WEIHONG
维宏股份 创业板:300508

WISE Wise B1 Series

Servo Drive User Manual
(EtherCAT Bus Type 2nd Version)

SPECIALIZED/CONCENTRATED/FOCUSED

Preface

First of all, thank you for choosing **Wise B1 Servo Drive**!

This manual introduces the selection, installation and wiring of **Wise B1 Servo Drive** in detail.

Please read this manual carefully before installing and using this product. This will help you get familiar with the product quickly and use it better.

If this product is updated or changed without special notice. You can use the Weihong Stock website http://www.weihong.com.cn check relevant information.

Unpacking Inspection

To ensure the normal use of the product, please check the following contents in detail after receiving the product:

- Check the product mode on the drive nameplate, which is the same as the mode ordered.
- Whether the appearance is damaged or scratched.
- Whether the screws are locked or fall off.
- Whether the product configuration is complete.

Version Change Record

Through the following table, you can quickly query the change records of each version of this manual.

Revision Date	Version	Change Content
04/06/2023	R1	The manual is released for the first time.
08/30/2023	R2	● Added medium frequency vibration suppression related parameters and usage instructions (Chapter 6.3.3); ● Added model tracking related parameters and usage instructions (Chapter 6.4); ● Parameter naming optimization; ● Added servo time sequence description (Chapter 5.6);

Revision Date	Version	Change Content
		● Correct the servo shutdown time sequence (Chapter 5.7); ● Added P30 group parameters and description (Chapter 10.15) ● Fixed some description errors;

Certification Information

Certification	Standard
CE	LVD 2014/35/ EU
	EMC standard 2014/30/ EU

Safety Precaution

Safety precautions can be divided into caution and warning types according to the degree of possible harm caused by non-compliance.

: General type information, including but not limited to supplementary instructions, use restrictions and other suggestive information. If such information is not followed, some functions may not use properly. Note that failure to observe this information may in some cases result in personal injury or damage to the machine.

: Information that needs prompt in particular. If not follow such information may cause personal injury or even death, machine damage, or other property losses.

Warning
1) Transportation and Storage Related Matters ● This product must be transported correctly according to its weight; ● Please do not climb or stand on the product or place heavy objects on it; ● Please do not drag or transport the product with cables or devices connected to the

Warning

product;

- Please keep away from moisture during storage and transportation.

2) Installation Related Matters

- Sealing strips shall be pasted at the joints of the electric cabinet door to seal all the joints;
- The cable entry shall be sealed and can be easily reopened on site;
- Use fans or heat exchangers to dissipate heat and convection air;
- If used fan to dissipate heat, air filter must be used at air inlet or outlet;
- Please reserve space between this product and other devices according to the requirements;
- Please read the product instruction manual and safety precautions carefully before installation, non-professionals personnel are not allowed to install the product;
- Please install this product firmly without vibration. During installation, do not throw or knock the product, and do not have any impact or load on the product;
- Please install a shielding device to reduce electromagnetic interference.

3) Wiring Related Matters

- Please make sure the personnel responsible for wiring and checking must have the ability to complete the work;
- Please cut off all power supplies before wiring, otherwise there is a risk of electric shock;
- Please be grounded reliably, and the grounding resistance should be less than 4 ohms. Do not use neutral wire instead of ground wire. Otherwise, it may not work properly due to interference;
- Please make sure that the wiring is correct and firm, otherwise misoperation may occur;
- Please keep your fingers dry before plugging in or pulling out the plug or toggle the switch to prevent electric shock;
- The connected wires shall not be damaged or squeezed, or there may be electric leakage or short circuit.

4) Running and Debugging Related Matters

- Please do not touch any wiring terminals, fans, resistors, etc. in the running status;
- Please do not disassemble or disassemble any device or part in the running status;
- Please check whether the parameter settings are correct before running. Wrong setting will cause unexpected movement of the machine.


Caution

Unpacking and Checking Related Matters

- Please confirm whether it is the product you purchased;
- Please check whether the product is damaged during transportation;
- Please check the list to see if all parts and accessories are complete and there is no damage;
- Please contact us in time. If there is any product discrepancy, missing accessories or transportation damage.

Contact Information

You can obtain our technical support or services through the following ways:

Company name: Shanghai Weihong Electronic Technology Co., Ltd.
Headquarters address: No. 1590 Huhang Highway, Fengxian District, Shanghai
Zip code: 201401
Telephone: 400-882-9188
Fax: 021-33587519
E-mail: weihong@weihong.com.cn
Official website: http://www.weihong.com.cn

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Chapter 1 Servo System Selection

1.1 Servo Drive

1.1.1 Servo Drive Composition

- WSD-B1-**02B**-E/ WSD-B1-**04B**-E

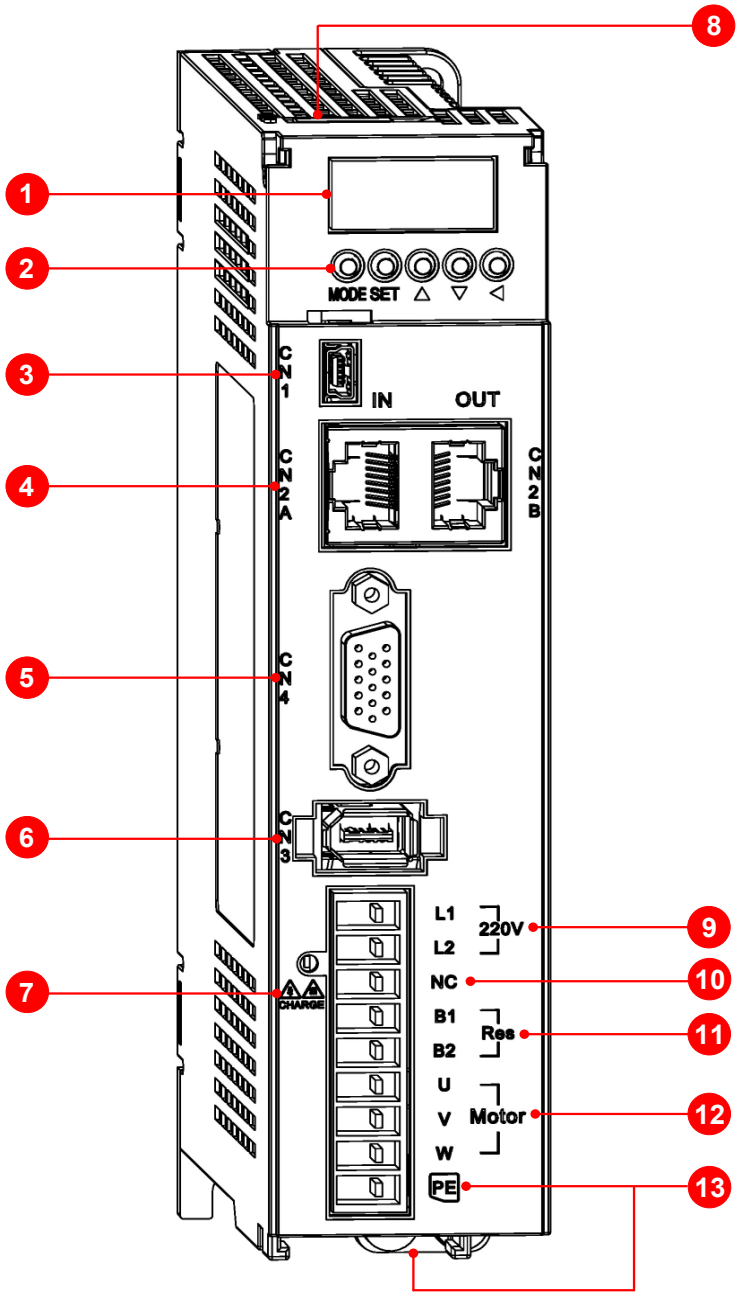


Figure 0-1 B1 servo drive composition (bus type)

No.	Sign	Name	Description
1	-	Digital display device	5-bit 8-segment LED digital tube
2	MODE	Mode button	Switch between modes / Return to the previous menu
	SET	Confirm button	Set confirmation / Enter the next menu
	▲	Increment button	Increase LED digital tube value / Turn the page
	▼	Decrement button	Decrease LED digital tube value / Turn the page
	◀	Shift button	Change the flashing position of the digital tube cursor to view the high level of data with a length greater than 5 digits
3	CN1	Communication interface	Communicate with PC, use servo debugging software for online debugging and firmware upgrade
4	CN2A, CA2B	Communication interface (EtherCAT)	EtherCAT communication interface, CN2A connects to the master station or the previous slave station, CA2B connects to the next slave station
5	CN4	Control interface	Digital input and output interface
6	CN3	Encoder interface	Used to connect motor encoder
7	CHARGE	Bus voltage indicator	Used to indicate that the bus capacitance is in a charged status; When the indicator light is on, even if the main circuit power supply is OFF, the internal capacitance of the servo unit may still be charged. Do not touch the power terminal when the light is on to avoid electric shock
8	CN5	STO safety interface	For safe signal access. This feature is optional
9	L1, L2	Main circuit power input terminal	Refer to the product nameplate to select the power spec
10	NC	Reserved interface	Reserved interface
11	B1, B2	External regenerative resistor connection terminal	Used when external regenerative resistor is connected
12	U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
13	PE	Motor grounding terminal	For motor PE grounding
	⏚	Drive ground terminal	Used to drive grounding

- WSD-B1-**08B**-E/ WSD-B1-**10B**-E

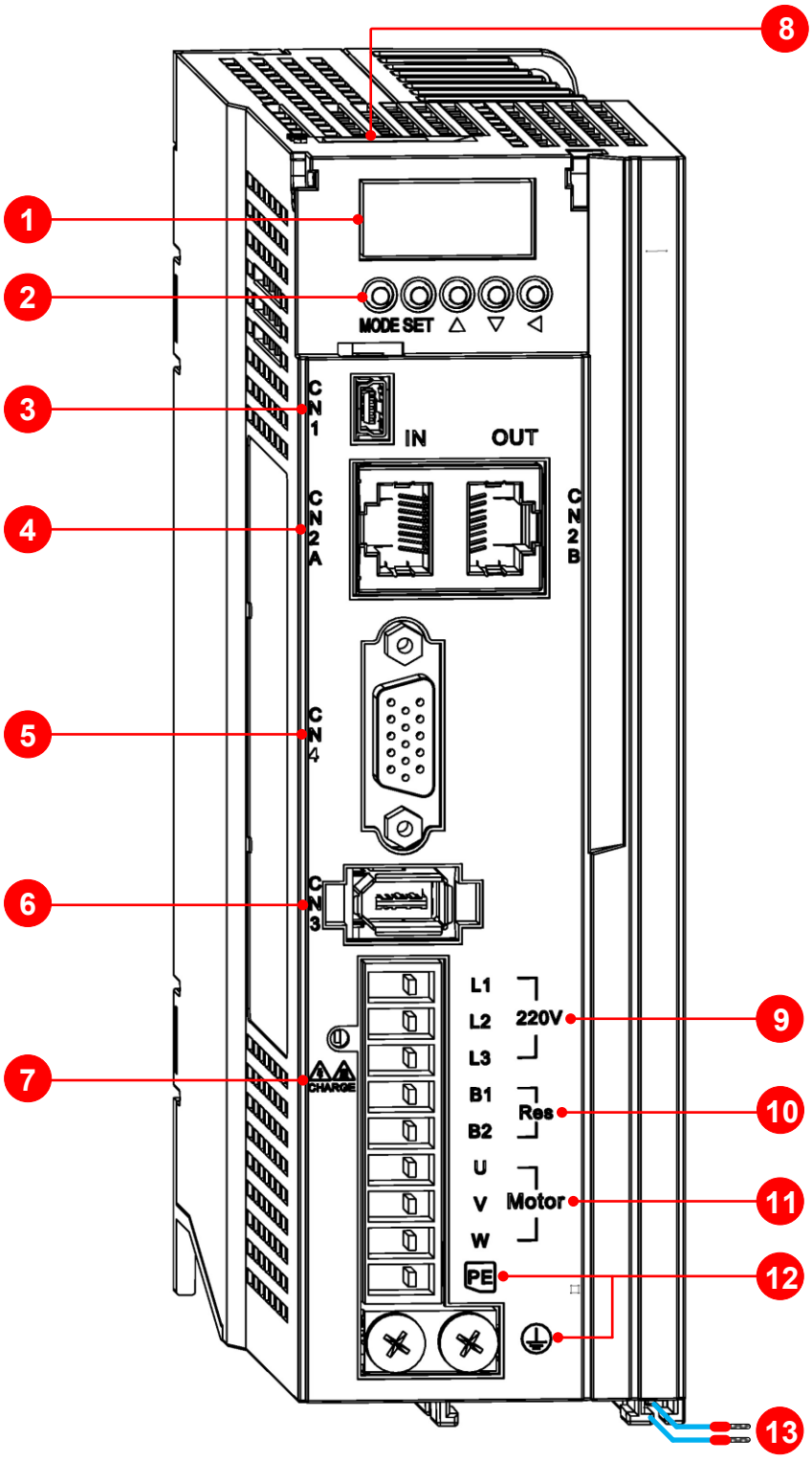


Figure 0-2 B1 servo drive composition (bus type)

No.	Sign	Name	Description
1	-	Digital display device	5-bit 8-segment LED digital tube
2	MODE	Mode button	Switch between modes / Return to the previous menu
	SET	Confirm button	Set confirmation / Enter the next menu
	▲	Increment button	Increase LED digital tube value / Turn the page
	▼	Decrement button	Decrease LED digital tube value / Turn the page
	◀	Shift button	Change the flashing position of the digital tube cursor to view the high level of data with a length greater than 5 digits
3	CN1	Communication interface	Communicate with PC, use servo debugging software for online debugging and firmware upgrade
4	CN2A, CA2B	Communication interface (EtherCAT)	EtherCAT communication interface, CN2A connects to the master station or the previous slave station, CA2B connects to the next slave station
5	CN4	Control interface	Digital input and output interface
6	CN3	Encoder interface	For connecting motor encoder
7	CHARGE	Bus voltage indicator	Used to indicate that the bus capacitance is in a charged status; When the indicator light is on, even if the main circuit power supply is OFF, the internal capacitance of the servo unit may still be charged. Do not touch the power terminal when the light is on to avoid electric shock
8	CN5	STO safety interface	For safe signal access. This feature is optional
9	L1, L2	Main circuit power input terminal	Refer to the product nameplate to select the power spec
10	B1, B2	Regenerative resistor connection terminal	Used when external regenerative resistor is connected • B1 and B2 cannot be empty and must have resistors connected • B1 and B2 are empty when leaving the factory. Please connect the built-in resistor (leads B1 and B2) or connect an external resistor according to the usage requirements
11	U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
12	PE	Motor grounding terminal	For motor PE grounding
	⏚	Drive ground terminal	Used to drive grounding
13	B1, B2	Built-in regenerative resistor lead	• When using the built-in resistor, please connect this lead to the B1 and B2 terminals • When using an external resistor, this lead unconnected

- WSD-B1-**15B**-E/ WSD-B1-**15C**-E / WSD-B1-**30C**-E

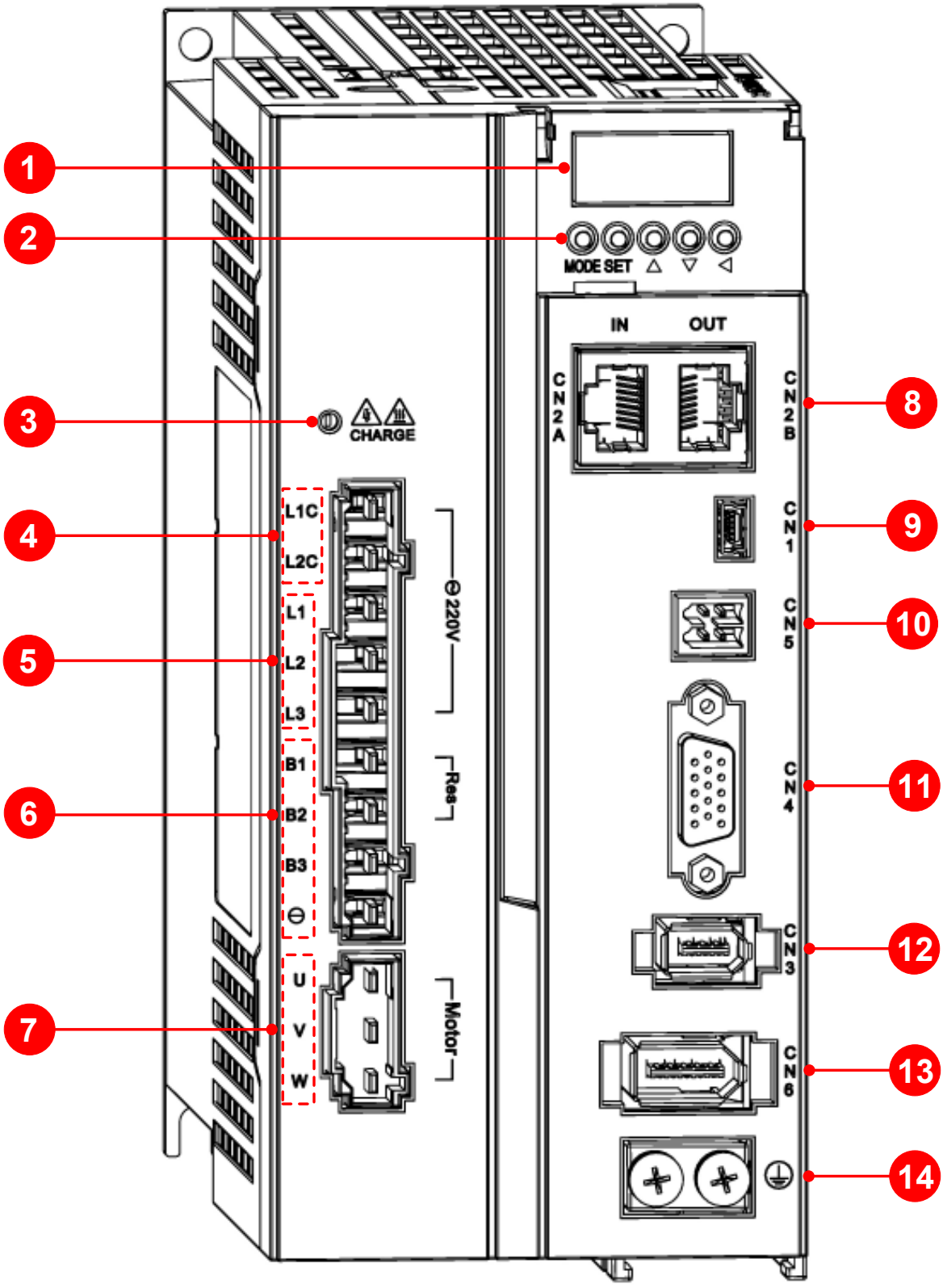
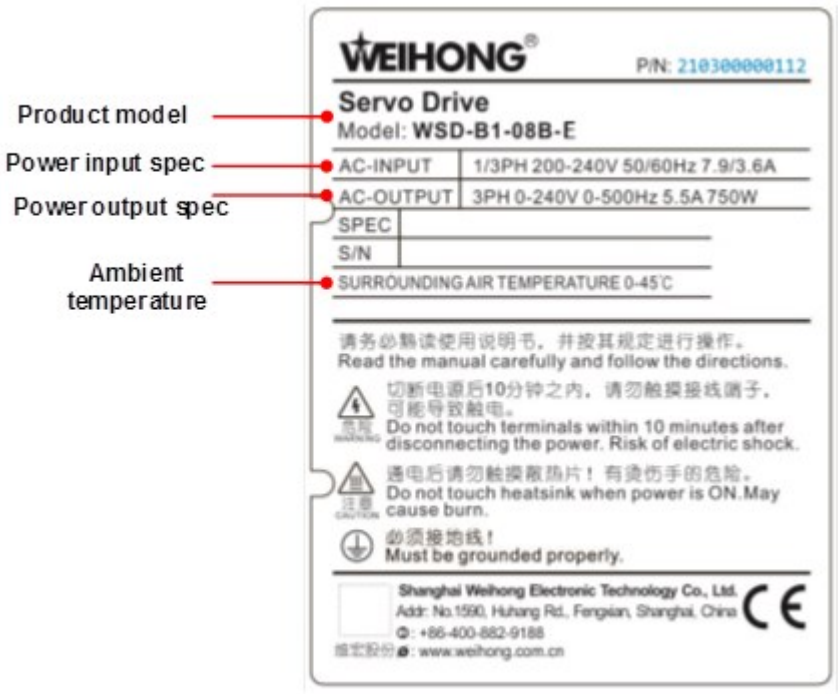


Figure 0-3 B1 servo drive composition (bus type)

No.	Sign	Name	Description
1	-	Digital display device	5-bit 8-segment LED digital tube
2	MODE	Mode button	Switch between modes / Return to the previous menu
	SET	Confirm button	Set confirmation / Enter the next menu
	▲	Increment button	Increase LED digital tube value / Turn the page
	▼	Decrement button	Decrease LED digital tube value / Turn the page
	◀	Shift button	Change the flashing position of the digital tube cursor to view the high level of data with a length greater than 5 digits
3	CHARGE	Bus voltage indicator	Used to indicate that the bus capacitance is in a charged status; When the indicator light is on, even if the main circuit power supply is OFF, the internal capacitance of the servo unit may still be charged. Do not touch the power terminal when the light is on to avoid electric shock
4	L1C, L2C	Control circuit power input terminal	Refer to the product nameplate to select the power spec
5	L1, L2, L3	Main circuit power input terminal	Refer to the product nameplate to select the power spec
6	B1,B2,B3	External regenerative resistor connection terminal	When leaving the factory, B2 and B3 are short-circuited, use the built-in resistor; When using external resistance, remove the circuit between B2 and B3, connect the external resistance between B1 and B2, and set relevant parameters: P00.16/ P00.18/ P00.19
	B1/⊕, ⊖	DC bus terminal	For common bus connection when multiple machines are in parallel
7	U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
8	CN2A, CN2B	Communication interface (EtherCAT)	EtherCAT communication interface, CN2A connects to the master station or the previous slave station, CA2B connects to the next slave station
9	CN1	Communication interface	Communicate with PC, use servo debugging software for online debugging and firmware upgrade
10	CN5	STO safety interface	For safe signal access. This feature is optional
11	CN4	Control interface	Digital input and output interface
12	CN3	Encoder interface	Used to connect motor encoder
13	CN6	Reserved interface	Raster signal reserved interface
14	⏚	Grounding terminal	Used for motor and drive grounding

1.1.2 Nameplate and Model Description

◆ Nameplate



◆ Model

WSD - B 1 - 04 B - E
① ② ③ ④ ⑤ ⑥

①	
Symbol	Product Type
WSD	Wise drive

②	
Symbol	Product Series
B	B series

③	
Symbol	Design No.
1	1st generation

④	
Symbol	Power Spec(kW)
02	0.2
04	0.4
08	0.75
10	1.0
15	1.5
30	3.0

⑤	
Symbol	Voltage Spec(V)
B	220
C	380

⑥	
Symbol	Model Code
A	Pulse type
B	Pulse+STO
C	Pulse+High protection
D	Pulse+STO+High protection
E	Ethercat bus
F	Ethercat bus+STO
G	Ethercat bus+High protection
H	Ethercat bus+STO+High protectio

1.1.3 Servo Drive Technical Specification

◆ **Basic Specification**

<table>
<tr><th colspan="2">Item</th><th colspan="8">Content</th></tr>
<tr><td colspan="2">WSD-B1-□□□-E</td><td>02B</td><td>04B</td><td>08B</td><td>10B</td><td>15B</td><td>15C</td><td>30C</td></tr>
<tr><td colspan="2">Power （kW）</td><td>0.2</td><td>0.4</td><td>0.75</td><td>1.0</td><td>1.5</td><td>1.5</td><td>3.0</td></tr>
<tr><td rowspan="4">Power supply</td><td rowspan="2">Main circuit power supply</td><td colspan="2">Single-phase</td><td colspan="2">Single-phase / three-phase</td><td rowspan="2">Three-phase AC200V~240V, -15%~+10%, 50/60Hz</td><td colspan="2" rowspan="2">Three-phase AC380V~440V, -15%~+10%, 50/60Hz</td></tr>
<tr><td colspan="4">AC200V～240V, -15%~+10%, 50/60Hz</td></tr>
<tr><td>Control circuit power supply</td><td colspan="4">None</td><td>Single-phase AC200V~240V, -15%~+10%, 50/60Hz</td><td colspan="2">Single-phase AC380V~440V, -15%~+10%, 50/60Hz</td></tr>
<tr><td>Continuous output current (Arms)</td><td>1.6</td><td>2.8</td><td>5.5</td><td>7.6</td><td>11.6</td><td>5.4</td><td>11.9</td></tr>
<tr><td>Instantaneous Max output current (Arms)</td><td>5.8</td><td>10.1</td><td>16.9</td><td>23</td><td>32</td><td>14</td><td>29.75</td></tr>
<tr><td colspan="2">Regenerative resistor</td><td colspan="2">External</td><td colspan="6">Built-in</td></tr>
<tr><td colspan="2">Dynamic brake</td><td colspan="8">Built-in</td></tr>
<tr><td colspan="2">Cooling mode</td><td colspan="2">Natural cooling</td><td colspan="6">Fan cooling</td></tr>
<tr><td colspan="2">Control method</td><td colspan="8">SVPWM</td></tr>
<tr><td colspan="2">Encoder</td><td colspan="8">17 bit / 20 bit / 23 bit / 24 bit / 25 bit</td></tr>
<tr><td colspan="2">Communication method with PC</td><td colspan="8">USB communication</td></tr>
<tr><td colspan="2">Panel operator</td><td colspan="8">5 buttons, 5-digit LED display</td></tr>
<tr><td colspan="2">Protection function</td><td colspan="8">• Hardware protect: overvoltage, undervoltage, overcurrent, drive overheating, encoder error, etc
• Software protect: memory failure, initialization failure, I/O allocation error, overspeed, overload, brake resistor overload, position deviation excess, etc
• Fault record: record 14 fault codes and the latest 3 detailed fault information</td></tr>
<tr><td rowspan="2">Ambient specification</td><td>Use ambient</td><td colspan="8">• Indoor: no direct sunlight
• No corrosive gas: avoid oil fume, flammable gas, dust, etc</td></tr>
<tr><td>Temperature used</td><td colspan="8">0~55℃ (when the temperature is above 45 ℃, please forced air cooling)</td></tr>
</table>

Item		Content						
WSD-B1-□□□-E		02B	04B	08B	10B	15B	15C	30C
	Storage temperature	-20℃~65℃						
	Humidity	Lower than 90%RH (no condensation)						
	Height	Normal use when the altitude is lower than 1000m, derating use when the altitude is 1000m~2000m						
	Vibration	＜1G						
	IP level	20						

◆ **Control Mode**

Item		Content
Command type		EtherCat bus
IO input / output		5 physical inputs, 3 physical outputs
Position mode	Command input format	Bus input
	Command input circuit	Bus input
	Electronic gear ratio	Range: 0.001~32000
	Filter	Command smoothing filter, FIR filter, damping filter
	Pulse output	Bus output
Speed / torque mode	Command form	Bus input

1.1.4 Connection between Servo Drive and Peripheral Device

- WSD-B1-**02B**-E/ WSD-B1-**04B**-E

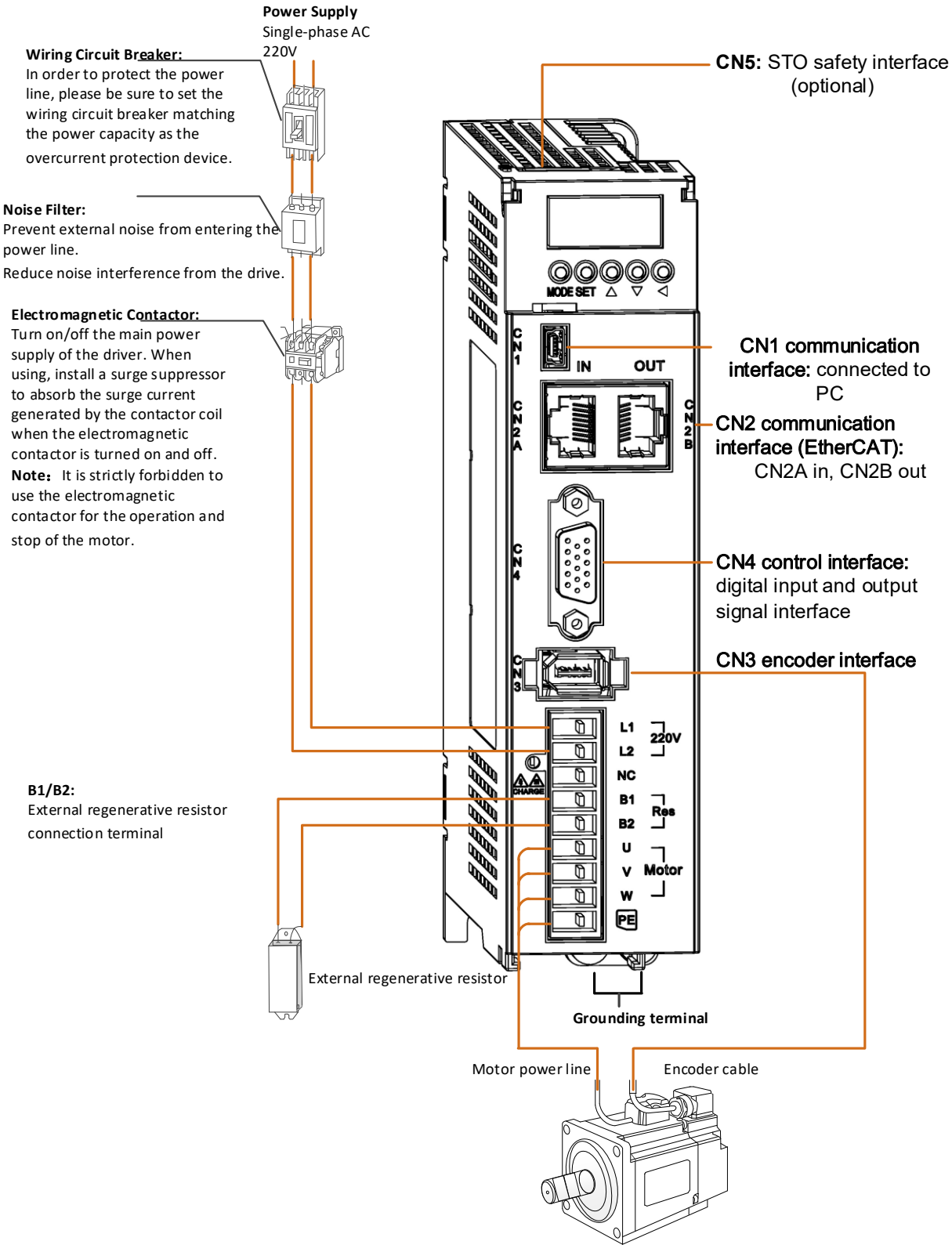


Figure 0-4 B1 Connection diagram of servo drive and peripheral device

- WSD-B1-**08B**-E/ WSD-B1-**10B**-E

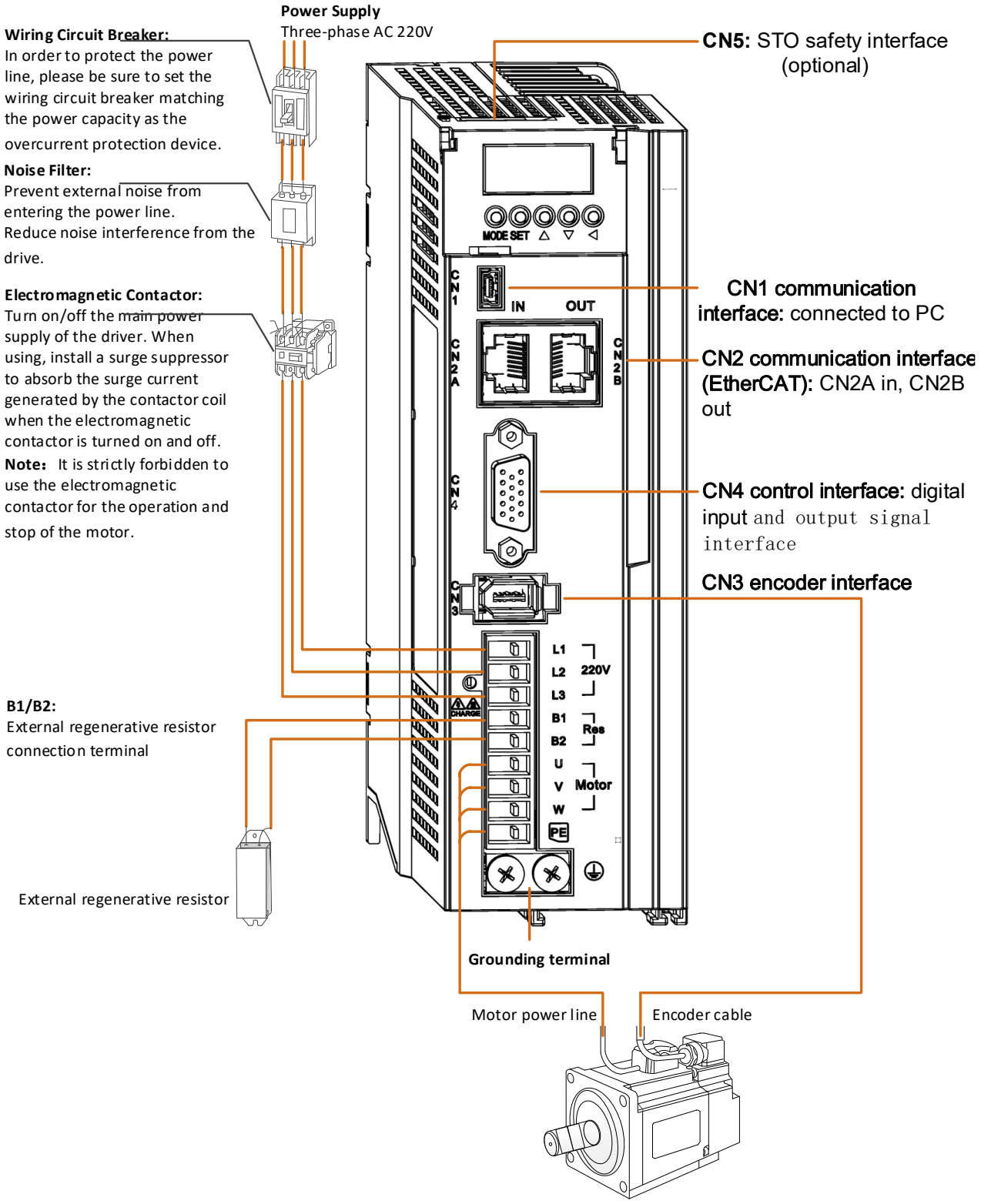


Figure 0-5 B1 Connection diagram of servo drive and peripheral device

- WSD-B1-**15B**-E/ WSD-B1-**15C**-E / WSD-B1-**30C**-E

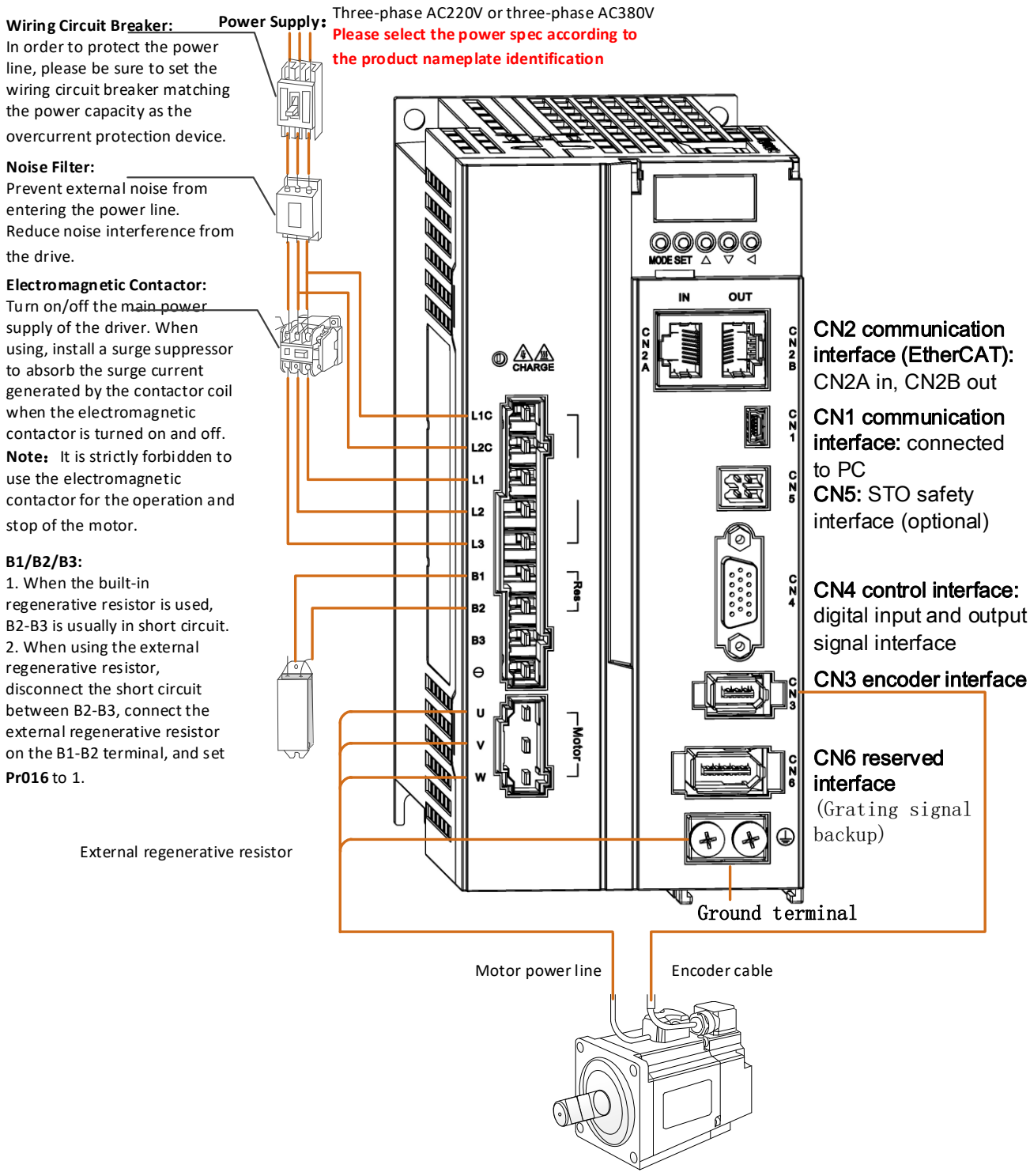


Figure 0-6 B1 Connection diagram of servo drive and peripheral device

Warning

- When using external regenerative discharge resistor, please be sure to set external protection such as temperature insurance.
- The regenerative resistor has a built-in temperature fuse and thermostat. After the temperature fuse is activated, it cannot be restored.
- Please install the regenerative resistor on incombustible materials such as metal.

1.2 Servo Motor

1.2.1 Servo Motor Model

WSM - 130 M - 2420 C - D2 1 Y - S 01 - T
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

①	
Symbol	Product Series
WSM	WSM series

②	
Symbol	Flange Frame
130	130 mm

③	
Symbol	Inertia
L	Small inertia
M	Medium inertia
H	Large inertia

④	
Symbol	Rated Power / Rated Speed
0430	0.4 kW / 3000 rpm
2420	2.4 kW / 2000 rpm

⑤	
Symbol	Voltage (V)
B	220
C	380

⑥	
Symbol	Encoder Type
D1	Tamagawa 17-bit multi-turn absolute value
D2	Tamagawa 23-bit multi-turn absolute value
D3	Nikon 24-bit multi-turn absolute value
D4	23-bit multi-turn absolute value
D5	Tamagawa 23-bit multi-turn absolute value N50
G1	17-bit single-turn absolute value magnetic encoder
G2	17-bit multi-turn absolute magnetic encoder

⑦	
Symbol	Button, Brake, Oil Seal
1	Button+oil seal
2	Button+brake+oil seal
3	Beam axis+oil seal
4	Beam axis+brake+oil seal

⑧	
Symbol	Motor Connector Type
X	Lead type,small aviation plug
Y	Big aviation plug
Z	Lead type, AMP connector
S	Socket type

⑨	
Symbol	Non-standard Code Meaning
Null	Standard
S	Axis non-standard

⑩	
Symbol	Non-standard Serial No. Meaning
01	Axis diameter 24mm

⑪
Manufacture No.

1.2.2 Servo Motor Specification

Motor Model	Flange Frame No. mm	Rated Power kW	Rated Torque N·m	Max TorqueN·m	Rated Speed rpm	Max Speed rpm	Rated Current Arms	Rotor Inertia $10^{-4}Kgm^2$	Voltage V
WSM-100M-1030B-D4□Y-M	100	1.0	3.2	9.6	3000	5000	5.0	2.458	220
WSM-110M-1030B-D4□Y-M	110	1.0	4.0	12.0	3000	3500	5.0	5.4	
WSM-110M-1020B-D4□Y-M		1.0	5.0	15.0	2000	3000	6.0	6.3	
WSM-110M-1220B-D4□Y-M		1.2	6.0	18.0	2000	3000	6.0	7.6	
WSM-110M-1530B-D4□Y-M		1.5	5.0	15.0	3000	3000	6.0	6.3	
WSM-110M-1830B-D4□Y-M		1.8	6.0	18.0	3000	3000	6.0	7.6	
WSM-130M-1020B-D4□Y-M	130	1.0	5.0	15.0	2000	4000	7.0	10.6	
WSM-130M-1515B-D4□Y-M		1.5	10.0	25	1500	1600	6.0	19.4	
WSM-130M-0915B-D4□Y-M		0.85	5.39	14.2	1500	3000	6.9	13.9	
WSM-130M-1025B-D4□Y-M		1.0	4.0	12.0	2500	2600	4.0	8.5	
WSM-130M-1525B-D4□Y-M		1.5	6.0	18.0	2500	2900	6.0	12.6	
WSM-130M-2025B-D4□Y-M		2.0	7.7	22.0	2500	2700	7.5	15.3	
WSM-130M-0915C-D2□Y-M	130	0.85	5.39	14.2	1500	3500	4.0	13.9	380
WSM-130M-1020C-D2□Y-M		1.0	5.0	15.0	2000	4000	4.0	10.6	
WSM-130M-1315C-D2□Y-M		1.3	8.34	23.3	1500	3000	5.5	19.9	
WSM-130M-1325C-D□□Y-M		1.3	5.0	15.0	2500	2800	3.0	10.6	
WSM-130M-1520C-D2□Y-M		1.5	7.2	22.0	2000	3000	5.0	15.3	
WSM-130M-1525C-D2□Y-M		1.5	6.0	18.0	2500	2900	3.7	12.6	
WSM-130M-1815C-D2□Y-M		1.8	11.5	28.7	1500	3000	7.9	26.0	
WSM-130M-2020C-D2□Y-M		2.0	10.0	25.0	2000	3000	6.0	19.4	
WSM-130M-2025C-D2□Y-M		2.0	7.7	22.0	2500	2700	4.7	15.3	
WSM-130M-2315C-D2□Y-M		2.3	15.0	30.0	1500	1600	5.0	27.7	
WSM-130M-3825C-D2□Y-M		3.8	15.0	30.0	2500	2800	8.3	27.7	
WSM-180M-3015C-D2□Y-M	180	3.0	19.0	47.0	1500	1600	7.5	70.0	

Motor Model	Flange Frame No. mm	Rated Power kW	Rated Torque N·m	Max TorqueN·m	Rated Speed rpm	Max Speed rpm	Rated Current Arms	Rotor Inertia 10^{-4}Kgm^2	Voltage V
WSM-40M-0130B-D2□X-T	40	0.1	0.32	0.954	3000	6000	1.1	0.036	220
WSM-60M-0230B-D2□X-T	60	0.2	0.64	1.92	3000	6000	1.6	0.29	
WSM-60M-0430B-D2□X-T	60	0.4	1.27	3.81	3000	6000	2.5	0.56	
WSM-80M-0830B-D2□X-T	80	0.75	2.39	7.17	3000	5000	4	1.56	
WSM-80M-1030B-D2□X-T		1.0	3.18	9.54	3000	5000	6	2.03	
WSM-130M-0915B-D2□Y-T	130	0.85	5.39	13.8	1500	3000	6.9	13.95	
WSM-130M-1020B-D2□Y-T		1.0	4.8	12.65	2000	4000	6.6	13.95	
WSM-130M-1120C-D2□Y-T	130	1.1	5.39	14.2	2000	4000	4.3	13.95	380
WSM-130M-1720C-D2□Y-T		1.7	8.34	23.3	2000	4000	6.7	19.95	
WSM-130M-2315C-D2□Y-T		2.3	14.32	37.4	1500	3000	10	32.2	
WSM-130M-2420C-D2□Y-T		2.4	11.5	28.7	2000	4000	8.9	26.1	
WSM-130M-3020C-D2□Y-T		3.0	14.32	37.4	2000	4000	12	32.2	
WSM-180M-2315C-D2□Y-T	180	2.3	14.32	37.4	1500	3000	9.1	46	
WSM-180M-2915C-D2□Y-T		2.9	18.6	45.1	1500	3000	11.9	46	
WSM-180M-3020C-D2□Y-T		3.0	14.32	37.4	2000	4000	12	46	

Motor Model	Flange Frame No. mm	Rated Power kW	Rated Torque N·m	Max TorqueN·m	Rated Speed rpm	Max Speed rpm	Rated Current Arms	Rotor Inertia 10^{-4}Kgm^2	Voltage V
17-bit Single-turn Absolute Value Magnetic Encoder									
WSM-40M-0130B-G1□□-S	40	0.1	0.32	1.11	3000	6000	1.1	0.071	220
WSM-60M-0230B-G1□□-S	60	0.2	0.64	2.54	3000	6000	1.9	0.28	
WSM-60M-0430B-G1□□-S	80	0.4	1.27	5.08	3000	6000	2.6	0.56	
WSM-80M-0830B-G1□□-S		0.75	2.39	8.35	3000	6000	4.6	1.56	
23-bit Multi-turn Absolute Value Beam Encoder									
WSM-40M-0130B-D4□□-S	40	0.1	0.32	1.11	3000	6000	1.1	0.071	220
WSM-60M-0230B-D4□□-S	60	0.2	0.64	2.54	3000	6000	1.9	0.28	
WSM-60M-0430B-D4□□-S	80	0.4	1.27	5.08	3000	6000	2.6	0.56	
WSM-80M-0830B-D4□□-S		0.75	2.39	8.35	3000	6000	4.6	1.56	

Motor Model	Flange Frame No. mm	Rated Power kW	Rated Torque N·m	Max Torque N·m	Rated Speed rpm	Max Speed rpm	Rated Current Arms	Rotor Inertia $10^{-4}Kgm^2$	Voltage V
WSM-130H-0915B-D2□Y-N	130	0.85	5.4	16.2	1500	3000	6.5	13.9	220
WSM-130H-1020B-D2□Y-N		1.0	4.8	14.4	2000	4000	7.2	13.9	

1.3 Servo System Spec Adaptation List

Series	Motor Model	Flange Frame No. mm	Rated Power kW	Drive Model WSD-B1-□□□-E
M series	WSM-100M-1030B-D4□Y-M	100	1.0	08B
	WSM-110M-1030B-D4□Y-M	110	1.0	08B
	WSM-110M-1020B-D4□Y-M		1.0	10B
	WSM-110M-1220B-D4□Y-M		1.2	10B
	WSM-110M-1530B-D4□Y-M		1.5	10B
	WSM-110M-1830B-D4□Y-M		1.8	10B
	WSM-130M-1020B-D4□Y-M	130	1.0	10B
	WSM-130M-1515B-D4□Y-M		1.5	10B
	WSM-130M-0915B-D4□Y-M		0.85	10B
	WSM-130M-1025B-D4□Y-M		1.0	08B
	WSM-130M-1525B-D4□Y-M		1.5	10B
	WSM-130M-2025B-D4□Y-M		2.0	15B
	WSM-130M-0915C-D2□Y-M	130	0.85	15C
	WSM-130M-1020C-D2□Y-M		1.0	15C
	WSM-130M-1315C-D2□Y-M		1.3	15C
	WSM-130M-1325C-D□□Y-M		1.3	15C
	WSM-130M-1520C-D2□Y-M		1.5	15C
	WSM-130M-1525C-D2□Y-M		1.5	15C
	WSM-130M-1815C-D2□Y-M		1.8	30C
	WSM-130M-2020C-D2□Y-M		2.0	30C
	WSM-130M-2025C-D2□Y-M		2.0	15C
	WSM-130M-2315C-D2□Y-M		2.3	30C
	WSM-130M-3825C-D2□Y-M		3.8	30C

Series	Motor Model	Flange Frame No. mm	Rated Power kW	Drive Model WSD-B1-□□□-E
	WSM-180M-3015C-D2□Y-M	180	3.0	30C
T series	WSM-40M-0130B-D2□X-T	40	0.1	02B
	WSM-60M-0230B-D2□X-T	60	0.2	02B
	WSM-60M-0430B-D2□X-T		0.4	04B
	WSM-80M-0830B-D2□X-T	80	0.75	08B
	WSM-80M-1030B-D2□X-T		1.0	10B
	WSM-130M-0915B-D2□Y-T	130	0.85	10B
	WSM-130M-1020B-D2□Y-T		1.0	10B
	WSM-130M-1120C-D2□Y-T	130	1.1	15C
	WSM-130M-1720C-D2□Y-T		1.7	30C
	WSM-130M-2315C-D2□Y-T		2.3	30C
	WSM-130M-2420C-D2□Y-T		2.4	30C
	WSM-130M-3020C-D2□Y-T		3.0	30C
	WSM-180M-2315C-D2□Y-T	180	2.3	30C
	WSM-180M-2915C-D2□Y-T		2.9	30C
	WSM-180M-3020C-D2□Y-T		3.0	30C
S series	WSM-40M-0130B-G1□□-S	40	0.1	02B
	WSM-60M-0230B-G1□□-S	60	0.2	02B
	WSM-60M-0430B-G1□□-S		0.4	04B
	WSM-80M-0830B-G1□□-S	80	0.75	08B
	WSM-40M-0130B-D4□□-S	40	0.1	02B
	WSM-60M-0230B-D4□□-S	60	0.2	02B
	WSM-60M-0430B-D4□□-S		0.4	04B
	WSM-80M-0830B-D4□□-S	80	0.75	08B
N series	WSM-130H-0915B-D2□Y-N	130	0.85	10B
	WSM-130H-1020B-D2□Y-N		1.0	10B

1.4 Regenerative Brake Resistor Specification

"-" means no built-in brake resistor

Model	Built-in Brake Resistor Specifications		External Brake Resistor Min Allowable Resistance Value (Ω)	External Brake Resistor Min Allowable Power (W)	Capacitor Absorbs Max Brake Energy (J)
	Resistance Value (Ω)	Power Pr(W)			
WSD-B1-02B-E	-	-	50	80	7.8
WSD-B1-04B-E	-	-	45	80	15.7
WSD-B1-08B-E	50	75	40	150	26.7
WSD-B1-10B-E	50	75	20	200	32.4
WSD-B1-15B-E	25	100	15	300	47.7
WSD-B1-15C-E	100	100	60	300	34.3
WSD-B1-30C-E	50	100	40	600	50.4

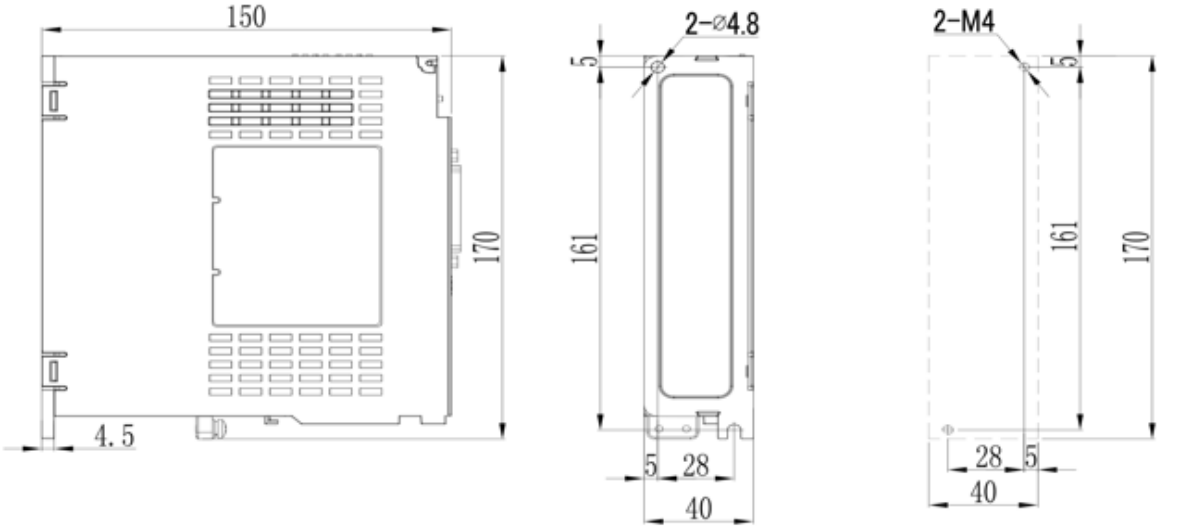
1.5 Connector Accessory

Accessory Name	Power No.	Weihong Material No.
Power cord plug	02B / 04B	101905000116
Power cord plug	08B / 10B	101905000124
Cord plug	15B / 15C / 30C	101905000145
Power cable plug	15B / 15C / 30C	101905000146
Encoder cable plug (optional)	General	101903000074
I/O terminals (optional)	General	101903000062 (44PIN metal joint) 101903000049 (plastic shell)
EtherCAT communication cable (optional)	General	102002000243 (0.5m) 102002000307 (1m) 102002000249 (3m)
Battery box (optional)	General	101600000008 (3.6V 2700mAh)

Chapter 2 Installation Instruction

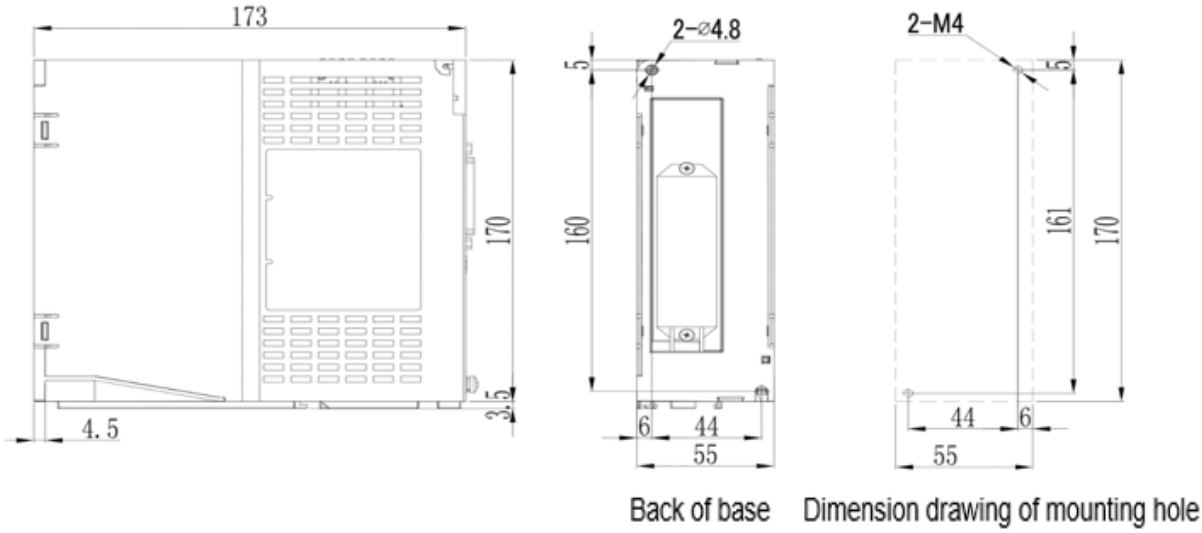
2.1 Installation Dimension

- WSD-B1-**02B**-E/ WSD-B1-**04B**-E



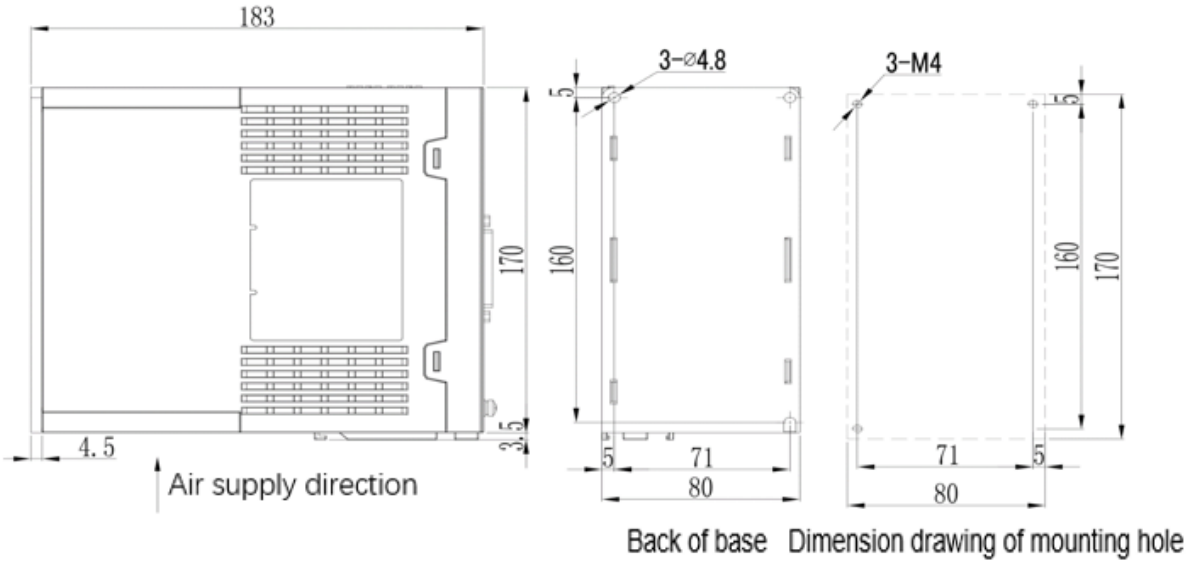
Back of base Dimension drawing of mounting hole

- WSD-B1-**08B**-E/ WSD-B1-**10B**-E



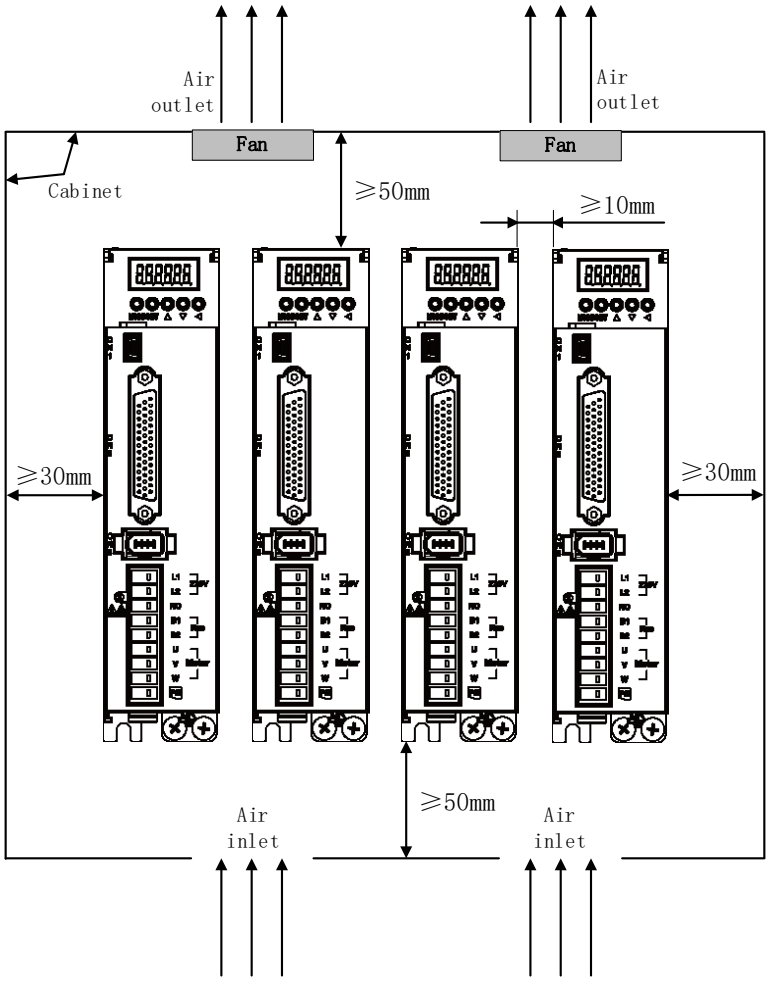
Back of base Dimension drawing of mounting hole

- WSD-B1-**15B**-E/ WSD-B1-**15C**-E/ WSD-B1-**30C**-E



2.2 Installation Space Requirement

Please be sure to install in the control box according to the installation standards shown.

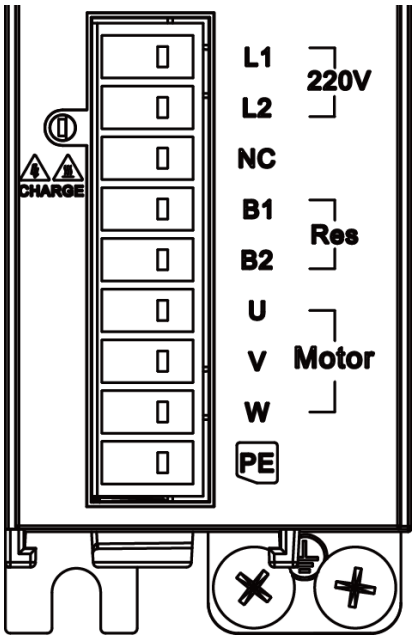


Chapter 3 Wiring

3.1 Main Circuit Wiring

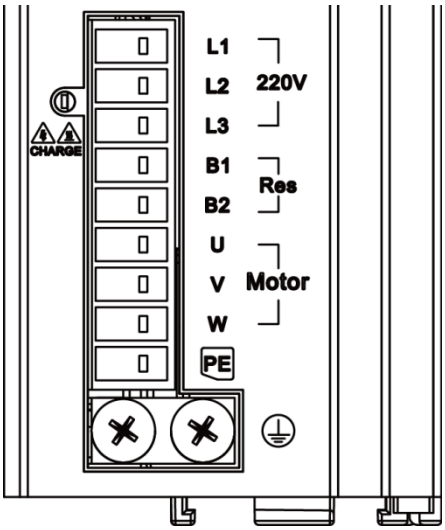
3.1.1 Terminal Introduction

- WSD-B1-**02B**-E/ WSD-B1-**04B**-E



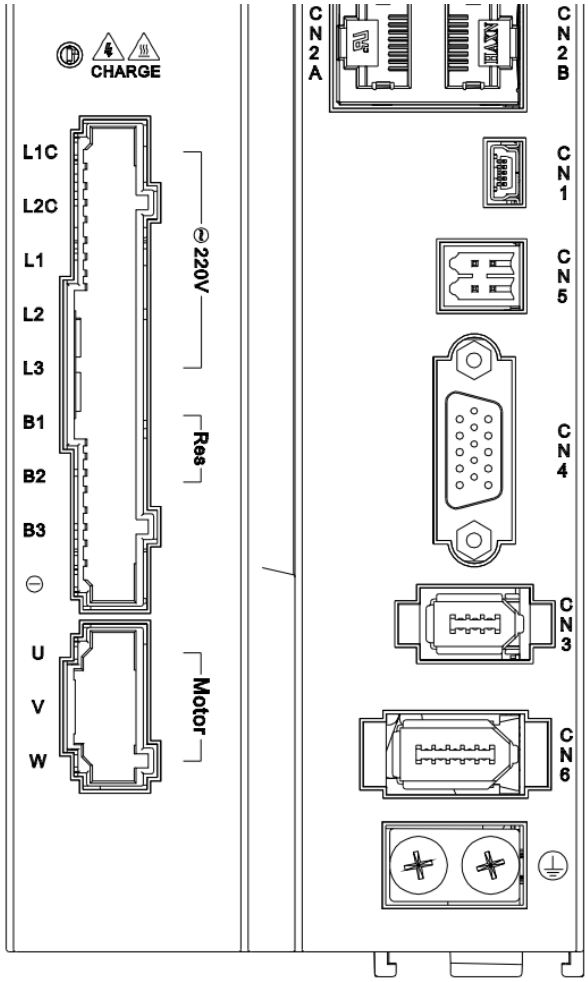
Sign	Name	Description
L1, L2	Main circuit power input terminal	Single-phase AC200V~240V, -15%~+10%, 50/60Hz
NC	Reserved interface	Reserved interface
B1, B2	External regenerative resistor connection terminal	Used when external regenerative resistor is connected
U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
PE	Motor grounding terminal	For motor PE grounding
⏚	Drive grounding terminal	For drive grounding

- WSD-B1-**08B**-E/ WSD-B1-**10B**-E



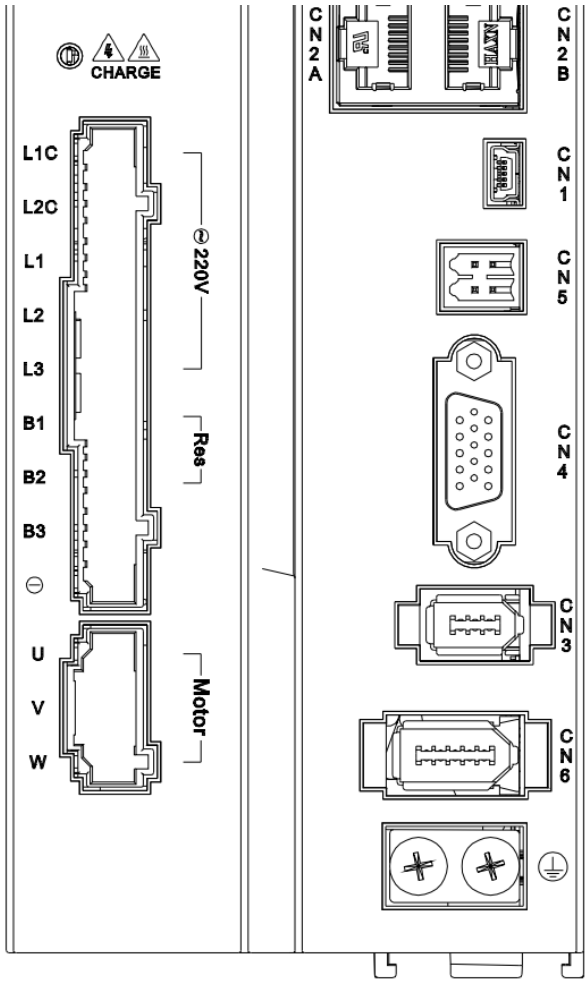
Sign	Name	Description
L1, L2, L3	Main circuit power input terminal	Single-phase/three-phase AC200V~240V, -15%~+10%, 50/60Hz
B1, B2	External regenerative resistor connection terminal	Used when external regenerative resistor is connected
U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
PE	Motor grounding terminal	For motor PE grounding
⏚	Drive grounding terminal	For drive grounding

- WSD-B1-**15B**-E



Sign	Name	Description
L1C, L2C	Control circuit power input terminal	Single-phase AC200V~240V, -15%~+10%, 50/60Hz
L1, L2, L3	Main circuit power input terminal	Three-phase AC200V~240V, -15%~+10%, 50/60Hz
B1, B2, B3	External regenerative resistor connection terminal	When leaving the factory, B2 and B3 are shorted, use the built-in resistor When using an external resistor, remove the short wire between B2 and B3, connect an external resistor between B1 and B2, and set the relevant parameters: P0016/ P0018/ P0019
B1, ⊖	DC bus terminal	Used for common bus connection when multiple machines are connected in parallel
U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
⏚	Grounding terminal	For motor and drive grounding

- WSD-B1-**15C**-E / WSD-B1-**30C**-E



Sign	Name	Description
L1C, L2C	Control circuit power input terminal	Single-phase AC380V~440V, -15%~+10%, 50/60Hz
L1, L2, L3	Main circuit power input terminal	Three-phase AC380V~440V, -15%~+10%, 50/60Hz
B1, B2, B3	External regenerative resistor connection terminal	When leaving the factory, B2 and B3 are shorted, use the built-in resistor When using an external resistor, remove the short wire between B2 and B3, connect an external resistor between B1 and B2, and set the relevant parameters: P0016/ P0018/ P0019: P0016/ P0018/ P0019
B1, ⊖	DC bus terminal	Used for common bus connection when multiple machines are connected in parallel
U, V, W	Servo motor connection terminal	Connect servo motor U, V and W phases
⏚	Grounding terminal	For motor and drive grounding

3.1.2 Wire Specification

◆ **Notes**

- This spec is the spec when the temperature is 40 ℃ and three wire harnesses flow through the rated current.
- Please use a voltage withstand wire greater than 600V for the main circuit.
- Please consider the attenuation coefficient of the allowable current of the wire when bundling it into a bundle and put it in a hard PVC tube or metal sleeve.
- Generally, the heat aging speed of PVC wire is relatively fast, and it can not to use in a short period of time, so when the ambient temperature (cabinet temperature) is high, please use heat-resistant wire.

◆ **Wire Type**

Wire Type		Conductor Allowable Temperature (℃)
Sign	Name	
IV	600V PVC wire	60
HIV	Special heat-resistant PVC wire	75

The relationship between wire diameter and allowable current for three wires is shown in the following table. Do not exceed the value in the table when using.

(Note: The following table data is the reference value of 600V special heat-resistant PVC wire (HIV).)

AWG Specification	Nominal Area (mm^2)	Constitute (piece/ mm^2)	Conductor Resistance (Ω/km)	Allowable Current at Different Ambient Temperatures (A)		
				30℃	40℃	50℃
20	0.5	19/0.18	39.5	6.6	5.6	4.5
19	0.75	30/0.18	26.0	8.8	7.0	5.5
18	0.9	37/0.18	24.4	9.0	7.7	6.0
16	1.25	50/0.18	15.6	12.0	11.0	8.5
14	2.0	7/0.6	9.53	23	20	16
13	2.63	52/0.254	7.1	28	24	20
12	3.5	7/0.8	5.41	33	29	24
10	5.5	7/1.0	3.47	43	38	31
8	8.0	7/1.2	2.41	55	49	40
6	14.0	7/1.6	1.35	79	70	57

◆ **Main Circuit Wire Specification**

The following table shows the recommended specs of wires for main circuit power input.

