DA180A Series
AC Servo Drive
User Manual



SHENZHEN INVT ELECTRIC CO., LTD.

Preface

Overview

Thanks for choosing DA180A series AC servo drive (DA180A drive for short).

DA180A drive is a new generation of servo drive that INVT develops, using the modular design. The host controller software uses USB communication and the bus control is optional among Modbus bus, CANopen bus and EtherCAT bus. Meanwhile, this product is equipped with online/offline inertia identification, gain switching, auto/manual notch filter, auto/manual vibration control filter, medium-frequency vibration suppression, and internal point-to-point (PTP) control.

DA180A drive adopts electromagnetic compatibility design to ensure strong anti-electromagnetic interference capacity while realizing low noise and weakening electromagnetic interference in the application sites.

This manual instructs you how to install, wire, set parameters for, diagnose and remove faults for, and maintain the drive, and also lists related precautions. Before installing the product, read through this manual carefully to ensure the proper installation and running with the excellent performance and powerful functions into full play.

If the product is ultimately used for military affairs or weapon manufacture, comply with the export control regulations in the Foreign Trade Law of the People's Republic of China and complete related formalities.

The manual is subject to change without prior notice.

Readers

Personnel with electrical professional knowledge (such as qualified electrical engineers or personnel with equivalent knowledge).

Change history

The manual is subject to change irregularly without prior notice due to product version upgrades or other reasons.

No.	Change description	Version	Release date
1	First release.	V1.0	June 2025

Contents

1 Safety precautions 1
1.1 Safety declaration 1
1.2 Safety level definition 1
1.3 Personnel requirements 1
1.4 Safety guidelines 2
2 Product overview 5
2.1 Servo drive 5
2.1.1 Drive overview 5
2.1.2 External view of the drive 8
2.1.3 Drive naming rule 8
2.1.4 Drive nameplate 9
2.1.5 Drive communication specifications 9
2.1.6 Drive product configuration comparison 10
2.1.7 Power ratings and cabinet volume 13
2.2 Servo motor 14
2.2.1 Motor nameplate 14
2.2.2 Servo motor models 14
2.3 Compatible cable 15
2.3.1 Cable nameplate 16
2.3.2 Cable model designation 16
2.3.3 Power cable 18
2.3.4 Encoder cable 19
2.3.5 Brake cable 20
2.3.6 Power cable terminal kit 20
2.3.7 Encoder cable terminal kit 21
2.4 Braking resistor specifications 21
3 Installation instructions 23
3.1 Drive dimensions 23
3.1.1 A/B size and dimension diagram 23
3.2 Drive installation 24
3.2.1 Installation method 24
3.2.2 Installation space and direction 24
3.3 Motor dimensions 25
3.3.1 Outline and installation dimensions for 40-frame motor 26
3.3.2 Outline and installation dimensions for 60-frame motor 26
3.3.3 Outline and installation dimensions for 80-frame motor 27
3.3.4 Outline and installation dimensions for 100-frame motor 27

3.3.5 Outline and installation dimensions for 130-frame motor 28
3.4 Motor installation precautions 28
3.5 Technical parameters of servo motor 29
3.5.1 Motor specifications 29
4 Wiring instruction 30
4.1 System wiring 30
4.1.1 Input power cable requirements 31
4.1.2 Control cable requirements 31
4.1.3 Cable diameter table of main circuit 32
4.1.4 EMI filter model selection 32
4.2 Main circuit (1PH 220V) terminal wiring 33
4.3 Motor power cable wiring 33
4.3.1 Power cable for 40 frame size 50W–100W 33
4.3.2 Power cable for 60 and 80 frame sizes 200W–750W 34
4.3.3 Power cable for 100 frame size 1kW 34
4.3.4 Power cable for 130 frame size 1kW (220V) 35
4.4 Motor and encoder cable wiring 35
4.4.1 Encoder cable for 60 and 80 frame sizes (17-bit and 23-bit) 35
4.4.2 Encoder cable for 100 frame size (17-bit and 23-bit) 35
4.4.3 Encoder cable for 110 and 130 frame sizes (17-bit and 23-bit) 36
4.5 Control I/O-CN1 terminal layout 36
4.6 Encoder CN2 terminal 37
4.7 RS485/CAN-CN3 terminal 37
4.8 USB-CN4 terminal 38
5 Control mode application 39
5.1 Standard wiring of position mode 39
5.2 Standard wiring of speed mode 40
5.3 Standard wiring of torque mode 41
5.4 Standard wiring of bus mode 42
5.5 CN1 function description 42
5.5.1 Pins of CN1 terminal 42
5.5.2 CN1 terminal definition 43
5.5.3 Power supply signal (based on 5.5.2) 44
5.5.4 Configuration table for different digital modes 45
5.5.5 Pulse input signals and functions 58
5.5.6 Analog input signals and functions 58
5.5.7 Encoder output signals and functions 59
5.6 CN1 wiring instruction 59
5.6.1 Wiring of digital input circuit 59
5.6.2 Wiring of the pulse input circuit 60

5.6.3 Wiring of the analog input circuit 62
5.6.4 Wiring of digital output circuit 63
5.6.5 Wiring of frequency division output circuit of encoder feedback signal 63
5.6.6 Wiring of the electromagnetic brake 64
6 Operation and running 65
6.1 Running 65
6.1.1 Connect to the power 65
6.1.2 Trial jogging 65
6.1.3 Running in position control mode 66
6.1.4 Running at the speed control mode 67
6.1.5 Running at the torque control mode 68
6.1.6 Parameter settings before running the servo 69
6.1.7 Servo enabled 69
6.1.8 Servo stop/Stop running 70
6.1.9 Timing diagram 71
6.2 Display and operation 74
6.2.1 Keypad display 74
6.2.2 Operation flowchart 75
6.2.3 Common monitoring mode 76
6.2.4 Monitoring mode 77
6.2.5 Parameter setting mode instruction 77
6.2.6 Auxiliary function instruction 78
6.2.7 Alarm display 81
6.2.8 Alarm clearing 81
7 Function codes 82
7.1 Group P0 Basic control 82
7.1.1 Basic settings 82
7.1.2 Position control 91
7.1.3 Speed/Torque control 98
7.1.4 Control mode switchover 111
7.1.5 Speed display filtering 112
7.2 Group P1 Autotuning control parameters 113
7.2.1 Inertia identification (Automatic gain) 113
7.2.2 Self-adaptive vibration control 117
7.3 Group P2 Motor control parameters 126
7.3.1 Gain setting 126
7.3.2 Gain switchover 130
7.3.3 Special motor control 136
7.4 Group P3 I/O management parameters 148
7.4.1 Digital input/output configuration 148

7.4.2 Analog input/output adjustment 156
7.4.3 Digital input/output settings 163
7.4.4 Analog input 3 adjustment 168
7.5 Group P4 Extension and application 172
7.5.1 Communication settings 172
7.5.2 Servo types and communication control commands 175
7.5.3 Extension and application 181
7.5.4 Special commands 190
7.5.5 Frequency-division output and second encoder settings 193
7.6 Group P5 Program jog, homing, and PTP control 199
7.6.1 Program jog 199
7.6.2 Homing 202
7.6.3 PTP control 206
7.7 Group P6 Application functions 223
7.8 Group PtP0, PtP1, PtP2 PTP control 240
7.9 Group P11 Position comparison output 287
7.10 Group R0 User monitoring parameters 315
7.11 Group R1 I/O monitoring parameters 335
7.12 Group R3 Fault record parameters 339
8 Commissioning 342
8.1 Operation instruction of inertia identification 342
8.1.1 Online inertia identification 342
8.1.2 Offline inertia identification 342
8.2 General methods for adjusting parameters 343
8.2.1 Gain adjustment in position mode 346
8.2.2 Gain adjustment in speed mode 348
8.2.3 Gain adjustment in torque mode 350
8.3 Mechanical resonance suppressing 350
8.4 Gain switching function 352
9 Communication 356
9.1 Overview 356
9.2 RS485 communication protocol 356
9.2.1 Protocol description 356
9.2.2 Protocol description 356
9.2.3 Communication frame structure 357
9.2.4 Command code and communication data 357
9.2.5 Error checkout of the communication frame 359
9.2.6 Error message response 360
9.3 CANopen communication protocol 361
9.3.1 CANopen protocol description 361

9.3.2 CANopen hardware configuration 361
9.3.3 CANopen software configuration 362
9.3.4 CANopen functions 363
9.4 EtherCAT communication protocol 367
9.4.1 Basic settings of EtherCAT application 367
9.4.2 EtherCAT communication 374
9.4.3 Compatible communication specifications 379
10 Fault handling 381
10.1 Drive faults and solutions 381
10.2 CANopen communication faults and solutions 407
10.3 EtherCAT communication faults and solutions 410
Appendix A Parameter list 412
A.1 Setup parameter list 412
A.1.1 Function parameter list 412
A.1.2 Monitoring parameter list 444
A.2 Common monitoring parameters 448
A.3 Fault codes 449
A.4 Record table of parameter setting 453

1 Safety precautions

1.1 Safety declaration

Read this manual carefully and follow all safety precautions before moving, installing, wiring, operating and servicing the drive. Otherwise, equipment damage or physical injury or death may be caused.

We shall not be liable or responsible for any physical injury or equipment damage caused due to failure to follow the safety precautions.

1.2 Safety definition

To ensure personal safety and avoid property damage, you must pay attention to the safety symbols and warnings in the manual.

Warning symbols	Name	Description
	Danger	Severe personal injury or even death can result if related requirements are not followed.
	Electric shock	Severe personal injury or even death can result if related requirements are not followed. As high voltage still presents in the bus capacitor after power off, wait for at least 15 minutes after power off to prevent electric shock.
	Warning	Personal injury or equipment damage can result if related requirements are not followed.
	Electrostatic discharge	The PCBA may be damaged if related requirements are not followed.
	Hot sides	You may get burnt if related requirements are not followed.
Note	Note	Slight personal injury or equipment damage can result if related requirements are not followed.

1.3 Personnel requirements

Trained and qualified professionals: People operating the equipment must have received professional electrical and safety training, and must be familiar with all steps and requirements of equipment installing, commissioning, running and maintaining and capable to prevent any emergencies according to experiences.

1.4 Safety guidelines

General principles	
	• Only trained and qualified professionals are allowed to carry out related operations. • Do not perform wiring, inspection or component replacement when power supply is applied. Before performing these operations, ensure all the input power supplies have been disconnected, and wait for at least the time designated on the drive.
	• Do not modify the drive unless authorized; otherwise fire, electric shock or other injury may result. • Prevent the screws, cables and other conductive parts from falling into the drive.
	• The base may become hot when the drive is running. Do not touch. Otherwise, you may get burnt.
	• The electrical parts and components inside the drive are electrostatic sensitive. Take measurements to prevent electrostatic discharge when performing related operations.

Delivery	
	• Select appropriate tools for drive delivery to avoid damage to the drive, and take protective measures like wearing safety shoes and working uniforms to avoid physical injury or death. • Protect the drive against physical shock or vibration. • Do not carry the drive only by its front cover as the cover may fall off.

Installation	
	• Do not install the drive on inflammables. In addition, prevent the drive from contacting or adhering to inflammables. • Do not install the damaged or incomplete drive. • Do not contact the drive with damp objects or body parts. Otherwise, electric shock may result. • Do not connect the input power cables to the output terminals, otherwise damage to the drive may occur. • Do not touch the conductive parts directly; do not connect any external cables (especially those related to electricity) to the enclosure or short connect the external cables, otherwise electric shock or short circuit may occur.

Wiring	
	• The installation site must be away from children and other public places. • Connect the optional braking parts (such as braking resistors and braking units). • Do ground with proper techniques and ensure the grounding resistor is less than 10Ω. The conductivity of PE earth conductor is the same as the phase conductor (with the same cross area). • L1, L2, and L3 are the power input terminals, while U, V, and W are the motor output terminals. Connect the input power cables and motor cables properly; otherwise, the drive may be damaged. • When the drive is installed in a confined space (such as cabinet), it is necessary to provide protective devices (such as fireproof housing, electrical protective housing, mechanical protective housing, etc.) that meet the IP rating, and the IP rating shall comply with the relevant IEC standards and local regulations. • Do install the overcurrent protector, leakage current protector and emergency device and ensure the normal usage after wiring, otherwise electric shock, hurt and fire may occur. • Connect the drive and motor as correct phase sequence, otherwise drive fault or damage may occur.

Commissioning	
	• Do not switch on or switch off the input power supplies of the drive frequently. • If the drive has been stored for a long time without being used, perform checking and carry out pilot run for the drive before using it again. • Set the corresponding parameters before operation, otherwise the drive may run abnormally or beyond the expectation because of the load.

Running	
	• Close the drive front cover before running; otherwise, electric shock may occur. • De-couple the motor load and run the motor independently before operation to avoid accidents. • Check whether the AC power supply is the same as the rated voltage of the servo drive, otherwise fire, hurt, damage to the drive may occur. • Please ensure the drive can be disconnected from the power supply by E-switch before any operation.

Maintenance	
	• Do not perform drive maintenance or component replacement when the power is on. Otherwise, electric shock may result. • Keep the drive and its parts and components away from combustible materials and ensure they have no combustible materials adhered.
	• During maintenance and component replacement, take proper anti-static measures on the drive and its internal parts.
	• Do not carry out any insulation and voltage withstand test to the drive directly, and do not test the control circuit of the drive by megameter.
Note	• Use proper torque to tighten screws.

Disposal	
	• The components inside the drive contain heavy metals. Dispose of a scrap drive as industrial waste.

