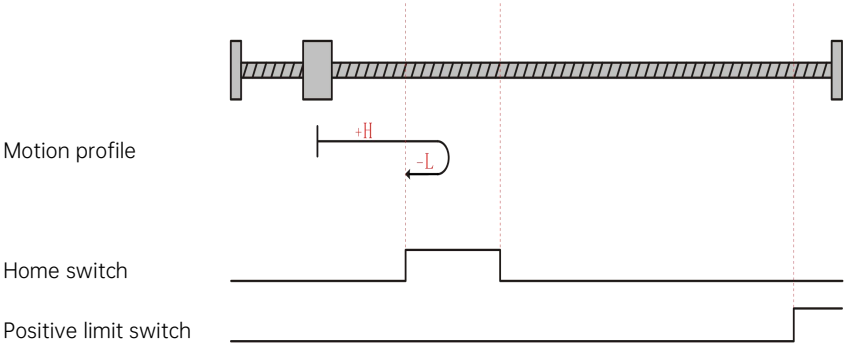
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



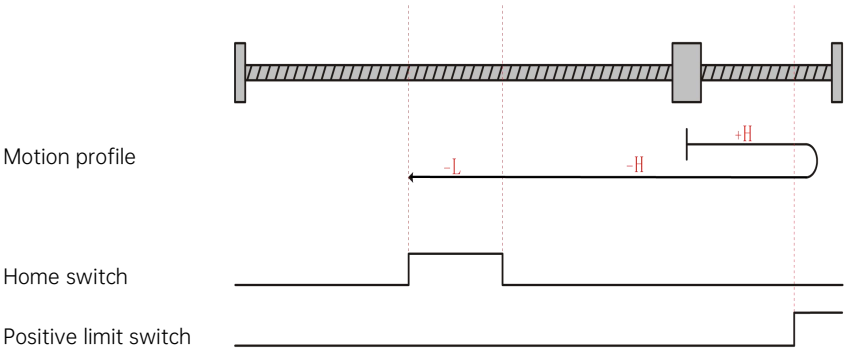
31) P12.01 = 123, homing mode 123

Homing in forward direction, and the home switch as the deceleration point and the home position.

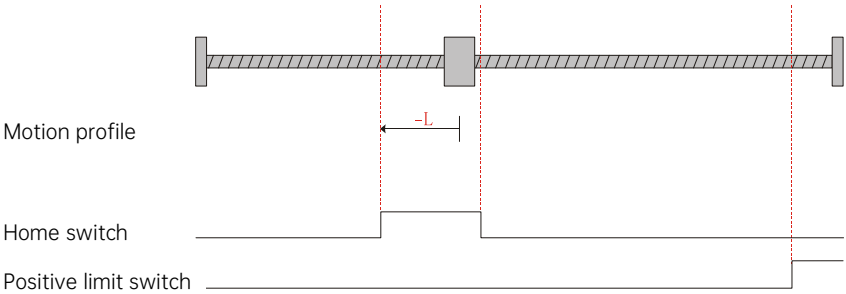
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the backward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



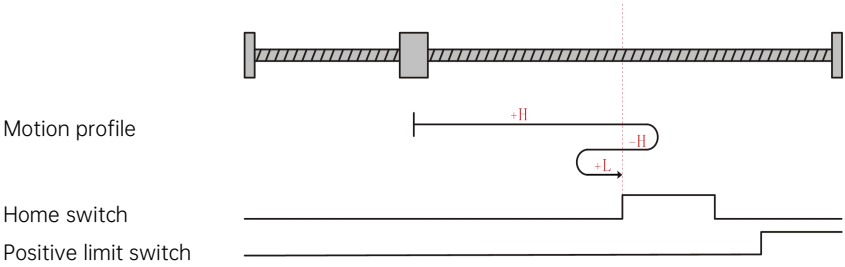
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.



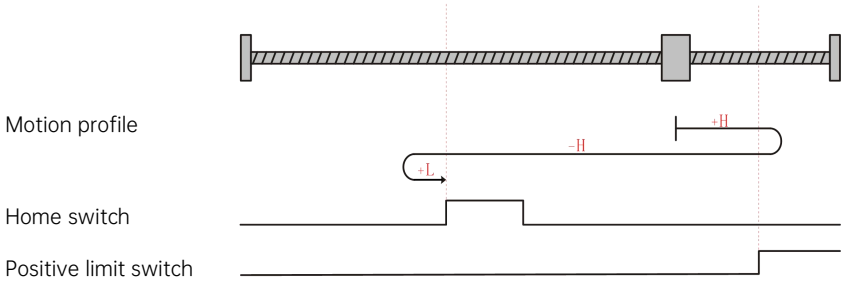
32) P12.01 = 124, homing mode 124

Homing in forward direction, and the home switch as the deceleration point and the home position.

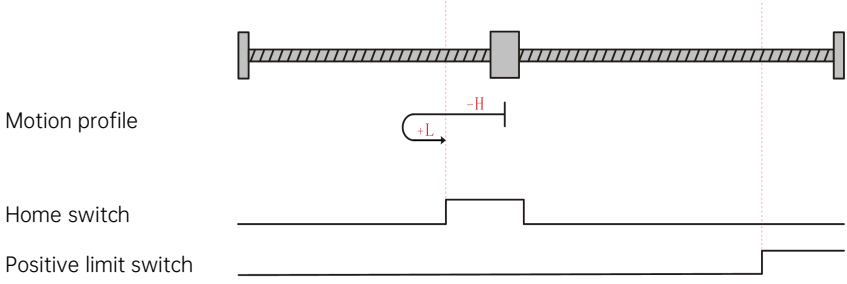
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



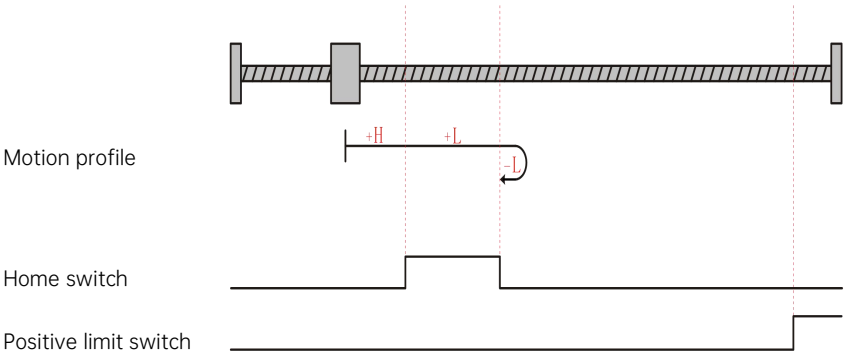
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



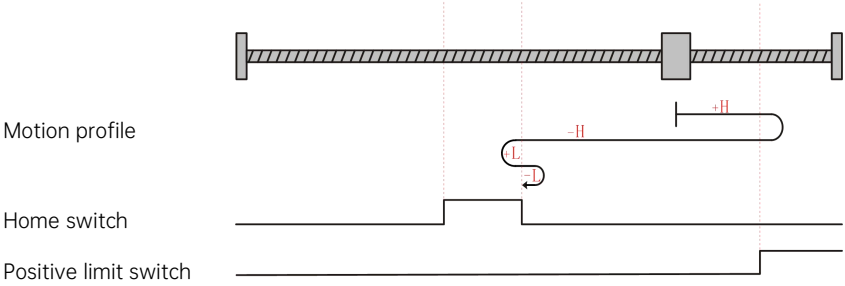
33) P12.01 = 125, homing mode 125

Homing in forward direction, and the home switch as the deceleration point and the home position.

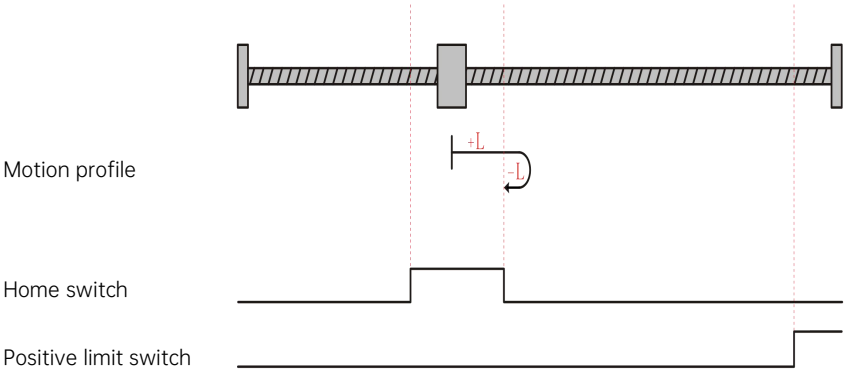
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the forward direction at a low speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed till it reaches the falling edge of the home switch. Following that, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



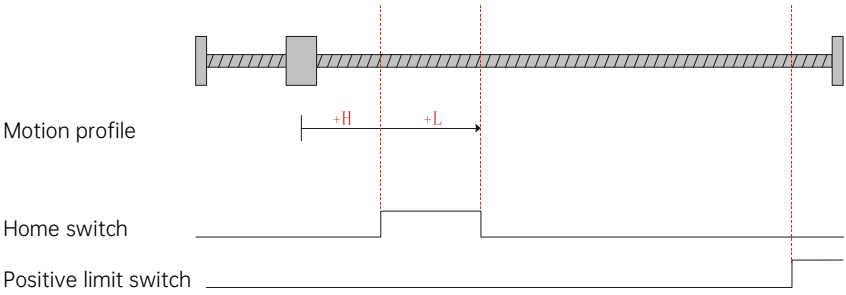
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



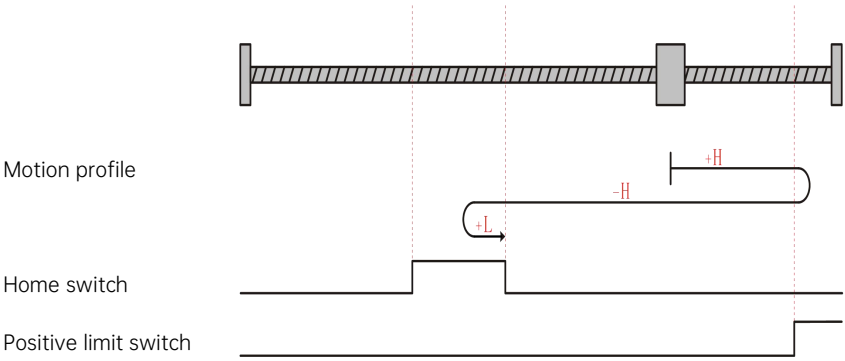
34) P12.01 = 126, homing mode 126

Homing in forward direction, and the home switch as the deceleration point and the home position.

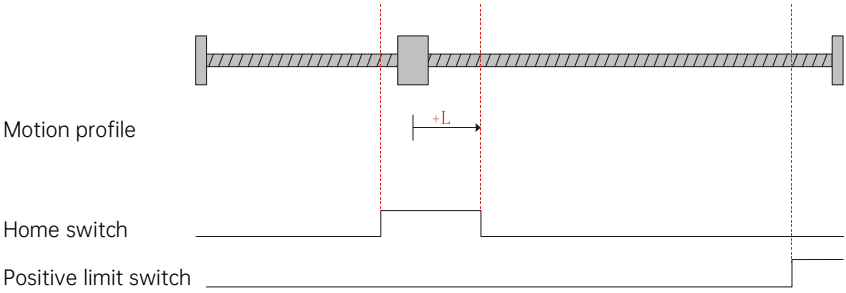
The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the forward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the forward direction at a high speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



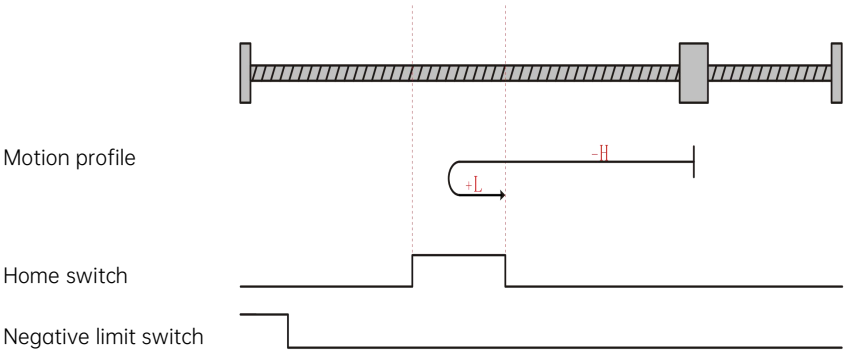
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.



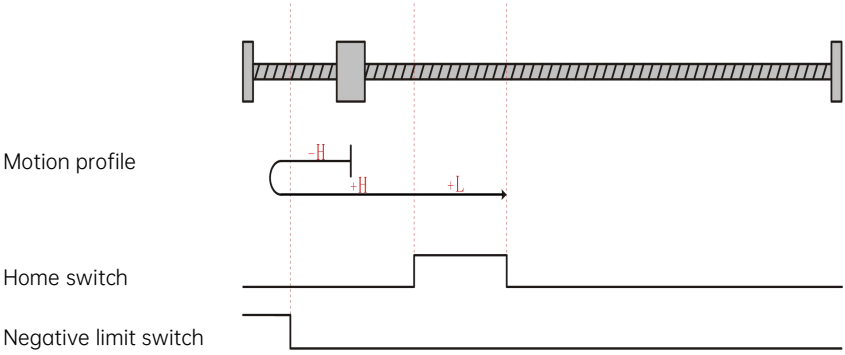
35) P12.01 = 127, homing mode 127

Homing in backward direction, and the home switch as the deceleration point and the home position.

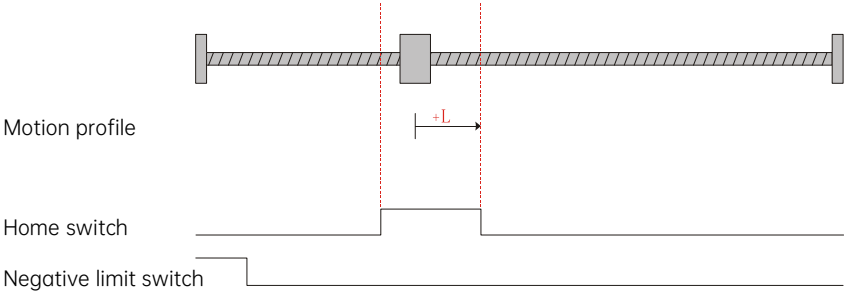
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing continues in the forward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



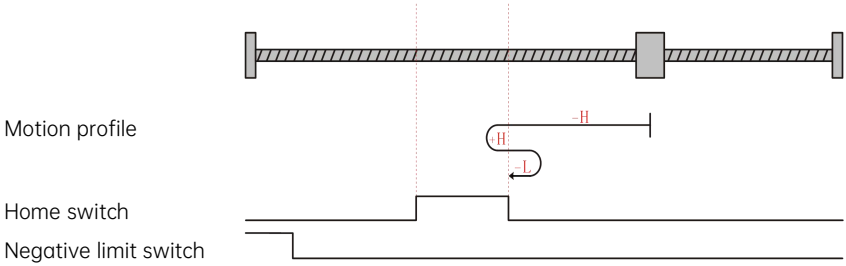
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.



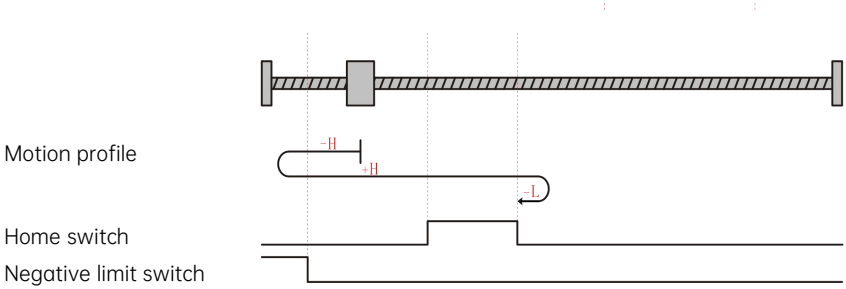
36) P12.01 = 128, homing mode 128

Homing in backward direction, and the home switch as the deceleration point and the home position.

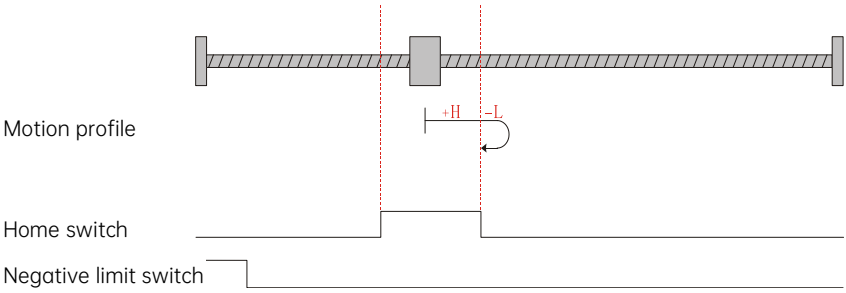
The present motor position is between the home switch and the positive limit switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of t he home switch.



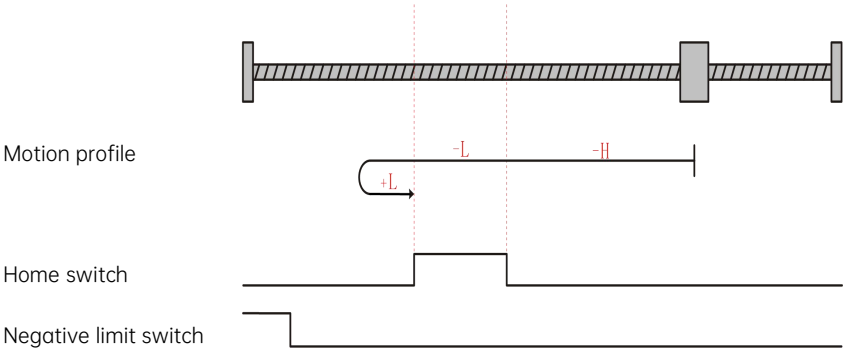
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the forward direction at a high speed till it reaches the falling edge of the home switch. Then, homing is processed in the backward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



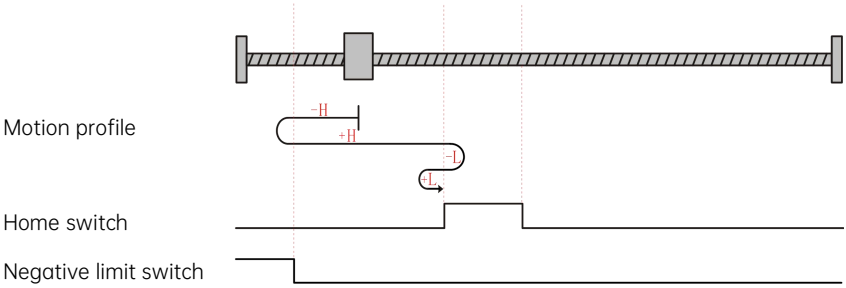
37) P12.01 = 129, homing mode 129

Homing in backward direction, and the home switch as the deceleration point and the home position.