WSD-B1-□□□-E	Rated Current (mm²)	Voltage Level (V)	Recommended Wire Specification(40℃)			
			L1/L2/L3 (mm²)	L1C/L2C (mm²)	U/V/W (mm²)	⏚ (mm²)
02B	1.6	220	0.5	-	0.5	2.0
04B	2.8		0.5	-	0.5	2.0
08B	5.5		0.75	-	0.75	2.0
10B	7.6		1.25	-	1.25	2.0
15B	11.6		2.0	1.5	2.0	3.5
15C	5.4	380	0.75	0.75	0.75	2.0
30C	11.9		2.0	1.5	2.0	3.5

3.1.3 Wiring Instruction

◆ **Notes**

- If the drive is directly connected to the commercial power supply (no transformer is used for isolation), in order to avoid confusion between the servo system and the outside world, please be sure to use the wiring circuit breaker (QF) or fuse to protect the power line.
- The drive has no built-in ground short circuit, so in order to build a safer system, please configure a leakage circuit breaker for overload and short circuit protection, or combine it with the wiring circuit breaker, and install the ground short circuit protection leakage circuit breaker.
- Please do not turn on/off the power frequently. Because the drive power part has capacitor, when the power supply is ON, it will flow large charging current. If the power supply is ON/OFF frequently, the performance of its internal main circuit components will be reduced.

◆ **Related Matters During Wiring**

•Please shorten the cable as much as possible, when designing and configuring the system.

- Please observe the following items when wiring the main circuit:
  - Please use twisted-pair wires or multi-core twisted-pair integral shielded wires as input and output signal cables and encoder cables.
  - The maximum wiring length of input and output signal cable is 3m, and the maximum length of encoder cable is 20m.
- Please observe the following items when connecting the ground wire:
  - Use thick wire for grounding cable as much as possible.
  - Grounding cable resistance is less than 100 Ω.
  - Must be single point grounded.
  - Please ground the servo motor directly, when the servo motor and the machine are insulated from each other.
- When using the cable, try not to bend or pull it too tightly to avoid damage the cable.

◆ **Design of Power on Sequence Control**

Please consider the following points when designing the power connection sequence control:

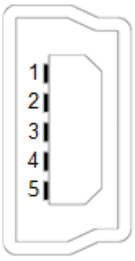
- After the signal of "servo alarm" is output, the main circuit power supply is in the OFF status.
- The power spec of the parts used shall be consistent with the input power supply.

Warning

- When connecting the control power supply and the main circuit power supply, please connect the main circuit power supply at the same time (or within 1s after connecting the control power supply).
- When cutting off the power supply, please cut off the control power supply and the main circuit power supply at the same time (or cut off the control power supply after cutting off the main circuit power supply).

3.2 CN1 Communication Interface (with PC)

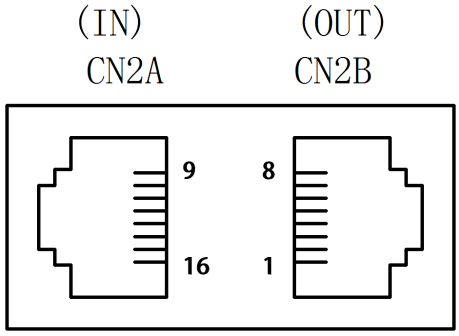
CN1 is a MiniUSB communication interface, which is connected to the computer installed with iMotion software. It can perform status monitoring, parameter editing, motion waveform analysis, fault analysis and other operations on the computer. (You can contact us or log in to the official website to obtain iMotion software)

Pin	Definition	Description	Pin Position Distribution Diagram
1	+5V	Power supply +5V	
2	Data -	Data -	
3	Data +	Data +	
4	—	—	
5	GND	Grounding	

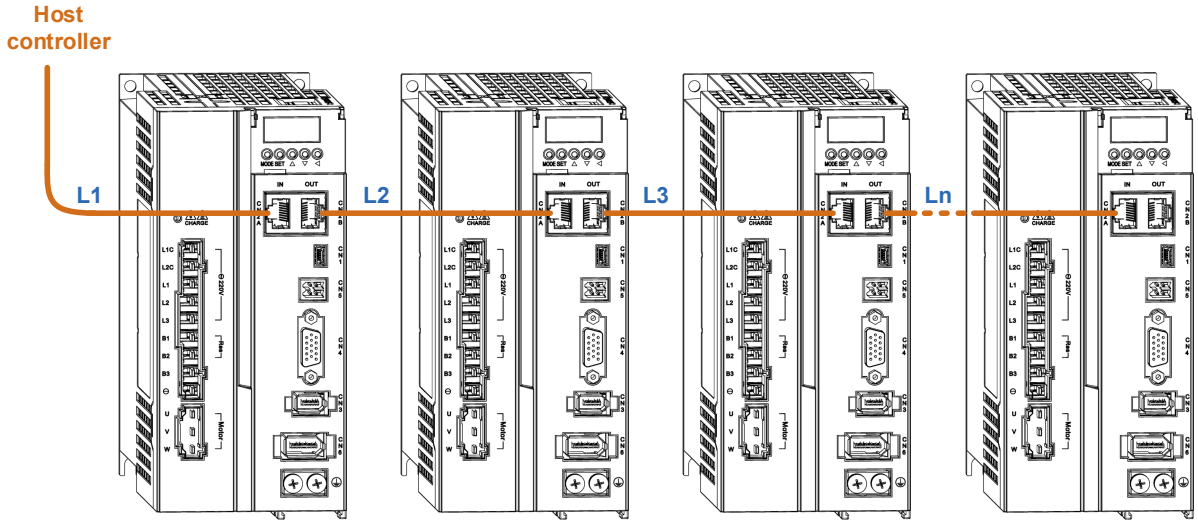
3.3 EtherCAT Communication Interface

CN2A/CN2B is the EtherCAT bus communication interface (A in and B out).

3.3.1Port Definition

Pin	Definition	Description	Pin Position Distribution
1	TD+	Data sending +	
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	-	-	
5	-	-	
6	RD-	Data receiving -	
7	-	-	
8	-	-	
9	TD+	Data sending +	
10	TD-	Data sending -	
11	RD+	Data receiving +	
12	-	-	
13	-	-	
14	RD-	Data receiving -	
15	-	-	
16	-	-	
Shell	Grounding	Connect to shield layer	

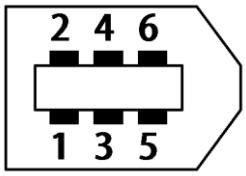
3.3.2 Wiring Diagram



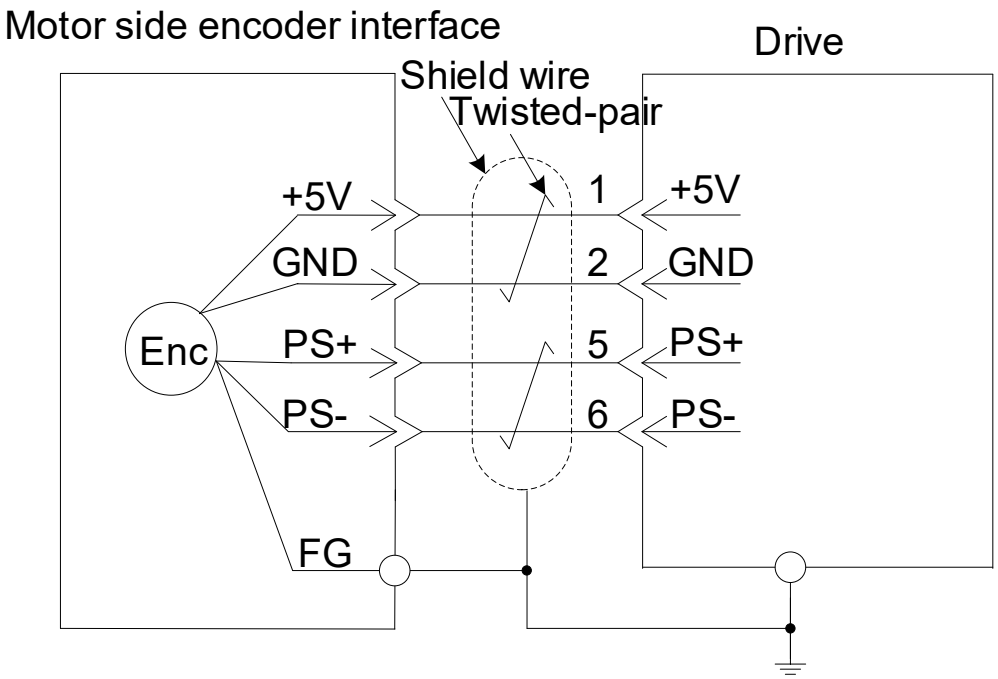
3.4 CN3 Encoder Interface

CN3 is the motor encoder wire interface, which supports serial communication 17-bit, 20-bit, 23-bit, 24-bit, 25-bit and other encoders.

3.4.1 Port Definition

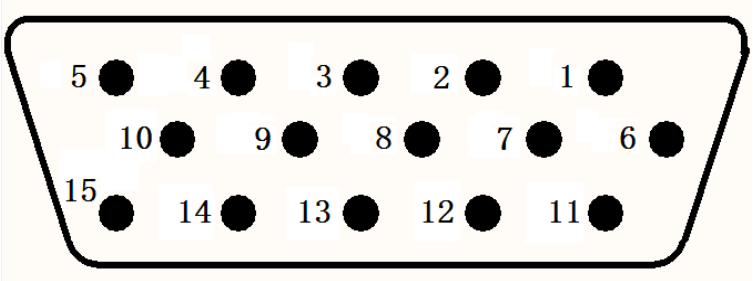
Pin	Definition	Description	Pin Position Distribution
1	+5V	Power supply +5V	
2	GND	Signal ground	
3	NC	-	
4	NC	-	
5	PS+	Signal positive	
6	PS-	Signal negative	
Shell	PE	Shield	

3.4.2 Wiring Diagram



3.5 CN4 Control Interface

CN4 is a control signal interface, connected to the host computer, and mainly includes digital input, output and other signals.

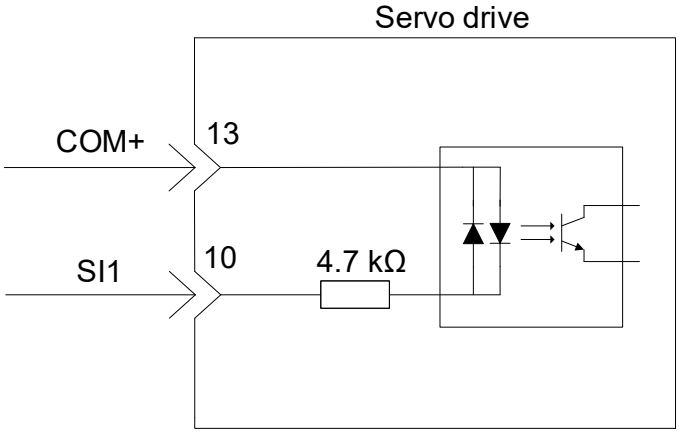


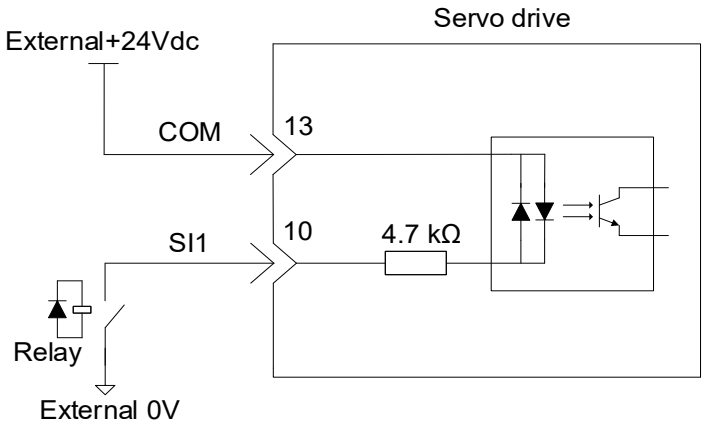
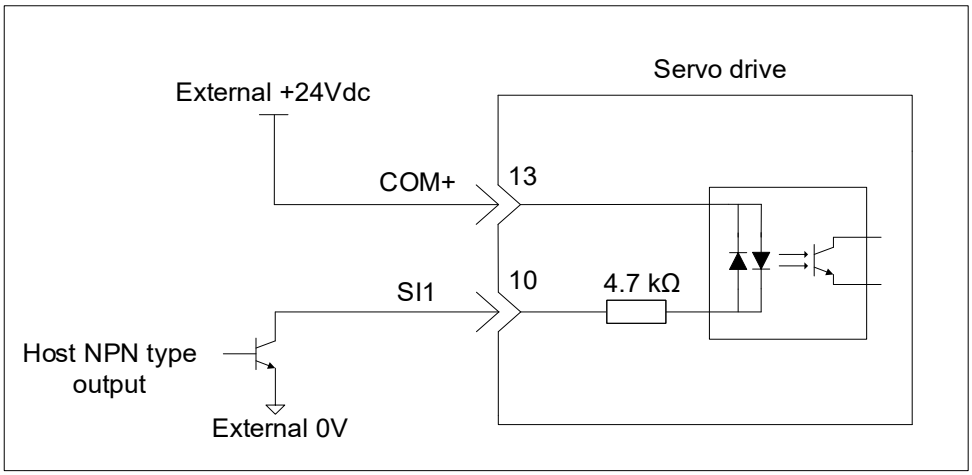
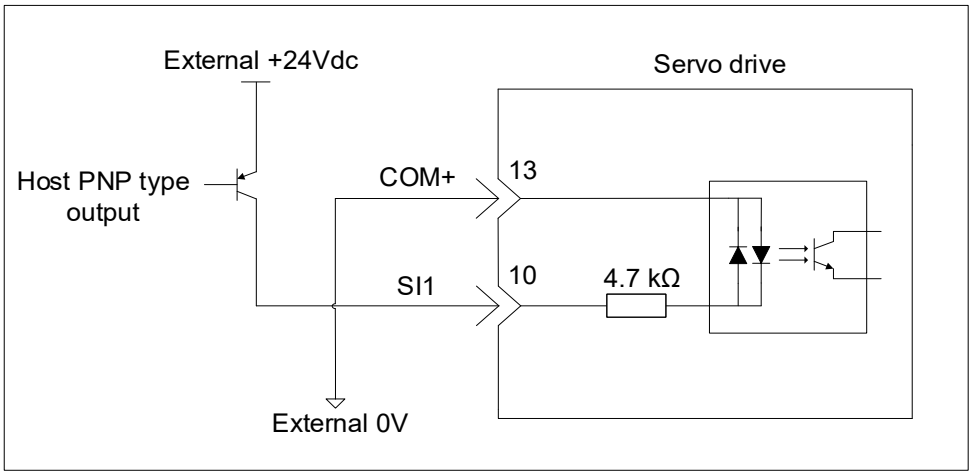
3.5.1 Port Definition

Signal Type	Pin	Definition	Description
Digital input	10	SI1	Digital input 1, default POT
	9	SI2	Digital input 2, default NOT
	8	SI3	Digital input 3, default HOME
	7	SI4	Digital input 4, default probe 1
	11	SI5	Digital input 5, default probe 2
	13	COM+	Power supply input: +11~30VDC
	14	COM-	
	15	+24V_OUT	Internal 24V power supply output, range +20~28VDC, maximum current 200mA
Digital output	1	SO1+	Digital output 1, default BRK
	6	SO1-	
	3	SO2+	Digital output 2, default S_RDY
	2	SO2-	
	5	SO3+	Digital output 3, default ALM (NC)
	4	SO3-	
	12	NC	-
	Shell	PE	Connect to shield layer

3.5.2 Digital Input Signal

Taking SI1 as an example, the interface circuits of SI1~SI5 are the same.

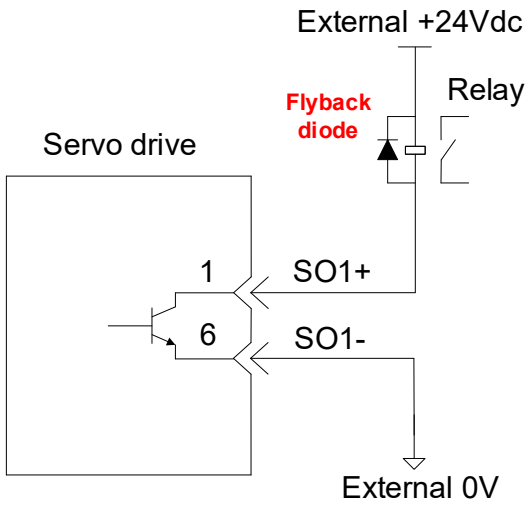
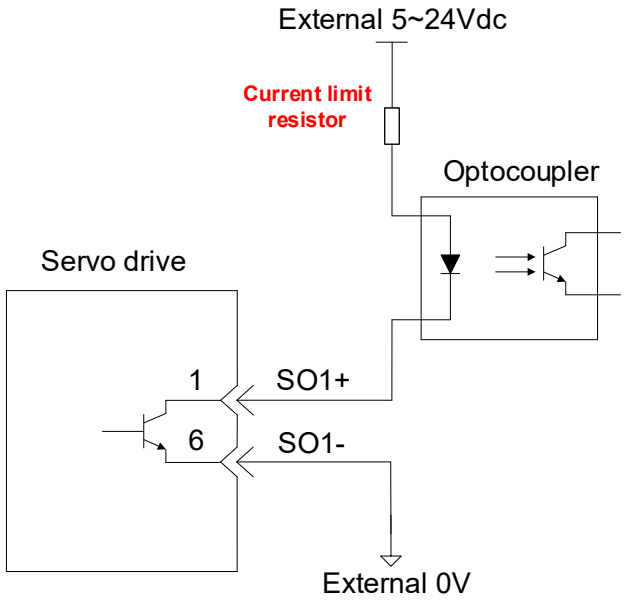


Interface Type	Circuit (Take SI1 as an Example)
When the host computer is a relay output	
When the host computer is an open collector output	 

Caution

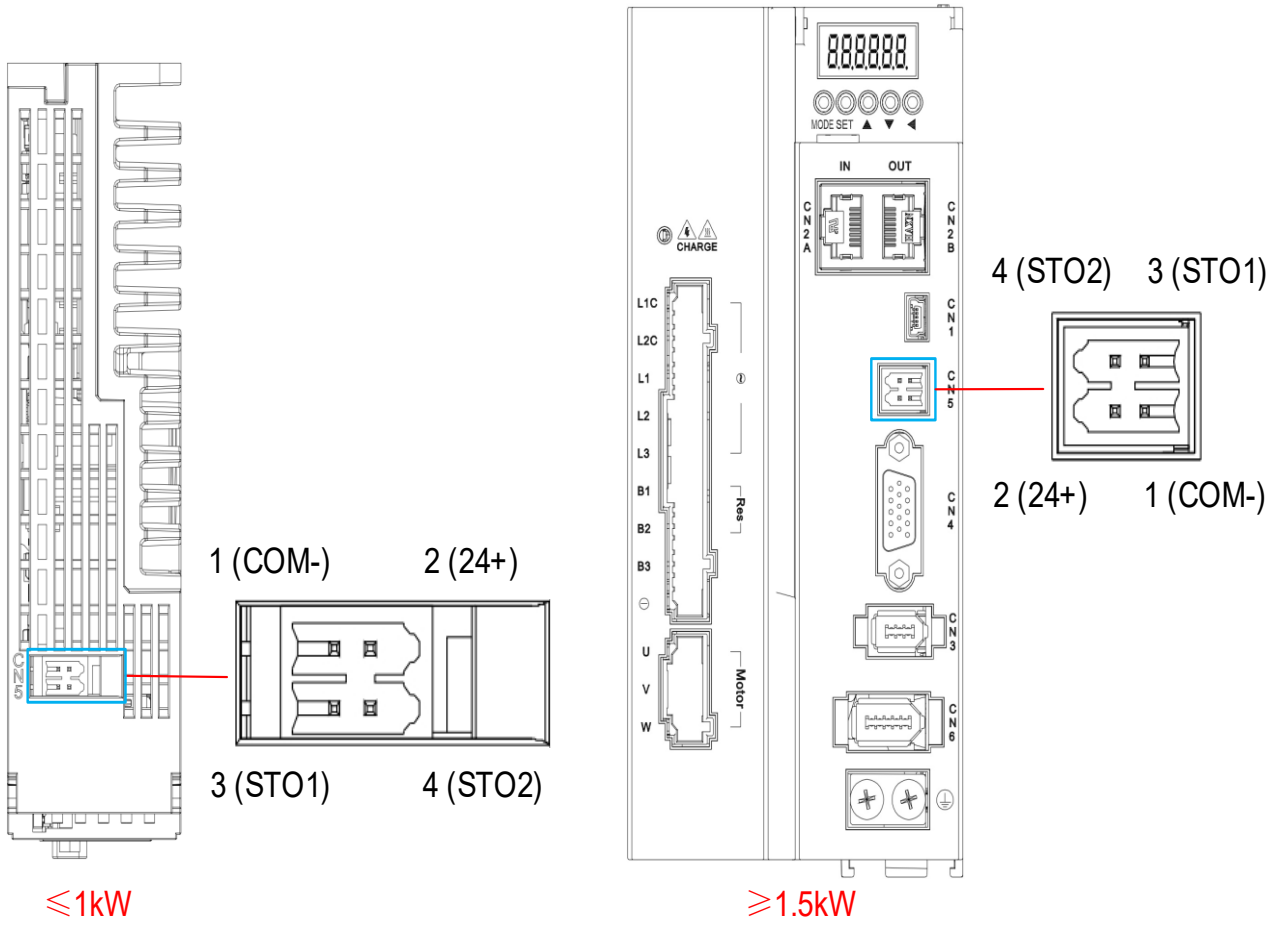
- Mixing PNP and NPN input is not supported.

3.5.3 Digital Output Signal

Interface Type	Circuit (Take SI1 as an Example)	Caution
When the host computer is a relay input		• Please be sure to connect a flyback diode, otherwise the SO output port may be damaged.
When the host computer use optocoupler input		• Please be sure to connect current limit resistor • The maximum allowable voltage of the optocoupler output circuit inside the drive is DC30V, and the maximum allowable current is DC50mA.

3.6 CN5 STO Safety Interface

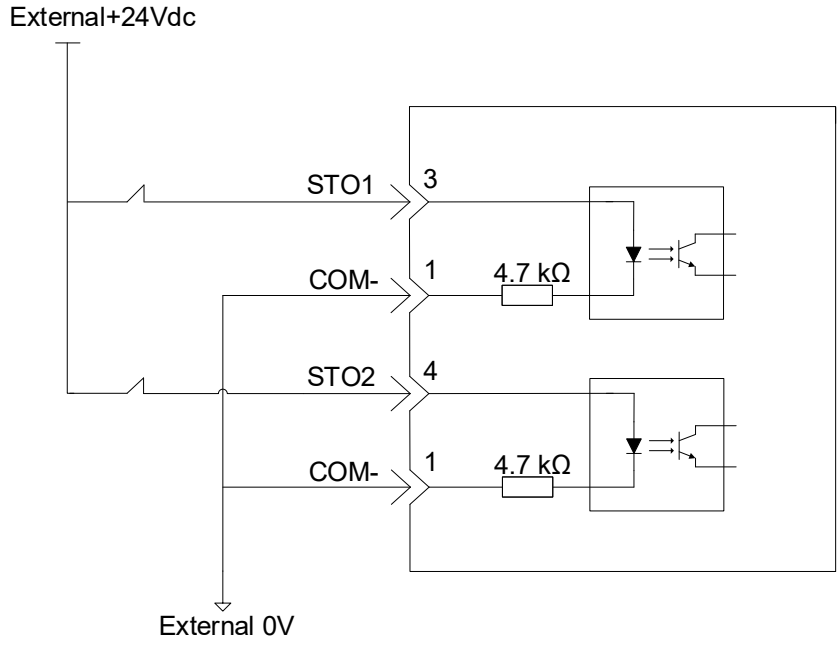
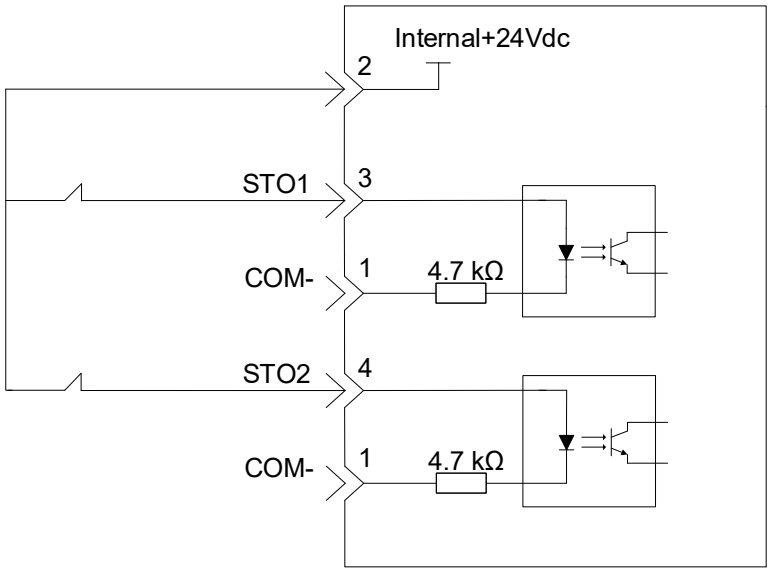
STO is the safe torque off function. When the function is triggered, the motor's torque output is safely cut off.



3.6.1 Port Definition

Pin	Definition	Description
1	COM-	Reference ground
2	+24V	Internal +24V
3	STO1	Safety input 1
4	STO2	Safety input 1

3.6.2 Wiring Diagram

<table>
<tr><th>Power Supply Type</th><th>Circuit</th><th>Caution</th></tr>
<tr><td>External 24V</td><td> 
</td><td rowspan="2">• When the STO1 and STO2 input states are high at the same time, the drive works;
• If one is high and one is low or both are low, the drive will not work.</td></tr>
<tr><td>Internal 24V</td><td> 
</td></tr>
</table>

3.7 External Regenerative Brake Resistor Connection

When the direction of torque and speed of the motor is opposite, the motor changes from the electric status to the regenerative power generation status, and the regenerative energy is fed back to the DC circuit after full-wave rectification by the freewheeling diode. Because the electric energy of the DC circuit cannot be fed back to the power grid through the rectifier bridge. Only by the absorption of the capacitor of the drive itself, the charge accumulation of the capacitor will form a "pump voltage", which will increase the DC voltage. At this time, the energy can only be consumed through the regenerative resistor, otherwise the excessive DC voltage will damage all parts of the device.

Set the external regenerative resistor through the parameter **P00.16 Regenerative Resistor External Selection:**

- P00.16 is set to 0, use built-in regeneration resistance.
- P00.16 is set to 1, use external regeneration resistance.

Caution

- When the servo drive leaves the factory, the default value of P00.16 is 0. At this time, use the built-in regeneration resistor.
- When using built-in regenerative resistor, B2-B3 is usually in short circuit status.
- When using the external regenerative resistor, remove the connecting wire between B2 and B3 (no B3 terminal for 1kW and below models), connect the external regenerative resistor on B1-B2 terminal as shown in the figure, and set P00.16 to 1.

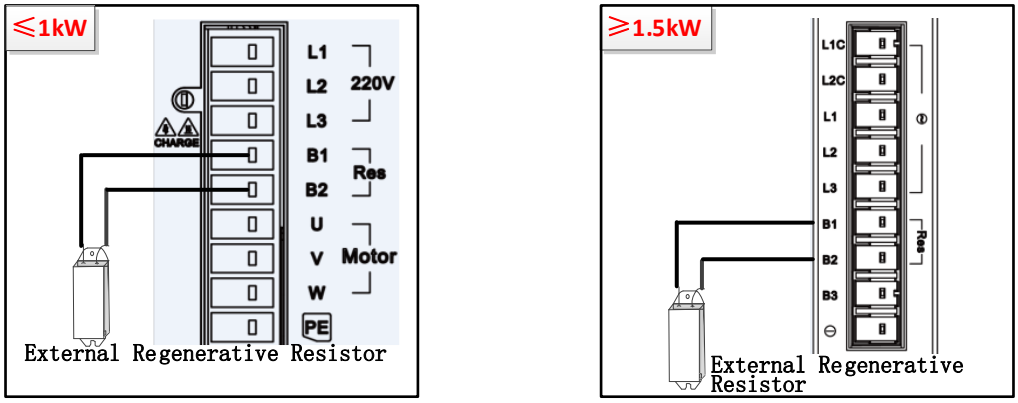


Figure 3-1 Connection diagram of external regenerative brake resistor

Warning

Please make sure that the regeneration resistor is wired correctly, otherwise it will cause damage to the machine or fire.

Chapter 4 Drive Panel

4.1 Panel Introduction

This section mainly introduces the panel composition, display and mode switching of the drive.

4.1.1 Panel Composition

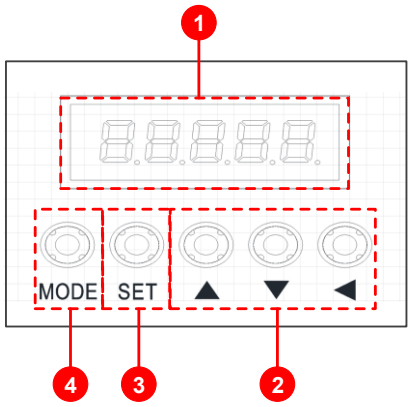
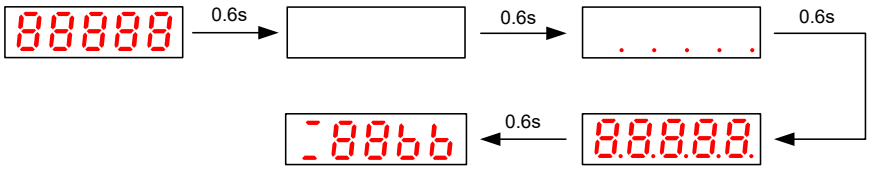


Figure 0-1 Composition of B1 servo drive panel

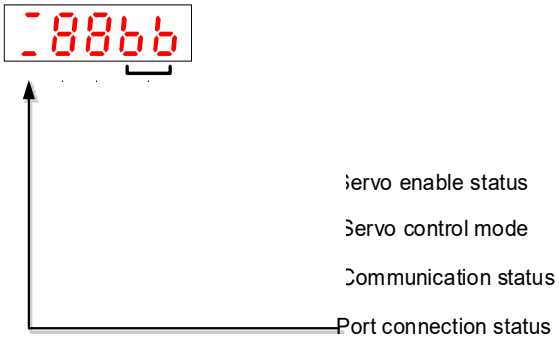
No.	Sign	Name	Description
1	-	LED display area	• Display current status, parameter values, etc • When a fault occurs, it is converted to a fault display screen, and the LED is flashing
2	▲	Increment button	Increase LED digital tube display value
	▼	Decrement button	Decrease LED digital tube display value
	◀	Shift button	Change the LED digital tube flashing bit, turn the page to view the high level value of data longer than 5 digits
3	SET	Confirm button	• Enter the next menu • Execute commands such as saving parameters
4	MODE	Mode button	• It is used to switch the three operation modes of status monitoring, parameter setting and auxiliary function • Return to previous menu

4.1.2 Status Display

1） When power supply on:



2） Servo communication status display d38 (default display):

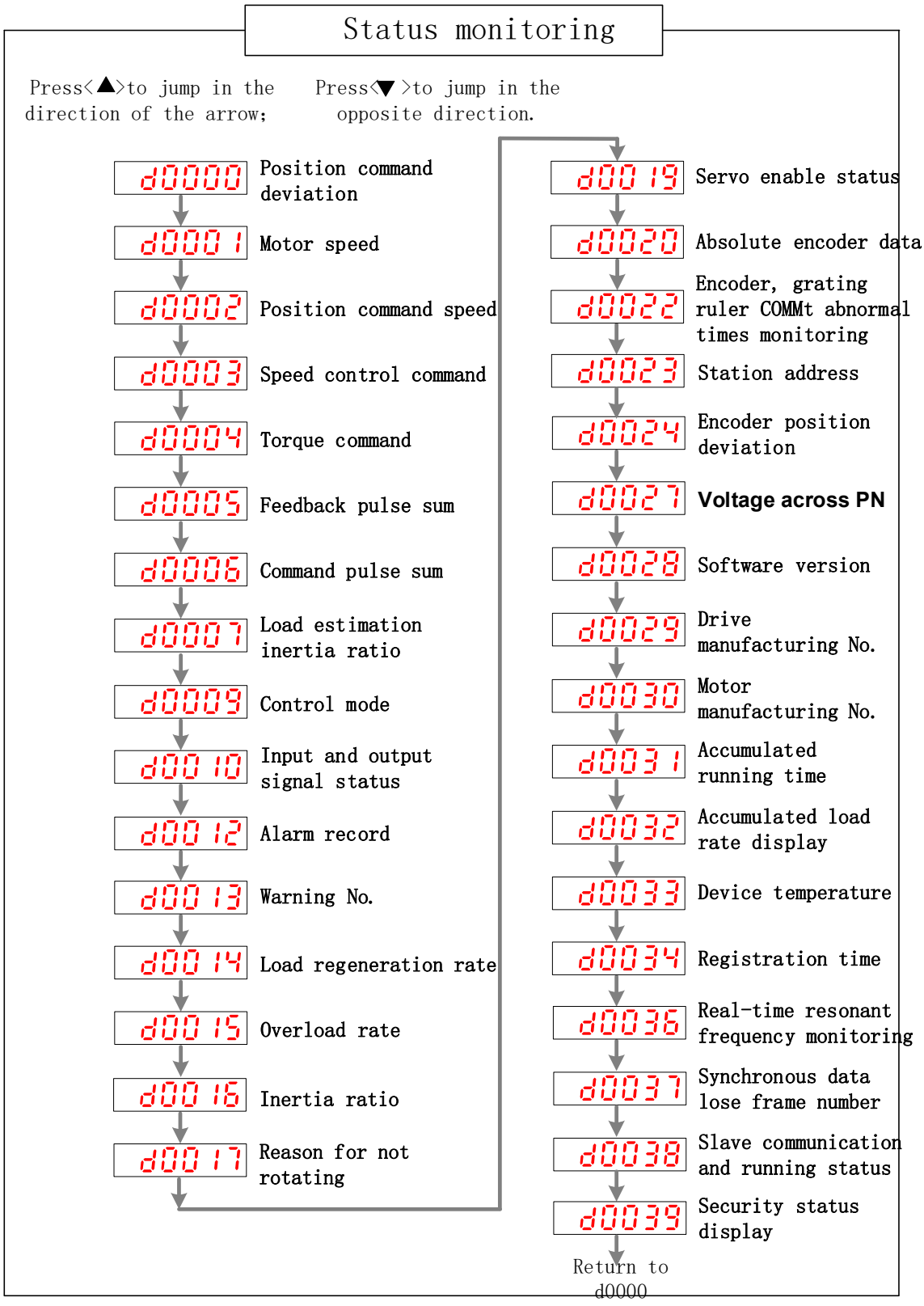


Name	Description
Port connection status	Long dark means that the physical layer has not detected a communication connection, and long light means that the physical layer has established a communication connection. Up - always on: CN2A EtherCAT input is connected successfully Down - always on: CN2B EtherCAT output is connected successfully
Communication status	Display the EtherCAT state machine status of the slave station in character form. 1: Initialization state (INIT) 2: Pre-operation status (PROP) 4: Safe operating status (SAFEOP) 8: Operating status (OP)
Servo control mode (hexadecimal)	0: No mode 1: Profile position mode (PP) 3: Profile velocity mode (PV) 4: Profile torque mode (PT) 6: Zero return mode (HOMING) 8: Cycle synchronization position mode (CSP) 9: Cycle synchronization speed mode (CSV) A: Cycle synchronization torque mode (CST)
Servo enable status	rn: Servo enable (run) bb: Servo is not enabled

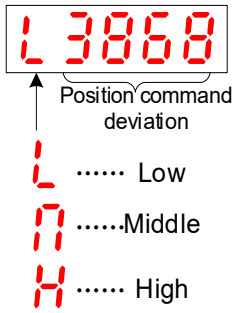
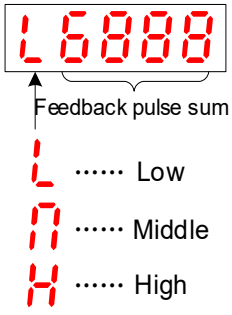
4.1.3 Mode Switch

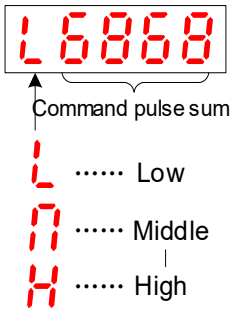
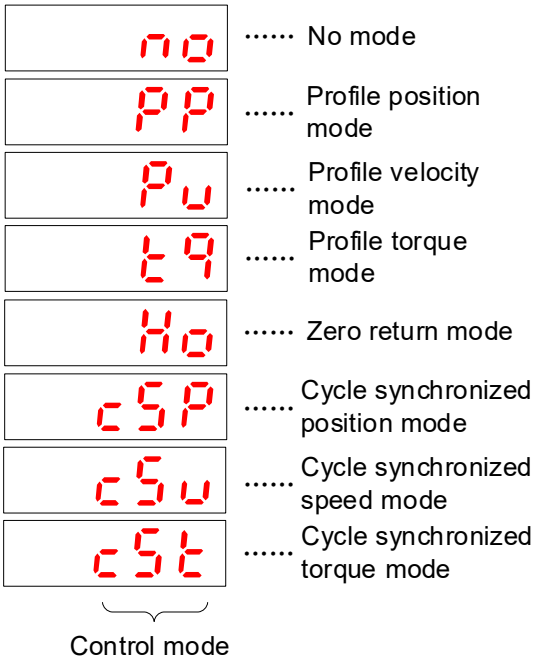
4.2 Status Monitoring

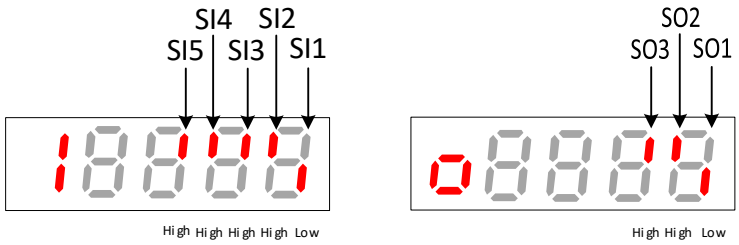
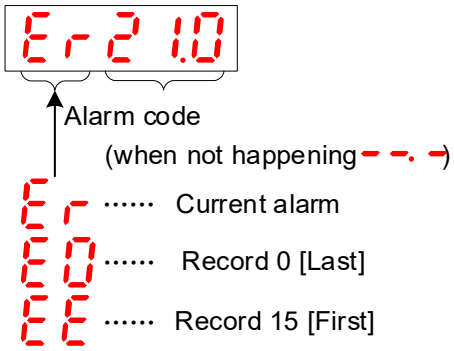
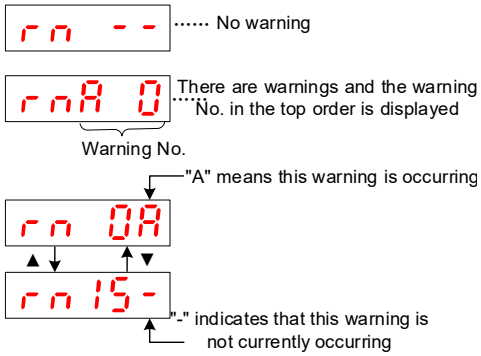
Monitor drive operating status. The operation process in monitor mode is as follows:

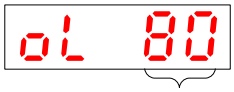
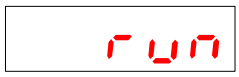
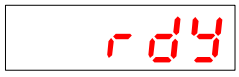


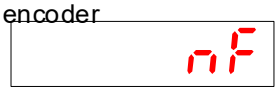
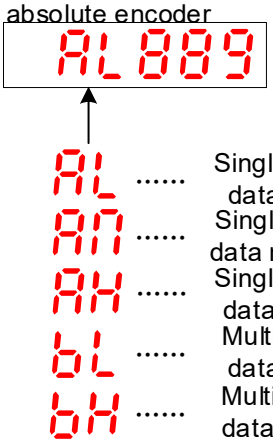
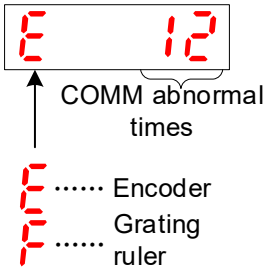
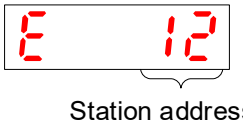
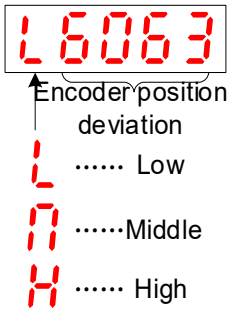
○ Status Monitoring Instruction

Name	Operating Instruction
Position command deviation (d0000)	Press the **SET** button to enter this item, as shown below:  When the value is less than 5-bit, the symbol on the left is not displayed, and when it is greater than 5-bit, it is automatically displayed.
Motor speed (d0001)	Press the **SET** button to enter this item, as shown below: 
Position command speed (d0002)	Press the **SET** button to enter this item, as shown below: 
Speed control command (d0003)	Press the **SET** button to enter this item, as shown below: 
Torque command (d0004)	Press the **SET** button to enter this item, as shown below: 
Feedback pulse sum (d0005)	Press the **SET** button to enter this item, as shown below:  Press ▲ / ▼ button to switch between low (L), middle (N) and high (H).

Name	Operating Instruction
Command pulse sum (d0006)	Press the **SET** button to enter this item, as shown below:  Press ▲ / ▼ button to switch between low (L), middle (N) and high (H).
Load estimation inertia ratio (d0007)	Press the **SET** button to enter this item, as shown below: 
Control mode (d0009)	Press the **SET** key to enter this item. Each mode is as follows: 
Input and output signal status (d0010)	Press the **SET** button to enter this item. Press ▲/▼ to switch between input signals (5 SI) and output signals (3 SO), The host half of the digital tube represents high level, and the lower half represents low level, as shown in the figure below:

Name	Operating Instruction
	
Alarm record (d0012)	Press the **SET** button to enter this item, as follows:  Press ▲/▼ to view 16 alarm records.
Warning No. (d0013)	Press the **SET** button to enter this item.  Press▲ or ▼ to display the occurrence of each warning. For details, please see Warning chapter.
Regeneration load rate (d0014)	Display the current regeneration resistance load rate (parameter **P00.16 Regenerative Discharge Resistor External Selection** = 0 or 1 is valid) Press the **SET** button to enter this item, as shown below:  Regeneration load rate%

Name	Operating Instruction
Overload rate (d0015)	Monitor the current overload rate of the motor. Press the **SET** button to enter this item, as shown below:  Overload rate%
Inertia ratio (d0016)	When P00.02=7 (inertia test mode), the learned inertia ratio is displayed here. Press the **SET** button to enter this item, as shown below:  Inertia ratio (%)
Reason for not rotating (d0017)	Display the reason number for the motor not rotating. Press the **SET** key to enter this item, as follows:  Control mode　Reason No. For details, please see 5.8 Reason for Motor not Rotating.
Servo status (d0019)	Display servo status. Press **SET** to enter the display interface.  Servo enable  Servo ready  AC or DC undervoltage  Servo alarm: the number is alarm code
Absolute encoder data (d0020)	Display absolute encoder data. Press **SET** to enter the display interface, and press the ▲/▼ keys to turn pages:

Name	Operating Instruction
	When connecting non-absolute encoder  When connecting absolute encoder 
Encoder or grating ruler COMMt abnormal times monitoring (d0022)	Record the number of encoder or grating ruler COMM error. Press **Set** to enter the display interface: 
Station address (d0023)	Press **SET** to enter the display interface: 
Encoder position deviation (d0024)	Press **SET** to enter the display interface, and press the ▲/▼ keys to turn pages: 
Voltage across PN (d0027)	Press ▲ / ▼ keys to turn pages

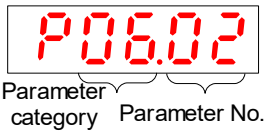
Name	Operating Instruction
	 Voltage across PN (V)  Control power supply voltage (V)  Switching power supply 12V voltage (V)
Software version (d0028)	 DSP version  FPGA version  Parameter version
Drive MFG No. (d0029)	Press ▲ / ▼ keys to turn pages  Drive No. high  Drive No. middle  Drive No. secondary middle  Drive No. low
Motor serial No. (d0030)	 Motor No. high  Motor No. low No.
Accumulated working time (d0031)	 Accumulated working time (h) L ····· Low H ····· High
Accumulated load rate (d0032)	 Accumulated load rate

Name	Operating Instruction
Device temperature (d0033)	 Drive temperature (℃)  Reserved  Reserved  CPU temperature (℃)
Registration time remaining (d0034)	 ..... Time remaining  ..... No time limit
Real-time resonance frequency (d0036)	 Resonance frequency
Synchronous data loss frame number (d0037)	 Synchronous data loss frame number
Slave communication and operating status (d0038)	 Servo enable status Servo control mode Communication status Port connection status
Safe status display (d0039)	Press the **SET** key to enter this item, and you can monitor two states, as follows.  ..... Safe status  ..... Alarm status  ..... No STO function Press ▲ / ▼ keys to turn pages, as follows

Name	Operating Instruction
	SAFEt Safe status SF1 - STO1 input optocoupler OFF SF2 A STO2 input optocoupler ON - ····· OFF A ····· ON

4.3 Parameter Setting

1）Parameter name composition:

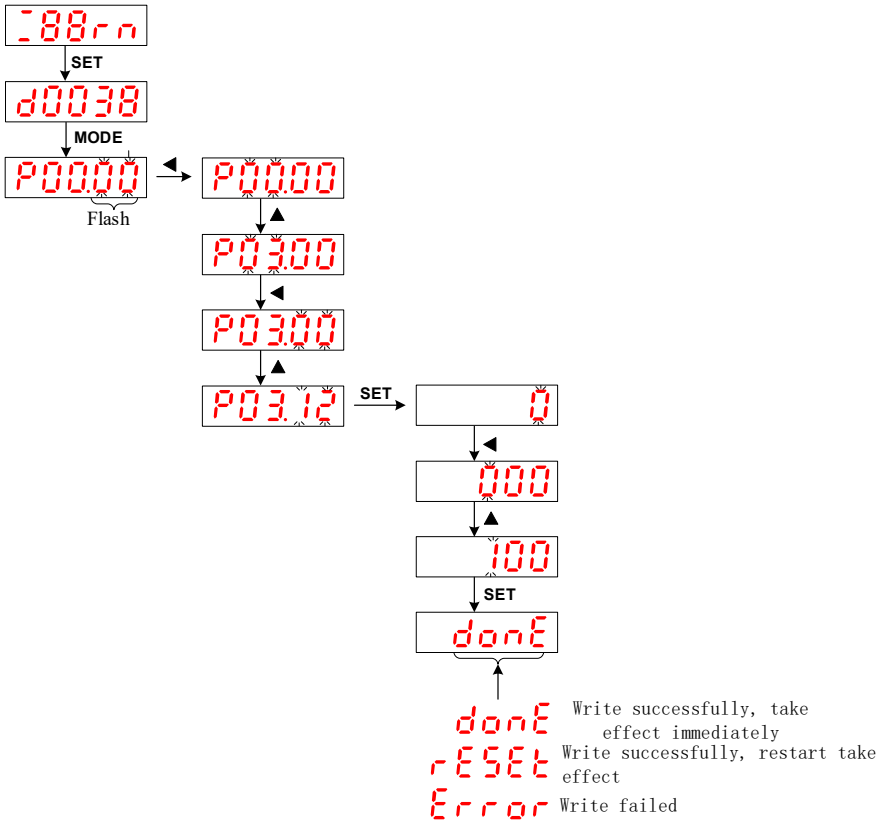


After power-on, **P00.01** will be displayed when entering the parameter setting interface for the first time, and the last selected parameter code will be displayed when entering again.

2）Setting example: Take P03.12 from 0 to 100 as an example.

Operation Steps:

• Set parameters as follows:



4.4 Auxiliary Function

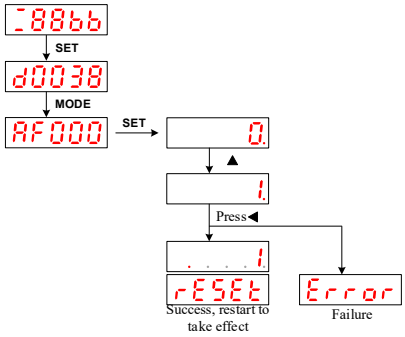
Auxiliary function list:

Auxiliary Function	Panel Display
Station address setting	AF000
Alarm clear	AF001
Jog run	AF005
Clear absolute encoder	AF006
Parameter initialization	AF007
Front panel lock release	AF008
Drive registration	AF009

4.4.1 Station Address Setting (AF000)

It is recommended to use the default setting 0 for the EC drive station address. At this time, the address will be automatically assigned according to the wiring sequence.

If manual allocation is required, set it according to the wiring sequence. The specific operations are as follows (taking node 1 as an example).

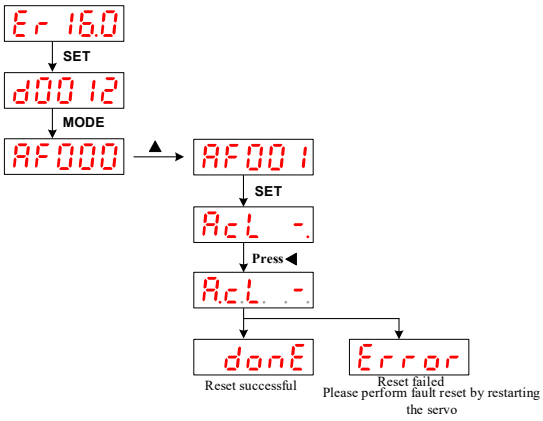


4.4.2 Alarm Reset (AF001)

Alarms with "resettable" attribute can be cleared by akarm reset (for "resettable" attribute, please refer to Chapter 9.2 "alarm code list").

Take the overload alarm Er16.0 as an example.

Operation Steps:



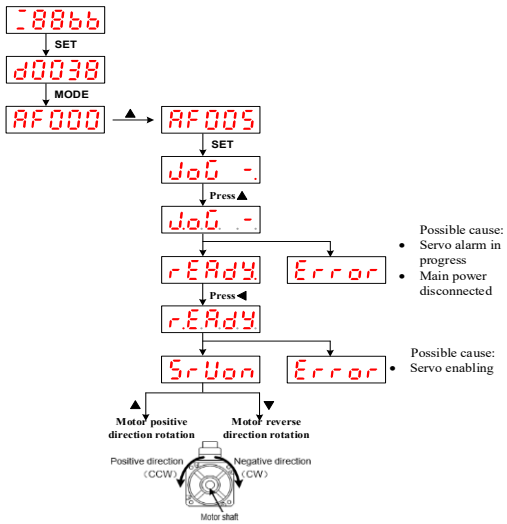
4.4.3 JOG Run (AF005)

In order to test whether the servo motor can operate normally and whether there is abnormal noise or vibration, it can be determined through JOG. The following mainly describes the panel operation steps (you can also operate through iMotion debugging software).

Prerequisite:

The servo has no alarm and is in the servo OFF status.

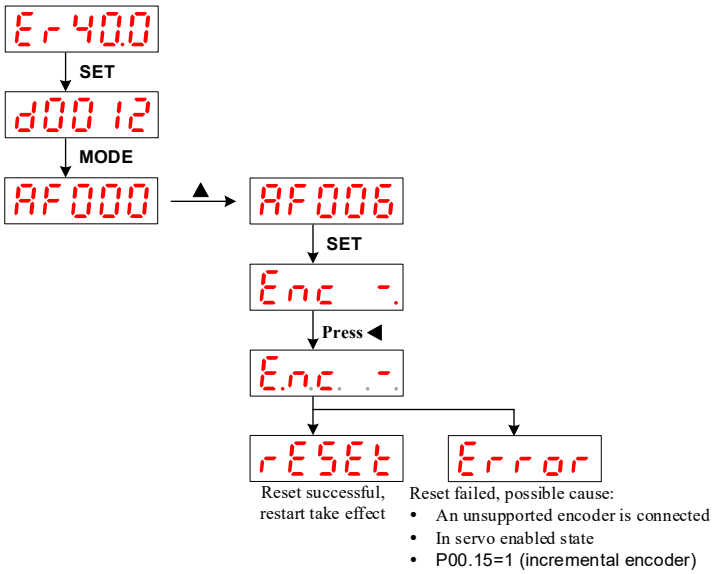
Operation Steps:



4.4.4 Clear Absolute Encoder (AF006)

When the encoder is power on for the first time, it will alarm Er40.0 and prompt to clear the multi-turn data. The specific operation is as follows.

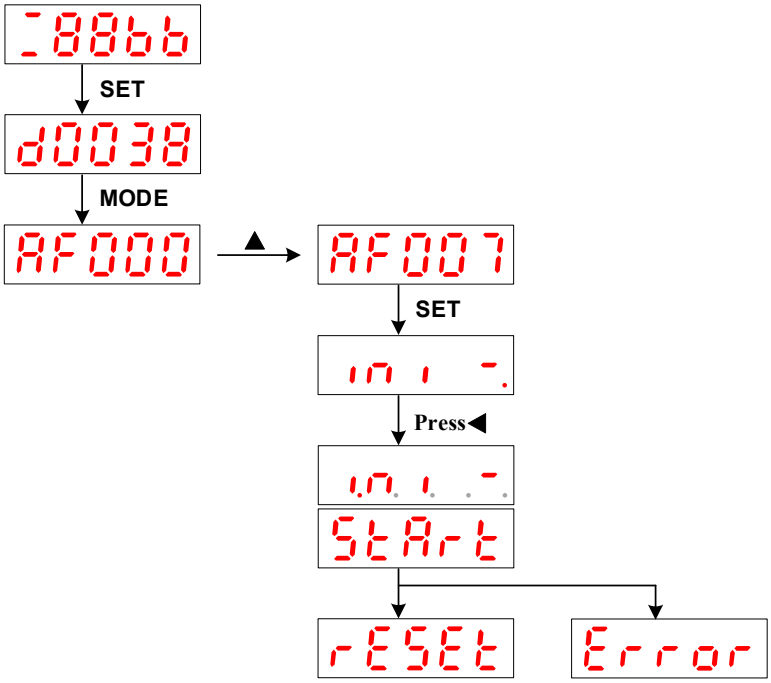
Operation Steps:



4.4.5 Parameter Initialization (AF007)

The parameters are restored to the factory default after the operation.

Operation Steps:



Initialization successful, restart take effect

Initialization failed, possibly cause:

- Er11.0 fault occurs;
- Er36.0/Er36.1/Er36.2/Er37.0/Er37.1/Er37.2 fault occurs.

4.4.6 Panel Lock Release (AF008)

To prevent accidental parameter changes caused by misoperation, the panel can be placed in a locked status. This can be achieved through the drive panel or iMotion software. The restrictions during locking are as follows:

Mode	Limitations when the Panel is Locked
Status monitoring	Unlimited, all monitor data can be confirmed.
Parameter setting	The parameter cannot be changed, but can confirm the parameter setting value.
Auxiliary function	All auxiliary functions except **Panel Lock Release** cannot be performed and there is no display.

Operation Steps:

1. Panel lock

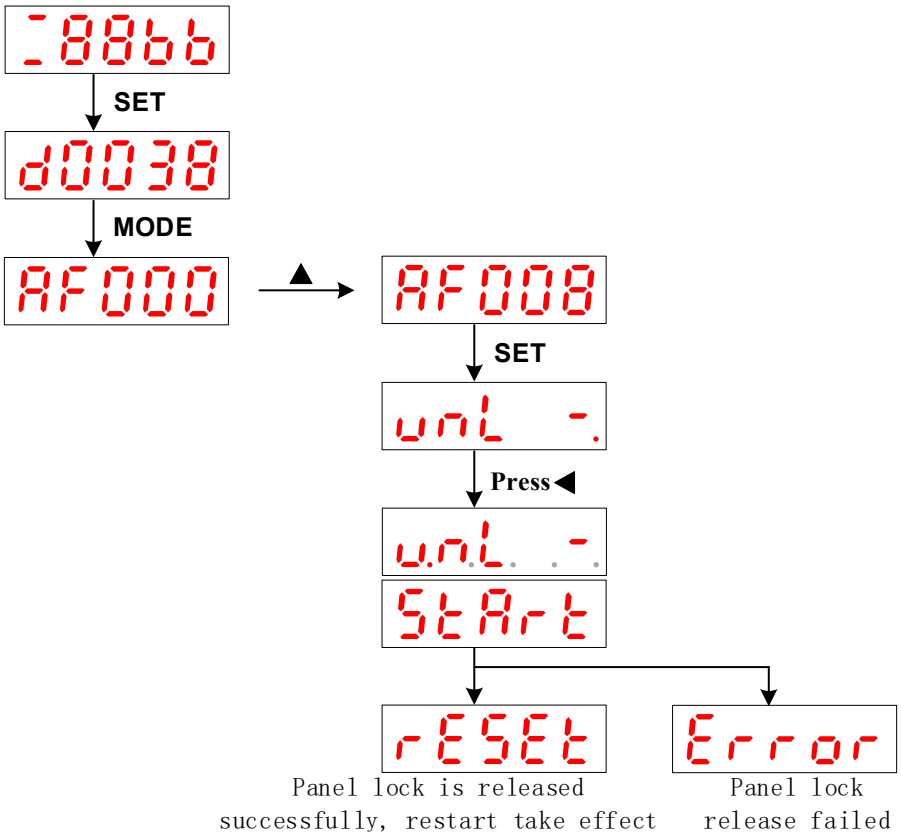
1） Set the parameter **P05.35 Panel Lock Setting** to **1**.

2） Restart the drive power supply, and the display panel lock setting is successful.

2. Panel lock release

Select one of the following methods to unlock the drive panel:

- Through drive panel operation:



- Through iMotion software operation:

1）Set the parameter **P05.35 Front Panel Lock Setting** to **0**, and click **Write** to save the setting.

2）Restart the drive power supply, and the panel lock status is released.

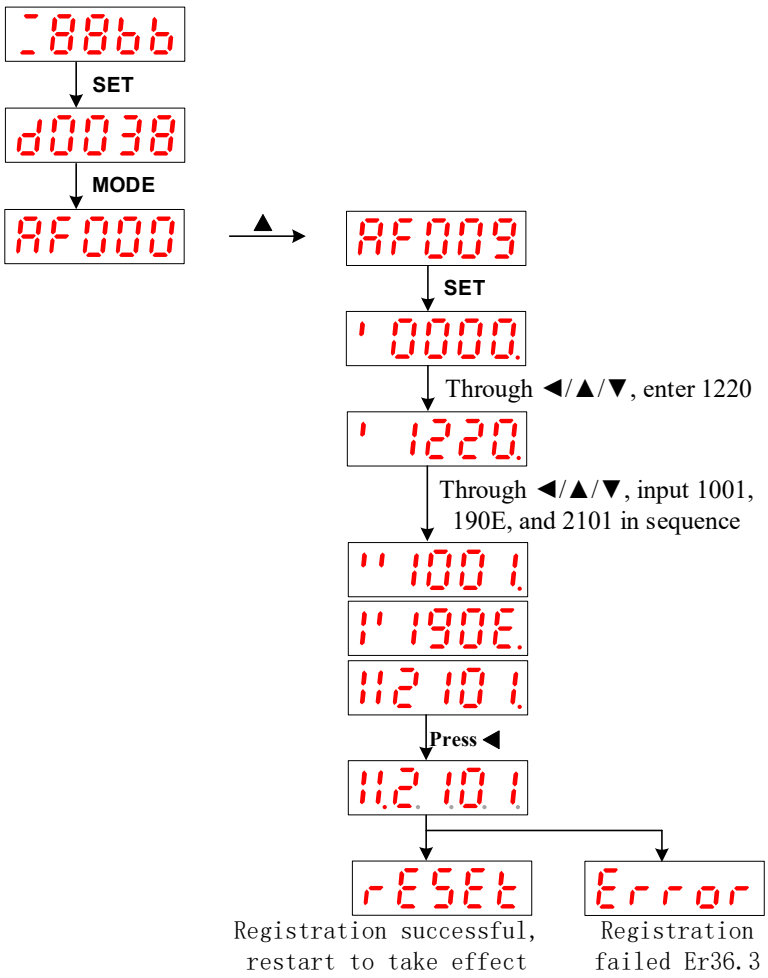
Caution

- The start screen lasts for a short time and may not be visible.

4.4.7 Drive Registration (AF009)

Take entering the registration code 1220-1001-190E-2101 as an example.

The digital tube on the left side of the AF009 interface represents the page number, which corresponds to the four strings of registration codes. The specific operations are as follows.



Chapter 5 Trial Run

5.1 Pre-run Check

Items to be checked before running the motor to ensure the safe operation of the motor:

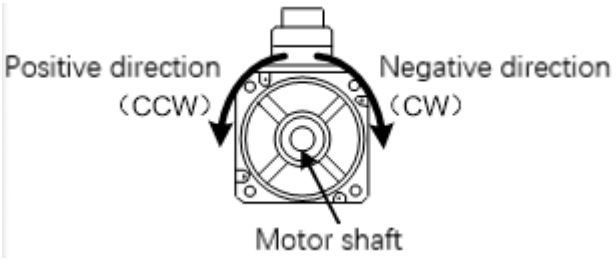
- Check whether the wiring is correct (especially power supply input and motor output).
- Check the ground wire for short circuit.
- Check whether the wiring connection is loose.
- Check whether the power supply voltage is within the rated voltage range.
- Check whether the motor is fixed stably.

5.2 Power On

After connecting the main circuit power supply and control power supply, the bus voltage indicator shows no error.

5.3 Select the Motor Rotation Direction

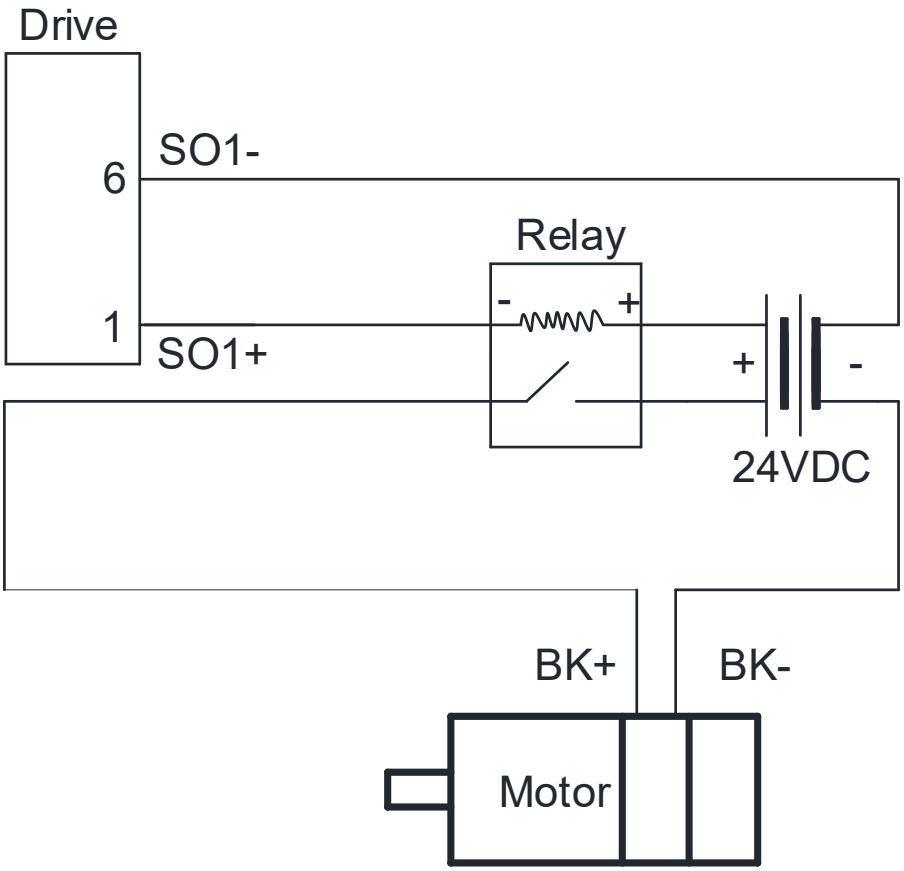
Through 607E setting, select the command polarity and change the motor rotation direction.

Value	Command Direction	Motor Rotation Direction	Motor Rotation Direction Diagram
0	Positive	CW	
	Negative	CCW	
224	Positive	CCW	
	Negative	CW	

5.4 Brake Setting

Brake can keep the motor locked when the servo drive is in non-running status, so that the moving parts of the machine will not move due to its own weight or external force.

Brake wiring diagram, as follows:



Caution

- Please refer to the wiring diagram above and use drive control brake (the drive can comprehensively monitor the motor status and reasonably control brake according to specific timing). Please do not control the brake through host controller, as unpredictable problems may occur.
- Motor brake is only used when keeping the servo motor stopped (servo OFF).
- The motor brake cannot be used to stop the motor, otherwise the brake structure will be damaged.
- The electromagnetic brake coil has no polarity.

5.5 Trial Run

The motor can be trial run by any of the following methods:

- Panel Jog run
- iMotion Jog run

5.5.1 Panel Jog Run

Through the drive panel, jog runs the motor. For details, please see JOG Run.

5.5.2 IMotion JOG Run

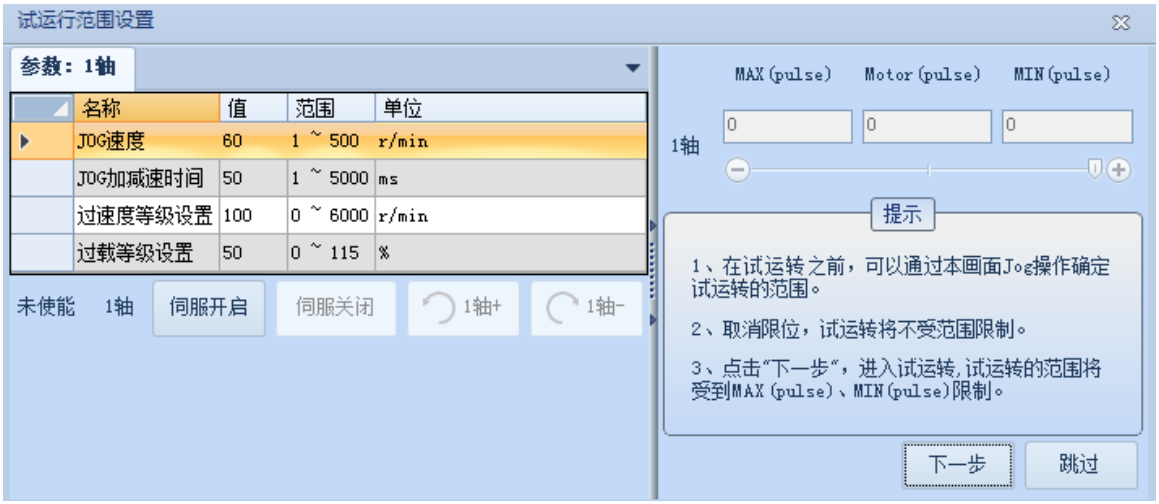
Prerequisite:

iMotion software has been connected with the drive.

Operation Steps:

1. Open the iMotion software, click the 

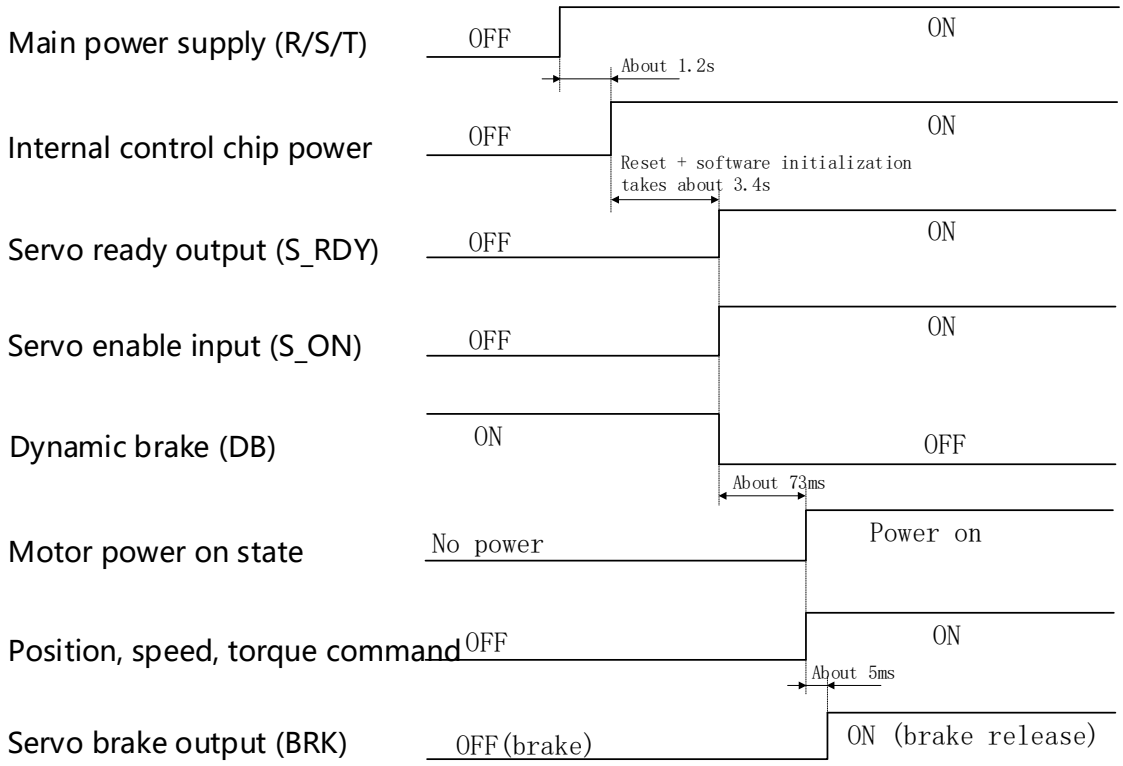
on the **Function Preview** tab to enter the **Trial Run** interface:



2. Set the following according to the actual situation:
   - In the **Parameter** setting area, you can set the **Speed**, **Acceleration and Deceleration Time**, **Overspeed Level Setting** and **Overload Level Setting** of axis as required.
   - Click **Servo On** to enable the motor.
   - Left click on the **Axis+** button does not release, the motor will CW at the set speed, and stop after releasing. Similarly, left click on the **Axis-** button does not release, and the motor will CCW at the set speed.
   - Click **Servo Off**, the motor will be in the status of disconnection enable.