2 Product overview

2.1 Servo drive

2.1.1 Drive overview

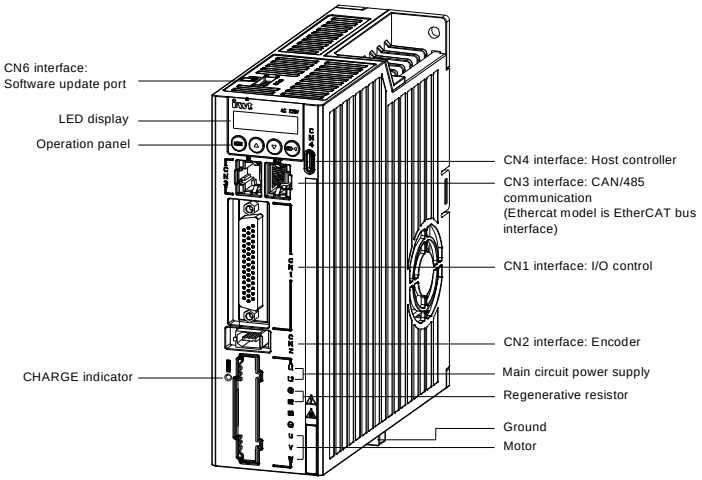
DA180A series servo drive (400W/1kW)				
Specification			**Description**	
Power supply	System input voltage of 220V		1PH, AC 220V(±15%), 47–63Hz	
Port	Control signal	Input	10 inputs (The function is configurable through parameter settings.) (7 inputs for EtherCAT models.)	
		Output	2/4 differential outputs (The function is configurable through parameter settings.)	
	Analog	Input	Two 12bit analog inputs (None for EtherCAT models.)	
	Pulse signal	Input	Two groups (mode: open collector input or differential input)	
		Output	One group differential output (A+, A-; B+, B-; Z+, Z-) One group open collector output (A, B, Z)	
	Encoder	Input	2/4-PPR absolute encoder interface (BISS-C, EnDat2.1)	
	Communication	USB	1:1 communication upper PC software	
		RS485	1:n communication (optional)	
		CANopen	1:n communication (optional)	
		EtherCAT	1:n communication (optional)	
Control mode			Position control; speed control; torque control; position/speed mode switching; speed/torque mode switching; position/torque mode switching; CANopen mode; EtherCAT mode	
Function	Position control	Control input	Retention pulse clearing; command pulse input disabled; electronic gear ratio switching; vibration control switching, etc	
		Control output	Positioning completion output, etc	
		Pulse input	Max. pulse input frequency	Optical coupling: differential input 4Mpps, open collector input 200kpps;

DA180A series servo drive (400W/1kW)				
Specification			Description	
			Pulse input mode	Pulse + direction; CW+CCW; quadrature encoder
			Electronic gear	1/10000–1000 times
			Filter	Command smoothing filter; FIR filter
		Analog input	Torque limit command input	Can independently perform clockwise/counterclockwise torque limit
		Vibration control	Able to suppress 1–200Hz front-end vibration and overall machine vibration	
		Pulse output	Can perform arbitrary frequency division settings under the encoder resolution; B phase reverse function	
	Speed control	Control input	Internal command speed selection 1 Internal command speed selection 2 Internal command speed selection 3 Zero speed clamp, etc	
		Control output	Speed reaching, etc	
		Analog input	Speed command input	The speed command input can be set according to the analog voltage DC ± 10V
			Torque limit input	Can independently perform clockwise/counterclockwise torque limit
		Internal speed commands	8 step speed can be switched according to the external control input	
		ACC/DEC adjustment of speed command	ACC/DEC time setting and S curve setting	
		Zero-speed clamp	In the speed mode, it can set the operation mode as the speed mode and position mode	
		Speed command	A delay filter of analog input speed command	

DA180A series servo drive (400W/1kW)				
Specification			**Description**	
		filter		
		Speed command zero drift control	Zero drift control against outside interference	
	Torque control	Control input	Zero speed clamp input, etc	
		Control output	Speed reaching, etc	
		Analog input	Torque command input	Analog torque command input, gain and polarity can be set based on analog voltage
			Speed limit input	Analog speed limit
		Speed limit	Set the speed limit by parameters	
		Torque command filter	A delay filter of analog input torque command	
		Torque command zero drift control	Zero drift control against outside interference	
	Internal position plan	Plan bits	128 bits internal position planning, the positioning can be controlled through communication	
		Route setting	Position, speed, ACC time, DEC time, stop timer, various state output, operational mode	
		Homing	LS signal, Z phase signal, LS signal+Z phase signal, torque limit signal	
Protection	Protection function		Such as protection against phase-loss, overvoltage, undervoltage, overcurrent, overheating, storage fault, initialization fault, I/O distribution abnormalities and large position deviation, braking resistor overload, and drive overload.	
	Dynamic braking		For emergency stop function, including stop and fault stop scenarios. (This function is unavailable for the pulse type)	

DA180A series servo drive (400W/1kW)		
Specification		**Description**
	Protection and fault record	Up to 10 faults can be recorded. The key parameters can be recorded when fault occurs.
Environment	Working temperature	0–55°C (Derate 80% when the ambient temperature is 45–55°C.)
	Storage temperature	-20°C–70°C (No freezing)
	Operation/storage humidity	⩽90%RH (no condensation)
	IP class	IP20
	Altitude	Lower than 1000m
	Vibration	⩽5.88m/s², 10–60Hz (Working at the resonance point is not allowed)

2.1.2 External view of the drive



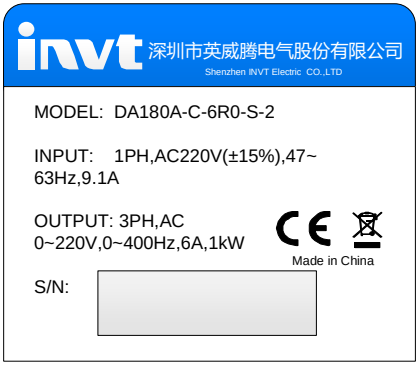
2.1.3 Drive naming rule

DA180A-E-2R8-S-2

① ② ③ ④ ⑤

Symbol	Description	Naming example
①	Product series	DA180A: Servo drive series
②	Product category	E: Pulse type C: CANopen bus type N: EtherCAT bus type
③	Rated output current	2R8: 2.8A 6R0: 6.0A
④	Voltage class	S: 220V
⑤	Encoder category	2: Communication encoder (Tamagawa, BISS*, EnDat*, Nikon* and others) **Note:** The encoder with an * mark is equipped as an optional configuration. For details, contact the manufacturer.

2.1.4 Drive nameplate



2.1.5 Drive communication specifications

Specification			Description
Port	Communication	USB	1:1 communication upper PC software (standard)
		RS485	1:n communication (standard)
		CANopen	1:n communication (optional)
		EtherCAT	1:n communication (optional)
Basic performance of the slave	Supported services	EtherCAT	CoE (PDO, SDO)
	Synchronization method	EtherCAT	Distributed clocks (DCs)
	Transmission medium	EtherCAT	Shielded Category 5 Enhanced or better Ethernet cable

Specification			Description
	Number of slave nodes	EtherCAT	Supports a maximum of 65,535, but fewer than 128 are recommended for practical network configurations.
	Min. synchronization period	EtherCAT	125μs
	Physical layer		100BASE-TX
	Baud rate		100 Mbit/s (100Base-TX)
	Duplex mode		Full duplex
	Topology structure		Ring, linear
	Transmission distance		<100m between nodes (ideal conditions)
	Synchronous jitter		<1μs
Control mode			Position control; speed control; torque control; position/speed mode switching; speed/torque mode switching; position/torque mode switching; fully-closed loop control; CANopen mode; EtherCAT mode

2.1.6 Drive product configuration comparison

Attribute grouping	Function description	DA180A series	DA180A series direct drive servo
Product overview	Name definition	Economical AC general-purpose servo	Economical AC direct-driven servo
	Release date	2023	2024
	Power range (kW)	0.4–1kW	0.4–1kW
	Current range (A)	2.8–6A (220V)	2.8–6A (220V)
Technical control performance	Input voltage (V)	1PH 220V	1PH 220V
	Input frequency (Hz)	47–63	47–63
	Output voltage	Output according to motor design (not exceeding input voltage)	Output according to motor design (not exceeding input voltage)
	Output frequency	0–599	0–599
	Control mode	Position control; speed control; torque control; position/speed mode switching; speed/torque mode switching;	Position control; speed control; torque control; position/speed mode switching; speed/torque mode switching;

Attribute grouping	Function description	DA180A series	DA180A series direct drive servo
		position/torque mode switching	position/torque mode switching
	Motor type	AC permanent magnet synchronous motor	Linear motor, DD motor
	Communication support	EtherCAT/CANopen/pulse	EtherCAT/pulse
	Speed loop bandwidth	2.5k	2.5k
	Overload capacity	3 times	3 times
	Braking unit	Available	Available
	Braking capability	Built-in braking resistor (not available for 2.8A models, available for 6A models)/External resistor	Built-in braking resistor (not available for 2.8A models, available for 6A models)/External resistor
Adapted motor	Encoder	Absolute (Tamagawa protocol)	A/B/Z incremental encoder, single-ended hall, BiSS-C, EnDat 2.1 protocol
	Brake control	None	None
	Temperature sensor	None	Available (PT100/KTY84)
Motion control performance	Frequency setting method	Internal step-speed, pulse, bus	Internal step-speed, pulse, bus
	Fault protection	Memorize at power failure	Memorize at power failure
Communication performance	EtherCAT communication cycle	Minimum 125μs	Minimum 125μs
	PROFINET communication cycle	None	None
	CANopen maximum baud rate	20k–1Mbit/s (DA180A direct drive servo does not support CANopen)	20k–1Mbit/s
	RS485 frequency	9600bit/s, 19200bit/s, 38400bit/s, 57600bit/s	9600–57600bit/s
Commissioning	Inertia automatic identification	Available	Available
	Zero-offset control (model tracking)	None	None

Attribute grouping	Function description	DA180A series	DA180A series direct drive servo
	Vibration automatic suppression	Available	Available
	Torque disturbance compensation	Available	Available
	Positioning compensation	None	Available (supports Renishaw laser interferometer)
	Friction compensation	Available	Available
	Magnetic pole identification	None	Available (supports micromotion and static)
	Hall commutation	None	Available (supports single-ended hall commutation)
Special function	Fully-closed loop	None	-
	Electronic cam (e-cam)	None	None
	Gantry synchronization	None	None
	Probe function	Available	Available
	Flying capture function	Available	Available
	Firmware upgrade	Available	None
Safety function	Dynamic braking	Not available on E type, and available on C and N types	Available
	STO	None	None
Terminal	Analog input	2 channels/Unavailable (N bus)	2 channels/Unavailable (N bus)
	Terminal analog input resolution	12bit	12bit
	Analog output	None	None
	Digital input	10 channels/7 channels (N bus)	10 channels/7 channels (N bus)
	Digital output	4 channels	4 channels
	Commissioning USB interface description	Type-C	Type-C

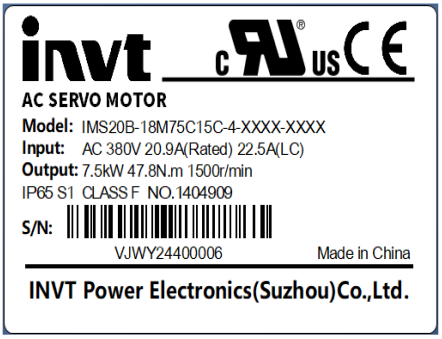
Attribute grouping	Function description	DA180A series	DA180A series direct drive servo
	Encoder interface	6PIN(1394)	15PIN (DB15)
	2nd encoder interface	None	None
Accessories	External braking resistor	Optional	Available
	Reactor	Optional	Optional
	EMC filter	Optional	Optional
	Keypad instruction	LED 6-digit 7-segment digital tube, 4 keys	LED 6-digit 7-segment digital tube, 4 keys
Other	Installation method	Wall mounting	Wall mounting
	Temperature of running environment	0–55°C (Derate to 80% when the ambient temperature is 45–55°C.)	0–55°C (Derate to 80% when the ambient temperature is 45–55°C.)
	Ingress protection (IP) rating	IP20	IP20
	Pollution degree	2	2
	Cooling method	Natural cooling for drives lower than 400W, fan cooling for the others.	Natural cooling for drives lower than 400W, fan cooling for the others.
	Volume description	A	A

2.1.7 Power ratings and cabinet volume

Model	Input		Output		Cabinet volume
	Voltage (V)	Rated current (A)	Power (kW)	Rated current (A)	
DA180A-E-2R8-S-2	1PH 220	3.6	0.4	2.8	A
DA180A-C-2R8-S-2		3.6	0.4	2.8	
DA180A-N-2R8-S-2		3.6	0.4	2.8	
DA180A-E-6R0-S-2		9.1	1.0	6	
DA180A-C-6R0-S-2		9.1	1.0	6	
DA180A-N-6R0-S-2		9.1	1.0	6	

2.2 Servo motor

2.2.1 Motor nameplate



Note: "No.*******" in the nameplate is the motor model code (motor code for short). Please input this code into servo parameter P0.00 correctly (P0.00 is long parameter which can be set via keypad. See details in section 6.2.1 Keypad display). Improper parameter value will result in abnormal operation of servo system, or even lead to serious drive or motor faults.