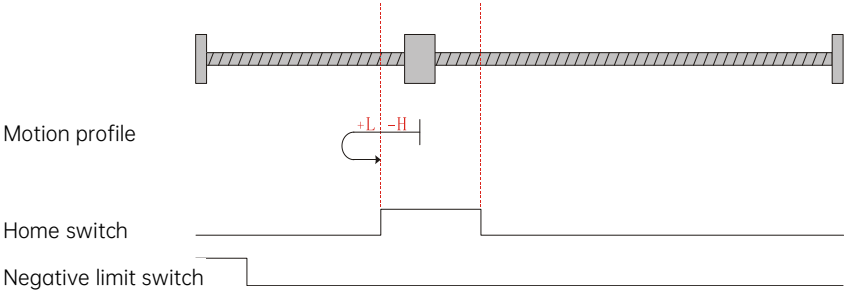
The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the home switch. Then, homing continues in the backward direction at a low speed till it reaches the falling edge of the home switch. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed till it reaches the falling edge of the home switch. Following that, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



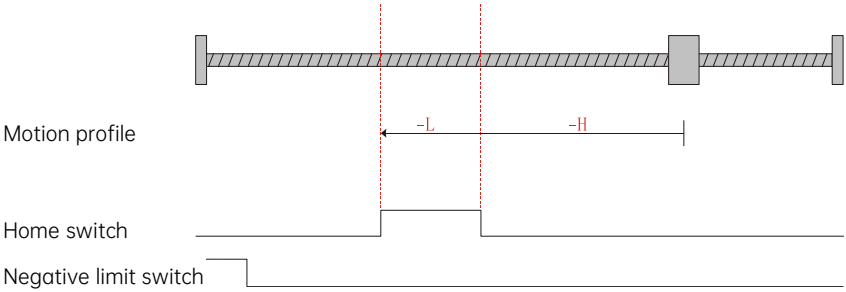
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed till it reaches the falling edge of the home switch. Then, homing is processed in the forward direction at a low speed, and stops when the motor reaches the rising edge of the home switch.



38) P12.01 = 130, homing mode 130

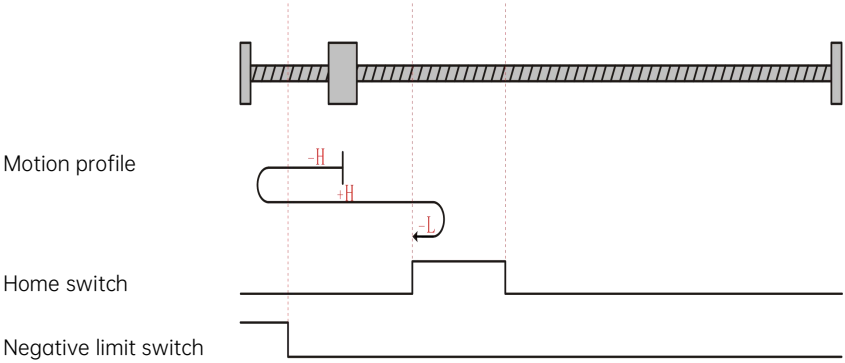
Homing in backward direction, and the home switch as the deceleration point and the home position.

The present motor position is between the positive limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward direction at a high level till it reaches the rising edge of the home switch. Then, homing continues in the backward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.

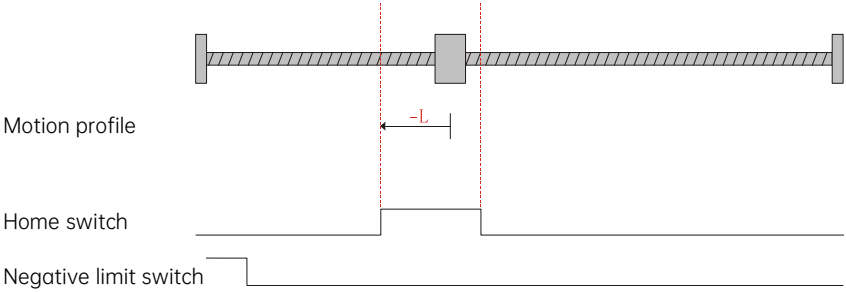


The present motor position is between the negative limit switch and the home switch. When homing starts, the home switch is at a low level, and homing is processed in the backward

direction at a high speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a high speed till it reaches the rising edge of the home switch. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the falling edge of the home switch.



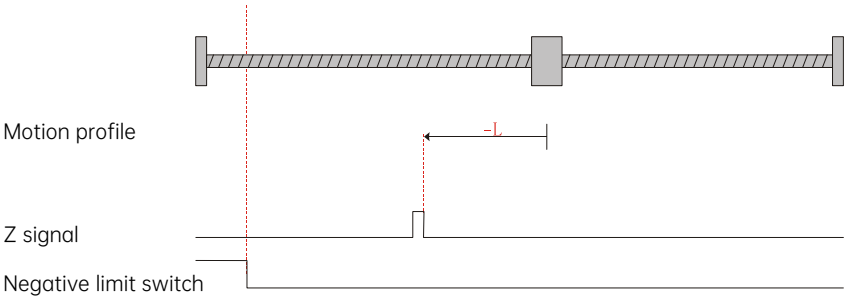
The present motor position is in the effective zone of the home switch. When homing starts, the home switch is at a high level, and homing is processed in the backward direction at a low speed. Homing stops when the motor reaches the falling edge of the home switch.



39) P12.01 = 133, homing mode 133

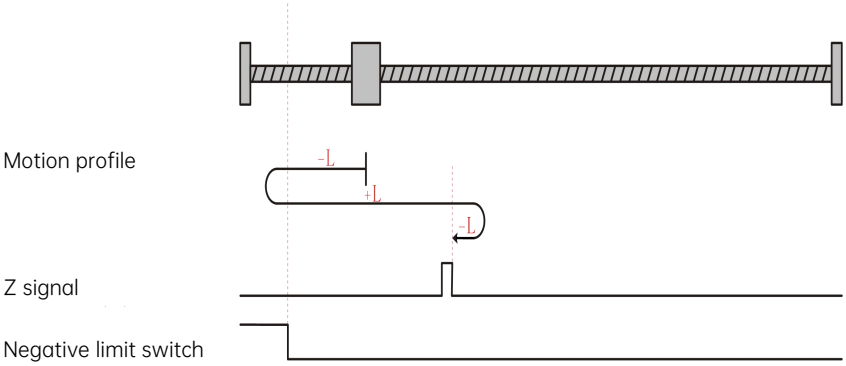
Homing in backward direction, and the motor Z signal as the deceleration point and the home position.

When there is at least one Z signal between the present motor position and the negative limit switch, homing will be processed in the backward direction at a low speed, and stop when the motor reaches the rising edge of the Z signal.



When the present motor position is at the Z signal, the homing enable will be triggered. The present position will be recognized as the home position immediately, and homing stops.

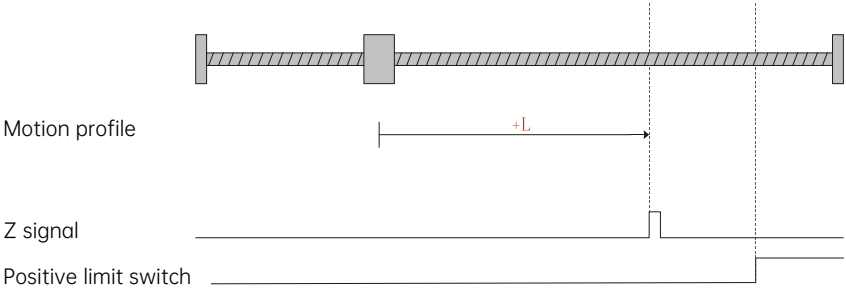
When there is no Z signal between the present motor position and the negative limit switch, homing will be processed in the backward direction at a low speed till it reaches the rising edge of the negative limit switch. Then, homing is processed in the forward direction at a low speed till it reaches the falling edge of the Z signal. Afterwards, homing is processed in the backward direction at a low speed, and stops when the motor reaches the Z signal.



40) P12.01 = 134, homing mode 134

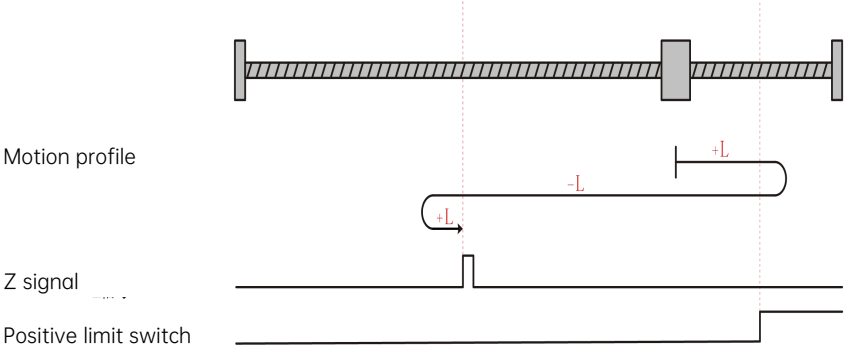
Homing in forward direction, and the motor Z signal as the deceleration point and the home position.

When there is as least one Z signal between the present motor position and the positive limit switch, homing will be processed in the forward direction at a low speed, and stop when the motor reaches the rising edge of the Z signal.



When the present motor position is at the Z signal, the homing enable will be triggered. The present position will be recognized as the home position immediately, and homing stops.

When there is no Z signal between the present motor position and the positive limit switch, homing will be processed in the forward direction at a low speed till it reaches the rising edge of the positive limit switch. Then, homing is processed in the backward direction at a low speed till it reaches the falling edge of the Z signal. Afterwards, homing is processed in the forward direction at a low speed, and stops when the motor reaches the Z signal.



41) P12.01 = 135, homing mode 135

The present motor position will be recognized as the home position, which is the same with the mode "Direct setting of home position."

7.10.6 Home position direct setting (Set reference point; Mode 5)

1. Select the running mode ModePos =5;
2. Set the drive running command EnableAxis = 1;
3. The positioning motion is triggered by the rising edge of ExecuteMode;

7.10.7 Traversing block (Mode 6)

Properly set the control words of the program segments based on actual operation conditions.

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0

BIT0

0: Positioning. 1: Fixed torque

BIT1

1: Jump effective. 0: Jump ineffective

BIT2

1: Cycle effective. 0: Cycle ineffective

BIT4 to BIT7

Number of cycles in the segment

BIT8 to BIT12

The next jump segment (0 to 31)

BIT15

0: Absolute position. 1: Relative position

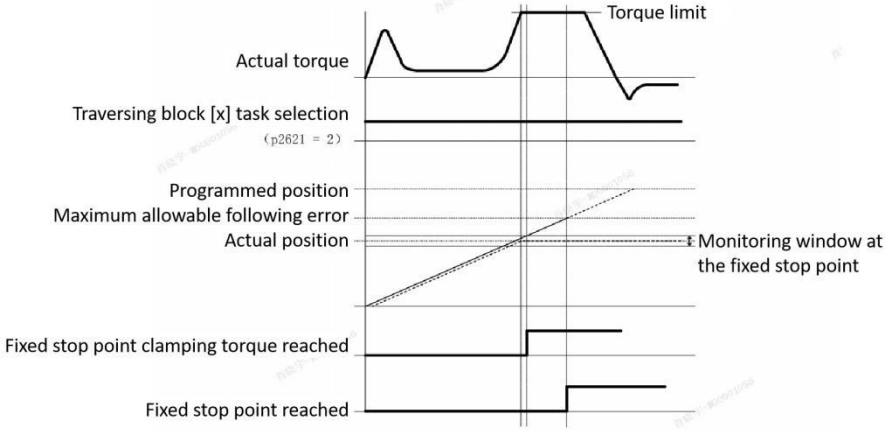
7.10.7.1 Positioning mode

1. Select the running mode ModePos =6;
2. Set the drive running command EnableAxis = 1;
3. Set the percentage of speed, acceleration, and deceleration via the input parameters OverV, OverAcc, and OverDec; it is required to set the running conditions CancelTraversing and IntermediateStop to 1, and set Jog1 and Jog2 to 0;
4. The number of the program segment is set by the input parameter "Position", which ranges from 0 to 31;
5. The positioning motion is triggered by the rising edge of ExecuteMode;
6. When the target position is reached, set AxisPosOk to 1.

7.10.7.2 Fixed stop point mode

When implementing the fixed endstop function using the Telegram 111, the endstop becomes effective and is moved to the fixed stop point at a set speed. It reaches the fixed stop point within the following error after the torque limit is reached. In case of excessive position deviation or when the fixed endstop is not found, an alarm will be reported. Properly set P17.12 (Fixed endstop clamping torque), P17.13

(Maximum following error of the fixed endstop), and P17.14 (Fixed endstop monitoring window) based on actual operation.



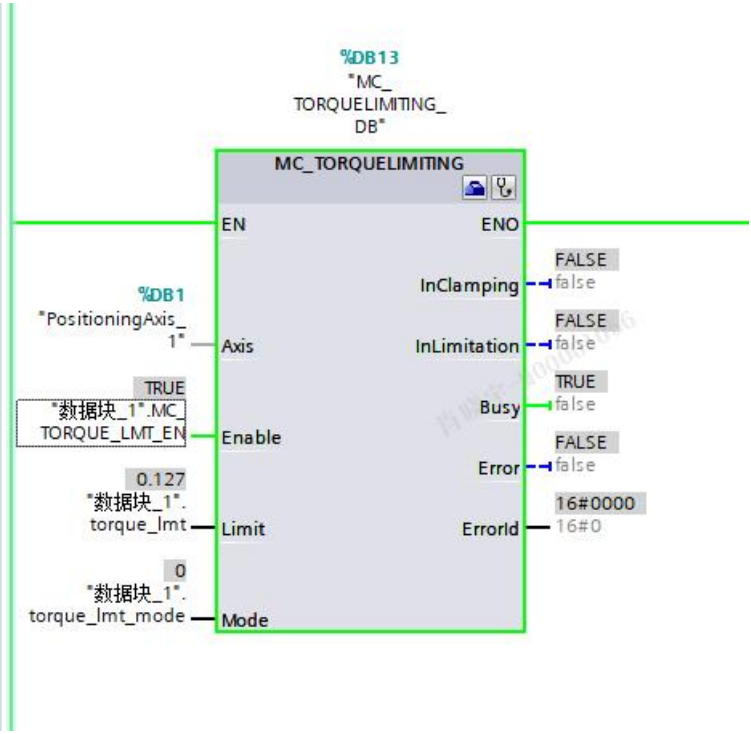
7.10.8 Jog (Velocity-dependent; Mode 7)

1. Select the running mode ModePos =7;
2. Set the drive running command EnableAxis = 1;
3. The jogging direction is determined by Jog1 and Jog2, and the jogging speed is set via P06.06;
4. When the target position is reached, set AxisPosOk to 1.

7.11 Torque control and torque limit

7.11.1 Torque limit via Siemens Telegrams 102 and 105

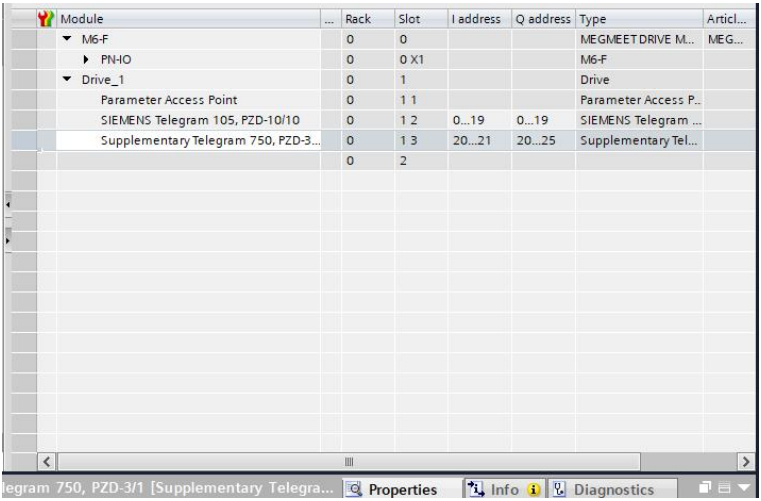
MEMRED in the Siemens Telegram 102/105 sets the torque limit via the function block MC_Torquelimiting. MEMRED refers to the torque reduction value, where 0x4000 corresponds to 300% of the torque reduction value. When Limit is set to 0.127 and the torque limit is set to 10%, MEMRED = (3.81-0.127)*0x4000/3.81 = 15838.



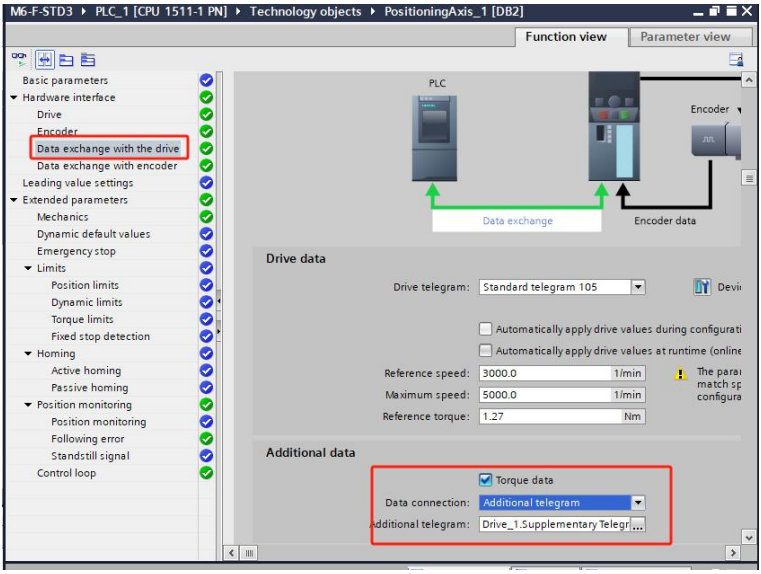
MC_Torquelimiting and MC_TorqueRange cannot be effective simultaneously.