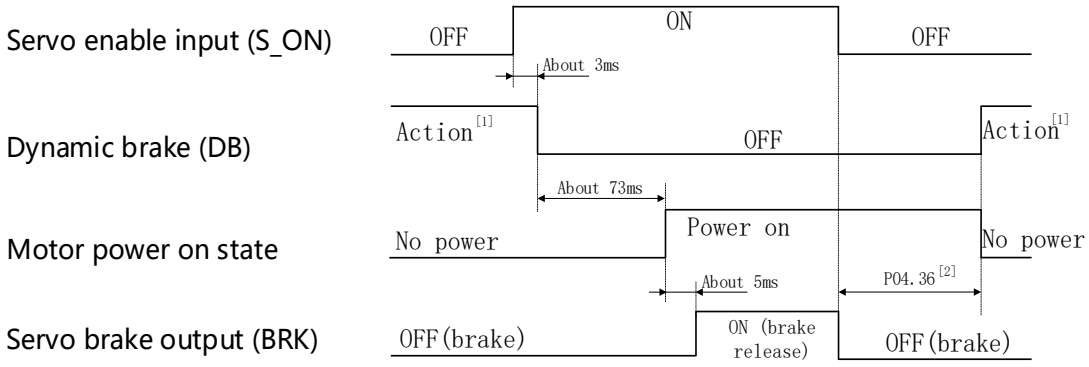
5.6 Servo Time Sequence Diagram

5.6.1 Power ON (Servo Enable Synchronous ON)



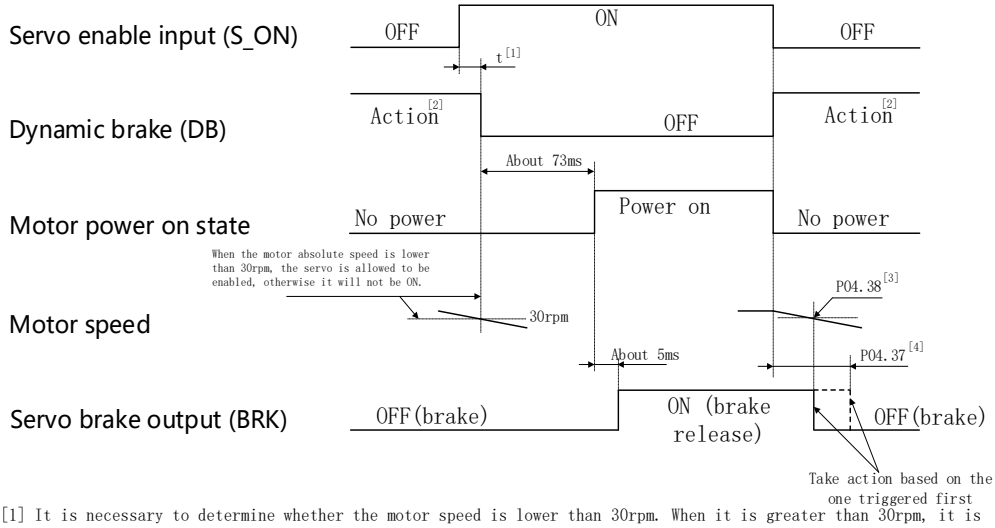
5.6.2 Servo Enable ON and OFF

5.6.2.1Servo Enable Turn On and Off when the Motor is Stationary



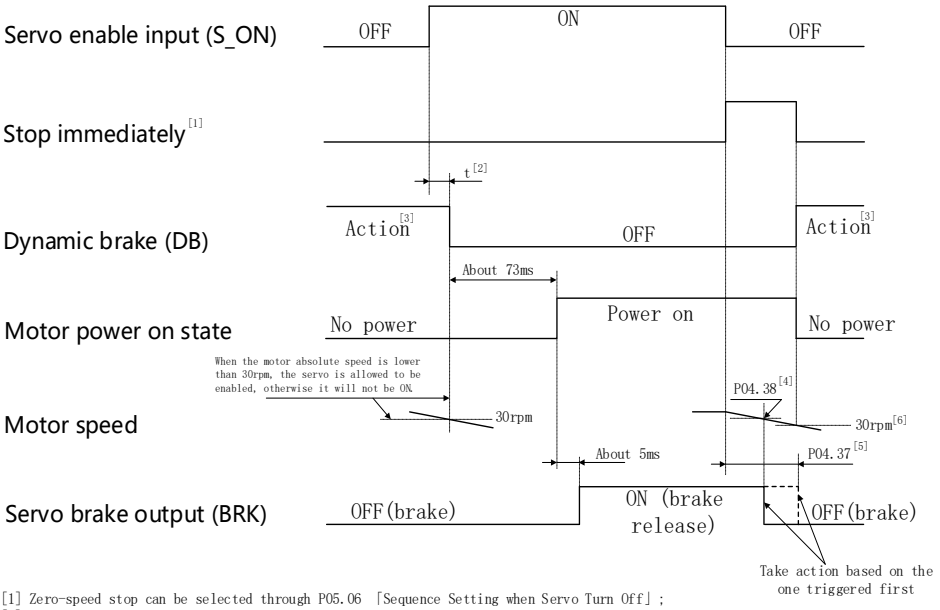
[1] The DB status when the servo is turned off normally is determined by parameter P05.06 「Sequence Setting when Servo Turn Off」;
[2] P04.36: The time for the motor to be powered on after the servo enable is turned off normally.

5.6.2.2 Servo Enable Turn On and Off when the Motor Rotate - DB Stop/Free Stop



[1] It is necessary to determine whether the motor speed is lower than 30rpm. When it is greater than 30rpm, it is not allowed to be enabled (30rpm is an internal fixed value);
[2] The DB status when the servo is turned off normally is determined by parameter P05.06 「Sequence Setting when Servo Turn Off」.
[3] P04.38: When the motor rotates, the speed judgment value of BRK output signal OFF;
[4] P04.37: When the motor rotates, the time from servo enable input signal OFF to BRK output signal OFF;

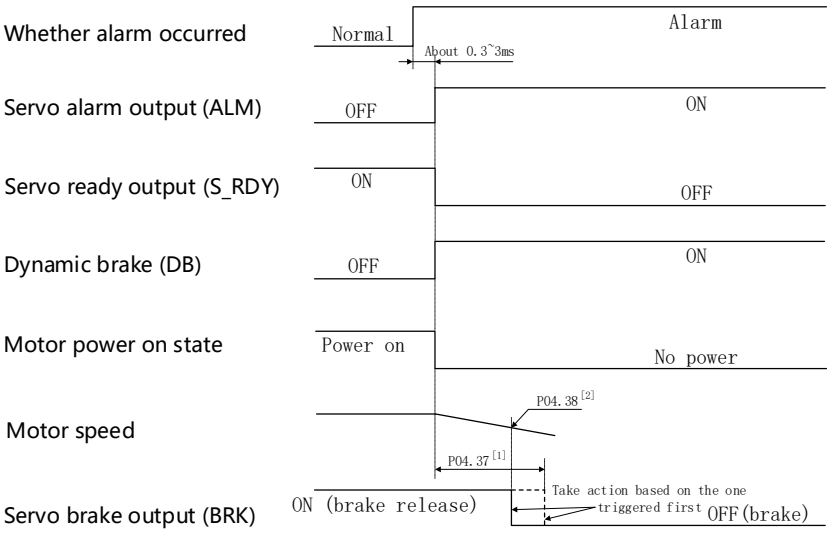
5.6.2.3 Servo Enable Turn On and Off when the Motor Rotate - Stop Immediately



[1] Zero-speed stop can be selected through P05.06 「Sequence Setting when Servo Turn Off」;
[2] It is necessary to determine whether the motor speed is lower than 30rpm. When it is greater than 30rpm, it is not allowed to be enabled (30rpm is an internal fixed value);
[3] The DB status when the servo is turned off normally is determined by parameter P05.06 「Sequence Setting when Servo Turn Off」;
[4] P04.38: When the motor rotates, the speed judgment value of the BRK output signal is OFF. When it is lower than this value, the BRK signal is OFF;
[5] P04.37: When the motor rotates, the time from servo enable input signal OFF to BRK output signal OFF;
[6] When the motor speed is greater than 30rpm, it is in the "deceleration" state, and when it is less than 30rpm, it switches to the "after stopping" state.

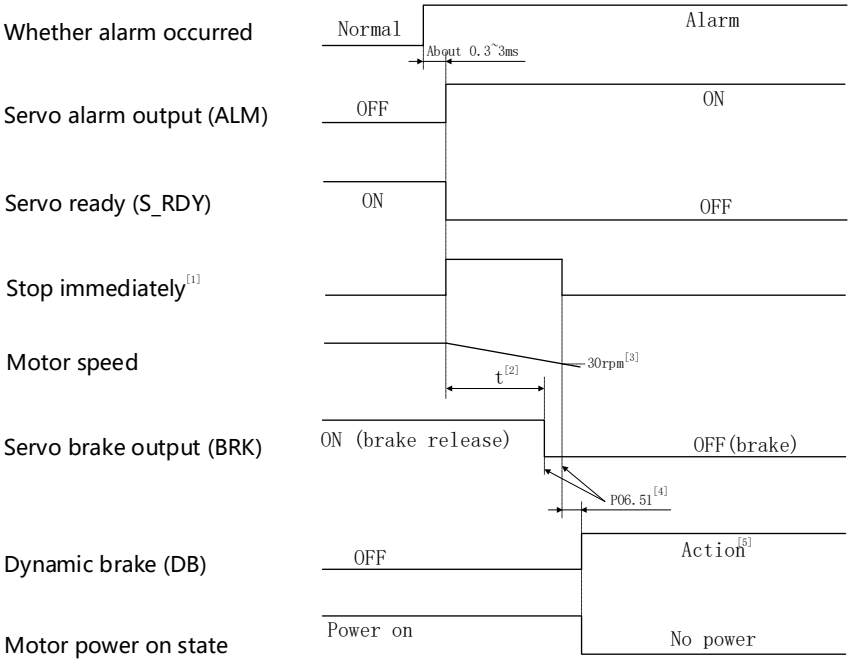
5.6.3 Alarm

5.6.3.1 DB and Free Shutdown when Alarm Occurs



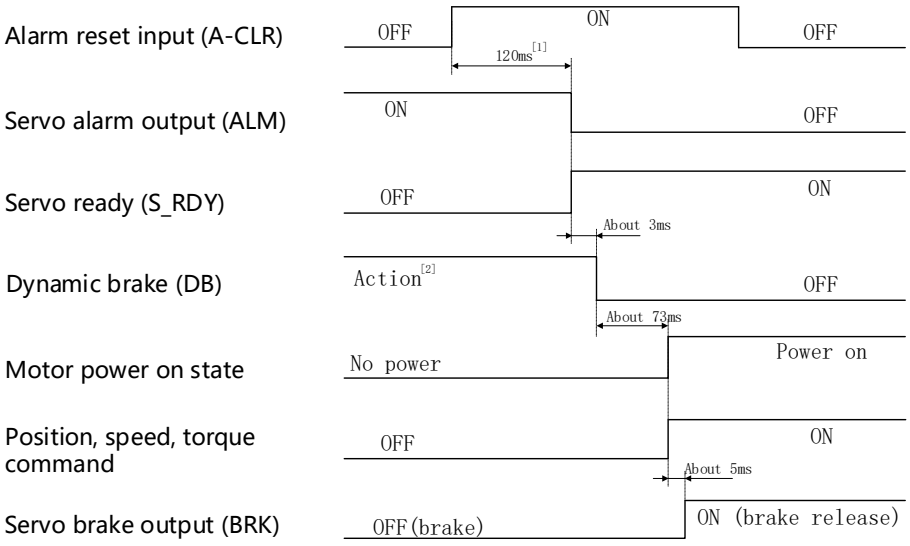
[1] P04.37: When the motor rotates, the time from servo OFF to BRK signal OFF;
[2] P04.38: When the motor rotates, the speed judgment value for BRK signal OFF, the default is 30rpm.

5.6.3.2 Stop Immediately when Alarm Occur (Zero-speed Stop)



[1] Zero-speed shutdown, when an alarm with "stop immediately" attribute occurs, you can choose to use this shutdown method;
[2] The first action triggered in accounting to P04.37 and P04.38 is carried out;
P04.37: When the motor rotates, the time from servo enable input signal OFF to BRK output signal OFF;
P04.38: When the motor rotates, the speed judgment value of BRK output signal OFF;
[3] It is internally fixed at 30rpm. When the motor speed is less than this value, the servo switches to the "after stop" state;
[4] P06.51: When an alarm with "stop immediately" attribute occurs, after the BRK signal is OFF and the motor speed is less than 30rpm, the time the motor is powered on is maintained;
[5] Take action according to P05.10 「Alarm Sequence Setting」.

5.6.4 Alarm Reset



[1] Here is the recognition time of the alarm clear input signal A-CLR, which can be set through P05.16 「Alarm Clear Input Setting」.
[2] The DB status when the servo alarm occurs is determined by P05.10 「Alarm Sequence Setting」;

5.7 Servo Stop

5.7.1 Shutdown Description

Shutdown can be divided into during deceleration (shutdown mode) and after stopping (shutdown status, motor speed is less than 30rpm).

1）The shutdown methods during deceleration is compared as follows:

Shutdown Mode	Shutdown Description	Shutdown Characteristic
Free shutdown	The servo motor is powered off and decelerates freely to 0. The deceleration time is affected by mechanical inertia, mechanical friction, etc	Smooth deceleration, small mechanical shock, slow decelerate process, deceleration is uncontrollable
Deceleration shutdown	The speed command decelerates smoothly to 0	Smooth deceleration, small mechanical impact, controllable deceleration
DB brake	Shutdown by built-in dynamic brake	Fast deceleration, have mechanical shock, fast deceleration process, deceleration is uncontrollable
E-stop	Zero-speed shutdown, the speed command is set to 0	Fast deceleration, large mechanical shock, fast deceleration process, deceleration is uncontrollable

2）The shutdown status after stopping is compared as follows:

Shutdown Status	Status Description
Free running status	The motor is not powered and the motor shaft can rotate freely.
Position locked status	Motor is powered on, motor shaft is locked and cannot rotate freely
DB brake status	The motor is not powered and is in a short-circuit braking state, and the motor shaft cannot rotate freely

3） Related parameter

Shutdown Action Trigger Source	Stop Method (during Deceleration)		Shutdown State (after Stopping)
QuickStop command	P30.17 (605Ah)=0	Shutdown according to Pr5.06 (3005:07h)	Pr5.06 (3005:07h)
	P30.17 (605Ah)≠0	Shutdown according to P30.17 (605Ah)	
DisableVoltage/ Shutdown command	P30.18 (605Bh)=0	Shutdown according to Pr5.06 (3005:07h)	
	P30.18 (605Bh)≠0	Shutdown according to P30.18 (605Bh)	
Disable op	P30.19 (605Ch)=0	Shutdown according to	

Shutdown Action Trigger Source	Stop Method (during Deceleration)		Shutdown State (after Stopping)
command		Pr5.06 (3005:07h)	
	P30.19 (605Ch)≠0	Shutdown according to P30.19 (605Ch)	
Halt command	P30.20 (605Dh)		
Servo alarm occurs	P30.21 (605Eh)=0	Shutdown according to Pr5.10 (3005:0Bh)	Pr5.10 (3005:0Bh)
	P30.21 (605Eh)≠0	Shutdown according to P30.21 (605Eh)	
Main power supply OFF detected	According to the control word 6040h, select one of 605Ah~605Eh to shutdown; If an alarm occurs at this time, it will jump to 605Eh and shutdown.		Pr5.07 (3005:08h)
Prohibition limit (overtravel) is valid	Unable to set, internally shutdown according to P30.17 (605Ah) =2		Pr5.05 (3005:06h)

5.7.2 Quick Shutdown

Servo running status, when **bit2 (Quick stop)** of control word **6040h** is **0**, execute perform quick shutdown.

5.7.2.1 Decelerating

The shutdown method during deceleration is set through object dictionary **605A:00h**.

P30.17 (605A:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Quick shutdown method	-2~7	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

Value	PP & CSP & PV & CSV	TQ & CST (torque mode)	HM
-1	Reserved	Reserved	Reserved
-2	Reserved	Reserved	Reserved
0	Shutdown according to P05.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h E-stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h E-stop deceleration
3	Shutdown at 60C6h maximum deceleration	Shutdown with torque command as 0	Shutdown at 60C6h maximum deceleration
5	Same as 1		
6	Same as 2		
7	Same as 3		

5.7.2.2 After Stopping

When the motor decelerates to less than 30rpm, it enters the after stopping state. The shutdown state is setting by parameter P05.06 (3005:07h).

P05.06 (3005:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Servo enable OFF shutdown time sequence	0~9	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

The shutdown state of after stopping will act according to the "after stopping" of this parameter.

Value	Decelerating	After Stopping	Position Deviation
0, 4	DB shutdown	Keep DB[*1] status	Clear[*2]
1, 5	Free shutdown	Keep DB status	Clear
2, 6	DB shutdown	Keep free running	Clear

		status	
3, 7	Free shutdown	Keep free running status	Clear
8	Stop immediately	Keep DB status	Clear
9	Stop immediately	Keep free running status	Clear

*1: When the motor speed is greater than 30r/min, it will shutdown in this way. When the motor speed is less than 30r/min, it switches to the "after stopping" state. After that, no matter how the motor speed changes, it will act according to the "after stopping" status.

*2: DB is a dynamic brake, which is built into the drive and performs E-stop through short circuit of the electrical circuit.

DB is only used as an emergency braking method, and the motor cannot be started or stopped normally, otherwise the internal circuit may be damaged.

When the DB function is in effect, the motor cannot be dragged externally, otherwise the drive will be damaged.

*3: The position deviation is always kept at zero.

*4: Immediate stop means zero-speed shutdown. The shutdown speed is fast and the mechanical shock is large. The maximum torque during immediate stop can be set through **P05.11 Torque Limit at Immediate Stop**.


Caution

- An alarm occurs when the servo is turned off. The drive will action according to parameter **P05.10 Alarm Shutdown Time Sequence**.

5.7.3 Shutdown

When the device state switches the command to shutdown (Shutdown) or turn off the main circuit power supply (Disable voltage), execute shutdown.

5.7.3.1 Decelerating

P30.18 (605B:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Turn off shutdown method	0~1	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to Pr5.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration

5.7.3.2 After Stopping

The after stopping status operate according to the setting of P05.06 (3005:07h).

5.7.4 Servo Enable OFF Shutdown

The host computer controls the servo to turn off and enable, and the servo shutdown according to the shutdown method of enable OFF.

5.7.4.1 Decelerating

P30.19 (605C:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Servo enable OFF shutdown method	0~1	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to Pr5.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration

5.7.4.2 After Stopping

The after stopping status operate according to the setting of P05.06 (3005:07h).

5.7.5 Pause Shutdown

When **bit8 (halt)** of control word **6040h** is **0**, execute pause shutdown.

5.7.5.1 Decelerating

P30.20 (605D:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Pause shutdown method	1~3	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

Value	PP & CSP & PV & CSV	TQ & CST	HM
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h E-stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h E-stop deceleration
3	Shutdown at 60C6h maximum deceleration	Shutdown at torque command as 0	Shutdown at 60C6h maximum deceleration

5.7.5.2 After Stopping

The after stopping status operate according to the setting of P05.06 (3005:07h).

5.7.6 Alarm Shutdown

5.7.6.1 Decelerating

P30.21 (605E:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Alarm shutdown method	0~2	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to P05.10(3005:0Bh)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h E-stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h E-stop deceleration

5.7.6.2 After Stopping

The after stopping state operates according to the "after stopping" parameters of the following parameters.

P05.10 (3005h:0Bh)	Name	Setting Range	Unit	Factory Value	Association Mode
	Alarm shutdown time sequence	0~7	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	rw	No	Yes	

Value	Decelerating*1	After Stopping	Position Deviation
0	DB*2 shutdown	Keep DB status	Clear *3
1	Free shutdown	Keep DB status	Clear
2	DB shutdown	Keep free running status	Clear
3	Free shutdown	Keep free running status	Clear
4	Action A: stop immediately; Action B: DB shutdown*4	Keep DB status	Clear
5	Action A: stop immediately; Action B: free shutdown	Keep DB status	Clear
6	Action A: stop immediately; Action B: DB shut down	Keep free running status	Clear
7	Action A: stop immediately; Action B: free shutdown	Keep free running status	Clear

*1: When the motor speed is greater than 30r/min, it will shutdown in this way. When the motor speed is less than 30r/min, it switches to the "after stopping" state. After that, no matter how the motor speed changes, it will act according to the "after stopping" status.

*2: E-stop the motor through the short circuit of the electrical circuit of the motor. The dynamic braking circuit is built into the drive.

*3: The position deviation is always kept at zero.

*4: When the parameter setting value is 4~7, if an alarm occurs and has the "immediately stop" attribute (refer to 9.3 Alarm Code List), action A will be followed, otherwise action B will be followed.

5.7.7 Main Power Supply OFF Shutdown

5.7.7.1 Decelerating

Select the shutdown mode according to the switching command of the 6040 control word.

5.7.7.2 After Stopping

P05.07 (3005:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Main power supply OFF shutdown time sequence	0~9	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	No	Yes	

- The description is the same as P05.06(3005:07h)
- If an alarm occurs when the main power supply is turned off, the shutdown state will proceed according to the **P05.10 Alarm Shutdown Time Sequence**.

5.7.8 Overtravel Shutdown

When the moving part of the machine exceeds the safe movement range, the overtravel signal POT or NOT is triggered, and perform overtravel shutdown.

5.7.8.1 Decelerating

When the overtravel is triggered, the shutdown method for internal fixed use P30.17 (605A:00h) set value 2 is used for deceleration shutdown.

5.7.8.2 After Stopping

P05.05 (3005:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Overtravel shutdown time sequence	0~2	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	rw	No	Yes	

Value	Decelerating	After Stopping	Position Deviation
0	DB shutdown	Torque command in the rotation direction is prohibited=0	Keep
1	Torque command in the rotation direction is prohibited = 0	Torque command in the rotation direction is prohibited=0	Keep
2	Keep	Torque command in the rotation direction is prohibited=0	Clear before/after deceleration

5.8 Reason for Motor not Rotating Troubleshoot

When the motor does not run, you can find the cause through the panel, and troubleshoot it.

No.	Not Rotating Reason	Content	P	S	T
Flash	Failure and warning	Failure occurs, warning occurs	●	●	●
00	No reason	Failed to detect the non-rotation reason	●	●	●
01	Main power supply off	The main power supply of the drive is not connected	●	●	●
02	No signal enable	The drive has not received the motor enable command	●	●	●
03	Overtravel input take	1）When parameter P05.04 is set to 0	●	●	●

No.	Not Rotating Reason	Content	P	S	T
	effect	(overtravel input takes effect): • When the positive direction overtravel input (POT) is valid, the speed command is in the positive direction. • When the positive direction overtravel input (NOT) is valid, the speed command is in the positive direction. Software limit is valid: • In the negative direction action command, both the command position and the actual position are smaller than the minimum software position limit of object 607D:01h. • In the positive direction action command, both the command position and the actual position are greater than the maximum software position limit of object 607D:02h.			
04	The torque limit setting is small	Torque limit setting is less than 5% of rated value	●	●	●
05	Analog torque limit takes effect and torque limit setting is too small	P05.21=5 and the absolute value of analog input AI2 is less than 5%	●	●	
06	INH input takes effect	Pulse inhibit input takes effect, and servo ignores external pulse command input	●		
07	The frequency of command pulse wave input is low	The position command of each control cycle is less than 1 pulse	●		
08	CL input takes effect	Deviation counter reset input (CL) is connected to COM -	●		
09	ZEROSPD input takes effect	Set parameter P03.15 to 1 (zero-speed clamp takes effect), and zero-speed clamp input (ZEROSPD) takes effect		●	●
11	Internal speed command is 0	Internal speed command setting is less than 30 r/min		●	
12	Low torque command	Torque to zero input less than 5% of rated value			●
13	Low speed limit	Speed command input is less than 5% of rated value			●
14	Other	Maybe the command is too small, the load is too heavy, the machine is stuck, the drive or motor is faulty, etc.	●	●	●

Chapter 6 Debugging

6.1 Inertia Ratio Learning

The inertia ratio is an important parameter of servo control, and it is recommended to adjust it first when servo gain debugging. Correctly setting the load inertia ratio helps to adjust the servo quickly.

$$\text{Inertia ratio} = \frac{\text{Mechanical load inertia}}{\text{Motor rotor inertia}} \times 100\ [\%]$$

6.1.1 Related Parameter

Parameter Code	Parameter Name	Setting Range	Default Value	Unit	Effective Time
P00.02	Real-time automatic adjustment mode setting	0~7	0	-	Effective immediately
P00.04	Inertia ratio	1~10000	250	%	Effective immediately

For details, please see Parameter List.

6.1.2 Operation Steps

Step	Operation	Description
1	Set P00.02=5	Inertia ratio self-learning mode
2	Run the motor through the host command until the value of **P00.04 Inertia Ratio** becomes stable.	
3	Set P00.02=0	Restore manual mode
4	Save parameters	

6.1.3 Related Matters

- During inertia learning, the actual speed of the motor should be greater than 150 rpm, usually 300~500 rpm.
- Actual acceleration shall be greater than 80r/s^2.
- The load applied to the motor should be relatively stable and should not fluctuate too much.
- Excessive inertia ratio of actual load may cause identification failure.

- Excessive mechanical transmission clearance may cause identification failure.

6.2 Gain Adjustment

6.2.1 Automatic Gain Adjustment

6.2.1.1 Related Parameter

Code	Name	Setting Range	Default Value	Unit	Effective Time
P00.02	Real-time automatic adjustment mode setting	0~7	0	-	Effective immediately
P00.03	Real-time automatic adjustment rigidity setting	1~31	13	-	Effective immediately
P01.00	1st position loop gain	0~30000	480	0.1Hz	Effective immediately
P01.01	1st speed loop gain	1~32767	270	0.1Hz	Effective immediately
P01.02	1st speed loop integration time	1~10000	210	0.1ms	Effective immediately
P01.03	1st speed detection filter	0~10000	0	0.1ms	Effective immediately
P01.04	1st torque filter	0~2500	84	0.1ms	Effective immediately
P01.05	2nd position loop gain	0~30000	570	0.1Hz	Effective immediately
P01.06	2nd speed loop gain	1~32767	270	0.1Hz	Effective immediately
P01.07	2nd speed loop integration time	1~10000	10000	0.1ms	Effective immediately
P01.08	2nd speed detection filter	0~10000	0	0.1ms	Effective immediately
P01.09	2nd torque filter	0~2500	84	0.1ms	Effective immediately
P01.10	Speed feedforward gain	0~1000	300	0.1%	Effective immediately
P01.11	Speed feedforward filter time	0~6400	200	0.01ms	Effective immediately
P01.12	Torque feedforward gain	0~1000	0	0.1%	Effective immediately
P01.13	Torque feedforward filter time	0~6400	0	0.01ms	Effective immediately

6.2.1.2 Operation Steps

It is recommended to complete the Inertia Ratio Learning.

The steps for automatic gain adjustment are as follows.

Step	Operation	Description
1	Set P00.02=1	Rigidity table adjustment mode
2	Set P02.00=2	Turn on 2 adaptive filters to automatically suppress resonance when it occurs
3	Adjust rigidity level P00.03 until the operating effect is appropriate	Suggest changing P00.03 in stationary status
4	• Set P00.02=0 • Set P02.00=0	• Restore manual gain mode • Turn off adaptive filter
5	• Save parameters	

Related Instructions:

The following only describes the most commonly used standard mode (that is, when parameter P00.02 is set to 1). This mode can also be called the rigidity table adjustment mode.

In this mode, when P00.03 changes, the linkage parameters are as follows:

- Gain parameters are switched according to the rigidity table: P01.00~P01.09 (except P01.03 and P01.08).
- The feedforward parameters are restored to factory values: P01.03, P01.08, P01.10~P01.13.
- Gain switching parameters are restored to factory values: P01.14~P01.27.

Rigidity Table

Rigidity P00.03	1st Gain				2nd Gain			
	P01.00	P01.01	P01.02	P01.04	P01.05	P01.06	P01.07	P01.09
	Position Loop Gain (0.1/s)	Speed Loop Gain (0.1Hz)	Speed Loop Integration Time Constant (0.1ms)	Torque Filter (0.01ms)	Position Loop Gain (0.1/s)	Speed Loop Gain (0.1Hz)	Speed Loop Integration Time Constant (0.1ms)	Torque Filter (0.01ms)
0	20	15	3700	1500	25	15	10000	1500
1	25	20	2800	1100	30	20	10000	1100
2	30	25	2200	900	40	25	10000	900
3	40	30	1900	800	45	30	10000	800
4	45	35	1600	600	55	35	10000	600

Rigidity P00.03	1st Gain				2nd Gain			
	P01.00	P01.01	P01.02	P01.04	P01.05	P01.06	P01.07	P01.09
	Position Loop Gain (0.1/s)	Speed Loop Gain (0.1Hz)	Speed Loop Integration Time Constant (0.1ms)	Torque Filter (0.01ms)	Position Loop Gain (0.1/s)	Speed Loop Gain (0.1Hz)	Speed Loop Integration Time Constant (0.1ms)	Torque Filter (0.01ms)
5	55	45	1200	500	70	45	10000	500
6	75	60	900	400	95	60	10000	400
7	95	75	700	300	120	75	10000	300
8	115	90	600	300	140	90	10000	300
9	140	110	500	200	175	110	10000	200
10	175	140	400	200	220	140	10000	200
11	320	180	310	126	380	180	10000	126
12	390	220	250	103	460	220	10000	103
13	480	270	210	84	570	270	10000	84
14	630	350	160	65	730	350	10000	65
15	720	400	140	57	840	400	10000	57
16	900	500	120	45	1050	500	10000	45
17	1080	600	110	38	1260	600	10000	38
18	1350	750	90	30	1570	750	10000	30
19	1620	900	80	25	1880	900	10000	25
20	2060	1150	70	20	2410	1150	10000	20
21	2510	1400	60	16	2930	1400	10000	16
22	3050	1700	50	13	3560	1700	10000	13
23	3770	2100	40	11	4400	2100	10000	11
24	4490	2500	40	9	5240	2500	10000	9
25	5000	2800	35	8	5900	2800	10000	8
26	5600	3100	30	7	6500	3100	10000	7
27	6100	3400	30	7	7100	3400	10000	7
28	6600	3700	25	6	7700	3700	10000	6
29	7200	4000	25	6	8400	4000	10000	6
30	8100	4500	20	5	9400	4500	10000	5
31	9000	5000	20	5	10500	5000	10000	5

6.2.1.3 Related Matters

- The acceleration and deceleration time of the operation curve should be properly set; otherwise overload may occur.
- For vertical axis, fall prevention measures shall be taken first.

- Mechanical transmission gap too large may lead to unsatisfactory debugging results.

6.2.2 Manual Gain Adjustment

When parameter P00.02 is set to 0, it is manual gain adjustment mode.

For the main parameters of manual gain adjustment mode and automatic gain adjustment, please refer to Gain Adjustment to adjust each parameter.

Related Matters:

- It is recommended to adjust the speed loop gain first.
- It can be debugged in combination with **P00.04 Inertia Ratio**.
- Pay attention to the wide adaptability of parameters to meet the operation effect. Too high servo gain will lead to control instability, and may cause damage to the machinery and reduce the service life of the device.

6.2.3 Gain Switching

The gain switching function can be triggered by external SI input (set to GAIN) or internal status to achieve the following effects:

- When the servo is stationary (servo enabled) switch to a lower gain, suppressing vibration.
- Use high gain during servo stop (setting stage) to shorten positioning time.
- Use high gain during servo operation to improve servo response.
- Switch different gain through external signal according to device status.

6.2.3.1 Related Parameter

Code	Name	Setting Range
P01.14	2nd gain setting	0: The 1st gain is fixed. At this time, P and PI can be switched through external SI input GAIN 1: The gain switching of the 1st gain (P01.00~P01.04) and the 2nd gain (P01.05~P01.09) is valid
P01.15~P01.27	Switching conditions, etc	See the following table for details

6.2.3.2 Switch Condition Description

Description of symbols in the table: ●: Parameter is valid - : Parameter is invalid

Position Control Mode					
Switching Condition			Switch Timing		
P01.15	2nd Gain Switching Condition	Diagram	Delay Time *1 (P01.16)	Level (P01.17)	Hysteresis *2 (P01.18)
0	1st gain fixed		-	-	-
1	2nd gain fixed		-	-	-
2	External gain switching		-	-	-

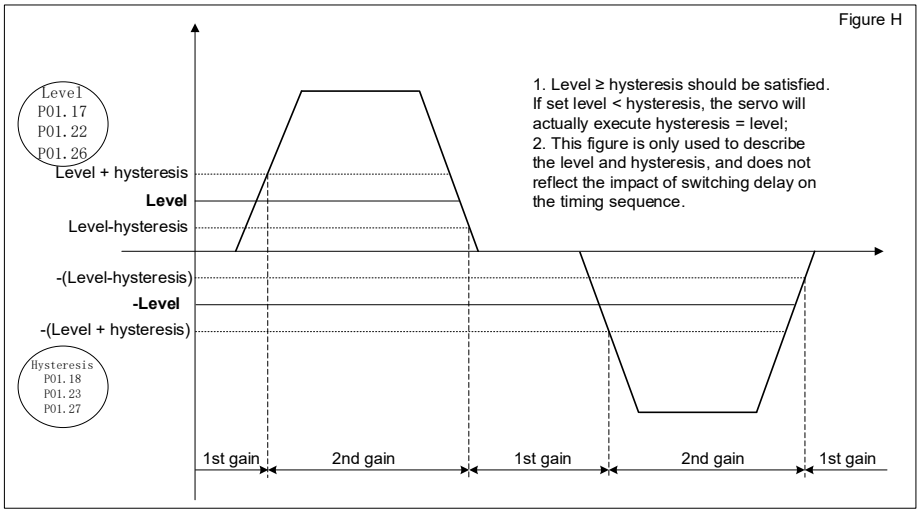
Position Control Mode					
	input				
3	Torque command	A	●	●[%]	●[%]
4	Invalid (1st gain fixed)		-	-	-
5	Speed command	C	●	●[r/min]	●[r/min]
6	Position deviation	D	●	●[pulse]	●[pulse]
7	Position command	E	●	-	-
8	Positioning incomplete	F	●	-	-
9	Actual speed	C	●	●[r/min]	●[r/min]
10	Position command+actual speed	G	●	●[r/min]	●[r/min]

Speed Control Mode					
Switching Condition			Switch Timing		
P01.20	**2nd Gain Switching Condition**	**Diagram**	**Delay Time *1 (P01.21)**	**Level (P01.22)**	**Hysteresis *2 (P01.23)**
0	1st gain fixed		-	-	-
1	2nd gain fixed		-	-	-
2	External gain switching input		-	-	-
3	Torque command	A	●	●[%]	●[%]
4	Speed command variation	B	-	●[10(r/min)/s]	●[10(r/min)/s]
5	Speed command	C	●	●[r/min]	●[r/min]

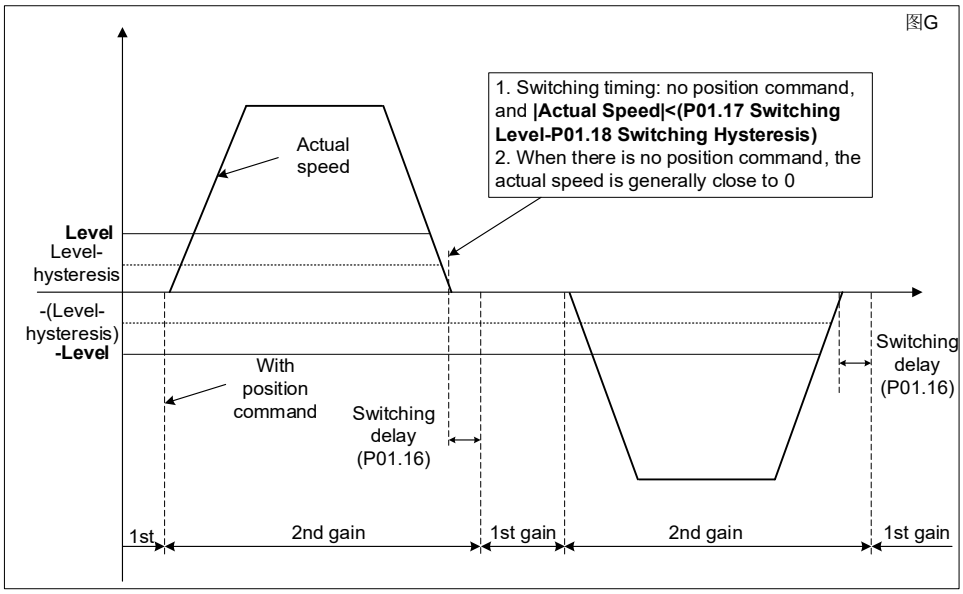
Torque Control Mode					
Switching Condition			Switch Timing		
P01.24	**2nd Gain Switching Condition**	**Diagram**	**Delay Time*1 (P01.25)**	**Level (P01.26)**	**Hysteresis *2 (P01.27)**
0	1st gain fixed		-	-	-
1	2nd gain fixed		-	-	-
2	External gain switching input		-	-	-
3	Torque command	A	●	●[%]	●[%]

*1: The delay time (P01.16, P01.21, P01.25) is only effective when returning from the 2nd gain to the 1st gain.

*2: The definitions of levels and hysteresis are shown in the following.

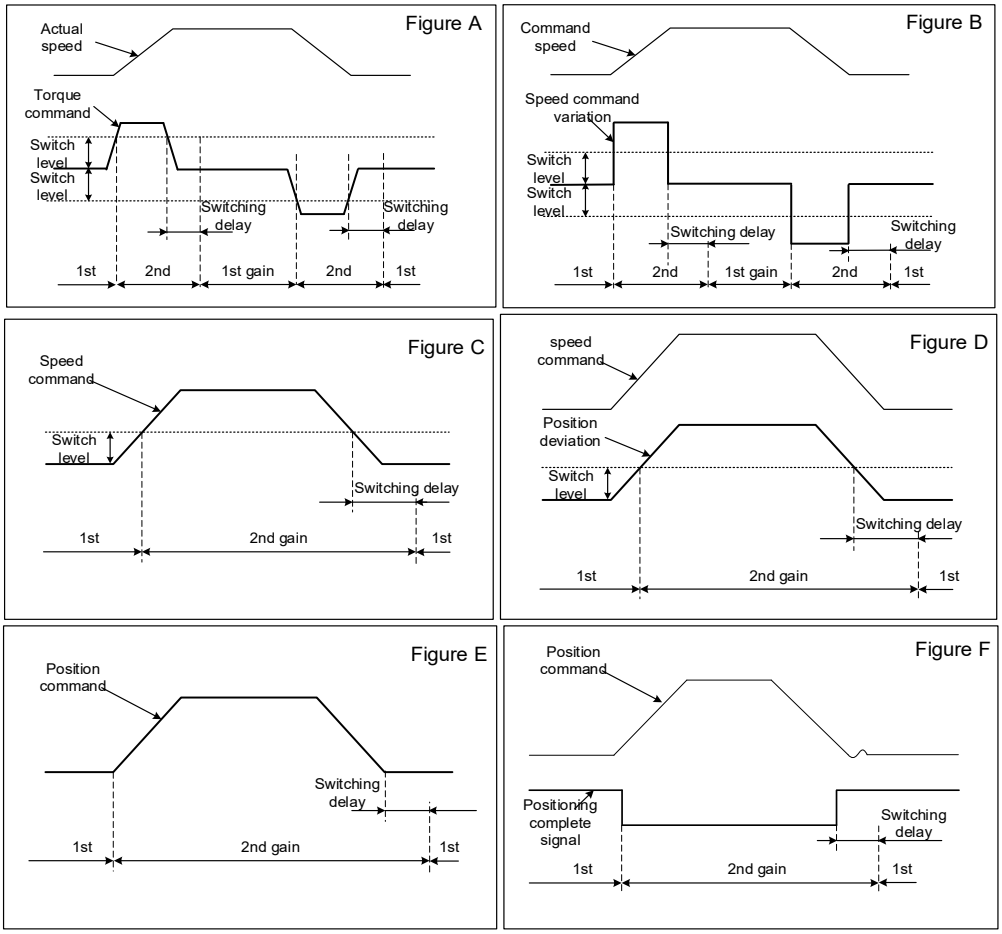


*3: When P01.15=10, the meaning of delay time, level and hysteresis is different from other situations. Please refer to figure G for details.



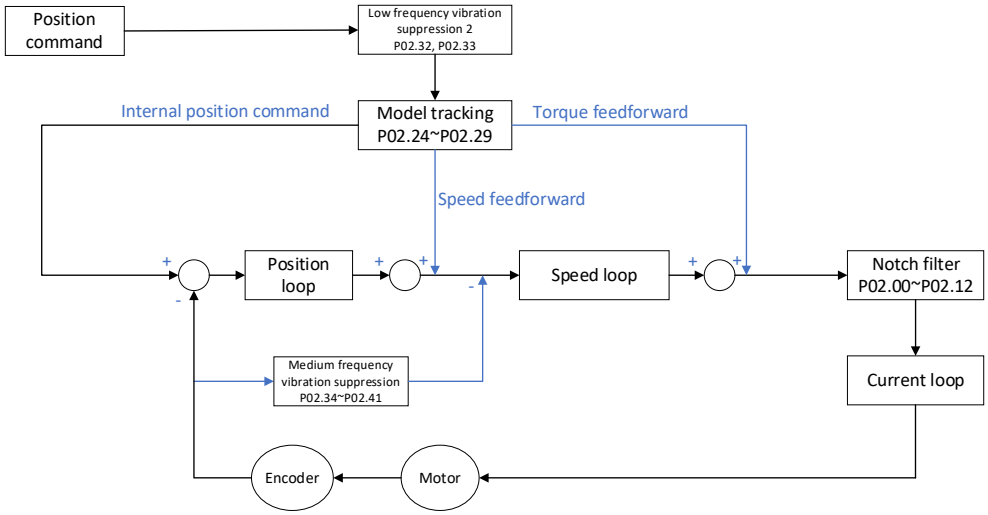
6.2.3.3 Gain Switching Time Sequence Diagram

Note: The following figures reflect the switching delay (P01.16, P01.21, P01.25), but do not reflect the offset of the gain switching time sequence caused by hysteresis (P01.18, P01.23, P01.27).



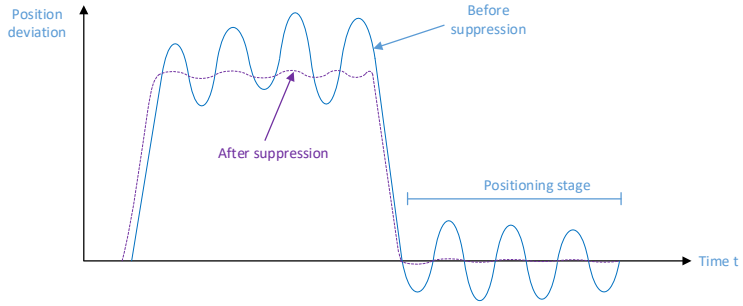
6.3 Vibration Suppression

6.3.1 Control Block Diagram



6.3.2 Low Frequency Vibration Suppression

Applicable frequency range: 1-100Hz



Low frequency vibration suppression effect diagram

6.3.2.1 Model Tracking Vibration Suppression

1) Applicable situations: There is low frequency oscillation in the movement process;

2) For usage, please refer to the Model Tracking chapter.

6.3.2.2 End Low Frequency Vibration Suppression

1) Applicable situation: Low frequency oscillation exists during the positioning stage;

2) Related parameters

Code	Name	Setting Range	Default Value	Unit	Effective Method
P02.32	Low frequency vibration suppression 2 frequency	0～2500	0	0.1Hz	Effective immediately
P02.33	Low frequency vibration suppression 2 compensation	10～1000	100	1%	Effective immediately

3) Operation steps

Step	Operation	Description
1	Inertia ratio learning	
2	Adjust appropriate speed loop gain to ensure speed loop response	Judging by speed follow
3	Determine the frequency: Use Imotion debugging software to collect motion waveforms and calculate the low frequency oscillation frequency	
4	Set P02.32 = low frequency oscillation frequency, confirm the effect and adjust	The lower the value of P02.32, the greater the position response delay.
5	Save parameters	

6.3.3 Medium Frequency Vibration Suppression

Applicable frequency range: 100~1000Hz, can be used in conjunction with high frequency vibration suppression (notch filter).

6.3.3.1 Related Parameter

Code	Name	Setting Range	Default Value	Unit	Effective Method
P02.34	Medium frequency vibration suppression enable	0～1	-	0.1Hz	Effective immediately
P02.35	Medium frequency vibration suppression frequency	10～20000	1000	0.1Hz	Effective immediately
P02.36	Medium frequency vibration suppression inertia correction	1~1000	100	1%	Effective immediately
P02.37	Medium frequency vibration suppression damping gain	0~300	0	1%	Effective immediately
P02.38	Medium frequency vibration suppression filter time constant 1 compensation	-1000~1000	0	0.01ms	Effective immediately
P02.39	Medium frequency vibration suppression filter time constant 2 compensation	-1000~1000	0	0.01ms	Effective immediately
P02.40	Medium frequency vibration suppression damping gain 2	0~300	0	1%	Effective immediately
P02.41	Medium frequency vibration suppression frequency 2	10~50000	20000	us	Effective immediately

6.3.3.2 Adjustment Step

Step	Operation	Description
1	Set P02.34=1	Enable medium frequency vibration suppression
2	Determine resonant frequency: • Method 1: P02.00=2 automatic learning, can be viewed at P02.07 and P02.10; • Method 2: Use the Imotion debugging software, set P02.00=3, and then use the FFT function to obtain the resonant frequency; • Method 3: Use the Imotion debugging software to collect the deviation or torque waveform for calculation;	
3	• Set P02.35=resonance frequency • Set P02.37=100 (experience value, adjustable) • Set P02.38 • Adjust each parameter value according	• Set resonant frequency • P02.37 is the compensation gain. When the value increases, the vibration suppression effect is better. When =0, there is no vibration suppression effect.

Step	Operation	Description
	to the vibration suppression effect Other parameters are generally kept as default or adjusted if necessary.	• P02.38 generally defaults to 0. If adjustment is needed, please refer to the experience value of -25.
4	Save parameters	

6.3.4 High Frequency Vibration Suppression (Notch)

Applicable frequency range: 500~5000Hz

6.3.4.1 Related Parameter

Code	Name	Setting Range
P02.00	Adaptive filter mode setting	0: The 3rd and 4th filters are invalid 1: The 3rd filter is valid, and the parameter values are automatically updated based on the adaptation results; the 4th filter is invalid 2: The 3rd and 4th filters are valid, and the parameter values are automatically updated based on the adaptation results 3: Resonance frequency test mode, needs to be used with Imotion software 4: Adaptation results cleared: The 3rd and 4th groups of filters are invalid, and the parameters return to their initial values.

Code	Name	Setting Range	Default Value	Unit	Effective Method
P02.01	1st notch frequency	50~5000	5000	Hz	Effective immediately
P02.02	1st notch width selection	0~20	2	-	Effective immediately
P02.03	1st notch depth selection	0~99	0	-	Effective immediately
P02.04	2nd notch frequency	50~5000	5000	Hz	Effective immediately
P02.05	2nd notch width selection	0~20	2	-	Effective immediately
P02.06	2nd notch depth selection	0~99	0	-	Effective immediately
P02.07	3rd notch frequency	50~5000	5000	Hz	Effective immediately
P02.08	3rd notch width selection	0~20	2	-	Effective immediately
P02.09	3rd notch depth selection	0~99	0	-	Effective immediately
P02.10	4th notch frequency	50~5000	5000	Hz	Effective

Code	Name	Setting Range	Default Value	Unit	Effective Method
					immediately
P02.11	4th notch width selection	0~20	2	-	Effective immediately
P02.12	4th notch depth selection	0~99	0	-	Effective immediately

For details, please see P02 Vibration Suppression Function.

6.3.4.2 Operation Steps

Step	Operation	Description
1	Set P02.00=2	Enable 2 groups of adaptive filters
2	When the motor is running, resonance is automatically suppressed and P02.07~P02.12 parameters are automatically set.	The motor will whistle briefly and disappear immediately
3	Set P02.00=0	Turn off adaptive filter
4	Save parameters	

Note: When the resonance cannot be suppressed, you can try to clear the current resonance frequency setting value (P02.00=4), and then repeat the above steps;

When the resonance cannot be suppressed, the Medium Frequency Vibration Suppression Function can be used in combination;

When resonance cannot be suppressed, the gain can be appropriately reduced.

6.4 Model Tracking

1) Model tracking is only used during position control, which can improve response and fast positioning.

2) When the model tracking gain P02.25 is set low, it can effectively suppress low frequency oscillation during operation, but at the same time it will reduce the position response.

3) After the model tracking function is enabled, the system position loop response mainly depends on P02.25, not the position loop gain P01.00.

4) When using model tracking, speed feedforward P01.10=0 should be set.

6.4.1 Related Parameter

Code	Name	Setting Range	Default Value	Unit	Effective Method
P02.24	Model tracking control selection	0～2	0	-	Effective immediately
P02.25	Model tracking control gain	10～20000	500	0.1/s	Effective

Code	Name	Setting Range	Default Value	Unit	Effective Method
					immediately
P02.26	Model tracking control inertia correction	500～2000	1000	0.1%	Effective immediately
P02.27	Model tracking control positive torque feedforward compensation	0～10000	1000	0.1%	Effective immediately
P02.28	Model tracking control negative torque feedforward compensation	0～10000	1000	0.1%	Effective immediately
P02.29	Model tracking control speed feedforward compensation	0～10000	1000	0.1%	Effective immediately
P02.30	Low frequency vibration suppression 1 frequency A	10～2500	500	0.1Hz	Effective immediately
P02.31	Low frequency vibration suppression 1 frequency B	10～2500	700	0.1Hz	Effective immediately

For details, please see P02 Vibration Suppression

6.4.2 Debug Step

Step	Operation	Description
1	Inertia ratio learning, try to set according to the learning value	Inertia ratio affects model tracking output
2	Adjust appropriate speed loop gain to ensure speed loop response	Judging by speed follow
3	Set P01.10=0	Not use the original speed feedforward function
4	Set P02.24=1 (suitable for rigidity model) Or set P02.24=2 (suitable for flexible model)	Enable model tracking and select the appropriate mode
5	Adjust P02.25 model tracking gain	• The larger the value, the faster the response. If it is too large, it will cause oscillation. • Lower gain can effectively suppress low frequency oscillation, but will also reduce the position loop response.
6	Save parameters	

6.5 Quadrant Bulge Suppression

Disturbance compensation and friction compensation mainly compensate for mechanical friction and fixed load disturbance, and improve quadrant bulge.

When debugging, it is recommended to debug the disturbance compensation first, and then adjust the friction compensation when the requirements cannot be met, and the two can take effect at the same time.

6.5.1 Disturbance Compensation

6.5.1.1 Debug Step

Step	Operation	Description
1	Inertia ratio learning, try to set according to the learning value	
2	Adjust appropriate speed loop gain to ensure speed loop response	Judging by speed follow
3	• Set P06.23 • Set P06.25 Other parameters are generally defaulted	• The larger the value of P06.23, the better the compensation effect. If it is too high, it will cause vibration. When set to 0, there is no compensation effect • The larger the value of P06.25, the better the compensation effect. If it is too large, it will cause vibration
4	Save parameters	

6.5.1.2 Related Parameter

Code	Name	Setting Range	Default Value	Unit	Effective Time
P06.23	Disturbance compensation coefficient	0~100	0	%	Effective immediately
P06.24	Disturbance compensation frequency correction	-10000~10000	0	0.1Hz	Effective immediately
P06.25	Disturbance compensation gain	10~10000	100	%	Effective immediately
P06.26	Disturbance compensation gain correction	1~1000	100	%	Effective immediately

6.5.2 Friction Compensation

The concepts related to friction are introduced as follows:

Status	Friction Type	Description
Static	Static friction	There is a trend of relative motion, but there is no relative motion yet
Motion	Sliding/rolling friction	Friction force generated by the contact surface of two objects in relative motion
	Viscous friction	It is related to lubricant, air and other media, and generally has a linear relationship with speed

6.5.2.1 Related Parameter

Code	Name	Setting Range	Default Value	Unit	Effective Time	Effective Mode
P06.07	Gravity load torque compensation value	-100~100	0	%	Effective immediately	P, S
P06.08	Positive friction torque compensation value	-100~100	0	%	Effective immediately	P
P06.09	Negative friction torque compensation value	-100~100	0	%	Effective immediately	P
P06.12	Friction torque compensation filter	0~30000	200	0.01ms	Effective immediately	P
P06.33	Friction compensation positive effective speed setting	0~1000	0	0.1rpm	Effective immediately	P
P06.36	Friction compensation negative effective speed setting	0~1000	0	0.1rpm	Effective immediately	P
P06.50	Viscous friction compensation gain	0~10000	0	0.1%/ 10000rpm	Effective immediately	P, S

6.5.2.2 Debugging Instruction

- P06.07 is gravity load torque compensation. If the motor is subject to a continuous unbalance load gravity torque, this parameter can be used to reduce the positioning deviation caused by different directions, such as vertical axis application.
- P6.08 and P06.09 mainly compensate the motion friction torque, reduce the positioning deviation and improve the quadrant bulge. The effective time of compensation is adjusted through P06.33 and P06.36.
- P06.50 mainly compensates viscous friction torque.

Chapter 7 EtherCAT Communication

7.1 Overview

This series of products supports high-speed real-time Ethernet communication, namely EtherCAT, and implements the Cia402 standard protocol with reference to the DS402 communication configuration file. This manual mainly explains the application layer specifications. For data link layer protocols and specifications, please refer to the documents released by the EtherCAT Association (ETG).

7.1.1 Related Terms

Term	Description
ESI	Device description file (XML file format), please refer to ETG related documentation for details
Station Alias	Slave station alias
Device status	According to the CiA402 standard, the status of the servo drive (The Device Status) is referred to as the device status. (See the "CiA Draft Standard Proposal 402" document for details)

7.1.2 ESI File

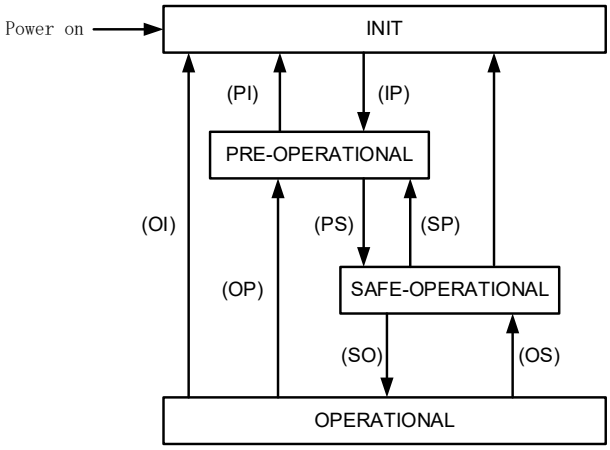
The ESI file name format corresponding to this series of product models is as follows. For specific files, please go to our official website to download the latest files.

Servo Product Model	ESI File Name
WSD-B1-□□□-E	Weihong_WSDB1_EC_R0.3.xml

7.2 Communication Status

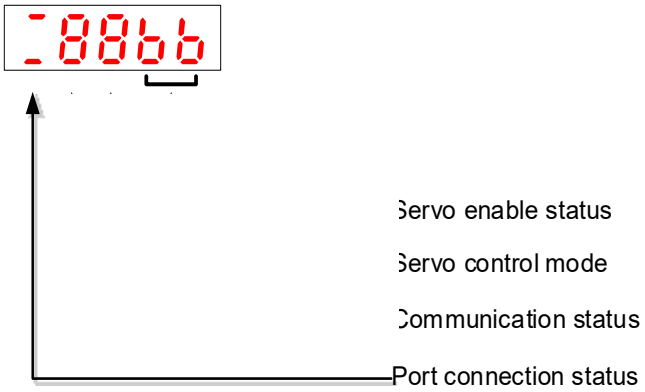
7.2.1 EtherCAT Communication State Machine

The startup of EtherCAT communication and the communication status transition between the master station and slave station applications during operation (EtherCAT status device) are as follows. Normally, status transfer starts based on a request from the master.



7.2.2 Communication Status Panel Display

The current EtherCAT communication status can be viewed through the drive panel (that is, d0038 is displayed by default after power on). The display instructions are as follows:



Name	Description
Port connection status	Long dark means that the physical layer has not detected a communication connection, and long light means that the physical layer has established a communication connection. Up - always on: CN2A EtherCAT input is connected successfully Down - always on: CN2B EtherCAT output is connected successfully
Communication status	Display the EtherCAT state machine status of the slave station in character form. 1: Initialization state (INIT) 2: Pre-operation status (PROP) 4: Safe operating status (SAFEOP) 8: Operating status (OP)
Servo control mode (hexadecimal)	0: No mode 1: Profile position mode (PP) 3: Profile velocity mode (PV) 4: Profile torque mode (PT) 6: Zero return mode (HOMING) 8: Cycle synchronization position mode (CSP)

Name	Description
	9: Cycle synchronization velocity mode (CSV) A: Cycle synchronization torque mode (CST)
Servo enable status	rn: Servo enable (run) bb: Servo is not enabled

7.2.3 Slave Station Alias Setting

This product supports changing the network topology by configuring Station Alias (slave station alias).

- When Station Alias = 0, the master station automatically assigns the slave station number.
- When Station Alias ≠ 0, the master station automatically assigns the slave station number invalid.

It can be set through the panel auxiliary function AF000.

7.3 PDO Mapping

7.3.1 PDO Mapping Steps

1. Switch the EtherCAT communication state (ESM) from Init to PreOP state.
2. Under SDO information, set 1C12:00h=0 and 1C13:00h=0.

- 1C12:01h can only be changed when 1C12:00h=0 and ESM is in PreOp state.
- 1C13:01h can only be changed when 1C13:00h=0 and ESM is in PreOp state.

3. Under SDO information, set 1600:00h=0, 1620:00h=0, 1621:00h=0, 1622:00h=0.
4. Under SDO information, take the PDO configuration that is the same as the factory value as an example as follows:

Type	Index	Value	Object Content		Remark
RPDO	1600:01h	60400010h	6040:00h	ControlWord	Default
	1600:02h	60600008h	6060:00h	Modes of operation	
	1600:03h	607A0020h	607A:00h	Target Position	
	1600:04h	60B80010h	60B8:00h	Touch probe function	
	1600:05h~0Ah	00000000h	—	—	
TPDO	1A00:01h	603F0010h	603F:00h	Error code	Default
	1A00:02h	60410010h	6041:00h	Statusword	

Type	Index	Value	Object Content		Remark
	1A00:03h	60610008h	6061:00h	Modes of operation display	
	1A00:04h	60640020h	6064:00h	Position actual value	
	1A00:05h	606C0020h	606C:00h	Velocity actual value	
	1A00:06h	60B90010h	60B9:00h	Touch probe status	
	1A00:07h	60BA0020h	60BA:00h	Touch probe1 position value	
	1A00:08h	60BC0020h	60BC:00h	Touch probe2 position value	
	1A00:09h	60F40020h	60F4:00h	Following error actual value	
	1A00:0Ah	60FD0020h	60FD:00h	Digital inputs	
RPDO	1620:01h	60400010h	6040:00h	ControlWord	CSP
	1620:02h	60600008h	6060:00h	Modes of operation	
	1620:03h	607A0020h	607A:00h	Target Position	
	1620:04h	60B80010h	60B8:00h	Touch probe function	
	1620:05h~0Ah	00000000h	—	—	
TPDO	1A20:01h	603F0010h	603F:00h	Error code	
	1A20:02h	60410010h	6041:00h	Statusword	
	1A20:03h	60610008h	6061:00h	Modes of operation display	
	1A20:04h	60640020h	6064:00h	Position actual value	
	1A20:05h	60B90010h	60B9:00h	Touch probe status	
	1A20:06h	60BA0020h	60BA:00h	Touch probe1 position value	
	1A20:07h	60F40020h	60F4:00h	Following error actual value	
	1A20:08h	60FD0020h	60FD:00h	Digital inputs	
	1A20:09h~0Ah	00000000h	—	—	
RPDO	1621:01h	60400010h	6040:00h	ControlWord	CSP CSV CST
	1621:02h	60600008h	6060:00h	Modes of operation	
	1621:03h	60710010h	6071:00h	Target Torque	
	1621:04h	607A0020h	607A:00h	Target Position	
	1621:05h	60B80010h	60B8:00h	Touch probe function	
	1621:06h	60FF0020h	60FF:00h	Target Velocity	
	1621:07h~0Ah	00000000h	—	—	
TPDO	1A21:01h	603F0010h	603F:00h	Error code	
	1A21:02h	60410010h	6041:00h	Statusword	
	1A21:03h	60610008h	6061:00h	Modes of operation display	
	1A21:04h	60640020h	6064:00h	Position actual value	
	1A21:05h	606C0020h	606C:00h	Velocity actual value	
	1A21:06h	60770010h	6077:00h		
	1A21:07h	60B90010h	60B9:00h	Touch probe status	
	1A21:08h	60BA0020h	60BA:00h	Touch probe1 position value	
	1A21:09h	60FD0020h	60FD:00h	Digital inputs	

Type	Index	Value	Object Content		Remark
	1A21:0Ah	00000000h	—	—	
RPDO	1622:01h	60400010h	6040:00h	ControlWord	PP
	1622:02h	60600008h	6060:00h	Modes of operation	
	1622:03h	607A0020h	607A:00h	Target Position	
	1622:04h	60810020h	6081:00h	Profile Velocity	
	1622:05h	60830020h	6083:00h	Profile Acceleration	
	1622:06h	60840020h	6084:00h	Profile Deceleration	
	1622:07h	60B80010h	60B8:00h	Touch probe function	
	1622:08h~0Ah	00000000h	—	—	
TPDO	1A22:01h	603F0010h	603F:00h	Error Code	
	1A22:02h	60410010h	6041:00h	Statusword	
	1A22:03h	60610008h	6061:00h	Modes of operation display	
	1A22:04h	60640020h	6064:00h	Position actual value	
	1A22:05h	606C0020h	606C:00h	Velocity actual value	
	1A22:06h	60770010h	6077:00h	Torque actual value	
	1A22:07h	60B90010h	60B9:00h	Touch probe status	
	1A22:08h	68BC0020h	68BC:00h	Touch probe2 position value	
	1A22:09h	60BA0020h	60BA:00h	Touch probe1 position value	
	1A22:0Ah	60FD0020h	60FD:00h	Digital inputs	

5. According to the above object sub-indexes number, set 1600:00h=4, 1620:00h=4, 1621:00h=6, 1622:00h=7 in order to make the configuration valid.

6. According to the above mapping objects, set the SM allocation object 0x1C12 of RPDO and the SM allocation object 0x1C13 of TPDO as follows:

Type	Index	Value	Object Content	Remark
RPDO configuration	1C12:01h	1600h	Select axis mapping object RPDO	
TPDO configuration	1C13:01h	1A00h	Select axis mapping object TPDO	

7. According to the above SM configuration quantity, set 0x1C12:00h=1,0x1C13:00h=1 to make the configuration valid.

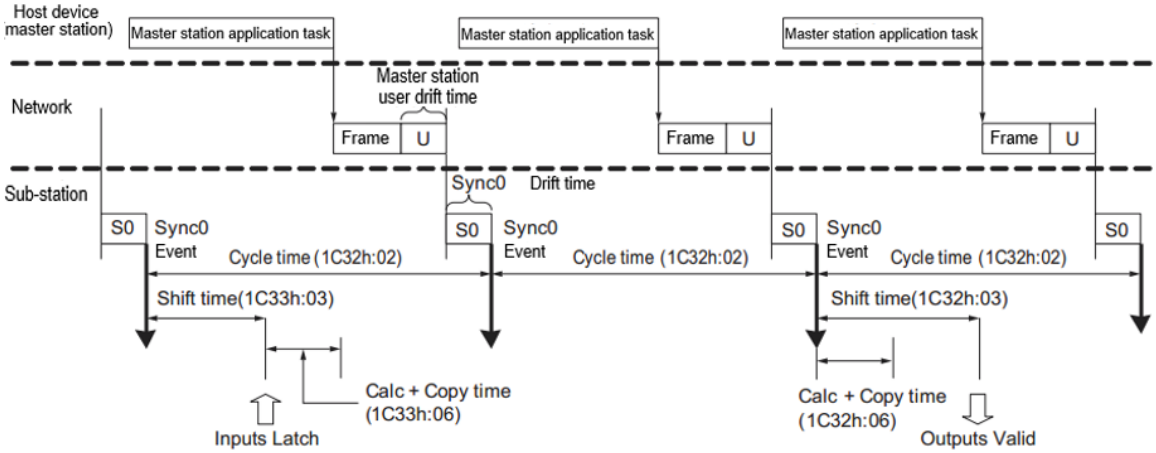
8. Migrate the EtherCAT communication status (ESM) from PreOP to SafeOP, and now TxPDO is valid.

9. Migrate the EtherCAT communication status (ESM) from SafeOP to OP status, and now RxPDO is valid.

7.4 DC Synchronization

This series of products supports the Distributed Clocks synchronization technology of EtherCAT communication, so that all devices have the same datum time, so that the slave station device can implement synchronous mode according to the synchronization event (Sync0 event) that occurs at the datum time.

The synchronization time sequence is as follows:



7.4.1 DC Synchronization Configuration

Index	Sub-index	Name	Access	Value	Remark
1C32h	Sync Manager Channel 2 (Process data output) Synchronization				
	01h	Sync Mode	RO	02h: DC mode (synchronous with SYNC0)	
	02h	Cycle time	RO	N*125000ns (N=1~32)	Set by master station
	03h	Shift time	RO	Not supported	
	05h	Min Cycle time	RO	500000ns	
	06h	Calc and copy time	RO	250000ns	
	09h	Delay time	RO	0	
	0Ah	Sync0 cycle time	RO	The value of ESC register 09A0h	
1C33h	Sync Manager Channel 3 (Process data input) Synchronization				
	01h	Sync Mode	RO	02h: DC mode (synchronous with SYNC0)	
	02h	Cycle time	RO	Same setting as 1C32h:02h	
	03h	Shift time	RW	N*250000ns	
	05h	Min Cycle time	RO	Same setting as 1C32h:05h	
	06h	Calc and copy time	RO	250000ns	
	09h	Delay time	RO	0	
	0Ah	Sync0 cycle time	RO	The value of ESC register 09A0h	

7.4.2 Parameter Save and Initialization

7.4.2.1 Parameter Save

1010h: 00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Save the sub-index number of the parameter object	0~255	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

1010h: 01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Save all parameters	0~4294967295	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	No	No	

Set object **1010:01h** to **65766173h** (ASCII code: save), and the object with all EEPROM values "yes" can be written to EEPROM.

- If the writing is successful, the value of object **1010:01h** will be restored to **1h**;
- If writing fails, **Er36.0 Alarms (EEPROM Parameter Writing Fails)**;

7.4.2.2 Parameter Initialization

1011h: 00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Restore the sub-index number of the parameter object	0~255	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

1010h: 01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Restore all parameters	0~4294967295	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	No	No	

Set object **1010:01h** to **64616F6Ch** (ASCII code: load) to restore all objects to factory setting and

EEPROM Objects with "Yes" value are written to the EEPROM.

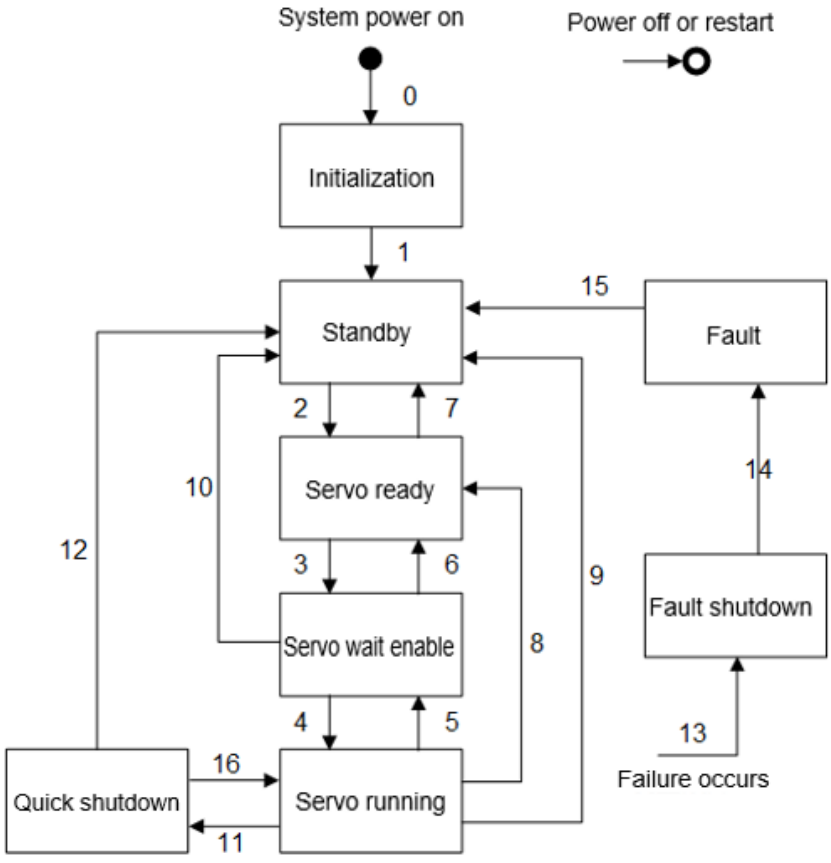
- If the writing is successful, the value of object **1010:01h** will be restored to **1h**;
- If writing fails, **Er36.0 Alarms (EEPROM Parameter Writing Fails)**;
- If the request is to restore the motor to the enabled state when it leave the factory, the slave station return the SDO abort code: 08000020h.

Chapter 8 CiA402 Operation Mode

8.1 Device Status Switching

Related Term	Description
Device status	According to the CiA402 standard, the status of the servo drive (The Device Status) is referred to as the device status. Contains the following status: • Not ready to switch on • Switch on disabled • Ready to switch on • Switched on • Operation enabled • Quick stop active • Fault reaction active • Fault (See the "CiA Draft Standard Proposal 402" document for details)

The servo drive device status (referred to as device status) will perform state machine switching in accordance with the CiA402 protocol according to the EtherCAT communication command (6040h control word) or drive abnormality detection, etc. The status transition diagram is as follows:



The current device status can be viewed through the object dictionary 6041h status word.