2.2.2 Servo motor models

IMS20B-06 M 20B 30C-2-M4 4 _-××××

① ② ③ ④ ⑤ ⑥ ⑦ ⑧⑨ ⑩

Symbol	Description	Definition
①	Product series	IMS20B: IMS20B series permanent magnet synchronous motor
②	Base model No. (mm)	04: 40 06: 60 08: 80 10: 100 13: 130
③	Inertial class	L: Low inertia; M: Medium inertia; H: High inertia
④	Rated power (W)	A: ×1 B: ×10 C: ×100 D: ×1000 For example: 20B indicates 0.2kW; 40B indicates 0.4kW; 10C indicates 1kW.
⑤	Rated speed (rpm)	A: ×1 B: ×10 C: ×100 D: ×1000 E: ×10000 For example: 30C indicates 30×100=3000rpm.
⑥	Voltage class (V)	2: 220
⑦	Encoder type	First digit: Encoder category N: No encoder P: Photoelectric encoder

Symbol	Description	Definition
		M: Magnetic encoder M4: 17-bit magnetic encoder P7: 23-bit optical encoder
		Second digit: Communication protocol and resolution Comply with Tamagawa protocols: 3: Single-turn absolute (17 bits) 4: Multi-turn absolute (17 bits) 9: Multi-turn absolute (23 bits) Set encoder resolution according to the function code. **Note:** For compliance with BISS-C or Endat2.1 protocols, please consult the original manufacturer's technical personnel.
⑧	Oil seal and brake	0: With oil seal but no brake (Empty by default) 1: Without oil seal or brake 4: With oil seal and electromagnetic brake 5: Without oil seal but with electromagnetic brake
⑨	Cooling method	N: Natural cooling (Empty by default) F: Forced air cooling
⑩	Product lot number	First digit: Supplier management code Second and third digits: Product type code Fourth and fifth digits: Non-standard identification serial number

2.3 Compatible cable

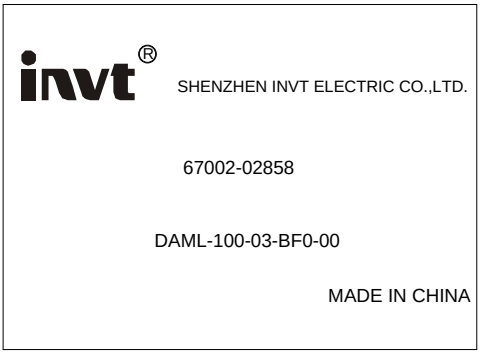
The cables used in the servo system mainly include power cables, encoder cables, and brake cables.

Power cables: Used to supply power from the drive to the motor.

Encoder cables: Specifically designed for transmitting encoding signals and feedback in the servo system.

Brake cables: Used to control emergency stops of the drive during power supply from the driver, serving a protective function.

2.3.1 Cable nameplate



Note: This is an example for the standard cable nameplate of the DA180A series products, which may include certification marks such as CE, depending on the actual certification status.

2.3.2 Cable model designation

DA ML-100-03-B F 0-00
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

DA ML-B F
① ② ⑤ ⑥

Table 2-1 Model designation of power cable and accessories

Symbol	Description	Naming example
①	Product series	For internal use by manufacturer
②	Power cable	ML: Power cable
③	Cable diameter	050: 0.5mm²; 100: 1.0mm²
④	Cable length	03: 3m; 05: 5m; 10: 10m; …
⑤	Plug on motor end	A: 4PIN plastic plug B: 4PIN regular aviation plug YD28 X: In-line terminal
⑥	Plug on drive end	F: Tubular terminal W: Y shape terminal
⑦	Cable material	0: Regular cable

Symbol	Description	Naming example
		A: Shielded regular cable B: Shielded flexible towline cable F: Flexible towline cable
⑧	Serial No.	00: Standard part; 01: Serial no. for non-standard parts; ...

DB EL-04-03-B I 0-04 A0
① ② ③ ④ ⑤⑥⑦ ⑧ ⑨

DB EL-B I
① ② ⑤ ⑥

Table 2-2 Model designation of encoder cable and accessories

Symbol	Description	Naming example
①	Product series	For internal use by manufacturer
②	Encoder cable	EL: Encoder cable
③	Number of wires	04: 4-core cable 06: 6-core cable
④	Cable length	03: 3m; 05: 5m; 10: 10m; …
⑤	Plug on motor end	B: 15PIN regular aviation plug YD28 X: In-line terminal
⑥	Plug on drive end	1: 1394 6-Pin terminal
⑦	Cable material	0: Regular cable without battery holder D: Regular cable with battery holder F: Flexible drag chain cable without battery holder H: Flexible drag chain cable with battery holder
⑧	Encoder type	04: 17-bit single-turn/17-bit multi-turn/23-bit multi-turn absolute value
⑨	Serial No.	A0: Standard part; A1: Serial no. for non-standard parts; ...

BRKL-03- B
① ② ③

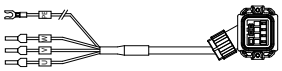
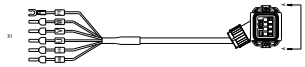
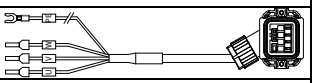
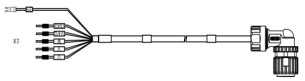
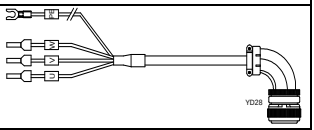
Table 2-3 Model designation of servo motor brake cables

Symbol	Description	Naming example
①	Product series	BRKL: Motor braking cable (130 flange)

Symbol	Description	Naming example
②	Cable length	03: 3m; 05: 5m; 10: 10m; ……; 30: 30m
③	Plug on motor end	B: 3PIN regular aviation plug D: 2PIN plastic plug

2.3.3 Power cable

Table 2-4 Power cable model selection

Drive model	Motor frame	Cable model	Cable cross-sectional area (mm^2)	Schematic diagram
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B series 40/60/80 (reverse cable outlet scenarios)	DAML-20A-xx-XF0-00A2	0.5	
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B brake series 40/60/80	DAML-050-xx-XF0-01	0.5	
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B series 40/60/80	DAML-050-*-XF*-*	0.5	
DA180A-*-6R0-S-2	IMS20B series 100	DAML-100-*-GF*-*	1.0	
DA180A-*-6R0-S-2	IMS20B series 130	DAML-100-*-BF*-*	1.0	

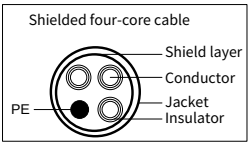
Note:

- The size of the power cable should comply with local regulations.
- The power cable must be able to withstand the corresponding load current.
- The maximum rated temperature margin for the power cable under continuous operation should not be lower than 70°C.
- The conductivity of the PE grounding conductor is the same as that of the phase

conductor, that is, the cross-sectional areas are the same.

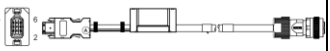
- To protect the conductor, when the shielded cable and phase conductor are of the same material, the cross-sectional area of the shielded cable must be the same as that of the phase conductor. This is to reduce the grounding resistance and improve the continuity of impedance.
- To effectively restrict the emission and conduction of radio frequency (RF) interference, the conductivity of the shielded cable must at least be 1/10 of the conductivity of the phase conductor. The coverage rate of shielded layer must be above 85% at least.

It is recommended to use shielded four-core cables for power cables.



2.3.4 Encoder cable

Table 2-5 Encoder cable model selection

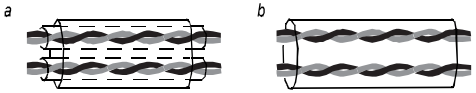
Drive model	Motor frame	Cable model	Cable cross-sectional area	Schematic diagram
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B series 40-, 60-, and 80-frame absolute encoders	DBEL-04-**-XI*-04A* DBEL-06-**-XI*-04A* (with battery holder)	#22*3P	
DA180A-*-6R0-S-2	IMS20B series 100-frame absolute encoders	DBEL-04-**-JI*-04** DBEL-06-**-JI*-04** (with battery holder)	#22*3P	
DA180A-*-6R0-S-2	IMS20B series 130-frame absolute encoders	DBEL-04-**-BI*-04** DBEL-06-**-BI*-04** (with battery holder)	#22*3P	

Note:

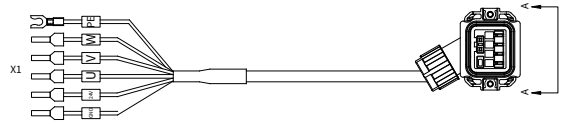
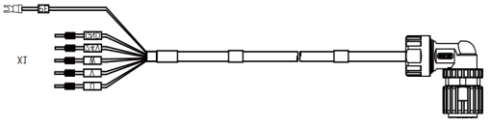
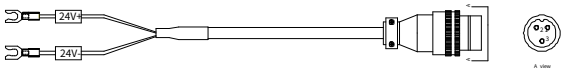
- All encoder cables and cables used for frequency input must be shielded twisted-pair cables. Use one separate twisted pair for each signal. Do not use the same ground

wire for different analog signals.

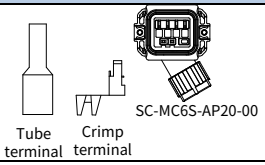
- For low-voltage digital signals, double-shielded cables (as shown in figure a) are recommended, but single-shielded or unshielded twisted pairs (as shown in figure b) can also be used. For pulse input signals, however, only shielded cables can be used.

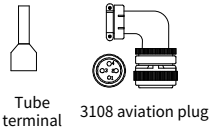
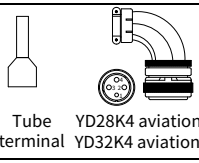


2.3.5 Brake cable

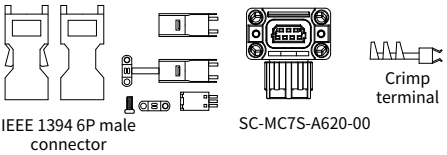
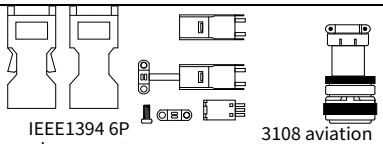
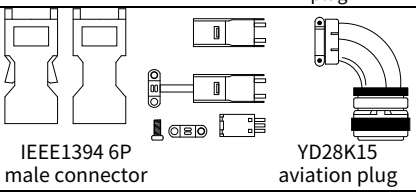
Motor frame	Cable model	Cable cross-sectional area	Schematic diagram
IMS20B series 40/60/80	DAML-050-xx-XF0-01 (UVW cables include brake wires)	0.5mm²	
100-frame	DAML-100-xx-HF0-01 (UVW cables include brake wires)	0.5mm²	
130-frame	BRKL-*-B	0.5mm²	

2.3.6 Power cable terminal kit

Drive model	Motor frame	Kit model	Schematic diagram
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B series 40/60/80	DAML-XF	

Drive model	Motor frame	Kit model	Schematic diagram
DA180A-*-6R0-S-2	100-frame	DAML-HF	
DA180A-*-6R0-S-2	130-frame	DAML-BF	

2.3.7 Encoder cable terminal kit

Drive model	Motor frame	Kit model	Schematic diagram
DA180A-*-2R8-S-2 DA180A-*-6R0-S-2	IMS20B series 40-, 60-, and 80-frame absolute encoders	DBEL-XI	
DA180A-*-6R0-S-2	100-frame	DBEL-JI	
DA180A-*-6R0-S-2	130-frame	DBEL-BI	

2.4 Braking resistor specifications

Drive model	Embedded braking resistor	Min. resistance of external braking resistors
DA180A-E-2R8-S-2	-	60Ω

Drive model	Embedded braking resistor	Min. resistance of external braking resistors
DA180A-C-2R8-S-2		
DA180A-N-2R8-S-2		
DA180A-E-6R0-S-2	45Ω 60W	45Ω
DA180A-C-6R0-S-2		
DA180A-N-6R0-S-2		

3 Installation instructions

3.1 Drive dimensions

3.1.1 A/B size and dimension diagram

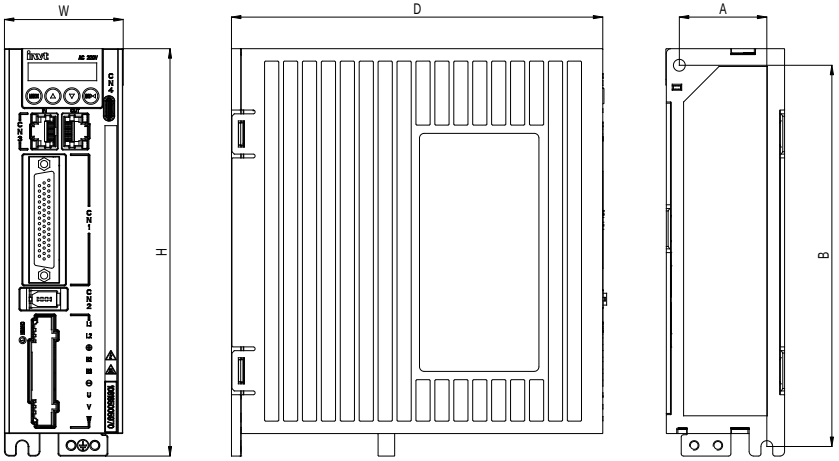


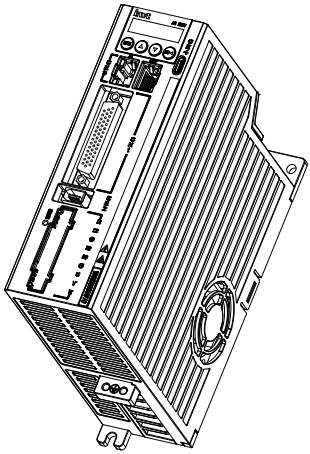
Table 3-1 Detailed dimension table (unit: mm)

Volume	Model	Outline dimensions			Installation dimensions		Hole diameter
		H	W	D	A	B	
A	DA180A-E-2R8-S-2	172	50	157	37	161	M4 (Ø5)
	DA180A-C-2R8-S-2						
	DA180A-N-2R8-S-2						
	DA180A-E-6R0-S-2						
	DA180A-C-6R0-S-2						
	DA180A-N-6R0-S-2						

3.2 Drive installation

3.2.1 Installation method

The base installation method is as follows: fix with 2-M4 screws, recommended tightening torque 1.2 Nm.