7.11.2 Torque control and torque limit via the Additional Telegram 750

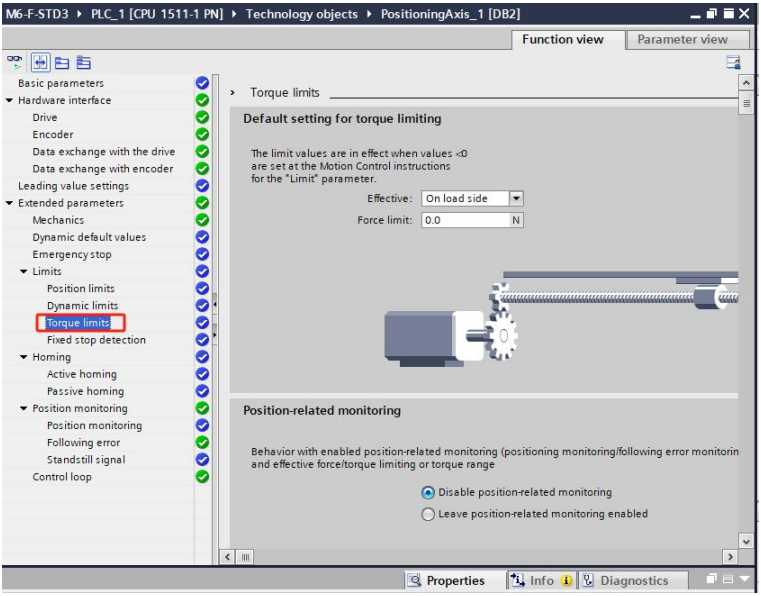
Configure the parameter of the function code: P17.02 = 750. Configure the Additional Telegram 750 in PLC.



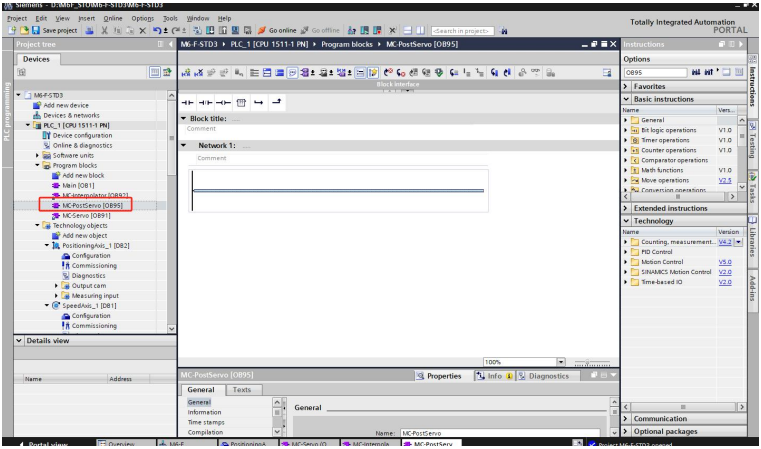
Tick the box and select the additional telegram "Technology objects".



Select "On load side" for the torque limit effective value.

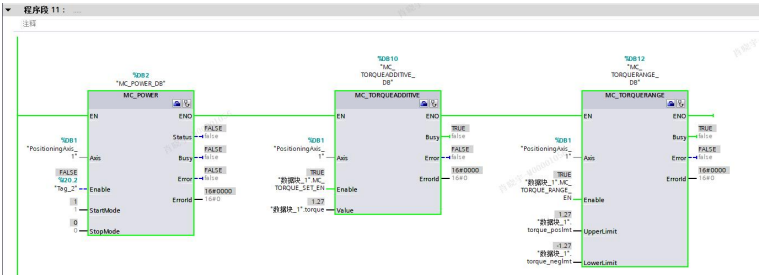


Enable the STW1.14 switchover of torque control modes using the function block OB95.



Control the torque reference and the torque limit via MC_TorqueAdditive and MC_TorqueRange.

The torque reference refers to the maximum motor torque (P01.05). The maximum torque 3.81 N·m corresponds to the M_ADDI value of 0x4000 in the telegram. The torque reference 1.27 N·m corresponds to the value of M_ADDI = 1.27*0x4000/3.81 = 5461.



When enabled, the motor runs at a speed = 6000 (Maximum speed threshold P06.09) * 10.0% (FWD speed limit P07.10) = 600 rpm

When using the control word STW1.14 to switch the torque, before switching from the torque mode to the position mode, it is required to disable the servo enable via MC_Power. Otherwise, the servo will run to position, which is set before the switchover, at the maximum speed.

7.11.3 Torque limit via the Siemens Telegram 111

The Siemens Telegram 111 enables the reading/writing of the torque limit, the 16-bit function code parameters, and the PNU parameters via the user receive word and the user send word.

When P17.08 (User receive word) is set to 1, it functions the same as the torque limit MEMRED. The value of 0x4000 corresponds to 300% of the torque reduction value. When Limit is set to 0.127 and the torque limit is set to 10%, MEMRED = (3.81-0.127)*0x4000/3.81 = 15838.

When the value of P17.08 is between 900 and 999, the parameter is used to write the PNU parameters. P17.08 = PNU parameter number.

When the value of P17.08 is between 10000 and 40000, the parameter is used to write the function code parameters. P17.08 = 10000 + Menu number * 100 + Parameter number.

When P17.09 (User send word) is set to 1, the present torque 0x4000 corresponds to 300% rated torque value.

When P17.09 (User send word) is set to 2, the present current 0x4000 corresponds to 100% rated current value.

When P17.09 (User send word) is set to 3, it refers to Di input.

When the value of P17.09 is between 900 and 999, the parameter is used to read the PNU parameters. P17.09 = PNU parameter number.

When the value of P17.09 is between 10000 and 40000, the parameter is used to read the function code parameters. P17.09 = 10000 + Menu number * 100 + Parameter number.

7.12 Non-cyclic parameters reading/writing

The PLC adopts two methods for the non-cyclic reading/writing of the M6-F function code parameters and the PNU parameters: function block SINA_PARA_S (FB287) and function block WRREC/RDREC.

The corresponding number of the function code parameter = 10000 +Menu number * 100 +Parameter number. For example, the corresponding number of the function code parameter P08.01 is 10801, and the indexes of the function code parameters are all 0.

7.12.1 Read/Write parameters via the function block SINA_PARA_S (FB287)

Only the reading/writing of a single parameter is supported by FB287. The default value of AxisNO is 1, and hardwareId refers to the hardware identifier of the M6-F.

1.

Writing of the 16-bit parameter P08.00

ReadWrite = 1

Parameter = 10800

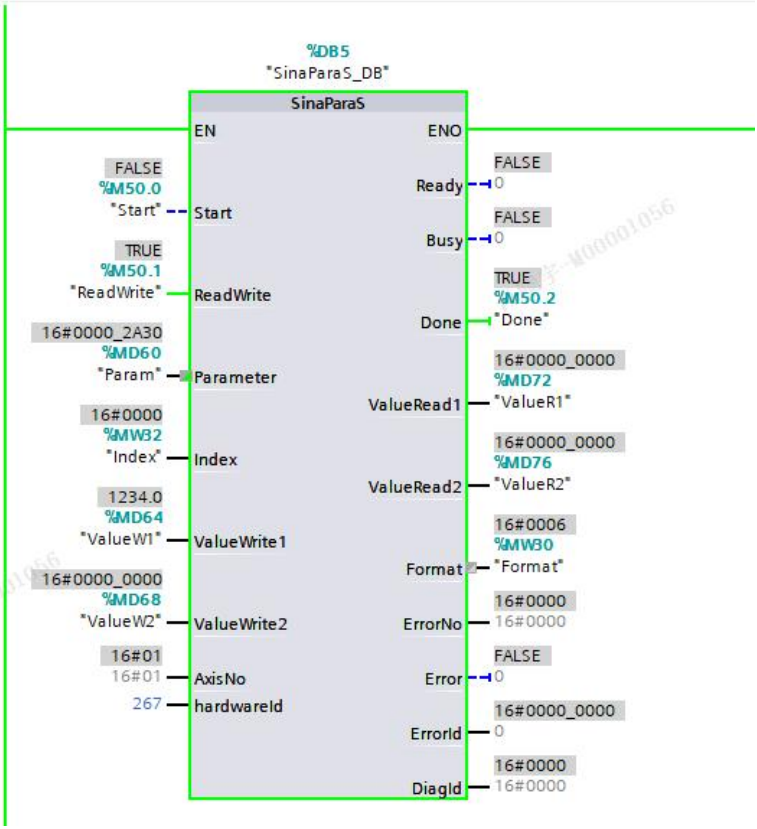
Index = 0

AxisNo = 1

ValueWrite1 = 1234

Start = 1

Check the host device: P08.00 = 123.4



2.

Writing of the 32-bit parameter P19.00

ReadWrite = 1

Parameter = 11900

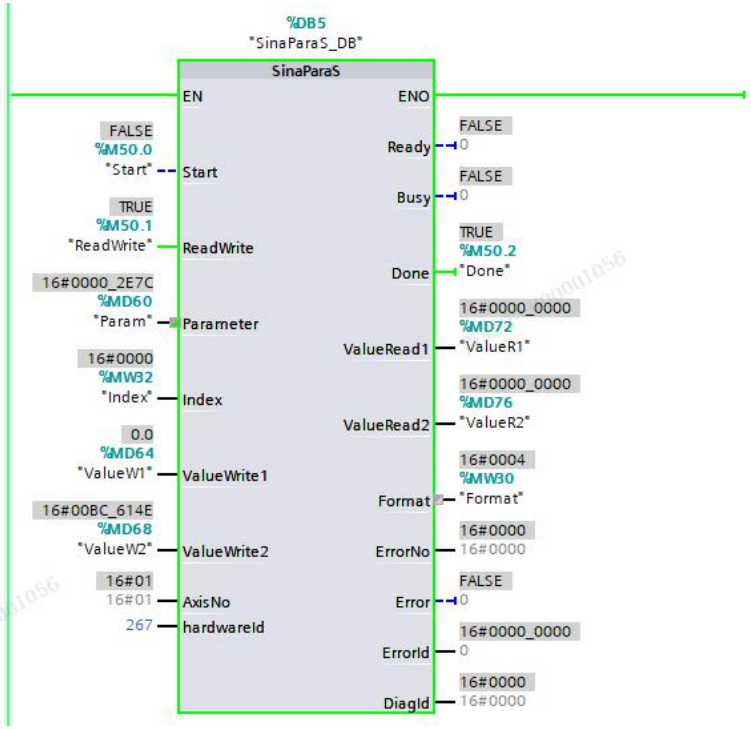
Index = 0

AxisNo = 1

ValueWrite2 = 12345678

Start = 1

Check the host device: P19.00 = 12345678



3.

Reading of the 16-bit parameter P08.01

Check the host device: P08.00 = 5.00

ReadWrite = 0

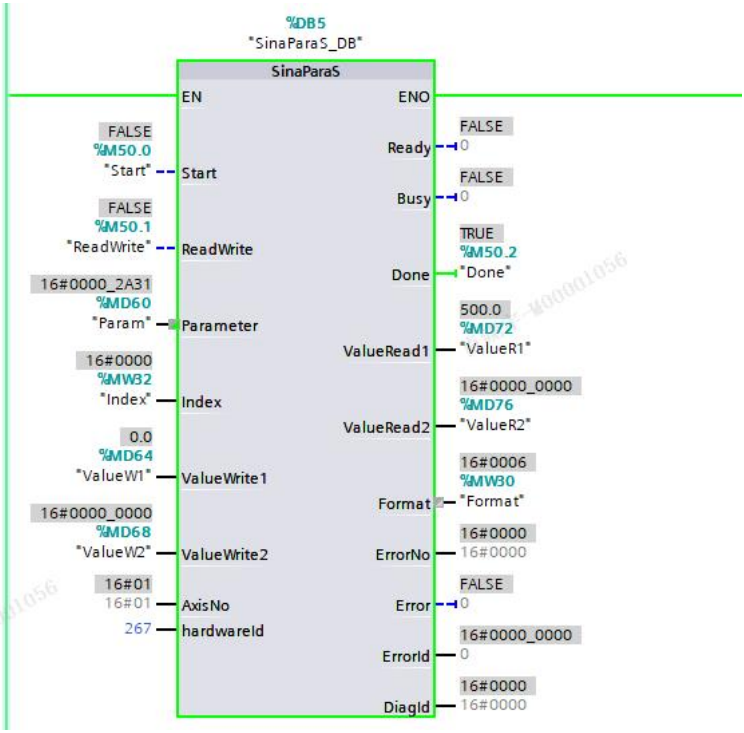
Parameter = 10801

Index = 0

AxisNo = 1

Start = 1

ValueRead1 = 500



4.

Reading of the 32-bit parameter P19.01

Check the host device: P19.01 = 50000

ReadWrite = 1

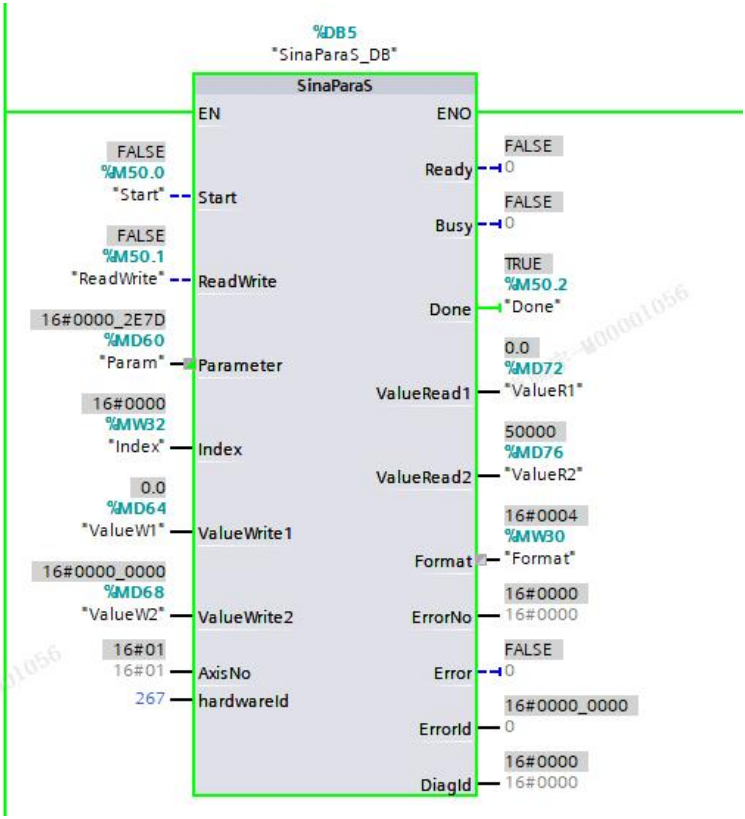
Parameter = 11901

Index = 0

AxisNo = 1

Start = 1

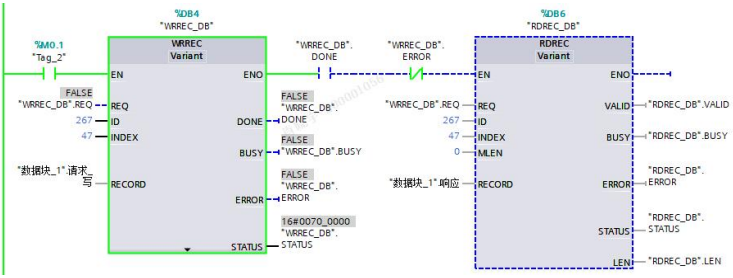
ValueRead2 = 50000



7.12.2 Read/Write parameters via the function blocks WRREC and RDREC

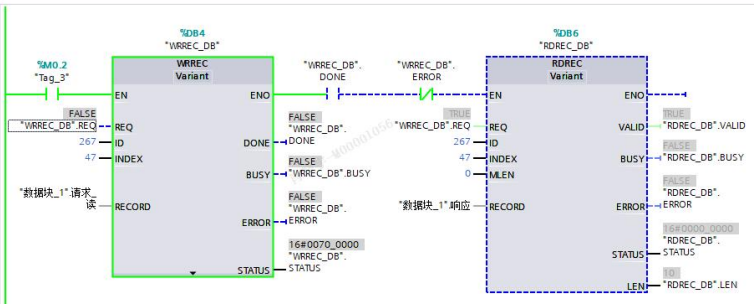
Call the function blocks WRREC and RDREC in OB1. The index is fixed at 47. ID refers to the hardware identifier of the M6-F.

Write P04.01=1.00 in accordance with the profile format.



Request_write	Struct		
Request Reference	Byte	16#1	
Request ID	Byte	16#2	
Axis	Byte	16#1	
No. of Parameters	Byte	16#1	
Attribute	Byte	16#10	
No. of Elements	Byte	16#1	
Param Num	Int	10401	
Subindex	Int	0	
format	Byte	16#6	
No. of values	Byte	16#1	
Value	Int	100	

Read P20.03 = C0A8010A in accordance with the profile format.



Request_read	Struct		
Request Reference	Byte	16#1	16#01
Request ID	Byte	16#1	16#01
Axis	Byte	16#1	16#01
No. of Parameters	Byte	16#1	16#01
Attribute	Byte	16#10	16#10
No. of Elements	Byte	16#1	16#01
Param Num	Int	12003	12003
Subindex	Int	0	0
Response	Struct		
Response Reference	Byte	16#0	16#01
Response ID	Byte	16#0	16#01
Axis	Byte	16#0	16#01
No. of Parameters	Byte	16#0	16#01
format	Byte	16#0	16#07
No. of values	Byte	16#0	16#01
Value	DWord	16#0	16#C0A8_010A

Chapter 8 Fault Diagnosis and Removal

The alarms are defined and categorized by PROFIdrive.

Number	Type	Description	Fault code (P10.18)
1	Hardware/Software fault	A fault occurs with the hardware or software.	16, 25
2	Main power supply fault	A fault occurs with the main power supply, which results in phase loss, overvoltage, or undervoltage.	6, 20, 29
3	Control power supply fault	A fault occurs with the control power supply.	3, 80
4	DC bus overvoltage	The voltage of the DC bus exceeds the threshold value.	2
5	Power electronic component fault	A fault occurs with the power electronic component, which results in overheat, overcurrent, or phase loss due to IGBT failure.	1, 10
6	Electronic component overheat	The electronic component temperature exceeds the threshold value.	8
7	Short circuit to ground, or inter-phase short circuit	Grounding or inter-phase short circuits are found in the power cable or the motor winding.	46
8	Motor overload	The motor operates beyond the limit of temperature, current, or torque.	11, 12
9	Host controller communication fault	A fault occurs with the PROFINET communication between the drive and the controller.	36
10	Safety operation monitoring channel fault	A fault is detected via the safety operation monitoring.	
11	Position feedback interface fault	A status error or signal loss occurs during the encoder signal processing.	19, 30, 31, 41, 71, 75, 76, 77, 78, 79
12	Internal communication fault	Abnormality or interruption occurs with the communication between the internal components of the drive.	13, 56
13	Power module fault	A fault or malfunction occurs with the power module.	