6041h Status Word	Device Status
XXXX XXXX X0XX 0000	Initialization (Not ready to switch on)
XXXX XXXX X1XX 0000	Standby (Switch on disabled)
XXXX XXXX X 01X 0001	Servo ready (Ready to switch on)
XXXX XXXX X 01X 0011	Servo wait enable (Switched on)
XXXX XXXX X 01X 0111	Servo running (Operation enabled)
XXXX XXXX X 00X 0111	Quick shutdown (Quick stop active)
XXXX XXXX X 0XX 1111	Alarm shutdown (Fault reaction active)
XXXX XXXX X 0XX 1000	Alarm (Fault)

8.1.1 6040h (ControlWord)

6040h: 00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Control word	0~65535	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	rw	RPDO	No	

Command used to control device status switching. Details of each bit information:

bit	Information Details
0	Wait for enable.
1	Main circuit power supply.
2	Quick shutdown.
3	Servo running.
4~6	Related to control mode (for details, please refer to **Position Control Mode**, **Speed Control Mode**, and **Torque Control Mode**).
7	Alarm reset.
8	When the pause bit value is 1, the motor presse the **605Dh Pause Shutdown Mode** to execute the motor deceleration pause, and the motor resumes operation after transitioning from 1 → 0.
9~14	Reserved.
15	Gain switching

The combination of control word bit7, 3~0 forms a command to switch the device status:

Command	bit7	bit3	bit2	bit1	bit0	Device Status Migration No.
Turn off the main circuit power supply	0	—	—	0	—	7, 9, 10, 12

Shutdown	0	—	1	1	0	2, 6, 8
Wait enable	0	0	1	1	1	3
Servo running	0	1	1	1	1	3(*1), 4, 16
Turn off enable	0	0	1	1	1	5
Quick shutdown	0	—	0(*2)	1	—	7, 10, 11
Alarm reset	0 → 1	—	—	—	—	15

Note:

*1: When the device status is in the servo ready state, directly send the servo running (Enable Operation) command, and the driver will automatically execute states 3 and 4 in sequence to switch to the servo running state.

*2: When the quick shutdown bit value is 0, it is a quick shutdown command.

8.1.2 6041h (StatusWord)

6041h: 00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Status word	0~65535	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	ro	TPDO	No	

Current drive device status. Details of each bit information:

bit	Meaning	Description
0	Ready	—
1	Wait enable	—
2	Running	—
3	Alarm	—
4	Main circuit power supply	When the value is 1, the drive main circuit is powered.
5	Quick shutdown	When the value is 0, the drive enter quick shutdown state.
6	Standby	—
7	Warning	When the value is 1 the drive is in warning state. When warning occurs, it will not switch the drive device status or interrupt the motor action.
8	Reserved	—
9	Remote control	When the value is 1 the drive can handle commands from the host. The drive has the value 1 in the communication status PreOP, SafeOP or OP.
10	Control mode related	Different because of control mode.

<table>
<tr><td>11</td><td>Internal restriction</td><td>Different because of control mode.<table><tr><th>Control Mode</th><th>Description</th></tr><tr><td>Position control</td><td>0: The position command and position feedback do not exceed the limit;
1: The position command or position feedback exceed the limit.
Position command and feedback need to meet software limits and torque limits*1.</td></tr><tr><td>Speed control</td><td>0: The speed command and speed feedback do not exceed the limit;
1: The speed command or speed feedback exceed the limit.
The speed command and feedback need to meet the torque limit*1.</td></tr><tr><td>Torque control</td><td>0: The torque command and torque feedback do not exceed the limit;
1: The torque command or torque feedback exceed the limit.
Torque command and feedback need to meet the torque limit*1 and speed limit *2.</td></tr></table></td></tr>
<tr><td>12</td><td>Control mode related</td><td>Different because of control mode.</td></tr>
<tr><td>13</td><td>Control mode related</td><td>Different because of control mode.</td></tr>
<tr><td>14</td><td>Reserved</td><td>—</td></tr>
<tr><td>15</td><td>Reserved</td><td>—</td></tr>
</table>

Note:

*1: Torque limit refers to the smaller value of the following objects:

6072h Maximum Torque

3001:04h 1st Torque Limit (3005:16h = 1 or 2)

3005:17h 2nd Torque Limit (3005:16h =2)

60E0h Forward Torque Limit (3005:16h = 5)

60E1h Reverse Torque Limit (3005:16h = 5)

*2: Speed limit refers to the smaller value of the following objects:

6080h Maximum Motor Speed

3003:16h Speed Limit Value 1 (3003:12h = 0 or 2)

3003:16h Speed Limit Value 2 (3003:12h = 2)

The combination of bit6, 5, 3~0 forms the device status:

Combination Form	Device Status
XXXX XXXX X0XX 0000 b	Initialization (Not ready to switch on)
XXXX XXXX X1XX 0000 b	Standby (Switch on disabled)
XXXX XXXX X 01X 0001	Servo ready (Ready to switch on)
XXXX XXXX X 01X 0011 b	Servo wait enable (Switched on)
XXXX XXXX X 01X 0111 b	Servo running (Operation enabled)

XXXX XXXX X 00X 0111 b	Quick shutdown (Quick stop active)
XXXX XXXX X 0XX 1111 b	Alarm shutdown (Fault reaction active)
XXXX XXXX X 0XX 1000 b	Alarm (Fault)

8.2 Control Mode Selection

Displays the control modes supported by the drive. Currently the drive supports 7 control modes.

8.2.1 6502h (Supported Drive Modes)

6502h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Supported control modes	0~4294967295	—	941	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro	TPDO	No	

Control modes supported by the drive. Details of each bit information:

bit	Control Mode	Value
0	Profile Position Mode (PP)	1
1	Velocity mode	0
2	Profile Velocity Mode (PV)	1
3	Profile Torque Mode (PT)	1
4	Reserved	0
5	Zero Return Mode (HM)	1
6	Interpolation mode (not supported)	0
7	Cycle Position Synchronization Mode (CSP)	1
8	Cycle Velocity Synchronization Mode (CSV)	1
9	Cycle Torque Synchronization Mode (CST)	1
10~31	Reserved	0

8.2.2 6060h (Modes of Operation)

When using the EtherCAT bus to set the control mode, make sure that the object **3000:02h Control Mode Setting** is always the default value **19**.

6060h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Control mode	0~10	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I8	rw	RPDO	Yes	

Set the drive control mode. The corresponding relationship between object value and control mode is as follows:

Value	Control Mode
0	No mode.
1	Profile Position Mode (PP)
2	Velocity mode. Not supported yet.
3	Profile Velocity Mode (PV)
4	Profile Torque Mode (PT)
5	Reserved. Not supported yet.
6	Zero Return Mode (HM)
7	Interpolation mode. Not supported yet.
8	Cycle Position Synchronization Mode (CSP)
9	Cycle Velocity Synchronization Mode (CSV)
10	Cycle Torque Synchronization Mode (CST)

Setting an unsupported control mode through SDO will return SDO abort message; setting an unsupported control mode through PDO will cause **Er88.1 Control Mode Setting Abnormal Protection**. When the device status transitions to servo running, the value of object **6061h Control Mode Display** is **0**, and **Er88.1 Control Mode Setting Abnormal Protection** occurs.

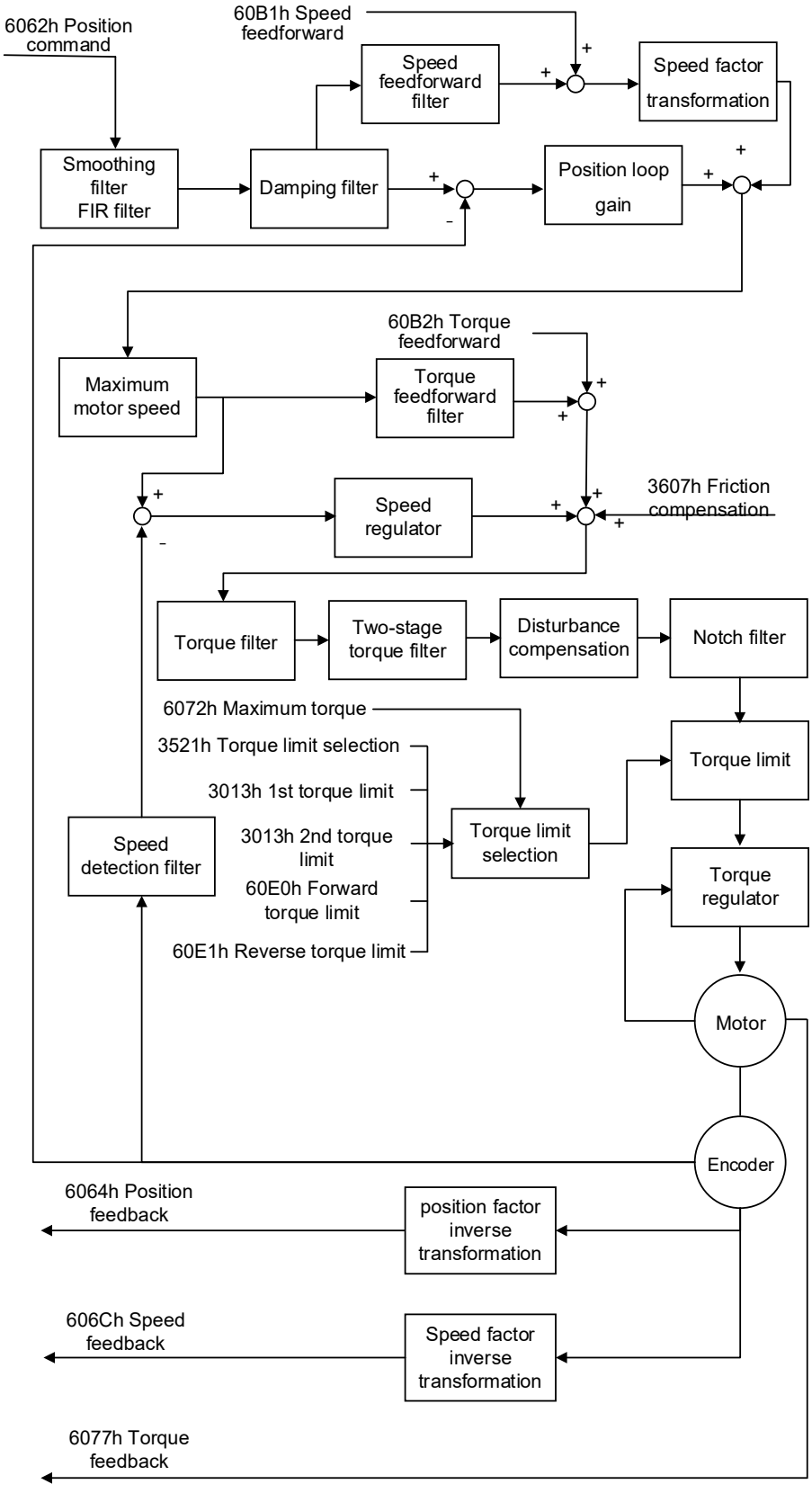
8.2.3 6061h (Modes of Operation Display)

6061h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Control mode display	0~10	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I8	rw	TPDO	No	

Displays the current control mode of the drive. The corresponding relationship between the object value and the control mode is the same as the **6060h** control mode.

8.3 Position Control Mode

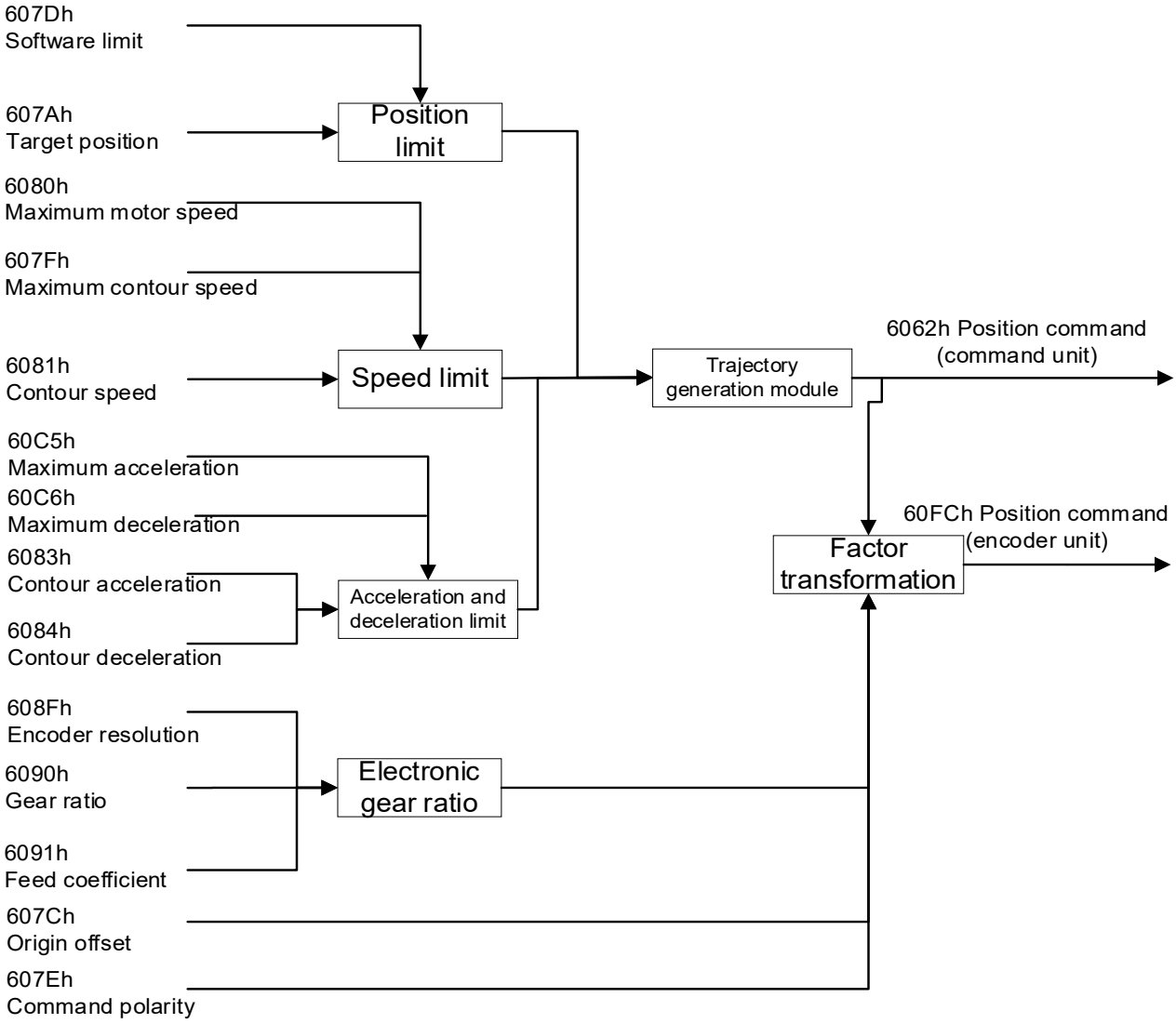
Position control mode:



8.3.1 Profile Position Mode (PP)

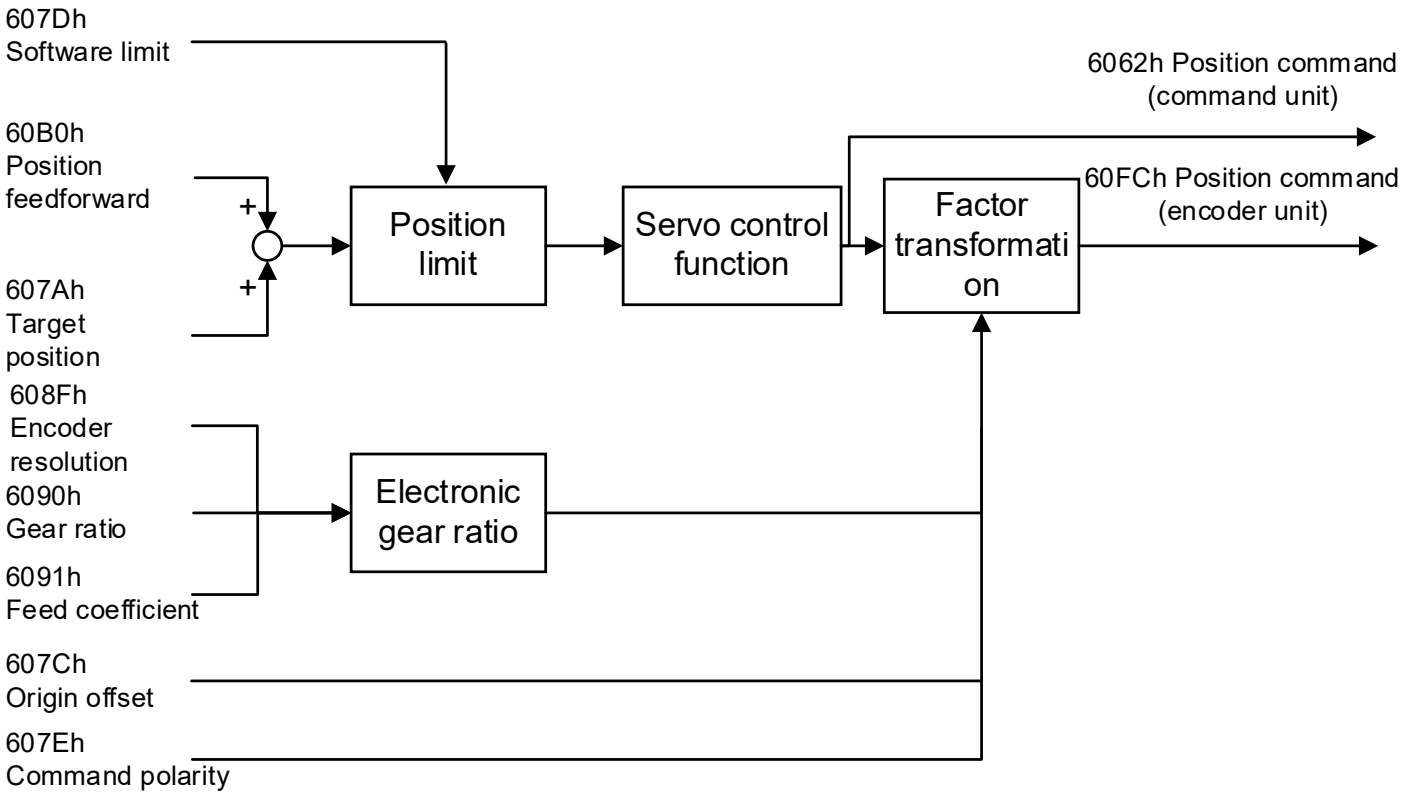
In the contour position mode, the driver internally generates a trajectory to complete position control based on parameters such as **607Ah Target Position**, **6081h Contour Speed**, **6083h Contour Acceleration**, **6084h Contour Deceleration** and **60F2h Positioning Mode**.

Trajectory generation module:



8.3.2 Cycle Position Synchronization Mode (CSP)

Trajectory generation module:



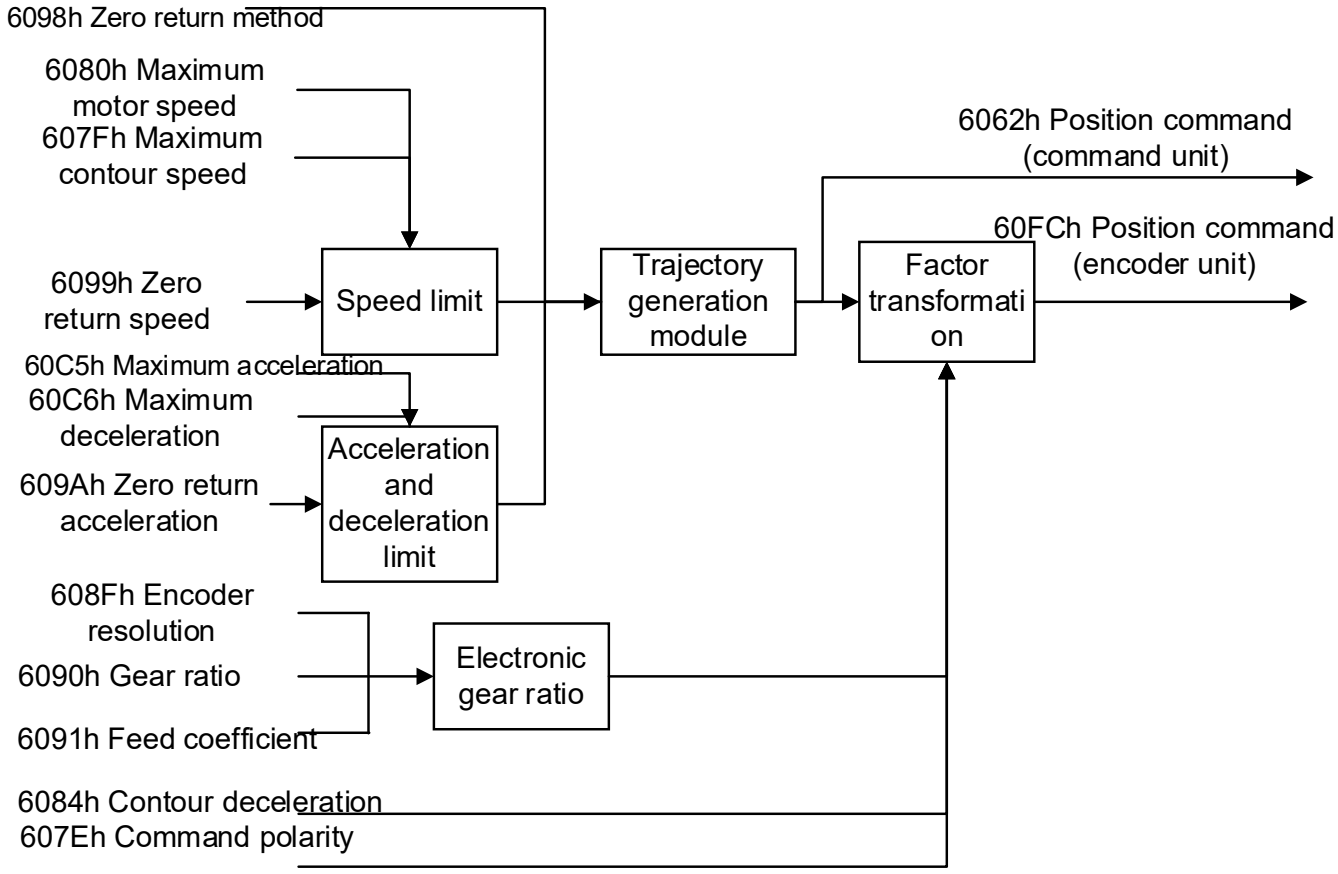
8.3.3 Zero Return Mode (HM)

In the zero return mode, the driver internally generates a trajectory for position control based on parameters such as **6098h Zero Return Method**, **6099:01h Switch Search Speed**, **6099:02h Zero Point Search Speed**, and **609Ah Zero Return Acceleration** to find the zero point.

After the zero return action is completed, the following objects are reset:

- **6063h Position Feedback** (encoder unit) = **60FCh Position Command** (encoder unit) = 0
- **6064h Position Feedback** (command unit) = **6062h Position Command** (command unit) = **607Ch Origin Offset**

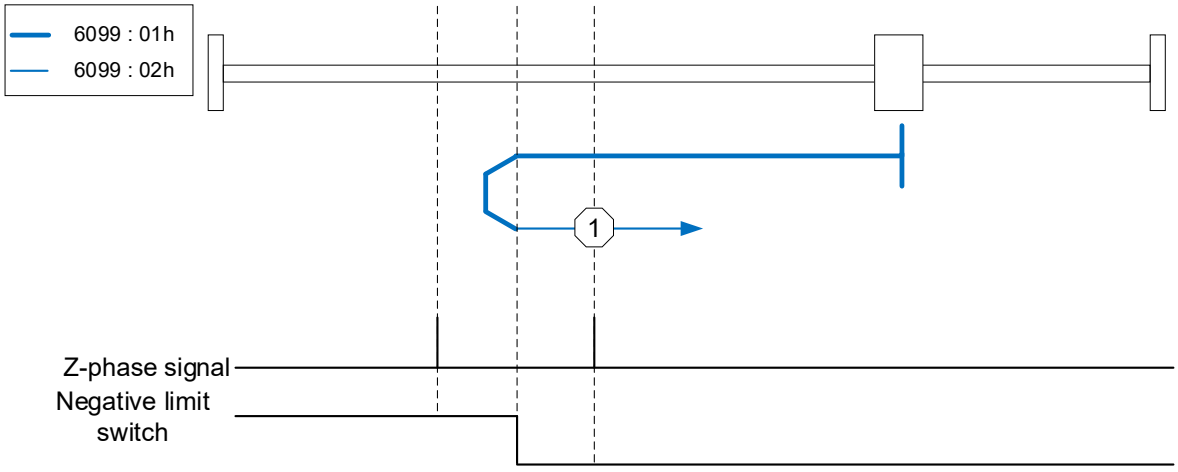
Trajectory generation module:



8.3.3.1 6098h = 1 Use Negative Limit Signal

When the zero return action start, if the negative limit signal is low, the initial running direction of the motor is negative. After receiving the rising edge signal of the negative limit, it decelerates and runs in the reverse direction at low speed. The origin is the first Z signal in the falling edge direction of the negative limit.

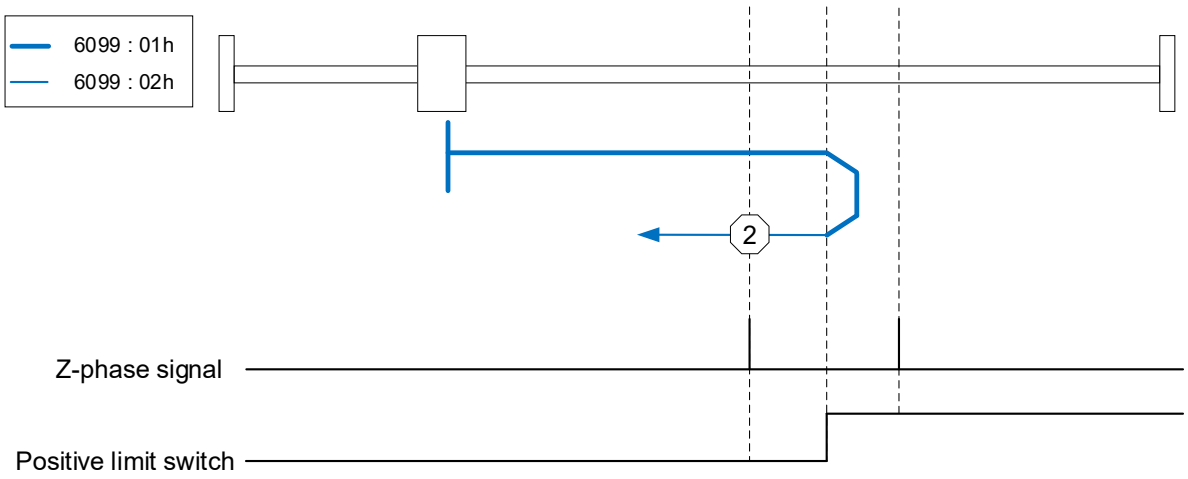
Return to original position based on negative limit switch and zero position pulse:



8.3.3.2 6098h = 2 Use Positive Limit Signal

When the zero return action start, if the positive limit signal is low, the initial running direction of the motor is the positive direction. After receiving the positive limit rising edge signal, it decelerates and runs in reverse at low speed. The origin is the first Z signal after the positive limit falling edge.

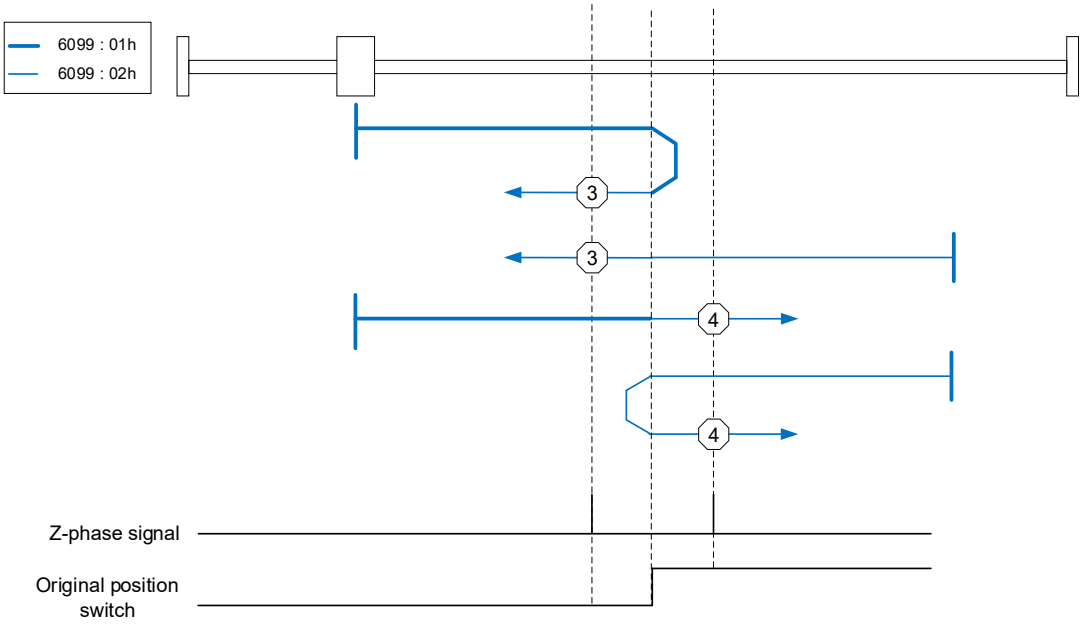
Return to original position based on positive limit switch and zero position pulse:



8.3.3.3 6098h = 3, 4 Use Switch Signal

When the zero return action start, if the switch signal is low, the initial running direction of the motor is the positive direction, and the speed is **6099:01h Switch Search Speed**. If the switch signal is high, the initial running direction of the motor is the negative direction, and the speed is **6099:02h Zero Search Speed**.

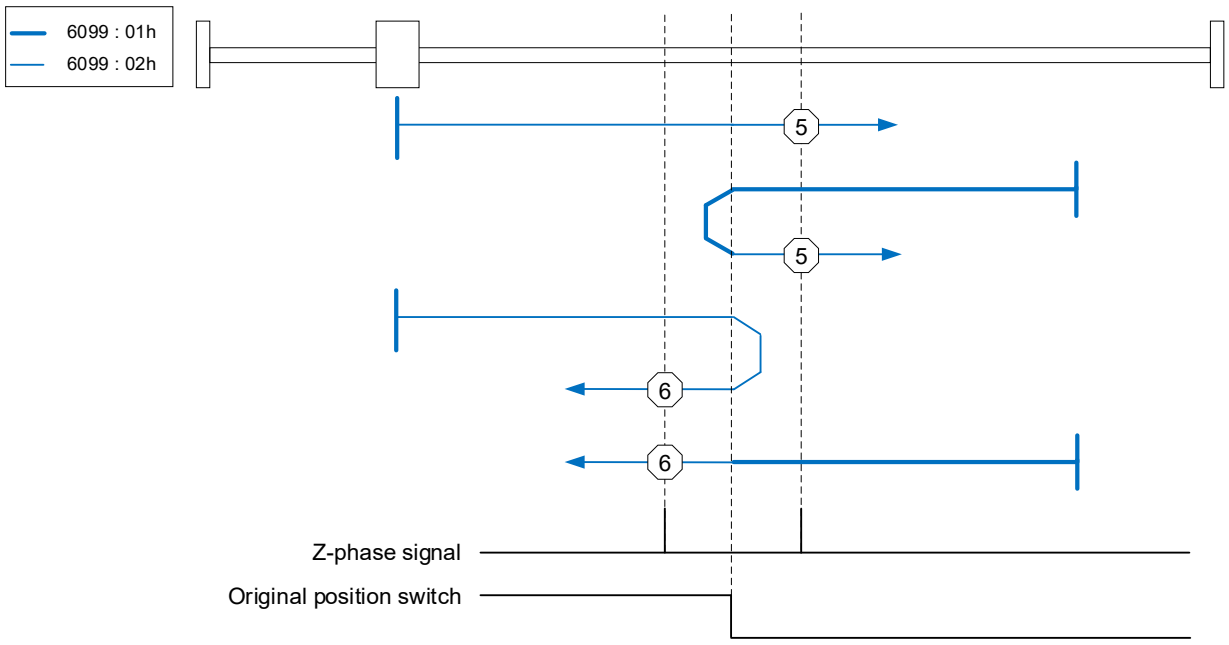
Return to original position based on positive original position switch and zero position pulse:



8.3.3.4 6098h = 5, 6 Use Switch Signal

When the zero return action start, if the switch signal is low, the motor initial running direction is negative, and the speed is **6099:01h Switch Search Speed**. If the switch signal is high, the motor initial running direction is positive and the speed is **6099:02h Zero Search Speed**.

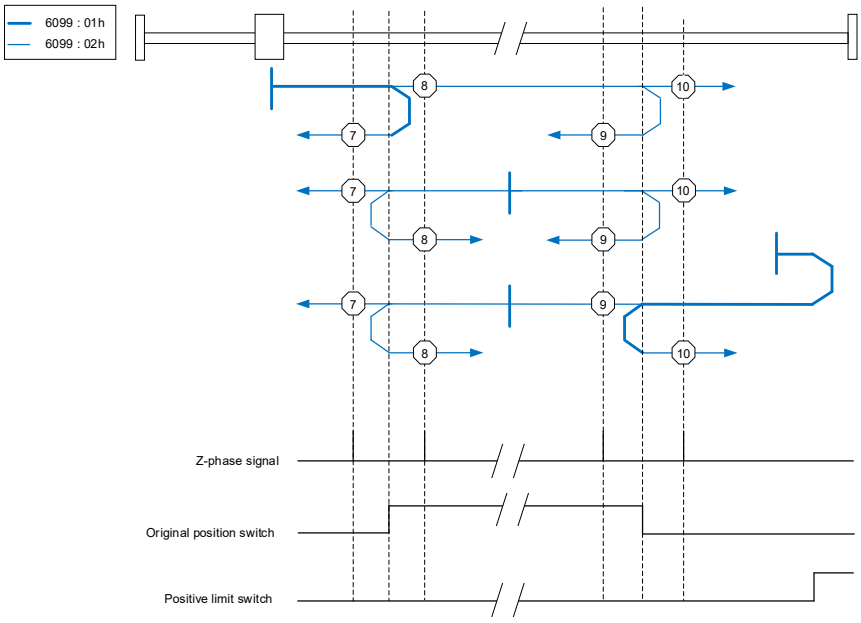
Return to original position based on negative original position switch and zero position pulse:



8.3.3.5 6098h = 7, 8, 9, 10 Use Positive and Negative Limit Signal and Switch Signal

When the zero return action start, if the switch signal is low, the initial running direction of the motor is the positive direction, and the speed is **6099:01h Switch Search Speed**. When the motor is running and the switch signal is high, the drive automatically decelerates to **6099:02h Zero Search Speed**. When the zero return action start, if the switch signal is high, the initial running direction of the motor in methods 7 and 8 is the negative direction, the initial direction of the motor in methods 9 and 10 is the positive direction, and the speed is **6099:02h Zero Search Speed**.

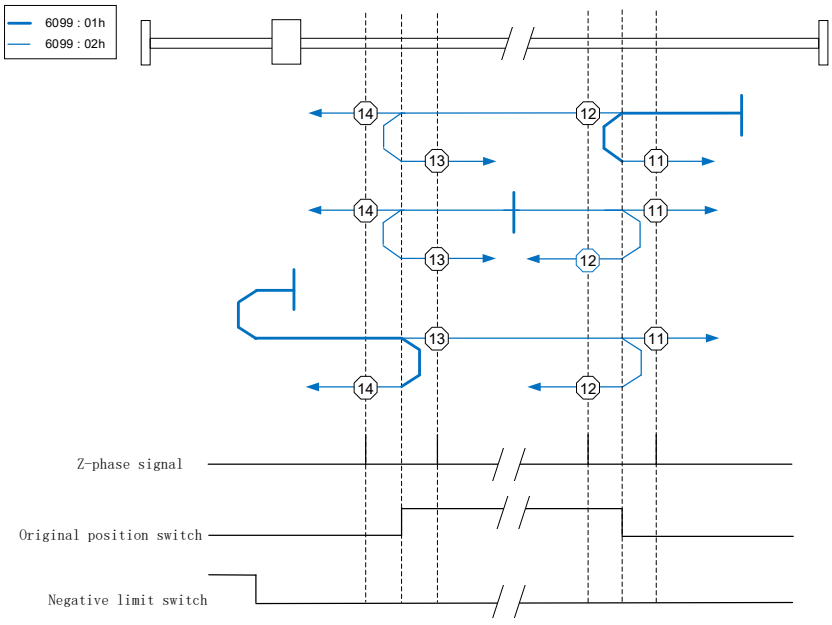
Return to the original position based on the original position switch and zero position pulse - the initial movement direction is positive:



8.3.3.6 6098h = 11, 12, 13, 14 Use Positive and Negative Limit Signal and Switch Signal

When the zero return action start, if the switch signal is low, the initial running direction of the motor is the negative direction, and the speed is **6099:01h Switch Search Speed**. When the motor is running, when the switch signal is high, the drive automatically decelerates to **6099:02h Zero Search Speed**. When the zero return action start, if the switch signal is high, the initial running direction of the motor in methods 11 and 12 is the positive direction, the initial direction of the motor in methods 13 and 14 is the negative direction, and the speed is **6099:02h Zero Search Speed**.

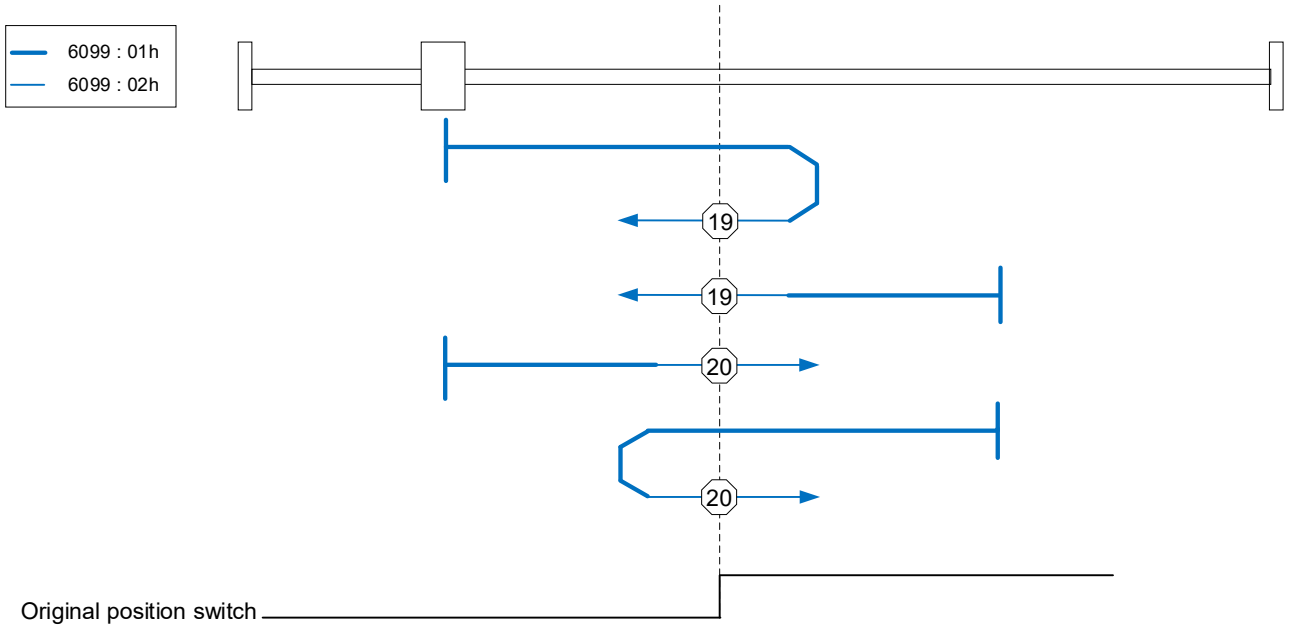
Return to the original position based on the original position switch and zero position pulse - the initial movement direction is negative:



8.3.3.7 6098h = 17~30

For the zero return action, please refer to zero return methods 1~14 in sequence. The difference is that the origin of the zero return method is located at the corresponding positive or negative limit or switch signal edge, rather than the nearby Z signal position.

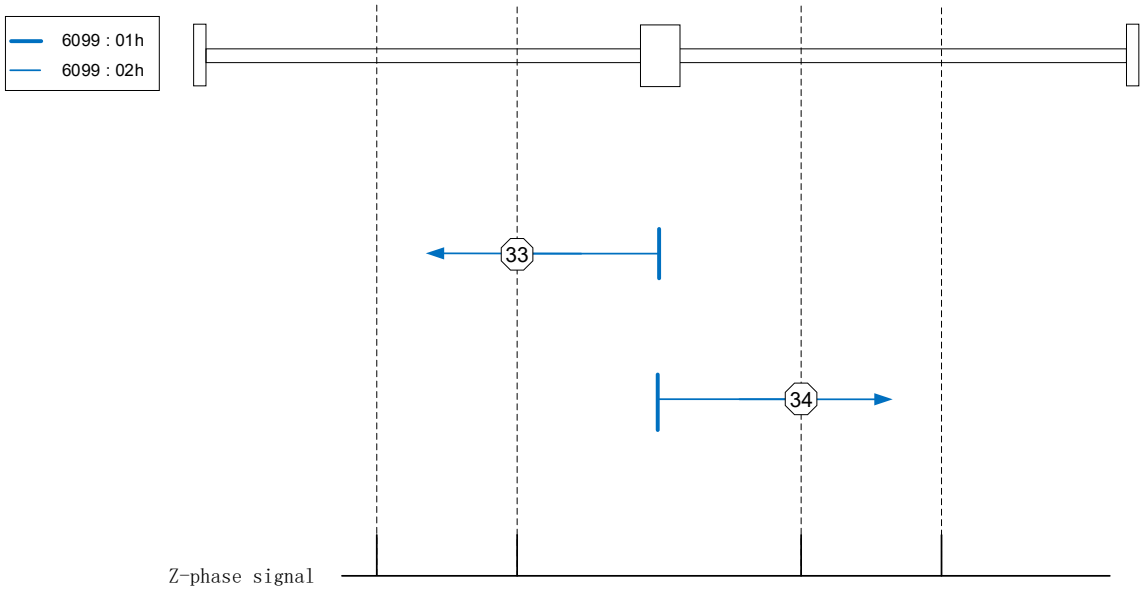
Return to original position based on positive original position switch:



8.3.3.8 6098h = 33, 34 not Use Limit or Switch Signal

The speed is **6099:02h Zero Search Speed**, and the origin is the first Z signal in the negative or positive direction of the current position.

Return to original position based on zero position pulse:

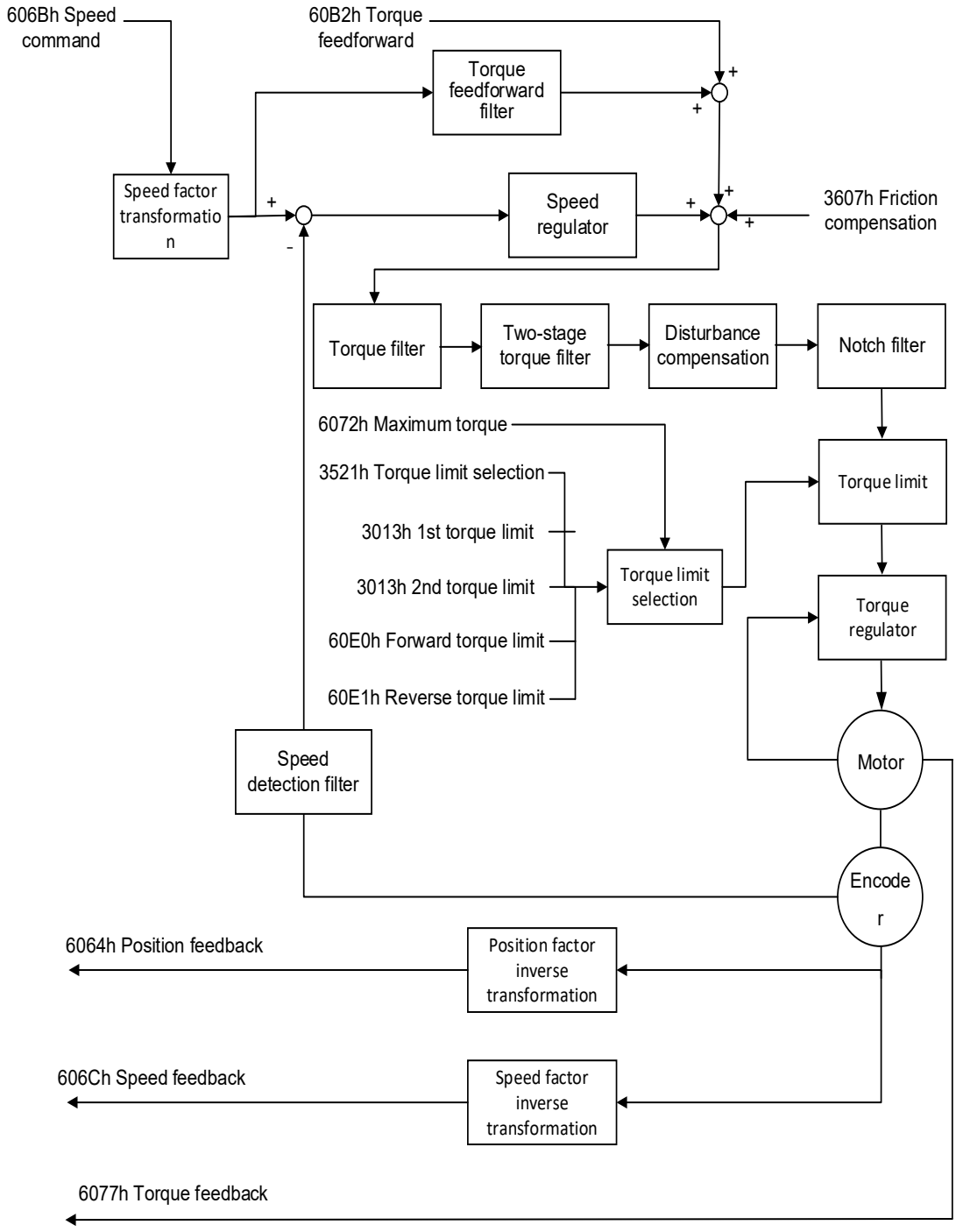


8.3.3.9 6098h = 35, 37 not Use Limit or Switch Signal

Using the current position as the zero, the motor does not need to be enabled.

8.4 Speed Control Mode

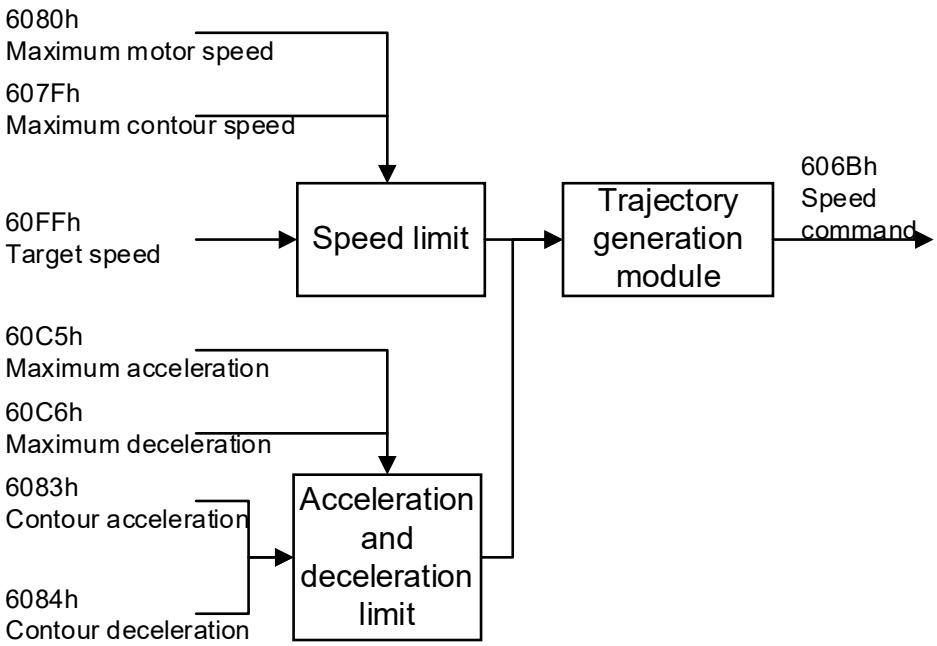
Speed control mode:



8.4.1 Profile Velocity Mode (PV)

In the profile velocity mode, the drive perform internal speed planning to complete speed control based on parameters such as **60FFh Target Speed**, **6083h Contour Acceleration** and **6084h Contour Deceleration**.

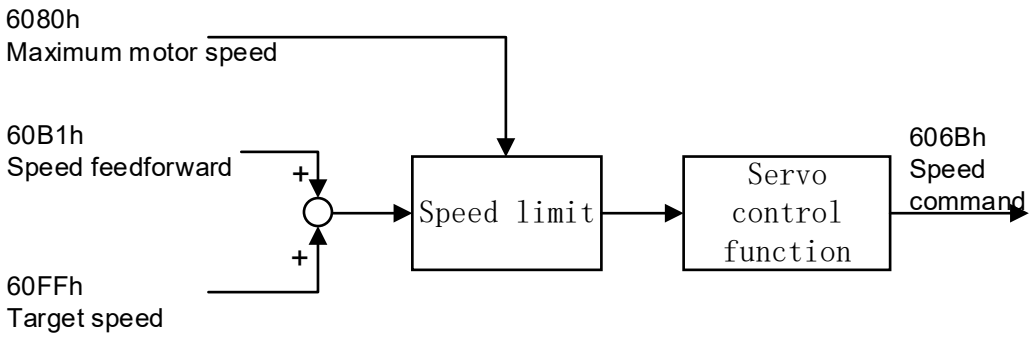
Trajectory generation module:



8.4.2 Cycle Velocity Synchronization Mode (CSV)

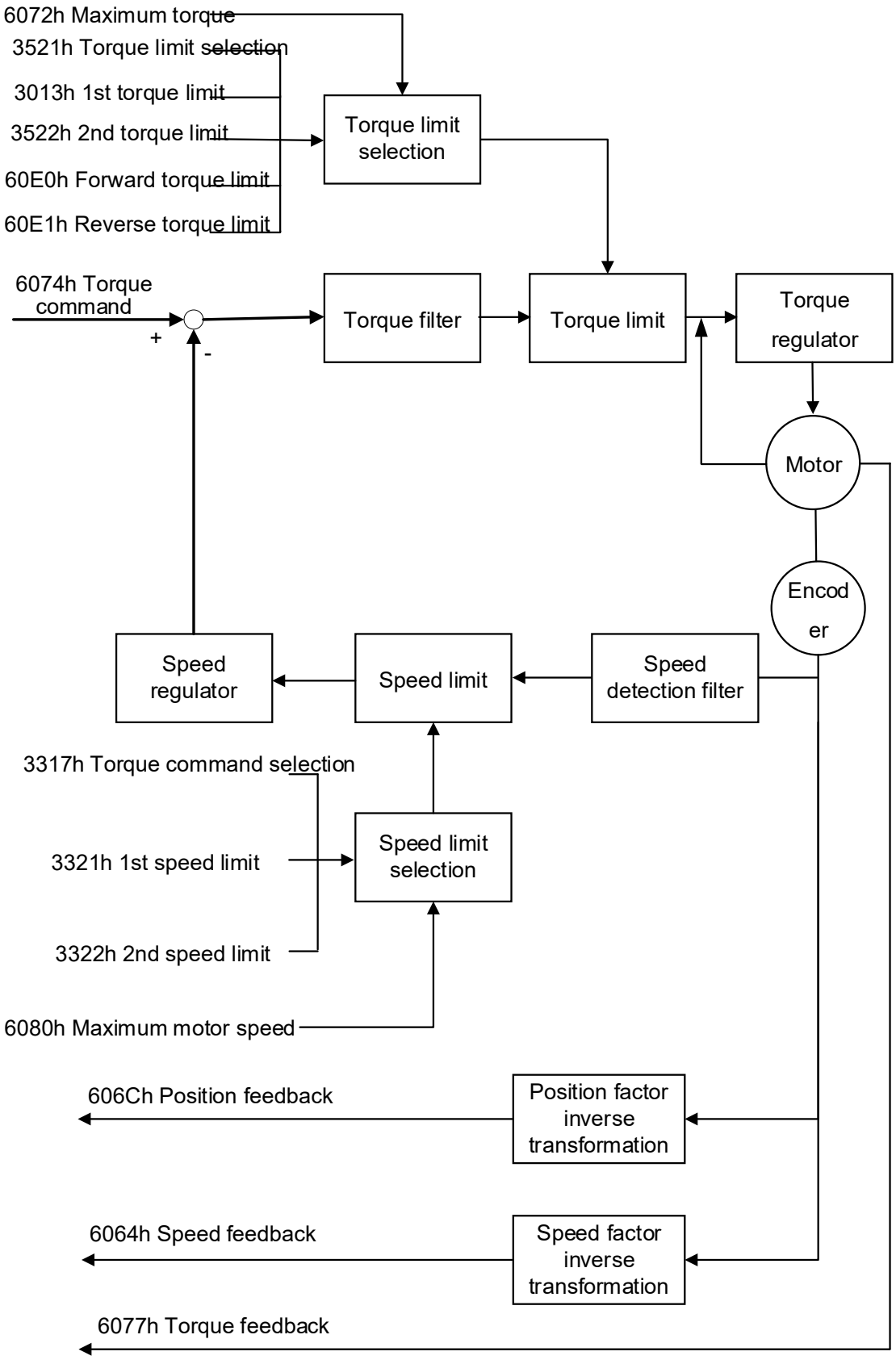
Cycle position synchronization mode, hereinafter referred to as CSV mode.

Trajectory generation module:



8.5 Torque Control Mode

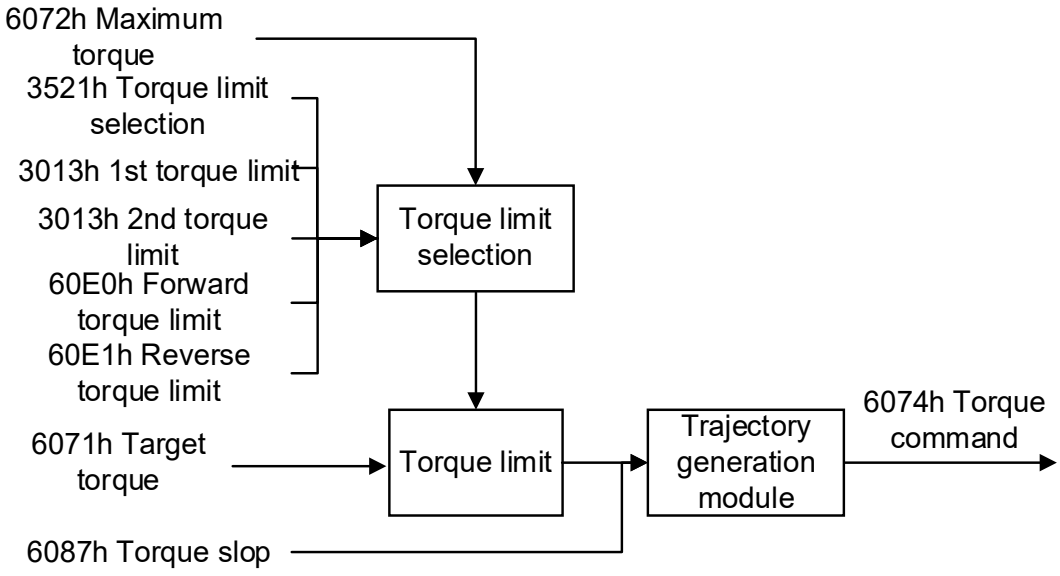
Torque control mode:



8.5.1 Profile Torque Mode (PT)

In the contour torque mode, the driver performs internal torque planning to complete torque control based on parameters such as **6071h Target Torque** and **6087h Torque Slope**.

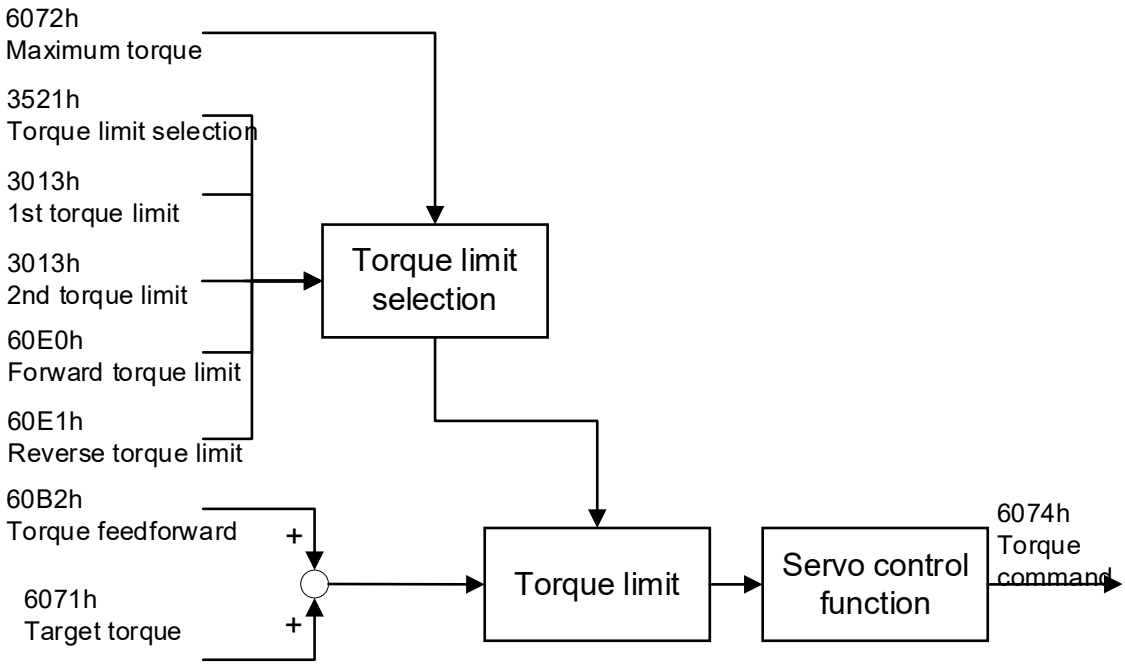
Trajectory generation module:



8.5.2 Cycle Torque Synchronous Mode (CST)

Cycle synchronization mode, hereinafter referred to as CST mode.

The control block diagram is as follows:



8.6 Mode Sharing Function

8.6.1 Servo Shutdown Method Selection

Refer to chapter 5.7 Servo Stop.

8.6.2 Probe Function

When the external input signal or motor Z-phase signal changes, the position information is latched. The drive supports probe 1 and probe 2 being enabled at the same time. The signal source of probe 1 can be selected as EXT1/Z-phase signal; the signal source of probe 2 can be selected as EXT2/Z-phase signal:

- When selecting the Z-phase signal, use the rising edge signal to collect.
- When selecting EXT1/EXT2, make sure the drive CN4 port is open.
  - CN4 function interface open: 3004:33h Function application selection switch bit5 = 1.
  - SI input configuration:
    - 3004:04h Function: EXT1: 00202020h NO / 00A0A0A0h NC.
    - 3004:05h Function: EXT2: 00212121h NO / 00A1A1A1h NC.

8.6.2.1 60B8h

60B8h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe function	0～65535	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	rw	RPDO	No	

The status of Probe 1 and Probe 2. The functions of each bit are as follows:

Value	Function
0	Probe 1 enable command. 0 - off; 1 - probe 1 enabled.
1	Probe 1 trigger mode. 0 - single; 1 - continuously.
2	Probe 1 input source. 0 - EXT1; 1 - Encoder Z-phase signal.
3	Not supported, fixed to 0.
4	Probe 1 rising edge sampling. 0 - off; 1 - enabled.
5	Probe 1 falling edge sampling. 0 - off; 1 - enabled.
6~7	Reserved.
8	Probe 2 enable command. 0 - off; 1 - enabled.
9	Probe 2 trigger mode. 0 - single; 1 - continuously.
10	Probe 2 input source. 0 - EXT2; 1 - Encoder Z-phase signal.
11	Not supported, fixed to 0.
12	Probe 2 rising edge sampling. 0 - off; 1 - enabled.
13	Probe 2 falling edge sampling. 0 - off; 1 - enabled.

14~15	Reserved.

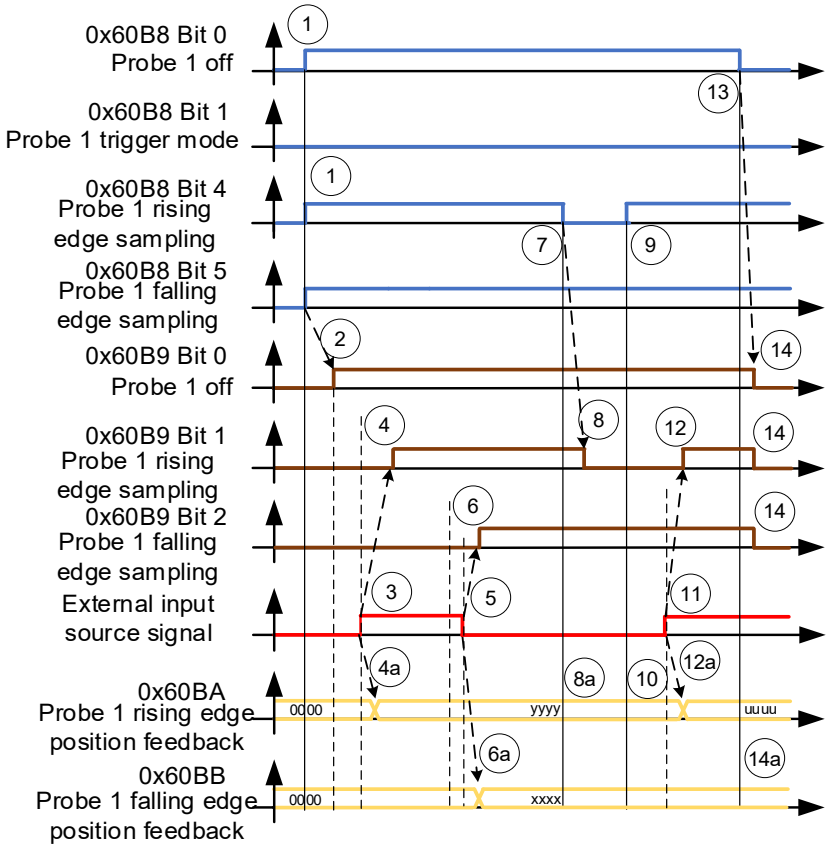
8.6.2.2 60B9h

60B9h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe status	0～65535	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	ro	TPDO	No	

The status of Probe 1 and Probe 2. The functions of each bit are as follows:

Value	Processing Method
0	Probe 1 enabled status. 0 - off; 1 - enabled.
1	Probe 1 rising edge signal. 0 - not latched; 1 - latched.
2	Probe 1 falling edge signal. 0 - not latched; 1 - latched.
3~7	Reserved.
8	Probe 2 enabled status. 0 - off; 1 - enabled.
9	Probe 1 falling edge signal. 0 - not latched; 1 - latched.
10	Probe 1 rising edge signal. 0 - not latched; 1 - latched.
11~15	Reserved.

Using Probe 1 as an example, the signal changes between related objects are as follows:



- 1: 60B8h bit0=1, enable probe 1.
- 1a: 60B8h bit1, 4, 5, configure probe 1 for rising edge and falling edge latch.
- 2: → 60B9h bit0=1, probe 1 enable status response.
- 3: The probe input source generate a rising edge signal.
- 4: → 60B9h bit1＝1, probe 1 rising edge signal latch status is set to 1.
- 4a: → 60BAh, probe 1 rising edge position feedback (yyyy) latch.
- 5: The probe input source generate a falling edge signal.
- 6: → 60B9h bit2＝1, probe 1 falling edge signal latch status is set to 1.
- 6a: → 60BBh, probe 1 falling edge position feedback (xxxx) latch.
- 7: 60B8h bit4=0, turn off probe 1 rising edge latch function.
- 8: → 60B9h bit1＝0, probe 1 rising edge signal latch state is reset.
- 8a: → 60BAh, probe 1 rising edge position feedback remains unchanged.
- 9: 60B8h bit4=1, turn on probe 1 rising edge latch function.
- 10: → 60BAh, probe 1 rising edge position feedback remains unchanged.
- 11: The probe input source generates a rising edge signal.
- 12: → 60B9h bit1＝1, probe 1 rising edge signal latch status is set to 1.
- 12a: → 60BAh, probe 1 rising edge position feedback (uuuu) latch.
- 13: 60B8h bit0=0, probe 1 is turned off.
- 14: → 60B9h bit0, 1, 2 = 0, status position reset.
- 14a: → 60BAh, 60BBh, probe 1 rising edge and falling edge position feedback remains unchanged.

8.6.2.3 60BAh

60BAh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe 1 rising edge position feedback	-2147483648 ~2147483647	Command unit	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	Ro	TPDO	No	
Probe 1 is the position feedback when the rising edge occurs.					

8.6.2.4 60BBh

60BBh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe 1 falling edge position feedback	-2147483648 ~2147483647	Command unit	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	ro	TPDO	No	
Probe 1 is the position feedback when the falling edge occurs.					

8.6.2.5 60BCh

60BCh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe 2 rising edge position feedback	-2147483648 ~2147483647	Command unit	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	ro	TPDO	No	
Probe 2 is the position feedback when the rising edge occurs.					

8.6.2.6 60BDh

60BDh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe 2 falling edge position feedback	-2147483648 ~2147483647	Command unit	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I32	ro	TPDO	No	
Probe 2 is the position feedback when the falling edge occurs.					

8.6.3 Factor Transformation

8.6.3.1 Electronic Gear Function

The electronic gear is the position command from the host input multiplied by the electronic gear ratio set by the object as the position command of the position control unit. The motor rotation movement amount per command unit can be set arbitrarily.

The electronic gear ratio set by the object takes effect when the motor is not enabled. The default value of electronic gear ratio is 1.

Electronic gear ratio calculation formula:

Electronic gear ratio = 608Fh encoder resolution * 6091h gear ratio / 6092h Feed constant

Description:

- The effective range of electronic gear ratio is 0.001~32000. If the setting value is greater than the range, the **Er27.1 Command Frequency Multiplication Abnormal Protection** occurs.
- During calculation, if the denominator/numerator exceeds 64 bits, or the denominator/numerator in the calculation result is greater than 32 bits, the **Er27.1 Command Frequency Multiplication Abnormal Protection** occurs.

The relationship between the command unit and the encoder unit is as follows:

6062h (position command·command unit)* Electronic gear ratio = 60FCh (position command·encoder unit)

8.6.3.2 608Fh (Motor Encoder)

Defines the encoder resolution for one motor revolution.

Encoder resolution = 608F:01h encoder movement amount / 608F:02h motor revolutions

608Fh:01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Encoder movement amount	1~4294967295	Command unit	8388608	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro	No	No	
The encoder movement amount is automatically set according to the encoder resolution.					

608Fh:02h	Name	Setting Range	Unit	Factory Value	Association Mode
	Motor revolutions	1~4294967295	r(motor)	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro	No	No	
Motor revolutions, fixed to 1.					

8.6.3.3 6091h (Gear Ratio)

Defines the proportional relationship between user specified motor shaft displacement and load axis displacement.

Gear ratio = 6091:01h motor revolutions / 6091:02h shaft revolutions

6091h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number	0~255	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

6091h:01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Motor revolutions	1~4294967295	r(motor)	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	

	U32	rw	No	Yes

6091h:02h	Name	Setting Range	Unit	Factory Value	Association Mode
	Shaft revolutions	1~4294967295	r(motor)	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	No	Yes	

8.6.3.4 6092h (Feed)

Feed Constant

Define the movement amount per axis rotation.

Feed constant = 6092:01h Feed / 6092:02h shaft revolutions

6092h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number	0~255	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

6092h:01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Feed	1~4294967295	Command unit	8388608	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro / rw	No	Yes	

Access permissions are determined by the bit value of object 3004h:32h:

- When bit0 = 0 of object 3004h:32h, the access permission is ro, and the value of 6092h:01h is the same as the value of object 608Fh:01h.
- When bit0 = 1 of object 3004h:32h, the access permission is rw.

6092h:02h	Name	Setting Range	Unit	Factory Value	Association Mode
	Shaft revolutions	1~4294967295	r(axis)	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro / rw	No	Yes	

Access permissions are determined by the bit value of object 3004h:32h:

- When bit0=0 of object 3004h:32h, the access permission is ro, and the value of 6092h:02h is the same as the value of object 608Fh:01h.
- When bit0=1 of object 3004h:32h, the access permission is rw.

8.6.3.5 607Eh (Command Polarity)

The EtherCAT driver determines the rotation direction of the motor based on the object **607Eh Command Polarity**.

607Eh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Command polarity	0~255	0.1%	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	rw	RPDO	Yes	

The polarity of the position command, speed command, and torque command. When the bit is 1, the polarity is reversed.

Value	Meaning
0~4	Reserved
5	Torque command polarity
6	Speed command polarity
7	Position command polarity

- Please set the polarity of the position command, speed command, and torque command to the same value (that is, set the object value to 0 or 224).
  The rotation direction take effect when the motor is not enabled.
  When the object value is 224, the affected objects are:

607Ah target position	60B0h position feedforward	60FFh target speed	60B1h speed feedforward
6071h target torque	60B2h torque feedforward	6062h position command	6064h position feedback
606Bh speed command	606Ch speed feedback	6074h torque command	6077h torque feedback
6078h current feedback			

- The rotation direction specified by this object is also valid for iMotion and the motor test run function of the drive panel.

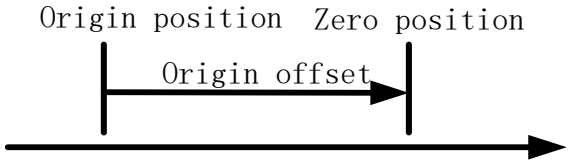
8.6.3.6 607Ch (Origin Offset)

607Ch:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Origin offset	-2147483648 ~2147483647	Command unit	0	ALL

	Type	Access Permission	PDO	EEPROM
	I32	rw	RPDO	Yes

Set the position where the origin deviates from the mechanical zero in the command unit coordinate system.

Origin offset diagram:



607Ch Origin Offset effective time:

- When the motor is not enabled.
- After the zero return action is successful.

8.6.4 Speed Type

8.6.4.1 606Ah

606Ah:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Sensor selection	-32768~32767	—	0	pv
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	ro	No	No	

Set the sensor that detects **606Ch Speed Feedback**.

Value	Description
0	Detect actual speed from position sensor.
1	Detect actual speed from speed sensor.

This drive does not support speed sensors and the value is fixed at **0**.

8.6.4.2 6080h

6080h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Motor maximum speed	0~4294967295	r/min	6000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	Rw	RPDO	Yes	

Set the maximum motor speed.

8.6.4.3 6083h

6083h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour acceleration	0~4294967295	Command unit /s^2	139810133	PP, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Set contour acceleration. When the object is set to 0, it is processed internally as 1.					