Note: There is a Ø5 installation hole at the lower left corner and upper right corner of the rear board respectively.

3.2.2 Installation space and direction

Please install the servo drive vertically and keep enough installation space for good ventilation. Install fans if necessary to ensure the temperature inside the control cabinet is lower than 45°C.

Figure 3-1 Single-unit installation

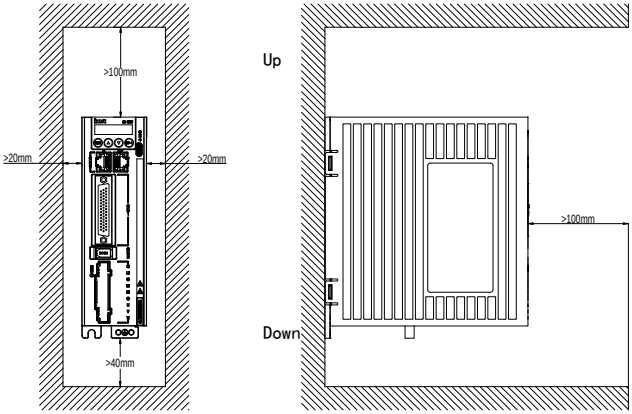
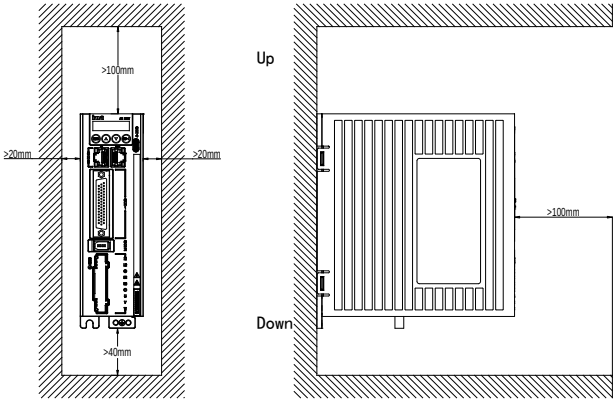


Figure 3-2 Multiple-unit installation

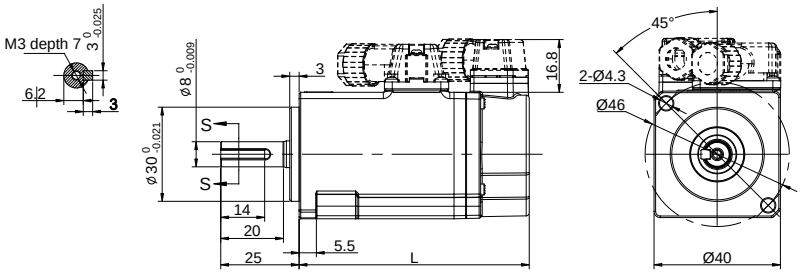


3.3 Motor dimensions

Note: As motor structure and dimension may vary slightly with design modification, for those who have demanding requirements for the installation length of motor, please confirm the installation length with us before ordering.

3.3.1 Outline and installation dimensions for 40-frame motor

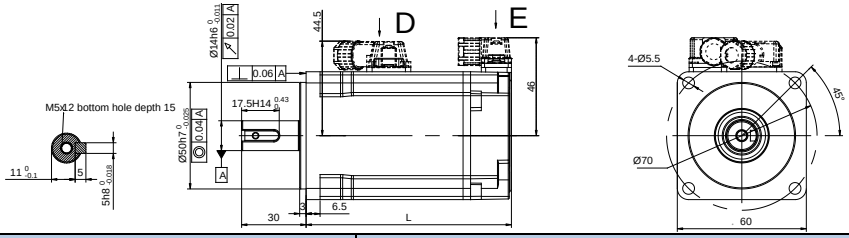
Figure 3-3 Outline and installation dimensions for 40-frame motor (unit: mm)



Model	L (mm)
IMS20B-04L05B30C-2-M4-J	62.4
IMS20B-04L05B30C-2-M44-J	88.1
IMS20B-04L05B30C-2-P9-J	62.4
IMS20B-04L05B30C-2-P94-J	88.1
IMS20B-04L10B30C-2-M4-J	73.4
IMS20B-04L10B30C-2-M44-J	100.1
IMS20B-04L10B30C-2-P9-J	73.4
IMS20B-04L10B30C-2-P94-J	100.1

3.3.2 Outline and installation dimensions for 60-frame motor

Figure 3-4 Outline and installation dimensions for 60-frame motor (unit: mm)

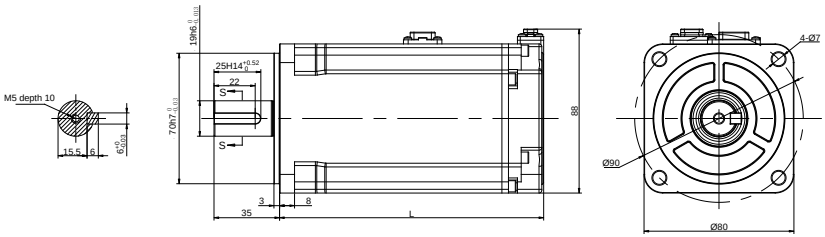


Motor model	L(mm)
IMS20B-06M20B30C-2-M4-AUL	73
IMS20B-06M20B30C-2-M44-AUL	95.5
IMS20B-06M20B30C-2-P9-AU	73
IMS20B-06M20B30C-2-P94-AUL	95.5
IMS20B-06M40B30C-2-M4-AUL	92.5

Motor model	L(mm)
IMS20B-06M40B30C-2-M44-AUL	114.5
IMS20B-06M40B30C-2-P9-AUL	92.5
IMS20B-06M40B30C-2-P94-AUL	114.5

3.3.3 Outline and installation dimensions for 80-frame motor

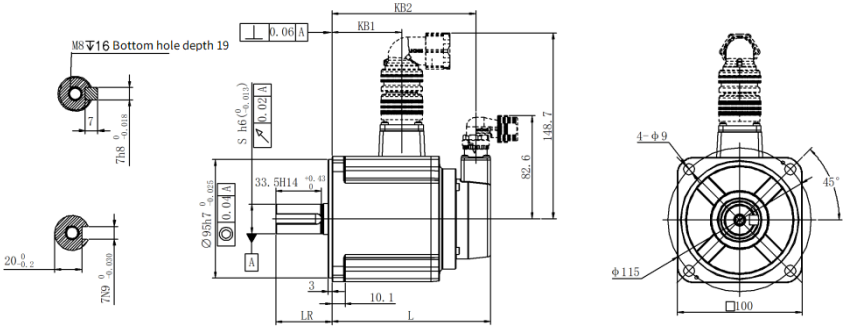
Figure 3-5 Outline and installation dimensions for 80-frame motor (unit: mm)



Motor model	L(mm)
IMS20B-08M10C30C-2-M4-AUL	110.8
IMS20B-08M10C30C-2-M44-AUL	141
IMS20B-08M10C30C-2-P9-AUL	110.8
IMS20B-08M10C30C-2-P94-AUL	141
IMS20B-08M75B30C-2-M4-AUL	96.8
IMS20B-08M75B30C-2-M44-AUL	127
IMS20B-08M75B30C-2-P9-AUL	96.8
IMS20B-08M75B30C-2-P94-AUL	127

3.3.4 Outline and installation dimensions for 100-frame motor

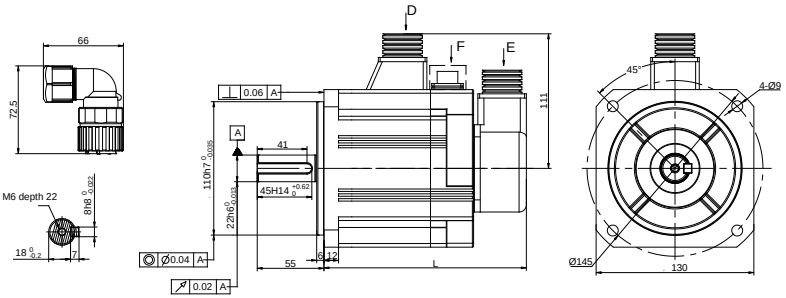
Figure 3-6 Outline and installation dimensions for 100-frame motor (unit: mm)



Motor model	L(mm)
IMS20B-10M10C30C-2-M4-J	127.4
IMS20B-10M10C30C-2-M44-J	156
IMS20B-10M10C30C-2-P9-J	127.4
IMS20B-10M10C30C-2-P94-J	156

3.3.5 Outline and installation dimensions for 130-frame motor

Figure 3-7 Outline and installation dimensions for 130-frame motor (unit: mm)



Motor model	L(mm)
IMS20B-13H85B15C-2-M4-A	138
IMS20B-13H85B15C-2-M44-A	167
IMS20B-13H85B15C-2-P9-A	138
IMS20B-13H85B15C-2-P94-A	167
IMS20B-13M10C20C-2-M4-A	130
IMS20B-13M10C20C-2-M44-A	159
IMS20B-13M10C20C-2-P9-A	130
IMS20B-13M10C20C-2-P94-A	159

3.4 Motor installation precautions

Do not pull the motor leads or output shaft during fetching and moving the motor.

Do not beat or hammer during the motor assembly to avoid damage to the encoder or shafts.

Please wipe the slushing oil on the motor shaft before using.

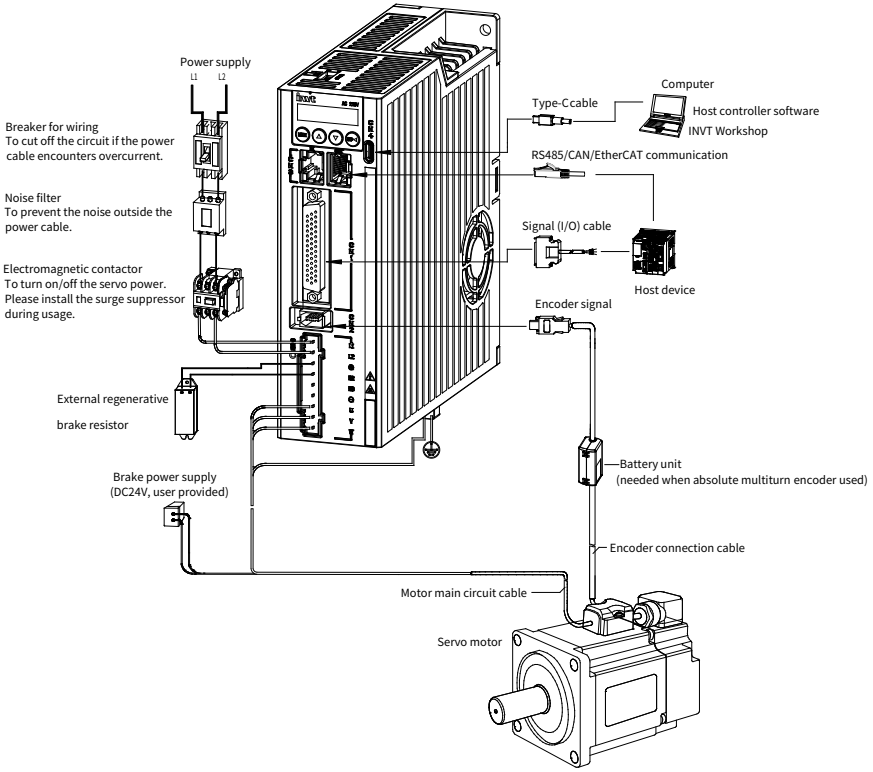
3.5 Technical parameters of servo motor

3.5.1 Motor specifications

Motor model	Frame size (mm)	Rated power (kW)	Rated current (A)	Rated torque (Nm)	Max. transient torque (Nm)	Rated speed (rpm)	Max. speed (rpm)	Voltage (V)	Rotation inertia Standard/ with brake (kg·cm²)	Weight Standard/ with brake (kg)
IMS20B-04L05B30C-2-***	40	0.05	0.58	0.16	0.48	3000	6000	220	0.018/0.021	0.28/0.47
IMS20B-04L10B30C-2-***		0.1	0.98	0.32	1.12	3000	6000	220	0.031/0.034	0.36/0.55
IMS20B-06M20B30C-2-***	60	0.2	1.4	0.64	2.24	3000	7000	220	0.28/0.31	0.8/1.1
IMS20B-06M40B30C-2-***		0.4	2.7	1.27	4.45	3000	7000	220	0.5/0.53	1.2/1.4
IMS20B-08M75B30C-2-***	80	0.75	4.8	2.39	8.37	3000	7000	220	1.7/1.75	2.2/2.7
IMS20B-08M10C30C-2-***		1	5.5	3.18	11.13	3000	7000	220	2.16/2.21	2.62/3.2
IMS20B-10M10C30C-2-***	100	1	6.6	3.18	9.55	3000	6000	220	1.84/2.59	3.3/4.1
IMS20B-13M10C20C-2-***	130	1	5.4	4.8	14.3	2000	4500	220	6.3/7.95	4.4/6.0
IMS20B-13H85B15C-2-***		0.85	6.2	5.4	13.5	1500	4500	220	13.1/14.3	5.7/7.3
Insulation class	Class F (155°C)									
Ingress protection (IP) rating	IP67 (for frame sizes ⩽80, direct plug), IP65 (for frame sizes 100–180, military-grade aviation plugs), and IP54 (for frame sizes 200, 263).									
Operating environment	Temperature: 0°C–+40°C (no freezing for frame sizes ⩽80), -10°C–+40°C (no freezing for frame sizes ⩾100) Humidity: ⩽90%RH (no condensation)									

4 Wiring instruction

4.1 System wiring



Note:

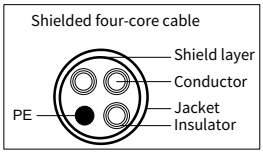
- Please make sure that the the power supply of the power grid is consistent with the input power specification indicated on the nameplate before turning on the input power supply of the drive.
- The electromagnetic contactor is used to connect and disconnect the power supply of the main circuit of the servo drive. Do not use it to start/stop the servo drive.
- If it is necessary to connect an external regenerative brake resistor, the jumper between B2 and B3 shall be removed. For details, see section 4.2 Main circuit (1PH 220V) terminal wiring. The external regenerative brake resistor must be installed on flame-resistance material which has good cooling effect, such as metal.