Number	Type	Description	Fault code (P10.18)
14	Braking module fault	The internal or external braking module is abnormal, overloaded, or overheated.	9
15	Power supply filter fault	The temperature of the power filter is too high or its state is abnormal.	
16	External signal fault	The external input signal exceeds the threshold value or an abnormal state occurs.	43
17	Application or technology function fault	The monitored position, speed, or torque of the drive exceeds the set threshold value.	27, 32, 34, 57, 58
18	Parameter setting/configuration fault	An error occurs with the setting/configuration of the drive parameters.	18, 22, 35, 55, 61, 70, 72
19	Common drive fault	A fault occurs with the device component.	4, 7, 37, 39, 40, 66, 73
20	Auxiliary device fault	An abnormal situation occurs with the monitoring of the auxiliary device.	

All possible fault types, fault causes, and solutions for the M6-F series are summarized as shown in table 8-1.

Tabel 8-1 Fault record table

Fault code	Fault type	Cause	Confirmation method	Solution
Er.001	Drive overcurrent	The motor cables are in poor contact.	Check whether the cable connector is loose.	Reliably fasten the cable connector.
		The motor cables are grounded.	Check the insulation resistance between the UVW and the grounding cable of the motor.	Replace the motor if the insulation is poor.
		Short circuit occurs between the motor UVW phases.	Check whether the motor UVW interphase short circuit occurs.	Connect the motor cables correctly.
		The motor is burned out and damaged.	Check whether the resistances between the motor cables are balanced.	Replace the motor if the resistances are unbalanced.
		The gain setting is improper and the motor oscillates.	Check whether the motor oscillates or generates abnormal noise, or check the running graphs.	Re-adjust the gain.

Fault code	Fault type	Cause	Confirmation method	Solution
		The encoder is incorrectly wired, its cables are aged and corroded, or the connection becomes loose.	Check whether the encoder wiring is correct, whether the cables are aged, and whether the connection is reliable.	Re-weld or fasten the encoder cables.
Er.002	Drive main circuit overvoltage	The main circuit input voltage exceeds the specified range.	Measure the input power line voltage range.	Adjust the input power voltage according to the specifications.
		The braking resistor fails.	Measure the resistance between P and PB.	If the resistor is open, replace the external braking resistor.
		The resistance of the external braking resistor does not match (the resistance is too large, resulting in the insufficiency of the energy absorption during braking.	Confirm the resistance of the braking resistor.	Select braking resistors with proper resistance according to the operation conditions and the load.
		The motor is in the full acceleration/deceleration state.	Check the deceleration ramp time during running, and monitor the bus voltage P11.09.	Increase the acceleration/deceleration time within the allowed range.
Er.003	Drive control power overvoltage	The control power voltage exceeds the input voltage range.	Measure the control power line voltage range.	Adjust the control power voltage according to the specifications.
Er.004	Motor locked rotor occurs.	Output UVW phase loss or incorrect phase sequence occurs.	Perform noload motor trial running, and check the motor wiring.	Re-wire correctly, and replace the cables.
		UVW output disconnection occurs.	Check the UVW wiring.	Re-wire correctly, and replace the cables.
		The locked rotor is caused by mechanical factors.	Check the running command and the motor speed.	Check and remove the mechanical factors that cause the locked rotor.
Er.006	Input side phase loss	Phase loss occurs in input L1, L2, or L3.	Check the input wiring and the input power.	If the input power is single-phase 220 V, set P10.00 to 1; if the input power is three-phase 220V, check whether phase loss occurs in the input power, and replace the cables if needed.
Er.007	Output side phase loss	Phase loss occurs in output UVW.	Check the output wiring, the motor, and the cables.	Replace the wiring cables.

Fault code	Fault type	Cause	Confirmation method	Solution
Er.008	Drive overheat	Ambient temperature is excessively high.	Check the cooling conditions around the drive.	Improve the servo drive cooling conditions, and reduce the ambient temperature.
		Overload operation for excessive times	Check whether any overload fault is reported in the fault record.	To reset, wait for 60 s after overload occurs; increase the capacity of the drive and motor; increase the acceleration/deceleration time; reduce the load.
		The fan is damaged.	Check whether the fan is running during drive operation.	Replace the fan.
Er.009	Braking resistor overload	The external braking resistor is in poor wiring, its connection is loose, or the cables are disconnected.	Check whether the braking resistor is reliably wired.	Re-wire the external braking resistor according to the correct wiring diagram.
		The jumper wire across the power terminals P and PB is disconnected when the internal braking resistor is used.	Check whether the jumper wire across the power terminals is reliably connected.	Correctly and reliably connect the jumper wire.
		Insufficient capacity of the servo drive or the braking resistor	Calculate the maximum braking energy.	Increase the braking resistor capacity; increase the servo drive capacity; increase the acceleration/deceleration time.
		The load's moment of inertia is beyond the range of the allowable moment of inertia.	Check the value of the load's moment of inertia.	Increase the capacity of the drive, motor, and the resistor.
Er.010	Power module protection	Interphase short circuit or short circuit to ground occurs in the output three phases.	Check the insulation of the cable and the output motor.	Replace the cable or the motor.
		Instantaneous overcurrent of the drive	See overcurrent solutions.	See overcurrent solutions.
		The auxiliary power supply is damaged; the drive voltage is insufficient.	Seek technical assistance.	Seek technical assistance.
		Inverter shoot-through	Seek technical assistance.	Seek technical assistance.
		Abnormal control board	Seek technical assistance.	Seek technical assistance.
		Brake pipe is damaged.	Seek technical	Seek technical assistance.

Fault code	Fault type	Cause	Confirmation method	Solution
			assistance.	
Er.011 Er.012	Er.011: Servo drive overload Er.012: Motor overload	Incorrect wiring of the motor and the encoder	Check whether the wiring is correct according to the correct wiring diagram.	Re-wire according to the correct wiring diagram; replace the cables.
		The load is excessively heavy, and the motor keeps outputting effective torque higher than the rated value for a long time.	Check the overload characteristics and the running commands of the motor or drive.	Increase the capacity of the drive and motor; reduce the load; increase the acceleration/deceleration time.
		The acceleration/deceleration is excessively frequent, or the load inertia is excessively large.	Check the inertia ratio and the start-stop cycle.	Increase the acceleration/deceleration time.
		The gain adjustment is improper; there is excessive rigidity; the motor vibrates; the sound is abnormal.	Check whether the motor vibrates and whether the sound is abnormal during motor running.	Re-adjust the gain.
		The servo drive or motor model is set incorrectly.	Check the setting of the motor model.	Correctly set the motor model.
		Overload during running resulted from locked rotor which is caused by mechanical factors	Check the running commands and the motor speed via the commissioning platform or the panel display.	Remove the mechanical factors causing the locked rotor.
		Note: To clear the fault or power on again, wait for 60 s after the occurrence of the overload fault.		
Er.013	EEPROM read/write fault	Parameter read/write error	Check whether an instantaneous power failure occurs during parameter writing.	Restore to the default setting (P02.22=2), and reset the parameter.
		The number of times of parameter writing within a certain amount of time exceeds the maximum.	Check whether the host device frequently modifies the parameters.	Change the parameter writing method and write again.
Er.014	Abnormal communication of serial port	Improper setting of communication parameters	Check the function code settings.	Correctly set the baud rate and the communication data format.
		The communication wiring is incorrect, or the cable is	Check whether the communication wiring is	Wire the communication cables again, or replace the

Fault code	Fault type	Cause	Confirmation method	Solution
		unreliably connected or disconnected.	correct and whether the connection is reliable.	communication cables.
		Improper setting of fault parameters.	Check whether the setting of P15.02 is excessively short.	Correctly set P15.02.
		The host device does not work.	Check the signal of the host system.	Check whether the host device is working.
Er.015	Resistance of the external braking resistor is excessively small.	The resistance of the external braking resistor is smaller than the minimum value required by the servo drive.	Measure the resistance and check with function code P02.20	A braking resistor of which the resistance meets the requirement shall be applied; change the setting of the function code P02.20.
Er.016	The current detection circuit is abnormal.	The cable connection or the plug-in unit of the control board is loose.	Check whether the cable connection or the plug-in unit of the control board is loose.	Check the wiring, and re-wire.
		Analog input (AI) overvoltage	Check whether the AI voltage exceeds 12 V.	Adjust the AI voltage.
Er.018	Poor auto-tuning	The motor parameter setting is incorrect.	Check the parameters on the motor nameplate.	Correctly set the motor parameters.
		Reverse rotating auto-tuning is performed when reverse running is prohibited.	Check whether the reverse running prohibit function is enabled.	Disable the reverse running prohibit function.
		Incorrect wiring of motor	Check the motor wiring.	Make sure the power line UVW is properly connected, and the sequence is correct.
Er.019	Encoder fault	Encoder type error	Check the setting of the encoder type.	Correctly set the encoder type parameter.
		Encoder disconnection	Check the encoder cables.	Replace the encoder cables.
Er.020	Undervoltage during main circuit operation	Voltage drop of the power grid	Measure the voltage and check whether the voltage of the input grid power is abnormal.	Improve the input of grid power.
		Overload, or mismatching between the motor and the drive	Check the load and whether the drive and motor match.	Select the appropriate drive and motor.
Er.021	AI function conflict	The same AI channel is set to different functions.	Check the setting of the AI channel parameters.	Make sure the AI functions properly to avoid conflict.
Er.022	Incorrect setting of	Parameter auto-tuning in the non-VC control mode	Check the setting of the control mode	Make sure the control mode parameters are correctly set.

Fault code	Fault type	Cause	Confirmation method	Solution
	control mode parameters		parameters.	
Er.024	Abnormal AI input	AI channel overvoltage	Measure the AI channel voltage.	Adjust the input voltage, and make sure the value does not exceed 12 V.
		Incorrect wiring of the AI channel	Check the wiring in accordance with the correct wiring diagram.	Re-wire.
Er.025	Temperature sampling disconnection protection	The temperature sampling circuit is abnormal.		Seek technical assistance.
		The temperature sensor or signal cable is abnormal.		Seek technical assistance.
Er.027	Servo motor overspeed	The initial angle of the encoder is incorrect.	Check the initial angle of the encoder P01.22.	Perform the encoder angle auto-tuning again.
		The actual speed of the servo motor exceeds the overspeed threshold.	Check whether the overspeed threshold is set appropriately. (The overspeed threshold is set via P10.12; when P10.12 is set to 0, the overspeed threshold is 1.2 times of the motor maximum speed; when P10.12 is set to a non-0 value, the overspeed threshold is the minimum between P10.12 and the value of 1.2 times of the motor maximum speed)	Correctly set the overspeed threshold.
		Incorrect UVW phase sequence of the motor wiring	Check the wiring of the servo motor.	Make sure the motor wiring is correct.
		The input reference value exceeds the overspeed range.	Check the input reference.	Decrease the value of the reference, or adjust the gain.
		The motor speed overshoots.	Check the waveform of the motor speed.	Decrease the regulator gain; adjust the servo gain, or adjust the operating conditions.
		Servo drive fault	Check whether the fault is reported again when the system is powered	Replace the servo drive.

Fault code	Fault type	Cause	Confirmation method	Solution
			off and powered on again.	
Er.031	Encoder multi-turn count overflow	The multi-turn count exceeds 65535.	Check whether the value of P11.33 exceeds the maximum number of encoder turns.	Operate the motor in the speed mode to make the multi-turn count avoid the overflow judgement value 65535; shield the multi-turn overflow fault.
Er.032	Excessive position deviation	The position deviation exceeds the set value of P05.21.	Check whether the position deviation detection range P05.21 is excessively small, or whether the position gain P08.02 is excessively small.	Increase the position loop gain P08.02.
Er.033	Abnormal pulse input	The pulse frequency exceeds the set value of P10.13.	Check whether the maximum position pulse frequency P10.13 is excessively small.	Reset P10.13 according to the maximum position pulse frequency needed for normal mechanical running. If the output pulse frequency of the host device exceeds 4 MHz, it is necessary to reduce the output pulse frequency of the host device.
Er.034	Fully-closed loop position deviation is excessively large.	The position deviation of the external encoder and the internal encoder is excessively large.	Check whether the setting of P13.01 external encoder pulses per motor revolution is correct, and whether P13.04 the increase in threshold of excessive fully-closed loop position deviation judgement is excessively small.	Increase the threshold of excessive fully-closed loop position deviation judgement P13.04.
Er.035	Fully-closed loop function parameters setting error	In the fully-closed loop position mode, the source of position command is the internal position command. However, the internal/external loop switchover mode is applied.	Check whether P13.03 is set to 2, and whether the source of position command is the internal position command (Multi-segment position command, and interrupt positioning).	Use the external encoder feedback mode only (i.e. set P13.03 to 1 only) when the fully-closed loop function is applied and the source of position command is the internal position command.

Fault code	Fault type	Cause	Confirmation method	Solution
Er.036	PN bus communication is interrupted.	Communication interruption timeout between controller and servo	Check the connection between controller and servo.	Connect the cables again, or set appropriate disconnection detection time P17.07 according to the communication cycle.
Er.037	Homing timeout	After homing is enabled, the home position is not located within the time set by P12.09.	Check the settings of the homing mode and the homing timeout detection time P12.09.	Properly set the homing timeout detection time according to the homing motion profile.
Er.039	Positive over-travel	The motor exceeds the positive limit switch during running.	Check whether the mechanical device comes in contact with the limit switch.	Reverse the motor running to detach the device from the limit switch.
Er.040	Negative over-travel	The motor exceeds the negative limit switch during running.	Check whether the mechanical device comes in contact with the limit switch.	Reverse the motor running to detach the device from the limit switch.
Er.043	External fault	Action of the external fault terminal	Check whether the fault terminal is triggered by mistake.	Check the external wiring.
Er.046	Short circuit to ground upon power-on	The power output cables (UVW) of the drive are short circuited to ground.	Disconnect the UVW cables on the motor side, and check whether the power cables are short circuited to ground.	Re-wire, or replace the cables.
		The motor is short circuited to ground.	Disconnect the UVW cables on the motor side, and check whether the motor internal power cables are short circuited to the motor grounding wire.	Replace the motor.
Er.047 Er.048 Er.049	Internal logic error	...	...	Seek technical assistance.
Er.050	ASIC initialization error	Abnormal ASIC communication	Restart the drive.	Restart the drive; if the fault can not be reset, replace the drive.
Er.053	The position reference command of the controller is	The position reference command of the controller is excessively large.	Check the position reference command of the controller.	Reduce the deviation of the position reference command of the controller.

Fault code	Fault type	Cause	Confirmation method	Solution
	excessively large.			
Er.055	PN telegram configuration error	Mismatch between P17.01/P17.02 and the PLC program telegram configuration	Check the function code and the PLC telegram configuration.	Make sure the telegrams match.
Er.056	200P communication disconnection	The communication between 200P and MCU is interrupted.	Re-start the drive.	Re-start the drive; if the fault can not be reset, replace the drive.
Er.057	Fixed stop point beyond the monitoring window	When the fixed stop point is reached, the axis is beyond the monitoring window P17.14.	Check the axis position.	Check whether the endstop position is loose; adjust the monitoring window P17.14.
Er.058	The fixed stop point is not reached.	The fixed stop point is not located after the present position segment is performed.	Check the axis position.	Check the endstop position; check whether the setting of the segment position is excessively small.
Er.059	Running error after the fixed stop point is reached	After the fixed stop point is reached, the next segment is not directed to leave the stop point.	Check the axis running direction.	Check the axis running direction after the fixed stop point is reached.
Er.061	Electronic gear ratio setting error	Electronic gear ratio setting error	Check whether the electronic gear ratio parameter is set appropriately.	Correctly set the electronic gear ratio parameter.
Er.065	ASIC EEPROM is not burned.	ASIC EEPROM is not burned by the controller.	The controller burns the EEPROM according to the description file.	If the fault can not be reset, the controller needs to burn the EEPROM according to the description file.
Er.066	Homing logic error	The homing parameters are set improperly, or homing command is executed during positioning.	Check whether the homing parameters, including the home position search acceleration/deceleration time, and the homing method, are set correctly.	Properly set the homing parameters according to the actual homing method, or perform homing after the completion of positioning.
Er.070	The setting of matching motor number is invalid or incorrect.	The set motor number is invalid.	Check with the correct motor number, and reset.	Correctly set the motor number parameter P01.00.

Fault code	Fault type	Cause	Confirmation method	Solution
Er.071	Incremental encoder UVW position error	The UVW position of the incremental encoder is invalid.	Check whether the motor end and the servo end of the encoder cable are reversed. Re-plug the encoder terminals, power on multiple times repeatedly, and observe whether the fault still exists.	Swap the plugs of the encoder cable (the servo end is marked with the cable label), check the encoder wiring, or replace the encoder.
Er.072	Program burning error	The software program is inconsistent with the hardware.	Check whether the hardware model matches the software model.	Seek technical assistance.
Er.073	Bootstrapping failure	When enabling the 220 V drive, the motor speed is excessively high (exceeding 100 rpm).	Check whether the motor is rotating before enabling the drive.	Enable the drive when the motor is static or its speed is lower than 100 rpm.
Er.075	Absolute encoder battery undervoltage	The absolute encoder battery voltage is lower than 3.1 V when the drive is powered on.	Check whether the battery voltage is lower than 3.1 V.	Replace the encoder cable or encoder battery.
Er.076	Absolute encoder battery disconnection	The absolute encoder battery is disconnected, or the battery voltage is lower than 2.75 V during drive power failure.	Check whether the encoder battery is disconnected during drive power failure; check whether the battery voltage is excessively low.	If Er.076 is reported after the drive is powered on for the first time, press the reset button to clear the fault. If the fault remains after several times of resetting, replace the encoder cable or battery.
Er.077	Incorrect setting of encoder type	The actual encoder type is inconsistent with that read by P01.00.	Check whether the required encoder type of P01.00 is consistent with the actual encoder type.	Confirm the motor model, and modify the value of P01.00 if necessary.
Er.078	No parameter stored in the absolute encoder EEPROM	There is no parameter in the absolute encoder EEPROM when P01.00 is reading EEPROM.	Check whether any parameter has been written into the absolute encoder EEPROM.	Seek technical assistance.
Er.079	Absolute encoder EEPROM	Error occurs when writing parameters into the absolute encoder EEPROM.	Check whether parameters can be re-written after	Check the encoder type; replace the encoder or the motor if necessary.

Fault code	Fault type	Cause	Confirmation method	Solution
	parameter write error		power-off and power-on again.	
Er.080	Control circuit undervoltage	Control circuit power failure or undervoltage; USB power only.	Measure the control circuit power supply voltage and check whether the value is within the required range; check whether the control circuit power wiring is correct.	Check the power wiring, and replace the control circuit power supply if necessary.

Possible alarm types, causes, and solutions of the M6-F series are summarized as shown in table 8-2.