8.6.4.4 6084h

6084h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour deceleration	0~4294967295	Command unit /s^2	139810133	P, S
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Set contour deceleration. When the object is set to 0, it is processed internally as 1.					

8.6.4.5 6085h

6085h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Quick shutdown deceleration	0~4294967295	Command unit /s^2	139810133	P, S
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Set quick shutdown deceleration. When the object is set to 0, it is processed internally as 1.					

8.6.4.6 60A3h

60A3h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour jerk mode	1~2	—	0	PP, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	rw	No	No	

Acceleration mode in contour speed mode and contour position mode. This object is not supported, please fix to 0.

8.6.4.7 60A4h

60A4h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number	0~255	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

60A4h:01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour jerk 1	0~4294967295	Command unit /s^3	0	PP, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	No	Yes	

60A4h:02h	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour jerk 2	0~4294967295	Command unit /s^3	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	No	Yes	
Jerk in contour speed mode and contour position mode. The object is not supported.					

8.6.4.8 60C5h

60C5h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum acceleration	0~4294967295	Command unit /s	0	PP, HM, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Maximum acceleration in contour position mode and contour speed mode. When the object is set to 0, it is processed internally as 1.					

8.6.4.9 60C6h

60C6h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum deceleration	0~4294967295	Command unit /s	0	PP, HM, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Maximum deceleration in contour position mode and contour speed mode. When the object is set to 0, it is processed internally as 1.					

8.6.4.10 607Fh

607Fh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum contour speed	0~4294967295	Command unit /s	838860800	PP, HM, PV
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Set the speed limit value.					

8.6.5 Torque Type

8.6.5.1 6072h

6072h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum torque	0~65535	0.1%	5000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	rw	RPDO	Yes	
Maximum torque set by the motor.					

8.6.5.2 6073h

6073h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum current	0~65535	0.1%	5000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	ro	No	No	

Maximum current.

8.6.5.3 6087h

6087h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Torque slope	0~4294967295	0.1%/s	1000	T
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	
Set the torque command acceleration. When the object is set to 0, it is processed internally as 1.					

8.6.5.4 6088h

6088h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Torque contour type	-32768~32767	—	0	T
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I16	rw	RPDO	Yes	

Type of torque change in torque contour mode. This object is not supported, please fix to 0.

Value	Torque Change Type
0	Linear slope
1	$\sin^2$ slope

8.6.5.5 60E0h

60E0h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Forward torque limit	0~65535	0.1%	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	rw	RPDO	Yes	
Forward torque limit, effective when **3005h:16h Torque Limit Selection** value is 5.					

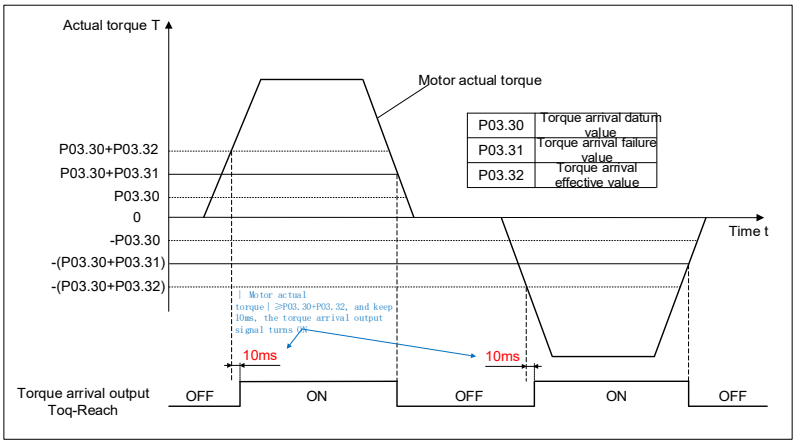
8.6.5.6 60E1h

60E1h:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Reverse torque limit	0~65535	0.1%	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	

	U16	rw	RPDO	Yes
Reverse torque limit, effective when **3005h:16h Torque Limit Selection** value is 5.				

8.6.5.7 Torque Arrival

When motor actual torque arrival specify the interval, the drive output the corresponding DO signal: Toq-Reach torque arrival. For details, please see Output Signal Distribution Table.



8.6.6 Alarm Type

8.6.6.1 603Fh

603Fh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Alarm code	0~65535	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U16	ro	TPDO	No	

The current alarm (only master No.)/warning No. of the drive. When alarm and warning do not occur, 0000h is displayed.

- The alarm code format is FFxxh, xx is the alarm main No.; the warning alarm code format is FFA/xh, x is the warning No..
- When alarm and warning occur at the same time, alarm is displayed.

8.6.7 Interpolation Cycle Type

8.6.7.1 60C2h

Interpolation Time Cycle

60C2h:00h	Name	Setting Range	Unit	Factory Value	Association Mode

	Sub-index number	0~255	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

60C2h:01h	**Name**	**Setting Range**	**Unit**	**Factory Value**	**Association Mode**
	Interpolation time cycle	0~255	—	1	CSP, CSV, CST
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	rw	No	Yes	

60C2h:02h	**Name**	**Setting Range**	**Unit**	**Factory Value**	**Association Mode**
	Interpolation time index	-128~63	—	-3	CSP, CSV, CST
	Type	**Access Permission**	**PDO**	**EEPROM**	
	I8	rw	No	Yes	

- The update cycle of the command in cycle synchronization mode. The object value is automatically updated according to the EtherCAT synchronous cycle. Please do not change it.
- Calculation method: interpolation time period =(60C2h:01h * $10^{60C2h:02h}$)s

8.6.8 Digital Input/Output Type

8.6.8.1 60FDh

60FDh:00h	**Name**	**Setting Range**	**Unit**	**Factory Value**	**Association Mode**
	Digital input	0~4294967295	—	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	ro	TPDO	No	

Reflects the current SI terminal logic of the driver. Function regulations of each bit:

bit	Function
0	Negative limit switch (NOT)
1	Positive limit switch (POT)
2	Origin switch (HOME)
3~15	Reserved

16	General input (GP)
17~31	Reserved

8.6.8.2 60FEh

Digital output

60FEh:00h	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number	0~255	—	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U8	ro	No	No	

60FEh:01h	Name	Setting Range	Unit	Factory Value	Association Mode
	Physical output	0~4294967295	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	

Note: Enabling SO output related function requires signal distribution of related terminals.

bit	Function
0	Set brake
1	Reserved
2	Reserved
3~15	Reserved
16	General output EX-OUT1
17~31	Reserved

60FEh:02h	Name	Setting Range	Unit	Factory Value	Association Mode
	Bit Mask	0~4294967295	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	
	U32	rw	RPDO	Yes	

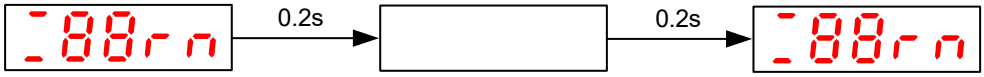
Need to be used in conjunction with 0x60FE.

For example: when each bit in 60FE:01h and each bit in 60FE:02h is 1, output to the terminal function.

Chapter 9 Warning and Alarm

9.1 Warning Code List

When the drive occurs a warning, the drive panel display the following cycle (interval is about 0.2s):



Solution: The warning code can be obtained through d0013 and combined with the following table for troubleshooting.

Warning Code	Warning Name	Reason	Latch Time
A0	Overload warning	Greater than 85% of the load rate protection level	1s~10s or ∞
A1	Over regeneration warning	Greater than 85% of the regeneration load rate level	1s~10s or ∞
A2	Battery warning	Less than battery voltage 3.2V	∞
A3	Fan warning	The fan stop state for 1s	1s~10s or ∞
A4	Encoder communication warning	The continuous occurrence time of encoder communication abnormal is greater than the specified value	1s~10s or ∞
A5	Encoder overheat warning	Encoder overheat warning detected	1s~10s or ∞
A6	Vibration detection warning	Vibration status detected	1s~10s or ∞
A7	Registration expiration warning	The remaining registration time is less than the specified value	∞

9.2 SDO Transmission Abort Code

When SDO data exchange fails, the slave station will return an abort message, including alarm information with abort code.

Solution: according to the causes of different abort codes, solve the alarm.

The SDO transmission abort codes are shown in the following table:

Abort Code	Details
0601 0000h	Indicates that the object does not support this access method.
0601 0002h	Indicates an attempt to write to a read-only object.
0601 0003h	Indicates that the sub-index cannot be written, and sub-index 00h needs to be set to 0 first to obtain write permission.

Abort Code	Details
0601 0006h	Indicates that in safe operation and running mode, objects mapped to RPDO are prohibited from SDO write access.
0602 0000h	Indicates that the object does not exist in the object dictionary.
0604 0041h	Indicates that the object cannot be PDO mapped.
0606 0000h	Indicates hardware error causing access failure.
0607 0010h	Indicates that the data types are inconsistent and the parameter lengths do not match.
0609 0011h	Indicates that the sub-index does not exist.
0609 0030h	Indicates that the parameter value setting is out of range.
0800 0020h	Indicates that the data cannot be transferred or stored in the application layer.
0800 0022h	Indicates that the data cannot be transferred or stored in the application layer due to the current device state.

9.3 Alarm Code List

The fault code is displayed as **ErXX.Y** on the panel, and the document writing format is **ErXX.Y** (XX represents the primary code, Y represents the secondary code).

To remove the problem, you need to cut off the power supply first, and then reconnect the power supply after troubleshooting.

"Resettable" fault code. For details, plesase see Alarm Reset.

Alarm Code	Name	Attribute			Reference Page No.
		Resettable	E-stop	Alarm Record	
Er11.0	Control power supply voltage insufficient protection	●			Page 130
Er12.0	Overvoltage protection	●		●	Page 130
Er13.0	Main power supply insufficient voltage protection (voltage across PN insufficient)	●			Page 131
Er13.1	Main power supply under-voltage protection (AC disconnection detection)	●	●		Page 131
Er14.0	Overcurrent protection			●	Page 132
Er14.1	IPM error protection			●	Page 132
Er15.0	Radiator 1 overheat fault		●	●	Page 133
Er15.2	Main control chip overheating protection		●	●	Page 133
Er16.0	Overload protection	●	●	●	Page 133
Er16.1	Torque saturation protection	●	●	●	Page 134
Er18.0	Regenerative discharge overload protection		●	●	Page 134
Er19.0	DB (dynamic brake) overload protection			●	Page 134
Er21.0	Encoder communication disconnection error			●	Page 135

Alarm Code	Name	Attribute			Reference Page No.
		Resettable	E-stop	Alarm Record	
Er23.0	Encoder communication data error protection			●	Page 135
Er24.0	Position deviation excess protection	●	●	●	Page 136
Er24.1	Speed deviation excess protection	●	●	●	Page 136
Er26.0	Overspeed protection	●	●	●	Page 137
Er26.1	2nd overspeed protection	●		●	Page 137
Er27.0	Command pulse input frequency error protection	●	●	●	Page 137
Er27.1	Command pulse frequency multiplication error protection	●	●	●	Page 137
Er27.3	Position command error protection	●	●	●	Page 138
Er27.4	Speed command error protection	●	●	●	Page 138
Er30.0	Safe input protection			●	Page 138
Er33.0	I/F input duplicate assignment error1 protection			●	Page 138
Er33.2	I/F input function number error1			●	Page 138
Er33.4	I/F output function number error1			●	Page 138
Er34.0	Motor movable range setting error protection	●	●	●	Page 138
Er36.0~Er36.2	EEPROM parameter error protection				Page 139
Er36.3	Registration code error				Page 139
Er37.0~Er37.2	EEPROM check code error protection				Page 139
Er38.0	Disable drive input protection	●	●		Page 139
Er40.0	Absolute system shutdown error protection			●	Page 139
Er41.0	Absolute count overflow error protection			●	Page 139
Er42.0	Absolute encoder overspeed error protection	●		●	Page 140
Er43.0	Encoder initialization error protection			●	Page 140
Er44.0	Absolute encoder single cycle counting error protection			●	Page 140
Er45.0	Absolute encoder multi-cycle counting error protection			●	Page 140
Er46.0	Absolute encoder overheat error protection			●	Page 140
Er47.0	Absolute encoder status error protection			●	Page 140
Er48.0	Encoder Z-phase error protection			●	Page 140
Er49.0	Encoder CS signal error protection			●	Page 140
Er52.3	Switch power supply voltage output abnormal	●		●	Page 140

Alarm Code	Name	Attribute			Reference Page No.
		Resettable	E-stop	Alarm Record	
Er52.4	Power board and control board not match			●	Page 141
Er52.5	Power module host bridge current excess			●	Page 141
Er57.0	Current offset excessive protection			●	Page 141
Er57.1	Current gain diagnostic error protection			●	Page 141
Er58.0	Chip operation error protection			●	Page 141
Er59.0	Registration time expired				Page 141
Er59.1	The software write adapter No. not match the hardware			●	Page 141
Er73.0	Regenerative resistor parameters do not match				Page 142
Er76.0	Motor stall over-temperature protection	●		●	Page 142
Er77.0	Runaway protection	●		●	Page 142
Er80.0	Incorrect communication status request abnormal protection	●	●	●	Page 143
Er80.1	Undefined communication status request abnormal protection	●	●	●	Page 143
Er80.2	Boot status request abnormal protection	●		●	Page 144
Er80.4	Synchronous communication timeout	●	●	●	Page 144
Er80.7	Synchronous signal abnormal protection	●	●	●	Page 144
Er81.0	Synchronous cycle setting abnormal protection	●		●	Page 145
Er81.1	Mailbox setting abnormal protection	●		●	Page 145
Er81.4	Synchronous communication timeout	●		●	Page 146
Er81.5	DC setting abnormal protection	●		●	Page 146
Er81.6	Synchronous mode setting abnormal protection	●		●	Page 146
Er81.7	Synchronization manager 2/3 setting abnormal protection	●	●	●	Page 147
Er85.0	TPDO allocation abnormal protection	●		●	Page 147
Er85.1	RPDO allocation abnormal protection	●		●	Page 147
Er85.2	Port disconnection detection abnormal protection	●	●	●	Page 147
Er85.3	SII EEPROM abnormal protection			●	Page 148
Er85.4	ESC configuration abnormal protection			●	Page 148
Er87.0	Forced alarm input protection	●	●		Page 148
Er88.0	Main power supply insufficient voltage protection (AC off detection 2)		●	●	Page 148
Er88.1	Control mode setting abnormal	●	●	●	Page 149

Alarm Code	Name	Attribute			Reference Page No.
		Resettable	E-stop	Alarm Record	
	protection				
Er88.2	Communication status during operation require abnormal protection	●	●	●	Page 149
Er95.0~Er95.4	Motor automatic recognition error protection				Page 150
Er99.0	Other			●	Page 150

9.4 Alarm Code Details

9.4.1 Er10 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er11.0	Control power supply voltage insufficient protection	**Alarm Principle:** ⩾1.5kW power drive, the control power supply voltage is less than the specified value, and the duration exceeds 2ms; The specified value of 220V drive is 150V; The specified value of 380V drive is 350V. **Possible Causes:** 1. Low input voltage; 2. Instantaneous power failure; 3. When the main power supply is turned on, the power supply voltage drops due to the impact of the inrush current; 4. Drive fault (circuit fault).	1. Measure whether the input voltage meets the spec of the nameplate; Check whether the terminal is loose or in poor contact; 2. Power on again; 3. Increased power supply capacity; 4. Replace the drive.
Er12.0	Overvoltage protection	**Alarm Principle:** The drive bus voltage is greater than the specified value; The rated value of 220V drive is 410V; The rated value of 380V drive is 810V. **Possible Causes:** 1. The input voltage is out of the allowable range; 2. Regeneration resistor failure; 3. External regenerative resistor does not match; 4. There is a switch on the zero line or the high impedance	1. Measure whether the input voltage is consistent with the nameplate; 2. Replace the external resistor; 3. Reduce the resistance value of external regeneration resistance and increase the power; (The resistance value should be less than the built-in resistance value, but not less than the minimum allowable value, and the power should be greater than the built-in resistance power); 4. Check whether P00.16, P00.18 and P00.19 are consistent with the actual wiring and resistance

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		leads to the deviation of the neutral point, resulting in the high voltage of one or two phases; 5. U, V, W are wrongly connected or in contact with the ground wire; 6. Drive fault (circuit fault).	specs; 5. The command is unreasonable. If the speed command is too high or the command acceleration and deceleration is too large, it should be reduced appropriately; 6. Ensure that the zero line screw of the machine tool and power distribution cabinet powered by the drive is not loose, and the zero line is not switched; 7. Make sure that U, V, W and ground wire are not wrongly connected and not in contact; 8. Replace the drive.
	 Caution If the input voltage is too high, the drive will be damaged, and the power should be cut off immediately.		
Er13.0	Main power supply voltage insufficient protection(PN)	**Alarm Principle:** The voltage across PN is detected to be lower than 180V. **Possible Causes:** 1. The power supply voltage is low, and the instantaneous power failure occurs; 2. The power supply capacity is insufficient, and the main power supply is affected by the impact current when it is connected, resulting in the power supply voltage drop; 3. The three-phase power supply is unbalanced; 4. If there is a phase loss, the drive with three-phase specs should be input and actually operates with single-phase power supply; 5. Drive fault (circuit fault).	1. Measure whether the input voltage meets the spec of the nameplate; Check whether the terminal is loose or in poor contact; 2. Increase power supply voltage capacity; 3. Ensure the power supply is normal; 4. Check whether the electromagnetic contactor of the main power supply is faulty; 5. Extend the setting of parameter **P05.09** and confirm the power supply of each phase; 6. Correctly connect all phases of the power supply (L1, L2, L3): when three-phase, connect all three terminals; When single-phase, choose any two of the terminals to connect; 7. Replace the drive.
Er13.1	Main power supply under-voltage protection (AC)	**Alarm Principle:** When the parameter **P05.08 Undervoltage Protection Selection when Main Power** is set to **1**, the inter-line transient stop time of L1-L3 is greater than the time set by the parameter **P05.09 Main Power Supply Off Detection Time** or the input voltage is less than the specified value when the	

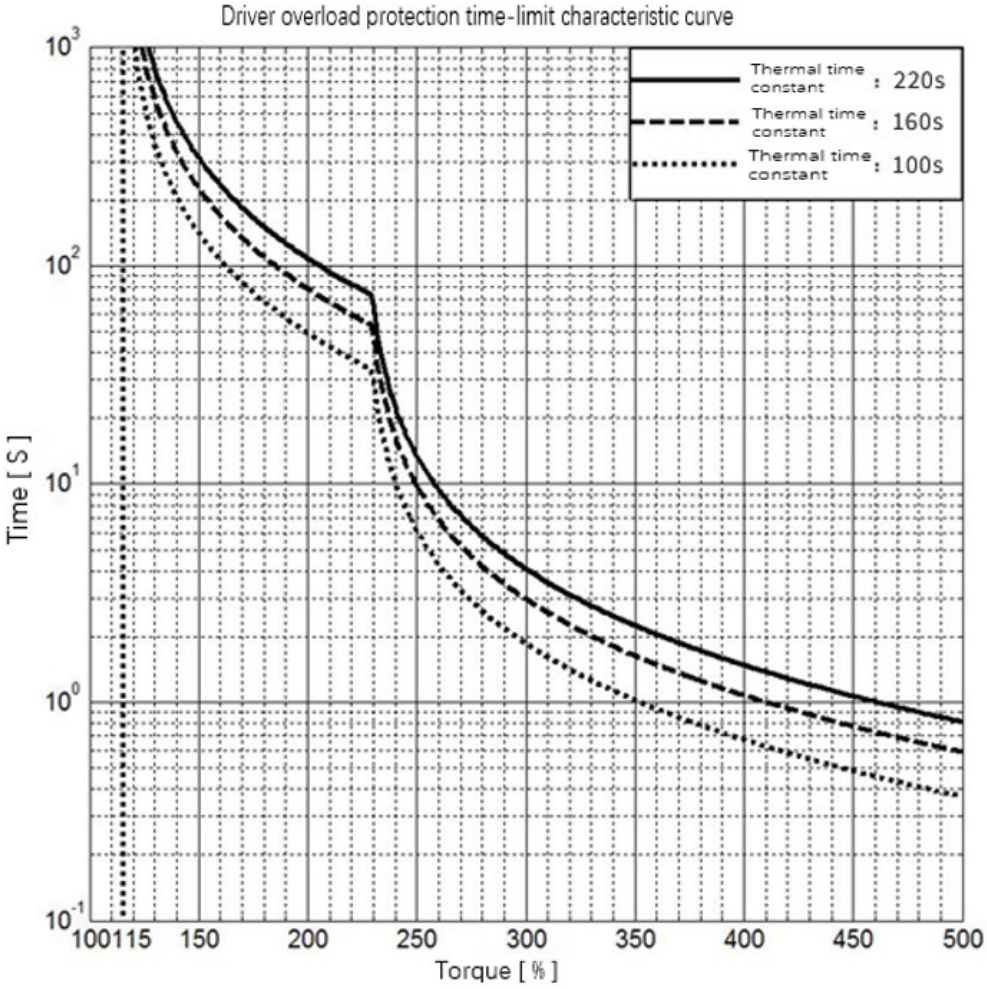
Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		servo is turned on. **Possible Causes:** 1. The power supply voltage is low, and the instantaneous power failure occurs; 2. The power supply capacity is insufficient, and the main power supply is affected by the impact current when it is connected, resulting in the power supply voltage drop; 3. The three-phase power supply is unbalanced; 4. If there is a phase loss, the drive with three-phase specs should be input and actually operates with single-phase power supply; 5. Drive fault (circuit fault).	
Er14.0	Overcurrent protection	The inverter current is greater than the specified value.	1. The power cable of the motor can be removed, and the drive can be powered on and enabled. If the fault occurs immediately, replace the drive; 2. Check whether the motor power cables U, V and W are short circuited; 3. Check whether there is a short circuit or poor insulation between the motor power cables U, V, W and the ground wire; 4. Check whether the resistance between the three phases of the motor is balanced. If not, replace the motor; 5. Check whether the connector plugs of motor connection U, V and W are loose or falling off; 6. Replace the drive. Do not use the servo enable signal to control the rotation and stop of the servo motor; 7. Check whether the power and current of motor and drive are suitable; 8. Input the command after 100ms of servo enable; 9. Check whether the command is reasonable, properly reduce the speed command or extend the acceleration and deceleration
Er14.1	IPM error protection		

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
			time; 10. Reduce gain or use adaptive filter to suppress.
Er15.0	Radiator 1 overheat fault	The temperature of the drive radiator and power element is greater than the specified value: 1. The operating temperature of the drive is greater than the specified value; 2. Drive overload.	Check whether it is overheated or overloaded. 1. Improve cooling conditions and reduce drive operating temperature; 2. The motor capacity is insufficient; 3. The motor and drive do not match; 4. Reduce the command speed and acceleration, and reduce the load.
Er15.2	Main control chip overheating protection	The operating temperature of the drive is greater than the specified value.	Reduce the operating temperature of the drive and improve the cooling conditions.
Er16.0	Overload protection	**Alarm Principle:** When the torque command value is greater than the overload level set by the parameter **P05.12 Overload Level Setting**, the system is protected according to the **Driver Overload Protection Time Limit Feature**. **Possible Causes:** 1. Overload: The effective torque of the motor is greater than the rated torque, and it remains in this status for a long time; 2. Poor gain adjustment causing motor oscillation; 3. Motor wiring error or broken wire; 4. The brake of the brake motor is not opened; 5. In the multi-machine wiring, the motor cable is mistakenly connected to other axes; 6. Parameter **P05.12** is set too small.	The motor load rate can be confirmed through panel monitoring d15 or Imotion. 1. Check whether it runs to the mechanical limit position; 2. Mechanical error leads to resistance excess: such as damaged ball of screw rod, blocked bearing, and uneven installation, etc; 3. Whether the motor capacity is enough; 4. Check whether the gain is set too high and the inertia ratio is set reasonably; 5. Connect the motor circuit correctly according to the wiring diagram or replace the cable for testing; 6. Check whether the brake is opened normally; 7. Check whether the power line and encoder line of the motor are connected to the two drives respectively; 8. Motor and drive corresponding error; 9. Set **P05.12** reasonably (the current maximum opening is 135%), which needs to be set in combination with the actual heating condition of the motor.

<table>
<tr><th>Alarm Code</th><th>Name</th><th>Alarm Principle and Possible Causes</th><th>Confirmation and Processing</th></tr>
<tr><td>Er16.1</td><td>Torque saturation protection</td><td>Alarm Principle:
motor actual torque arrival the limit value, and the duration is greater than P06.57 setting value</td><td>1. Confirm whether the torque limit setting is too small;
2. Confirm whether P06.57 is set too small;
3. Check whether the load is too large;</td></tr>
<tr><td rowspan="2">Er18.0</td><td rowspan="2">Regenerative discharge overload protection</td><td>Alarm Principle:
The regenerative energy is greater than the capacity of the regenerative resistor.
Possible Causes:
1. When using external regenerative resistor, poor wiring and resistance fault;
2. When the built-in regenerative resistor is used, the short connector between B2 and B3 falls off;
3. Regeneration resistance parameter setting error;
4. The large load inertia forms the regenerative energy in the deceleration, resulting in the voltage rise of the inverter;
5. The energy absorption of the regeneration resistor is insufficient, resulting in an increase in the error detection value;
6. If the motor speed is too high, can not fully absorb the regenerative energy within the specified deceleration time;
7. The power supply voltage of the main circuit is greater than the specified range.</td><td>1. Check the wiring or replace the resistance test;
2. Ensure that the short connector is well connected;
3. Check whether P00.16, P00.18 and P00.19 are consistent with the actual use mode and resistance parameters;
4. Increase motor and drive capacity;
5. Increase regeneration resistance capacity;
6. Properly reduce the command speed and extend the acceleration and deceleration time;
7. Confirm that the input voltage meets the specs of the nameplate and is within a reasonable range.</td></tr>
<tr><td colspan="2"> 

When setting parameter P00.16 to 2, be sure to set external protection such as temperature fuse. If there is no external protection, the regenerative resistor may be burnt due to error heating.</td></tr>
<tr><td>Er19.0</td><td>DB (dynamic brake) overload protection</td><td>1. The motor is driven by an external force;
2. The rotation energy when DB stop is greater than the DB resistance capacity;
3. Drive fault.</td><td>1. When the servo is OFF, do not use external force to drive the motor;
2. Avoid frequent use of DB to slow down and stop the motor at high speed;
3. Replace the drive.</td></tr>
</table>

Drive Overload Protection Time-limit Characteristic:



Thermal time constant corresponding to each power segment:

- P＜100W: 110s
- 100W＜P＜400W: 160s
- 400W＜P＜1kW: 200s
- 1kW＜P＜5kW: 220s

9.4.2 Er20 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er21.0	Encoder communication disconnection error	**Alarm Principle:** Encoder and drive communication interrupted.	1. Check whether the encoder line is broken; 2. Check whether the encoder line has wrong pin position definition; 3. Check whether the encoder cable is too long, resulting in large voltage drop. Generally, the encoder cable above 15m needs to increase the wire diameter or the number of cores;
Er23.0	Encoder communication data error protection	**Alarm Principle:** Encoder can communicate, but data content error, CRC verification failed.	

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
			4. Signal interference: ○ Use twisted pair cable with shielding layer; ○ Encoder line, power line, power supply line and other strong current shall be wired separately; ○ Encoder wire shielding layer shall be grounded at both ends. 5. Confirm the use ambient: the motor, encoder and cable should not be used in high temperature ambient, and should be protected from direct sunlight; 6. Motor encoder fault: replace the motor.
Er24.0	Position deviation excess protection	**Alarm Principle:** The position deviation pulse is greater than the setting value of the parameter **P00.14 Position Deviation Excess Threshold**. **Possible Causes:** 1. The motor is blocked due to mechanical factors; 2. Parameter **P00.14 Position Deviation Excess Threshold**. The set value is too small; 3. U, V, W phase loss, disconnection or phase sequence error; 4. Encoder disconnection; 5. The gain setting is too low; 6. Excessive acceleration and deceleration of position command; 7. Drive or motor fault.	1. Check the mechanical factors and make the motor no-load for test; 2. Confirm whether **P00.14** is set too small in combination with operating conditions; 3. Check the wiring, replace or swap the same cable for test; 4. Check the wiring, replace or swap the same cable for testing; 5. Check whether the gain setting is reasonable; 6. Properly lower the speed of position command; 7. Replace the drive or motor.
Er24.1	Speed deviation excess protection	**Alarm Principle:** The difference between the internal command speed and the actual speed is greater than the set value of **P06.02 Speed Deviation Excess Threshold**. This alarm only takes effect when internal speed command is used **Possible Causes:** 1. U, V, W wiring error;	1. Check the wiring; 2. Increase the acceleration and deceleration time of internal command speed **P03.12** and **P03.13**; 3. Increase the gain properly to make the speed follow faster; 4. Increase the setting value of parameter **P06.02**; 5. Set **P06.02=0** to make the speed deviation detection invalid.

<table>
<tr><th>Alarm Code</th><th>Name</th><th>Alarm Principle and Possible Causes</th><th>Confirmation and Processing</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>2. The acceleration and deceleration time of internal speed command is set too small;
3. The gain is too low;
4. P06.02 is set too small.</td><td></td></tr>
<tr><td colspan="2"> 
• When the command pulse input inhibit (INH) or the immediate stop of positive and negative drive inhibit input forcibly changes the internal position command speed to 0, the instantaneous speed deviation becomes larger. In addition, the speed deviation will also increase when the internal position command speed is started, so when setting parameter P06.02, ensure that the setting of parameter P06.02 is large enough.</td></tr>
<tr><td>Er26.0</td><td>Overspeed protection</td><td>Alarm Principle:
The motor speed is greater than the set value of parameter P05.13 Overspeed Level Setting.
Possible Causes:
1. Speed command input is too large;
2. Parameter setting error;
3. Command frequency division setting is unreasonable;
4. Speed overshoot caused by unreasonable gain setting;
5. U, V, W phase sequence error;
6. Encoder signal error.</td><td rowspan="2">1. Check whether the speed command is too large;
Confirm whether the speed limit settings P03.21 and P03.22 are reasonable in torque mode;
2. Confirm whether the parameter setting is reasonable;
3. Check whether the command frequency division setting is reasonable;
4. Check whether the gain is reasonable. Unreasonable gain will cause excessive speed overshoot;
5. Check the power line phase sequence;
6. Check the encoder cable and replace the cable for testing.</td></tr>
<tr><td>Er26.1</td><td>2nd overspeed protection</td><td>The speed of the motor is greater than the setting value of the parameter P06.15 2nd Overspeed Level Setting.</td></tr>
<tr><td>Er27.0</td><td>Command pulse input frequency error protection</td><td>The command pulse input frequency is greater than the setting value of parameter P05.32.</td><td>1. Check whether the command pulse input frequency is too large;
2. Check whether P05.32 setting is reasonable, combining wiring and pulse shape.</td></tr>
<tr><td>Er27.1</td><td>Command pulse frequency multiplication error protection</td><td>Command frequency division multiplier setting error:
The value of numerator/denominator is out</td><td>Check whether the numerator and denominator of the command frequency division multiplier is set incorrectly.</td></tr>
</table>

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		of range, and the normal range is 0.001~32000.	
Er27.3	Position command error protection	The position command speed value (the value after the electronic gear ratio) exceeds the maximum speed of the motor.	1. Check whether the command frequency division multiplier is set incorrectly; 2. Confirm whether the position command is error.
Er27.4	Speed command error protection	The speed command exceeds the maximum speed of the motor.	Check whether the speed command input is too large.

9.4.3 Er30 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er30.0	Safe input protection	The photocoupler of at least one of STO1 and STO2 is OFF	Confirm the wiring and signal status of STO1 and STO2
Er33.0	I/F input duplicate assignment error1 protection	Input ports (SI1~SI8) are set repeatedly during function allocation.	Check whether the same function is assigned to different ports.
Er33.2	I/F input function number error1	Input ports (SI1~SI8) are assigned unsupported functions in function allocation.	Please confirm whether the function matches the control mode.
Er33.4	I/F output function number error1	The output ports (SO1~SO7) have repeatedly allocated or allocated unsupported functions during function allocation.	1. Check whether the function is allocated repeatedly; 2. Check whether the function and control mode are compatible.
Er34.0	Motor movable range setting error protection	**Alarm Principle:** In the position control mode, when the current position command range is detected to be greater than the parameter **P05.14 Motor Movable Range Setting**, the drive will give this alarm to avoid abnormal collision of the motor due to vibration. **Possible Causes:** 1. Poor gain adjustment; 2. The setting value of parameter **P05.14** is too small.	1. Confirm whether the gain setting is reasonable; Confirm whether the setting of inertia ratio is reasonable; 2. 2. Increase the setting value of parameter **P05.14**; 3. When parameter **P05.14** is set to **0**, the protection function is invalid.
		Caution • **Er34.0** has no protection function for error position command; • When the software limit protection function acts, set the motor	

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		deceleration and stop according to the parameters **P05.10 Alarm Shutdown Time Sequence**; • During the deceleration process, if the load collides with the end of the machine tool, set parameter **P05.14** after estimating the deceleration action according to the load.	
Er36.0 Er36.1 Er36.2	EEPROM parameter error protection	**Alarm Principle:** Data error occurs when reading and writing data from EEPPOM **Possible Causes:** 1. Electromagnetic interference; 2. Parameter disorder; 3. Drive fault.	1. Check the grounding and eliminate electromagnetic interference; 2. Initialization parameters; 3. Power off and restart. If there is still an error, replace the drive.
Er37.0 Er37.1 Er37.2	EEPROM check code error protection	EEPROM failed to read data.	
Er36.3	Registration code error	1. Registration code input error; 2. Invalid registration code;	1. Check input; 2. Reapply;
Er38.0	Drive prohibition input protection	**Possible Causes:** 1. When parameter **P05.04 Overtravel Protection** setting is set to **0**, both positive and negative overtravel input are **ON**; 2. When parameter **P05.04** is set to **2**, one of the positive and negative overtravel input is **ON**.	1. Check **P05.04** parameter setting; 2. Check the external input signal and confirm that the wiring is normal.

9.4.4 Er40 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er40.0	Absolute system shutdown error protection	**Possible Causes:** 1. For the first power on after the encoder is powered off, it is necessary to perform multi-turn zeroing; 2. The battery voltage is lower than 2.75V.	1. The encoder can be reset for multiple turns through panel AF006, and then power off and restart (pay attention to the mechanical position change caused by the reset of the encoder for multiple turns); 2. Measure the battery voltage and replace the battery if it is lower than the normal value; Make sure the battery cable is connected properly.
Er41.0	Absolute count overflow error protection	Encoder multi-turn data overflow.	1. Set the parameter **P00.15 Absolute Encoder Setting** to **2**, and ignore the overflow of multiple rotation counter; 2. Make sure that the movement from the mechanical origin is

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
			within the range of -32767~32767.
Er42.0	Absolute encoder overspeed error protection	The motor speed is greater than the specified value when the encoder external power supply is error and only powered by battery.	1. Ensure that the encoder power supply voltage is DC5V$^{+5\%}_{-5\%}$ (4.75V~5.25V) ; 2. Ensure that the encoder connector is connected normally; 3. Confirm whether the motor is driven by external force and the rotating speed is too high.
Er43.0	Encoder initialization error protection	Error is detected during encoder initialization.	Replace the motor.
Er44.0	Absolute encoder single cycle counting error protection	Absolute encoder single-turn count error detected.	Replace the motor.
Er45.0	Absolute encoder multi-cycle counting error protection	Absolute encoder multi-turn count error detected: multi-turn data has changed.	Replace the motor.
Er46.0	Absolute encoder overheat error protection	The encoder temperature inside the motor is too high.	Reduce the ambient temperature of the motor.
Er47.0	Absolute encoder status error protection	When the power is turned on, it is detected that the encoder rotation speed exceeds the specified value.	When the power is turned on, avoid the rotation of the motor and do not drag it by external force.
Er48.0	Encoder Z- phase error protection	1. Missing phase Z-pulse detected for incremental encoder; 2. Encoder failure.	Replace the motor.
Er49.0	Encoder CS signal error protection	1. The CS signal logic error of the incremental encoder is detected; 2. Encoder failure.	Replace the motor.

9.4.5 Er50 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er52.3	Switch power supply voltage output abnormal	**Alarm Principle:** Switch power supply voltage is out of range **Possible Causes:** 1. Encoder wiring errors, aging corrosion, loose joints, etc.; 2. Drive failure.	1. Check or replace the cable; 2. Replace the drive.

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er52.4	Power board and control board not match	Drive failure	Replace drive
Er52.5	Power module host bridge current excess	**Alarm Principle:** The host bridge current excess **Possible Causes:** 1. Too high gain causes current oscillation; 2. The motor power line UVW and PE are connected reversely or short circuit to PE; 3. Motor failure; 4. Regenerative resistor overcurrent; 5. Drive failure.	1. Set the gain appropriately; 2. Check wiring; 3. Replace the motor; 4. Check whether the regeneration resistor value is too small or the wiring is short circuit; 5. Remove the motor UVW and PE, power on again and enable the servo. If the alarm still occurs, replace the drive.
Er57.0	Current offset excessive protection	**Alarm Principle:** During servo power on, the current sampling value exceeds the specified value. **Possible Causes:** 1. U, V, W short circuit to ground; U, V, W and ground wire are connected reversely; 2. Drive fault.	1. Check the power line wiring; 2. After cutting off the power, remove the UVW and PE, and then turn on the power again. If the error persists, replace the drive.
Er57.1	Current gain diagnostic error protection	1. Power circuit error; 2. The motor cables U, V and W are broken.	1. After cutting off the power, turn on the power again. If the error still occurs, replace the drive and motor and return to the factory for maintenance; 2. Ensure that the motor cable U, V, W signal wiring is normal.
Er58.0	Chip operation error protection	Error caused by chip power supply or noise.	After cutting off the power, turn on the power again. If the error still occurs, replace the drive and motor and return to the factory for maintenance.
Er59.0	Registration time expired	The remaining registration time of the software is insufficient.	Check the remaining usable time of the software and contact the dealer or manufacturer to re-register.
Er59.1	The software write adapter No. not match the hardware	The software version No. does not match the actual.	Check the software version No. and contact the dealer or manufacturer.

9.4.6 Er70 Series

<table>
<tr><th>Alarm Code</th><th>Name</th><th>Alarm Principle and Possible Causes</th><th>Confirmation and Processing</th></tr>
<tr><td>Er73.0</td><td>Regeneration resistance parameter mismatch</td><td>Parameter P00.19 The regeneration resistance is less than the minimum allowable resistance of the drive.</td><td>1. Check whether the parameter setting is consistent with the actual resistance value;
2. Replace the resistance that meets the spec.</td></tr>
<tr><td rowspan="2">Er76.0</td><td rowspan="2">Motor stall over-temperature protection</td><td>Alarm Principle:
An alarm occurs when the following three conditions are met simultaneously:
1. Actual motor speed is less than 10rpm;
2. Torque command arrival the limit value;
3. The duration arrival the setting value of parameter P06.61 Stall Protection Time.
Possible Causes:
1. U, V, W cable phase loss, disconnection, wrong phase sequence, etc.;
2. Mechanical factors cause the motor to stall;
3. The motor parameters are set incorrectly.</td><td>1. Check the power line;
2. Check whether the axis is at the limit position, whether there is mechanical lag, stuck, uneven installation, etc.;
3. Check the motor pole pairs and initial magnetic pole angle setting.</td></tr>
<tr><td colspan="2"> 
• After troubleshooting, please stop the machine for 30s before running the motor.</td></tr>
<tr><td>Er77.0</td><td>Runaway protection</td><td>Alarm Principle:
1. In the torque control mode, the torque command direction is opposite to the speed feedback direction, and the actual speed is greater than the setting value of P06.54, and the duration exceeds the setting value of P06.56;
2. In the position or speed control mode, the speed feedback direction is opposite to the speed command direction, and the actual speed is greater than the setting value of P06.54, and the duration exceeds the setting value</td><td>1. Check the power wiring;
2. If the phase sequence of U, V and W is correct and Er77.0 Runaway Protection still occurs, it may be caused by interference during power-on. At this time, it is necessary to reconnect the power supply;
3. Check the nameplate information of motor and drive to confirm whether it is us product;
4. Turn off the servo enable, turn the motor shaft by hand, and check whether the monitoring mode D01 changes with the rotation of the motor shaft. If the monitoring mode D01 does not change with the rotation of the motor shaft, re-weld, tighten or replace the encoder</td></tr>
</table>

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		of P06.56. **Possible Causes:** 1. U, V, W phase sequence wiring error; 2. When the power supply is turned on, the interference signal causes the initial phase detection error of the motor rotor; 3. Encoder model is not supported; 4. Encoder aging and corrosion, encoder plug loose; 5. The gravity load in vertical axis applications is too heavy; 6. Unreasonable parameter setting causes excessive servo vibration.	cable; 5. Reduce the vertical axle load, or increase the rigidity, or shield **Er77.0 Runaway Protection** without affecting the safety and use; 6. Check whether the servo gain is set too high and reduce the gain appropriately.

9.4.7 Er80 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er80.0	Incorrect communication status request abnormal protection	The slave station received an incorrect communication status switching request: • Init → SafeOP • Init → OP • PreOP → OP • PreOP → Bootstrap • SafeOP → Bootstrap OP → Bootstrap	Confirm the communication status switching request of the host device.
		The process after detect the error 1）The operation after detecting this error differs depending on the communication status: • When the communication status is **Init** / **PreOP** / **SafeOP**, the communication status remains unchanged. • When the communication status is **OP**, the communication status switch to **SafeOP**. 2）The AL status code detected is **0011h**.	
Er80.1	Undefined communication status request abnormal protection	Undefined communication status request received. Defined status request: • 1: Init state • 2: Pre-Operational state • 3: Bootstrap state	Confirm the communication status switching request of the host device.

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		• 4: Safe-Operational state • 8: Operational state	
		The Process after Detect the Error 1. The operation after detecting this error differs depending on the communication status: • When the communication status is **Init** / **PreOP** / **SafeOP**, the communication status remains unchanged. • When the communication status is **OP**, the communication status switch to **SafeOP**. The AL status code detected is **0012h**.	
Er80.2	Boot status request abnormal protection	When the communication status is in the **Init** status, **3: Bootstrap** (bootstrap status) request is received.	Confirm the communication status switching request of the host device.
		The Process after Detect the Error 1. The communication status remain unchanged. The AL status code detected is **0013h**.	
Er80.4	Synchronous communication timeout	When the communication status is in the **OP** state, the slave station does not receive the master station synchronous data within the synchronous communication timeout. The synchronous communication timeout is determined by ESC registers **0400h** and **0420h**.	• Ensure that the synchronous data transmission time of the host device is fixed (not interrupted). If interrupted, modify the host device sending interval or synchronous communication timeout. • Make sure that the wiring of the EtherCAT communication cable is normal. • Make sure there is no excessive noise on the EtherCAT communication cable.
		The Process after Detect the Error 1. The communication status switch to **SafeOP**. The AL status code detected is **001Bh**.	
Er80.7	Synchronous signal abnormal protection	When the communication status is in the **SAFEOP** or **OP** state, the **Sync0** synchronous signal is lost within the continuous synchronous cycle specified by object **3540h**.	1. Ensure that the synchronous data sending time of the host device is equal to the set communication cycle. 2. Ensure that

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
			propagation delay compensation and deviation compensation are correct. 3. Ensure that the EtherCAT communication cable is properly wired. 4. Ensure there is no excessive noise on the EtherCAT communication cable.  When the value of object 3005:29h is 0, synchronous signal abnormal detection is not performed.
		The Process after Detect the Error 1. The communication status switch to **PreOp**. The detected AL status code is **002Ch**.	
Er81.0	Synchronous cycle setting abnormal protection	When the communication state switch from **PreOP** → **SafeOP**, the value of ESC register **09A0h** is set incorrectly: • The synchronous cycle is less than 1ms. • The synchronous cycle is greater than 4ms. The synchronous cycle is not a multiple of 250 us.	Correctly set the synchronous cycle
		The Process after Detect the Error 1）When the communication status is **PreOP** → **SafeOP**, the communication status switch to **PreOP**; 2）The AL status code detected is **0035h**.	
Er81.1	Mailbox setting abnormal protection	When the communication status switch from **Init** → **PreOP** status or is in **PreOP** / **SafeOP** / **OP** state, the synchronization manager 0 / 1 setting value of the mailbox is wrong: • Synchronization manager 0 has incorrect setting: ○ ESC register **0800h** is set to a value other than **1000h**. ○ The length value of ESC	Refer to the synchronization manager provided by the ESI file for setting

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		register **0802h** is not between **34byte~128byte**. ○ ESC register **0804h** is set to a value other than **26h**. • Synchronization manager 1 has incorrect setting: ○ ESC register **0808h** is set to a value other than **1080h**. ○ The length value of ESC register **080Ah** is not between **34byte~128byte**. ○ ESC register **080Ch** is set to a value other than **22h**.	
		The Process after Detect the Error 1）The communication status switch to **Init**; 2）The **AL** status code detected is **0016h**.	
Er81.4	Synchronous communication timeout	When the communication status switch from **PreOP** → **SafeOP** status, synchronous communication setting error: • ESC register **0814h** bit6 is set to **0**. The synchronous communication timeout value (ESC register **0400h**, **0420h**) is set less than (communication cycle * 2).	Correctly set the ESC register related to synchronous communication
		The Process after Detect the Error 1）The communication status switch to **PreOP**; 2）The **AL** status code detected is **001Fh**.	
Er81.5	DC setting abnormal protection	When the communication status switch from **PreOP** → **SafeOP**, the DC synchronous signal activate register setting is incorrect. Error condition: ESC register **0981h** bit1 is set to **0**.	Correctly set the DC synchronous signal activate register.
		The Process after Detect the Error 1）The communication status switch to **SafeOP**; 2）The **AL** status code detected is **0030h**.	
Er81.6	Synchronous mode setting abnormal protection	When the communication status switch from **PreOP** → **SafeOP**, an unsupported synchronous mode is set: • Object **1C32:01h** is set to a value other than **2**. • Object **1C33:01h** is set to a value other than **2**.	Correctly set the parameters related to the slave station synchronous mode
		The Process after Detect the Error	

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		1）The communication status switch to **PreOP**; 2）The **AL** status code detected is **0028h**.	

Er81.7	Synchronization manager 2/3 setting abnormal protection	When the communication status switch from **PreOP** → **SafeOP**, an error is detected:
		• Synchronization manager 2 has incorrect setting:
		  ○ ESC register **0810h** is set to a value other than **1100h**.
		  ○ ESC register **0814h** is set to a value other than **64h**.
		• Synchronization manager 3 has incorrect setting:
		  ○ ESC register **0818h** is set to a value other than **1180h**.
		ESC register **081Ch** is set to a value other than **20h**.
			Correctly set synchronization manager 2 and synchronization manager 3

		The Process after Detect the Error 1）The communication status switch to **PreOP**; 2）The **AL** status code detected is **001Dh** or **001Eh**.	
Er85.0	TPDO allocation abnormal protection	When the communication status switch from **PreOP** → **SafeOP**: • The total length of TPDO mapping data is greater than 40 bytes. • The length value setting of ESC register 081Ah is inconsistent with the total length of TPDO mapping.	Set the total length of TPDO mapping data within 40 bytes
		The Process after Detect the Error 1）The communication status switch to **PreOP**; 2）The **AL** status code detected is **0024h**.	
Er85.1	RPDO allocation abnormal protection	When the communication status switch from **PreOP** → **SafeOP**: • The total length of RPDO mapping data is greater than 40 bytes. • The length value setting of ESC register 0812h is inconsistent with the total length of RPDO mapping.	Set the total length of RPDO mapping data within 40 bytes
		The Process after Detect the Error 1）The communication status switch to **PreOP**; 2）The **AL** status code detected is **0025h**.	
Er85.2	Port disconnect protection	When the communication state is in **PreOP** / **SafeOP** / **OP** state, the slave station detects that the port CN2A or	Ensure the EtherCAT communication cable is

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		CN2B disconnection time is greater than the threshold specified by object **3005:2Ah**.  If object **3005:2Ah** is set to **0**, port disconnection detection will not be performed.	properly wired
		The Process after Detect the Error 1）The communication status switch to **Init**; 2）The **AL** status code detected is **0006h**.	
Er85.3	SII EEPROM abnormal protection	SII EEPROM error occurred: • The SII EEPROM cannot be loaded correctly when switching from Init → PreOP in the communication state. • The internally stored ESI information (vendor ID, product code) is inconsistent with the definition of object **1018h**.	Ensure the drive's SII EEPROM data is normal
		The Process after Detect the Error 1）The communication status switch to **Init**; 2）The **AL** status code detected is **0006h**.	
Er85.4	ESC configuration abnormal protection	Drive ESC module fails to initialize properly	After cutting off the power supply, reconnect the power supply. If the error occurs again, replace the drive and return it to the factory for repair.
		The Process after Detect the Error 1）The communication status switch to **Init**; 2）The **AL** status code detected is **0000h**.	
Er87.0	Forced fault input protection	Forced fault input entered.	Ensure that the wiring of the forced fault input is normal.
Er88.0	Main power supply insufficient voltage protection (AC off detection 2)	**Alarm Principle:** • The setting value of 6007h is 1, and the PDS status is "Operation enabled" or "Quick stop active". In this status, the main circuit power supply is detected to be OFF; • The setting value of 6007h is 1, and the PDS status is "Ready to switch on", and the main circuit power supply is OFF. In this state, the Switch on command is	• Measure whether the input voltage meet the nameplate specifications; Check whether the wiring terminals are loose or have poor contact; • Improve power supply voltage capacity; • Ensure that the power

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
		received;	supply is normal; • Check whether the main power electromagnetic contactor is faulty; • Correctly connect each phase of the power supply (L1, L2, L3): when there are three phases, connect all three terminals; • In single phase mode, any two terminals can be selected to connect; • Replace the drive.
Er88.1	Control mode setting abnormal protection 2	While in **PreOP** / **SafeOP** / **OP** state, an error was detected: • When using **6040h Control Character** to convert the servo device status to **Servo Running**, the **3000:02h Control Mode Setting** is set to a value other than 19. • When using the **6040h Control Character** to convert the servo device status to servo running, the **6040h Control Character** value is 0. • When setting **3000:02h Control Mode Setting** of RPDO, an unsupported control mode is set.	Ensure the setting values of **3000:02h Control Mode Setting** and **6060h Control Mode** are correct
		The Process after Detect the Error 1）The communication status remain unchanged; 2）The **AL** status code detected is **0000h**.	
Er88.2	Communication status during operation require abnormal protection	When the motor is enabled, a communication status switching request is received: • The servo device status is in servo running or quick shutdown status. • The drive is in iMotion controlled trial run status. • The drive is in the trial run status of the display panel.	Confirm the communication status switching request of the host device
		The Process after Detect the Error 1）The communication status switch to the status corresponding to the request; 2）The **AL** status code detected is **0000h**.	

9.4.8 Er90 Series

Alarm Code	Name	Alarm Principle and Possible Causes	Confirmation and Processing
Er95.0	Motor automatic recognition error protection	Motor and drive voltage specification not match.	Check nameplate information to ensure product specification match.
Er95.1		Motor and drive encoder interface not match.	
Er95.2		1. The motor and drive power level not match: ○ Motor rated current＜drive rated current/4; ○ Motor rated current > drive rated current. 2. Motor No. not exist.	Ensure product specification match: Confirm the setting value of **P00.24 Motor No.**.
Er95.3		Motor encoder type not match drive setting: An incremental encoder is connected, but P00.15 is not set to 1.	Confirm whether the connected motor encoder type match the setting of parameter **P00.15**.
Er95.4		Read and write encoder EEPROM error. **Possible Causes:** 1. The motor has no write adapter No.; 2. Encoder fault;	1. Contact our personnel to write the motor adapter No.; 2. Replace the motor;
Er 99.0	Other	1. Misoperation of control circuit due to excessive noise; 2. The self-diagnosis function of the drive is activated due to an internal error in the drive.	After cutting off the power, turn on the power again. If the error still occurs, replace the drive.

Chapter 10 Parameter

10.1 Overview

Please read the following description carefully before debugging or parameter modification of Wise drive.

Association Mode	Description
P	PP: Profile position mode HM: Zero return mode CSP: Cycle synchronization position mode
S	PV: Profile velocity mode CSV: Cycle synchronization velocity mode
T	TQ: Profile torque mode CST: Cycle synchronization torque mode
ALL	P, S, T

10.2 Parameter List

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
P00 Basic setting		3000:02h			
	P00.02	3000:03h	Real-time automatic adjustment mode setting	Effective immediately	ALL
	P00.03	3000:04h	Real-time automatic adjustment rigidity setting	Effective immediately	ALL
	P00.04	3000:05h	Inertia ratio	Effective immediately	ALL
	P00.13	3000:0Eh	1st torque limit	Effective immediately	ALL
	P00.14	3000:0Fh	Position deviation excess threshold	Effective immediately	P
	P00.15	3000:10h	Absolute value encoder setting	Restart effective	ALL
	P00.16	3000:11h	Regenerative resistor usage selection	Restart effective	ALL
	P00.17	3000:12h	External regenerative resistor heat dissipation coefficient	Restart effective	ALL
	P00.18	3000:13h	External regenerative resistor power	Restart effective	ALL
	P00.19	3000:14h	External regenerative resistor resistance	Restart	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
				effective	
P01 Gain adjustment	P01.00	3001:01h	1st position loop gain	Effective immediately	P
	P01.01	3001:02h	1st speed loop gain	Effective immediately	ALL
	P01.02	3001:03h	1st speed loop integration time constant	Effective immediately	ALL
	P01.03	3001:04h	1st speed detection filter	Effective immediately	ALL
	P01.04	3001:05h	1st torque filter	Effective immediately	ALL
	P01.05	3001:06h	2nd position loop gain	Effective immediately	P
	P01.06	3001:07h	2nd speed loop gain	Effective immediately	ALL
	P01.07	3001:08h	2nd speed loop integral time constant	Effective immediately	ALL
	P01.08	3001:09h	2nd speed detection filter	Effective immediately	ALL
	P01.09	3001:0Ah	2nd torque filter	Effective immediately	ALL
	P01.10	3001:0Bh	Speed feedforward gain	Effective immediately	P
	P01.11	3001:0Ch	Speed feedforward filter	Effective immediately	P
	P01.12	3001:0Dh	Torque feedforward gain	Effective immediately	P,S
	P01.13	3001:0Eh	Torque feedforward filter	Effective immediately	P,S
	P01.14	3001:0Fh	2nd gain setting	Effective immediately	ALL
	P01.15	3001:10h	Position control switching mode	Effective immediately	P
	P01.16	3001:11h	Position control switching delay time	Effective immediately	P
	P01.17	3001:12h	Position control switching level	Effective immediately	P
	P01.18	3001:13h	Hysteresis during position control switching	Effective immediately	P
	P01.19	3001:14h	Position gain switching time	Effective immediately	ALL
	P01.20	3001:15h	Speed control switching mode	Effective immediately	S

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P01.21	3001:16h	Speed control switching delay time	Effective immediately	S
	P01.22	3001:17h	Speed control switching level	Effective immediately	S
	P01.23	3001:18h	Speed control switching hysteresis	Effective immediately	S
	P01.24	3001:19h	Torque control switching mode	Effective immediately	T
	P01.25	3001:1Ah	Torque control switching delay time	Effective immediately	T
	P01.26	3001:1Bh	Torque control switching level	Effective immediately	T
	P01.27	3001:1Ch	Torque control switching hysteresis	Effective immediately	T
P02 Vibration suppression	P02.00	3002:01h	Adaptive filter mode setting	Effective immediately	ALL
	P02.01	3002:02h	1st notch frequency	Effective immediately	ALL
	P02.02	3002:03h	1st notch width selection	Effective immediately	P,S
	P02.03	3002:04h	1st notch depth selection	Effective immediately	ALL
	P02.04	3002:05h	2nd notch frequency	Effective immediately	ALL
	P02.05	3002:06h	2nd notch width selection	Effective immediately	ALL
	P02.06	3002:07h	2nd notch depth selection	Effective immediately	ALL
	P02.07	3002:08h	3rd notch frequency	Effective immediately	ALL
	P02.08	3002:09h	3rd notch width selection	Effective immediately	ALL
	P02.09	3002:0Ah	3rd notch depth selection	Effective immediately	ALL
	P02.10	3002:0Bh	4th notch frequency	Effective immediately	ALL
	P02.11	3002:0Ch	4th notch width selection	Effective immediately	ALL
	P02.12	3002:0Dh	4th notch depth selection	Effective immediately	ALL
	P02.14	3002:0Fh	1st vibration damping frequency	Effective immediately	P
	P02.15	3002:10h	1st vibration damping ratio	Effective	P

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
				immediately	
	P02.16	3002:11h	2nd vibration damping frequency	Effective immediately	P
	P02.17	3002:12h	2nd vibration damping ratio	Effective immediately	P
	P02.18	3002:13h	3rd vibration damping frequency	Effective immediately	P
	P02.19	3002:14h	3rd vibration damping ratio	Effective immediately	P
	P02.20	3002:15h	4th vibration damping frequency	Effective immediately	P
	P02.21	3002:16h	4th vibration damping ratio	Effective immediately	P
	P02.22	3002:17h	Position command smoothing filter	Effective immediately	P
	P02.23	3002:18h	Position command FIR filter	Effective immediately	P
	P02.24	3002:19h	Model tracking control selection	Effective immediately	P
	P02.25	3002:1Ah	Model tracking control gain	Effective immediately	P
	P02.26	3002:1Bh	Model tracking control inertia correction	Effective immediately	P
	P02.27	3002:1Ch	Model tracking control positive torque feedforward compensation	Effective immediately	P
	P02.28	3002:1Dh	Model tracking control negative torque feedforward compensation	Effective immediately	P
	P02.29	3002:1Eh	Model tracking control speed feedforward compensation	Effective immediately	P
	P02.30	3002:1Fh	Low frequency vibration suppression 1 frequency A	Effective immediately	P
	P02.31	3002:20h	Low frequency vibration suppression 1 frequency B	Effective immediately	P
	P02.32	3002:21h	Low frequency vibration suppression 2 frequency	Effective immediately	P
	P02.33	3002:22h	Low frequency vibration suppression 2 compensation	Effective immediately	P
	P02.34	3002:23h	Medium frequency vibration suppression enable	Effective immediately	P
	P02.35	3002:24h	Medium frequency vibration suppression frequency	Effective immediately	P
	P02.36	3002:25h	Medium frequency vibration suppression	Effective	P

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
			inertia correction	immediately	
	P02.37	3002:26h	Medium frequency vibration suppression damping gain	Effective immediately	P
	P02.38	3002:27h	Medium frequency vibration suppression filter time constant 1 compensation	Effective immediately	P
	P02.39	3002:28h	Medium frequency vibration suppression filter time constant 2 compensation	Effective immediately	P
	P02.40	3002:29h	Medium frequency vibration suppression damping gain 2	Effective immediately	P
	P02.41	3002:2Ah	Medium frequency vibration suppression frequency 2	Effective immediately	P
P03 Speed /Torque control	P03.00	3003:01h	Speed command selection	Effective immediately	S
	P03.01	3003:02h	Internal speed command direction setting	Effective immediately	S
	P03.03	3003:04h	External analog speed command direction setting	Effective immediately	S
	P03.04	3003:05h	1st stage speed command	Effective immediately	S
	P03.05	3003:06h	2nd stage speed command	Effective immediately	S
	P03.06	3003:07h	3rd stage speed command	Effective immediately	S
	P03.07	3003:08h	4th stage speed command	Effective immediately	S
	P03.08	3003:09h	5th stage speed command	Effective immediately	S
	P03.09	3003:0Ah	6th stage speed command	Effective immediately	S
	P03.10	3003:0Bh	7th stage speed command	Effective immediately	S
	P03.11	3003:0Ch	8th stage speed command	Effective immediately	S
	P03.12	3003:0Dh	Acceleration time setting	Effective immediately	S
	P03.13	3003:0Eh	Deceleration time setting	Effective immediately	S
	P03.14	3003:0Fh	S-type acceleration and deceleration time setting	Effective immediately	S
	P03.15	3003:10h	Zero-speed clamp function selection	Effective immediately	S,T

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P03.16	3003:11h	Zero-speed clamp level	Effective immediately	S,T
	P03.17	3003:12h	Torque command selection	Effective immediately	T
	P03.18	3003:13h	Internal torque command direction setting	Effective immediately	T
	P03.21	3003:16h	Speed limit 1	Effective immediately	T
	P03.22	3003:17h	Speed limit 2	Effective immediately	T
	P03.30	3003:1Fh	Torque arrival datum value	Effective immediately	ALL
	P03.31	3003:20h	Torque arrival failure value	Effective immediately	ALL
	P03.32	3003:21h	Torque arrival effective value	Effective immediately	ALL
P04 I/F Monitor setting	P04.00	3004:01h	SI1 input selection	Restart effective	ALL
	P04.01	3004:02h	SI2 input selection	Restart effective	ALL
	P04.02	3004:03h	SI3 input selection	Restart effective	ALL
	P04.03	3004:04h	SI4 input selection	Restart effective	ALL
	P04.04	3004:05h	SI5 input selection	Restart effective	ALL
	P04.08	3004:09h	SO1 output selection	Restart effective	ALL
	P04.09	3004:0Ah	SO2 output selection	Restart effective	ALL
	P04.10	3004:0Bh	SO3 output selection	Restart effective	ALL
	P04.30	3004:1Fh	Positioning completion range	Effective immediately	P
	P04.31	3004:20h	Positioning completion output condition	Effective immediately	P
	P04.32	3004:21h	Positioning completion signal hold time	Effective immediately	P
	P04.33	3004:22h	Zero-speed threshold	Effective immediately	ALL
	P04.34	3004:23h	Speed consistent width	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P04.35	3004:24h	Speed arrival threshold	Effective immediately	S,T
	P04.36	3004:25h	Stop state, delay from servo enable OFF to motor no power	Effective immediately	ALL
	P04.37	3004:26h	Rotation state, servo enable OFF to brake output OFF delay	Effective immediately	ALL
	P04.38	3004:27h	Rotation state, speed threshold when brake output is OFF	Effective immediately	ALL
	P04.39	3004:28h	Warning output selection 1	Effective immediately	ALL
	P04.40	3004:29h	Warning output selection 2	Effective immediately	ALL
	P04.41	3004:2Ah	2nd positioning end range	Effective immediately	P
	P04.49	3004:32h	Function selection application switch 1	Restart effective	
	P04.50	3004:33h	Function selection application switch 2	Restart effective	
P05 Extended setting	P05.00	3005:01h	2nd command frequency division multiplier numerator	Effective immediately	P
	P05.01	3005:02h	3rd command frequency division multiplier numerator	Effective immediately	P
	P05.02	3005:03h	4th command frequency division multiplier numerator	Effective immediately	P
	P05.03	3005:04h	Pulse output frequency division denominator	Restart effective	ALL
	P05.04	3005:05h	Overtravel protection setting	Restart effective	ALL
	P05.05	3005:06h	Overtravel shutdown time sequence	Restart effective	ALL
	P05.06	3005:07h	Servo enable OFF shutdown time sequence	Effective immediately	ALL
	P05.07	3005:08h	Main power supply OFF shutdown time sequence	Effective immediately	ALL
	P05.08	3005:09h	Undervoltage protection selection when main power supply is OFF	Effective immediately	ALL
	P05.09	3005:0Ah	Main power supply OFF detection time	Effective immediately	ALL
	P05.10	3005:0Bh	Alarm shutdown time sequence	Effective immediately	ALL
	P05.11	3005:0Ch	Torque limit at immediate stop	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P05.12	3005:0Dh	Overload level setting	Effective immediately	ALL
	P05.13	3005:0Eh	Overspeed level setting	Effective immediately	ALL
	P05.14	3005:0Fh	Motor movable range setting	Effective immediately	P
	P05.16	3005:11h	Alarm clear signal identification time	Restart effective	ALL
	P05.20	3005:15h	Position unit setting	Restart effective	P
	P05.21	3005:16h	Torque limit source selection	Effective immediately	ALL
	P05.22	3005:17h	2nd torque limit	Effective immediately	P,S
	P05.23	3005:18h	Torque limit switching slope 1	Effective immediately	P,S
	P05.24	3005:19h	Torque limit switching slope 2	Effective immediately	P,S
	P05.25	3005:1Ah	CW external torque limit	Effective immediately	P,S
	P05.26	3005:1Bh	CCW external torque limit	Effective immediately	P,S
	P05.28	3005:1Dh	LED initial status	Restart effective	ALL
	P05.34	3005:23h	Panel data refresh time	Effective immediately	ALL
	P05.35	3005:24h	Panel lock setting	Restart effective	ALL
	P05.36	3005:25h	Phase loss detection filter times	Restart effective	ALL
	P05.37	3005:26h	Three-phase input specification servo unit power input selection	Restart effective	ALL
P06 Special setting	P06.01	3006:02h	Torque command digital given value	Effective immediately	T
	P06.02	3006:03h	Speed deviation excess threshold	Effective immediately	P
	P06.03	3006:04h	Current loop filter time constant	Effective immediately	ALL
	P06.04	3006:05h	JOG operation command speed	Effective immediately	ALL
	P06.07	3006:08h	Gravity load torque compensation value	Effective immediately	P,S
	P06.08	3006:09h	Positive friction torque compensation	Effective	P