4.1.1 Input power cable requirements

The sizes of the input power cables must comply with local regulations.

- The input power cables must be able to carry the corresponding load currents.
- The maximum temperature margin of the input power cables in continuous operation cannot be lower than 70°C.
- The conductivity of the PE grounding conductor is the same as that of the phase conductor, that is, the cross-sectional areas are the same.
- For details about the EMC requirements, see IEC/EN 61800-3:2004.

It is recommended to use shielded four-core cables for input cables.

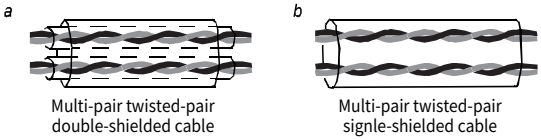


To protect the conductors, the cross-sectional area of the shielded cables must be the same as that of the phase conductors if the cable and conductor are made of materials of the same type. This reduces grounding resistance, and thus improves impedance continuity.

To effectively restrict the emission and conduction of radio frequency (RF) interference, the conductivity of the shielded cable must be at least 1/10 of the conductivity of the phase conductor. The coverage rate of shielded layer must be above 85% at least.

4.1.2 Control cable requirements

All analog control cables and cables used for frequency input must be shielded cables. Analog signal cables need to be double-shielded twisted-pair cables (as shown in figure a). Use one separate shielded twisted pair for each signal. Do not use the same ground wire for different analog signals.



For low-voltage digital signals, double-shielded cables are recommended, but shielded or unshielded twisted pairs (as shown in figure b) also can be used. For pulse input signals, however, only shielded cables can be used.

Note: A shielded twisted-pair cable must be used for a communication cable.

4.1.3 Cable diameter table of main circuit

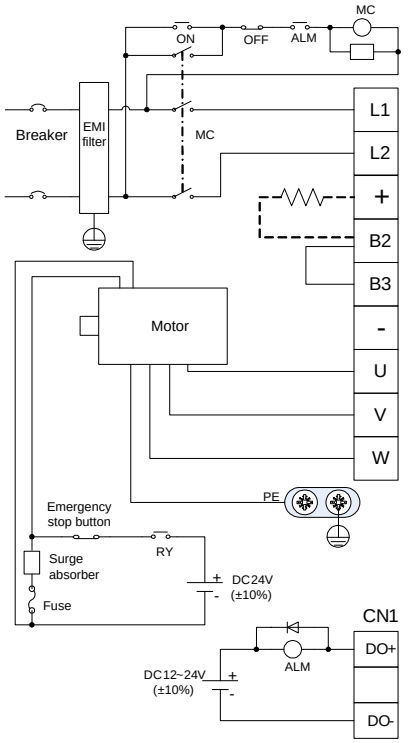
Small power range (100W–1kW)							
Drive model	Recommended cable size (mm^2)		Connectable cable size (mm^2)			Grounding screw specifications	Fastening torque (Nm)
	L1, L2, U, V, W	PE	L1, L2, U, V, W	(+), B2, B3, (-)	PE		
DA180A-E-2R8-S-2	0.5	0.5	0.5–4	0.5–4	0.5–4	M4.0	1.2–1.5
DA180A-C-2R8-S-2							
DA180A-N-2R8-S-2							
DA180A-E-6R0-S-2	1	1	1–4	1–4	1–4	M4.0	1.2–1.5
DA180A-C-6R0-S-2							
DA180A-N-6R0-S-2							

4.1.4 EMI filter model selection

Drive model	EMI filter model
DA180A-E-2R8-S-2	FLT-PS2010H-B
DA180A-C-2R8-S-2	
DA180A-N-2R8-S-2	
DA180A-E-6R0-S-2	
DA180A-C-6R0-S-2	
DA180A-N-6R0-S-2	

Note: The EMI filter models in the table are the models of our company and they are used for power input terminal.

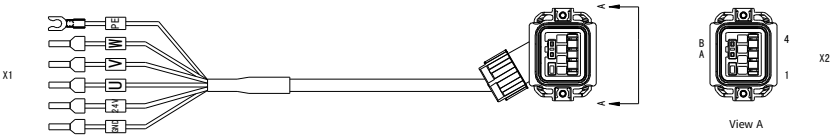
4.2 Main circuit (1PH 220V) terminal wiring



- You must make this emergency stop protection circuit.
- Add surge absorbing devices on both ends of the electromagnetic contactor winding.
- The power input voltage range: AC220V(±15%)
- Do not disconnect the short connection cable between B2 and B3, unless external regenerative brake resistor is used.
- When external regenerative brake resistor is used, disconnect the short connection cable between B2 and B3 and make connection based on the dotted lines in the diagram.
- Connect output U, V and W to the drive according to the motor cable phase sequence of servo motor, wrong phase sequence will cause drive fault
- Be sure to ground the servo drive to avoid accident of electrical shock.
- The electromagnetic brake uses 24V DC power supply which should be provided by the user. Moreover, it must be isolated from the DC12-24V power supply which is used by the control signal.
- Pay attention to the connection of the freewheeling diode. Reversed polarity may damage the drive.

4.3 Motor power cable wiring

4.3.1 Power cable for 40 frame size 50W–100W

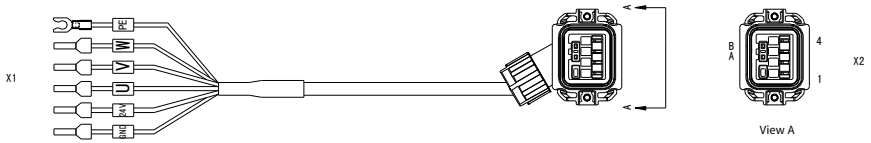


Remarks: DAML-20A-xx-XF0-00A2; applicable to IMS20B series 40/60/80 (reverse cable outlet scenario).

Wiring mapping			
Definition	**X1**	**X2**	**Core wire color**
U	Bar-type terminal	X2.2	Red

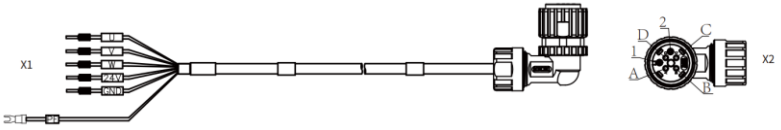
Wiring mapping			
Definition	**X1**	**X2**	**Core wire color**
V	Bar-type terminal	X2.1	White
W	Bar-type terminal	X2.3	Black
PE	U-type terminal	X2.4	Yellow/green
24V	Bar-type terminal	X2.A	Blue
GND	Bar-type terminal	X2.B	Brown

4.3.2 Power cable for 60 and 80 frame sizes 200W–750W



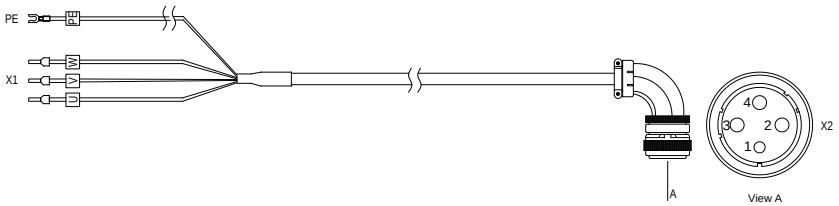
Wiring mapping			
Definition	**X1**	**X2**	**Core wire color**
U	Bar-type terminal	X2.2	Red
V	Bar-type terminal	X2.1	White
W	Bar-type terminal	X2.3	Black
PE	U-type terminal	X2.4	Yellow/green
24V	Bar-type terminal	X2.A	Blue
GND	Bar-type terminal	X2.B	Brown

4.3.3 Power cable for 100 frame size 1kW



Wiring mapping			
Definition	**X1**	**X2**	**Core wire color**
U	Bar-type terminal	X2.A	Red
V	Bar-type terminal	X2.B	White
W	Bar-type terminal	X2.C	Black
PE	U-type terminal	X2.D	Yellow/green
24V	Bar-type terminal	X2.1	Blue
GND	Bar-type terminal	X2.2	Brown

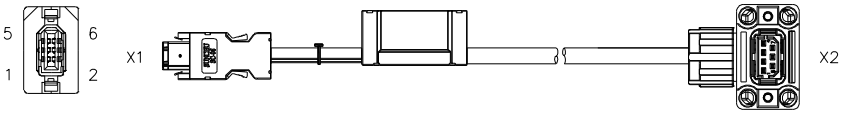
4.3.4 Power cable for 130 frame size 1kW (220V)



Wiring mapping			
Definition	**X1**	**X2**	**Core wire color**
U	Tubular terminal	X2.2	Yellow
V	Tubular terminal	X2.3	Green
W	Tubular terminal	X2.4	Red
PE	Grounding terminal	X2.1	Yellow/green

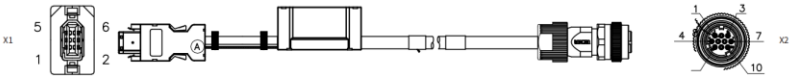
4.4 Motor and encoder cable wiring

4.4.1 Encoder cable for 60 and 80 frame sizes (17-bit and 23-bit)



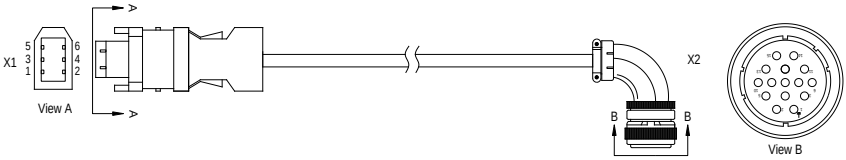
Wiring mapping			
Signal	**X1**	**X2**	**Core wire color**
SD+	X1.5	X2.1	Blue
SD-	X1.6	X2.2	Purple
5V	X1.1	X2.5	Red
GND	X1.2	X2.6	Orange
BAT+	X1.3	X2.3	Brown
BAT-	X1.4	X2.4	Black
PE	Housing	X2.7	-

4.4.2 Encoder cable for 100 frame size (17-bit and 23-bit)



Wiring mapping			
Signal	**X1**	**X2**	**Core wire color**
SD+	X1.5	X2.1	Twisted pair
SD-	X1.6	X2.2	
5V	X1.1	X2.4	Twisted pair
GND	X1.2	X2.9	
VB-3.6V	-	X2.6	Twisted pair
VB-GND	-	X2.5	
PE	Iron shell	X2.10	Woven

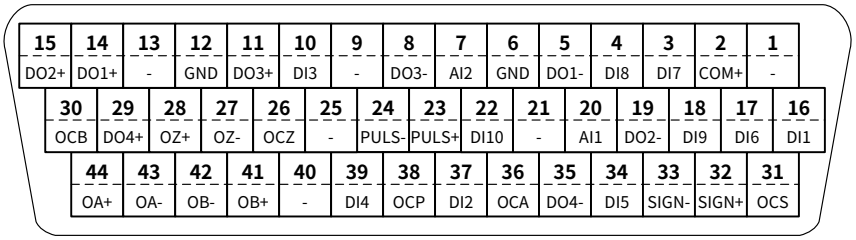
4.4.3 Encoder cable for 110 and 130 frame sizes (17-bit and 23-bit)



Wiring mapping			
Signal	**X1**	**X2**	**Core wire color**
SD+	X1.5	X2.2	Twisted pair
SD-	X1.6	X2.3	
5V	X1.1	X2.4	Twisted pair
GND	X1.2	X2.5	
VB-3.6V	-	X2.6	Twisted pair
VB-GND	-	X2.7	
PE	Iron shell	X2.1	Woven

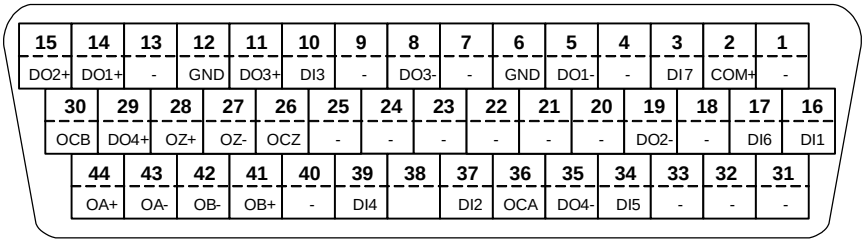
4.5 Control I/O-CN1 terminal layout

Pulse type, CANopen type interface:



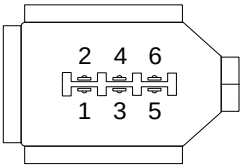
CN1 plug pins and signal codes

EtherCAT bus-type interface:



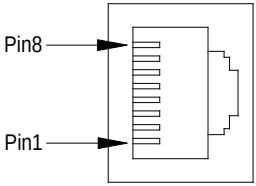
Note: For details about the terminal functions and applications, see chapter 5 Control mode application.