Tabel 8-2 Alarm code table

Alarm code	Alarm type	Cause	Confirmation method	Solution
AL.012	Motor overload	Incorrect wiring of motor or encoder	Check the wiring according to the correct wiring diagram.	Properly re-wire according to the correct wiring diagram; replace the cables.
		The motor outputs effective torque exceeding the rated value for an extended period, which is resulted from excessive overload.	Check the overload characteristics and the running commands of the motor or drive.	Increase the capacity of the drive and the motor; reduce the load; increase the acceleration/deceleration time.
		Acceleration/Deceleration is excessively frequent, or the load inertia is excessively large.	Check the inertia ratio and the start/stop cycle.	Increase the acceleration/deceleration time.
		The gain adjustment is inappropriate; there is excessive rigidity; the motor vibrates and generates abnormal sound.	Check whether the motor vibrates and generates abnormal sound during running.	Re-adjust the gain.
		Incorrect setting of the drive/motor model	Check the setting of the motor model.	Correctly set the motor model.
		Overload during running resulted from locked rotor which is caused by mechanical factors	Check the running commands and the motor speed via the commissioning platform or the panel	Remove the mechanical factors causing the locked rotor.

Alarm code	Alarm type	Cause	Confirmation method	Solution
			display.	
AL.014	Serial port communication abnormality	Incorrect setting of the communication parameters	Check the function code setting.	Correctly set the baud rate and the communication data format.
		The communication cable is wired incorrectly, or the connection is unreliable or disconnected.	Check whether the communication cable is wired/connected correctly and reliably.	Re-connect the communication cable, or replace the communication cable.
		Incorrect setting of the alarm parameters	Check whether the set value of P15.02 is too short.	Correctly set P15.02.
		The host device is not working.	Check whether the host device signal is normal.	Check whether the host device is working normally.
AL.024	Abnormal AI input	AI channel overvoltage	Check the AI channel input voltage.	Adjust the input voltage, and make sure the value does not exceeds 12 V.
		AI channel wiring error	Check the wiring in accordance with the correct wiring diagram.	Re-wire.
AL.025	Temperature sampling disconnection protection	The temperature sampling circuit is abnormal.		Seek technical assistance.
		The temperature sensor or signal cable is abnormal.		Seek technical assistance.
AL.038	DI emergency brake alarm	Action by emergency brake terminal	Set P02.09 to 1 to enable the emergency brake. An alarm will be reported upon any action by the emergency brake terminal when the drive is in the running state.	Set the reference according to normal logic.
AL.039	Positive over-travel alarm	The drive position exceeds the positive limit switch when P10.04 is set to 0 or 1.	Check whether the DI terminal is set to function 35 in group P03. Check the DI terminal logic validity of the bit corresponding to the	Check the running mode. Under the premise of safety, make the terminal logic of the positive limit switch invalid by implementing a reverse command or rotating the motor.

Alarm code	Alarm type	Cause	Confirmation method	Solution
			input signal monitoring P11.12.	
AL.040	Negative over-travel alarm	The drive position exceeds the negative limit switch when P10.04 is set to 0 or 1.	Check whether the DI terminal is set to function 36 in group P03. Check the DI terminal logic validity of the bit corresponding to the input signal monitoring P11.12.	Check the running mode. Under the premise of safety, make the terminal logic of the negative limit switch invalid by implementing a reverse command or rotating the motor.
AL.062	Interrupt positioning alarm	The interrupt positioning is enabled during zero-speed running.	Check the servo running state.	Perform the interrupt positioning in non-zero speed state.
AL.075	Absolute encoder battery undervoltage	The absolute encoder battery voltage is lower than 3.1 V when the drive is powered on.	When operation is enabled, an alarm of LOW is reported. When not enabled, AL.075 is reported; measure the battery voltage and check whether it is lower than 3.1 V.	Replace the encoder cable or battery.

Chapter 9 Parameter Table

The drive parameter indexes of the M6-F drive models are explained below

Parameter group	Index	Remark
P00	100XX	Drive parameter index = (10000 + Group number * 100 + Parameter number); [Example]: Parameter P00.00 in group P00: Index = 10000; Parameter P12.10 in group P12: Index = 11210;
P01	101XX	
…		

Drive parameters are listed below.

Index	Name	Range	Min. unit	Default	Effective time	Property
P00: Drive parameters						
10000	Series number	0 to FFFF	1	Manufacturer setting	-	At display
10001	DSP software version number	0.00 to 99.99	0.01	Manufacturer setting	-	At display
10002	Customized version number	0 to 9999	1	Manufacturer setting	-	At display
10003	FPGA software version number	0.00 to 99.99	0.01	Manufacturer setting	-	At display
10004	Servo drive voltage class	0: 220 V 1: 380 V	1	Manufacturer setting	-	At display
10005	Servo drive rated current	0 to 999.9 A	0.1 A	Manufacturer setting	-	At display
10006	Servo drive maximum current	0 to 999.9 A	0.1 A	Manufacturer setting	-	At display
P01: Motor parameters						
10100	Motor number	0: Motor parameter can be set; 0x0001 to 0xFFFF: Motor parameter is set automatically based on motor number;	1	0	Immediate	At stop
10101	Rated power	0.04 to 99.99 kW	0.01 kW	Depend on model	Power-on again	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
10102	Rated voltage	0 to "Servo drive rated voltage"	1 V	0	Power-on again	At stop
10103	Rated current	0.1 to 999.9 A	0.1 A	Depend on model	Power-on again	At stop
10104	Rated torque	0.1 to 655.35 N·m	0.01 N·m	Depend on model	Power-on again	At stop
10105	Maximum torque	0.1 to 655.35 N·m	0.01 N·m	Depend on model	Power-on again	At stop
10106	Rated rotating speed	0.1 to 6000.0 rpm	0.1 rpm	Depend on model	Power-on again	At stop
10107	Maximum rotating speed	0.1 to 6000.0 rpm	0.1 rpm	Depend on model	Power-on again	At stop
10108	Rotor inertia Jm	0.001 to 65.535 kg*cm^2	0.01 kg*cm^2	Depend on model	Power-on again	At stop
10109	Number of pole pairs	2 to 72 pole pairs	1 pole pair	Depend on model	Power-on again	At stop
10110	Stator Resistance R1	0.000 to 65.000 Ω	0.001 Ω	Depend on model	Power-on again	At stop
10111	Direct axis inductance Ld	0.00 to 200.00 mH	0.01 mH	Depend on model	Power-on again	At stop
10112	Q-axis Inductance Lq	0.00 to 200.00 mH	0.01 mH	Depend on model	Power-on again	At stop
10113	Back EMF constant	1 to 600.0 V/krpm	0.1 V/krpm	Depend on model	Power-on again	At stop
10114	Torque coefficient Kt	0.001 to 65.000 N·m/A	0.01 N·m/A	Depend on model	Power-on again	At stop
10115	Electrical constant Te	0.01 to 650.00 ms	0.01 ms	Depend on model	Power-on again	At stop
10116	Mechanical constant Tm	0.01 to 650.00 ms	0.01 ms	Depend on model	Power-on again	At stop
10117	Brake function	0: Without brake 1: With brake	1	Depend on model	Immediate	At stop
10118	Encoder selection	0: Reserved 1: Tamagawa serial intelligent 23-bit absolute encoder 2: Line-saving incremental encoder (with UVW) 3: Reserved 4: Full line incremental encoder 5: Reagle Sensing 17-bit	1	1	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		absolute encoder (Reserved) 6: Nikon 20-bit absolute encoder (Reserved) 7: Reserved				
10119	Number of encoder lines	1 to 4194304	1	2097152	Immediate	At stop
10120	Initial angle tuning during encoder installation	0: No action 1: Action (Static motor) 2: Action (Rotating motor)	1	0	Immediate	At stop
10121	Rotation direction	0: A ahead of B 1: B ahead of A	1	0	Immediate	At stop
10122	Initial angle of encoder installation	0.0 to 359.9°	0.1°	180.0	Immediate	At stop
10123	Initial angle of encoder Z pulse	0.0 to 359.9°	0.1°	180.0	Immediate	At stop
P02: Basic control parameters						
10200	Control mode selection	0: Speed mode 1: Position mode 2: Torque mode 3: Speed mode ←→ position mode (switchover via function 9) 4: Torque mode ←→ position mode (switchover via function 9) 5: Speed mode ←→ torque mode (switchover via function 9) 6: Speed mode ←→ torque mode ←→ position mode(torque switchover via function 9; position switchover via function 10; no switchover when function 9 and 10 are both valid or invalid, and the system stays in speed mode under the circumstances) 7: CANopen mode	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		8: EtherCAT mode 9: MECHATROLINK-III mode 10: PROFINET mode				
10201	Internal servo enable	0 to 1	1	0	Immediate	During running
10202	Absolute system mode selection	0: Absolute position linear mode 1: Absolute position rotation mode	1	0	Immediate	At stop
10203	Rotation direction selection	0: CCW direction as the forward direction (A ahead of B) 1: CW direction as the forward direction (reverse mode; A after B)	1	0	Immediate	During running
10204	Encoder frequency-division output pulses	1 to 32768 P/r	1	2500 P/r	Immediate	During running
10205	Pulse output source selection	0: Motor encoder frequency-division output 1: Pulse command synchronous output 2: Frequency-division or synchronous output prohibit	1	2	Immediate	During running
10206	Output pulse direction selection	0: A ahead of B 1: A after B	1	0	Immediate	During running
10207	Z pulse output polarity selection	0: Positive output (Z pulse at a high level) 1: Negative output (Z pulse at a low level)	1	0	Immediate	During running
10208	Stop mode	0: Decelerate to stop 1: Coast to stop	1	0	Immediate	During running
10209	Emergency stop enable	0: No operation; remain in the present running state 1: Enable the emergency stop; stop based on the set stop mode (P02.08); report an alarm AI.038	1	0	Immediate	During running
10210	Delay from the brake output being	20 to 500 ms	1 ms	250	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
	switched to ON to the command input					
10211	Delay from the brake output being switched to OFF to the motor's entry into the non-powered state	1 to 1000 ms	1 ms	150	Immediate	During running
10212	Brake command output speed limit value	0 to 3000.0 rpm	1 rpm	10.0	Immediate	During running
10213	Delay from the servo enable being switched to OFF to the brake output being switched to OFF	1 to 30000 ms	1 ms	500	Immediate	During running
10214	Minimum energy consumption resistor allowed by the drive	-	1	Depend on model	-	At display
10215	Built-in energy consumption resistor power	-	1	Depend on model	-	At display
10216	Built-in energy consumption resistor resistance	-	1	Depend on model	-	At display
10217	Resistor heat dissipation coefficient	0: 0% 1: 25% 2: 50% 3: 75% 4: 100%	1	2	Immediate	During running
10218	Energy consumption resistor selection	0: Use built-in energy consumption resistor 1: Use external energy consumption resistor 2: Energy consumption resistor not used	1	0	Immediate	At stop
10219	External energy consumption resistor power	1 to 65535 W	1 W	Depend on model	Immediate	At stop
10220	External energy	1 to 65535 Ω	1 Ω	Depend on	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
	consumption resistor resistance			model		
10221	Parameter protection setting	0: Modification available for all data; 1: Modification prohibited except for this function code and P06.01; 2: Modification prohibited except for this function code;	1	0	Immediate	During running
10222	Parameter initialization	0: State of parameter modification 1: Clear fault memory information 2: Restore to default value	1	0	Immediate	At stop
10223	LED display parameter selection	0: Switch to display P11.00 1: Switch to display P11.01 2: Switch to display P11.02 3: Switch to display P11.03 4: Switch to display P11.04 5: Switch to display P11.05 …	1	0	Immediate	During running
P03: Digital input/output terminal parameters						
10300	DI1 terminal function selection	0: No function 1: Servo enable 2: External reset (RESET) input 3: Gain switchover 4: Multi-speed DI switchover of running direction 5: Multi-segment running reference switchover 1 6: Multi-segment running reference switchover 2 7: Multi-segment running reference switchover 3 8: Multi-segment running reference switchover 4 9: Control mode switchover 1 10: Control mode switchover 2	1	1	Immediate	At stop
10301	DI2 terminal function selection		1	2	Immediate	At stop
10302	DI3 terminal function selection		1	5	Immediate	At stop
10303	DI4 terminal function selection		1	6	Immediate	At stop
10304	Reserved		1	0	Immediate	At stop
10305	Reserved		1	0	Immediate	At stop
10306	Reserved		1	0	Immediate	At stop
10307	Reserved		1	0	Immediate	At stop
10308	Reserved		1	0	Immediate	At stop
10309	Reserved		1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		11: Zero servo enable terminal 12: Pulse input prohibit 13: FWD rotation prohibit 14: REV rotation prohibit 15: Electronic gear ratio switchover 1 16: Electronic gear ratio switchover 2 17: FWD jog 18: REV jog 19: External torque limit during FWD rotation 20: External torque limit during REV rotation 21: Multi-segment position reference 1 23: Multi-segment position reference 2 23: Multi-segment position reference 3 24: Multi-segment position reference 4 25: Multi-segment position reference 5 26: Speed command direction switchover 27: Torque command direction switchover 28: Multi-segment / Signal-point position command enable 29: Position deviation counter clear 30: Interrupt positioning state release 31: Interrupt positioning prohibit 32: Home switch 33: Homing enable 34: Emergency stop 35: Positive limit switch				

Index	Name	Range	Min. unit	Default	Effective time	Property
		36: Negative limit switch 37: Main/Auxiliary speed reference switchover 38: External fault input 39: External terminal 1 input 40: External terminal 2 input				
10310	Terminal (DI1 to DI8) filter time	1 to 500 ms	1 ms	10	Immediate	During running
10311	Terminal (DI9/DI10) filter time	0 to 127(Filter time = Set value x 100 ns)	100 ns	50	Immediate	During running
10312	DI enable terminal validity type selection	0: The enable terminal is effective based on level; 1: The enable terminal is effective based on edge jump;	1	1	Immediate	During running
10313	Status of enabled input terminal	Binary setting 0: Normal logic, positive logic active 1: logical negation, negative logic active LED ones place BIT0 to BIT3: DI1 to DI4 LED tens place BIT0 to BIT3: DI5 to DI8 LED hundreds place BIT0 to BIT1: DI9 to DI10	1	000	Immediate	During running
10314	Virtual input terminal setting	Binary setting 0: Disabled 1: Enabled LED ones place BIT0 to BIT3: DI1 to DI4 LED tens place BIT0 to BIT3: DI5 to DI8 LED hundreds place BIT0 to BIT1: DI9 to DI10	1	000	Immediate	During running
10315	DO1 function selection	0: Servo drive ready (RDY) 1: Servo drive running signal (RUN) 2: Consistent speed 3: Speed arrival signal 4: Zero-speed operation	1	0	Immediate	At stop
10316	DO2 function selection		1	1	Immediate	At stop
10317	DO3 function selection		1	3	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
10318	Reserved	5: Drive fault 6: Drive alarm 7: Host device switch signal 8: Torque limiting 9: Speed limiting 10: Zero servo completed 11: Positioning completed 12: Position proximity 13: Alarm of position exceeding tolerance 14: Homing 15: Homing completed 16: Electrical homing 17: Electrical homing completed 18: Brake output (brake output signal) 19: Torque arrival signal 20: FWD/REV indication terminal 21: Reserved 22: Position arrival 1 23: Position arrival 2 24: Position arrival 3 25: Position arrival 4 26: Position arrival 5 27: Interrupt positioning completed	1	11	Immediate	At stop
10319	Reserved		1	5	Immediate	At stop
10320	Reserved		1	6	Immediate	At stop
10321	Status setting of enabled output terminal	Binary setting 0: Positive logic active 1: Negative logic active LED ones place BIT0 to BIT3: DO1 to DO4 LED tens place BIT0 to BIT1: DO5 to DO6	1	00	Immediate	During running
P05: Position control parameters						
10500	Position reference mode	0: Pulse reference 1: Single-point position reference 2: Multi-segment position reference	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
10501	Pulse reference input terminal selection	0: Low-speed terminal 1: High-speed terminal	1	1	Immediate	At stop
10502	Pulse command mode	0: A/B phase pulse 1: Pulse + Sign 2: CW/CCW pulse	1	0	Immediate	At stop
10503	Pulse command logic	0: Positive logic 1: Negative logic	1	0	Immediate	At stop
10504	Reserved					
10505	Command pulses per motor revolution	0 to 8388608 P/r	1 P/r	10000	Immediate	At stop
10506	Position command first-order low-pass filter time	0.0 to 2000.0 ms	0.1 ms	0	Immediate	During running
10507	Position command movement average filter time	0.0 to 12.8 ms	0.1 ms	0	Immediate	During running
10508	Electronic gear numerator	1 to 1073741824	1	8388608	Immediate	At stop
10509	Electronic gear ratio denominator 1	1 to 1073741824	1	10000	Immediate	At stop
10510	Electronic gear ratio denominator 2	1 to 1073741824	1	10000	Immediate	At stop
10511	Electronic gear ratio denominator 3	1 to 1073741824	1	10000	Immediate	At stop
10512	Electronic gear ratio denominator 4	1 to 1073741824	1	10000	Immediate	At stop
10513	Electronic gear ratio switchover conditions	0: Switch when the position command is 0 and holds for 3 ms; 1: Real-time switchover;	1	0	Immediate	At stop
10514	Position deviation clear method selection	0: Clear position deviation when servo enable is OFF or when servo is stopped; 1: Clear position deviation when servo enable is OFF or a fault/alarm occurs; 2: Clear position deviation when servo enable is OFF or the external position	1	00	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		deviation clear DI is valid.				
10515	Position deviation clear DI signal type	0: Pulse mode 1: Level mode	0	0	Immediate	At stop
10516	Speed feedforward control selection	0: No speed feedforward; 1: Internal speed feedforward (take the speed information corresponding to the position command in the encoder unit as the source of the speed feedforward signal); 2: AI1 as the speed feedforward; 3: AI2 as the speed feedforward;	1	1	Immediate	At stop
10517	Position controller output limit	0 to "Maximum speed"	0.1 rpm	6000.0	Immediate	During running
10518	Output conditions for positioning completion	0: The absolute value of position deviation is smaller than the amplitude of positioning completion; 1: The absolute value of position deviation is smaller than the amplitude of positioning completion, and the command after the position command filtering is zero; 2: The absolute value of position deviation is smaller than the amplitude of positioning completion, and the position command is zero;	1	0	Immediate	At stop
10519	Positioning completion range	0 to 10000	1 command unit	10	Immediate	During running
10520	Position proximity signal width	1 to 32767	1 command unit	100	Immediate	During running
10521	Position error detection range	0 to 32767	1 encoder unit	20000	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
10522	Position error alarm invalid	0: Enable 1: Disable	1	0	Immediate	During running
10523	Servo shutdown mode	0: Switch to speed control and stop according to servo shutdown time; 1: Switch to speed control and decelerate to stop	1	1	Immediate	During running
10524	Servo shutdown time	0 to 3000 ms When PL (CCWL) or NL (CWL) occurs, decelerate to stop according to the shutdown time	1	0	Immediate	During running
10525	Mechanical gear ratio numerator in the absolute position rotation mode	1 to 65535	1	1	Immediate	At stop
10526	Mechanical gear ratio denominator in the absolute position rotation mode	1 to 65535	1	1	Immediate	At stop
10527	Position offset in the absolute position linear mode (Lower 32 bits)	0 to 4294967295	1 encoder unit	0	Immediate	At stop
10528	Position offset in the absolute position linear mode (Higher 32 bits)	0 to 4294967295	1 encoder unit	0	Immediate	At stop
10529	Number of pulses per load revolution in the absolute position rotation mode (Lower 32 bits)	0 to 4294967295	1 encoder unit	0	Immediate	At stop
10530	Number of pulses per load revolution in the absolute position rotation mode (Higher 32 bits)	0 to 127	1 encoder unit	0	Immediate	At stop
10531	Soft limit function setting	0: Disable soft limit 1: Enable soft limit immediately upon	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		power-on 2: Enable soft limit after homing				
10532	Software limit maximum point	-2147483647 to 2147483647	1 command unit	2147483647	Immediate	At stop
10533	Software limit minimum point	-2147483647 to 2147483647	1 command unit	-2147483648	Immediate	At stop
P06: Speed control parameters						
10600	Main reference source selection	0: Digital reference (P06.01) 1: AI1 analog reference 2: AI2 analog reference 3: Serial port communication reference 4: Multi-speed reference (Auxiliary reference not available)	1	0	Immediate	During running
10601	Main reference speed setting	-6000.0 to 6000.0 rpm	0.1 rpm	0.0	Immediate	During running
10602	Auxiliary speed source selection	0: No auxiliary reference 1: Digital reference 2: AI1 analog reference 3: AI2 analog reference 4: Serial port communication reference	1	0	Immediate	During running
10603	Auxiliary reference speed setting	-6000.0 to 6000.0 rpm	0.1 rpm	0	Immediate	During running
10604	Main/Auxiliary reference calculation	0: Main + Auxiliary 1: Main - Auxiliary 2: Main/Auxiliary reference switchover via terminal 3: MAX (Main/Auxiliary reference) 4: MIN (Main/Auxiliary reference)	1	0	Immediate	During running
10605	Jog speed	0.0 to 6000.0 rpm	0.1 rpm	100.0	Immediate	At stop
10606	Jog operation					
10607	Speed command acceleration time 1	0 to 65535 ms	1 ms	1000	Immediate	During running
10608	Speed command deceleration time 1	0 to 65535 ms	1 ms	1000	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
10609	Maximum speed threshold	0.0 to 6000.0 rpm	0.1 rpm	6000.0	Immediate	During running
10610	Forward speed threshold	0.0 to 6000.0 rpm	0.1 rpm	6000.0	Immediate	During running
10611	Reverse speed threshold	0.0 to 6000.0 rpm	0.1 rpm	6000.0	Immediate	During running
10612	Positive torque limit channel	0: Internal positive torque limit value 1: AI1 reference 2: AI2 reference 3: External negative torque limit value	1	0	Immediate	At stop
10613	Negative torque limit channel	0: Internal negative torque limit value 1: AI1 reference 2: AI2 reference 3: External negative torque limit value	1	0	Immediate	At stop
10614	Internal positive torque limit value	0.0% to +400.0%	0.1%	Depend on model	Immediate	During running
10615	Internal negative torque limit value	0.0% to +400.0%	0.1%	Depend on model	Immediate	During running
10616	External positive torque limit value	0.0% to +400.0%	0.1%	100.0	Immediate	During running
10617	External negative torque limit value	0.0% to +400.0%	0.1%	100.0	Immediate	During running
10618	Torque feedforward control selection	0: No torque feedforward 1: Internal torque feedforward (take the speed command as the torque feedforward signal source. In the position control mode, the speed command comes from the output of the position controller)	1	1	Immediate	During running
10619	Zero clamp function	0: Disabled 1: Always enabled 2: Enabled under conditions (enabled via terminal)	1	0	Immediate	At stop
10620	Zero clamp gain	0 to 6.000	0.001	1.000	Immediate	During