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
			value	immediately	
	P06.09	3006:0Ah	Negative friction torque compensation value	Effective immediately	P
	P06.11	3006:0Ch	Current response level setting	Effective immediately	ALL
	P06.12	3006:0Dh	Friction torque compensation filter	Effective immediately	P
	P06.14	3006:0Fh	Immediate stop time when alarm	Effective immediately	ALL
	P06.15	3006:10h	2nd overspeed level setting	Effective immediately	ALL
	P06.23	3006:18h	Disturbance compensation coefficient	Effective immediately	P,S
	P06.24	3006:19h	Disturbance compensation frequency correction	Effective immediately	P,S
	P06.25	3006:1Ah	Disturbance compensation gain	Effective immediately	P,S
	P06.26	3006:1Bh	Disturbance compensation inertia correction	Effective immediately	P,S
	P06.27	3006:1Ch	Warning latch (hold) time selection	Restart effective	ALL
	P06.28	3006:1Dh	Vibration detection level	Restart effective	ALL
	P06.29	3006:1Eh	Absolute encoder multi-turn data upper limit	Restart effective	ALL
	P06.30	3006:1Fh	Damping filter enable switch	Effective immediately	P
	P06.32	3006:21h	Real-time automatic adjustment of user setting	Effective immediately	ALL
	P06.33	3006:22h	Friction compensation positive effective speed setting	Effective immediately	P
	P06.36	3006:25h	Friction compensation negative effective speed setting	Effective immediately	P
	P06.38	3006:27h	Warning shield setting	Restart effective	ALL
	P06.40	3006:29h	Absolute encoder origin position offset	Effective immediately	ALL
	P06.41	3006:2Ah	1st damping depth	Effective immediately	ALL
	P06.42	3006:2Bh	2-stage torque filter time constant	Effective immediately	ALL
	P06.43	3006:2Ch	2-stage torque filter attenuation term	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P06.47	3006:30h	Function extension setting 2	Effective immediately	ALL
	P06.50	3006:33h	Viscous friction compensation gain	Effective immediately	ALL
	P06.51	3006:34h	Immediate stop end until the motor power off and delay	Effective immediately	ALL
	P06.52	3006:35h	Runaway protection function enable	Effective immediately	ALL
	P06.54	3006:37h	Runaway speed judgment threshold	Effective immediately	ALL
	P06.56	3006:39h	Runaway protection detection time	Effective immediately	ALL
	P06.57	3006:3Ah	Torque saturation error protection detection time	Effective immediately	ALL
	P06.58	3006:3Bh	Slot torque compensation gain	Effective immediately	ALL
	P06.60	3006:3Dh	Manufacturer password	Effective immediately	ALL
	P06.61	3006:3Eh	Stall protection time	Effective immediately	ALL
	P06.62	3006:3Fh	Stall protection enable	Effective immediately	ALL
	P06.69	3006:46h	Flux weakening enable	Effective immediately	ALL
	P06.70	3006:47h	Flux weakening depth	Effective immediately	ALL
	P06.71	3006:48h	Flux weakening integral time constant	Effective immediately	ALL
	P06.72	3006:49h	Maximum flux weakening current	Effective immediately	ALL
	P06.75	3006:4Ch	Backlash compensation direction	Restart effective	P
	P06.76	3006:4Dh	Backlash compensation amount	Effective immediately	P
	P06.77	3006:4Eh	Backlash compensation time constant	Effective immediately	P
P07 Motor parameter	P07.00	3007:01h	Motor No.	Restart effective	ALL
	P07.01	3007:02h	Motor type selection	Restart effective	ALL
	P07.04	3007:05h	Motor rated current	Restart effective	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P07.05	3007:06h	Motor rated torque	Restart effective	ALL
	P07.06	3007:07h	Maximum motor torque	Restart effective	ALL
	P07.07	3007:08h	Motor rated speed	Restart effective	ALL
	P07.08	3007:09h	Maximum motor speed	Restart effective	ALL
	P07.09	3007:0Ah	Motor rotational inertia	Restart effective	ALL
	P07.10	3007:0Bh	Motor pole pairs	Restart effective	ALL
	P07.11	3007:0Ch	Motor back EMF constant	Restart effective	ALL
	P07.12	3007:0Dh	Motor stator resistance	Restart effective	ALL
	P07.13	3007:0Eh	Motor d-axis inductance	Restart effective	ALL
	P07.14	3007:0Fh	Motor q-axis inductance	Restart effective	ALL
	P07.16	3007:11h	Motor thermal time constant	Restart effective	ALL
	P07.17	3007:12h	Motor phase sequence selection	Restart effective	ALL
	P07.18	3007:13h	Initial pole angle	Restart effective	ALL
	P07.25	3007:1Ah	Encoder type selection	Restart effective	ALL
	P07.26	3007:1Bh	Bus encoder bit	Restart effective	ALL
	P07.27	3007:1Ch	Bus encoder turns	Restart effective	ALL
	P07.66	3007:43h	Motor manufacturing serial number	Show only	ALL
	P07.67	3007:44h	Motor model low	Show only	ALL
	P07.68	3007:45h	Motor model middle	Show only	ALL
	P07.69	3007:46h	Motor model high	Show only	ALL
P08 Drive parameter	P08.00	3008:01h	Drive voltage level	Show only	ALL
	P08.01	3008:02h	Drive rated power	Show only	ALL
	P08.02	3008:03h	Drive rated current	Show only	ALL
	P08.03	3008:04h	Drive maximum current	Show only	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P08.04	3008:05h	Drive overcurrent protection point	Show only	ALL
	P08.06	3008:07h	Brake unit action voltage	Restart effective	ALL
P10 Monitoring parameter	P10.00	300A:01h	Position command deviation	Show only	ALL
	P10.01	300A:02h	Motor speed	Show only	ALL
	P10.02	300A:03h	Position command speed	Show only	ALL
	P10.03	300A:04h	Speed control command	Show only	ALL
	P10.04	300A:05h	Torque command	Show only	ALL
	P10.05	300A:06h	Feedback pulse sum	Show only	ALL
	P10.06	300A:07h	Command pulse sum	Show only	ALL
	P10.07	300A:08h	Estimated inertia ratio	Show only	ALL
	P10.08	300A:09h	Control model	Show only	ALL
	P10.09	300A:0Ah	SI signal status	Show only	ALL
	P10.10	300A:0Bh	SO signal status	Show only	ALL
	P10.14	300A:0Fh	Current alarm	Show only	ALL
	P10.15	300A:10h	Current alarm	Show only	ALL
	P10.16	300A:11h	Regeneration load rate	Show only	ALL
	P10.17	300A:12h	Overload rate	Show only	ALL
	P10.18	300A:13h	Phase current effective value	Show only	ALL
	P10.19	300A:14h	Reason for not rotating	Show only	ALL
	P10.20	300A:15h	Servo system status	Show only	ALL
	P10.21	300A:16h	Mechanical angle	Show only	ALL
	P10.22	300A:17h	Electrical angle	Show only	ALL
	P10.23	300A:18h	Encoder rotation 1 turn data	Show only	ALL
	P10.24	300A:19h	Encoder multi-turn data	Show only	ALL
	P10.25	300A:1Ah	Encoder communication error times	Show only	ALL
	P10.26	300A:1Bh	Encoder position deviation	Show only	ALL
	P10.27	300A:1Ch	Voltage across PN	Show only	ALL
	P10.28	300A:1Dh	Control power supply voltage	Show only	ALL
	P10.29	300A:1Eh	Switching power supply output 12V voltage	Show only	ALL
	P10.30	300A:1Fh	MCU software version	Show only	ALL
	P10.31	300A:20h	FPGA software version	Show only	ALL
	P10.32	300A:21h	Servo parameter version	Show only	ALL
	P10.33	300A:22h	Accumulated running time	Show only	ALL
	P10.34	300A:23h	Average load rate	Show only	ALL
	P10.35	300A:24h	CPU temperature	Show only	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P10.36	300A:25h	IGBT temperature	Show only	ALL
	P10.37	300A:26h	Drive temperature (reserve)	Show only	ALL
	P10.38	300A:27h	Motor temperature (reserve)	Show only	ALL
	P10.39	300A:28h	Encoder temperature (reserve)	Show only	ALL
	P10.40	300A:29h	Real-time resonance frequency	Show only	ALL
	P10.41	300A:2Ah	Absolute value encoder absolute position low 32 bits	Show only	ALL
	P10.42	300A:2Bh	Absolute value encoder absolute position high 32 bits	Show only	ALL
	P10.47	300A:30h	STO status	Show only	ALL
	P10.53	300A:36h	Registration remaining time	Show only	ALL
	P10.81	300A:52h	Last 1st alarm	Show only	ALL
	P10.82	300A:53h	Last 2nd alarm	Show only	ALL
	P10.83	300A:54h	Last 3rd alarm	Show only	ALL
	P10.84	300A:55h	Last 4th alarm	Show only	ALL
	P10.85	300A:56h	Last 5th alarm	Show only	ALL
	P10.86	300A:57h	Last 6th alarm	Show only	ALL
	P10.87	300A:58h	Last 7th alarm	Show only	ALL
	P10.88	300A:59h	Last 8th alarm	Show only	ALL
	P10.89	300A:5Ah	Last 9th alarm	Show only	ALL
	P10.90	300A:5Bh	Last 10th alarm	Show only	ALL
P11 COMM parameter	P11.31	300B:20h	EtherCAT station address	Effective immediately	ALL
	P11.32	300B:21h	EtherCAT station alias	Effective immediately	ALL
	P11.33	300B:22h	EtherCAT communication status	Show only	ALL
	P11.34	300B:23h	EtherCAT communication error code (AL error code)	Show only	ALL
	P11.35	300B:24h	EtherCAT synchronous cycle (ESC register 0981h)	Show only	ALL
	P11.36	300B:25h	EtherCAT watchdog timeout (ESC register 400h*420h)	Effective immediately	ALL
	P11.37	300B:26h	Synchronous data accumulated lost times	Show only	ALL
	P11.40	300B:29h	Synchronous signal continuous loss time upper limit	Effective immediately	ALL
	P11.41	300B:2Ah	Bus port disconnect detection time	Effective immediately	ALL
	P11.43	300B:2Ch	EtherCAT port 0 invalid frame and error maximum value	Show only	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P11.44	300B:2Dh	EtherCAT port 1 invalid frame and error maximum value	Show only	ALL
	P11.45	300B:2Eh	EtherCAT port forwarding error maximum value	Show only	ALL
	P11.46	300B:2Fh	EtherCAT data frame processing unit error maximum value	Show only	ALL
	P11.47	300B:30h	EtherCAT port 0 and port 1 connection loss maximum value	Show only	ALL
	P11.52	300B:35h	CSP position command increment excess times	Effective immediately	ALL
P12 Auxiliary control parameter	P12.00	300C:01h	Software reset	Effective immediately	ALL
	P12.01	300C:02h	Alarm reset	Effective immediately	ALL
	P12.02	300C:03h	Parameter initialization	Effective immediately	ALL
	P12.04	300C:05h	E-stop	Effective immediately	ALL
	P12.06	300C:07h	JOG trial run function	Effective immediately	ALL
	P12.07	300C:08h	SI forced input set value	Effective immediately	ALL
	P12.08	300C:09h	SO forced output set value	Effective immediately	ALL
	P12.09	300C:0Ah	Absolute value encoder reset	Effective immediately	ALL
	P12.31	300C:20h	Drive registration	Effective immediately	ALL
	P12.32	300C:21h	Drive registration code high	Effective immediately	ALL
	P12.33	300C:22h	Drive registration code low	Effective immediately	ALL
P30 ~ P33 EtherCAT parameter	P30.14	603F:00h	Error code	Show only	ALL
	P30.15	6040:00h	Control character	Show only	ALL
	P30.16	6041:00h	Status character	Show only	ALL
	P30.17	605A:00h	Quick shutdown method	Effective immediately	ALL
	P30.18	605B:00h	Turn off shutdown method	Effective immediately	ALL
	P30.19	605C:00h	Turn off the enable shutdown method	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P30.20	605D:00h	Pause shutdown method	Effective immediately	ALL
	P30.21	605E:00h	Alarm shutdown method	Effective immediately	ALL
	P30.22	6060:00h	Control mode	Effective immediately	ALL
	P30.27	6065:00h	Position deviation excess threshold	Effective immediately	P
	P30.28	6066:00h	Position deviation excess time window	Effective immediately	P
	P30.29	6067:00h	Position arrival threshold	Effective immediately	P
	P30.30	6068:00h	Position arrival time window	Effective immediately	P
	P30.35	606D:00h	Speed arrival threshold	Effective immediately	P
	P30.36	606E:00h	Speed arrival time window	Effective immediately	P
	P30.39	6071:00h	Target torque	Effective immediately	ALL
	P30.40	6072:00h	Maximum torque	Effective immediately	ALL
	P30.48	607A:00h	Target position	Effective immediately	P
	P30.50	607B:01h	Position range limit minimum value	Effective immediately	P
	P30.51	607B:02h	Position range limit maximum value	Effective immediately	P
	P30.52	607C:00h	Origin offset	Effective immediately	P
	P30.54	607D:01h	Position limit minimum value	Effective immediately	P
	P30.55	607D:02h	Position limit maximum value	Effective immediately	P
	P30.56	607E:00h	Command polarity	Effective immediately	ALL
	P30.57	607F:00h	Maximum contour speed	Effective immediately	ALL
	P30.61	6083:00h	Profile acceleration	Effective immediately	ALL
	P30.62	6084:00h	Contour deceleration	Effective	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
				immediately	
	P30.63	6085:00h	Quick shutdown deceleration	Effective immediately	ALL
	P30.65	6087:00h	Torque slope	Effective immediately	T
	P30.71	6091:01h	Motor revolutions	Effective immediately	P
	P30.72	6091:02h	Shaft revolutions	Effective immediately	P
	P31.00	6098:00h	Origin return method	Effective immediately	ALL
	P31.02	6099:01h	Switch search speed	Effective immediately	ALL
	P31.03	6099:02h	Zero search speed	Effective immediately	ALL
	P31.04	609A:00h	Zero return acceleration	Effective immediately	ALL
	P31.10	60B1:00h	Speed feedforward	Effective immediately	P,S
	P31.11	60B2:00h	Torque feedforward	Effective immediately	S,T
	P31.12	60B8:00h	Probe function	Effective immediately	ALL
	P31.19	60C2:01h	Interpolation time cycle value	Effective immediately	ALL
	P31.20	60C2:02h	Interpolation time index	Effective immediately	ALL
	P31.23	60E0:00h	Positive torque limit	Effective immediately	ALL
	P31.24	60E1:00h	Negative torque limit	Effective immediately	ALL
	P31.57	60F2:00h	Positioning method	Effective immediately	P
	P31.63	60FE:01h	Physical output	Effective immediately	ALL
	P31.64	60FE:02h	Physical output enable	Effective immediately	ALL
	P32.34	1600:00h	The sub-index number of the default RPDO mapped object	Effective immediately	ALL
	P32.35	1600:01h	1st mapped object	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P32.36	1600:02h	2nd mapped object	Effective immediately	ALL
	P32.37	1600:03h	3rd mapped object	Effective immediately	ALL
	P32.38	1600:04h	4th mapped object	Effective immediately	ALL
	P32.39	1600:05h	5th mapped object	Effective immediately	ALL
	P32.40	1600:06h	6th mapped object	Effective immediately	ALL
	P32.41	1600:07h	7th mapped object	Effective immediately	ALL
	P32.42	1600:08h	8th mapped object	Effective immediately	ALL
	P32.43	1600:09h	9th mapped object	Effective immediately	ALL
	P32.44	1600:0Ah	10th mapped object	Effective immediately	ALL
	P32.45	1620:00h	The sub-index number of RPDO mapped object in CSP mode	Effective immediately	ALL
	P32.46	1620:01h	1st mapped object	Effective immediately	ALL
	P32.47	1620:02h	2nd mapped object	Effective immediately	ALL
	P32.48	1620:03h	3rd mapped object	Effective immediately	ALL
	P32.49	1620:04h	4th mapped object	Effective immediately	ALL
	P32.50	1620:05h	5th mapped object	Effective immediately	ALL
	P32.51	1620:06h	6th mapped object	Effective immediately	ALL
	P32.52	1620:07h	7th mapped object	Effective immediately	ALL
	P32.53	1620:08h	8th mapped object	Effective immediately	ALL
	P32.54	1620:09h	9th mapped object	Effective immediately	ALL
	P32.55	1620:0Ah	10th mapped object	Effective immediately	ALL
	P32.56	1621:00h	The sub-index number of RPDO mapped	Effective	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
			object in CSP/CSV/CST mode	immediately	
	P32.57	1621:01h	1st mapped object	Effective immediately	ALL
	P32.58	1621:02h	2nd mapped object	Effective immediately	ALL
	P32.59	1621:03h	3rd mapped object	Effective immediately	ALL
	P32.60	1621:04h	4th mapped object	Effective immediately	ALL
	P32.61	1621:05h	5th mapped object	Effective immediately	ALL
	P32.62	1621:06h	6th mapped object	Effective immediately	ALL
	P32.63	1621:07h	7th mapped object	Effective immediately	ALL
	P32.64	1621:08h	8th mapped object	Effective immediately	ALL
	P32.65	1621:09h	9th mapped object	Effective immediately	ALL
	P32.66	1621:0Ah	10th mapped object	Effective immediately	ALL
	P32.67	1622:00h	The sub-index number of RPDO mapped object in PP mode	Effective immediately	ALL
	P32.68	1622:01h	1st mapped object	Effective immediately	ALL
	P32.69	1622:02h	2nd mapped object	Effective immediately	ALL
	P32.70	1622:03h	3rd mapped object	Effective immediately	ALL
	P32.71	1622:04h	4th mapped object	Effective immediately	ALL
	P32.72	1622:05h	5th mapped object	Effective immediately	ALL
	P32.73	1622:06h	6th mapped object	Effective immediately	ALL
	P32.74	1622:07h	7th mapped object	Effective immediately	ALL
	P32.75	1622:08h	8th mapped object	Effective immediately	ALL
	P32.76	1622:09h	9th mapped object	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P32.77	1622:0Ah	10th mapped object	Effective immediately	ALL
	P33.00	1A00:00h	The sub-index number of the default TPDO mapped object	Effective immediately	ALL
	P33.01	1A00:01h	1st mapped object	Effective immediately	ALL
	P33.02	1A00:02h	2nd mapped object	Effective immediately	ALL
	P33.03	1A00:03h	3rd mapped object	Effective immediately	ALL
	P33.04	1A00:04h	4th mapped object	Effective immediately	ALL
	P33.05	1A00:05h	5th mapped object	Effective immediately	ALL
	P33.06	1A00:06h	6th mapped object	Effective immediately	ALL
	P33.07	1A00:07h	7th mapped object	Effective immediately	ALL
	P33.08	1A00:08h	8th mapped object	Effective immediately	ALL
	P33.09	1A00:09h	9th mapped object	Effective immediately	ALL
	P33.10	1A00:0Ah	10th mapped object	Effective immediately	ALL
	P33.11	1A20:00h	The sub-index number of TPDO mapped object in CSP mode	Effective immediately	ALL
	P33.12	1A20:01h	1st mapped object	Effective immediately	ALL
	P33.13	1A20:02h	2nd mapped object	Effective immediately	ALL
	P33.14	1A20:03h	3rd mapped object	Effective immediately	ALL
	P33.15	1A20:04h	4th mapped object	Effective immediately	ALL
	P33.16	1A20:05h	5th mapped object	Effective immediately	ALL
	P33.17	1A20:06h	6th mapped object	Effective immediately	ALL
	P33.18	1A20:07h	7th mapped object	Effective immediately	ALL
	P33.19	1A20:08h	8th mapped object	Effective	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
				immediately	
	P33.20	1A20:09h	9th mapped object	Effective immediately	ALL
	P33.21	1A20:0Ah	10th mapped object	Effective immediately	ALL
	P33.22	1A21:00h	The sub-index number of TPDO mapped object in CSP/CSV/CST mode	Effective immediately	ALL
	P33.23	1A21:01h	1st mapped object	Effective immediately	ALL
	P33.24	1A21:02h	2nd mapped object	Effective immediately	ALL
	P33.25	1A21:03h	3rd mapped object	Effective immediately	ALL
	P33.26	1A21:04h	4th mapped object	Effective immediately	ALL
	P33.27	1A21:05h	5th mapped object	Effective immediately	ALL
	P33.28	1A21:06h	6th mapped object	Effective immediately	ALL
	P33.29	1A21:07h	7th mapped object	Effective immediately	ALL
	P33.30	1A21:08h	8th mapped object	Effective immediately	ALL
	P33.31	1A21:09h	9th mapped object	Effective immediately	ALL
	P33.32	1A21:0Ah	10th mapped object	Effective immediately	ALL
	P33.33	1A22:00h	The sub-index number of TPDO mapped object in PP mode	Effective immediately	ALL
	P33.34	1A22:01h	1st mapped object	Effective immediately	ALL
	P33.35	1A22:02h	2nd mapped object	Effective immediately	ALL
	P33.36	1A22:03h	3rd mapped object	Effective immediately	ALL
	P33.37	1A22:04h	4th mapped object	Effective immediately	ALL
	P33.38	1A22:05h	5th mapped object	Effective immediately	ALL
	P33.39	1A22:06h	6th mapped object	Effective immediately	ALL

Parameter Group	Parameter No.	EtherCAT Communication Address	Name	Effective Method	Association Mode
	P33.40	1A22:07h	7th mapped object	Effective immediately	ALL
	P33.41	1A22:08h	8th mapped object	Effective immediately	ALL
	P33.42	1A22:09h	9th mapped object	Effective immediately	ALL
	P33.43	1A22:0Ah	10th mapped object	Effective immediately	ALL
	P33.49	1C12:00h	SM2 RPDO allocated object number	Effective immediately	ALL
	P33.50	1C12:01h	PDO mapped object allocated by RPDO1	Effective immediately	ALL
	P33.51	1C13:00h	SM3 TPDO allocated object number	Effective immediately	ALL
	P33.52	1C13:01h	PDO mapped object allocated by TPDO1	Effective immediately	ALL
	P33.55	1C32:02h	Synchronous cycle	Effective immediately	ALL
	P33.56	1C32:03h	Offset time	Show only	ALL
	P33.61	1C32:0Ah	Sync0 signal cycle	Show only	ALL
	P33.63	1C32:0Ch	SM signal lost	Show only	ALL
	P33.69	1C33:03h	Offset time	Effective immediately	ALL

10.3 [P00] Basic Setting

P00.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Control mode setting	1~99	—	19	Restart effective	ALL

Set the control mode used.

Value	Content
1	Position control mode
2	Speed control mode
3	Torque control mode
19	EtherCAT bus control

P00.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Real-time automatic adjustment mode setting	0~7	—	0	Effective immediately	ALL

Set the control mode for adjustment.

Value	Mode	Description
0	Invalid	The real-time automatic adjustment function is invalid (manual mode)
1	Standard	Basic mode, rigidity table adjustment takes effect: modify **P00.03 Rigidity Level**, and gain parameters will be automatically updated according to the built-in rigidity table
2	Position*1	Applicable to horizontal axis • Rigidity table adjustment takes effect; • Automatic estimation of inertia ratio P00.04; • Automatically set P01.15=10 (gain switching);
3	Vertical axis*2	Applicable to vertical axis • Rigidity table adjustment takes effect; • Automatic estimation of inertia ratio P00.04; • Automatic estimation of vertical axis gravity load torque compensation P06.07;
4	Friction compensation*3	Applicable to vertical axis+transmission form with large friction (such as belt pulley) • Rigidity table adjustment takes effect; • Automatic estimation of inertia ratio P00.04; • Automatic estimation of vertical axis variable load P06.07; • Automatic estimation of positive and negative friction torque compensation P06.08 and P06.09
5	Load characteristic learning	• Rigidity table adjustment is invalid; • Only automatic estimation of inertia ratio P00.04;
6	User setting*4	Combination of real-time automatic adjustment function through parameter **P06.32 Real-time Automatic Adjustment of User Setting**
7	Load characteristic*5 test	Do not change the parameters set now, only infer the load characteristics (inertia ratio, vertical axis variable load, positive and negative friction moment compensation), and support the use with software

Value	Mode	Related Parameter
0	Invalid	None
1	Standard	Support rigidity table debugging. After modifying **P00.03 (Rigidity Level)**, the following parameters are linked • Gain parameters are switched according to the rigidity table: P01.00~P01.09 (except P01.03 and P01.08) • The feedforward parameters are restored to the factory value: P01.03, P01.08, P01.10~P01.13

		• The gain switching parameter is restored to the factory value: P01.14~P01.27
2	Position *1	• The linkage parameters after modifying P00.03 are the same as 1 (except P01.15) • Inertia ratio P00.04 will be self-learning and updated • Automatically set P01.15=10 (gain switching is valid and switches according to condition 10) • Vertical axis gravity load torque compensation P06.07 is restored to the factory value • Positive and negative friction torque compensation P06.08 and P06.09 are restored to the factory value
3	Vertical axis *2	• The linkage parameters after modifying P00.03 are the same as 1 • Inertia ratio P00.04 will be self-learning and updated • Vertical axis gravity load torque compensation P06.07 self-learning and updating • Positive and negative friction torque compensation P06.08 and P06.09 are restored to the factory default
4	Friction compensation *3	• The linkage parameters after modifying P00.03 are the same as 1 • Inertia ratio P00.04 will be self-learning and updated • Vertical axis gravity load torque compensation P06.07 self-learning and updating • Positive and negative friction torque compensation P06.08, P06.09 self-learning and update
5	Load characteristic learning	• Only learn and update inertia ratio P00.04, other parameters remain unchanged
6	User settings*4	Self-adjustment function combination configuration is performed through **P06.32**. Refer to **P06.32** parameter description for details
7	Load characteristic *5 test	The inertia ratio, vertical axis gravity load torque compensation, and positive/negative direction friction torque compensation will be self-learning, and the learning results will only be displayed in the "gain adjustment" interface of the debugging software iMotion, and will not be updated to the parameter value

*1: The speed and torque control mode is the same as the standard mode.

*2: Torque control mode is the same as standard mode.

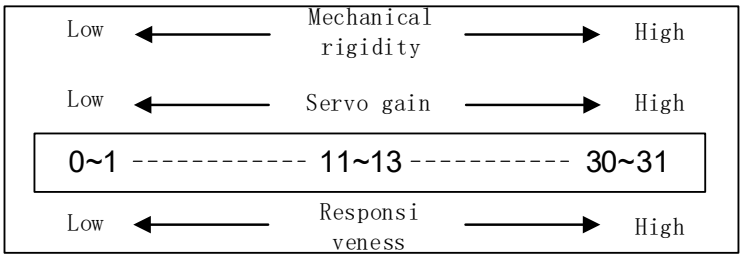
*3: The speed control is the same as the vertical axis mode; Torque control is the same as standard mode.

*4: Because of the different control modes, some functions may not be used. For details, please see P06.32.

*5: Due to different control modes, some functions may not be used.

P00.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Real-time automatic adjustment rigidity setting	0~31	—	13	Effective immediately	ALL

When the automatic adjustment is effective, change the servo response through this parameter. (Refer to P00.02 setting).



Caution

As the setting value of mechanical rigidity becomes higher, the mechanical rigidity increases and the responsiveness become higher, but machine tool vibration easily occurs. Improve responsiveness while confirming machine tool movement.

P00.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Inertia ratio	0～10000	%	250	Effective immediately	ALL

Set the load inertia ratio of load inertia and motor rotor inertia.

$$P00.04 = \frac{\text{Load inertia}}{\text{Rotor inertia}} \times 100\ [\%]$$

P00.13	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st torque limit	0～500	%	300	Effective immediately	ALL

Set the limit value of the motor output 1st torque.

Caution

When the maximum torque of the motor is limited, the overload capacity of the motor will be reduced, and the alarm of speed deviation excess or position deviation may occur.

P00.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position deviation excess threshold	0～1073741824	Command unit	35000000	Effective immediately	P

- The setting position deviation of the command unit (when leaving the factory) is too large.
- Unit and calculation method can be changed through **P05.20 Position Unit Setting**.

$$\text{P00.14} > \text{Max motor speed rpm}/60 \times \frac{\text{Encoder resolution}}{\text{P01.00 Position loop gain}/10} \times \text{Electronic gear ratio} \times (1.2\sim2)$$

- When this parameter is set to 0, the alarm code **Er24.0 Position Deviation Excess Protection** is invalid.

For Example:

Parameter **P01.00 Position Loop Gain** default value **270**, drive electronic gear ratio 1:1, maximum motor speed 3000r/min, motor encoder resolution 17bit, so the recommended setting value:

P00.14 >(3000/60)* (2^{17}/(270/10) * 1 * 1.2=291271

Because the electronic gear ratio is about 1:1, if it is converted into the number of turns, it is about 2.22r. If the motor speed is 60r/min, the position cannot be moved after the collision, and the **Er24.0 Position Deviation Excess Protection** within about 3s.

P00.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute encoder setting	0～4	—	2	Restart effective	ALL

Set the use method of absolute encoder.

Value	Function
0	Used as absolute value encoder
1	Used as incremental encoder
2	Used as absolute value encoder, ignoring counter overflow of multiple rotations
3	For manufacturer use, please do not set
4	Infinite rotation absolute mode; Used in absolute system (absolute mode), the upper limit of multi-turn counting can be set arbitrarily

P00.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Regenerative resistor usage selection	0～3	—	0 3	Effective immediately	ALL

The factory default without built-in resistance drive (≤ 400W) is 3, and the factory default with built-in resistance drive (> 400W) is 0.

P00.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Regenerative resistor usage selection	0～3	—	0 3	Effective immediately	ALL

Value	Regenerative Discharge Resistor Used	Function
0	Built-in resistor	Use the built-in regenerative resistor of the drive to absorb regenerative energy
1	External resistance	The built-in regenerative resistor is invalid, and the external regenerative resistor is used to absorb the regenerative energy
2	External resistance	For manufacturer use, please do not set
3	None	No regenerative resistance, only absorb regenerative energy through built-in capacitor

Warning

- When using the built-in regenerative discharge resistor, please set this parameter to 0.
- When using external regenerative discharge resistor, be sure to set temperature fuse and other external protection.
- The regenerative resistor may generate error heat, resulting in burning loss, which has nothing to do with whether the regenerative resistor overload protection is effective.
- Because of the high temperature of the external resistance, please pay attention to safety during use, avoid touching and burn.

P00.17	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	External regenerative resistor heat dissipation coefficient	0～100	%	30	Restart effective	ALL
External regenerative resistor heat dissipation coefficient, usually the factory value is used.						

P00.18	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	External regenerative resistor power	0～65535	1W	0	Restart effective	ALL
External regenerative resistor power setting.						

P00.19	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	External regenerative	0～65535	1Ω	0	Restart effective	ALL

P00.19	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	resistor resistance					
External regenerative resistor resistance setting.						

10.4 [P01] Gain Adjustment

P01.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st position loop gain	0～30000	0.1/s	480	Effective immediately	P
Determine position loop responsiveness. When the setting value is large, the positioning time of the motor can be shortened. If the setting value is too large, it may cause vibration of the machine tool.						

P01.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st speed loop gain	1～32767	0.1Hz	270	Effective immediately	ALL
Determine the responsiveness of the speed loop. The larger the speed loop is, the faster the response is. However, if the setting is too large, it may cause machine vibration. In the position control mode, to increase the position loop gain, first increase the value of this parameter.						

P01.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st speed loop integration time constant	1～10000	0.1ms	210	Effective immediately	ALL
Set the speed loop integration time constant. The smaller the setting value is, the faster the deviation value is close to **0** when stopping. Too small setting value may cause machine tool vibration. When set to **9999**, points will be maintained; No integral effect when set to **10000**.						

P01.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st speed detection filter	0～10000	0.01ms	0	Effective immediately	ALL
After speed detection, the time constant of low pass filter (LPF) can be set. The larger the setting value is, the larger the time constant is. Although the motor noise can be reduced, the responsiveness will also be reduced. Factory default are usually used.						

P01.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st torque filter	0～2500	0.01ms	84	Effective immediately	ALL

Set the time constant of the first-order lag filter inserted into the torque command part.
Used to suppress high-frequency harmonics in torque command

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P01.05	2nd position loop gain	0～30000	0.1/s	570	Effective immediately	P
P01.06	2nd speed loop gain	1～32767	0.1Hz	270	Effective immediately	ALL
P01.07	2nd speed loop integral time constant	1～10000	0.1ms	10000	Effective immediately	ALL
P01.08	2nd speed detection filter	0～10000	0.01ms	0	Effective immediately	ALL
P01.09	2nd torque filter	0～2500	0.01ms	84	Effective immediately	ALL

- Position loop, speed loop, speed loop detection filter and torque filter have 2 groups of gain or time constant respectively.
- The function and content of the 2nd gain are the same as that of the 1st gain.
- 1st gain is used by default.

P01.10	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed feedforward gain	0～1000	0.1%	300	Effective immediately	P

- The speed control command calculated by the internal position command is multiplied by this parameter and added to the speed command.
- Increase this parameter to improve position command response and reduce position deviation at fixed speed.

P01.11	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed feedforward filter	0～6400	0.01ms	200	Effective immediately	P

P01.11	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode

Set the filtering time constant for speed feedforward. Increasing this parameter can reduce the vibration caused by the speed feedforward gain, but it will also weaken the speed feedforward effect and increase the position deviation.

For Example: When the speed feedforward filter is set to 50 (0.5ms), the speed feedforward becomes effective by gradually increasing the speed feedforward gain. The relationship between position deviation and speed feedforward gain in fixed speed action meets the following formula:

$$\text{Position deviation [command unit]} = \frac{\text{Command speed [command unit/s]}}{\text{Position loop gain [1/s]}} \times \frac{\text{100-Speed feedforward gain [\%]}}{100}$$

P01.12	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque feedforward gain	0～1000	0.1%	0	Effective immediately	P,S

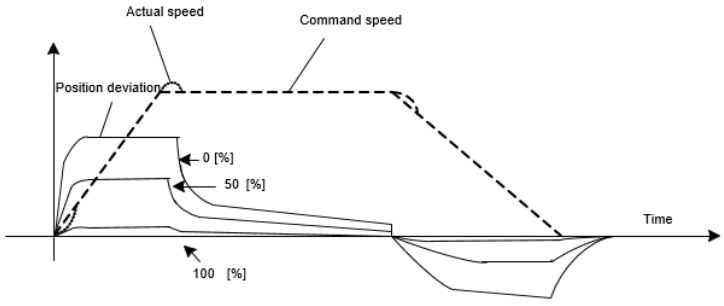
- The speed command is multiplied by this parameter and added to the torque command.
- Increase this parameter to reduce the position deviation during acceleration and deceleration. In the ideal working condition of undisturbed torque, when the given speed command is trapezoidal, the position deviation can be reduced to about 0 by increasing the torque feedforward gain.

P01.13	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque feedforward filter	0～6400	0.01ms	0	Effective immediately	P,S

Set the time constant of the first-order low-pass filter required for torque feedforward input.

When the parameter is set to 50 (0.5ms), the torque feedforward gain is gradually increased to make the torque feedforward become effective.

It is the same as the speed feedforward filtering time constant. When this parameter becomes larger, the position deviation of the acceleration change point will become larger.



Among:

- Before using torque feedforward, please set the inertia ratio correctly.
- In the ideal working condition of undisturbed torque, when the speed command is trapezoidal, the position deviation can be reduced to about **0** by increasing the torque feedforward gain.

P01.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd gain setting	0～1	—	1	Effective immediately	ALL

Use the gain switching function to achieve the best control effect.

Value	Gain Selection and Switching
0	Fixed using the 1st gain. At this time, the gain switching input function (GAIN) can be used to switch the speed loop action to PI action or P action. When the logic of GAIN input is set to a: • GAIN input optocoupler OFF → PI action • GAIN input optocoupler ON → P action When the logic of GAIN input is set to b, OFF/ON is opposite.
1	The gain switching of the 1st gain (P01.00~P01.04) and the 2nd gain (P01.05~P01.09) is valid.

P01.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position control switching mode	0～10	—	0	Effective immediately	P

Set the trigger condition of gain switching during position control.

Value	Switching Condition	Gain Selection and Switching
0	1st gain fixed	Fixed use of the 1st gain(**P01.00 ~P01.04**)
1	2nd gain fixed	Fixed use of the 2nd gain(**P01.05 ~P01.09**)
2	Gain switching input	• When the gain switching input (GAIN) is disconnected or the function is not assigned, it is the 1st gain. • When the gain switching input (GAIN) is disconnected or the function is not assigned, it is the 2nd gain.
3	Large torque command	• In the previous 1st gain, when the absolute value of torque command is greater than (level+hysteresis) [%], it will be transferred to the 2nd gain. • In the previous 2nd gain, when the absolute value of torque command ≤ (level hysteresis) [%] is longer than the delay time, return to the 1st gain.
4	Large variation of speed command	Effective in speed control mode: • In the previous 1st gain, when the absolute value of speed command change is greater than (level+hysteresis) [10r/min/s], it will be transferred to the 2nd gain. • In the last 2nd gain, if the status duration when the absolute value of speed command change ≤ (level hysteresis) [10r/min/s] is greater than the delay time, return to the 1st gain.

5	Large speed command	Effective in position and speed control mode: • In the previous 1st gain, when the absolute value of speed command is greater than (level+hysteresis) [r/min], transfer to the 2nd gain. • In the previous 2nd gain, if the status duration when the absolute value of speed command ≤ (level hysteresis) [r/min] is greater than the delay time, return to the 1st gain.
6	Large position deviation	Effective in position control mode: • In the previous 1st gain, when the absolute value of position deviation is greater than (level+hysteresis) [pulse], transfer to the 2nd gain. • In the previous 2nd gain, when the absolute value of position deviation ≤ (level hysteresis) [pulse] status duration is greater than the delay time, return to the 1st gain. • The unit of level and hysteresis is [pulse], which is set with encoder resolution during position control.
7	Position command	Effective in position control mode: • In the previous 1st gain, if the position command is not 0, it will be transferred to the 2nd gain. • In the last 2nd gain, when the status duration of position command is 0>delay time, return to the 1st gain.
8	Positioning incomplete	Effective in position control mode: • In the previous 1st gain, if the positioning is not completed, it will be transferred to the 2nd gain. • In the previous 2nd gain, return to the 1st gain when the duration of the positioning completed status is greater than the delay time.
9	Large actual speed	Effective in position control mode: • In the previous 1st gain, when the absolute value of the actual speed ＞ (level+hysteresis) [r/min], transfer to the 2nd gain. • In the last 2nd gain, when the absolute value of the actual speed ≤ (level hysteresis) [r/min] is longer than the delay time, return to the 1st gain.
10	Position command+actual speed	Effective in position control mode: • In the previous 1st gain, if the position command is not 0, it will be transferred to the 2nd gain. • In the previous 2nd gain, when the status duration of position command is 0 is greater than the delay time, and the absolute value of actual speed is ≤ (level hysteresis) [r/min], return to the 1st gain.

P01.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position control switching delay time	0～10000	0.1ms	50	Effective immediately	P
When the 2nd gain is switched to the 1st gain, the time from condition triggering to actual switching. This parameter takes effect when the following conditions are met simultaneously:						

P01.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position control switching delay time	0～10000	0.1ms	50	Effective immediately	P

- Position control mode
- P01.15 is set in the range of **3**, **5~10**
- Switch the 2nd gain to the 1st gain

P01.17	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position control switching level	0～20000	According to mode	50	Effective immediately	P

In the position control mode, the switch level takes effect when the parameter **P01.15 Position Control Switch Mode** is set to 3, 5, 6, 9 and 10.

The value of this parameter must not be less than parameter **P01.18 Position Control Switching Hysteresis.**

P01.18	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position control switching hysteresis	0～20000	According to mode	33	Effective immediately	P

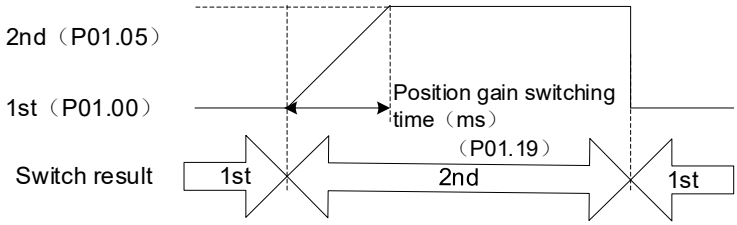
During position control, when parameter **P01.15 Position Control Switch Mode** is set to **3**, **5**, **6**, **9** and **10**, switching hysteresis takes effect.

When parameter **P01.17 Position Control Switching Level** is less than the parameter value, the system will set the parameter value equal to parameter **P01.17**.

P01.19	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position gain switching time	0～10000	0.1ms	33	Effective immediately	P

In the position control mode, if the difference between the parameter **P01.00 1st Position Loop Gain** and the parameter **P01.05 2nd Position Loop Gain** is large, this parameter can be increased to slow down the gain change during switching and reduce vibration.

P01.19	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position gain switching time	0～10000	0.1ms	33	Effective immediately	P



Caution

When the position loop gain becomes smaller, it will switch immediately without being affected by this parameter.

P01.20	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed control switching mode	0～5	—	0	Effective immediately	S

Set the trigger condition of gain switching during speed control.

Value	Switching Condition
0	Use 1st gain
1	Use 2nd gain
2	External gain switching input
3	Large torque command
4	Large variation of speed command
5	Large command speed

P01.21	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed control switching delay time	0～10000	0.1ms	0	Effective immediately	S

When the speed control mode is set, the 2nd gain is switched to the 1st gain. When the parameter **P01.20 Speed Control Switching Mode** is set to **3~5**, the time from condition triggering to actual switching is set.

P01.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed control switching level	0～20000	According to mode	0	Effective immediately	S

In speed control mode, when parameter **P01.20 Speed Control Switching Mode** is set to **3~5**, the switching level takes effect.

Caution

This parameter value shall not be less than parameter **P01.23 Speed Control Switching Hysteresis**.

P01.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed control switching hysteresis	0～20000	According to mode	0	Effective immediately	S

In the speed control mode, the switching hysteresis takes effect when the parameter **P01.20 Speed Control Switching Mode** is set to **3~5**.

Caution

When parameter **P01.22 Speed Control Switching Level** is less than the parameter value, the system will set the parameter value equal to parameter **P01.22**.

P01.24	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque control switching mode	0～3	—	0	Effective immediately	T

During torque control, set the trigger circuit conditions for gain switching.

Value	Switching Condition
0	1st gain fixed
1	2nd gain fixed
2	External gain switching input
3	Large torque command

P01.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque control switching delay time	0～10000	0.1ms	0	Effective immediately	T

P01.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
When the torque control mode is set, the 2nd gain is switched to the 1st gain, and the parameter **P01.24 Torque Control Switching Mode** is set to **3**, the time from condition triggering to actual switching.						

P01.26	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque control switching level	0～20000	According to mode	0	Effective immediately	T

In torque control mode, when parameter **P01.24 Torque Control Switching Mode** is set to **3**, the switching level takes effect.

This parameter value shall not be less than parameter **P01.27 Torque Control Switching Hysteresis**.

P01.27	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque control switching hysteresis	0～20000	According to mode	0	Effective immediately	T

In torque control mode, when parameter **P01.24 Torque Control Switching Mode** is set to **3**, switching hysteresis takes effect.

When parameter **P01.26 Torque Control Switching Level** is less than this parameter value, the system will set this parameter value equal to parameter **P01.26**.

10.5 [P02] Vibration Suppression Function

P02.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Adaptive filter mode setting	0～4	—	0	Effective immediately	P,S

Set the estimated resonance frequency number of adaptive filter and the estimated action.
This parameter only affects the 3rd and 4th filters, not the 1st and 2nd filters.

Value	Content	
0	Corresponding filter: invalid	Adaptive filter invalid: • The relevant parameters of the 3rd and 4th notch filters remain unchanged.
1	Corresponding filter: 1 valid	1 adaptive filter become valid: • The 3rd notch filter correlation parameters are updated according to the learning results.
2	Corresponding filter: 2 valid	2 adaptive filter become valid: • The 3rd and 4th notch filters are updated according to the adaptation results;
3	Resonance frequency test	Test resonance frequency, test results can be confirmed by iMotion: • The 3rd and 4th notch filters are fixed.
4	Adaptation result clearing	The 3rd and 4th notch filter correlation parameters are invalid and the adaptation result is cleared.

P02.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st notch frequency	50～5000	Hz	5000	Effective immediately	ALL

Set the frequency of the 1st resonance control notch filter.


Caution

When the setting value is **5000**, the function of notch filter is invalid.

P02.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st notch width selection	0～20	—	2	Effective immediately	ALL

Set the width of the 1st resonance control notch filter.


Caution

The larger the setting value is, the larger the notch width is, and the factory default is usually used.

P02.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st notch depth selection	0～99	—	0	Effective immediately	ALL

Set the notch depth of the 1st resonance control notch filter.

 Caution

When the setting value increases, the notch depth becomes shallow and the phase lag decreases.

P02.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd notch frequency	50～5000	Hz	5000	Effective immediately	ALL

Set the frequency of the 2nd resonance control notch filter.

 Caution

When the setting value is **5000**, the function of notch filter is invalid.

P02.05	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd notch width selection	0～20	—	2	Effective immediately	ALL

Set the width of the 2nd resonance control notch filter.

 Caution

The larger the setting value is, the larger the notch width is, and the factory default is usually used.

P02.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd notch depth selection	0～99	—	0	Effective immediately	ALL

Set the notch depth of the 2nd resonance control notch filter.

 Caution

When the setting value increases, the notch depth becomes shallow and the phase lag decreases.

P02.07	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	3rd notch frequency	50～5000	Hz	5000	Effective immediately	ALL

Set the frequency of the 3rd resonance control notch filter.

 Caution

When the setting value is **5000**, the function of notch filter is invalid.

P02.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	3rd notch width selection	0～20	—	2	Effective immediately	ALL

Set the width of the 3rd resonance control notch filter.

 Caution

The larger the setting value is, the larger the notch width is, and the factory default is usually used.

P02.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	3rd notch depth selection	0～99	—	0	Effective immediately	ALL

Set the notch depth of the 3rd resonance control notch filter.

 Caution

When the setting value increases, the notch depth becomes shallow and the phase lag decreases.

P02.10	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	4th notch frequency	50～5000	Hz	5000	Effective immediately	ALL

Set the frequency of the 4th resonance control notch filter.

 Caution

When the setting value is **5000**, the function of notch filter is invalid.

P02.11	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	4th notch width selection	0～20	—	2	Effective immediately	ALL

Set the width of the 4th resonance control notch filter.

 Caution

The larger the setting value is, the larger the notch width is, and the factory default is usually used.

P02.12	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	4th notch depth selection	0～99	—	0	Effective immediately	ALL

Set the notch depth of the 4th resonance control notch filter.

 Caution

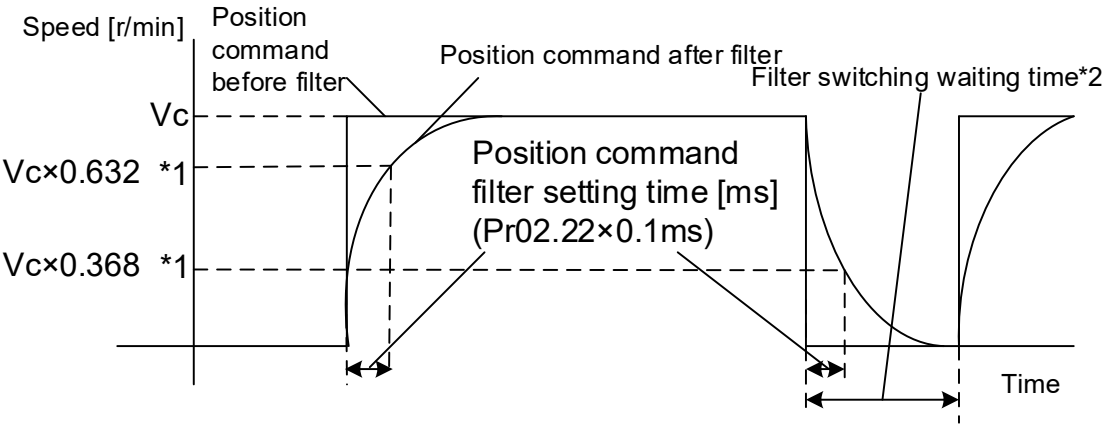
When the setting value increases, the notch depth becomes shallow and the phase lag decreases.

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.14	1st vibration damping frequency	0～2000	0.1Hz	0	Effective immediately	P
P02.15	1st vibration damping ratio	0～500	0.001	0	Effective immediately	P
P02.16	2nd vibration damping frequency	0～2000	0.1Hz	0	Effective immediately	P
P02.17	2nd vibration damping ratio	0～500	0.001	0	Effective immediately	P
P02.18	3rd vibration damping frequency	0～2000	0.1Hz	0	Effective immediately	P
P02.19	3rd vibration damping ratio	0～500	0.001	0	Effective immediately	P
P02.20	4th vibration damping frequency	0～2000	0.1Hz	0	Effective immediately	P

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.21	4th vibration damping ratio	0～500	0.001	0	Effective immediately	P

P02.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position command smoothing filter	0～32767	0.1ms	0	Effective immediately	P

Set the time constant of the first-order low-pass filter for the square wave command of the target speed Vc. As shown in the following figure.



*1: When the actual filter time constant is less than 100ms, the absolute error with the set value is not more than 0.2ms;
When it is more than 20ms, the relative error with the setting value is not more than 0.1%.

*2: During positioning end output, P02.22 switch is performed when the command pulse of each control cycle changes from 0 to non-0.

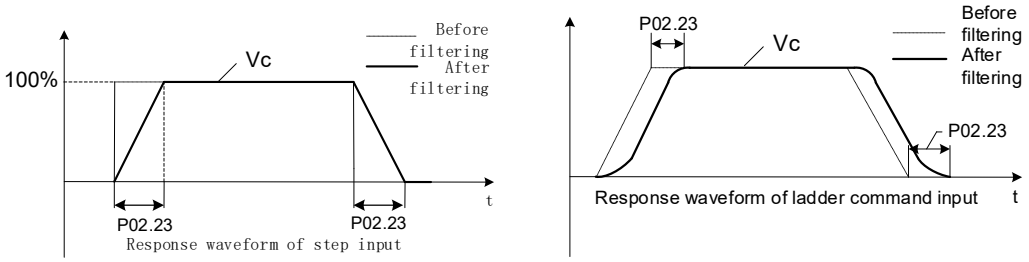
Caution

When the filter time becomes smaller and the positioning completion setting is larger, if there are detention pulses left in the filter in the above stages (that is, the area of time integration of the position command before the filter minus the value of the position command after the filter), then in order to immediately execute these detention pulses to return to the original position after switching, the motor may temporarily run at a speed higher than the original command.

P02.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position command FIR filter	0～5120	0.1ms	0	Effective immediately	P

P02.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode

Set the time constant of FIR filter for position command.



P02.24	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Model tracking control selection	0～2	-	0	Effective immediately	P

Model tracking control mode selection.

Value	Description
0	Not used
1	Rigidity model
2	Double inertia model

P02.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Model tracking control gain	10～20000	0.1/s	500	Effective immediately	P

- Determine the position loop responsiveness. The larger the value, the higher the response.
- After enabling model tracking, the system's position loop response depend on this parameter rather than the position loop gain P01.00.

P02.26	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Model tracking control inertia correction	500～2000	0.1%	1000	Effective immediately	P

- When the model tracking control call the inertia ratio for calculation, this parameter is introduced for correction.

	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.27	Model tracking control positive torque feedforward compensation	0～10000	0.1%	1000	Effective immediately	P
• Set torque feedforward compensation during positive motion						

	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.28	Model tracking control negative torque feedforward compensation	0～10000	0.1%	1000	Effective immediately	P
• Set torque feedforward compensation during negative motion						

	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.29	Model tracking control speed feedforward compensation	0～10000	0.1%	1000	Effective immediately	P
• Set model tracking control speed feedforward compensation						

	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.30	Low frequency vibration suppression 1 frequency A	10～2500	0.1Hz	500	Effective immediately	P
• It takes effect when P02.25=2 (double inertia model), generally keep the default						

	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P02.31	Low frequency vibration suppression 1 frequency B	10～2500	0.1Hz	700	Effective immediately	P
• It takes effect when P02.25=2 (double inertia model), generally keep the default						

P02.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Low frequency vibration suppression 2 frequency	0～2000	0.1Hz	0	Effective immediately	P

- It is mainly used to suppress the residual oscillation after the motor stops, and is generally set to the actual oscillation frequency.
- This parameter is invalid when set to 0.
- The smaller the setting value, the greater the position loop response lag.

P02.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Low frequency vibration suppression 2 compensation	10～1000	1%	100	Effective immediately	P

- Generally keep the default

P02.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression enable	0～1	-	0	Effective immediately	P,S

- This parameter is used to set whether to enable the medium frequency vibration suppression function.
- The medium frequency vibration suppression function is mainly used to suppress vibration in the frequency range of 100Hz~1000Hz.

Value	Description
0	Disable
1	Enable

P02.35	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression frequency	10～20000	0.1Hz	1000	Effective immediately	P,S

- Set the medium frequency vibration suppression frequency

P02.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression inertia correction	1～1000	1%	100	Effective immediately	P,S
• When calling the inertia ratio for calculation, introduce this parameter for correction.						

P02.37	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression damping gain	0～300	1%	0	Effective immediately	P,S
• Medium frequency vibration suppression output coefficient. The larger the value, the better the vibration suppression effect. If it is too large, overshooting oscillation will occur. • When this parameter is set to 0, the medium frequency vibration suppression function is invalid.						

P02.38	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression filter time constant 1 compensation	-1000～1000	0.01ms	0	Effective immediately	P,S
• Built-in low-pass filter phase adjustment						

P02.39	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression filter time constant 2 compensation	-1000～1000	0.01ms	0	Effective immediately	P,S
• Built-in high-pass filter phase adjustment						

P02.40	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression damping gain 2	0～300	1%	0	Effective immediately	P,S
• Adjust this parameter when multiple vibration frequencies occur						

P02.41	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Medium frequency vibration suppression frequency 2	10～50000	us	20000	Effective immediately	P,S

- Used by the manufacturer, please do not modify it.

10.6 [P03] Speed/Torque Control

P03.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed command selection	0～4	—	0	Effective immediately	S

Speed command source selection.

Value	Command Source
0	EtherCAT bus command
1	Internal speed command P03.04~P03.11

P03.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Internal speed command direction setting	0～1	—	0	Effective immediately	S

Set the positive and negative direction of the internal speed command.

Value	Internal Speed Setting (1st speed to 8th speed)	Speed Command Symbol Selection (VC-SIGN)	Speed Command Direction
0	+	No effect	Positive
	-	No effect	Negative
1	Symbol has no effect	OFF	Positive
	Symbol has no effect	ON	Negative

P03.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	External analog speed command direction setting	0～1	—	0	Effective immediately	S

Set the direction of external analog speed command.

Value	Direction
0	CW
1	CCW

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P03.04	1st stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.05	2nd stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.06	3rd stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.07	4th stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.08	5th stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.09	6th stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.10	7th stage speed command	-20000～20000	r/min	0	Effective immediately	S
P03.11	8th stage speed command	-20000～20000	r/min	0	Effective immediately	S

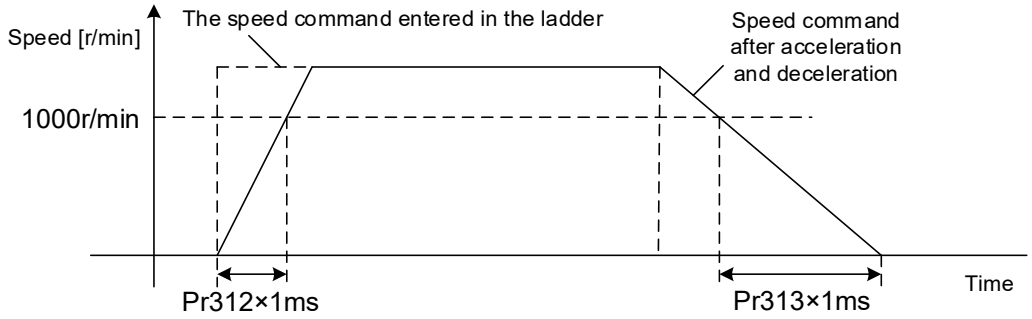
Set the 1st to 8th stage speed of the internal command speed.

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P03.12	Acceleration time setting	0～10000	ms/(1000r/min)	0	Effective immediately	S
P03.13	Deceleration time setting	0～10000	ms/(1000r/min)	0	Effective immediately	S

Set the acceleration and deceleration processing time for the speed command input.
When trapezoidal speed command is used, set the time from 0 to 1000r/min as P03.12;
Set the time of speed command from 1000r/min to 0 to P03.13.
If the target value of speed command is Vc [r/min], the time required for acceleration and

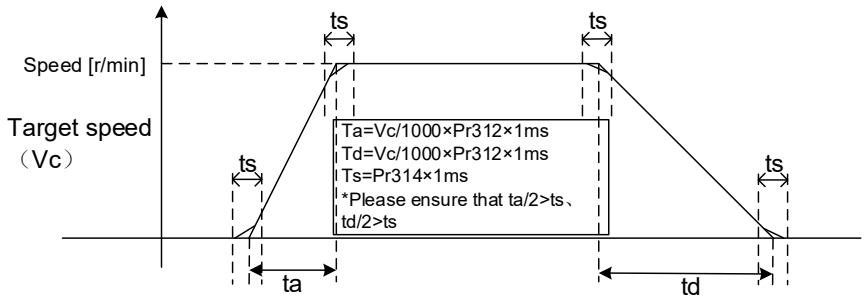
deceleration can be calculated by the following formula:

- Acceleration time［ms］＝V_c/1000×P03.12×1ms
- Deceleration time［ms］＝V_c/1000×P03.13×1ms



P03.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	S-type acceleration and deceleration time setting	0～1000	ms	0	Effective immediately	S

For the acceleration and deceleration time set for parameters **P03.12 Acceleration Time Setting** and **P03.13 Deceleration Time Setting**, the **Sigmoid** time **ts** in the time width centered on its acceleration and deceleration inflection point is set.



P03.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Zero-speed clamp function selection	0～3	—	0	Effective immediately	S,T

Set zero-speed clamp input function.

Value	ZEROSPD Input Function
0	Invalid, zero-speed clamp input is ignored.
1	When the zero-speed clamp (ZEROSPD) input signal is **ON**, the speed command is forced to be set to **0**.
2	When the zero-speed clamping (ZEROSPD) input signal is **ON**, the speed command is forced to be set to **0**, and the actual speed of the motor becomes below the value of parameter **P03.16 Zero-speed Clamp Level**, and then it is switched to the position control mode and servo locked at this position.
3	When the zero-speed clamp (ZEROSPD) input signal is **ON** and the speed command is less than (P03.16-10r/min), switch to position control and servo lock at this position.

P03.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Zero-speed clamp level	10～20000	r/min	30	Effective immediately	S,T

When P03.15 is set to 2 or 3, this parameter sets the time to switch to position control.
When P03.15=3, use 10r/min hysteresis in detection.

P03.17	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque command selection	0～2	—	0	Effective immediately	T

Select the torque command source and speed limit source.

Value	Torque Command Input	Speed Limit Input
0	Bus command (6071h)	P03.21 setting value
1	Bus command (6071h)	Bus command (6080h)
2	P06.01 setting value	P03.21, P03.22 setting value

P03.18	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Internal torque command direction	0～1	—	0	Effective immediatel	T

P03.18	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	setting				y	

Set the direction of the internal torque command.

Value	Direction
0	Specify direction with torque command symbol. For example: torque command input "+" → positive direction; "-" → negative direction.
1	Specify direction with external TC-SIGN signal.

P03.21	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed limit 1	0～20000	r/min	0	Effective immediately	T

When parameter **P03.17 Torque Command Selection** is set to **2**, the speed limit value of the positive direction command takes effect.

P03.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed limit 2	0～20000	r/min	0	Effective immediately	T

When parameter **P03.17 Torque Command Selection** is set to **2**, the speed limit value of the negative direction command takes effect.

P03.30	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque arrival datum value	0～400	%	0	Effective immediately	ALL

Set the torque arrival output signal datum value.
For details, please see Torque Arrival Output.

P03.31	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque arrival failure value	0～400	%	10	Effective immediately	ALL

Set the torque arrival output signal failure value.

P03.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque arrival effective value	0～400	%	20	Effective immediately	ALL
Set the effective value of torque arrival output signal.						

10.7 [P04] I / F Monitor Setting

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P04.00	SI1 input selection	0~00FFFFFFh	—	00010101h (65793)	Restart effective	ALL
P04.01	SI2 input selection	0~00FFFFFFh	—	00020202h (131586)	Restart effective	ALL
P04.02	SI3 input selection	0~00FFFFFFh	—	00222222h (2236962)	Restart effective	ALL
P04.03	SI4 input selection	0~00FFFFFFh	—	00202020h (2105376)	Restart effective	ALL
P04.04	SI5 input selection	0~00FFFFFFh	—	00212121h (2171169)	Restart effective	ALL

Set the function assignment of the external SI input.

Description of Setting Value:

- Parameters are set in hexadecimal, and displayed on the display panel in decimal.
- The number function of hexadecimal digits takes effect in the specified control mode. Please set the function number in the "★★" part:

  0 0 – – – – ★★ h: Position control

  0 0 – – ★★ – – h: Speed control

  0 0 ★★ – – – – h: Torque control

Refer to the following table for input signal pin assignment. The setting of signal polarity is also included in the set value (- means it cannot be set):

Signal Name	Symbol	Function Number				Applicable Mode
		a Contact (NO)	b Contact (NC)	Always Valid	Always Invalid	
Invalid (-)	-	00h	-	-	-	-
Positive overtravel input	POT	01h	81h	41h	C1h	P S T
Negative overtravel input	NOT	02h	82h	42h	C2h	P S T
Alarm clear input	A-CLR	04h	-	-	C4h	P S T
Forced alarm input	E-STOP	14h	94h	54h	D4h	P S T
Origin switch input	HOME	22h	A2h	62h	E2h	P

Probe 1	-	20h	A0	60h	E0h	P S T
Probe 2	-	21h	A1h	61h	E1h	P S T
Undefined	GP	2Eh	AEh	6Eh	EEh	P S T


Caution

- Do not set the setting value outside the table.
- The same function cannot be allocated to multiple pins, otherwise, **Err33.0 I/F Input Repeated Allocation Exception 1** will occur.
- Please note that the front panel is displayed in 10 digits.
- "Always valid" and "always invalid" are described as follows.

  Always valid: it means that the input signal function will remain valid (ON) and will not be affected by external signals.

  Always invalid: it means that the input signal function will remain in an invalid status (OFF status) and will not be affected by external signals.

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P04.08	SO1 output selection	0～00FFFFFFh	—	00030303h（197379）	Restart effective	ALL
P04.09	SO2 output selection	0～00FFFFFFh	—	00020202h（131586）	Restart effective	ALL
P04.10	SO3 output selection	0～00FFFFFFh	—	00010101h（65793）	Restart effective	ALL

Set the function assignment of SO output.

Description of Setting Value:

- Parameters are set in hexadecimal, and displayed on the display panel in decimal.
- The number function of hexadecimal digits takes effect in the specified control mode. Please set the function number in the "★★" part:

  0 0 – – – – ★★ h: Position control

  0 0 – – ★★ – – h: Speed control

  0 0 ★★ – – – – h: Torque control

Refer to the following table for output signal pin assignment. The setting of signal polarity is also included in the set value:

Signal Name	Symbol	Function Number		Applicable Mode
		a Contact (NO)	b Contact (NC)	
Invalid	-	00h	80h	-
Servo fault output	ALM	81h	01h	P S T
Servo ready output	S-RDY	02h	82h	P S T
Brake release signal	BRK-OFF	03h	83h	P S T

Positioning completed	INP	04h	84h	P
Speed arrival output	AT-SPPED	05h	85h	S T
Signal output in torque limit	TLC	06h	86h	P S T
Zero-speed clamp detection signal	ZSP	07h	87h	S T
Speed consistent output	V-COIN	08h	88h	P S T
Warning output 1	WARN1	09h	89h	P S T
Warning output 2	WARN2	0Ah	8Ah	P S T
Whether the position command is output	P-CMD	0Bh	8Bh	P
Positioning completed 2	INP2	0Ch	8Ch	P
Output in speed limit	V-LIMIT	0Dh	8Dh	P
Alarm attribute output	ALM-ATB	0Eh	8Eh	P S T
Whether the speed command is output	V-CMD	0Fh	8Fh	S
Torque arrival output	Toq-Reach	14h	94h	P S T


Caution

- Output function can assign the same function to different pins.
- When the port is set to "invalid", the transistor output remains OFF.
- Do not set setting values other than those in the above table.
- Please note that the front panel is decimal.

P04.30	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Positioning completion range	0～262144	Command unit/encoder unit	800	Effective immediately	P

Set the position deviation timing of the positioning completion signal (INP1) output.

The unit of this parameter is determined by the setting value of parameter **P05.20 Position Unit Setting**. When parameter **P05.20** changes, the unit of **P00.14 Position Deviation Excess Threshold** will also change.

P04.31	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Positioning completion output condition	0～3	—	0	Effective immediately	P

Setting the output condition of positioning completion signal (INP1).

Value	Positioning Completion Signal Output Condition
0	Output when the position deviation is less than the setting value of **P04.30 Positioning Completion Range**.
1	When there is no position command and the position deviation is less than the setting value of parameter **P04.30**, it will output.
2	When there is no position command, and the zero-speed detection signal is **ON**, the position deviation is less than the setting value of parameter **P04.30**, it will output.
3	When there is no position command and the position deviation is less than the setting value of parameter **P04.30**, it will output. Keep the output status within **P04.32 Positioning Completion Signal Hold Time**. After the hold time is exceeded, it is decided whether to keep output or disconnect according to the position command and position deviation at this time.

P04.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Positioning completion signal hold time	0～30000	1ms	0	Effective immediately	P

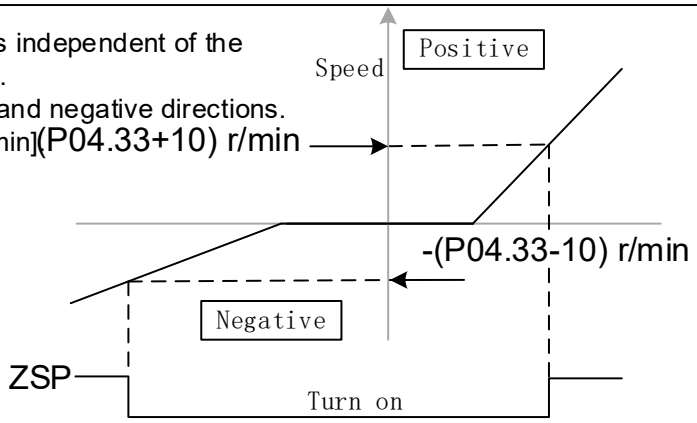
Hold time when parameter **P04.31 Positioning Completion Output Conditions** is set to **3**.

Value	Positioning Completion Signal Action
0	Hold time becomes infinite and remains **ON** until the next position command is received.
1～30000	It remains **ON** only during setting. If the position command is received during holding, it will become **OFF**.

P04.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Zero-speed threshold	10～20000	r/min	50	Effective immediately	ALL

When the motor speed is lower than the set speed of this parameter, zero-speed detection signal (ZSP) is output.

- The setting of P04.33 is independent of the motor rotation direction.
  It acts in both positive and negative directions.
- There is a lag of 10 [r/min]



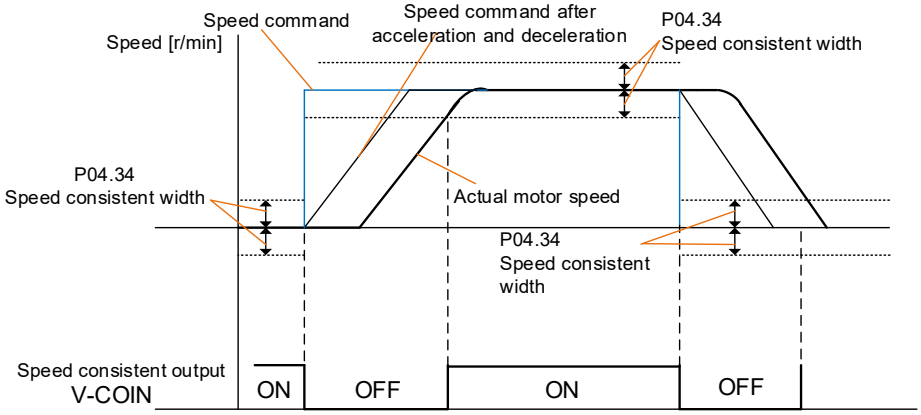
P04.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed consistent width	10～20000	r/min	50	Effective immediately	ALL

Set the detection time of speed consistent output (V-COIN).

If the difference between the speed command and the motor speed is less than the set value, the output speed is consistent with the output (V-COIN).

Caution

This parameter uses 10r/min hysteresis. When the speed is consistent, the actual detection width is as follows.

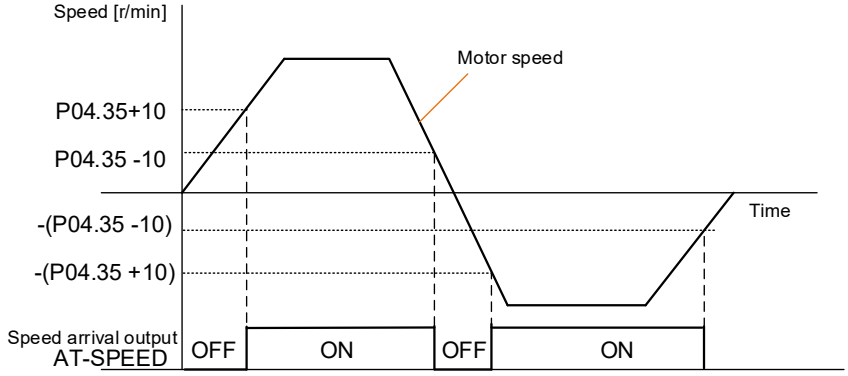


- Conditions for speed consistent output OFF → ON: speed deviation is less than (P04.34-10) r/min.
- Condition of speed consistency output ON → OFF: speed deviation is greater than (P04.34+10) r/min.

P04.35	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed arrival threshold	10～20000	r/min	1000	Effective immediately	S,T

Set the detection time of speed arrival output (AT-SPEED).

When the motor speed is greater than the parameter value, the output speed arrival the output (AT-SPEED). This parameter use 10r/min hysteresis.

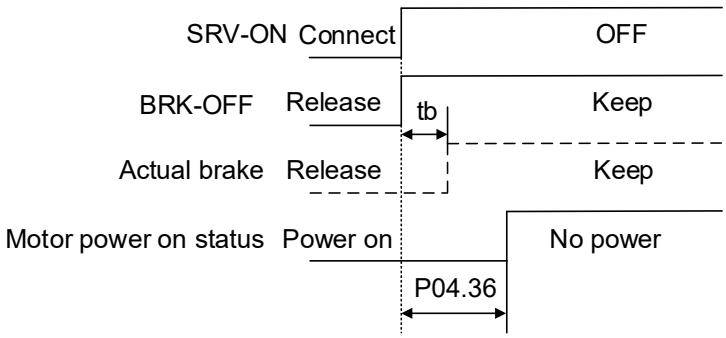


P04.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Stop state, delay from servo enable OFF to motor no power	0～10000	ms	150	Effective immediately	ALL

When the servo enable is turned off when the motor is stationary, set the time from the brake release signal BRK-OFF turn off (brake hold) to the motor being completely powered off.

The sequence diagram and related descriptions are as follows:

- **Tb:** The time from BRK-OFF signal output to actual brake action completion;
- **Power On:** The motor is still locked;
- **Power Off:** The motor is completely powered off and in free status or DB braking status (set according to DB action);
- P04.36 setting value should be ⩾ tb, otherwise the load may fall a certain distance.

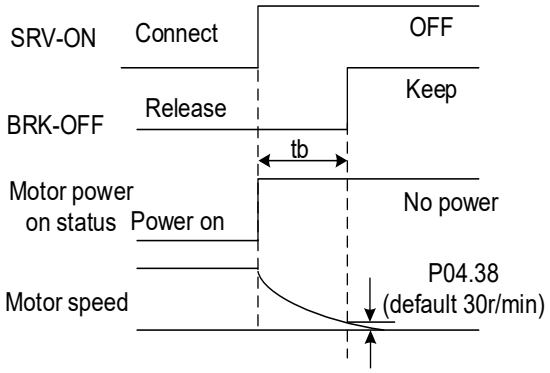


P04.37	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Rotation state, servo enable OFF to brake output OFF delay	0～10000	ms	0	Effective immediately	ALL

When the servo enable is turned off while the motor is rotating, set the time from when the **SRV-ON** signal is detected to be turned off to when the external brake release signal (**BRK-OFF**) is turned off.

The time sequence diagram and related instructions are as follows:

- The time from **SRV-ON** turning off to the motor speed dropping to **P04.38**:
- If it is greater than the value set by **P04.37**, the **BRK-OFF** signal will act according to the value set by **P04.37**;
- If it is less than the setting value of **P04.37**, the **BRK-OFF** signal will act according to the time when the speed drops to **P04.38**.



P04.38	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Rotation state, speed threshold when brake output is OFF	30～3000	r/min	30	Effective immediately	ALL

Set the timing when the motor brake release signal **BRK-OFF** turn off when the motor is rotating.

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P04.39	Warning output selection 1	0～16	—	0	Effective immediately	ALL
P04.40	Warning output selection 2	0～16	—	0	Effective immediately	ALL

Select the type of output warning with warning output 1 and 2.

Value	Warning Name	Content
0	—	OR output of all warnings
1	Overload warning	The load rate protection level is greater than 85%
2	Over-regeneration warning	Regenerative load rate level is greater than 85%
3	Battery warning	Battery voltage is less than 3.2V
4	Fan warning	The fan stops running for 1s

5	Encoder communication warning	The number of consecutive encoder communication errors exceeds the specified value
6	Encoder overheat warning	Encoder overheat warning detected
7	Vibration detection warning	Vibration status detected
8	Registration time expires	Drive registration time is less than 24h
9~16	Reserve	-

P04.41	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd positioning end range	0～4191304	Command unit	800	Effective immediately	P

Set the position deviation condition for positioning completion signal 2 (INP2) output.

INP2 is not affected by parameter **P04.31 Positioning Completion Output Condition**. When the position deviation is less than the set value, the output is **ON**.

Set the unit and deviation calculation method according to parameter **P05.20 Position Unit Setting**.

P04.49	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Function selection application switch 1	-2147483647～2147483647	-	100	Restart effective	P

Use bit unit to set each function

bit	Description
0	Electronic gear ratio related object **6092h Feed Constant** is read-only
1	Electronic gear ratio related object **6092h Feed Constant** is readable and writable

P04.50	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Function selection application switch 1	-2147483647～2147483647	-	32	Restart effective	P

Use bit unit to set each function

bit	Description
0~4	Used by the manufacturer, fixed to 0
5	Interface open: 0-invalid, 1-valid
6~31	Used by the manufacturer, fixed to 0

10.8 [P05] Extended Setting

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P05.00	2nd command frequency division multiplier numerator	0~1073741824	—	0	Effective immediately	P
P05.01	3rd command frequency division multiplier numerator	0~1073741824	—	0	Effective immediately	P
P05.02	4th command frequency division multiplier numerator	0~1073741824	—	0	Effective immediately	P
Set the 2nd to 4th numerator of the command pulse input frequency division.						

P05.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Overtravel protection setting	0～2	—	0	Restart effective	ALL

Set the action of overtravel protection input (POT, NOT).

Value	Action
0	POT: Prohibit forward rotation NOT: Prohibit negative rotation
1	POT, NOT invalid
2	POT/NOT any unilateral input will cause **Er38.0 Prohibit Drive Input Protection**.

P05.05	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Overtravel shutdown time sequence	0～2	—	0	Restart effective	ALL

This parameter is only effective when **P05.04 = 0** and is used to set the shutdown method when the overtravel signal POT or NOT is triggered.