4.6 Encoder CN2 terminal



CN2 port function			
Pin	**Name**	**Function**	**Remarks**
1	5V	5V power supply	Different encoders use different cables
2	GND	Power ground	
3	CLK+	BISS Endat clock output+	
4	CLK-	BISS Endat clock output-	
5	SD+	Serial encoder data+	
6	SD-	Serial encoder data-	

4.7 RS485/CAN-CN3 terminal

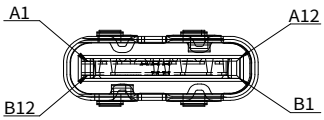


CN3 port function			
Pin	**Name**	**Function**	**Remarks**
1	CAN_H	CAN data +	485 and CAN use the same interface

CN3 port function			
Pin	**Name**	**Function**	**Remarks**
2	CAN_L	CAN data -	and each signal has two pins for multiple networking.
3	CAN_GND	CAN signal ground	
4	RS485+	RS485 data +	
5	RS485-	RS485 data -	
8	GND	RS485 GND	
6, 7	-	Unused	

Note: EtherCAT bus-type drive, this port is standard network cable port definition, namely pin 1, 2, 3 and 6 correspond to Tx+, Tx-, Rx+ and Rx- respectively.

4.8 USB-CN4 terminal

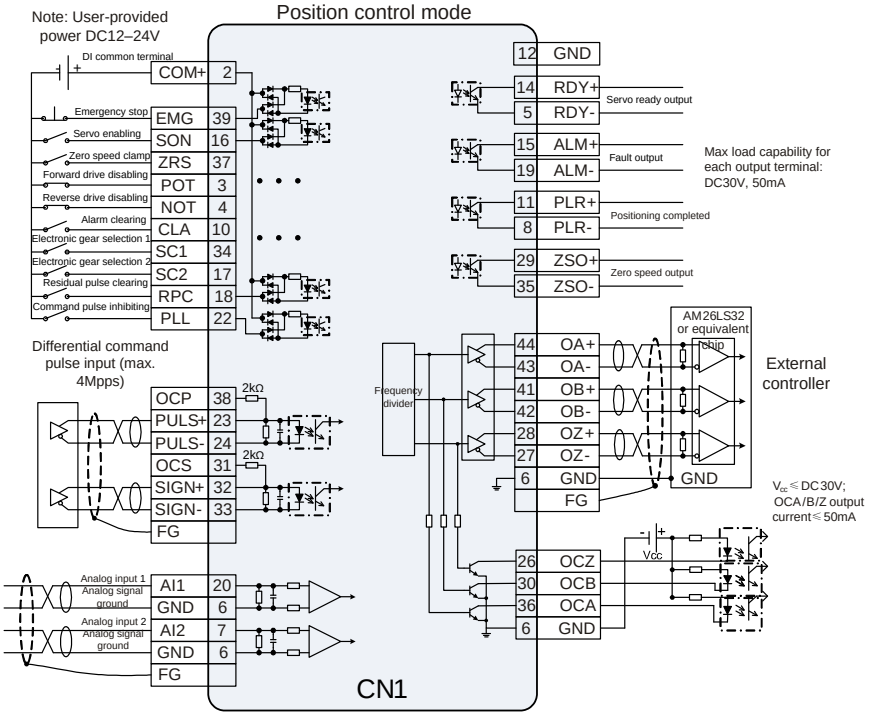


CN4 USB port function table			
Pin	**Name**	**Function**	**Remarks**
A7, B7	USB-	Data-	Standard type-c interface
A6, B6	USB+	Data+	
A1, A12, B1, B12	GND	Signal ground	
A4, B4, A5, B5, A9, B9	-	Unused	

Note: A shielded Type-C debugging cable must be used. If interference is present in the operating environment, wrap the Type-C debugging cable around a ferrite core.

5 Control mode application

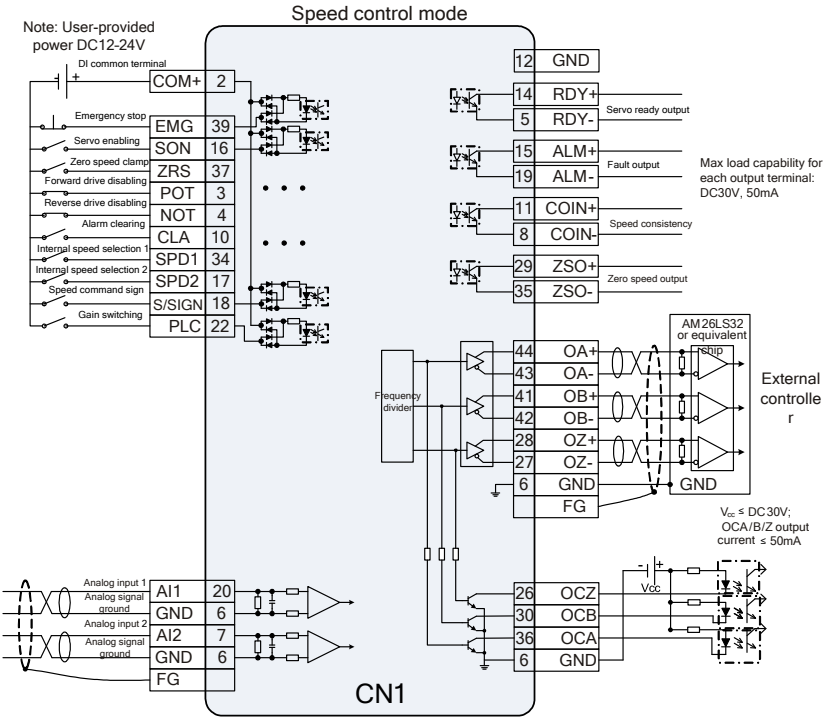
5.1 Standard wiring of position mode



Note:

1. ( ) is shielded twisted cable.
2. ( ) is user-provided power.
3. ( ) is GND, corresponding to pin 6/12.

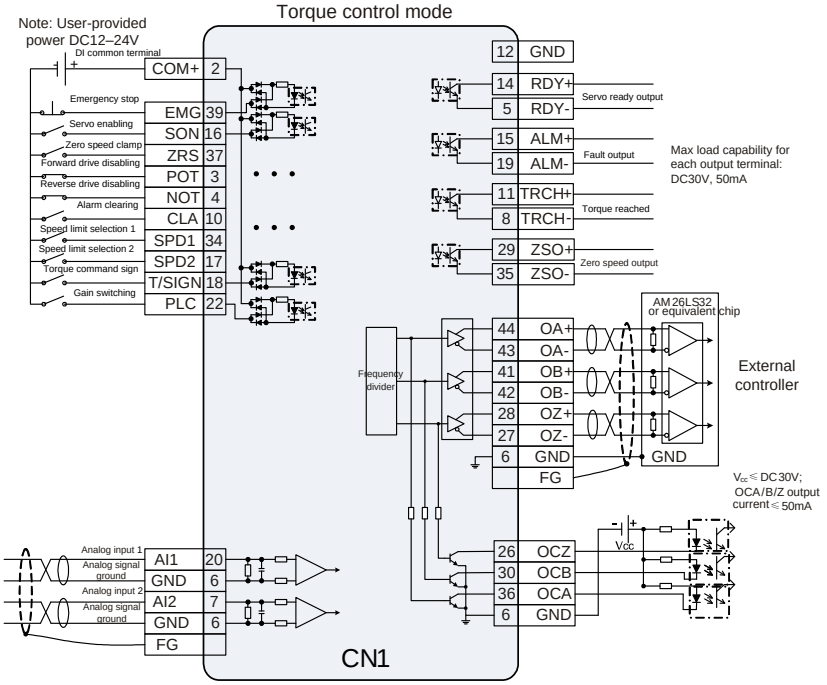
5.2 Standard wiring of speed mode



Note:

1. ( ) is shielded twisted cable.
2. ( ) is user-provided power.
3. ( ) is GND, corresponding to pin 6/12.

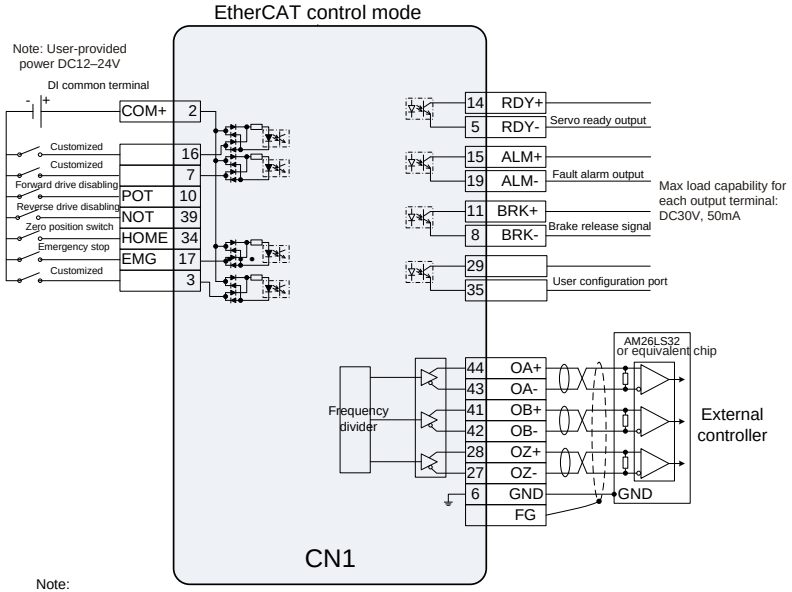
5.3 Standard wiring of torque mode



Note:

1. ( ) is shielded twisted cable.
2. ( ) is user-provided power.
3. ( ) is GND, corresponding to pin 6/12.

5.4 Standard wiring of bus mode



Note:

1. ( ) is shielded twisted cable.
2. ( ) is user-provided power.
3. ( ) is GND, corresponding to pin 6/12.

5.5 CN1 function description

5.5.1 Pins of CN1 terminal

Figure 5-1 Pulse type, CANopen type interface

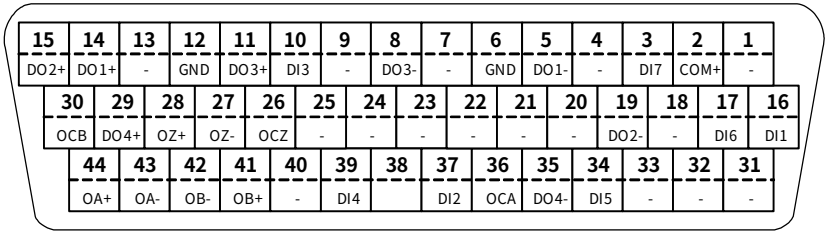
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DO2+	DO1+	-	GND	DO3+	DI3	-	DO3-	AI2	GND	DO1-	DI8	DI7	COM+	-

30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
OCB	DO4+	OZ+	OZ-	OCZ	-	PULS-	PULS+	DI10	-	AI1	DO2-	DI9	DI6	DI1

44	43	42	41	40	39	38	37	36	35	34	33	32	31
OA+	OA-	OB-	OB+	-	DI4	OCP	DI2	OCA	DO4-	DI5	SIGN-	SIGN+	OCS

CN1 plug pins and signal codes

Figure 5-2 EtherCAT bus-type interface



5.5.2 CN1 terminal definition

Table 5-1 Pulse type, CANopen type

Pin	Symbol	Function	Pin	Symbol	Function
1	-	Unused	23	PULS+	Differential command pulse +
2	COM+	Common terminal of digital input	24	PULS-	Differential command pulse -
3	DI7	Digital input 7	25	-	Unused
4	DI8	Digital input 8	26	OCZ	Z-phase open collector output
5	DO1-	Digital output 1 -	27	OZ-	Z-phase differential output -
6	GND	Signal ground	28	OZ+	Z-phase differential output +
7	AI2	Analog input 2	29	DO4+	Digital output 4 +
8	DO3-	Digital output 3 -	30	OCB	B-phase open collector output
9	-	Unused	31	OCS	Open collector command direction
10	DI3	Digital input 3	32	SIGN+	Differential command direction +
11	DO3+	Digital output 3 +	33	SIGN-	Differential command direction -
12	GND	Signal ground	34	DI5	Digital input 5
13	-	Unused	35	DO4-	Digital output 4 -
14	DO1+	Digital output 1 +	36	OCA	A-phase open collector output
15	DO2+	Digital output 2 +	37	DI2	Digital input 2
16	DI1	Digital input 1	38	OCP	Open collector command pulse
17	DI6	Digital input 6	39	DI4	Digital input 4
18	DI9	Digital input 9	40	-	Unused
19	DO2-	Digital output 2 -	41	OB+	B-phase differential output +
20	AI1	Analog input 1	42	OB-	B-phase differential output -
21	-	Unused	43	OA-	A-phase differential output -
22	DI10	Digital input 10	44	OA+	A-phase differential output +

Table 5-2 EtherCAT type

Pin	Symbol	Function	Pin	Symbol	Function
1	-	Unused	23	-	Unused
2	COM+	Common terminal of digital input	24	-	Unused
3	DI7	Digital input 7	25	-	Unused
4	-	Unused	26	OCZ	Z-phase open collector output
5	DO1-	Digital output 1 -	27	OZ-	Z-phase differential output -
6	GND	Signal ground	28	OZ+	Z-phase differential output +
7	-	Unused	29	DO4+	Digital output 4 +
8	DO3-	Digital output 3 -	30	OCB	B-phase open collector output
9	-	Unused	31	-	Unused
10	DI3	Digital input 3	32	-	Unused
11	DO3+	Digital output 3 +	33	-	Unused
12	GND	Signal ground	34	DI5	Digital input 5
13	-	Unused	35	DO4-	Digital output 4 -
14	DO1+	Digital output 1 +	36	OCA	A-phase open collector output
15	DO2+	Digital output 2 +	37	DI2	Digital input 2
16	DI1	Digital input 1	38	-	Unused
17	DI6	Digital input 6	39	DI4	Digital input 4
18	-	Unused	40	-	Unused
19	DO2-	Digital output 2 -	41	OB+	B-phase differential output +
20	-	Unused	42	OB-	B-phase differential output -
21	-	Unused	43	OA-	A-phase differential output -
22	-	Unused	44	OA+	A-phase differential output +

5.5.3 Power supply signal (based on 5.5.2)

Symbol	Pin	Name	Function
GND	6, 12	Signal ground	Analog input signal ground, namely the ground of A/B/Z frequency-division output signal
COM+	2	Common terminal of digital input	If DI is active-low (0V), COM+ connects to the positive end of external DC power (12V–24V). If DI is active-high (12V–24V), COM+ connects to the reference ground of external DC power (12V–24V).
FG	Housing	Ground of the housing	The enclosure of CN1 terminal is connected with the enclosure of the drive.