Index	Name	Range	Min. unit	Default	Effective time	Property
						running
10621	Zero clamp starting speed	0.0 to 1000.0 rpm	0.1 rpm	2.0	Immediate	During running
10622	Speed arrival detection width	0.0 to 5000.0 rpm	0.1 rpm	20.0	Immediate	During running
10623	Zero speed threshold	0.0% to 100.0% of maximum speed	0.1%	1.0	Immediate	During running
10624	Speed consistency threshold	0.0 to 100.0 rpm	0.1 rpm	10.0	Immediate	During running
P07: Torque control parameters						
10700	Torque reference selection	0: Digital reference 1: AI1 reference 2: AI2 reference 3: Serial port reference	1	0	Immediate	At stop
10701	Positive direction selection of torque	0: FWD drive as positive 1: REV drive as positive	1	0	Immediate	At stop
10702	Speed/Torque switchover mode selection	0: Direct switchover 1: Switch over the torque switchover point	1	0	Immediate	At stop
10703	Torque digital reference	-400.0% to +400.0%	0.1%	0.0	Immediate	During running
10704	Torque reference acceleration / deceleration time	0 to 6553.5 ms	0.1 ms	0	Immediate	At stop
10705	Torque command filter time constant	0 to 30.0 ms	0.1 ms	1.0	Immediate	At stop
10706	Second torque command filter time constant	0 to 30.0 ms	0.1 ms	1.0	Immediate	At stop
10707	Speed/Torque switchover point	0.0% to 400.0% of initial torque	0.1%	100.0	Immediate	At stop
10708	Speed/Torque switchover delay	0 to 1000.0 ms	0.1 ms	0.0	Immediate	At stop
10709	FWD speed limit channel	0: FWD speed limit value 1: AI1 reference 2: AI2 reference	1	0	Immediate	At stop
10710	FWD speed limit value	0.0% to 100.0%	0.1%	100.0	Immediate	During running
10711	REV speed limit channel	0: REV speed limit value 1: AI1 reference	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		2: AI2 reference				
10712	REV speed limit value	0.0% to 100.0%	0.1%	100.0	Immediate	During running
10713	Torque arrival reference value	0.0 to 400.0%	0.1%	0.0	Immediate	During running
10714	Torque arrival effective value	0.0 to 400.0%	0.1%	20.0	Immediate	During running
10715	Torque arrival non-effective value	0.0 to 400.0%	0.1%	10.0	Immediate	During running
P08: Gain parameters						
10800	Speed loop proportional gain 1	0.1 to 5000.0 Hz	0.1 Hz	20.0	Immediate	During running
10801	Speed loop integral time 1	0.00 to 10.000 ms	0.01 ms	5.00	Immediate	During running
10802	Position loop gain 1	1 to 8000 rad/s	1 rad/s	18	Immediate	During running
10803	Speed regulator output filter time 1	0 to 32.0 ms	0.1 ms	0.8	Immediate	During running
10804	Speed loop proportional gain 2	0.1 to 5000.0 Hz	0.1 Hz	20.0	Immediate	During running
10805	Speed loop integral time 2	0.00 to 10.000 ms	0.01 ms	1.00	Immediate	During running
10806	Position loop gain 2	1 to 8000 rad/s	1 rad/s	60	Immediate	During running
10807	Speed regulator output filter time 2	0 to 32.0 ms	0.1 ms	0.8	Immediate	During running
10808	Gain selection mode	0: Gain 1 is fixed; P/PI switchover via external DI 1:Gain switchover based on condition selection of P08.09	0	0	Immediate	During running
10809	Gain switchover condition selection	0: No switchover of gain 1 1: Switchover via external DI terminal 2: Torque command 3: Speed command 4: Feedback speed 5: Speed command change rate 6: Position deviation	1	0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
		7: Speed command high/low speed threshold 8: Position command received 9: Positioning not completed 10: Position command received + actual speed				
10810	Gain switchover delay	0 to 1000 ms	1 ms	5	Immediate	During running
10811	Gain switchover level	0 to 20000	Switch on condition	50	Immediate	During running
10812	Gain switchover hysteresis	0 to 20000	Switch on condition	30	Immediate	During running
10813	Position gain switchover time	0 to 1000 ms	1 ms	5	Immediate	During running
10814	Speed feedforward filter time	0.00 to 64.00 ms	0.01 ms	0.05	Immediate	During running
10815	Speed feedforward gain	0.0 to 100.0%	0.01%	0.0	Immediate	During running
10816	Torque feedforward filter time	0.00 to 64.00 ms	0.01	0.05	Immediate	During running
10817	Torque feedforward gain	0.0 to 200.0%	0.1%	0.0	Immediate	During running
10818	Cut-off frequency of feedback speed low-pass filter (Encoder filter time at present)	100 to 4000 Hz (0.0 to 40.0)	0.0	40.0	Immediate	During running
10819	PDFF (Pseudo-differential feedforward) control coefficient (Reserved in non-torque control mode)	0.0 to 100.0%	0.1%	100.0	Immediate	During running
P09: Adjustment parameters						
10900	Offline inertia identification function		0.01	0.00	Immediate	At stop
10901	Inertia identification	200 to 2000 rpm	1 rpm	800	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
	maximum speed					
10902	Inertia identification acceleration time	10 to 1000 ms	1 ms	60	Immediate	At stop
10903	Motor revolutions for inertia identification	0.00 to 2.00 r	0.01 r	0.00	Immediate	At stop
10904	Waiting time after single inertia identification	50 to 10000	1 ms	800	Immediate	At stop
10905	Online inertia identification mode	0: Disabled 1: Enabled; change slowly 2: Enabled; change at normal speed 3: Enabled; change quickly	1	0	Immediate	At stop
10906	Gain adjustment mode	0: Parameter auto-tuning is invalid; manual tuning is applied; 1: Parameter auto-tuning mode; automatically adjust the gain parameters using the rigidity table; 2: Positioning mode; automatically adjust the gain parameters using the rigidity table;	1	0	Immediate	At stop
10907	Rigidity level	0 to 31	1	14	Immediate	At stop
10908	Adaptive notch filter mode	0: The parameters of the 3rd and 4th notch filters are not updated; 1: The adaptive results of the 3rd notch filter parameters are updated; 2: The parameter adaptive results of the 3rd and 4th notch filters are updated; 3: Automatically detect the mechanical resonance frequency, but do not set the relevant parameters of the notch filter; 4: Restore the parameters of the 4 notch filters to	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		default values;				
10909	Setting of sensitivity for automatic vibration suppression	1 to 100	1	1	Immediate	At stop
10910	Notch filter 1 frequency	0 to 4000 Hz	1 Hz	0	Immediate	At stop
10911	Notch filter 1 width	10 to 1000 Hz	1 Hz	100	Immediate	At stop
10912	Notch filter 2 frequency	0 to 4000 Hz	1 Hz	0	Immediate	At stop
10913	Notch filter 2 width	10 to 1000 Hz	1 Hz	100	Immediate	At stop
10914	Notch filter 3 frequency	0 to 4000 Hz	1 Hz	0	Immediate	At stop
10915	Notch filter 3 width	10 to 4000 Hz	1 Hz	100	Immediate	At stop
10916	Notch filter 4 frequency	0 to 4000 Hz	1 Hz	0	Immediate	At stop
10917	Notch filter 4 width	10 to 1000 Hz	1 Hz	100	Immediate	At stop
10918	Speed loop low-pass filter time-constant	0 to 65536 μs	1 μs	0	Immediate	At stop
10919	Speed reference notch filter frequency	0 to 1000 Hz	1 Hz	0	Immediate	At stop
10920	Speed reference notch filter width	10 to 500 Hz	1 Hz	100	Immediate	At stop
10921	Reserved					
10922	Resonance frequency identification result	0 to 2000 Hz	1 Hz	-	Immediate	At stop
10923	Disturbance torque compensation gain	0.0% to 100.0%	0.1%	0	Immediate	At stop
10924	Disturbance observer filter time	0.0 to 25.0 ms	0.1 ms	0	Immediate	At stop
10925	Low-frequency resonance suppression mode selection	0: Manually set vibration suppression parameters 1: Automatically set vibration suppression parameters	1	0	Immediate	During running
10926	Low-frequency resonance frequency	1.0 to 200.0 Hz	0.1 Hz	100．0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
10927	Low-frequency resonance frequency filter setting	0 to 20	1	0	Immediate	During running
10928	Low-frequency resonance position deviation judgment threshold	1 to 1000 P	1 P	5	Immediate	At stop
10929	Torque command offset (Vertical axis mode)	-300.00% to 300.00%	0.01%	0.00	Immediate	During running
10930	Viscous friction compensation gain	0 to 1000.0	0.1%/ 10000 rpm	0	Immediate	At stop
10931	Positive friction compensation	0 to 50.0%	0.1	0	Immediate	At stop
10932	Negative friction compensation	0 to 50.0%	0.1%	0	Immediate	At stop
10933	Quadrant protrusion positive direction compensation value	-100.00% to 100.00%	0.01%	0.00	Immediate	At stop
10934	Quadrant protrusion opposite direction compensation value	-100.00% to 100.00%	0.01%	0.00	Immediate	At stop
10935	Quadrant protrusion compensation delay	0 to 1000.0	0. 1 ms	0.0	Immediate	At stop
10936	Quadrant protrusion compensation filter	0 to 1000.0	0. 1 ms	0.0	Immediate	At stop
10937	Quadrant protrusion compensation effective position	0 to 65535	1	1	Immediate	At stop
10938	Load's moment of inertia ratio	0.00 to 120.00	0.01	1.00	Immediate	At stop
P10: Fault and protection parameters						
11000	Action selection upon phase loss	0: Activate protection upon input and output phase loss 1: No protection upon input phase loss 2: No protection upon output phase loss	1	0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
		3: No protection upon input/output phase loss				
11001	Action selection upon communication timeout	0: Activate protection and coast to stop 1: Report an alarm and keep running	1	0	Immediate	During running
11002	Action selection upon temperature sampling disconnection	0: Activate protection and coast to stop 1: Report an alarm and keep running	1	0	Immediate	During running
11003	Action selection upon analog input fault	0: Activate protection and coast to stop 1: Report an alarm and keep running	1	0	Immediate	During running
11004	Over-travel stop mode selection	0: Activate protection and coast to stop 1: Report an alarm, decelerate to zero, and hold the state of position lock	1	2	Immediate	During running
11005	Reserved					
11006	Motor overload protection action selection	0: Activate protection and coast to stop 1: Report an alarm and keep running	1	1	Immediate	At stop
11007	Motor overload protection gain	20.0% to 300.0%	0.1%	100.0	Immediate	During running
11008	Runaway protection enable (Reserved)	0: Disable 1: Enable	1	1	Immediate	At stop
11009	Locked rotor over-temperature protection enable	0: Shield the detection for locked rotor over-temperature protection 1: Enable the detection for locked rotor over-temperature protection	1	0	Immediate	At stop
11010	Locked rotor over-temperature protection time window	10 to 65535 ms	1 ms	100	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
11011	Action selection for encoder multi-turn overflow fault	0: Not shield 1: Shield	1	0	Immediate	At stop
11012	Overspeed fault threshold	0 to 15000 rpm	1 rpm	10800	Immediate	At stop
11013	Maximum position pulse frequency	100 to 4000 kHz	1 kHz	4000	Immediate	At stop
11014	Action selection for absolute encoder battery undervoltage fault	0: Set the battery undervoltage as a fault; each time the drive is powered on or reset, detect the battery voltage and report an alarm if an undervoltage occurs; detection is disabled during other periods of operation; 1: Set the battery undervoltage as an alarm; report an alarm when the battery voltage is lower than 3 V; battery voltage detection is always enabled.	1	0	Immediate	At stop
11015	Function selection when main circuit undervoltage occurs	0: Do not report an alarm when main circuit undervoltage is detected; 1: Report an alarm when main circuit undervoltage is detected; 2: Report an alarm when main circuit undervoltage is detected, and implement torque limit.	1	0	Immediate	At stop
11016	Torque limit value during main circuit undervoltage	0 to 100%	1%	100	Immediate	At stop
11017	Torque limit release time during main circuit undervoltage	0 to 1000 ms	1 ms	10	Immediate	At stop
11018	Type of the last fault	0: No record of abnormalities 1: Overcurrent	1	0	-	At display

Index	Name	Range	Min. unit	Default	Effective time	Property
		2: Main circuit overvoltage 3: Control circuit overvoltage 4: Motor locked rotor 5: Parameter modification without power off 6: Phase loss on the input side 7: Phase loss on the output side 8: Heatsink overheat 9: Braking resistor overload 10: Power module protection 11: Servo drive overload 12: Motor overload 13: EEPROM read/write error 14: Serial port communication error 15: Excessively small external brake resistance (Reserved) 16: Abnormal current detection circuit 17: Reserved 18: Poor auto-tuning 19: Encoder fault 20: Undervoltage during main circuit operation 21: AI function conflict 22: Parameter setting error 23: Communication position reference overflow (Reserved) 24: Abnormal AI input 25: Inverter module sampling disconnection protection 26: Reserved 27: Overspeed (The actual speed of the servo motor exceeds the overspeed fault threshold) 28: Runaway (Reserved)				

Index	Name	Range	Min. unit	Default	Effective time	Property
		29: Main circuit undervoltage 30: Encoder multi-turn count error 31: Encoder multi-turn count overflow 32: Excessively large position deviation 33: Abnormal pulse input 34: Excessively large position deviation in fully closed loop 35: Function parameter setting error in fully closed loop 36: Connection interruption in CAN communication 37: Homing timeout 38: DI emergency brake (Alarm only) 39: Forward over-travel alarm 40: Reverse over-travel alarm 41: Encoder battery failure 42: Reserved 43: External fault 44: Reserved 45: Reserved 46: Short circuit to ground at power-on 47: Parameter per-unit error 48: Internal logic error 1 49: Internal logic error 2 50 to 54: Reserved 55: PN telegram configuration error 56: 200P communication disconnection 57: Fixed stop point beyond the monitoring window 58: Fixed stop point not reached				

Index	Name	Range	Min. unit	Default	Effective time	Property
		59: Running error after the fixed stop point is reached 60: Reserved 61: Abnormal electronic gear ratio 62: Interrupt positioning alarm 66: Homing logic error 70: Setting error of matching motor number 71: Incremental encoder UVW error 72: Program burning error 73: Bootstrapping failure 75: Absolute encoder battery undervoltage 76: Absolute encoder battery disconnection 77: Encoder type setting error 78: No parameter stored in the absolute encoder EEPROM 79: Absolute encoder EEPROM parameter write error 80: Control circuit undervoltage				
11019	Type of the second fault	Same as P10.18	1	0	-	At display
11020	Type of the first fault	Same as P10.18	1	0	-	At display
11021	Bus voltage at the last fault	0 to 999 V	1 V	0	-	At display
11022	V-phase current at the last fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11023	W-phase current at the last fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11024	D-axis current reference value at the last fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11025	Q-axis current	0.0 to 999.9 A	0.1 A	0.0	-	At