Value	Shutdown Method	After Stopping	Contents of Deviation Counter
0/1	Torque command in the rotation direction is prohibited = 0	Torque command in the rotation direction is prohibited=0	Keep*2
2	E-stop	Command in the rotation direction is prohibited=0*1	Clear before and after deceleration*3

*1：In position control, position command = 0; in speed control, speed command = 0; in torque control, speed limit value = 0;

*2：When the overtravel protection is triggered, if you continue to send commands in the prohibited rotation direction, it may cause the drive to occur alarm **Er24.0 Position Deviation Excess Protection**.

*3：The position deviation will be cleared the moment of deceleration start and completion, so it is necessary to perform a reset to the origin again.

*4：When **P05.04=2**, if either POT or NOT is triggered, the alarm **Er38.0 Overtravel Protection** will occur. At this time, the shutdown will not be performed according to this parameter but according to the **P05.10 Alarm Shutdown Time Sequence**. The same applies when other alarms occur, and **P05.10** takes priority.

P05.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Servo enable OFF shutdown time sequence	0～9	—	0	Effective immediately	ALL

Set the servo shutdown method and after stopping state when the enable is turned off.

Value	Decelerating *1	After Stopping	Position Deviation
0	DB*2 shutdown	Keep DB status	Clear*3
1	Free shutdown	Keep DB status	Clear
2	DB shutdown	Keep free running status	Clear
3	Free shutdown	Keep free running status	Clear
4	DB shutdown	Keep DB status	Clear
5	Free shutdown	Keep DB status	Clear
6	DB shutdown	Keep free running status	Clear
7	Free shutdown	Keep free running	Clear

P05.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Servo enable OFF shutdown time sequence	0～9	—	0	Effective immediately	ALL

		status	
8	Stop immediately	Keep DB status	Clear
9	Stop immediately	Keep free running status	Clear

*1: When the motor speed is greater than 30r/min, it will shutdown in this way. When the motor speed is less than 30r/min, it switches to the "after stopping" state. After that, no matter how the motor speed changes, it will act according to the "after stopping" status.

*2: DB is a dynamic brake, which is built into the drive and performs E-stop through short circuit of the electrical circuit.

DB is only used as an emergency braking method, and the motor cannot be started or stopped normally, otherwise the internal circuit may be damaged.

When the DB function is in effect, the motor cannot be dragged externally, otherwise the drive will be damaged.

*3: The position deviation is always kept at zero.

*4: Immediate stop means zero-speed shutdown. The shutdown speed is fast and the mechanical shock is large. The maximum torque during immediate stop can be set through **P05.11 Torque Limit at Immediate Stop**.


Caution

An alarm occurs when the servo is turned off. The drive will action according to parameter **P05.10 Alarm Shutdown Time Sequence**.

P05.07	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Main power supply OFF shutdown time sequence	0～9	—	0	Effective immediately	ALL

- Set the shutdown nethod and after stopping status when the main power is cut off.
- The relationship between this parameter setting, the shutdown method, the deviation counter and the parameter **P05.06 Servo Enable OFF Shutdown Time Sequence** are the same.
- If an alarm occurs when the main power supply is turned off, the drive will shutdown according to parameter **P05.10 Alarm Shutdown Time Sequence**.

P05.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Undervoltage protection selection when main power	0～1	—	1	Effective immediately	ALL

- Set the protection method when the main power supply is **OFF** and the servo is in the **ON** state.
- When the servo is enabled in **OFF** state, there is no undervoltage protection.

P05.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Undervoltage protection selection when main power	0～1	—	1	Effective immediately	ALL

Value	Protection Method when Main Power is **OFF**
0	Turn off the servo enable directly and **Er13.1** will not be displayed; When the main power is turned on again, it returns to the servo enabled state.
1	Turn off servo enable and display **Er13.1**


Caution

- When parameter **P05.09** is set to **2000**, **P05.08** setting is invalid.
- If the parameter **P05.09** is set for a long time, the voltage across P-N drops below the specified value before the main power supply circuit is detected, and **Er13.0 Main Power Supply Voltage Shortage Protection (PN)** will occur. This alarm has nothing to do with the setting of **P05.08**.

P05.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Main power supply OFF detection time	70～2000	ms	70	Effective immediately	ALL

Set the time from main power supply OFF to detection.
When it is set to **2000**, the main power supply is not detected to be off.

P05.10	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Alarm shutdown time sequence	0～7	—	0	Effective immediately	ALL

Set the servo shutdown method and after stopping status when an alarm occurs.

Value	Decelerating *1	After Stopping	Position Deviation
0	DB*2 shutdown	Keep DB status	Clear *3
1	Free shutdown	Keep DB status	Clear
2	DB shutdown	Keep free running status	Clear
3	Free shutdown	Keep free running status	Clear
4	Action A: stop immediately; Action B: DB shutdown*4	Keep DB status	Clear

5	Action A: stop immediately; Action B: free shutdown	Keep DB status	Clear
6	Action A: stop immediately; Action B: DB shut down	Keep free running status	Clear
7	Action A: stop immediately; Action B: free shutdown	Keep free running status	Clear

*1: When the motor speed is greater than 30r/min, it will shutdown in this way. When the motor speed is less than 30r/min, it switches to the "after stopping" state. After that, no matter how the motor speed changes, it will act according to the "after stopping" status.

*2: E-stop the motor through the short circuit of the electrical circuit of the motor. The dynamic braking circuit is built into the drive.

*3: The position deviation is always kept at zero.

*4: When the parameter setting value is 4~7, if an alarm occurs and has the "immediately stop" attribute (refer to 9.3 Alarm Code List), action A will be followed, otherwise action B will be followed.

P05.11	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque limit at immediate stop	0～500	%	0	Effective immediately	ALL

Maximum torque limit when setting immediate stop.
The factory value of 0, which is the torque limit during normal operation.

P05.12	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Overload level setting	0～500	%	0	Effective immediately	ALL

Set the overload level. When the setting value is 0 or greater than 115, the actual overload level is 115%.
Usually the factory value is used, and the level is set only when the overload level is reduced.

P05.13	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Overspeed level setting	0～20000	r/min	0	Effective immediately	ALL

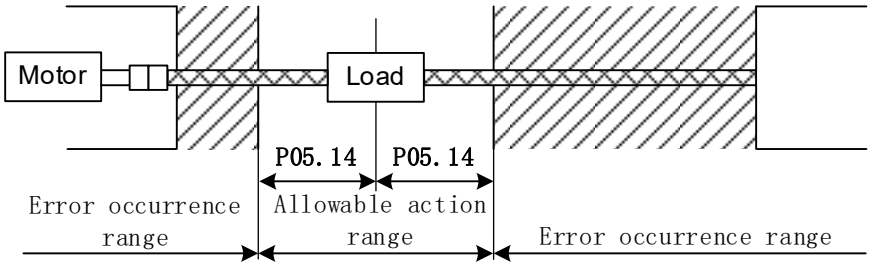
Set the overspeed level. If the motor speed is greater than the setting value, it will occur **Er26.0 Overspeed Protection**.
Usually the factory value 0 is used. At this time, the actual internal overspeed level is 1.2 times the motor maximum speed.
Generally, P05.13=Vmax * (1.2~1.5)

- Vmax: Motor nominal maximum speed (r/min).
- 1.2~1.5: Safety factor to prevent frequent occurrence of overspeed.

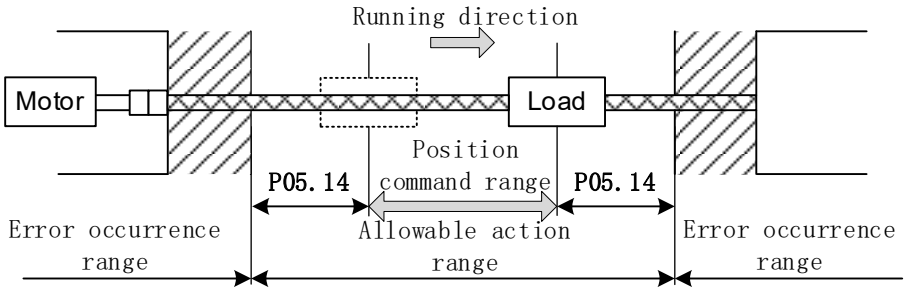
P05.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Motor movable range setting	0～1000	0.1 rpm	10	Effective immediately	P

Set the movable range of the motor corresponding to the input range of the position command, if it is exceeded which will occur **Er34.0 Motor Movable Range Error Protection**.

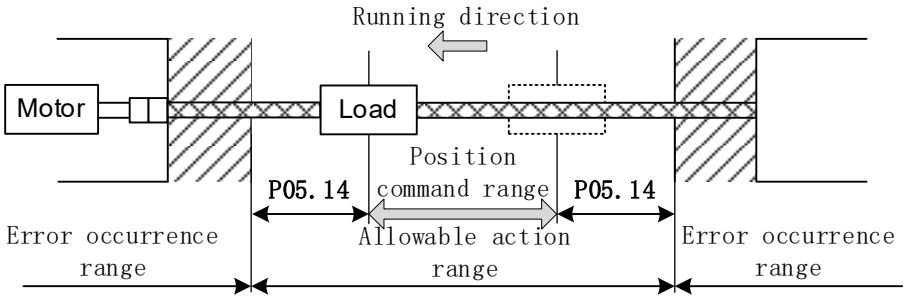
- Servo enable, no position command input:



- Servo enable, right position command input:



- Servo enable, when the left position command is input:



P05.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Alarm clear signal identification time	0～1	—	0	Restart effective	ALL

Select the identification time of alarm clear input (A-CLR).

Value	Identification Time
0	120ms
1	1ms

P05.20	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position unit setting	0～1	—	0	Restart effective	P

Select the unit with excess positioning completion range and position deviation.

Value	Unit
0	Command
1	Encoder

P05.21	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque limit source selection	0～6	—	1	Effective immediately	ALL

Set torque limit method.

Value	Positive Direction	Negative Direction
0,4	Invalid	
1	1st torque limit (P00.13)	
2	1st torque limit (P00.13)	2nd torque limit (P05.22)
3	TL-SEL OFF → 1st torque limit (P00.13) TL-SEL ON → 2nd torque limit (P05.22)	
5	Absolute value of external analog input AI2	
6	TL-SEL OFF	
	1st torque limit (P00.13)	2nd torque limit (P05.22)
	TL-SEL ON	
	CW external torque limit (P05.25)	CCW external torque limit (P05.26)

P05.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd torque limit	0～500	%	500	Effective immediately	P,S

Set the 2nd limit value of motor output torque.
This parameter is limited by the maximum torque of the motor.

P05.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque limit switching slope 1	0～4000	ms/100%	0	Effective immediately	P,S
Set the change rate (slope) from the 1st torque limit to the 2nd torque limit during torque limit switching (TL-SEL).						

P05.24	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque limit switching slope 2	0～4000	ms/100%	0	Effective immediately	P,S
Set the change rate (slope) from the 2nd torque limit to the 1st torque limit during torque limit switching (TL-SEL).						

P05.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	CW external torque limit	0～500	%	500	Effective immediately	P,S
When parameter **P05.21 Torque Limit Source Selection** is **5**, set the positive direction torque limit through this parameter. This parameter is limited by the maximum torque of the motor.						

P05.26	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	CCW external torque limit	0～500	%	500	Effective immediately	P,S
When parameter **P05.21 Torque Limit Source Selection** is **6** (TL-SEL input), set the negative direction torque limit through this parameter. This parameter is limited by the maximum torque of the motor.						

P05.28	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	LED initial status	0～39	—	38	Restart effective	ALL

Set the default display content of LED after power on

Value	Content	Value	Content
0	Position command deviation	20	Absolute encoder data
1	Motor speed	22	Encoder, feedback grating ruler communication error times monitor
2	Position command speed	23	Reserve
3	Speed control command	24	Encoder position deviation (encoder unit)
4	Torque command	27	Voltage across PN
5	Feedback pulse sum	28	Software version
6	Command pulse sum	29	Drive manufacturing No.
7	Load estimation inertia ratio	30	Motor manufacturing No.
9	Control model	31	Accumulated running time
10	Input and output signal status	32	Accumulated load rate
12	Error reason and history	33	Device temperature
13	Warning number	34	Drive remaining time
14	Regeneration load rate	36	Real-time resonance frequency
15	Overload rate	37	Synchronous data loss frame number
16	Inertia ratio	38	Slave station communication and running status
17	Reason for not rotating	39	STO safe status display
19	Servo enable status		

P05.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Panel data refresh time	0～10000	ms	200	Effective immediately	ALL

Set the panel data refresh time.

P05.35	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Panel lock setting	0～1	—	0	Restart effective	ALL

Set whether to allow panel operation.

Value	Content
0	Allow panel operation
1	Prohibit panel operation

P05.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Phase loss detection filter times	0～10	-	2	Restart effective	ALL

- Set the times for continuous phase loss detection. The **Er13.1** alarm occurs after arrival setting value

P05.37	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Power input specification selection	0～1	—	0	Restart effective	ALL

Power input specification selection (applicable to drives with three-phase input specifications):

Value	Content
0	Support single-phase power input
1	Only three-phase power input is supported. At this time, the alarm **Er13.1** will occur when the single-phase power supply is input

10.9 [P06] Special Setting

P06.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque command digital given value	-500～500	%	0	Effective immediately	T

Internal torque command setting.

When **P00.01 Control Mode Setting**=**3** and **P03.17 Torque Command Selection**=**2,** this parameter takes effect**.**

P06.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed deviation excess threshold	0～100	r/min	0	Effective immediately	P

If the speed deviation (the difference between the internal position command speed and the actual speed) is greater than the set value, it will occur **Er24.1 Speed Deviation Excess Protection**.

When this parameter is **0**, the speed deviation excess protection is not detected.

P06.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Current loop filter time constant	-2500～2500	0.01ms	0	Effective immediately	ALL
Set the current loop filter time constant						

P06.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	JOG trial run command speed	0～500	r/min	300	Effective immediately	ALL
Set the command speed during JOG trial run (speed control).						

P06.07	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Gravity load torque compensation value	-100～100	%	0	Effective immediately	P,S
In position and speed control mode, set the variable load compensation value added to the torque command. When parameter **P00.02 Real-time Automatic Adjustment Mode Setting** is set to **3** or **4**, this parameter will be automatically updated.						

P06.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Positive friction torque compensation value	-100～100	%	0	Effective immediately	P
In the position control mode, set the friction compensation value added to the torque command when receiving the position command in the positive direction. When the parameter **P00.02 Real-time Automatic Adjustment Mode Setting** is set to **4**, the parameter will be updated automatically.						

P06.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Negative friction torque compensation value	-100～100	%	0	Effective immediately	P
In the position control mode, set the friction compensation value added to the torque command when receiving the position command in the negative direction. When the parameter **P00.02 Real-time Automatic Adjustment Mode Setting** is set to **4**, the						

P06.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
parameter will be updated automatically.						

P06.11	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Current response level setting	20～500	%	100	Effective immediately	ALL
It is used to adjust the response of the current loop. The higher the value, the higher the response. Too large may cause vibration.						

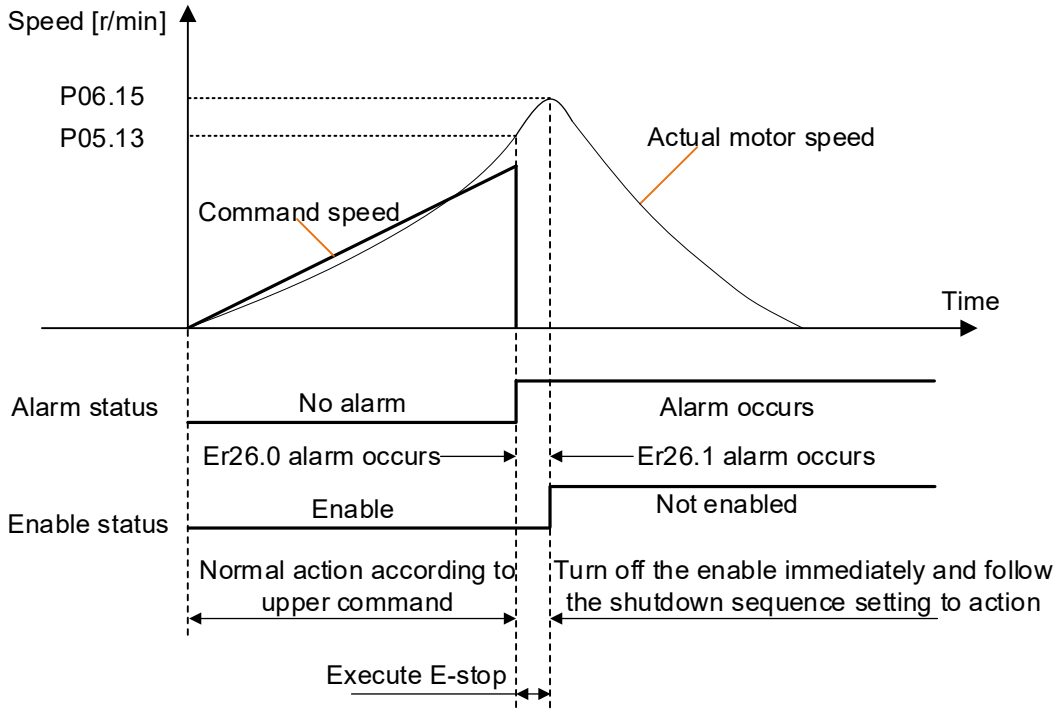
P06.12	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Friction torque compensation filter	0～30000	0.01ms	200	Effective immediately	ALL
Set the time constant of wave converter when positive and negative friction torque compensation (P06.08, P06.09). When the set value is larger, the torque compensation is smoother, which is beneficial to the improvement of system stability, but the set value is too large, which will affect the effect of torque compensation.						

P06.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Immediate stop time when alarm	0～1000	ms	200	Effective immediately	ALL
• This parameter is used when an alarm with the "immediate stop" attribute occurs. • Set the maximum allowable time from the alarm start to the action stop (motor speed is lower than 30rpm). • If the actual stop time exceeds the set value, it will change to the forced alarm status and switch to the standby stop mode (P05.10 action B). • If the parameter value is 0, switch directly to the standby stop mode (P05.10 action B).						

P06.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd overspeed level setting	0～20000	r/min	0	Effective immediately	ALL
Set over speed level. Speed level. When the parameter value is **0**, the overspeed level is set to 1.2 times the motor maximum revolutions. If the motor speed is greater than this parameter value, **Er26.1 2nd Overspeed Protection** occurs.						

P06.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2nd overspeed level setting	0～20000	r/min	0	Effective immediately	ALL

The sequence diagrams of the overspeed level P05.13 and the 2nd overspeed level P06.15 are as follows:



P06.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Disturbance compensation coefficient	0～100	%	0	Effective immediately	P,S

Set parameters of disturbance compensation effect.

The higher the setting value, the better the effect, but if the setting value is too high, the response may more easily to vibration.

Generally, set below 95%.

P06.24	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Disturbance compensation frequency correction	-10000~10000	0.1Hz	0	Effective immediately	P,S

Set disturbance compensation frequency correction

P06.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Disturbance compensation gain	10~10000	%	100	Effective immediately	P,S
Parameters that set the responsiveness to external disturbance. The higher the setting value, the better the response to external disturbance, but when the device has a resonant frequency, setting the value too high may cause vibration.						

P06.26	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Disturbance compensation inertia correction	1~1000	%	100	Effective immediately	P,S
Used to correct the inertia ratio. If **P00.04 Inertia Ratio** is set correctly, no correction is required.						

P06.27	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Warning latch (hold) time selection	0～10	s	5	Restart effective	ALL

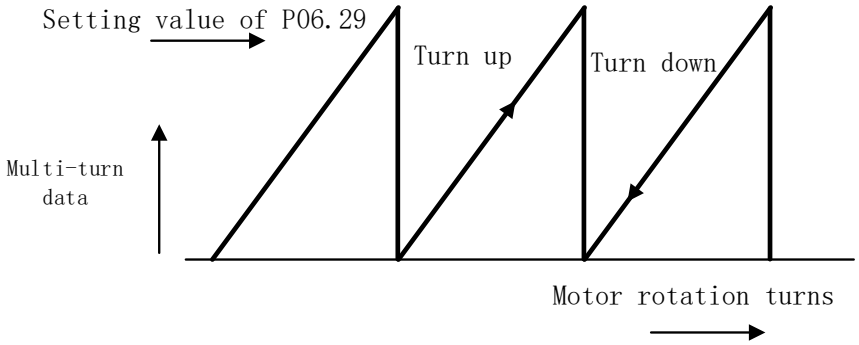
Set warning latch time.

Value	Content
0	Locking time is infinite
1～10	Locking time 1～10 (s)

P06.28	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Vibration detection level	30～1000	%	100	Restart effective	ALL
The smaller the setting value, the more sensitive it is to resonance detection when the adaptive filter is effective.						

P06.29	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute encoder multi-turn data upper limit	0～65534	Rev	0	Restart effective	ALL
Set the upper limit of absolute encoder multi-turn data. If the multi-turn data is greater than this setting value, the multi-turn data becomes 0; otherwise the multi-turn data turns down from 0 to this parameter value. The parameter value takes effect when the parameter **P00.15 Absolute Encoder Setting** is set to **4**.						

P06.29	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute encoder multi-turn data upper limit	0～65534	Rev	0	Restart effective	ALL



Caution

When parameter **P00.15** is set to **0** or **2** (absolute mode), the upper limit of absolute multi-turn data is ignored, and the internal data is taken as 65534.

P06.30	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Damping filter enable switch	0～2	—	0	Effective immediately	P

Whether the damping filter is effective.

Value	Content
0	Invalid
1	Valid
2	Manufacturer use

P06.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Real-time automatic adjustment of user setting	0~65535	—	0	Effective immediately	ALL

P00.02=6 detailed setting of automatic adjustment function in automatic adjustment mode.

bit	Content	Description

<table>
<tr><td>1～0</td><td>Load characteristic estimation</td><td>Set whether the load characteristic estimation function is effective.<table><tr><th>Value</th><th>Function</th></tr><tr><td>0</td><td>Invalid</td></tr><tr><td>1</td><td>Valid</td></tr></table>When the load characteristic estimation is invalid, even if the inertia ratio is updated as the estimated value, the current setting will not change.</td></tr>
<tr><td>3～2</td><td>Inertia ratio update</td><td>Update of load characteristic estimation result of setting P00.04 Inertia Ratio.<table><tr><th>Value</th><th>Function</th></tr><tr><td>0</td><td>Use the current setting</td></tr><tr><td>1</td><td>Use estimated value update</td></tr></table></td></tr>
<tr><td>6～4</td><td>Torque compensation</td><td>Update the load characteristic estimation results of setting parameters P06.07 Gravity Load Torque Compensation Value, P06.08 Positive Friction Torque Compensation Value and P06.09 Negative Friction Torque Compensation Value.<table><tr><th>Value</th><th>Function</th><th colspan="3">Compensation Setting</th></tr><tr><td>0</td><td>Use the current setting</td><td>P06.07</td><td>P06.08</td><td>P06.09</td></tr><tr><td>1</td><td>Torque compensation invalid</td><td>Clearing</td><td>Clearing</td><td>Clearing</td></tr><tr><td>2</td><td>Vertical axis mode</td><td>Update</td><td>Clearing</td><td>Clearing</td></tr><tr><td>3</td><td>Friction compensation (low)</td><td>Update</td><td>Low</td><td>Low</td></tr><tr><td>4</td><td>Friction compensation(middle)</td><td>Update</td><td>Middle</td><td>Middle</td></tr><tr><td>5</td><td>Friction compensation(high)</td><td>Update</td><td>High</td><td>High</td></tr></table></td></tr>
<tr><td>7</td><td>Rigidity setting</td><td>Set whether the parameter P00.03 Real-time Automatic Adjustment Rigidity Setting takes effect.<table><tr><th>Value</th><th>Function</th></tr><tr><td>0</td><td>Invalid</td></tr><tr><td>1</td><td>Valid</td></tr></table></td></tr>
</table>

8	Fixed parameter setting	Set whether fixed parameters can be changed. Value: 0 — Function: The function uses the current settings Value: 1 — Function: Set to fixed value
10～9	Gain switching setting	Select the setting method of gain switch related parameters when real-time automatic adjustment takes effect. Value: 0 — Function: Use current setting Value: 1 — Function: Gain switching invalid Value: 2 — Function: Gain switching valid


Caution

This parameter needs to be set in bit unit. To prevent setting errors, it is recommended to use iMotion software when editing parameters. The setting method of bit unit parameter is as follows:

- Confirm the last bit of each setting.
  Example: The last bit of torque compensation function is 4
- Multiply the (last bit) power of 2 by the set value.
  Example: When the torque compensation function is set to friction compensation (medium), it is 24 × 4＝64.
- For each setting, calculate 1 and 2 steps, and take all added values as P06.32 setting values.
  Example: set as: load characteristic measurement=effective, inertia ratio update=effective, torque compensation=friction compensation (middle), rigid setting=effective, fixed parameter=fixed value, gain switching setting=effective:
  $2^0 \times 1 + 2^2 \times 1 + 2^4 \times 4 + 2^7 \times 1 + 2^8 \times 1 + 2^9 \times 2 = 1477$

P06.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Friction compensation positive effective speed setting	0～1000	0.1rpm	0	Effective immediately	P

Set the speed point of friction torque compensation start.

Because of the different friction force of the mechanism, the speed point may be different, which can be jigged according to the specific situation.

P06.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Friction compensation negative effective speed setting	0～1000	0.1rpm	0	Effective immediately	P
Set the speed point of friction torque compensation start. Because of the different friction force of the mechanism, the speed point may be different, which can be jigged according to the specific situation.						

P06.38	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Warning shield setting	0~65535	—	0	Restart effective	ALL
Mask setting for warning detection. If the corresponding bit is set to 1, the detection of the corresponding warning is invalid.						

P06.40	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute encoder origin position offset	-1073741823～1073741823	Command unit	0	Effective immediately	ALL
Set the offset of encoder position and mechanical coordinate system position when absolute encoder is used.						

P06.41	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	1st damping depth	0～1000	—	0	Effective immediately	ALL
Set the 1st damping frequency depth. The set value of **0** is the deepest, and the depth becomes shallower when the set value increases. Set parameter **P06.41 1st Damping Depth**, jiggle vibration control effect and delay.						

P06.42	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2-stage torque filter time constant	0～2500	0.01ms	0	Effective immediately	ALL
Set the time constant for the torque command filter, which is independent of the gain selection status. If the setting value is too large, the machine tool control will be unstable and vibration will occur. When the parameter **P06.43 2-segment Torque Filter Attenuation Term** is not more than 50 (that is, quadratic filter is used), the time constant corresponding to this parameter value is 5~159 (0.05ms~1.59ms, frequency 100Hz~3000Hz).						

Value	Description
0	The filter is invalid.
1~4	Corresponding time constant 5 (3000Hz).
5~158	Corresponding time parameter 5~158 (100Hz~3000Hz).
159~2500	The corresponding time constant is 159 (100Hz).

P06.43	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	2-stage torque filter attenuation term	0～1000	—	1000	Effective immediately	ALL

Set 2-stage torque filter attenuation term.

Machine tool vibration caused by too small or too large setting value.

Value	Function
0	The filter is invalid.
1~4	Corresponding time constant 5 (3000Hz).
5~15	Corresponding time parameter 5~158 (100Hz~3000Hz).
159~2500	Corresponding time constant is 159 (100Hz).

The factory value is usually used, i.e ζ = Quadratic filter of form 1(ζ = P06.43 / 1000).

P06.47	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Function extension setting 2	0～15	—	0	Effective immediately	ALL

Bit1 and bit2 are set to 0, and bit0 and bit3 are set according to the actual situation:

- bit0 is set to 1: it is applicable to restart the power supply when the 2 degrees of freedom control mode is effective.
- bit3 is set to 1: when applicable to multi-joint robots, real-time automatic adjustment can be changed to the synchronization type.

P06.50	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Viscous friction compensation gain	0～10000	0.1% / （10000r/min）	0	Effective immediately	ALL

Set the viscous friction compensation gain.

P06.51	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Immediate stop end until the motor power off and delay	0～10000	ms	0	Effective immediately	ALL

- This parameter is used when an alarm with the "immediate stop" attribute occurs.
- Set the time to maintain motor power on after the BRK brake output signal OFF and the motor speed is lower than 30rpm.

P06.52	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Runaway protection function enable	0～1	—	1	Effective immediately	ALL

Set whether runaway protection is effective.

Value	Function
0	Invalid
1	Valid

P06.54	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Runaway speed judgment threshold	1～100	rpm	50	Effective immediately	ALL

The speed threshold of runaway protection judgment.

P06.56	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Runaway protection detection time	10～1000	ms	200	Effective immediately	ALL

Runaway protection detection time.

P06.57	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque saturation error protection detection time	0～5000	—	0	Effective immediately	ALL

P06.57	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode

Set torque saturation error protection detection time.

If the duration in continuous torque limit exceeds the set value, **Er16.1 Torque Saturation Error Protection** occurs.

When the setting value is 0, this function is invalid and **Er16.1 Torque Saturation Error Protection** does not occur.

P06.58	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Slot torque compensation gain	0～500	%	0	Effective immediately	ALL

Adjust the cogging torque compensation value to improve the inherent pulsation of the motor.

P06.60	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Manufacturer password	-32768~32768	—	0	Effective immediately	ALL

Please fix to 0.

P06.61	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Stall protection time	10~65535	ms	200	Effective immediately	ALL

Set the motor stall and over-temperature alarm detection time.

P06.62	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Stall protection enable	0~1	—	1	Effective immediately	ALL

Whether the stall over-temperature protection is effective.

Value	Function
0	Invalid
1	Valid

P06.69	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Flux weakening enable	0~1	—	0	Effective immediately	ALL

Set whether the flux weakening function is effective.

Value	Function
0	Invalid
1	Valid

P06.70	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Flux weakening depth	50～110	—	95	Effective immediately	ALL

Set flux weakening depth.

P06.71	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Flux weakening integral constant	50～10000	0.1ms	600	Effective immediately	ALL

Set flux weakening integral constant.

P06.72	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Maximum flux weakening current	0～200	%	60	Effective immediately	ALL

Set the percentage relative to the rated current of the motor.

P06.75	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Backlash compensation direction	0～1	-	0	Restart effective	P

Set the backlash compensation direction.

Value	Function
0	Backlash compensation through forward direction command
1	Backlash compensation through reverse direction command

P06.76	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Backlash compensation amount	-500000～500000	0.1 command pulse	0	Effective immediately	P

Set the backlash compensation amount to be added to the position command.
The setting unit is 0.1 as the command unit, but for the compensation amount converted into encoder pulses that is less than 1 pulse, rounding is used

P06.77	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Backlash compensation time constant	0～65535	-	0	Effective immediately	P

Set the time parameter of the once delay filter corresponding to the backlash compensation amount (P06.76) added to the position command.
Set P06.77 (backlash compensation time constant) to "0", then the once delay filter is invalid.

10.10 [P07] Motor Parameter

P07.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Motor No.	0～9999999	—	0	Restart effective	ALL

Set motor No..
Parameter initialization operation has no effect on this parameter.
Er95.2 Motor Automatic Identification Error Protection alarm occurs when the motor number setting exceeds the range of the “supporting motor No. list”.

Value	Function
0	Automatic identification of motor parameters
1	Motor parameter customization
2~9999999	Manufacturer supporting motor No.

P07.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Motor type selection	0～2	—	2	Restart effective	ALL

Set motor type.

Value	Function
0	Internal use
1	Linear permanent magnet synchronous motor
2	Rotating permanent magnet synchronous motor

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P07.02	Reserved parameter	—	—	—	—	—
P07.03	Reserved parameter	—	—	—	—	—
P07.04	Motor rated current effective value	0~65535	0.01A	0	Restart effective	ALL
P07.05	Motor rated torque	0~655350	0.01N.m	0	Restart effective	ALL
P07.06	Maximum motor torque	0~655350	0.01N.m	0	Restart effective	ALL
P07.07	Motor rated speed	0~32767	r/min	0	Restart effective	ALL
P07.08	Maximum motor speed	0~65535	r/min	0	Restart effective	ALL
P07.09	Motor rotational inertia	0~655350	0.01kg.cm^2	0	Restart effective	ALL
P07.10	Motor pole pairs	0~255	Poles	0	Restart effective	ALL
P07.11	Motor back EMF constant	0~65535	0.1V/(1000rpm)	0	Restart effective	ALL
P07.12	Motor stator resistance	0~65535	0.01Ω	0	Restart effective	ALL
P07.13	Motor d-axis inductance	0~65535	0.01mH	0	Restart effective	ALL
P07.14	Motor q-axis inductance	0~65535	0.01mH	0	Restart effective	ALL
P07.15	Reserved parameter	—	—	—	—	—
P07.16	Motor thermal time constant	1~32767	0.1s	1600	Restart effective	ALL
P07.17	Motor phase sequence selection	0~1	—	0	Restart effective	ALL
P07.18	Initial pole angle	0~3600	0.1°	0	Restart effective	ALL
P07.19 ~P07.24	Reserved parameter	—	—	—	—	—

P07.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Encoder type selection	0～9	—	2	Restart effective	ALL

P07.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode

Set encoder type.

Value	Function
0	ABZ type
1	Sine and cosine
2	Manufacturer use
3	Tamagawa single turn absolute value
4	Tamagawa multi-turn absolute value
5	Panasonic incremental
6	Panasonic multi-turn absolute value
7	Yaskawa 5 absolute value
8	Yaskawa 5 incremental
9	Nikon

No.	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
P07.26	Bus encoder bit	0~31	bit	0	Restart effective	ALL
P07.27	Bus encoder turns	0~31	rev	0	Restart effective	ALL
P07.66	Motor manufacturing serial number	0~2147483647	—	0	Show only	ALL
P07.67	Motor model low	0~2147483647	—	0	Show only	ALL
P07.68	Motor model middle	0~2147483647	—	0	Show only	ALL
P07.69	Motor model high	0~2147483647	—	0	Show only	ALL

10.11 [P08] Drive Parameter

P08.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive voltage level	0～380	V	220	Show only	ALL

Drive input voltage level

P08.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive rated power	0～65535	0.01kW	75	Show only	ALL

P08.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Drive rated power						

P08.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive rated current	0～65535	0.01A	500	Show only	ALL
Drive rated current						

P08.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive maximum current	0～65535	0.01A	500	Show only	ALL
Drive maximum current						

P08.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive overcurrent protection point	0～100	%	100	Effective immediately	ALL
Drive maximum current						

P08.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Brake unit action voltage	3500～7500	0.1V	3900	Restart effective	ALL
Production unit action voltage						

10.12 [P10] Monitoring Parameter

P10.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position command deviation	-2147483648～2147483647	Command unit	0	Show only	ALL
Position command deviation (read only).						

P10.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Motor speed	-20000～20000	r/min	0	Show only	ALL
Motor speed (read only).						

P10.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Position command speed	-20000～20000	r/min	0	Show only	ALL
Position command speed (read only).						

P10.03	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Speed control command	-20000～20000	r/min	0	Show only	ALL
Speed control command (read only).						

P10.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Torque command	-500～500	%	0	Show only	ALL
Torque command (read only).						

P10.05	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Feedback pulse sum	-2147483648～2147483647	Encoder unit	0	Show only	ALL
Feedback pulse sum (read only).						

P10.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Command pulse sum	-2147483648～2147483647	Command unit	0	Show only	ALL
Command pulse sum (read only).						

P10.07	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Load estimation inertia ratio	0～10000	%	0	Show only	ALL
Load estimated inertia ratio (read only).						

P10.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Control model	1～3	—	1	Show only	ALL
Control mode (read only).						

P10.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	SI signal status	0～65535	—	0	Show only	ALL
SI signal status (read only).						

P10.10	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	SO signal status	0～65535	—	0	Show only	ALL
SO signal status (read only).						

P10.14	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Current alarm	-2147483648～2147483647	—	0	Show only	ALL
Current alarm (read only).						

P10.15	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Current warning	-2147483648～2147483647	—	0	Show only	ALL
Current warning (read only).						

P10.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Regeneration load rate	-2147483648～2147483647	%	0	Show only	ALL

P10.16	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Regeneration load rate (read only).						

P10.17	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Overload rate	-2147483648～2147483647	%	0	Show only	ALL
Overload rate (read only).						

P10.18	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Phase current effective value	-2147483648～2147483647	—	0	Show only	ALL
Phase current effective value (read only).						

P10.19	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Reason for not rotating	-2147483648～2147483647	—	0	Show only	ALL
Reason for not rotating (read only).						

P10.20	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Servo system status	-2147483648～2147483647	—	0	Show only	ALL
Servo system status (read only).						

P10.21	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Mechanical angle	-2147483648～2147483647	Encoder unit	0	Show only	ALL
Mechanical angle (read only).						

P10.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Electrical angle	-2147483648～2147483647	0.1°	0	Show only	ALL

P10.22	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Electrical angle (read only).						

P10.23	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Encoder rotation 1 turn data	-2147483648～2147483647	Encoder unit	0	Show only	ALL
Encoder rotates 1 turn of data (read only).						

P10.24	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Encoder multi-turn data	-2147483648～2147483647	Rev	0	Show only	ALL
Encoder multi-turn data (read only).						

P10.25	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Encoder communication error times monitoring	-2147483648～2147483647	—	0	Show only	ALL
Encoder communication error times monitoring (read only).						

P10.26	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Encoder position deviation	-2147483648～2147483647	Encoder unit	0	Show only	ALL
Encoder position deviation (read only).						

P10.27	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Voltage across PN	0～65535	V	0	Show only	ALL
Voltage across PN (read only).						

P10.28	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Control power supply voltage	0～65535	V	0	Show only	ALL

P10.28	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Control power supply voltage (read only).						

P10.29	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Switching power supply output 12V voltage	0～65535	0.1V	0	Show only	ALL
Switching power supply outputs 12V voltage (read only).						

P10.30	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	MCU software version	0～2147483647	—	0	Show only	ALL
MCU software version (read only).						

P10.31	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	FPGA software version	0～2147483647	—	0	Show only	ALL
FPGA software version (read only).						

P10.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Servo parameter version (read only)	0～2147483647	—	6	Show only	ALL
Servo parameter version.						

P10.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Accumulated running time	0～87600	0.1H	0	Show only	ALL
Accumulated running time (read only).						

P10.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Average load rate	0～65535	%	0	Show only	ALL

P10.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Average load rate (read only).						

P10.35	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	CPU temperature	0～65535	1℃	0	Show only	ALL
CPU temperature (read only).						

P10.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	IGBT temperature	0～65535	1℃	0	Show only	ALL
IGBT temperature (read only).						

P10.37	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive temperature	0～65535	1℃	0	Show only	ALL
Drive temperature (read only).						

P10.40	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Real-time resonance frequency	0～5000	Hz	0	Show only	ALL
Real-time resonance frequency (read only).						

P10.41	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute value encoder absolute position low 32 bits	-2147483648～2147483647	Encoder unit	0	Show only	ALL
Absolute value encoder absolute position low 32 bits (read only).						

P10.42	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute value encoder absolute	-2147483648～2147483647	Encoder unit	0	Show only	ALL

P10.42	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	position high 32 bits					
Absolute value encoder absolute position high 32 bits (read only).						

P10.47	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	STO status	0～7	—	0	Show only	ALL

STO port status

Value	Function
bit0	STO1 status
bit1	STO2 status
bit2	FB status

P10.53	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Registration remaining time	-2147483648～2147483647	—	0	Show only	ALL
Registration remaining time (read only).						

P10.81	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 1st alarm	0～65535	0.1	0	Show only	ALL
Last 1st alarm (read only).						

P10.82	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 2nd alarm	0～65535	0.1	0	Show only	ALL
Last 2nd alarm (read only).						

P10.83	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 3rd alarm	0～65535	0.1	0	Show only	ALL
Last 3rd alarm (read only).						

P10.84	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 4th alarm	0～65535	0.1	0	Show only	ALL
Last 4th alarm (read only).						

P10.85	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 5th alarm	0～65535	0.1	0	Show only	ALL
Last 5th alarm (read only).						

P10.86	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 6th alarm	0～65535	0.1	0	Show only	ALL
Last 6th alarm (read only).						

P10.87	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 7th alarm	0～65535	0.1	0	Show only	ALL
Last 7th alarm (read only).						

P10.88	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 8th alarm	0～65535	0.1	0	Show only	ALL
Last 8th alarm (read only).						

P10.89	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 9th alarm	0～65535	0.1	0	Show only	ALL
Last 9th alarm (read only).						

P10.90	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Last 10th alarm	0～65535	0.1	0	Show only	ALL
Last 10th alarm (read only).						

10.13 [P11] Communication Parameter

P11.31	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT station address	0～65535	—	0	Effective immediately	ALL

P11.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT station alias	0~65535	—	0	Effective immediately	ALL

P11.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT communication status	-2147483648～2147483647	—	0	Show only	ALL

P11.34	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT communication error code (AL error code)	-2147483648～2147483647	—	0	Show only	ALL

P11.35	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT synchronous cycle (ESC register 0981h)	-2147483648～2147483647	—	0	Show only	ALL

P11.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT watchdog timeout	-2147483648～	—	0	Effective	ALL

P11.36	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	(ESC register 400h*420h)	2147483647			immediately	

P11.37	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Synchronous data accumulated lost times	-2147483648～2147483647	—	0	Show only	ALL

P11.40	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Synchronous signal continuous loss time upper limit	0～100	—	4	Effective immediately	ALL

- When the value is 0, no detection.
- When the synchronous signal loss times is greater than the set value, **Er80.7 Synchronous Signal Abnormal Protection** occurs.

P11.41	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Bus port disconnect detection time	0～10000	—	0	Effective immediately	ALL

- When the value is 0, no detection.
- When it is detected that the disconnection time of CN2A or CN2B exceeds the set value, **Er85.2 Port Disconnection Detection Abnormal Protection** occurs.

P11.43	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT port 0 invalid frame and error maximum value	0～65535	—	0	Show only	ALL

P11.44	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT port 1 invalid frame and error maximum value	0～65535	—	0	Show only	ALL

P11.45	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT port forwarding error maximum value	0～65535	—	0	Show only	ALL

P11.46	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT data frame processing unit error maximum value	0～65535	—	0	Show only	ALL

P11.47	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	EtherCAT port 0 and port 1 connection loss maximum value	0～65535	—	0	Show only	ALL

P11.52	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	CSP position command increment excess times	1～30	—	20	Effective immediately	ALL

- When the command abnormal times are continuously detected to be greater than the set value, the **Er27.3 Position Command Abnormal Alarm** occurs.

10.14 [P12] Auxiliary Control Parameter

P12.00	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Software reset	0～1	—	0	Effective immediately	ALL

Software reset.

Value	Function
0	Software reset off
1	Software reset on

P12.01	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Alarm reset	0～1	—	0	Effective immediately	ALL

Alarm reset.

Value	Function
0	Alarm reset off
1	Alarm reset on

P12.02	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Parameter initialization	0～2	—	0	Effective immediately	ALL

Parameter initialization.

Value	Function
0	Parameter initialization off
1	Parameter initialization on
2	Reserve

P12.04	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	E-stop	0～1	—	0	Effective immediately	ALL

E-stop.

Value	Function
0	E-stop off
1	E-stop on

P12.06	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	JOG trial run function	-2147483648～2147483647	—	0	Effective immediately	ALL

JOG trial run function.

P12.07	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	SI forced input set value	0～65535	—	0	Effective immediately	ALL
SI forced input set value.						

P12.08	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	SO forced output set value	0～65535	—	0	Effective immediately	ALL
SO forced output set value.						

P12.09	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Absolute value encoder reset	0～1	—	0	Effective immediately	ALL

Absolute value encoder reset.

Value	Function
0	Absolute value encoder reset off
1	Absolute value encoder reset on

P12.31	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive registration	0～1	—	0	Effective immediately	ALL
Drive registration.						

P12.32	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive registration code high	-2147483648～2147483647	—	0	Effective immediately	ALL
Drive registration code high.						

P12.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
	Drive registration code low	-2147483648～2147483647	—	0	Effective immediately	ALL

P12.33	Name	Setting Range	Unit	Factory Value	Effective Method	Association Mode
Drive registration code low.						

10.15 [P30] EtherCAT Parameter

P30.14 (603F:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Error code	0～65535	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RO	TPDO	NO	Show only

Current fault of the drive (only main number)/warning number. When no fault or warning occurs, 0000h is displayed.

- The fault code format is FFxxh, xx is the fault main number; the warning fault code format is FFA/xh, x is the warning number.
- When a fault and warning occur simultaneously, a fault is displayed.

P30.15 (6040: 00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Control character	0~65535	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	RPDO	NO	Effective immediately

Command used to control device status switching. Details of each bit information:

bit	Information Details
0	Wait enable.
1	Main circuit power supply.
2	Quick shutdown.
3	Servo running.
4~6	Control mode related (For details, please refer to **Position Control Mode**, **Speed Control Mode** and **Torque Control Mode**).
7	Fault reset.
8	When the pause bit value is 1, the motor will perform **605Dh Pause Shutdown Mode** to slow down and pause. After 1 → 0 migration, the motor will resume operation.
9~15	Reserved.

The combination of control character bit7, 3~0 forms a command to switch the device status:

Command	bit7	bit3	bit2	bit1	bit0	Device Status Migration No.
Main circuit power supply OFF	0	—	—	0	—	7，9，10，12
Shutdown	0	—	1	1	0	2，6，8
Wait enable	0	0	1	1	1	3
Servo running	0	1	1	1	1	3(*1)，4，16
Enable OFF	0	0	1	1	1	5
Quick shutdown	0	—	0(*2)	1	—	7，10，11
Fault reset	0 → 1	—	—	—	—	15

Note:

*1: When the device status is in the servo ready status, directly send the servo running (Enable Operation) command, and the drive will automatically execute status 3 and 4 in sequence to switch to the servo running status.

*2: When the quick shutdown bit value is 0, it is a quick shutdown command.

P30.16 (6041: 00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Status character	0~65535	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RO	TPDO	NO	Show only

Current drive device status. Details of each bit information:

bit	Meaning	Description
0	Ready	—
1	Wait enable	—
2	Running	—
3	Fault	—
4	Main circuit power supply	When the value is 1, the main circuit of the drive is powered.
5	Quick shutdown	When the value is 0, the drive enter quick shutdown status.
6	Standby	—
7	Warning	When the value is 1, the drive is in warning state. When warning occurs, it will not switch the drive device status or interrupt the motor action.
8	Reserved	—

<table>
<tr><td>9</td><td>Remote control</td><td>When the value is 1, the drive can handle command from the host. The drive has the value 1 in the communication status PreOP, SafeOP or OP.</td></tr>
<tr><td>10</td><td>Control mode related</td><td>Different due to control mode.</td></tr>
<tr><td>11</td><td>Internal limit</td><td>Different due to control mode.
<table>
<tr><th>Control Mode</th><th>Description</th></tr>
<tr><td>Position control</td><td>0: The position command and position feedback not exceed the limit;
1: The position command or position feedback exceed the limit.
Position command and feedback must meet software limit and torque limit*1.</td></tr>
<tr><td>Speeed control</td><td>0: The speed command and speed feedback not exceed the limit;
1: Speed command or speed feedback exceed the limit.
The speed command and feedback need to meet the torque limit*1.</td></tr>
<tr><td>Torque control</td><td>0: Torque command and torque feedback not exceed the limit;
1: Torque command or torque feedback exceed the limit.
The torque command and feedback need to meet the torque limit*1 and speed limit*2.</td></tr>
</table></td></tr>
<tr><td>12</td><td>Control mode related</td><td>Different due to control mode.</td></tr>
<tr><td>13</td><td>Control mode related</td><td>Different due to control mode.</td></tr>
<tr><td>14</td><td>Reserved</td><td>—</td></tr>
<tr><td>15</td><td>Reserved</td><td>—</td></tr>
</table>

Note:

*1: Torque limit refer to the smaller value of the following objects:

6072h maximum torque
3001:04h 1st torque limit (3005:16h = 1 or 2)
3005:17h 2nd torque limit (3005:16h =2)
60E0h forward torque limit (3005:16h = 5)
60E1h reverse torque limit (3005:16h = 5)

*2: The speed limit refer to the smaller value of the following objects:

6080h maximum motor speed
3003:16h speed limit value 1 (3003:12h = 0 or 2)
3003:17h speed limit value 2 (3003:12h = 2)

The combination of bit6, 5, 3~0 forms the device status:

Combination Form	Device Status
XXXX XXXX X0XX 0000	Initialization (Not ready to switch on)

XXXX XXXX X1XX 0000	Standby (Switch on disabled)
XXXX XXXX X 01X 0001	Servo ready (Ready to switch on)
XXXX XXXX X 01X 0011	Servo wait enable (Switched on)
XXXX XXXX X 01X 0111	Servo running (Operation enabled)
XXXX XXXX X 00X 0111	Quick shutdown (Quick stop active)
XXXX XXXX X 0XX 1111	Fault shutdown (Fault reaction active)
XXXX XXXX X 0XX 1000	Fault (Fault)

P30.17 (605A:00h)	**Name**	**Setting Range**	**Unit**	**Factory Value**	**Association Mode**
	Quick shutdown method	-2~7	-	2	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger16	RW	NO	YES	Effective immediately

Servo running status, when **bit2 (Quick stop)** of control character **6040h** is **0**, execute quick shutdown.

This parameter only plan the deceleration process, and the shutdown status after stopping will act according to Pr5.06 (3005:07h).

Value	PP & CSP & PV & CSV	TQ & CST (Torque Mode)	HM
-1	Reserved	Reserved	Reserved
-2	Reserved	Reserved	Reserved
0	Shutdown according to Pr5.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h emergency stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h emergency stop deceleration
3	Shutdown at 60C6h maximum deceleration	Shutdown at torque command as 0	Stop at 60C6h maximum deceleration
5	Same as 1		
6	Same as 2		
7	Same as 3		

P30.18 (605B:00h)	**Name**	**Setting Range**	**Unit**	**Factory Value**	**Association Mode**
	Turn off shutdown method	0~1	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger16	RW	NO	YES	Effective immediately

When the device status switching command is shutdown (Shutdown) or turn off main circuit power supply (Disable voltage), execute shutdown.
This parameter only plan the deceleration process, and the shutdown status after stopping will act according to Pr5.06 (3005:07h).

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to Pr5.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration

P30.19 (605C:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Servo enable OFF shutdown method	0~1	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger16	RW	NO	YES	Effective immediately

When the host computer controls the servo OFF enable, it executes the servo enable OFF shutdown.
This parameter only plan the deceleration process, and the shutdown status after stopping will act according to Pr5.06 (3005:07h).

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to Pr5.06 (3005:07h)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration

P30.20 (605D:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Pause shutdown method	1～3	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger16	RW	NO	YES	Effective immediately

When **bit8 (halt)** of control character **6040h** is **0**, execute pause shutdown.
This parameter only plan the deceleration process, and the shutdown status after stopping will act according to Pr5.06 (3005:07h).

Value	PP & CSP & PV & CSV	TQ & CST	HM
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h emergency stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h emergency stop deceleration
3	Shutdown at 60C6h	Shutdown at torque	Shutdown at 60C6h

	maximum deceleration	command as 0	maximum deceleration

P30.21 (605E:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Alarm shutdown method	0~2	—	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger16	RW	NO	YES	Effective immediately

This parameter only plan the deceleration process, and the shutdown status after stopping will act according to Pr5.10(3005:0Bh).

Value	PP & CSP & PV & CSV	TQ & CST	HM
0	Shutdown according to Pr5.10(3005:0Bh)		
1	Shutdown at 6084h contour deceleration	Shutdown at 6087h torque slope	Shutdown at 609Ah zero return acceleration
2	Shutdown at 6085h emergency stop deceleration	Shutdown at 6087h torque slope	Shutdown at 6085h emergency stop deceleration

P30.22 (6060h:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Control mode	0~10	—	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Interger8	RW	RPDO	YES	Effective immediately

The upper controller set the control mode of the drive through this parameter.

Value	Control Mode
0	No mode
1	Profile Position Mode (PP)
2	Speed mode (not supported yet)
3	Profile velocity mode (PV)
4	Profile torque mode (PV)
5	Reserved (not supported yet)
6	Zero return mode (HM)
7	Interpolation mode (not supported yet)
8	Cycle position synchronization mode (CSP)
9	Cycle velocity synchronization mode (CSV)
10	Cycle torque synchronization mode (CST)

Setting an unsupported control mode through SDO will return SDO abort message;

Set an unsupported control mode through PDO, and **Er88.1 Control Mode Setting Abnormal Protection** occurs;

When the device status transitions to servo running, if the value of object **6061h Control Mode Display** is **0**, **Er88.1 Control Mode Setting Abnormal Protection** occurs.

	Name	Setting Range	Unit	Factory Value	Association Mode
P30.27 (6065:00h)	Position deviation excess threshold	0~4294967295	Command unit	100000	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
The difference between position command 6062h and position feedback 6064h exceeds ±6065h, and position deviation excess alarm occurs when the time arrival 6066h.					

	Name	Setting Range	Unit	Factory Value	Association Mode
P30.28 (6066:00h)	Position deviation excess time window	0~65535	ms	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer16	RW	RPDO	NO	Effective immediately
Used with P30.27(6065:00h)					

	Name	Setting Range	Unit	Factory Value	Association Mode
P30.29 (6067:00h)	Position arrival threshold	0~4294967295	Command unit	100	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	YES	Effective immediately
The difference between position command 6062h and position feedback 6064h is within ±6067h, and position deviation excess alarm occurs at arrival time 6068h.					

	Name	Setting Range	Unit	Factory Value	Association Mode
P30.30 (6068:00h)	Position arrival time window	0~65535	ms	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer16	RW	RPDO	No	Effective

P30.30 (6068:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
					immediately
Used with 6067h					

P30.35 (606D:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Speed arrival threshold	0~65535	rpm	10	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned16	RW	RPDO	NO	Effective immediately
Set speed arrival threshold					

P30.36 (606E:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Speed arrival time window	0~65535	ms	0	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned16	RW	RPDO	NO	Effective immediately
Set the speed to arrival the effective time window, use it with 606Dh					

P30.39 (6071:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Target torque	-32768~32767	0.1%	0	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Integer16	RW	RPDO	YES	Effective immediately
Set the servo target torque in contour torque mode.					

P30.40 (6072:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum torque	0~65535	0.1%	5000	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned16	RW	RPDO	NO	Effective immediately
Set the servo maximum torque command limit.					

P30.48 (607A:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Target position	-2147483648~ 2147483647	Command unit	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	YES	Effective immediately
Set the servo target position in contour position mode					

P30.50 (607B:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Position range limit minimum value	-2147483648~ 2147483647	Command unit	-2147483648	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately
In setting contour position mode, position range limit minimum value					

P30.51 (607B:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Position range limit maximum value	-2147483648~ 2147483647	Command unit	2147483648	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately
In setting contour position mode, position range limit maximum value					

P30.52 (607C:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Origin offset	-2147483648~ 2147483647	Command unit	2147483648	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately

- Set the offset between the mechanical zero point and the mechanical origin.
- After the zero return is completed, the motor stop position is the mechanical zero point. The mechanical zero point = the mechanical origin point + 607Ch (origin offset). When 607Ch = 0, the mechanical origin point and the mechanical zero point coincide.

P30.54 (607D:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Position limit minimum value	-2147483648~ 2147483647	Command unit	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately
That is, the negative soft limit is relative to the position of the mechanical zero point. When the zero return is not completed, the soft limit is meaningless.					

P30.55 (607D:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Position limit maximum value	-2147483648~ 2147483647	Command unit	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately
That is, the positive soft limit is relative to the position of the mechanical zero point. When the zero return is not completed, the soft limit is meaningless.					

P30.56 (607E:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Command polarity	0~255	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	RPDO	NO	Effective immediately

- Set the polarity of position, speed and torque command
- bit7=1, position command reverse direction
  bit6=1, speed command reverse direction
  bit5=1, torque command reverse direction
- Others are meaningless

P30.57 (607F:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Maximum contour speed	0~4294967295	Command unit /s	838860800	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the maximum speed limit value					

P30.61 (6083:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour acceleration	0~4294967295	Command unit /s^2	139810133	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the acceleration during the acceleration stage in contour position mode					

P30.62 (6084:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Contour deceleration	0~4294967295	Command unit /s^2	139810133	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the deceleration during the deceleration stage in contour position mode					

P30.63 (6085:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Quick shutdown deceleration	0~4294967295	Command unit /s^2	139810133	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set quick shutdown deceleration					

P30.65 (6087:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Torque slope	0~4294967295	0.1%/s	1000	T
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the torque command acceleration in contour torque mode, that is, the torque command increment per second					

P30.71 (6091:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Motor revolutions	1~4294967295	r	1	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Command division multiple frequency numerator					

P30.72 (6091:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Shaft revolutions	1~4294967295	r	1	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Command division multiple frequency denominator					

P31.00 (6098:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Origin return method	-128~127	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer8	RW	RPDO	RW	Effective immediately
Set zero return method					

P31.02 (6099:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Switch search speed	0~4294967295	Command unit /s	13981013	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the speed of searching the deceleration switch, generally the speed is faster					

P31.03 (6099:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Zero search speed	0~4294967295	Command unit /s	1398101	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the search origin signal speed. Generally, use slower speed to improve the zero return accuracy.					

P31.04 (609A:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Zero return acceleration	0~4294967295	Command unit /s^2	139810133	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
Set the acceleration in zero return mode					

P31.10 (60B1:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Speed feedforward	-2147483648~ 2147483647	Command unit /s	0	P,S
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer32	RW	RPDO	NO	Effective immediately
Set speed feedforward					

P31.11 (60B2:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Torque feedforward	-32768~32767	0.1%	0	S,T
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer16	RW	RPDO	NO	Effective immediately
Set torque feedforward					

P31.12 (60B8:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Probe function	0~65535	-	0	ALL

	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned16	RW	RPDO	YES	Effective immediately

The functions of each bit are as follows

Value	Function
0	Probe 1 enable command. 0 - off; 1 - probe 1 enable.
1	Probe 1 trigger mode. 0-single; 1-continuous.
2	Probe 1 input source. 0-EXT1; 1-encoder Z-phase signal.
3	Not supported, fixed to 0.
4	Probe 1 rising edge sampling. 0-off; 1-enable.
5	Probe 1 falling edge sampling. 0-off; 1-enable.
6~7	Reserved.
8	Probe 2 enable command. 0 - off; 1 - probe 1 enable.
9	Probe 2 trigger mode. 0-single; 1-continuous.
10	Probe 2 input source. 0-EXT2; 1-encoder Z-phase signal.
11	Not supported, fixed to 0.
12	Probe 2 rising edge sampling. 0-off; 1-enable.
13	Probe 2 falling edge sampling. 0-off; 1-enable.
14~15	Reserved.

P31.19 (60C2:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Interpolation time cycle value	0~255	-	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately

P31.20 (60C2:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	interpolation time index	-128~23	-	-3	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Integer8	RW	NO	NO	Effective immediately

- The update cycle of command in cycle synchronization mode. The object value is automatically updated according to the EtherCAT synchronous cycle. Please not change it.
- The calculation is as follows:

  Interpolation time cycle =（60C2h:01h * $10^{60C2h:02h}$）s

P31.23 (60E0:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Forward torque limit	0~65535	0.1%	3000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	RPDO	NO	Effective immediately
Set the servo forward torque limit value					

P31.24 (60E1:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Negative torque limit	0~65535	0.1%	3000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	RPDO	NO	Effective immediately
Set the servo negative torque limit value					

P31.57 (60F2:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Positioning method	0~32767	-	0	P
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	RPDO	NO	Effective immediately
Used to set positioning action specification in PP mode					

P31.63 (60FE:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Physical output	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately

SO forced output. (Note: Enabling SO output related function require signal distribution of related terminals)

bit	Function
0	Set brake
1	Reserved
2	Reserved
3~15	Reserved

P31.63 (60FE:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	16	General output EX-OUT1			
	17~31	Reserved			

P31.64 (60FE:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Physical output enable	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	RPDO	NO	Effective immediately
SO force output enable. Need to be used in conjunction with 0x60FE. For example: when each bit in 60FE:01h is ANDed with each bit in 60FE:02h and the result is 1, it is output to the terminal function.					

P32.34 (1600:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of the default RPDO mapped object	0~10	-	4	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number. ESM can be modified during Init or PreOP.					

P32.35 (1600:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614807056 (60400010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P32.36 (1600:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1616904200 (60400008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P32.37 (1600:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1618608160 (607A0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P32.38 (1600:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1622671376 (60B80010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P32.39 (1600:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P32.40 (1600:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P32.41 (1600:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P32.42 (1600:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P32.43 (1600:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P32.44 (1600:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P32.45 (1620:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of RPDO mapped object in CSP mode	0~10	-	4	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P32.46 (1620:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614807056 (60400010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P32.47 (1620:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1616904200 (60600008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P32.48 (1620:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1618608160 (607A0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P32.49 (1620:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1622671376 (60B80010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P32.50 (1620:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P32.51 (1620:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P32.52 (1620:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P32.53 (1620:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P32.54 (1620:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P32.55 (1620:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10 th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P32.56 (1621:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of RPDO mapped object in CSP/CSV/CST	0~10	-	6	ALL

P32.56 (1621:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	mode				
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P32.57 (1621:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614807056 (60400010h)	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P32.58 (1621:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1616904200 (60600008h)	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P32.59 (1621:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1618018320 (60710010h)	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P32.60 (1621:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1618608160 (607A0020h)	ALL
	Type	Access	PDO	EEPROM	Effective

P32.60 (1621:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
		Permission			Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P32.61 (1621:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1622671376 (60B80010h)	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P32.62 (1621:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1627324448 (60FF0020h)	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P32.63 (1621:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	0	ALL
	Type	Access Permission	PDO	EEPROM	Effective Method
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P32.64 (1621:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P32.65 (1621:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P32.66 (1621:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P32.67 (1622:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of RPDO mapped object in PP mode	0~10	-	7	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P32.68 (1622:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614807056 (60400010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P32.69 (1622:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1616904200 (60600008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P32.70 (1622:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1618608160 (607A0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P32.71 (1622:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1619066912 (60810020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P32.72 (1622:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1619197984 (60830020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P32.73 (1622:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1619263520 (60840020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P32.74 (1622:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	1622671376 (60B80010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P32.75 (1622:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P32.76 (1622:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P32.77 (1622:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P33.00 (1A00:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of the default TPDO mapped object	0~10	-	8	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P33.01 (1A00:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614741520 (603F0010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P33.02 (1A00:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1614872592 (60410010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P33.03 (1A00:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1616969736 (60610008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P33.04 (1A00:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1617166368 (60640020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P33.05 (1A00:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1622736912 (60B90010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P33.06 (1A00:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1622802464 (60BA0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P33.07 (1A00:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	1626603552 (60F40020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P33.08 (1A00:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	1627193376 (60FD0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P33.09 (1A00:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P33.10 (1A00:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P33.11 (1A20:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of TPDO mapped object in CSP mode	0~10	-	8	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P33.12 (1A20:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614741520 (603F0010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P33.13 (1A20:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1614872592 (60410010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P33.14 (1A20:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1616969736 (60610008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P33.15 (1A20:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1617166368 (60640020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P33.16 (1A20:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1622736912 (60B90010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P33.17 (1A20:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1622802464 (60BA0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P33.18 (1A20:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	1626603552 (60F40020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P33.19 (1A20:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	1627193376 (60FD0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P33.20 (1A20:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P33.21 (1A20:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P33.22 (1A21:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of TPDO mapped object in CSP/CSV/CST mode	0~10	-	9	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P33.23 (1A21:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614741520 (603F0010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P33.24 (1A21:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1614872592 (60410010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P33.25 (1A21:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1616969736 (60610008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P33.26 (1A21:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1617166368 (60640020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P33.27 (1A21:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1617690656 (606C0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P33.28 (1A21:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1618411536 (60770010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P33.29 (1A21:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	1622736912 (60B90010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P33.30 (1A21:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	1622802464 (60BA0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P33.31 (1A21:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	1627193376 (60FD0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P33.32 (1A21:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P33.33 (1A22:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sub-index number of TPDO mapped object in PP mode	0~10	-	10	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the actual effective sub-index number					

P33.34 (1A22:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	1st mapped object	0~4294967295	-	1614741520 (603F0010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 1					

P33.35 (1A22:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	2nd mapped object	0~4294967295	-	1614872592 (60410010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 2					

P33.36 (1A22:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	3rd mapped object	0~4294967295	-	1616969736 (60610008h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 3					

P33.37 (1A22:04h)	Name	Setting Range	Unit	Factory Value	Association Mode
	4th mapped object	0~4294967295	-	1617166368 (60640020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 4					

P33.38 (1A22:05h)	Name	Setting Range	Unit	Factory Value	Association Mode
	5th mapped object	0~4294967295	-	1617690656 (606C0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 5					

P33.39 (1A22:06h)	Name	Setting Range	Unit	Factory Value	Association Mode
	6th mapped object	0~4294967295	-	1622736912 (60B90010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 6					

P33.40 (1A22:07h)	Name	Setting Range	Unit	Factory Value	Association Mode
	7th mapped object	0~4294967295	-	1622802464 (60BA0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 7					

P33.41 (1A22:08h)	Name	Setting Range	Unit	Factory Value	Association Mode
	8th mapped object	0~4294967295	-	1618411536 (60770010h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 8					

P33.42 (1A22:09h)	Name	Setting Range	Unit	Factory Value	Association Mode
	9th mapped object	0~4294967295	-	1626603552 (60F40020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 9					

P33.43 (1A22:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	10th mapped object	0~4294967295	-	1627193376 (60FD0020h)	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Mapping object 10					

P33.49 (1C12:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	SM2 RPDO allocated object number	0~1	-	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the PDO mapped object number actually assigned to SM2					

P33.50 (1C12:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	PDO mapped object allocated by RPDO1	5632~6143	-	5632	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	NO	NO	Effective immediately
PDO mapping object allocated by RPDO1					

P33.51 (1C13:00h)	Name	Setting Range	Unit	Factory Value	Association Mode
	SM3 TPDO allocated object number	0~4	-	1	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned8	RW	NO	NO	Effective immediately
Indicate the PDO mapping object number actually assigned to SM3					

P33.52 (1C13:01h)	Name	Setting Range	Unit	Factory Value	Association Mode
	PDO mapping object allocated by TPDO1	6656~6848	-	6656	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RW	NO	NO	Effective immediately
PDO mapping object allocated by TPDO1					

P33.55 (1C32:02h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Synchronous cycle	0~4294967295	-	1000000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	NO	Effective immediately
Indicate the cycle period of the servo synchronous signal, range 1~4ms. It should be set to an integer multiple of 250000ns, otherwise Er81.0 (synchronous cycle setting abnormality) will occur.					

P33.56 (1C32:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Offset time	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RO	NO	YES	Effective immediately
Not supported yet					

P33.61 (1C32:0Ah)	Name	Setting Range	Unit	Factory Value	Association Mode
	Sync0 signal cycle	0~4294967295	-	1000000	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RO	NO	YES	Effective immediately
When transitioning from PreOP→SafeOP in the ESM status, the drive will automatically overwrite the object with the value of ESC register 090Ah (synchronous 0 signal cycle time).					

P33.63 (1C32:0Ch)	Name	Setting Range	Unit	Factory Value	Association Mode
	SM signal lost	0~65535	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned16	RO	NO	YES	Effective immediately
Each time the drive receives a complete frame of RPDO data, it will trigger the synchronous manager 2 (SM2) write event. Whenever the drive does not receive RPDO data within a synchronous cycle, the object value will increase by 1. This value is reset to 0 each time the slave station switches the ESM status from PreOP→SafeOP.					

P33.69 (1C33:03h)	Name	Setting Range	Unit	Factory Value	Association Mode
	Offset time	0~4294967295	-	0	ALL
	Type	**Access Permission**	**PDO**	**EEPROM**	**Effective Method**
	Unsigned32	RW	NO	YES	Effective immediately
Set the time from the occurrence of DC synchronous signal 0 to the slave station updating TPDO data. Please set the value to an integer multiple of 250000ns.					

Chapter 11 Object Dictionary

11.1 Parameter Table Description

The object dictionary of this series products refers to the CiA402 (CANopen in Automation) protocol definition and is classified as follows:

Index	Content	Axis Serial Number	Whether to Support PDO Mapping
0000h~0FFFh	Data type description object	Common for all axes	No
1000h~1FFFh	CoE communication parameter object	Common for all axes	No
2000h~2FFFh	Product information	Common for all axes	No
3000h~5FFFh	Axis servo drive parameter object	Distributed according to axis serial number*1)	No
6000h~9FFFh	Standard servo drive Profile object	Distributed according to axis serial number*1)	Partially supported
A000h~FFFFh	Reserved	-	-

- Data type description:

Data Type	Abbreviation	Length (bit)
Unsigned8	U8	8
Unsigned16	U16	16
Unsigned32	U32	32
Integer8	I8	8
Integer16	I16	16
Integer32	I32	32
Boolean	BOOL	1
Visible String	VS	-
Octet String	OS	-

- Effective method description:
  - R: Need to power on again to take effect
  - A: Effective immediately
- Storage attribute description:
  - Yes: Can store to EEPROM
  - No: Cannot store to EEPROM

11.2 1000h~1FFF (CoE Communication Parameter Area)

1000h~1FFFh not support PDO mapping.