5.5.4 Configuration table for different digital modes

Table 5-3 Default configuration table of position and speed mode

Symbol	Pin	Name	Position mode			Speed mode		
			Default	Symbol	Function	Default	Symbol	Function
DI1	16	Digital input 1	0x003	SON	Servo enabled	0x003	SON	Servo enabled
DI2	37	Digital input 2	0x00D	ZRS	Zero-speed clamp	0x00D	ZRS	Zero-speed clamp
DI3	10	Digital input 3	0x004	CLA	Alarm clearing	0x004	CLA	Alarm clearing
DI4	39	Digital input 4	0x016	EMG	Emergency stop	0x016	EMG	Emergency stop
DI5	34	Digital input 5	0x019	SC1	Numerator 1 of electric gear ratio	0x00A	SPD1	Internal speed command 1
DI6	17	Digital input 6	0x01A	SC2	Numerator 2 of electric gear ratio	0x00B	SPD2	Internal speed command 2
DI7	3	Digital input 7	0x001	POT	Positive direction drive disabled	0x001	POT	Positive direction drive disabled
DI8	4	Digital input 8	0x002	NOT	Negative direction drive disabled	0x002	NOT	Negative direction drive disabled
DI9	18	Digital input 9	0x007	RPC	Residual pulses clearing	0x00E	S-SIGN	Speed command sign
DI10	22	Digital input 10	0x008	PLL	Command pulse disabled	0x006	PLC	Gain switchover
DO1	14/5	Digital output 1	0x001	RDY	Servo ready for output	0x001	RDY	Servo ready for output
DO2	15/19	Digital output 2	0x003	ALM	Fault output	0x003	ALM	Fault output
DO3	11/8	Digital output 3	0x007	PLR	Positioning completed	0x009	COIN	Speed consistent
DO4	29/35	Digital output 4	0x00D	ZSO	Zero output of speed	0x00D	ZSO	Zero output of speed

Table 5-4 Default configuration table of torque and EtherCAT mode

Signal	Pin	Name	Torque mode			EtherCAT mode		
			Default	Symbol	Function	Default	Symbol	Function
DI1	16	Digital input 1	0x003	SON	Servo enabled	0x000	-	User configurable
DI2	37	Digital input 2	0x00D	ZRS	Zero-speed clamp	0x000	-	User configurable
DI3	10	Digital input 3	0x004	CLA	Alarm clearing	0x001	POT	Positive direction drive disabled
DI4	39	Digital input 4	0x016	EMG	Emergency stop	0x002	NOT	Negative direction drive disabled
DI5	34	Digital input 5	0x00A	SPD1	Speed limit selection 1	0x017	HOME	Zero position switch
DI6	17	Digital input 6	0x00B	SPD2	Speed limit selection 2	0x016	EMG	Emergency stop
DI7	3	Digital input 7	0x001	POT	Positive direction drive disabled	0x000	-	User configurable
DI8	4	Digital input 8	0x002	NOT	Negative direction drive disabled	-	-	Not available
DI9	18	Digital input 9	0x00F	T-SIGN	Torque command signal	-	-	Not available
DI10	22	Digital input 10	0x006	PLC	Gain switchover	-	-	Not available
DO1+	14	Digital output 1 +	0x001	RDY	Servo ready for output	0x001	RDY	Servo ready for output
DO2+	15	Digital output 2 +	0x003	ALM	Fault output	0x003	ALM	Fault output
DO3+	11	Digital output 3 +	0x010	TRCH	Torque reaching	0x005	BRK	Electromagnetic brake release signal
DO4+	29	Digital output 4 +	0x00D	ZSO	Zero output of speed	-	-	User configurable

Note:

- For EtherCAT models, DI1 and DI2 can be configured to be probe 1 and probe 2. For N0 models, DI1 and DI2 are used for the probe function. If you want to reuse them for other functions, do not use the probe function simultaneously, to avoid function conflicts.
- DI1 and DI2 serve as probe inputs, supporting an input voltage range of 18V–30V with a response time of 10–30μs. For applications requiring high response time precision, triggering on the rising edge is recommended.

5.5.4.1 Function description of the digital input

Signal name	Symbol	Function number	Applicable mode		
Positive direction drive disabled	POT	0x01	P	S	T
Negative direction drive disabled	NOT	0x02	P	S	T
This function input is the drive prohibition against positive/negative direction. The concrete action is related to the setting of P3.40 [travel limit switch setting]: When P3.40 is set to 0 and positive direction input is disabled, the motor stops at the current position, only negative direction command input can be accepted. If the negative direction drive input is disabled, the motor stops at the current position, only positive direction command input can be accepted. P3.40 is 1, the function is invalid; When P3.40 is set to 2, and prohibition of positive/negative drive input is valid, the drive alarms.					

Signal name	Symbol	Function number	Applicable mode		
Servo enabled	SON	0x03	P	S	T
This function indicates the control signal of the servo enabling/disabling. If it is valid, the drive will provide power to the motor; if invalid, the drive will cut off connection.					

Signal name	Symbol	Function number	Applicable mode		
Alarm clearing	CLA	0x04	P	S	T
This function indicates the control signal of alarm clearing when the drive alarms. Some alarms cannot be cleared by this function. Please refer to chapter 10 Fault handling for detailed information.					

Signal name	Symbol	Function number	Applicable mode		
Control mode switchover	MCH	0x05	P	S	T
This function indicates the control signal of mode switching when P0.03 is 3, 4 and 5. When the control mode is 0, 1, 2, 6 and 7 the function input is invalid.					

Signal name	Symbol	Function number	Applicable mode		
Gain switchover	PLC	0x06	P	S	T
This function indicates the control signal of 1st and 2nd gain switching.					

Signal name	Symbol	Function number	Applicable mode		
Residual pulses clearing	RPC	0x07	P		
This function indicates the control signal of retention pulse clearing and the detailed operation is relative to the setting of P3.45. P3.45=0 means electrical level clear. When the digital input is valid, retention pulse will be 0. P3.45=1 means rising edge clear. When the digital input triggers retention pulse clearing from the edge of 0→1, only clear once.					

Signal name	Symbol	Function number	Applicable mode		
Command pulse disabled	PLL	0x08	P		
This function indicates the control signal of stopping receiving the command pulse and the detailed operation is relative to the setting of P3.44. If P3.44 is set to 0, the function takes effect. When the digital input is valid, the drive suspends receiving command pulse input. When P3.44 is set to 1, the digital input function is invalid.					

Signal name	Symbol	Function number	Applicable mode		
Torque limit switchover	TLC	0x09	P	S	
This function indicates the control signal of 1st and 2nd torque limit switching. Please refer to the instruction of P0.09.					

Signal name	Symbol	Function number	Applicable mode		
Internal speed command 1	SPD1	0x0A		S	T
Internal speed command 2	SPD2	0x0B		S	T
Internal speed command 3	SPD3	0x0C		S	

Signal name	Symbol	Function number	Applicable mode

There are 1–8 signal selections for the internal speed command and 1–4 for the internal speed limit.

Control mode	Set value of P0.40	SPD3	SPD2	SPD1	Related parameter and set value
Speed mode	0	0	0	0	P0.46 internal speed 1
		0	0	1	P0.47 internal speed 2
		0	1	0	P0.48 internal speed 3
		0	1	1	P0.49 internal speed 4
		1	0	0	P0.50 internal speed 5
		1	0	1	P0.51 internal speed 6
		1	1	0	P0.52 internal speed 7
		1	1	1	P0.53 internal speed 8
Torque mode	0	0	0	0	P0.46 speed limit 1
		0	0	1	P0.47 speed limit 2
		0	1	0	P0.48 speed limit 3
		0	1	1	P0.49 speed limit 4

Signal name	Symbol	Function number	Applicable mode		
Zero-speed clamp	ZRS	0x0D		S	T

This function indicates the control signal of zero-speed clamp. The detailed action is associated with the setting of P0.58 [Zero speed clamp mode]. For details, see the description for P0.58.

Signal name	Symbol	Function number	Applicable mode		
Speed command sign	S-SIGN	0x0E		S	

This function indicates the sign selection of speed command input in the speed control mode.
If P0.41 is 1, the input function is valid, and when the setting is 0, the function is invalid.

Signal name	Symbol	Function number	Applicable mode		
Torque command sign	T-SIGN	0x0F			T

This function indicates the sign selection of torque command input in the torque control mode.
If P0.61 is 1, the input function is valid, and when the setting is 0, the function is invalid.

Signal name	Symbol	Function number	Applicable mode		
Internal position command 1	POS1	0x10	P		
Internal position command 2	POS2	0x11	P		
Internal position command 3	POS3	0x12	P		
Internal position command 4	POS4	0x13	P		
Internal position command 5	POS5	0x20	P		
Internal position command 6	POS6	0x21	P		
Internal position command 7	POS7	0x22	P		

These functions are the segment command selection signal (0–127) in the PTP (point-to-point) control mode. It has the same function with P5.20 [PTP trigger signa] in bus control mode. It takes effect only when parameter P0.20 [Position command selection] is set to 2.

The combination of 7 digital inputs is used to select the different PTP position of PtP0.00–PtP2.55 and the corresponding target speed, ACC/DEC time and the delay time of P5.21–P5.68.

Control mode	POS7	POS6	POS5	POS4	POS3	POS2	POS1	Related parameter and set value
Position mode	0	0	0	0	0	0	0	PtP0.01[position of step 00]
	0	0	0	0	0	0	1	PtP0.03[position of step 01]
	0	0	0	0	0	1	0	PtP0.05[position of step 02]
	0	0	0	0	0	1	1	PtP0.07[position of step 03]
	0	0	0	0	1	0	0	PtP0.09[position of step 04]
	0	0	0	0	1	0	1	PtP0.11[position of step 05]
	0	0	0	0	1	1	0	PtP0.13[position of step 06]
	0	0	0	0	1	1	1	PtP0.15[position of step 07]
	0	0	0	1	0	0	0	PtP0.17[position of step 08]
	0	0	0	1	0	0	1	PtP0.19[position of step 09]
	0	0	0	1	0	1	0	PtP0.21[position of step 10]
	0	0	0	1	0	1	1	PtP0.23[position of step 11]
	0	0	0	1	1	0	0	PtP0.25[position of step 12]
	x	x	x	x	x	x	x	xxx
	1	1	1	1	1	1	0	PtP2.53[position of step 126]
	1	1	1	1	1	1	1	PtP2.55[position of step 127]

Signal name	Symbol	Function number	Applicable mode		
External fault	EXT	0x14	P	S	T

This function indicates the signal of external input fault alarm.

If the digital input is valid, the drive will report Er10-3 and stop.

Signal name	Symbol	Function number	Applicable mode		
Inertia ratio switchover	JC	0x15	P	S	T
This function indicates the control signal of inertia ratio switching between 1st inertia ratio and 2nd inertia ratio. When the digital input is valid, the internal software uses P1.02; and when invalid, use P1.01.					

Signal name	Symbol	Function number	Applicable mode		
Emergency stop	EMG	0x16	P	S	T
This function indicates the control signal of emergency stop. If P3.41 is set to 0 and when the digital input is valid, the drive will stop to report Er10-4.					

Signal name	Symbol	Function number	Applicable mode		
HOME switch input	HOME	0x17	P		
This function indicates the input signal of HOME SWITCH. When the drive carries out HOME action, in some HOME mode, if the digital input is detected to be valid, HOME action is finished. See P5.10 for details.					

Signal name	Symbol	Function number	Applicable mode		
Triggering homing	HTRG	0x18	P		
This function indicates the trigger control signal of HOME function, and the rising edge is valid. This digital input has no relation with bus control. P5.15 [Homing trigger command] has the same function.					