Index	Name	Range	Min. unit	Default	Effective time	Property
	reference value at the last fault					display
11026	D-axis current feedback value at the last fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11027	Q-axis current feedback value at the last fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11028	Speed at the last fault	-6000.0 to 6000.0 rpm	0.1 rpm	0.0	-	At display
11029	Encoder position feedback at the last fault (PUU unit)	-2147483648 to 2147483647	1	0	-	At display
11030	DI state at the last fault	LED ones place BIT0 to BIT3: DI1 to DI4 LED tens place BIT0 to BIT3: DI5 to DI8 LED hundreds place BIT0 to BIT1: DI9 to DI10	1	0	-	At display
11031	DO state at the last fault	LED ones place BIT0 to BIT3: DO1 to DO4 LED tens place BIT0 to BIT2: DO5 to DO6	1	0	-	At display
11032	Drive state at the last fault	0 to FFFFH (same as P11.11)	1	0	-	At display
11033	Temperature at the last fault	-40.0℃ to 200.0℃	0.1℃	0.0	-	At display
11034	Bus voltage at the second fault	0 to 999 V	1 V	0	-	At display
11035	V-phase current at the second fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11036	W-phase current at the second fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11037	D-axis current reference value at the second fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11038	Q-axis current reference value at the second fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11039	D-axis current feedback value at	0.0 to 999.9 A	0.1 A	0.0	-	At display

Index	Name	Range	Min. unit	Default	Effective time	Property
	the second fault					
11040	Q-axis current feedback value at the second fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11041	Speed at the second fault	-6000.0 to 6000.0 rpm	0.1 rpm	0.0	-	At display
11042	Encoder position feedback at the second fault (PUU unit)	-2147483648 to 2147483647	1	0	-	At display
11043	DI state at the second fault	LED ones place BIT0 to BIT3: DI1 to DI4 LED tens place BIT0 to BIT3: DI5 to DI8 LED hundreds place BIT0 to BIT1: DI9 to DI10	1	0	-	At display
11044	DO state at the second fault	LED ones place BIT0 to BIT3: DO1 to DO4 LED tens place BIT0 to BIT2: DO5 to DO6	1	0	-	At display
11045	Drive state at the second fault	0 to FFFFH (same as P11.11)	1	0	-	At display
11046	Temperature at the second fault	-40.0℃ to 200.0℃	0.1℃	0.0	-	At display
11047	Bus voltage at the first fault	0 to 999 V	1 V	0	-	At display
11048	V-phase current at the first fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11049	W-phase current at the first fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11050	D-axis current reference value at the first fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11051	Q-axis current reference value at the first fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11052	D-axis current feedback value at the first fault	0.0 to 999.9 A	0.1 A	0.0	-	At display
11053	Q-axis current	0.0 to 999.9 A	0.1 A	0.0	-	At

Index	Name	Range	Min. unit	Default	Effective time	Property
	feedback value at the first fault					display
11054	Speed at the first fault	-6000.0 to 6000.0 rpm	0.1 rpm	0.0	-	At display
11055	Encoder position feedback at the first fault (PUU unit)	-2147483648 to 2147483647	1	0	-	At display
11056	DI state at the first fault	LED ones place BIT0 to BIT3: DI1 to DI4 LED tens place BIT0 to BIT3: DI5 to DI8 LED hundreds place BIT0 to BIT1: DI9 to DI10	1	0	-	At display
11057	DO state at the first fault	LED ones place BIT0 to BIT3: DO1 to DO4 LED tens place BIT0 to BIT2: DO5 to DO6	1	0	-	At display
11058	Drive state at the first fault	0 to FFFFH (same as P11.11)	1	0	-	At display
11059	Temperature at the first fault	-40.0℃ to 200.0℃	0.1℃	0.0	-	At display
P11: Display parameters						
11100	Speed command	-6000.0 to 6000.0 rpm	0.1 rpm		-	At display
11101	Actual motor speed	-6000.0 to 6000.0 rpm	0.1 rpm		-	At display
11102	Output voltage	0 to 480 V	1 V		-	At display
11103	Output current	0.0 to 4 Ie A	0.1 A		-	At display
11104	Q-axis current	-400.0 to +400.0% Ie	0.1%		-	At display
11105	D-axis current	-100.0 to +100.0% Ie	0.1%		-	At display
11106	Output torque	-300.00 to +300.00 N·m	0.01 N·m		-	At display
11107	Output power	0 to 60000 W	1 W			At display
11108	Average load rate	0.0 to 400.0% Te	0.1%		-	At display

Index	Name	Range	Min. unit	Default	Effective time	Property
11109	Bus voltage	0 to 900 V	1 V		-	At display
11110	Control voltage	0 to 450 V	1 V		-	At display
11111	Servo drive operation status	0 to FFFFH bit0: RUN/STOP bit1: REV/FWD bit2: Running at zero speed bit3: Accelerating bit4: Decelerating bit5: Running at a constant speed bit6: Reserved bit7: Reserved bit8: Overcurrent limiting bit9: DC overvoltage limiting bit10: Torque limiting bit11: Speed limiting bit12: Servo drive fault bit13: Speed control bit14: Torque control bit15: Position control	1		-	At display
11112	DI terminal status	0 to 3FFH 0: Disconnect 1: Connect The high-speed pulse reference will not be refreshed synchronously.	1		-	At display
11113	DO terminal status	0 to FH 0: Disconnect 1: Connect The high-speed pulse output will not be refreshed synchronously.	1		-	At display
11114	AI1 input voltage	-20.000 to 20.000 V	0.001 V		-	At display
11115	AI2 input voltage	-20.000 to 20.000 V	0.001 V		-	At display
11116	Input pulse frequency	0 to 4000.0 kpps	0.1 kpps		-	At display
11117	Corresponding	-6000.0 to 6000.0 rpm	0.1 rpm		-	At

Index	Name	Range	Min. unit	Default	Effective time	Property
	speed of the input pulse command					display
11118	Motor encoder counter value	0 to 4 times motor encoder lines -1	1		-	At display
11119	Motor encoder Z pulse position	0 to 4 times motor encoder lines -1	1		-	At display
11120	Number of input pulses	-2147483648 to 2147483647			-	At display
11121	Location of the position reference point	-2147483648 to 2147483647	1		-	At display
11122	Position reference	-2147483648 to 2147483647	1		-	At display
11123	Position feedback	-2147483648 to 2147483647	1		-	At display
11124	Position deviation pulse	-2147483648 to 2147483647	1		-	At display
11125	Location of the position reference point (PUU unit)	-2147483648 to 2147483647	1		-	At display
11126	Position reference (PUU unit)	-2147483648 to 2147483647	1		-	At display
11127	Position reference (PUU unit)	-2147483648 to 2147483647	1		-	At display
11128	Position deviation pulse (PUU unit)	-2147483648 to 2147483647	1		-	At display
11129	Accumulated time of power-on	0 to maximum 65535 hours	1 hour		-	At display
11130	Accumulated time of operation	0 to maximum 65535 hours	1 hour		-	At display
11131	Module temperature	-40.0℃ to 150.0℃	0.1℃		-	At display
11132	Encoder single-turn position	0 to 8388608	1		-	At display
11133	Absolute encoder revolutions	0 to 65535 r	1 r		-	At display
11134	Load's moment of inertia ratio	0.00 to 120.00	0.01		-	At display
11135	Absolute position PUU value	Present absolute position of the machine (Command	Command unit		-	At display

Index	Name	Range	Min. unit	Default	Effective time	Property
		unit) = Absolute mechanical position / Mechanical gear ratio -2147483648 to 2147483647				
11136	Absolute mechanical position (Lower 32 bits)	Absolute mechanical position refers to the position at the motor end which is converted from the load position in absolute position linear mode or absolute position rotation mode (Encoder unit). Absolute mechanical position = Absolute encoder position - Home offset	Encoder unit		-	At display
11137	Absolute mechanical position (Higher 32 bits)		Encoder unit		-	At display
11138	Absolute position of the absolute encoder (Lower 32 bits)	Absolute position of the absolute encoder refers to the feedback absolute position of the absolute encoder. (Encoder unit)	Encoder unit		-	At display
11139	Absolute position of the absolute encoder (Higher 32 bits)		Encoder unit		-	At display
11140	Single-turn position of the rotating load (Lower 32 bits)	Single-turn position of the rotating load refers to the position at the motor end which is converted from the single-turn position of the rotating load in the absolute position rotation mode. (Encoder unit)	Encoder unit		-	At display
11141	Single-turn position of the rotating load (Higher 32 bits)		Encoder unit		-	At display
11142	Single-turn position of the rotating load	It refers to the single turn position of the rotating load in the absolute position rotation mode. (Command unit)	Command unit		-	At display
11143	Mechanical angle (Number of pulses from home position)		Encoder unit		-	At display
11144	Electrical angle	0.00 to 360.00°	0.01°		-	At display
11145	Reserved					

Index	Name	Range	Min. unit	Default	Effective time	Property
P12: Servo positioning parameters						
11200	Homing enable control	0: Disable homing 1: Enable homing by the HomingStart signal input via DI 2: Enable electrical homing by the HomingStart signal input via DI 3: Immediately activate homing upon power-on 4: Immediately activate homing 5: Activate electrical homing 6: Take the present position as the home position	1	0	Immediate	At stop
11201	Homing method	0: Homing in forward direction, and the home switch as the deceleration point and the home position; 1: Homing in backward direction, and the home switch as the deceleration point and the home position; 2: Homing in forward direction, and the motor Z pulse as the deceleration point and the home position; 3: Homing in backward direction, and the motor Z pulse as the deceleration point and the home position; 4: Homing in forward direction, the home switch as the deceleration point, and the motor Z pulse as	1	9	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
		the home position; 5: Homing in backward direction, the home switch as the deceleration point, and the motor Z pulse as the home position; 6: Homing in forward direction direction, and the positive limit switch as the deceleration point and the home position; 7: Homing in backward direction, and the negative limit switch as the deceleration point and the home position; 8: Homing in forward direction, the positive limit switch as the deceleration point, and the motor Z pulse as the home position; 9: Homing in backward direction, the negative limit switch as the deceleration point, and the motor Z pulse as the home position;				
11202	Mode of the homing terminal command	0: Level mode 1: Pulse mode	1	0	Immediate	At stop
11203	Reserved					
11204	Positioning acceleration/ deceleration curve selection	0: T-shaped curve 1: S-shaped curve	1	0	Immediate	At stop
11205	Speed of high-speed home position search	0.0 to 1000.0 rpm	0.1 rpm	100.0	Immediate	At stop
11206	Speed of low-speed home position search	0.0 to 1000.0 rpm	0.1 rpm	10.0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
11207	Home offset	-1073741824 to 1073741824	1	0	Immediate	At stop
11208	Acceleration/ Deceleration time of home position search	0 to 65535 ms	1	200	Immediate	At stop
11209	Time limit for home position search	0 to 65535 ms	1	10000	Immediate	At stop
11210	Positioning mode selection	0: Relative position 1: Absolute position	1	0	Immediate	At stop
11211	Positioning lock-up mode	0: Locked at the lock-up point 1: Locked within the lock-up range	1	0	Immediate	At stop
11212	Selection of positioning time sequence	0: No response to the new positioning signal received during positioning; 1: Directly positioning to new position after receiving a new positioning signal during positioning;	1	0	Immediate	At stop
11213	Position reference of single-point positioning	-1073741824 to 1073741824	1	0	Immediate	During running
11214	Positioning speed	0.1 rpm to P05.17	0.1 rpm	100.	Immediate	During running
11215	Positioning acceleration time	1 to 65535 ms	1 ms	100	Immediate	During running
11216	Positioning deceleration time	1 to 65535 ms	1 ms	100	Immediate	During running
11217	Internal positioning end point setting	1 to 32	1	32	Immediate	At stop
11218	Multi-point positioning mode	0: Stop after a single operation (Use P12.17 to select the number of segments) 1: Cycle operation (Use P12.17 to select the number of segments) 2: Operation switchover via DI (Select via DI)	1	0	Immediate	At stop
11219	Internal position 1 reference	-1073741824 to 1073741824	1	0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
11220	Internal position 2 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11221	Internal position 3 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11222	Internal position 4 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11223	Internal position 5 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11224	Internal position 6 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11225	Internal position 7 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11226	Internal position 8 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11227	Internal position 9 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11228	Internal position 10 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11229	Internal position 11 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11230	Internal position 12 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11231	Internal position 13 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11232	Internal position 14 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11233	Internal position 15 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11234	Internal position 16 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11235	Internal position 1 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11236	Internal position 2 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11237	Internal position 3 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11238	Internal position 4	0 to 65535 ms	1 ms	100	Immediate	During

Index	Name	Range	Min. unit	Default	Effective time	Property
	acceleration/ deceleration time					running
11239	Internal position 5 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11240	Internal position 6 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11241	Internal position 7 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11242	Internal position 8 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11243	Internal position 9 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11244	Internal position 10 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11245	Internal position 11 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11246	Internal position 12 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11247	Internal position 13 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11248	Internal position 14 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11249	Internal position 15 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11250	Internal position 16 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11251	Automatic operation mode timer 1	0 to 600.00 s	0.01 s	1.00	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
11252	Automatic operation mode timer 2	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11253	Automatic operation mode timer 3	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11254	Automatic operation mode timer 4	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11255	Automatic operation mode timer 5	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11256	Automatic operation mode timer 6	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11257	Automatic operation mode timer 7	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11258	Automatic operation mode timer 8	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11259	Automatic operation mode timer 9	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11260	Automatic operation mode timer 10	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11261	Automatic operation mode timer 11	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11262	Automatic operation mode timer 12	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11263	Automatic operation mode timer 13	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11264	Automatic operation mode timer 14	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11265	Automatic operation mode timer 15	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11266	Automatic operation mode timer 16	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11267	Internal position 1 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11268	Internal position 2 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11269	Internal position 3 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11270	Internal position 4 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11271	Internal position 5 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
11272	Internal position 6 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11273	Internal position 7 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11274	Internal position 8 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11275	Internal position 9 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11276	Internal position 10 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11277	Internal position 11 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11278	Internal position 12 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11279	Internal position 13 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11280	Internal position 14 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11281	Internal position 15 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11282	Internal position 16 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11283	Position display of the present positioning reference	1 to 32	1	0	Immediate	At stop
11284	Position display of the present positioning completion	1 to 32	1	0	Immediate	At stop
11285	Reserved					
11286	Interrupt positioning enable	0: Disable the interrupt positioning 1: Enable the interrupt positioning	1	0	Immediate	During running
11287	Interrupt positioning displacement	0 to 1073741824	Command unit	10000	Immediate	During running
11288	Speed of the interrupt positioning constant-speed	0.0 to 6000.0 rpm	0.1 rpm	200.0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
	operation					
11289	Acceleration/ Deceleration time of the interrupt positioning	0 to 1000 ms	1 ms	10	Immediate	During running
11290	Interrupt positioning lock release signal enable	0: Disable 1: Enable	1	1	Immediate	During running
P17: PN parameters						
11700	PN software version	0 to 99.99	1	1.00	-	At display
11701	Telegram number selection	0 to 65535	1	3	Power-on again	At stop
11702	Additional Telegram	0 to 65535	1	0	Power-on again	At stop
11703	IP address	0 to 0xFFFFFFFF	1	0	Power-on again	At stop
11704	Subnet mask	0 to 0xFFFFFFFF	1	0	Power-on again	At stop
11705	Default gateway	0 to 0xFFFFFFFF	1	0	Power-on again	At stop
11706	Heartbeat threshold	0 to 65535	1	5	Power-on again	At stop
11707	Communication timeout	0 to 1000.0	1	0.1	Power-on again	At stop
11708	User receive word	0 to 65535	1	0	Power-on again	At stop
11709	User send word	0 to 65535	1	0	Power-on again	At stop
11710	Homing offset type	0 to 65535	1	0	Power-on again	At stop
11711	Homing offset	-2147483648 to 2147483647	1	0	Power-on again	At stop
11712	Fixed endstop clamping torque	0 to 655.35	0.01 N·m	0	Immediate	At stop
11713	Maximum following error of the fixed endstop	0 to 2147483647	1	10000	Immediate	At stop
11714	Fixed endstop monitoring window	0 to 2147483647	1	100	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
11715	Speed tolerance	0 to 60000	0.1 rpm	1000	Immediate	At stop
11716	Time tolerance	0 to 65535	1	10	Immediate	At stop
11717	Speed reference	0 to 65535	1	0	Immediate	At stop
11718	MAC address H	0 to 0xFFFFFF	1	0	-	At display
11719	MAC address L	0 to 0xFFFFFF	1	0	-	At display
11720	Reserved	0 to 65535	1	0	Immediate	At stop
11721	Reserved	0 to 65535	1	0	Immediate	At stop
11722	Reserved	0 to 65535	1	0	Immediate	At stop
11723	Reserved	0 to 65535	1	0	Immediate	At stop
11724	Reserved	0 to 65535	1	0	Immediate	At stop
P19: Internal positioning parameters 2						
11900	Internal position 17 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11901	Internal position 18 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11902	Internal position 19 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11903	Internal position 20 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11904	Internal position 21 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11905	Internal position 22 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11906	Internal position 23 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11907	Internal position 24 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11908	Internal position 25 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11909	Internal position 26 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11910	Internal position 27 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11911	Internal position 28 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11912	Internal position 29 reference	-1073741824 to 1073741824	1	0	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
11913	Internal position 30 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11914	Internal position 31 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11915	Internal position 32 reference	-1073741824 to 1073741824	1	0	Immediate	During running
11916	Internal position 17 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11917	Internal position 18 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11918	Internal position 19 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11919	Internal position 20 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11920	Internal position 21 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11921	Internal position 22 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11922	Internal position 23 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11923	Internal position 24 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11924	Internal position 25 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11925	Internal position 26 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11926	Internal position 27 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11927	Internal position 28 acceleration/	0 to 65535 ms	1 ms	100	Immediate	During running

Index	Name	Range	Min. unit	Default	Effective time	Property
	deceleration time					
11928	Internal position 29 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11929	Internal position 30 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11930	Internal position 31 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11931	Internal position 32 acceleration/ deceleration time	0 to 65535 ms	1 ms	100	Immediate	During running
11932	Automatic operation mode timer 17	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11933	Automatic operation mode timer 18	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11934	Automatic operation mode timer 19	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11935	Automatic operation mode timer 20	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11936	Automatic operation mode timer 21	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11937	Automatic operation mode timer 22	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11938	Automatic operation mode timer 23	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11939	Automatic operation mode timer 24	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11940	Automatic operation mode timer 25	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11941	Automatic operation mode timer 26	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11942	Automatic operation mode timer 27	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11943	Automatic operation mode timer 28	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11944	Automatic operation mode timer 29	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11945	Automatic operation	0 to 600.00 s	0.01 s	1.00	Immediate	During