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
1000h	00h	P32.00	Device type	131474	—	0～4294967295	No	U32	RO	Yes	A
1001h	00h	P32.01	Alarm register	0	—	0～255	No	U8	RO	Yes	A
1008h	00h	P32.02	Manufacturer device name	WSD_B1_EC	—	0～4294967295	No	VS	RO	Yes	A
1009h	00h	P32.03	Manufacturer hardware version	01.00.0	—	0～4294967295	No	VS	RO	Yes	A
100Ah	00h	P32.04	Manufacturer software version	01.00.0	—	0～4294967295	No	VS	RO	Yes	A
1010h	00h	P32.05	Save parameter object sub-index number	1	—	0～255	No	U8	RO	Yes	A
	01h	P32.06	Save all parameters	1	—	0～4294967295	No	U32	RW	Yes	A
1011h	00h	P32.07	Restore the sub-index number of the parameter object	1	—	0～255	No	U8	RO	Yes	A
	01h	P32.08	Restore all parameter default value	1	—	0～4294967295	No	U32	RW	Yes	A
1018h	00h	P32.09	Sub-index number of device information	4	—	0～255	No	U8	RO	Yes	A
	01h	P32.10	Manufacturer ID	2643	—	0～4294967295	No	U32	RO	Yes	A
	02h	P32.11	Product code	1	—	0～4294967295	No	U32	RO	Yes	A
	03h	P32.12	Product version No.	1	—	0～4294967295	No	U32	RO	Yes	A
	04h	P32.13	Product serial No.	1	—	0～4294967295	No	U32	RO	Yes	A
10F3h	00h	P32.14	Alarm history reading object sub-index number	19	—	0～255	No	U8	RO	Yes	A
	01h	P32.15	Maximum alarm information number	14	—	0～255	No	U8	RO	Yes	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	02h	P32.16	Latest alarm information	0	—	0～255	No	U8	RO	Yes	A
	03h	P32.17	Latest response information	0	—	0～255	No	U8	RW	Yes	A
	04h	P32.18	Latest available information	0	—	0～1	No	U8	RO	Yes	A
	05h	P32.19	Mark	38	—	0～65535	No	U16	RO	No	A
	06h	P32.20	Alarm information 1	0	—	0～4294967295	No	OS	RO	Yes	A
	07h	P32.21	Alarm information 2	0	—	0～4294967295	No	OS	RO	Yes	A
	08h	P32.22	Alarm information 3	0	—	0～4294967295	No	OS	RO	Yes	A
	09h	P32.23	Alarm information 4	0	—	0～4294967295	No	OS	RO	Yes	A
	0Ah	P32.24	Alarm information 5	0	—	0～4294967295	No	OS	RO	Yes	A
	0Bh	P32.25	Alarm information 6	0	—	0～4294967295	No	OS	RO	Yes	A
	0Ch	P32.26	Alarm information 7	0	—	0～4294967295	No	OS	RO	Yes	A
	0Dh	P32.27	Alarm information 8	0	—	0～4294967295	No	OS	RO	Yes	A
	0Eh	P32.28	Alarm information 9	0	—	0～4294967295	No	OS	RO	Yes	A
	0Fh	P32.29	Alarm information 10	0	—	0～4294967295	No	OS	RO	Yes	A
	10h	P32.30	Alarm information 11	0	—	0～4294967295	No	OS	RO	Yes	A
	11h	P32.31	Alarm information 12	0	—	0～4294967295	No	OS	RO	Yes	A
	12h	P32.32	Alarm information 13	0	—	0～4294967295	No	OS	RO	Yes	A
	13h	P32.33	Alarm information 14	0	—	0～4294967295	No	OS	RO	Yes	A
1600h	00h	P32.34	Sub-index number of the default RPDO mapped object	4	—	0～10	No	U8	RW	No	A
	01h	P32.35	1st mapped object	1614807056 (60400010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P32.36	2nd mapped object	1616904200 (60600008h)	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	03h	P32.37	3rd mapped object	1618608160 (607A0020h)	—	0～4294967295	No	U32	RW	No	A
	04h	P32.38	4th mapped object	1622671376 (60B80010h)	—	0～4294967295	No	U32	RW	No	A
	05h	P32.39	5th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	06h	P32.40	6th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	07h	P32.41	7th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	08h	P32.42	8th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	09h	P32.43	9th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	0Ah	P32.44	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1620h	00h	P32.45	Sub-index number of RPDO mapped object in CSP mode	4	—	0～10	No	U8	RW	No	A
	01h	P32.46	1st mapped object	1614807056 (60400010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P32.47	2nd mapped object	1616904200 (60600008h)	—	0～4294967295	No	U32	RW	No	A
	03h	P32.48	3rd mapped object	1618608160 (607A0020h)	—	0～4294967295	No	U32	RW	No	A
	04h	P32.49	4th mapped object	1622671376 (60B80010h)	—	0～4294967295	No	U32	RW	No	A
	05h	P32.50	5th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	06h	P32.51	6th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	07h	P32.52	7th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	08h	P32.53	8th mapped object	0	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	09h	P32.54	9th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	0Ah	P32.55	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1621h	00h	P32.56	Sub-index number of RPDO mapped object in CSP/CSV/CST mode	6	—	0～10	No	U8	RW	No	A
	01h	P32.57	1st mapped object	1614807056 (60400010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P32.58	2nd mapped object	1616904200 (60600008h)	—	0～4294967295	No	U32	RW	No	A
	03h	P32.59	3rd mapped object	1618018320 (60710010h)	—	0～4294967295	No	U32	RW	No	A
	04h	P32.60	4th mapped object	1618608160 (607A0020h)	—	0～4294967295	No	U32	RW	No	A
	05h	P32.61	5th mapped object	1622671376 (60B80010h)	—	0～4294967295	No	U32	RW	No	A
	06h	P32.62	6th mapped object	1627324448 (60FF0020h)	—	0～4294967295	No	U32	RW	No	A
	07h	P32.63	7th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	08h	P32.64	8th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	09h	P32.65	9th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	0Ah	P32.66	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1622h	00h	P32.67	Sub-index number of RPDO mapped object in PP mode	7	—	0～10	No	U8	RW	No	A
	01h	P32.68	1st mapped object	1614807056 (60400010	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
				h)							
	02h	P32.69	2nd mapped object	1616904200 (60600008h)	—	0～4294967295	No	U32	RW	No	A
	03h	P32.70	3rd mapped object	1618608160 (607A0020h)	—	0～4294967295	No	U32	RW	No	A
	04h	P32.71	4th mapped object	1619066912 (60B90010h)	—	0～4294967295	No	U32	RW	No	A
	05h	P32.72	5th mapped object	1619197984 (60830020h)	—	0～4294967295	No	U32	RW	No	A
	06h	P32.73	6th mapped object	1619263520 (603F0010h)	—	0～4294967295	No	U32	RW	No	A
	07h	P32.74	7th mapped object	1622671376 (60B80010h)	—	0～4294967295	No	U32	RW	No	A
	08h	P32.75	8th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	09h	P32.76	9th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	0Ah	P32.77	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1A00h	00h	P33.00	Sub-index number of the default TPDO mapped object	8	—	0～10	No	U8	RW	No	A
	01h	P33.01	1st mapped object	1614741520 (603F0010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P33.02	2nd mapped object	1614872592 (60410010h)	—	0～4294967295	No	U32	RW	No	A
	03h	P33.03	3rd mapped object	1616969736 (60610008h)	—	0～4294967295	No	U32	RW	No	A
	04h	P33.04	4th mapped object	1617166368 (60640020	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
				h)							
	05h	P33.05	5th mapped object	1622736912 (60B90010h)	—	0～4294967295	No	U32	RW	No	A
	06h	P33.06	6th mapped object	1622802464 (60BA0020h)	—	0～4294967295	No	U32	RW	No	A
	07h	P33.07	7th mapped object	1626603552 (60F40020h)	—	0～4294967295	No	U32	RW	No	A
	08h	P33.08	8th mapped object	1627193376 (60FD0020h)	—	0～4294967295	No	U32	RW	No	A
	09h	P33.09	9th mapped object		—	0～4294967295	No	U32	RW	No	A
	0Ah	P33.10	10th mapped object		—	0～4294967295	No	U32	RW	No	A
1A20h	00h	P33.11	Sub-index number of TPDO mapped object in CSP mode	8	—	0～10	No	U8	RW	No	A
	01h	P33.12	1st mapped object	1614741520 (603F0010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P33.13	2nd mapped object	1614872592 (60410010h)	—	0～4294967295	No	U32	RW	No	A
	03h	P33.14	3rd mapped object	1616969736 (60610008h)	—	0～4294967295	No	U32	RW	No	A
	04h	P33.15	4th mapped object	1617166368 (60640020h)	—	0～4294967295	No	U32	RW	No	A
	05h	P33.16	5th mapped object	1622736912 (60B90010h)	—	0～4294967295	No	U32	RW	No	A
	06h	P33.17	6th mapped object	1622802464 (60BA0020h)	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	07h	P33.18	7th mapped object	1626603552 (60F40020h)	—	0～4294967295	No	U32	RW	No	A
	08h	P33.19	8th mapped object	1627193376 (60FD0020h)	—	0～4294967295	No	U32	RW	No	A
	09h	P33.20	9th mapped object	0	—	0～4294967295	No	U32	RW	No	A
	0Ah	P33.21	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1A21h	00h	P33.22	Sub-index number of TPDO mapped object in CSP/CSV/CST mode	9	—	0～10	No	U8	RW	No	A
	01h	P33.23	1st mapped object	1614741520 (603F0010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P33.24	2nd mapped object	1614872592 (60410010h)	—	0～4294967295	No	U32	RW	No	A
	03h	P33.25	3rd mapped object	1616969736 (60610008h)	—	0～4294967295	No	U32	RW	No	A
	04h	P33.26	4th mapped object	1617166368 (60640020h)	—	0～4294967295	No	U32	RW	No	A
	05h	P33.27	5th mapped object	1617690656 (606C0020h)	—	0～4294967295	No	U32	RW	No	A
	06h	P33.28	6th mapped object	1618411536 (60770010h)	—	0～4294967295	No	U32	RW	No	A
	07h	P33.29	7th mapped object	1622736912 (60B90010h)	—	0～4294967295	No	U32	RW	No	A
	08h	P33.30	8th mapped object	1622802464 (60BA0020h)	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	09h	P33.31	9th mapped object	1627193376 (60FD0020h)	—	0～4294967295	No	U32	RW	No	A
	0Ah	P33.32	10th mapped object	0	—	0～4294967295	No	U32	RW	No	A
1A22h	00h	P33.33	Sub-index number of TPDO mapped object in PP mode	10	—	0～10	No	U8	RW	No	A
	01h	P33.34	1st mapped object	1614741520 (603F0010h)	—	0～4294967295	No	U32	RW	No	A
	02h	P33.35	2nd mapped object	1614872592 (60410010h)	—	0～4294967295	No	U32	RW	No	A
	03h	P33.36	3rd mapped object	1616969736 (60610008h)	—	0～4294967295	No	U32	RW	No	A
	04h	P33.37	4th mapped object	1617166368 (60640020h)	—	0～4294967295	No	U32	RW	No	A
	05h	P33.38	5th mapped object	1617690656 (606C0020h)	—	0～4294967295	No	U32	RW	No	A
	06h	P33.39	6th mapped object	1622736912 (60B90010h)	—	0～4294967295	No	U32	RW	No	A
	07h	P33.40	7th mapped object	1622802464 (60BA0020h)	—	0～4294967295	No	U32	RW	No	A
	08h	P33.41	8th mapped object	1622933536 (60770010h)	—	0～4294967295	No	U32	RW	No	A
	09h	P33.42	9th mapped object	1626603552 (60F40020h)	—	0～4294967295	No	U32	RW	No	A
	0Ah	P33.43	10th mapped object	1627193376 (60FD0020h)	—	0～4294967295	No	U32	RW	No	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
1C00h	00h	P33.44	SM communication type sub-index number	4	—	0～255	No	U8	RO	Yes	A
	01h	P33.45	SM0 communication type	1	—	0～4	No	U8	RO	Yes	A
	02h	P33.46	SM1 communication type	2	—	0～4	No	U8	RO	Yes	A
	03h	P33.47	SM2 communication type	3	—	0～4	No	U8	RO	Yes	A
	04h	P33.48	SM3 communication type	4	—	0～4	No	U8	RO	Yes	A
1C12h	00h	P33.49	SM2 RPDO allocated object number	1	—	0～1	No	U8	RW	No	A
	01h	P33.50	PDO mapped object allocated by RPDO1	5632	—	5632～6143	No	U16	RW	No	A
1C13h	00h	P33.54	SM3 TPDO allocated object number	1	—	0～4	No	U8	RW	No	A
	01h	P33.55	PDO mapped object allocated by TPDO1	6656	—	6656～6848	No	U16	RW	No	A
1C32h	00h	P33.59	SM2 sub-index number	32	—	0～255	No	U8	RO	Yes	A
	01h	P33.60	Synchronous mode	2	—	0～65535	No	U16	RW	No	A
	02h	P33.61	Synchronous cycle	1000000	—	0～4294967295	No	U32	RW	No	A
	03h	P33.62	Offset time	0	—	0～4294967295	No	U32	RO	Yes	A
	04h	P33.63	Supported synchronous type	4	—	0～65535	No	U16	RO	Yes	A
	05h	P33.64	Minimum communication cycle	500000	—	0～4294967295	No	U32	RO	Yes	A
	06h	P33.65	Calculation and copy time	250000	—	0～4294967295	No	U32	RO	Yes	A
	09h	P33.66	Delay time	0	—	0～4294967295	No	U32	RO	Yes	A
	0Ah	P33.67	Sync0 signal cycle	1000000	—	0～4294967295	No	U32	RO	Yes	A
	0Bh	P33.68	Communication cycle too short	0	—	0～65535	No	U16	RO	Yes	A
	0Ch	P33.69	SM signal lost	0	—	0～65535	No	U16	RO	Yes	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	0Dh	P33.70	Offset time too short	0	—	0～65535	No	U16	RO	Yes	A
	20h	P33.71	Synchronous error	0	—	0～1	No	U8	RO	Yes	A
1C33h	00h	P33.72	SM3 sub-index number	32	—	0～255	No	U8	RO	Yes	A
	01h	P33.73	Synchronous mode	2	—	0～65535	No	U16	RW	No	A
	02h	P33.74	Synchronous cycle	1000000	—	0～4294967295	No	U32	RO	Yes	A
	03h	P33.75	Offset time	0	—	0～4294967295	No	U32	RW	Yes	A
	04h	P33.76	Supported synchronous type	4	—	0～65535	No	U16	RO	Yes	A
	05h	P33.77	Minimum communication cycle	500000	—	0～4294967295	No	U32	RO	Yes	A
	06h	P33.78	Calculation and copy time	250000	—	0～4294967295	No	U32	RO	Yes	A
	09h	P33.79	Delay time	0	—	0～4294967295	No	U32	RO	Yes	A
	0Ah	P33.80	Sync0 signal cycle	1000000	—	0～4294967295	No	U32	RO	Yes	A
	0Bh	P33.81	Communication cycle too short	0	—	0～65535	No	U16	RO	Yes	A
	0Ch	P33.82	SM signal lost	0	—	0～65535	No	U16	RO	Yes	A
	0Dh	P33.83	Offset time too short	0	—	0～65535	No	U16	RO	Yes	A
	20h	P33.84	Synchronous error	0	—	0～1	No	U8	RO	Yes	A

11.3 2000h~2FFFh (Device Information Area)

2000h~2FFFh not support PDO mapping.

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
2101h	00h	P30.00	Device model number sub-index number	4	—	0～255	No	U8	RO	Yes	A
	01h	P30.01	Device model	—	—	0～4294967295	No	VS	RO	Yes	A
	02h	P30.02	Devise serial number	—	—	0～4294967295	No	VS	RO	Yes	A

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
Index	Sub-index	Parameter Number									
	03h	P30.03	Registration times	0	—	0～65535	No	U32	RO	Yes	A
2102h	00h	P30.04	Drive address sub-index number	2	—	0～255	No	U8	RO	Yes	A
	01h	P30.05	Station address	0	—	0～65535	No	U16	RO	Yes	A
	02h	P30.06	Station alias	0	—	0～65535	No	U16	RW	Yes	R
2200h	00h	P30.07	Drive registration sub-index number	3	—	0～255	No	U8	RO	Yes	A
	01h	P30.08	Registration	1	—	0～4294967295	No	U32	RW	Yes	A
	02h	P30.09	1st segment	0	—	0～4294967295	No	U32	RW	Yes	A
	03h	P30.10	2nd segment	0	—	0～4294967295	No	U32	RW	Yes	A

11.4 3000h~37FFh (Servo Parameter Area)

3000h~37FFh not support PDO mapping.

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
3000h 3001h	00h	—									
	02h	P00.01	Control mode setting	19	—	0~99	No	I32	RW	No	R
	03h	P00.02	Real-time automatic adjustment mode setting	0	—	0~6	No	I32	RW	No	A
	04h	P00.03	Real-time automatic adjustment rigidity setting	13	—	0~31	No	I32	RW	No	A
	05h	P00.04	Inertia ratio	250	%	0~10000	No	I32	RW	No	A
	0Eh	P00.13	1st torque limit	300	%	0~500	No	I32	RW	No	A
	0Fh 10h	P00.14 P00.15	Position deviation excess threshold Absolute encoder setting	350000002	According to unit —	0~1073741824 0~4	No No	I32 I32	RW RW	No No	A R
	11h	P00.16	Regenerative resistor usage selection	0	—	0~3	No	I32	RW	No	R
	12h	P00.17	External regenerative	30	%	0~100	No	I32	RW	No	R

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			resistor heat dissipation coefficient								
	13h	P00.18	External regenerative resistor power	0	W	0~65535	No	I32	RW	No	R
	14h	P00.19	External regenerative resistor resistance	0	Ω	0~65535	No	I32	RW	No	R
	00h	—	Gain adjustment sub-index number	28	—	0~255	No	I8	RO	Yes	A
3002h	01h	P01.00	1st position loop gain	480	0.1/s	0~30000	No	I32	RW	No	A
	02h	P01.01	1st speed loop gain	270	0.1Hz	1~32767	No	I32	RW	No	A
	03h	P01.02	1st speed loop integration time constant	210	0.1ms	1~10000	No	I32	RW	No	A
	04h	P01.03	1st speed detection filter	0	0.01ms	0~10000	No	I32	RW	No	A
	05h	P01.04	1st torque filter	84	0.01ms	0~2500	No	I32	RW	No	A
	06h	P01.05	2nd position loop gain	570	0.1/s	0~30000	No	I32	RW	No	A
	07h	P01.06	2nd speed loop gain	270	0.1Hz	1~32767	No	I32	RW	No	A
	08h	P01.07	2nd speed loop integration time constant	10000	0.1ms	1~10000	No	I32	RW	No	A
	09h	P01.08	2nd speed detection filter	0	0.01ms	0~10000	No	I32	RW	No	A
	0Ah	P01.09	2nd torque filter	84	0.01ms	0~2500	No	I32	RW	No	A
	0Bh	P01.10	Speed feedforward gain	300	0.10%	0~1000	No	I32	RW	No	A
	0Ch	P01.11	Speed feedforward filter	200	0.01ms	0~6400	No	I32	RW	No	A
	0Dh	P01.12	Torque feedforward gain	0	0.10%	0~1000	No	I32	RW	No	A
	0Eh	P01.13	Torque feedforward filter	0	0.01ms	0~6400	No	I32	RW	No	A
	0Fh	P01.14	2nd gain setting	1	—	0~1	No	I32	RW	No	A
	10h	P01.15	Position control switching mode	0	—	0~10	No	I32	RW	No	A
	11h	P01.16	Position control switching delay time	50	0.1ms	0~10000	No	I32	RW	No	A
	12h	P01.17	Position control switching level	50	According to mode	0~20000	No	I32	RW	No	A
	13h	P01.18	Position control switching hysteresis	33	According to mode	0~20000	No	I32	RW	No	A
	14h	P01.19	Position gain switching time	33	0.1ms	0~10000	No	I32	RW	No	A
	15h	P01.20	Speed control switching mode	0	—	0~5	No	I32	RW	No	A
	16h	P01.21	Speed control switching delay time	0	0.1ms	0~10000	No	I32	RW	No	A
	17h	P01.22	Speed control switching level	0	According to mode	0~20000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	18h	P01.23	Speed control switching hysteresis	0	According to mode	0~20000	No	I32	RW	No	A
	19h	P01.24	Torque control switching mode	0	—	0~3	No	I32	RW	No	A
	1Ah	P01.25	Torque control switching delay time	0	0.1ms	0~10000	No	I32	RW	No	A
	1Bh	P01.26	Torque control switching level	0	According to mode	0~20000	No	I32	RW	No	A
	1Ch	P01.27	Torque control switching hysteresis	0	According to mode	0~20000	No	I32	RW	No	A
	00h	—	Vibration suppression sub-index number	24	—	0~255	No	I8	RO	Yes	A
3003h	01h	P02.00	Adaptive filter mode setting	0	—	0~4	No	I32	RW	No	A
	02h	P02.01	1st notch frequency	5000	Hz	50~5000	No	I32	RW	No	A
	03h	P02.02	1st notch width selection	2	—	0~20	No	I32	RW	No	A
	04h	P02.03	1st notch depth selection	0	—	0~99	No	I32	RW	No	A
	05h	P02.04	2nd notch frequency	5000	Hz	50~5000	No	I32	RW	No	A
	06h	P02.05	2nd notch width selection	2	—	0~20	No	I32	RW	No	A
	07h	P02.06	2nd notch depth selection	0	—	0~99	No	I32	RW	No	A
	08h	P02.07	3rd notch frequency	5000	Hz	50~5000	No	I32	RW	No	A
	09h	P02.08	3rd notch width selection	2	—	0~20	No	I32	RW	No	A
	0Ah	P02.09	3rd notch depth selection	0	—	0~99	No	I32	RW	No	A
	0Bh	P02.10	4th notch frequency	5000	Hz	50~5000	No	I32	RW	No	A
	0Ch	P02.11	4th notch width selection	2	—	0~20	No	I32	RW	No	A
	0Dh	P02.12	4th notch depth selection	0	—	0~99	No	I32	RW	No	A
	0Fh	P02.14	1st vibration damping frequency	0	0.1Hz	0~2000	No	I32	RW	No	A
	10h	P02.15	1st vibration damping ratio	0	0.001	0~500	No	I32	RW	No	A
	11h	P02.16	2nd vibration damping frequency	0	0.1Hz	0~2000	No	I32	RW	No	A
	12h	P02.17	2nd vibration damping ratio	0	0.001	0~500	No	I32	RW	No	A
	13h	P02.18	3rd vibration damping frequency	0	0.1Hz	0~2000	No	I32	RW	No	A
	14h	P02.19	3rd vibration damping ratio	0	0.001	0~500	No	I32	RW	No	A
	15h	P02.20	4th vibration damping	0	0.1Hz	0~2000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			frequency								
	16h	P02.21	4th vibration damping ratio	0	0.001	0~500	No	I32	RW	No	A
	17h	P02.22	Position command smoothing filter	0	0.1ms	0~32767	No	I32	RW	No	A
	18h	P02.23	Position command FIR filter	0	0.1ms	0~5120	No	I32	RW	No	A
	19h	P02.24	Model tracking control selection	0	—	0~2	No	I32	RW	No	A
	1Ah	P02.25	Model tracking control gain	500	0.1/s	10~20000	No	I32	RW	No	A
	1Bh	P02.26	Model tracking control inertia correction	1000	0.1%	500~2000	No	I32	RW	No	A
	1Ch	P02.27	Model tracking control positive torque feedforward compensation	1000	0.1%	0~10000	No	I32	RW	No	A
	1Dh	P02.28	Model tracking control negative torque feedforward compensation	1000	0.1%	0~10000	No	I32	RW	No	A
	1Eh	P02.29	Model tracking control speed feedforward compensation	1000	0.1%	0~10000	No	I32	RW	No	A
	1Eh	P02.30	Low frequency vibration suppression 1 frequency A	500	0.1Hz	10~2500	No	I32	RW	No	A
	20h	P02.31	Low frequency vibration suppression 1 frequency B	700	0.1Hz	10~2500	No	I32	RW	No	A
	21h	P02.32	Low frequency vibration suppression 2 frequency	0	0.1Hz	0~2000	No	I32	RW	No	A
	22h	P02.33	Low frequency vibration suppression 2 compensation	100	1%	10~1000	No	I32	RW	No	A
	23h	P02.34	Medium frequency vibration suppression enable	0	—	0~1	No	I32	RW	No	A
	24h	P02.35	Medium frequency vibration suppression frequency	1000	0.1Hz	10~20000	No	I32	RW	No	A
	25h	P02.36	Medium frequency vibration suppression inertia correction	100	1%	1~1000	No	I32	RW	No	A
	26h	P02.37	Medium frequency vibration suppression	0	1%	0~300	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			damping gain								
	27h	P02.38	Medium frequency vibration suppression filter time constant 1 compensation	0	0.01ms	-1000~1000	No	I32	RW	No	A
	28h	P02.39	Medium frequency vibration suppression filter time constant 2 compensation	0	0.01ms	-1000~1000	No	I32	RW	No	A
	29h	P02.40	Medium frequency vibration suppression damping gain 2	0	0.01ms	0~300	No	I32	RW	No	A
	2Ah	P02.41	Medium frequency vibration suppression frequency 2	20000	1%	10~50000	No	I32	RW	No	A
	00h	—	Speed/torque sub-index number	23	—	0~255	No	I8	RO	Yes	A
3004h	01h	P03.00	Speed command selection	0	—	0~3	No	I32	RW	No	A
	02h	P03.01	Internal speed command direction setting	0							
	04h	P03.03	External analog speed command direction setting	0							
	05h	P03.04	1st stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	06h	P03.05	2nd stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	07h	P03.06	3rd stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	08h	P03.07	4th stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	09h	P03.08	5th stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	0Ah	P03.09	6th stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	0Bh	P03.10	7th stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	0Ch	P03.11	8th stage speed command	0	r/min	-20000~20000	No	I32	RW	No	A
	0Dh	P03.12	Acceleration time setting	0	ms/(1000r/min)	0~10000	No	I32	RW	No	A
	0Eh	P03.13	Deceleration time setting	0	ms/(1000r/min)	0~10000	No	I32	RW	No	A
	0Fh	P03.14	S-type acceleration and deceleration time setting	0	ms	0~1000	No	I32	RW	No	A
	10h	P03.15	Zero-speed clamp function selection	0	ms	0~3	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	11h	P03.16	Zero-speed clamp level	30	—	10~20000	No	I32	RW	No	A
	12h	P03.17	Torque command selection	1	—	0~2	No	I32	RW	No	A
	13h	P03.18	Internal torque command direction setting	0	—	0~1	No	I32	RW	No	A
	16h	P03.21	Speed limit 1	0	r/min	0~20000	No	I32	RW	No	A
	17h	P03.22	Speed limit 2	0	r/min	0~20000	No	I32	RW	No	A
	1Fh	P03.30	Torque arrival datum value	0	%	0~400	No	I32	RW	No	A
	20h	P03.31	Torque arrival failure value	10	%	0~400	No	I32	RW	No	A
	21h	P03.32	Torque arrival effective value	20	%	0~400	No	I32	RW	No	A
	00h	—	I/F monitor setting sub-index number	51	—	0~255	No	I8	RO	Yes	A
3005h	01h	P04.00	SI1 input selection	65793 (010101h)	—	0~16777215	No	I32	RW	No	R
	02h	P04.01	SI2 input selection	131586 (020202h)	—	0~16777215	No	I32	RW	No	R
	03h	P04.02	SI3 input selection	2236962 (222222h)	—	0~16777215	No	I32	RW	No	R
	04h	P04.03	SI4 input selection	2105376 (202020h)	—	0~16777215	No	I32	RW	No	R
	05h	P04.04	SI5 input selection	2171169 (212121h)							
	09h	P04.08	SO1 output selection	197379 (030303h)	—	0~16777215	No	I32	RW	No	R
	0Ah	P04.09	SO2 output selection	131586 (020202h)	—	0~16777215	No	I32	RW	No	R
	0Bh	P04.10	SO3 output selection	65793 (010101h)							
	1Fh	P04.30	Positioning completion range	800	According to unit	0~4194304	No	I32	RW	No	A
	20h	P04.31	Positioning completion output condition	0	—	0~3	No	I32	RW	No	A
	21h	P04.32	Positioning completion signal hold time	0	ms	0~30000	No	I32	RW	No	A
	22h	P04.33	Zero-speed threshold	50	r/min	10~20000	No	I32	RW	No	A
	23h	P04.34	Speed consistent width	50	r/min	10~20000	No	I32	RW	No	A
	24h	P04.35	Speed arrival threshold	1000	r/min	10~20000	No	I32	RW	No	A
	25h	P04.36	Stop state, delay from servo enable OFF to motor no power	0	ms	0~10000	No	I32	RW	No	A
	26h	P04.37	Rotation state, servo enable OFF to brake output OFF delay	0	ms	0~10000	No	I32	RW	No	A
	27h	P04.38	Rotation state, speed	30	r/min	30~3000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			threshold when brake output OFF								
	28h	P04.39	Warning output selection 1	0	—	0~16	No	I32	RW	No	A
	29h	P04.40	Warning output selection 2	0	—	0~16	No	I32	RW	No	A
	2Ah	P04.41	2nd positioning end range	800	According to unit	0~4194304	No	I32	RW	No	A
	32h	P04.49	Function selection application switch 1	0	—	-2147483648~2147483647	No	I32	RW	No	R
	33h	P04.50	Function selection application switch 2	0	—	-2147483648~2147483647	No	I32	RW	No	R
	00h	—	Extended setting sub-index number	38	—	0~255	No	I8	RO	Yes	A
3006h	05h	P05.04	Overtravel protection setting	1	—	0~2	No	I32	RW	No	R
	06h	P05.05	Overtravel shutdown time sequence	0	—	0~2	No	I32	RW	No	R
	07h	P05.06	Servo enable OFF shutdown time sequence	0	—	0~9	No	I32	RW	No	A
	08h	P05.07	Main power supply OFF shutdown time sequence	0	—	0~9	No	I32	RW	No	A
	09h	P05.08	Undervoltage protection selection when main power	1	—	0~1	No	I32	RW	No	A
	0Ah	P05.09	Main power supply OFF detection time	70	ms	70~2000	No	I32	RW	No	A
	0Bh	P05.10	Alarm shutdown time sequence	0	—	0~7	No	I32	RW	No	A
	0Ch	P05.11	Torque limit at immediate stop	0	%	0~500	No	I32	RW	No	A
	0Dh	P05.12	Overload level setting	0	%	0~500	No	I32	RW	No	A
	0Eh	P05.13	Overspeed level setting	0	r/min	0~20000	No	I32	RW	No	A
	0Fh	P05.14	Motor movable range setting	10	0.1r	0~1000	No	I32	RW	No	A
	11h	P05.16	Alarm clear signal identification time	0	—	0~1	No	I32	RW	No	R
	15h	P05.20	Position unit setting	0	—	0~1	No	I32	RW	No	R
	16h	P05.21	Torque limit source selection	1	—	0~6	No	I32	RW	No	A
	17h	P05.22	2nd torque limit	500	%	0~500	No	I32	RW	No	A
	18h	P05.23	Torque limit switching	0	ms/100	0~4000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			slope 1		%						
	19h	P05.24	Torque limit switching slope 2	0	ms/100 %	0~4000	No	I32	RW	No	A
	1Ah	P05.25	CW external torque limit	500	%	0~500	No	I32	RW	No	A
	1Bh	P05.26	CCW external torque limit	500	%	0~500	No	I32	RW	No	A
	1Dh	P05.28	LED initial status	38	—	0~39	No	I32	RW	No	R
	23h	P05.34	Panel data refresh time	0	—	0~1	No	I32	RW	No	R
	24h	P05.35	Panel lock setting	50	ms	0~10000	No	I32	RW	No	A
	25h	P05.36	Phase loss detection filter times	0	—	0~1	No	I32	RW	No	R
	26h	P05.37	Three-phase input specification servo unit power input selection	0	—	0~1	No	I32	RW	No	R
	00h	—	Special setting sub-index number	75	—	0~255	No	I8	RO	Yes	A
3007h	02h	P06.01	Torque command digital given value	0	%	-500~500	No	I32	RW	No	A
	03h	P06.02	Speed deviation excess threshold	0	r/min	0~100	No	I32	RW	No	A
	04h	P06.03	Current loop filter time constant	0	0.01ms	-2500~2500	No	I32	RW	No	A
	05h	P06.04	JOG trial run command speed	300	r/min	0~500	No	I32	RW	No	A
	08h	P06.07	Gravity load torque compensation value	0	%	-100~100	No	I32	RW	No	A
	09h	P06.08	Positive friction torque compensation value	0	%	-100~100	No	I32	RW	No	A
	0Ah	P06.09	Negative friction torque compensation value	0	%	-100~100	No	I32	RW	No	A
	0Ch	P06.11	Current response level setting	100	%	20~500	No	I32	RW	No	A
	0Dh	P06.12	Friction torque compensation filter	0	0.01ms	0~30000	No	I32	RW	No	A
	0Fh	P06.14	Immediate stop time when alarm	500	1ms	0~1000	No	I32	RW	No	A
	10h	P06.15	2nd overspeed level setting	0	r/min	0~20000	No	I32	RW	No	A
	18h	P06.23	Disturbance compensation coefficient	0	%	-100~100	No	I32	RW	No	A
	19h	P06.24	Disturbance compensation frequency correction	50	0.01ms	0~2500	No	I32	RW	No	A
	1Ah	P06.25	Disturbance	100	%	10~1000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			compensation gain								
	1Bh	P06.26	Disturbance compensation inertia correction	100	%	1~1000	No	I32	RW	No	A
	1Ch	P06.27	Warning latch (hold) time selection	5	s	0~10	No	I32	RW	No	R
	1Dh	P06.28	Vibration detection level	100	%	30~1000	No	I32	RW	No	A
	1Eh	P06.29	Absolute encoder multi-turn data upper limit	0	—	0~65534	No	I32	RW	No	R
	1Fh	P06.30	Damping filter enable switch	0	—	0~2	No	I32	RW	No	A
	21h	P06.32	Real-time automatic adjustment of user setting	0	—	0~65535	No	I32	RW	No	A
	22h	P06.33	Friction compensation positive effective speed setting	0	0.1r/min	0~1000	No	I32	RW	No	A
	25h	P06.36	Friction compensation negative effective speed setting	0	0.1r/min	0~1000	No	I32	RW	No	A
	27h	P06.38	Warning shield setting	0	—	0~65535	No	I32	RW	No	R
	29h	P06.40	Absolute encoder origin position offset	0	Command unit	-1073741823~1073741823	No	I32	RW	No	A
	2Ah	P06.41	1st damping depth	0	—	0~1000	No	I32	RW	No	A
	2Bh	P06.42	2-stage torque filter time constant	0	0.01ms	0~2500	No	I32	RW	No	A
	2Ch	P06.43	2-stage torque filter attenuation term	1000	—	0~1000	No	I32	RW	No	A
	30h	P06.47	Function extension setting 2	0	—	0~15	No	I32	RW	No	R
	33h	P06.50	Viscous friction compensation gain	0	0.1%/(10000r/min)	0~10000	No	I32	RW	No	A
	34h	P06.51	Immediate stop end until the motor power off and delay	0	ms	0~10000	No	I32	RW	No	A
	35h	P06.52	Runaway protection function enable	1	-	0~1	No	I32	RW	No	A
	36h	P06.53	Reserved	200	%	100~400	No	I32	RW	No	A
	37h	P06.54	Runaway speed judgment threshold	50	rpm	1~1000	No	I32	RW	No	A
	38h	P06.55	Reserved	2	ms	1~100	No	I32	RW	No	A
	39h	P06.56	Runaway protection detection time	30	ms	10~1000	No	I32	RW	No	A
	3Ah	P06.57	Torque saturation error protection detection time	0	ms	0~5000	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	3Bh	P06.58	Slot torque compensation gain	0	%	0~500	No	I32	RW	No	A
	3Dh	P06.60	Manufacturer password	0	—	-32768~32767	No	I32	RW	No	A
	3Eh	P06.61	Stall protection time	200	ms	10~65535	No	I32	RW	No	A
	3Fh	P06.62	Stall protection enable	1	—	0~1	No	I32	RW	No	A
	46h	P06.69	Flux weakening enable	0	—	0~1	No	I32	RW	No	A
	47h	P06.70	Flux weakening depth	95	%	50~110	No	I32	RW	No	A
	48h	P06.71	Flux weakening integral constant	600	0.1ms	50~10000	No	I32	RW	No	A
	49h	P06.72	Maximum flux weakening current	60	%	0~200	No	I32	RW	No	A
	4Ch	P06.75	Backlash compensation direction	0	—	0~1	No	I32	RW	No	A
	4Dh	P06.76	Backlash compensation amount	0	0.1 command pulse	-500000~500000	No	I32	RW	No	A
	4Eh	P06.77	Backlash compensation time constant	0	0.01ms	0~65535	No	I32	RW	No	A
	00h	—	Motor parameter sub-index number	70	—	0~255	No	I8	RO	Yes	A
3008h	01h	P07.00	Motor No.	0	—	0~9999999	No	I32	RW	No	R
	02h	P07.01	Motor type selection	0	—	0~4	No	I32	RW	No	R
	05h	P07.04	Motor rated current	0	0.01Arms	0~65535	No	I32	RW	No	R
	06h	P07.05	Motor rated torque	0	0.01N.m	0~655350	No	I32	RW	No	R
	07h	P07.06	Motor maximum torque	0	0.01N.m	0~655350	No	I32	RW	No	R
	08h	P07.07	Motor rated speed	0	r/min	0~32767	No	I32	RW	No	R
	09h	P07.08	Motor maximum speed	0	r/min	0~65535	No	I32	RW	No	R
	0Ah	P07.09	Motor rotational inertia	0	0.01kg.cm2	0~655350	No	I32	RW	No	R
	0Bh	P07.10	Motor pole pairs	0	poles	0~255	No	I32	RW	No	R
	0Ch	P07.11	Motor back EMF constant	0	0.1V/(1000rpm)	0~65535	No	I32	RW	No	R
	0Dh	P07.12	Motor stator resistance	0	0.01Ω	0~65535	No	I32	RW	No	R
	0Eh	P07.13	Motor d-axis inductance	0	0.01mH	0~65535	No	I32	RW	No	R
	0Fh	P07.14	Motor q-axis inductance	0	0.01mH	0~65535	No	I32	RW	No	R
	11h	P07.16	Motor thermal time constant	1600	0.1s	1~32767	No	I32	RW	No	R
	12h	P07.17	Motor phase sequence selection	0	—	0~1	No	I32	RW	No	R
	13h	P07.18	Initial pole angle	0	0.1 °(electrical angle)	0~3600	No	I32	RW	No	R
	1Ah	P07.25	Encoder type selection	0	—	0~9	No	I32	RW	No	R

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	1Bh	P07.26	Bus encoder bit	0	Bit	0~31	No	I32	RW	No	R
	1Ch	P07.27	Bus encoder turns	0	Rev	0~31	No	I32	RW	No	R
	43h	P07.66	Motor manufacturing serial number	0	—	0~2147483647	No	I32	RO	No	A
	44h	P07.67	Motor model low	0	—	0~2147483647	No	I32	RO	No	A
	45h	P07.68	Motor model middle	0	—	0~2147483647	No	I32	RO	No	A
	46h	P07.69	Motor model high	0	—	0~2147483647	No	I32	RO	No	A
	00h	—	Drive parameter sub-index number	38	—	0~255	No	I8	RO	Yes	A
300Ah	01h	P08.00	Drive voltage level	220	V	0~380	No	I32	RO	No	A
	02h	P08.01	Drive rated power	75	0.01kW	0~65535	No	I32	RO	No	A
	03h	P08.02	Drive rated current	500	0.01Amp	0~65535	No	I32	RO	No	A
	04h	P08.03	Drive maximum current	1500	0.01Amp	0~65535	No	I32	RO	No	A
	26h	P08.37	Drive manufacturing serial number high	0	—	-2147483648~2147483647	No	I32	RO	Yes	A
	27h	P08.38	Drive manufacturing serial number low	0	—	-2147483648~2147483647	No	I32	RO	Yes	A
	00h	—	Monitoring parameter sub-index number	95	—	0~255	No	I8	RO	Yes	A
300Bh	01h	P10.00	Position command deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	02h	P10.01	Motor speed	0	r/min	-20000~20000	No	I32	RO	No	A
	03h	P10.02	Position command speed	0	r/min	-20000~20000	No	I32	RO	No	A
	04h	P10.03	Speed control command	0	r/min	-20000~20000	No	I32	RO	No	A
	05h	P10.04	Torque command	0	%	-500~500	No	I32	RO	No	A
	06h	P10.05	Feedback pulse sum	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	07h	P10.03	Command pulse sum	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	08h	P10.04	Load estimation inertia ratio	0	%	0~10000	No	I32	RO	No	A
	09h	P10.08	Control model	1	—	1~3	No	I32	RO	No	A
	0Ah	P10.09	SI signal status	0	—	0~65535	No	I32	RO	No	A
	0Bh	P10.10	SO signal status	0	—	0~65535	No	I32	RO	No	A
	0Ch	P10.11	AI1 sampling voltage value	0	0.01V	-1200~1200	No	I32	RO	No	A
	0Dh	P10.12	AI2 sampling voltage value	0	0.01V	-1200~1200	No	I32	RO	No	A
	0Fh	P10.14	Current alarm	0	—	-	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
						2147483648~2147483647					
	10h	P10.15	Current warning	0	—	-2147483648~2147483647	No	I32	RO	No	A
	11h	P10.16	Regeneration load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	12h	P10.17	Overload rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	13h	P10.18	Phase current effective value	0	—	-2147483648~2147483647	No	I32	RO	No	A
	14h	P10.19	Reason for not rotating	0	—	-2147483648~2147483647	No	I32	RO	No	A
	15h	P10.20	Servo system status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	16h	P10.21	Mechanical angle	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	17h	P10.22	Electrical angle	0	0.1°	-2147483648~2147483647	No	I32	RO	No	A
	18h	P10.23	Encoder rotation 1 turn data	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	19h	P10.24	Encoder multi-turn data	0	Rev	-2147483648~2147483647	No	I32	RO	No	A
	1Ah	P10.25	Encoder communication error times monitoring	0	—	-2147483648~2147483647	No	I32	RO	No	A
	1Bh	P10.26	Encoder position deviation	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	1Ch	P10.27	Voltage across PN	0	V	0~65535	No	I32	RO	No	A
	1Dh	P10.28	Control power supply voltage	0	V	0~65535	No	I32	RO	No	A
	1Eh	P10.29	Switching power supply output 12V voltage	0	0.1V	0~65535	No	I32	RO	No	A
	1Fh	P10.30	MCU software version	0	—	0~2147483647	No	I32	RO	No	A
	20h	P10.31	FPGA software version	0	—	0~2147483647	No	I32	RO	No	A
	21h	P10.32	Servo parameter version	6	—	0~2147483647	No	I32	RO	No	A
	22h	P10.33	Accumulated running time	0	0.1H	0~876000	No	I32	RO	No	A
	23h	P10.34	Average load rate	0	%	0~65535	No	I32	RO	No	A
	24h	P10.35	CPU temperature	0	1℃	0~65535	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	25h	P10.36	IGBT temperature	0	1℃	0~65535	No	I32	RO	No	A
	26h	P10.37	Drive temperature (reserved)	0	1℃	0~65535	No	I32	RO	No	A
	27h	P10.38	Motor temperature (reserved)	0	1℃	0~65535	No	I32	RO	No	A
	28h	P10.39	Encoder temperature (reserved)	0	1℃	0~65535	No	I32	RO	No	A
	29h	P10.40	Real-time resonance frequency	0	Hz	0~5000	No	I32	RO	No	A
	2Ah	P10.41	Absolute value encoder absolute position low 32 bits	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	2Bh	P10.42	Absolute value encoder absolute position high 32 bits	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	2Ch	P10.43	Mechanical absolute position (low 32 bits)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	2Dh	P10.44	Mechanical absolute position (high 32 bits)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	2Eh	P10.45	Rotation load single-turn position (low 32 bits)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	2Fh	P10.46	Rotation load single-turn position (high 32 bits)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	30h	P10.47	STO port status	0	—	0~7	No	I32	RO	No	A
	36h	P10.53	Registration remaining time	0	—	-2147483648~2147483647	No	I32	RO	No	A
	52h	P10.81	Last 1st alarm	0	0.1	0~65535	No	I32	RO	No	A
	53h	P10.82	Last 2nd alarm	0	0.1	0~65535	No	I32	RO	No	A
	54h	P10.83	Last 3rd alarm	0	0.1	0~65535	No	I32	RO	No	A
	55h	P10.84	Last 4th alarm	0	0.1	0~65535	No	I32	RO	No	A
	56h	P10.85	Last 5th alarm	0	0.1	0~65535	No	I32	RO	No	A
	57h	P10.86	Last 6th alarm	0	0.1	0~65535	No	I32	RO	No	A
	58h	P10.87	Last 7th alarm	0	0.1	0~65535	No	I32	RO	No	A
	59h	P10.88	Last 8th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Ah	P10.89	Last 9th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Bh	P10.90	Last 10th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Ch	P10.91	Last 11th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Dh	P10.92	Last 12th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Eh	P10.93	Last 13th alarm	0	0.1	0~65535	No	I32	RO	No	A
	5Fh	P10.94	Last 14th alarm	0	0.1	0~65535	No	I32	RO	No	A
	61h	P10.96	Alarm record 1-alarm serial number	0	—	-2147483648~2147483647	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	62h	P10.97	Alarm record 1-control mode	0	—	-2147483648~2147483647	No	I32	RO	No	A
	63h	P10.98	Alarm record 1-motor speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	64h	P10.99	Alarm record 1-position command speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	65h	P10.100	Alarm record 1-speed control command	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	66h	P10.101	Alarm record 1-torque command	0	%	-2147483648~2147483647	No	I32	RO	No	A
	67h	P10.102	Alarm record 1-command position deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	68h	P10.103	Alarm record 1-Motor position	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	69h	P10.104	Alarm record 1-hybrid deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	6Ah	P10.105	Alarm record 1-input port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	6Bh	P10.106	Alarm record 1-output port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	6Ch	P10.107	Alarm record 1-analog input 1	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	6Dh	P10.108	Alarm record 1-analog input 2	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	6Eh	P10.109	Alarm record 1-analog input 3	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	6Fh	P10.110	Alarm record 1-overload load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	70h	P10.111	Alarm record 1-regeneration load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	71h	P10.112	Alarm record 1-voltage across PN	0	0.1V	-2147483648~2147483647	No	I32	RO	No	A
	72h	P10.113	Alarm record 1-drive temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	73h	P10.114	Alarm record 1-warning mark	0	—	-2147483648~2147483647	No	I32	RO	No	A
	74h	P10.115	Alarm record 1-inertia	0	%	-	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			ratio			2147483648~2147483647					
	75h	P10.116	Alarm record 1-position loop gain	0	0.1/s	-2147483648~2147483647	No	I32	RO	No	A
	76h	P10.117	Alarm record 1-speed loop gain	0	0.1Hz	-2147483648~2147483647	No	I32	RO	No	A
	77h	P10.118	Alarm record 1-speed loop integration time constant	0	0.1ms	-2147483648~2147483647	No	I32	RO	No	A
	78h	P10.119	Alarm record 1-encoder temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	79h	P10.120	Alarm record 1-3rd notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	7Ah	P10.121	Alarm record 1-4th notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	7Bh	P10.122	Internal use	0	—	-2147483648~2147483647	No	I32	RO	No	A
	7Ch	P10.123	Alarm record 1-U-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	7Dh	P10.124	Alarm record 1-V-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	7Eh	P10.125	Alarm record 1—EtherCAT communication (ESM) status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	7Fh	P10.126	Alarm record 1-servo device status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	80h	P10.127	Alarm record 1-encoder rotation per turn data	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	81h	P10.128	Alarm record 1-encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	82h	P10.129	Alarm record 1-external encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	83h	P10.130	Alarm record 1-time	0	0.1h	-2147483648~2147483647	No	I32	RO	No	A
	84h	P10.131	Alarm record 2-alarm serial number	0	—	-2147483648~2147483647	No	I32	RO	No	A
	85h	P10.132	Alarm record 2-control	0	—	-	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
			mode			2147483648~2147483647					
	86h	P10.133	Alarm record 2-motor speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	87h	P10.134	Alarm record 2-position command speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	88h	P10.135	Alarm record 2-speed control command	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	89h	P10.136	Alarm record 2-torque command	0	%	-2147483648~2147483647	No	I32	RO	No	A
	8Ah	P10.137	Alarm record 2-command position deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	8Bh	P10.138	Alarm record 2-Motor position	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	8Ch	P10.139	Alarm record 2-hybrid deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	8Dh	P10.140	Alarm record 2-input port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	8Eh	P10.141	Alarm record 2-output port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	8Fh	P10.142	Alarm record 2-analog input 1	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	90h	P10.143	Alarm record 2-analog input 2	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	91h	P10.144	Alarm record 2-analog input 3	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	92h	P10.145	Alarm record 2-overload load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	93h	P10.146	Alarm record 2-regeneration load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	94h	P10.147	Alarm record 2-VOLTAGE ACROSS PN	0	0.1V	-2147483648~2147483647	No	I32	RO	No	A
	95h	P10.148	Alarm record 2-drive temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	96h	P10.149	Alarm record 2-warning mark	0	—	-2147483648~2147483647	No	I32	RO	No	A
	97h	P10.150	Alarm record 2-inertia ratio	0	%	-2147483648~	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
						2147483647					
	98h	P10.151	Alarm record 2-position loop gain	0	0.1/s	-2147483648~2147483647	No	I32	RO	No	A
	99h	P10.152	Alarm record 2-speed loop gain	0	0.1Hz	-2147483648~2147483647	No	I32	RO	No	A
	9Ah	P10.153	Alarm record 2-speed loop integration time constant	0	0.1ms	-2147483648~2147483647	No	I32	RO	No	A
	9Bh	P10.154	Alarm record 2-encoder temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	9Ch	P10.155	Alarm record 2-3rd notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	9Dh	P10.156	Alarm record 2-4th notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	9Eh	P10.157	Internal use	0	—	-2147483648~2147483647	No	I32	RO	No	A
	9Fh	P10.158	Alarm record 2-U-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	A0h	P10.159	Alarm record 2-V-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	A1h	P10.160	Alarm record 2-EtherCAT communication (ESM) status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	A2h	P10.161	Alarm record 2-servo drive device status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	A3h	P10.162	Alarm record 2-encoder rotation per turn data	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	A4h	P10.163	Alarm record 2-encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	A5h	P10.164	Alarm record 2-external encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	A6h	P10.165	Alarm record 2-time	0	0.1h	-2147483648~2147483647	No	I32	RO	No	A
	A7h	P10.166	Alarm record 3-alarm serial number	0	—	-2147483648~2147483647	No	I32	RO	No	A
	A8h	P10.167	Alarm record 3-control mode	0	—	-2147483648~	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
						2147483647					
	A9h	P10.168	Alarm record 3-motor speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	AAh	P10.169	Alarm record 3-position command speed	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	ABh	P10.170	Alarm record 3-speed control command	0	r/min	-2147483648~2147483647	No	I32	RO	No	A
	ACh	P10.171	Alarm record 3-torque command	0	%	-2147483648~2147483647	No	I32	RO	No	A
	ADh	P10.172	Alarm record 3-command position deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	AEh	P10.173	Alarm record 3-Motor position	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	AFh	P10.174	Alarm record 3-hybrid deviation	0	Command unit	-2147483648~2147483647	No	I32	RO	No	A
	B0h	P10.175	Alarm record 3-input port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	B1h	P10.176	Alarm record 3-output port	0	—	-2147483648~2147483647	No	I32	RO	No	A
	B2h	P10.177	Alarm record 3-analog input 1	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	B3h	P10.178	Alarm record 3-analog input 2	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	B4h	P10.179	Alarm record 3-analog input 3	0	0.01V	-2147483648~2147483647	No	I32	RO	No	A
	B5h	P10.180	Alarm record 3-overload load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	B6h	P10.181	Alarm record 3-regeneration load rate	0	%	-2147483648~2147483647	No	I32	RO	No	A
	B7h	P10.182	Alarm record 3-VOLTAGE ACROSS PN	0	0.1V	-2147483648~2147483647	No	I32	RO	No	A
	B8h	P10.183	Alarm record 3-drive temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	B9h	P10.184	Alarm record 3-warning mark	0	—	-2147483648~2147483647	No	I32	RO	No	A
	BAh	P10.185	Alarm record 3-inertia ratio	0	%	-2147483648~2147483647	No	I32	RO	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	BBh	P10.186	Alarm record 3-position loop gain	0	0.1/s	-2147483648~2147483647	No	I32	RO	No	A
	BCh	P10.187	Alarm record 3-speed loop gain	0	0.1Hz	-2147483648~2147483647	No	I32	RO	No	A
	BDh	P10.188	Alarm record 3-speed loop integration time constant	0	0.1ms	-2147483648~2147483647	No	I32	RO	No	A
	BEh	P10.189	Alarm record 3-encoder temperature	0	℃	-2147483648~2147483647	No	I32	RO	No	A
	BFh	P10.190	Alarm record 3-3rd notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	C0h	P10.191	Alarm record 3-4th notch frequency	0	Hz	-2147483648~2147483647	No	I32	RO	No	A
	C1h	P10.192	Internal use	0	—	-2147483648~2147483647	No	I32	RO	No	A
	C2h	P10.193	Alarm record 3-U-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	C3h	P10.194	Alarm record 3-V-PHASE CURRENT	0	AD value	-2147483648~2147483647	No	I32	RO	No	A
	C4h	P10.195	Alarm record 3-EtherCAT communication (ESM) status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	C5h	P10.196	Alarm record 3-servo drive device status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	C6h	P10.197	Alarm record 3-encoder rotation per turn data	0	Encoder unit	-2147483648~2147483647	No	I32	RO	No	A
	C7h	P10.198	Alarm record 3-encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	C8h	P10.199	Alarm record 3-external encoder communication abnormal connection occurs times	0	Time	-2147483648~2147483647	No	I32	RO	No	A
	C9h	P10.200	Alarm record 3-time	0	0.1H	-2147483648~2147483647	No	I32	RO	No	A
	00h	—	Communication parameter setting sub-index number	43	—	0~255	No	I8	RO	Yes	A
300Ch	20h	P11.31	EtherCAT station address	0	—	0~65535	No	I32	RW	No	A
	21h	P11.32	EtherCAT station alias	0	—	0~65535	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
	22h	P11.33	EtherCAT communication status	0	—	-2147483648~2147483647	No	I32	RO	No	A
	23h	P11.34	EtherCAT communication error code (AL error code)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	24h	P11.35	EtherCAT synchronous cycle (ESC register 0981h)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	25h	P11.36	EtherCAT watchdog timeout (ESC register 400h*420h)	0	—	-2147483648~2147483647	No	I32	RW	No	A
	26h	P11.37	Synchronous data accumulated lost times (d37 monitoring)	0	—	-2147483648~2147483647	No	I32	RO	No	A
	29h	P11.40	Synchronous signal continuous loss time upper limit	4	—	0~100	No	I32	RW	No	A
	2Ah	P11.41	Port disconnect detection time	0	ms	0~10000	No	I32	RW	No	A
	2Ch	P11.43	EtherCAT port 0 invalid frame and error maximum value	0	—	0~65535	No	I32	RW	No	A
	2Dh	P11.44	EtherCAT port 1 invalid frame and error maximum value	0	—	0~65535	No	I32	RW	No	A
	2Eh	P11.45	EtherCAT port forwarding error maximum value	0	—	0~65535	No	I32	RW	No	A
	2Fh	P11.46	EtherCAT data frame processing unit error maximum value	0	—	0~65535	No	I32	RW	No	A
	30h	P11.47	EtherCAT port 0 and port 1 connection loss maximum value	0	—	0~65535	No	I32	RW	No	A
	35h	P11.52	CSP position command increment excess times	0	—	0~65535	No	I32	RW	No	A
	00h	P12.00	Auxiliary function sub-index number	10	—	0~255	No	I8	RO	Yes	A
Index	01h	P12.01	Software reset (2201:01h)	0	—	0~1	No	I32	RW	No	A
	02h	P12.02	Alarm reset (6040h bit7 0->1)	0	—	0~1	No	I32	RW	No	A
	03h	P12.03	Parameter initialization (1011:01h)	0	—	0~2	No	I32	RW	No	A
	04h	P12.04	Offline inertia identification enabled	0	—	-2147483648~2147483647	No	I32	RW	No	A
	05h	P12.05	E-stop	0	—	0~1	No	I32	RW	No	A
	06h	P12.06	Analog channel automatic adjustment	0	—	0~2	No	I32	RW	No	A
	07h	P12.07	JOG trial run function	0	—	-	No	I32	RW	No	A

Index	Sub-index	Parameter Number	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method
						2147483648~2147483647					
	08h	P12.08	SI forced input set value	0	—	0~65535	No	I32	RW	Yes	A
	09h	P12.09	SO forced output set value	0	—	0~65535	No	I32	RW	Yes	A
	0Ah	P12.10	Absolute value encoder reset (3200:01h)	0	—	0~1	No	I32	RW	No	A
	20h	P12.31	Drive registration	0	—	0~1	No	I32	RW	No	A
	21h	P12.32	Drive registration code high	0	—	-2147483648~2147483647	No	I32	RW	No	A
	22h	P12.33	Drive registration code low	0	—	-2147483648~2147483647	No	I32	RW	No	A

11.5 6000h~67FFh (Drive Profile Object Area)

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
6007h	00h	P30.13	Motor deceleration and stop method when interrupt connection command receive	1	—	0~3	No	I16	RO	No	6007h
603Fh	00h	P30.14	Error code	0	—	0~65535	TPDO	U16	RO	Yes	603Fh
6040h	00h	P30.15	Control character	0	—	0~65535	RPDO	U16	RW	Yes	6040h
6041h	00h	P30.16	Status character	0	—	0~65535	TPDO	U16	RO	Yes	6041h

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
605Ah	00h	P30.17	Quick shutdown method	2	—	-2~7	No	I16	RW	No	605Ah
605Bh	00h	P30.18	Turn off shutdown method	1	—	0~1	No	I16	RW	No	605Bh
605Ch	00h	P30.19	Servo enable OFF shutdown method	1	—	0~1	No	I16	RW	No	605Ch
605Dh	00h	P30.20	Pause shutdown method	1	—	1~3	No	I16	RW	No	605Dh
605Eh	00h	P30.21	Alarm shutdown method	2	—	0~2	No	I16	RW	No	605Eh
6060h	00h	P30.22	Mode selection	0	—	-128~127	RPDO	I8	RW	No	6060h
6061h	00h	P30.23	Running mode display	0	—	-128~127	TPDO	I8	RO	Yes	6061h
6062h	00h	P30.24	Position command	0	Command unit	-2147483648~2147483647	TPDO	I32	RO	Yes	6062h
6063h	00h	P30.25	Position feedback	0	Encoder unit	-2147483648~2147483647	TPDO	I32	RO	Yes	6063h
6064h	00h	P30.26	Position feedback	0	Command unit	-2147483648~2147483647	TPDO	I32	RO	Yes	6064h
6065h	00h	P30.27	Position deviation excess threshold	100000	Command unit	0~4294967295	RPDO	U32	RW	No	6065h
6066h	00h	P30.28	Position deviation excess time window	0	ms	0~65535	RPDO	I16	RW	No	6066h
6067h	00h	P30.29	Position arrival threshold	100	Command unit	0~4294967295	RPDO	U32	RW	No	6067h
6068h	00h	P30.30	Position arrival time window	0	ms	0~65535	RPDO	I16	RW	No	6068

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
											h
6069h	00h	P30.31	Speed sensor feedback value	0	—	-2147483648~2147483647	TPDO	I32	RO	Yes	6069h
606Ah	00h	P30.32	Sensor selection	0	—	-32768~32767	RPDO	I16	RO	Yes	606Ah
606Bh	00h	P30.33	Speed command	0	Command unit/s	-2147483648~2147483647	TPDO	I32	RO	Yes	606Bh
606Ch	00h	P30.34	Speed feedback	0	Command unit/s	-2147483648~2147483647	TPDO	I32	RO	Yes	606Ch
606Dh	00h	P30.35	Speed arrival threshold	10	r/min	0~65535	RPDO	U16	RW	No	606Dh
606Eh	00h	P30.36	Speed arrival time window	0	ms	0~65535	RPDO	U16	RW	No	606Eh
606Fh	00h	P30.37	Speed threshold	30	r/min	0~65535	RPDO	U16	RW	No	606Fh
6070h	00h	P30.38	Speed threshold time	0	ms	0~65535	RPDO	U16	RW	No	6070h
6071h	00h	P30.39	Target torque	0	0.1%	-32768~32767	RPDO	I16	RW	Yes	6071h
6072h	00h	P30.40	Maximum torque	5000	0.1%	0~65535	RPDO	U16	RW	No	6072h
6073h	00h	P30.41	Maximum current	5000	0.1%	0~65535	No	U16	RO	Yes	6073h
6074h	00h	P30.42	Torque command	0	0.1%	-32768~32767	TPDO	I16	RO	Yes	6074h
6075h	00h	P30.43	Motor rated current	0	mA	0~4294967295	No	U32	RO	Yes	6075h

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
6076h	00h	P30.44	Motor rated torque	0	mN * m	0~4294967295	No	U32	RO	Yes	6076h
6077h	00h	P30.45	Torque feedback	0	0.1%	-32768~32767	TPDO	I16	RO	Yes	6077h
6078h	00h	P30.46	Current feedback	0	0.1%	-32768~32767	TPDO	I16	RO	Yes	6078h
6079h	00h	P30.47	DC bus voltage	0	mV	0~4294967295	TPDO	U32	RO	Yes	6079h
607Ah	00h	P30.48	Target position	0	Command unit	-2147483648~2147483647	RPDO	I32	RW	Yes	607Ah
607Bh	00h	P30.49	Position range limit sub-index number	2	—	0~255	No	U8	RO	Yes	607Bh
	01h	P30.50	Position range limit minimum value	-2147483648	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	
	02h	P30.51	Position range limit maximum value	2147483647	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	
607Ch	00h	P30.52	Origin offset	0	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	607Ch
607Dh	00h	P30.53	Software absolute position limit sub-index number	2	—	0~255	No	I8	RO	Yes	607Dh
	01h	P30.54	Position limit minimum value	0	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	
	02h	P30.55	Position limit maximum value	0	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	
607Eh	00h	P30.56	Command polarity	0	—	0~255	RPDO	U8	RW	No	607Eh
607Fh	00h	P30.57	Maximum contour speed	838860800	Command unit/s	0~4294967295	RPDO	U32	RW	No	607

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
											Fh
6080h	00h	P30.58	Motor maximum speed	6000	r/min	0~4294967295	RPDO	U32	RW	No	6080h
6081h	00h	P30.59	Contour speed	0	Command unit/s	0~4294967295	RPDO	U32	RW	No	6081h
6082h	00h	P30.60	Stop speed	0	Command unit/s	0~4294967295	RPDO	U32	RW	No	6082h
6083h	00h	P30.61	Contour acceleration	139810133	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	6083h
6084h	00h	P30.62	Contour deceleration	139810133	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	6084h
6085h	00h	P30.63	Quick shutdown deceleration	139810133	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	6085h
6086h	00h	P30.64	Motor running curve type	0	—	-32768~32767	RPDO	I16	RW	No	6086h
6087h	00h	P30.65	Torque slope	1000	0.1%/s	0~4294967295	RPDO	U32	RW	No	6087h
6088h	00h	P30.66	Torque contour type	0	—	-32768~32767	RPDO	I16	RW	No	6088h
608Fh	00h	P30.67	Position encoder accuracy sub-index number	2	—	0~255	No	U8	RO	Yes	608Fh
	01h	P30.68	Encoder resolution	8388608	pulse	1~4294967295	No	U32	RO	Yes	
	02h	P30.69	Motor revolutions	1	r(motor)	1~4294967295	No	U32	RO	Yes	
6091h	00h	P30.70	Gear ratio sub-index number	2	—	0~255	No	U8	RO	Yes	6091h
	01h	P30.71	Motor revolutions	1	r(motor)	1~4294967295	RPDO	U32	RW	No	
	02h	P30.72	Shaft revolutions	1	r(axis)	1~4294967295	RPDO	U32	RW	No	
6092h	00h	P30.73	Feed constant sub-index number	2	—	0~255	No	U8	RO	Yes	6092h

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
	01h	P30.74	Feed	8388608	Command unit	1~4294967295	RPDO	U32	RW	No	
	02h	P30.75	Shaft revolutions	1	r(axis)	1~4294967295	RPDO	U32	RW	No	
6098h	00h	P31.00	Origin return method	0	—	-128~127	RPDO	I8	RW	No	6098h
6099h	00h	P31.01	Search speed sub-index number	2	—	0~255	No	U8	RO	Yes	6099h
	01h	P31.02	Switch search speed	13981013	Command unit/s	0~4294967295	RPDO	U32	RW	No	
	02h	P31.03	Zero search speed	1398101	Command unit/s	0~4294967295	RPDO	U32	RW	No	
609Ah	00h	P31.04	Zero return acceleration	139810133	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	609Ah
60A3h	00h	P31.05	Contour jerk method	1	—	1~2	No	U8	RW	No	60A3h
60A4h	00h	P31.06	Contour jerk sub-index number	2	—	0~255	No	U8	RO	Yes	60A4h
	01h	P31.07	Contour jerk1	0	Command unit/s^2	0~4294967295	No	U32	RW	No	
	02h	P31.08	Contour jerk2	0	Command unit/s^2	0~4294967295	No	U32	RW	No	
60B0h	00h	P31.09	Position feedforward	0	Command unit	-2147483648~2147483647	RPDO	I32	RW	No	60B0h
60B1h	00h	P31.10	Speed feedforward	0	Command unit/s	-2147483648~2147483647	RPDO	I32	RW	No	60B1h
60B2h	00h	P31.11	Torque feedforward	0	0.1%	-32768~32767	RPDO	I16	RW	No	60B2h
60B8h	00h	P31.12	Probe function	0	—	0~65535	RPDO	U16	RW	Yes	60B8h
60B9h	00h	P31.13	Probe status	0	—	0~65535	TPDO	U16	RO	Yes	60B9h
60BAh	00h	P31.14	Probe 1 rising edge position	0	Command unit	-2147483648~21	TPDO	I32	RO	Yes	60B

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
			feedback			47483647					Ah
60BBh	00h	P31.15	Probe 1 falling edge position feedback	0	Command unit	-2147483648~2147483647	TPDO	I32	RO	Yes	60BBh
60BCh	00h	P31.16	Probe 2 rising edge position feedback	0	Command unit	-2147483648~2147483647	TPDO	I32	RO	Yes	60BCh
60BDh	00h	P31.17	Probe 2 falling edge position feedback	0	Command unit	-2147483648~2147483647	TPDO	I32	RO	Yes	60BDh
60C2h	00h	P31.18	Interpolation time sub-index number	2	—	0~255	No	U8	RO	Yes	60C2h
	01h	P31.19	Interpolation time cycle value	1	—	0~255	No	U8	RW	No	
	02h	P31.20	Interpolation time index	-3	—	-128~63	No	I8	RW	No	
60C5h	00h	P31.21	Maximum acceleration	4294967295	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	60C5h
60C6h	00h	P31.22	Maximum deceleration	4294967295	Command unit/s^2	0~4294967295	RPDO	U32	RW	No	60C6h
60E0h	00h	P31.23	Forward torque limit	3000	0.1%	0~65535	RPDO	U16	RW	No	60E0h
60E1h	00h	P31.24	Negative torque limit	3000	0.1%	0~65535	RPDO	U16	RW	No	60E1h
60E3h	00h	P31.25	Supported zero return method sub-index number	4	—	0~255	No	U8	RO	Yes	60E3h
	01h	P31.26	Supported zero return method 1	1	—	0~32767	No	I16	RO	Yes	
	02h	P31.27	Supported zero return method 2	2	—	0~32767	No	I16	RO	Yes	
	03h	P31.28	Supported zero return method 3	3	—	0~32767	No	I16	RO	Yes	
	04h	P31.29	Supported zero return method 4	4	—	0~32767	No	I16	RO	Yes	

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
	05h	P31.30	Supported zero return method 5	5	—	0~32767	No	I16	RO	Yes	
	06h	P31.31	Supported zero return method 6	6	—	0~32767	No	I16	RO	Yes	
	07h	P31.32	Supported zero return method 7	7	—	0~32767	No	I16	RO	Yes	
	08h	P31.33	Supported zero return method 8	8	—	0~32767	No	I16	RO	Yes	
	09h	P31.34	Supported zero return method 9	9	—	0~32767	No	I16	RO	Yes	
	0Ah	P31.35	Supported zero return method 10	10	—	0~32767	No	I16	RO	Yes	
	0Bh	P31.36	Supported zero return method 11	11	—	0~32767	No	I16	RO	Yes	
	0Ch	P31.37	Supported zero return method 12	12	—	0~32767	No	I16	RO	Yes	
	0Dh	P31.38	Supported zero return method 13	13	—	0~32767	No	I16	RO	Yes	
	0Eh	P31.39	Supported zero return method 14	14	—	0~32767	No	I16	RO	Yes	
	0Fh	P31.40	Supported zero return method 15	17	—	0~32767	No	I16	RO	Yes	
	10h	P31.41	Supported zero return method 16	18	—	0~32767	No	I16	RO	Yes	
	11h	P31.42	Supported zero return method 17	19	—	0~32767	No	I16	RO	Yes	
	12h	P31.43	Supported zero return method 18	20	—	0~32767	No	I16	RO	Yes	
	13h	P31.44	Supported zero return method 19	21	—	0~32767	No	I16	RO	Yes	
	14h	P31.45	Supported zero return method 20	22	—	0~32767	No	I16	RO	Yes	
	15h	P31.46	Supported zero return method 21	23	—	0~32767	No	I16	RO	Yes	
	16h	P31.47	Supported zero return method 22	24	—	0~32767	No	I16	RO	Yes	
	17h	P31.48	Supported zero return method 23	25	—	0~32767	No	I16	RO	Yes	
	18h	P31.49	Supported zero return method 24	26	—	0~32767	No	I16	RO	Yes	
	19h	P31.50	Supported zero return method 25	27	—	0~32767	No	I16	RO	Yes	

Hexadecimal		Decimal	Name	Factory Setting	Unit	Range	PDO Mapping	Data Type	Read-Write Attribute	Stored Attribute	Effective Method Index
Index	Sub-index	Parameter Number									
	1Ah	P31.51	Supported zero return method 26	28	—	0~32767	No	I16	RO	Yes	
	1Bh	P31.52	Supported zero return method 27	29	—	0~32767	No	I16	RO	Yes	
	1Ch	P31.53	Supported zero return method 28	30	—	0~32767	No	I16	RO	Yes	
	1Dh	P31.54	Supported zero return method 29	33	—	0~32767	No	I16	RO	Yes	
	1Eh	P31.55	Supported zero return method 30	34	—	0~32767	No	I16	RO	Yes	
	1Fh	P31.56	Supported zero return method 31	37	—	0~32767	No	I16	RO	Yes	
60F2h	00h	P31.57	Positioning method	0	—	0~32767	RPDO	U16	RW	No	60F2h
60F4h	00h	P31.58	Position deviation	0	Command unit	-2147483648~2147483647	TPDO	U32	RO	Yes	60F4h
60FAh	00h	P31.59	Position loop output	0	Command unit/s	-2147483648~2147483647	TPDO	U32	RO	Yes	60FAh
60FCh	00h	P31.60	Position command	0	pulse	-2147483648~2147483647	TPDO	U32	RO	Yes	60FCh
60FDh	00h	P31.61	Digital input	0	—	0~4294967295	TPDO	U32	RO	Yes	60FDh
60FEh	00h	P31.62	Digital output sub-index number	2	—	0~255	No	U8	RO	Yes	60FEh
	01h	P31.63	Physical output	0	—	0~4294967295	RPDO	U32	RW	No	
	02h	P31.64	Physical output enable	0	—	0~4294967295	RPDO	U32	RW	No	
60FFh	00h	P31.65	Target speed	0	Command unit/s	-2147483648~2147483647	RPDO	I32	RW	Yes	60FFh
6502h	00h	P31.66	Support servo running mode	941	—	0~4294967295	TPDO	U32	RO	Yes	6502h

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