Index	Name	Range	Min. unit	Default	Effective time	Property
	mode timer 30					running
11946	Automatic operation mode timer 31	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11947	Automatic operation mode timer 32	0 to 600.00 s	0.01 s	1.00	Immediate	During running
11948	Internal position 17 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11949	Internal position 18 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11950	Internal position 19 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11951	Internal position 20 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11952	Internal position 21 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11953	Internal position 22 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11954	Internal position 23 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11955	Internal position 24 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11956	Internal position 25 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11957	Internal position 26 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11958	Internal position 27 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11959	Internal position 28 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11960	Internal position 29 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11961	Internal position 30 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11962	Internal position 31 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
11963	Internal position 32 positioning speed	0.0 rpm to P05.17	0.1 rpm	100.0	Immediate	During running
P20: Reserved						
12000	Reserved	0 to 65535	1	0	Immediate	At stop
12001	Reserved	0 to 65535	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
12002	Reserved	0 to 65535	1	0	Immediate	At stop
12003	Reserved	0 to 65535	1	0	Immediate	At stop
12004	Reserved	0 to 65535	1	0	Immediate	At stop
12005	Reserved	0 to 65535	1	0	Immediate	At stop
12006	Reserved	0 to 65535	1	0	Immediate	At stop
12007	Reserved	0 to 65535	1	0	Immediate	At stop
12008	Reserved	0 to 65535	1	0	Immediate	At stop
12009	Reserved	0 to 65535	1	0	Immediate	At stop
12010	Reserved	0 to 65535	1	0	Immediate	At stop
12011	Reserved	0 to 65535	1	0	Immediate	At stop
12012	Reserved	0 to 65535	1	0	Immediate	At stop
12013	Reserved	0 to 65535	1	0	Immediate	At stop
12014	Reserved	0 to 65535	1	0	Immediate	At stop
12015	Reserved	0 to 65535	1	0	Immediate	At stop
12016	Reserved	0 to 65535	1	0	Immediate	At stop
12017	Reserved	0 to 65535	1	0	Immediate	At stop
12018	Reserved	0 to 65535	1	0	Immediate	At stop
12019	Reserved	0 to 65535	1	0	Immediate	At stop
12020	Reserved	0 to 65535	1	0	Immediate	At stop
12021	Reserved	0 to 65535	1	0	Immediate	At stop
12022	Reserved	0 to 65535	1	0	Immediate	At stop
12023	Reserved	0 to 65535	1	0	Immediate	At stop
12024	Reserved	0 to 65535	1	0	Immediate	At stop
12025	Reserved	0 to 10	1	0	Immediate	At stop
12026	Reserved	0 to 65535	1	0	Immediate	At stop
12027	Reserved	0 to 65535	1	0	Immediate	At stop
12028	Reserved	0 to 65535	1	0	Immediate	At stop
12029	Reserved	0 to 65535	1	0	Immediate	At stop
P21: EPOS program segment control words						
12100	EPOS program segment 1 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12101	EPOS program segment 2 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
12102	EPOS program segment 3 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12103	EPOS program segment 4 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12104	EPOS program segment 5 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12105	EPOS program segment 6 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12106	EPOS program segment 7 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12107	EPOS program segment 8 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12108	EPOS program segment 9 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12109	EPOS program segment 10 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12110	EPOS program segment 11 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12111	EPOS program segment 12 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12112	EPOS program segment 13 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12113	EPOS program segment 14 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12114	EPOS program segment 15 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12115	EPOS program segment 16 control	0 to 0xFFFFFFFF	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
	word					
12116	EPOS program segment 17 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12117	EPOS program segment 18 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12118	EPOS program segment 19 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12119	EPOS program segment 20 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12120	EPOS program segment 21 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12121	EPOS program segment 22 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12122	EPOS program segment 23 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12123	EPOS program segment 24 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12124	EPOS program segment 25 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12125	EPOS program segment 26 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12126	EPOS program segment 27 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12127	EPOS program segment 28 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12128	EPOS program segment 29 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop

Index	Name	Range	Min. unit	Default	Effective time	Property
12129	EPOS program segment 30 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12130	EPOS program segment 31 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop
12131	EPOS program segment 32 control word	0 to 0xFFFFFFFF	1	0	Immediate	At stop

Chapter 10 Motor Number Quick Reference Table

To operate the M6-F series servo system, it is required to set the correct motor number via the function code P01.00 before the operation starts. Otherwise, normal operation will be disabled. Please check the motor number in the following tables. The medium-inertia motors comprise three types, namely the M series, P series, and N series, in accordance with the design code which is represented by the last letter in the motor model designation.

10.1 M series medium-inertia motor number

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
M series medium inertia	220 V	200	SPM-SC60602MAK-M	1211	SPM-SC60602MBK-M	1219
			SPM-SC10602MAK-M	1214	SPM-SC10602MBK-M	121C
			SPM-SC50602MAK-M	1215	SPM-SC50602MBK-M	121D
		400	SPM-SC60604MAK-M	1221	SPM-SC60604MBK-M	1229
			SPM-SC10604MAK-M	1224	SPM-SC10604MBK-M	122C
			SPM-SC50604MAK-M	1225	SPM-SC50604MBK-M	122D
		750	SPM-SC60807MAK-M	1231	SPM-SC60807MBK-M	1239
			SPM-SC10807MAK-M	1234	SPM-SC10807MBK-M	123C
			SPM-SC50807MAK-M	1235	SPM-SC50807MBK-M	123D
		1000	SPM-SC60810MAK-M	1241	SPM-SC60810MBK-M	1249
			SPM-SC10810MAK-M	1244	SPM-SC10810MBK-M	124C
			SPM-SC50810MAK-M	1245	SPM-SC50810MBK-M	124D
		850	SPM-SD61308MAK-M	1251	SPM-SD61308MBK-M	1259
			SPM-SD11308MAK-M	1254	SPM-SD11308MBK-M	125C
			SPM-SD51308MAK-M	1255	SPM-SD51308MBK-M	125D

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
		1300	SPM-SD61313MAK-M	1261	SPM-SD61313MBK-M	1269
			SPM-SD11313MAK-M	1264	SPM-SD11313MBK-M	126C
			SPM-SD51313MAK-M	1265	SPM-SD51313MBK-M	126D
	380 V	850	SPM-TD61308MAK-M	2211	SPM-TD61308MBK-M	2219
			SPM-TD11308MAK-M	2214	SPM-TD11308MBK-M	221C
			SPM-TD51308MAK-M	2215	SPM-TD51308MBK-M	221D
		1300	SPM-TD61313MAK-M	2221	SPM-TD61313MBK-M	2229
			SPM-TD11313MAK-M	2224	SPM-TD11313MBK-M	222C
			SPM-TD51313MAK-M	2225	SPM-TD51313MBK-M	222D
		1800	SPM-TD61318MAK-M	2231	SPM-TD61318MBK-M	2239
			SPM-TD11318MAK-M	2234	SPM-TD11318MBK-M	223C
			SPM-TD51318MAK-M	2235	SPM-TD51318MBK-M	223D
		2200	SPM-TD61322MAK-M	2251	SPM-TD61322MBK-M	2259
			SPM-TD11322MAK-M	2254	SPM-TD11322MBK-M	225C
			SPM-TD51322MAK-M	2255	SPM-TD51322MBK-M	225D
		2900	SPM-TD61829MAK-M	2261	SPM-TD61829MBK-M	2269
			SPM-TD11829MAK-M	2264	SPM-TD11829MBK-M	226C
			SPM-TD51829MAK-M	2265	SPM-TD51829MBK-M	226D
		4400	SPM-TD61844MAK-M	2281	SPM-TD61844MBK-M	2289
			SPM-TD11844MAK-M	2284	SPM-TD11844MBK-M	228C
			SPM-TD51844MAK-M	2285	SPM-TD51844MBK-M	228D
		5500	SPM-TD61855MAK-M	22A1	SPM-TD61855MBK-M	22A9
			SPM-TD11855MAK-M	22A4	SPM-TD11855MBK-M	22AC
			SPM-TD51855MAK-M	22A5	SPM-TD51855MBK-M	22AD
		7500	SPM-TD61875MAK-M	22C1	SPM-TD61875MBK-M	22C9

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
			SPM-TD11875MAK-M	22C4	SPM-TD11875MBK-M	22CC
			SPM-TD51875MAK-M	22C5	SPM-TD51875MBK-M	22CD

10.2 P series medium-inertia motor number

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
P series medium inertia	380 V	2900	SPM-TD61829MAK-P	2271	SPM-TD61829MBK-P	2279
			SPM-TD11829MAK-P	2274	SPM-TD11829MBK-P	227C
			SPM-TD51829MAK-P	2275	SPM-TD51829MBK-P	227D
		4400	SPM-TD61844MAK-P	2291	SPM-TD61844MBK-P	2299
			SPM-TD11844MAK-P	2294	SPM-TD11844MBK-P	229C
			SPM-TD51844MAK-P	2295	SPM-TD51844MBK-P	229D
		5500	SPM-TD61855MAK-P	22B1	SPM-TD61855MBK-P	22B9
			SPM-TD11855MAK-P	22B4	SPM-TD11855MBK-P	22BC
			SPM-TD51855MAK-P	22B5	SPM-TD51855MBK-P	22BD
		7500	SPM-TD61875MAK-P	22D1	SPM-TD61875MBK-P	22D9
			SPM-TD11875MAK-P	22D4	SPM-TD11875MBK-P	22DC
			SPM-TD51875MAK-P	22D5	SPM-TD51875MBK-P	22DD

10.3 N series medium-inertia motor number

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
N series medium inertia	220 V	200	SPM-SC60602MAK-N	3211	SPM-SC60602MBK-N	3219
			SPM-SC10602MAK-N	3214	SPM-SC10602MBK-N	321C
			SPM-SC50602MAK-N	3215	SPM-SC50602MBK-N	321D
		400	SPM-SC60604MAK-N	3221	SPM-SC60604MBK-N	3229
			SPM-SC10604MAK-N	3224	SPM-SC10604MBK-N	322C
			SPM-SC50604MAK-N	3225	SPM-SC50604MBK-N	322D
		750	SPM-SC60807MAK-N	3231	SPM-SC60807MBK-N	3239
			SPM-SC10807MAK-N	3234	SPM-SC10807MBK-N	323C
			SPM-SC50807MAK-N	3235	SPM-SC50807MBK-N	323D
		1000	SPM-SC60810MAK-N	3241	SPM-SC60810MBK-N	3249
			SPM-SC10810MAK-N	3244	SPM-SC10810MBK-N	324C
			SPM-SC50810MAK-N	3245	SPM-SC50810MBK-N	324D
		850	SPM-SD61308MAK-N	3251	SPM-SD61308MBK-N	3259
			SPM-SD11308MAK-N	3254	SPM-SD11308MBK-N	325C
			SPM-SD51308MAK-N	3255	SPM-SD51308MBK-N	325D
		1300	SPM-SD61313MAK-N	3261	SPM-SD61313MBK-N	3269
			SPM-SD11313MAK-N	3264	SPM-SD11313MBK-N	326C
			SPM-SD51313MAK-N	3265	SPM-SD51313MBK-N	326D
	380 V	850	SPM-TD61308MAK-N	4211	SPM-TD61308MBK-N	4219
			SPM-TD11308MAK-N	4214	SPM-TD11308MBK-N	421C
			SPM-TD51308MAK-N	4215	SPM-TD51308MBK-N	421D
		1300	SPM-TD61313MAK-N	4221	SPM-TD61313MBK-N	4229
			SPM-TD11313MAK-N	4224	SPM-TD11313MBK-N	422C

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
			SPM-TD51313MAK-N	4225	SPM-TD51313MBK-N	422D
		1800	SPM-TD61318MAK-N	4231	SPM-TD61318MBK-N	4239
			SPM-TD11318MAK-N	4234	SPM-TD11318MBK-N	423C
			SPM-TD51318MAK-N	4235	SPM-TD51318MBK-N	423D
		2200	SPM-TD61322MAK-N	4251	SPM-TD61322MBK-N	4259
			SPM-TD11322MAK-N	4254	SPM-TD11322MBK-N	425C
			SPM-TD51322MAK-N	4255	SPM-TD51322MBK-N	425D
		2900	SPM-TD61829MAK-N	4261	SPM-TD61829MBK-N	4269
			SPM-TD11829MAK-N	4264	SPM-TD11829MBK-N	426C
			SPM-TD51829MAK-N	4265	SPM-TD51829MBK-N	426D
		4400	SPM-TD61844MAK-N	4271	SPM-TD61844MBK-N	4279
			SPM-TD11844MAK-N	4274	SPM-TD11844MBK-N	427C
			SPM-TD51844MAK-N	4275	SPM-TD51844MBK-N	427D
		5500	SPM-TD61855MAK-N	4281	SPM-TD61855MBK-N	4289
			SPM-TD11855MAK-N	4284	SPM-TD11855MBK-N	428C
			SPM-TD51855MAK-N	4285	SPM-TD51855MBK-N	428D
		7500	SPM-TD61875MAK-N	4291	SPM-TD61875MBK-N	4299
			SPM-TD11875MAK-N	4294	SPM-TD11875MBK-N	429C
			SPM-TD51875MAK-N	4295	SPM-TD51875MBK-N	429D

10.4 Small-inertia series motor number

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
Small-inertia series	220 V	200	SPM-SC60602LAK-M	1111	SPM-SC60602LBK-M	1119
			SPM-SC10602LAK-M	1114	SPM-SC10602LBK-M	111C
			SPM-SC50602LAK-M	1115	SPM-SC50602LBK-M	111D
		400	SPM-SC60604LAK-M	1121	SPM-SC60604LBK-M	1129
			SPM-SC10604LAK-M	1124	SPM-SC10604LBK-M	112C
			SPM-SC50604LAK-M	1125	SPM-SC50604LBK-M	112D
		750	SPM-SC60807LAK-M	1131	SPM-SC60807LBK-M	1139
			SPM-SC10807LAK-M	1134	SPM-SC10807LBK-M	113C
			SPM-SC50807LAK-M	1135	SPM-SC50807LBK-M	113D
		1000	SPM-SD61310LAK-M	1141	SPM-SD61310LBK-M	1149
			SPM-SD11310LAK-M	1144	SPM-SD11310LBK-M	114C
			SPM-SD51310LAK-M	1145	SPM-SD51310LBK-M	114D
			SPM-SE61310LAK-M	1151	SPM-SE61310LBK-M	1159
			SPM-SE11310LAK-M	1154	SPM-SE11310LBK-M	115C
			SPM-SE51310LAK-M	1155	SPM-SE51310LBK-M	115D
		1500	SPM-SD61313LAK-M	1161	SPM-SD61313LBK-M	1169
			SPM-SD11313LAK-M	1164	SPM-SD11313LBK-M	116C
			SPM-SD51313LAK-M	1165	SPM-SD51313LBK-M	116D

10.5 Large-inertia series motor number

Inertia	Voltage	Power (W)	Brake not included		Brake included	
			Motor model	Motor number	Motor model	Motor number
Large-inertia series	220 V	400	SPM-SC60604HAK-K	1311	SPM-SC60604HBK-K	1319
			SPM-SC10604HAK-K	1314	SPM-SC10604HBK-K	131C
			SPM-SC50604HAK-K	1315	SPM-SC50604HBK-K	131D
		750	SPM-SC60807HAK-K	1321	SPM-SC60807HBK-K	1329
			SPM-SC10807HAK-K	1324	SPM-SC10807HBK-K	132C
			SPM-SC50807HAK-K	1325	SPM-SC50807HBK-K	132D

Appendix I Warranty and Service

Megmeet rigorously adheres to the ISO 9001:2015 standard in manufacturing motor drive products. If any irregularities occur with our products, please contact the product supplier or the headquarters directly. Megmeet is committed to delivering comprehensive technical support services to all our clients.

1. Warranty period

The warranty period for the product is 18 months from the date of purchase, but not exceeding 24 months after the manufacturing date recorded on the nameplate.

2. Warranty scope

During the warranty period, any abnormalities arising from the responsibility of our company can be repaired or replaced free of charge by our company. However, a certain amount of repair charges may apply even within the warranty period under the following circumstances:

(1) Damage caused by fire, flood, severe lightning strikes, or similar reasons;

(2) Man-made damage caused by users' unauthorized modifications;

(3) Damage due to dropping or transportation after purchase;

(4) Damage caused by usage beyond the standard specifications or requirements;

(5) Damage resulting from operation/use not in accordance with the user manual.

3. After-sales service

(1) If there are special requirements for the installation and commissioning of the drive product, or if the product's performance or functionality is not satisfactory, please contact the product distributor or Megmeet.

(2) In case of any abnormalities, please seek assistance by contacting the product supplier or Megmeet.

(3) During the warranty period, any abnormalities caused by manufacturing and design defects will be repaired free of charge by our company.

(4) Beyond the warranty period, repairs will be conducted at the customer's request and charged by our company.

(5) Service fees are calculated based on actual costs. Any agreements in place will take precedence.

Shenzhen Megmeet Electrical Co., Ltd.

Add: 5th Floor, Block B, Unisplendour Information Harbor, Langshan Road, Shenzhen, 518057, China

Tel: +86-755-86600500

Fax: +86-755-86600562

Website: www.megmeet.com

Parameter Recording Table

Shenzhen Megmeet Electrical Co., Ltd.

M6-F Series Servo Drive Warranty Bill

Customer company:	
Detailed address:	
Zip code:	Contact:
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact:	Tel:
Maintenance person:	Tel:
Maintenance date:	
Comment on service: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Unsatisfactory** Other comment: User's signature: Date:	
Customer Service Center follow-up record: ☐ **Follow-up phone call** ☐ **Follow-up letter** Other: Signature of the technical support engineer: Date:	

Note:

This bill becomes invalid if the user can not be visited.

Shenzhen Megmeet Electrical Co., Ltd.

M6-F Series Servo Drive Warranty Bill

Customer company:	
Detailed address:	
Zip code:	Contact:
Tel:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Purchase date:
Service unit:	
Contact:	Tel:
Maintenance person:	Tel:
Maintenance date:	
Comment on service: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Unsatisfactory** Other comment: User's signature: Date:	
Customer Service Center follow-up record: ☐ **Follow-up phone call** ☐ **Follow-up letter** Other: Signature of the technical support engineer: Date:	

Note:

This bill becomes invalid if the user can not be visited.