Signal name	Symbol	Function number	Applicable mode		
Numerator 1 of electric gear ratio	SC1	0x19	P		
Numerator 2 of electric gear ratio	SC2	0x1A	P		
The function is the selection signal of the electric gear ratio, up to 4 groups of electric gears can be switched. Before using the function, it is necessary to set P0.22 to 0 and then set different electric gear ratio (P0.25–P0.29). **Note:** If the electric gear is switched by digital value, it is necessary to set P4.10 [Upper computer type] to 0.					

Signal name	Symbol	Function number	Applicable mode

SC1	SC2	Electronic gear ratio	
		Numerator	Denominator
0	0	P0.25	P0.26
1	0	P0.27	P0.26
0	1	P0.28	P0.26
1	1	P0.29	P0.26

Signal name	Symbol	Function number	Applicable mode		
PTP control trigger	TRIG	0x1B	P		
In the PTP control mode, it needs to be used with internal position command selection 1–4, serving as the trigger signal for switching to the target segment (rising edge effective). When in use, the target segment is first selected via Internal position command selection 1 to 4, and then the rising edge of this digital input triggers the actual switch to the selected target segment.					

Signal name	Symbol	Function number	Applicable mode		
Input switchover for vibration suppression	VS-SEL	0x1C	P		
The function is the control signal of 1st and 2nd vibration control frequency. When the digital input is valid, the internal software uses P1.38; when invalid, use P1.36.					

Signal name	Symbol	Function number	Applicable mode		
Quick stop	Q-STOP	0x1D	P	S	T
This function indicates the control signal of the fast stop of external control. When the digital input is valid, the motor decelerates to 0 from current speed at the curve set by P0.69; when the input is invalid, the motor will restore to the operation state before stop.					

Signal name	Symbol	Function number	Applicable mode		
PTP control stop	PTP-ST	0x1E	P		
This function indicates the control signal of stopping PTP operation in the PTP control mode. In the bus control mode, it has the same function with P5.20 when it is 2048.					

Signal name	Symbol	Function number	Applicable mode		
Absolute position clearing	PCLR	0x1F	P		

Signal name	Symbol	Function number	Applicable mode		
This function is used to clear the multi-turn absolute encoder. When this digital input is valid, the multi-turn data of the encoder will be cleared while the single-turn data remains unchanged, however, the absolute position feedback of the system will be cleared.					

Signal name	Symbol	Function number	Applicable mode		
Forward jogging	FJOG	0x23	P		
This function indicates the forward jogging. When this digital input is valid, forward jogging operation will be applied.					

Signal name	Symbol	Function number	Applicable mode		
Reverse jogging	RJOG	0x24	P		
This function indicates the reverse jogging. When this value is valid, reverse jogging operation will be applied.					

Signal name	Symbol	Function number	Applicable mode		
High/low speed switching of jogging	JOGC	0x25	P		
This function indicates the high/low speed switching of jogging. When this digital input is valid, high speed jogging will be applied.					

Signal name	Symbol	Function number	Applicable mode		
JOG function of the terminal	DJOG	0x2C	P		
When this digital input is valid, JOG function of the terminal is valid.					

Signal name	Symbol	Function number	Applicable mode		
Gantry synchronization input clear	GIN	0x2D	P		
When this digital input is valid, gantry synchronous is removed.					

Signal name	Symbol	Function number	Applicable mode		
Master gantry synchronization alignment sensor	GSM	0x2E	P		
Master gantry synchronization alignment sensor.					

Signal name	Symbol	Function number	Applicable mode		
Slave gantry synchronization alignment sensor	GSS	0x2F	P		
Slave gantry synchronization alignment sensor.					

Signal name	Symbol	Function number	Applicable mode		
Dynamic braking relay feedback	DBS	0x30	P	S	T
When this digital input is valid, the dynamic braking relay will be closed.					

Signal name	Symbol	Function number	Applicable mode		
Manual and automatic switching of turret	DAT	0x31	P		
When this digital input is valid, the turret is manual mode.					

Signal name	Symbol	Function number	Applicable mode		
Forward jogging of turret	DFJ	0x32	P		
When this digital input is valid, the turret is forward jogging.					

Signal name	Symbol	Function number	Applicable mode		
Reverse jogging of turret	DRJ	0x33	P		
When this digital input is valid, the turret is reverse jogging.					

Signal name	Symbol	Function number	Applicable mode		
Magnetic pole detection	PDET	0x34	P		
If this digital input is valid, the magnetic pole is checked.					

5.5.4.2 Function description of the digital output

Signal name	Symbol	Function number	Applicable mode		
Servo ready for output	RDY	0x01	P	S	T
This function indicates the state signal of the drive. When valid, the drive can be enabled and provide power to the motor and when invalid, the drive gives no response to the command.					

Signal name	Symbol	Function number	Applicable mode		
Servo run output	RUN	0x02	P	S	T
This function indicates the state signal of the enabled drive. When valid, the motor is power on.					

Signal name	Symbol	Function number	Applicable mode		
Fault output	ALM	0x03	P	S	T
The function is the state signal when the drive displays the fault alarm. When it is valid, a fault occurs to the drive.					

Signal name	Symbol	Function number	Applicable mode		
Electromagnetic brake release signal	BRK	0x05	P	S	T
The function is the control release signal of output motor brake. When it is valid, the control brake is released and then it receives the motor control command; when invalid, the control brake will be disconnected.					

Signal name	Symbol	Function number	Applicable mode		
Position command validity	PCMD	0x06	P		
The function is the state signal of whether there is position command or not. When it is valid, the motor is controlled by the non-zero position command.					

Signal name	Symbol	Function number	Applicable mode		
Positioning completed	PLR	0x07	P		
The function is the state signal of positioning finished. When it is valid, the positioning is finished.					

Signal name	Symbol	Function number	Applicable mode		
Control mode switchover status	MCHS	0x08	P	S	T
This function indicates the state signal during control mode switching in output compound control mode. When it is valid, control mode 1 is switched to mode 2; if the function output is invalid, the control mode 2 is switched back to mode 1.					

Signal name	Symbol	Function number	Applicable mode		
Speed consistent	COIN	0x09	P	S	T
The function is the state signal of speed consistent. When it is valid, the deviation between current speed feedback and speed command is in the range of P3.53.					

Signal name	Symbol	Function number	Applicable mode		
Speed reached	SR	0x0A	P	S	T
The function is the state signal of output speed reaching. When it is valid, the current speed feedback is in the setting value of P3.54.					

Signal name	Symbol	Function number	Applicable mode		
Speed being limited	SL	0x0B	-	-	T
The function is the state signal of speed limiting. When it is valid, in the torque mode, if the current torque does not reach the torque command, the speed feedback is in the speed limiting.					

Signal name	Symbol	Function number	Applicable mode		
Speed command validity	SCMD	0x0C	P	S	T
The function is the state signal of whether there is speed command or not. When it is valid, non-zero speed command controls the motors.					

Signal name	Symbol	Function number	Applicable mode		
Zero output of speed	ZSO	0x0D	P	S	T
The function is the state signal of whether the current speed feedback is 0.					

Signal name	Symbol	Function number	Applicable mode		
Torque being limited	LM	0x0E	P	S	T
The function is the state signal of torque limiting. When it is valid, it means current torque output has reached the max. torque limit setting.					

Signal name	Symbol	Function number	Applicable mode		
Zeroing completed	HEND	0x0F	P		
The function is the state signal of zero completed. When it is valid, the drive has finished returning to zero and found zero position successfully.					

Signal name	Symbol	Function number	Applicable mode		
Torque reaching	TRCH	0x10	-	-	T
The function is the state signal of output torque reaching. When it is valid, the deviation between current torque output and torque command will be in the setting range of P3.59; there is 5% detection retention.					

Signal name	Symbol	Function number	Applicable mode		
PTP arrival	PTPF	0x16	P	-	-
This function indicates the output PTP arrival signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 1	PTPO1	0x17	P	-	-
This function indicates the output PTP output 1 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 2	PTPO2	0x18	P	-	-
This function indicates the output PTP output 2 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 3	PTPO3	0x19	P	-	-
This function indicates the output PTP output 3 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 4	PTPO4	0x1A	P	-	-
This function indicates the output PTP output 4 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 5	PTPO5	0x1B	P	-	-
This function indicates the output PTP output 5 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 6	PTPO6	0x1C	P	-	-
This function indicates the output PTP output 6 signal.					

Signal name	Symbol	Function number	Applicable mode		
PTP output 7	PTPO7	0x1D	P	-	-
This function indicates the output PTP output 7 signal.					

Signal name	Symbol	Function number	Applicable mode		
Gantry synchronization output clear	GSC	0x1E	P	-	-
This function is to output the clearance signal of gantry synchronization.					

Signal name	Symbol	Function number	Applicable mode		
Dynamic braking relay control	DBRC	0x1F	P	S	T
This function indicates the output dynamic brake relay control signal.					

5.5.5 Pulse input signals and functions

Symbol	Pin	Name	Function
OCP	38	Position command pulse input 1	In the position control mode, act as the position command input terminal. In other control mode, the terminal is invalid. Allowed Max. input pulse frequency: 4MHz in differential motion mode, 200kHz in open-collector mode.
PULS+	23		
PULS-	24		
OCS	31	Position command pulse input 2	
SIGN+	32		
SIGN-	33		

5.5.6 Analog input signals and functions

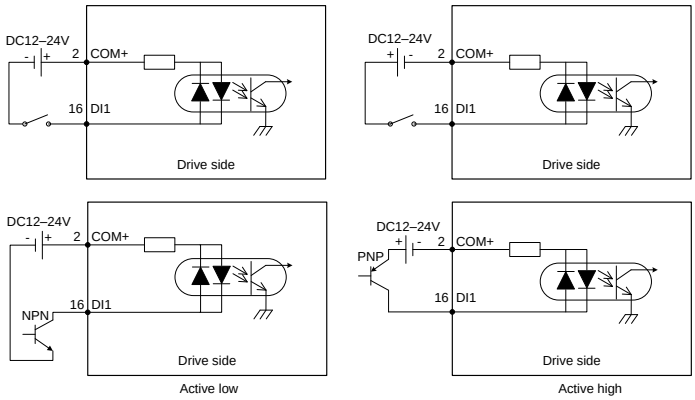
Symbol	Pin	Name	Default	Function	Function
AI1	20	Analog input 1	0x03	Speed command	The accuracy of two analog inputs is 12 bits. External analog input terminals. The input impedance is 13kΩ. The input voltage range is -10V–+10V. A voltage exceeding ±11V may damage the drive. The range and offset setting and function definition can be set.
AI2	7	Analog input 2	0x04	Torque command	
GND	6, 12	Signal ground	-	-	

5.5.7 Encoder output signals and functions

Symbol	Pin	Name	Function
OA+	44	A phase output	Output the frequency divided encoder signal, comply with the standard of TIA/EIA-422-B. The output phase A pulse and phase B pulse is still quadrature. When it rotates forward, phase A leads phase B by 90°. When it rotates in reverse, phase B leads phase A by 90°. Frequency division and frequency multiplication with any integer and decimal fraction is allowable. The output signals have no isolation.
OA-	43		
OB+	41	B phase output	
OB-	42		
OZ+	28	Z phase output	
OZ-	27		
OCA	36	A phase output	Output the open-collector signal of phase A, without isolation.
OCB	30	B phase output	Output the open-collector signal of phase B, without isolation.
OCZ	26	Z phase output	Output the open-collector signal of phase Z, without isolation.

5.6 CN1 wiring instruction

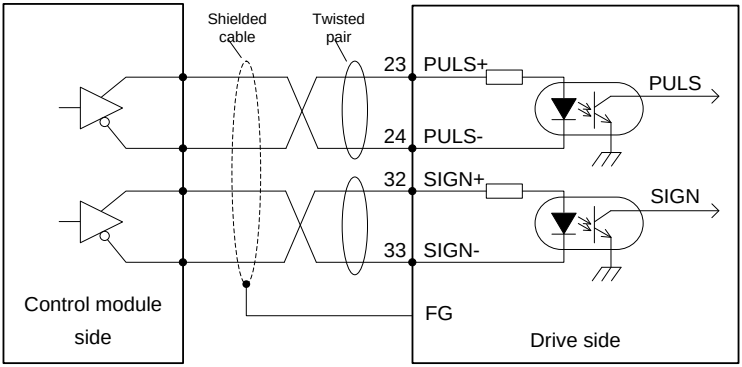
5.6.1 Wiring of digital input circuit



- The digital input power is user provided.
- The digital input circuit has two connection methods: a mechanical switch connection as shown in the figure and an open collector connection for triodes (NPN and PNP types, but the two cannot be mixed).

5.6.2 Wiring of the pulse input circuit

5.6.2.1 Wiring method 1: Differential mode

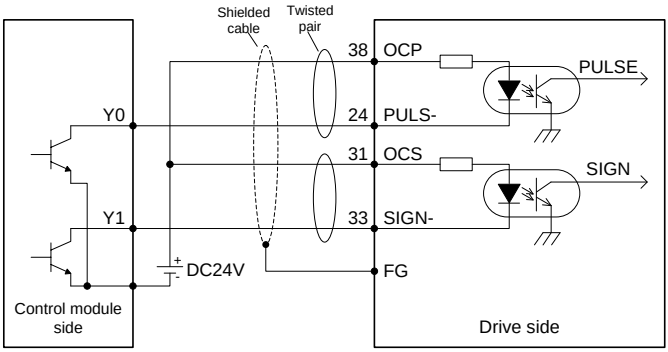


Note:

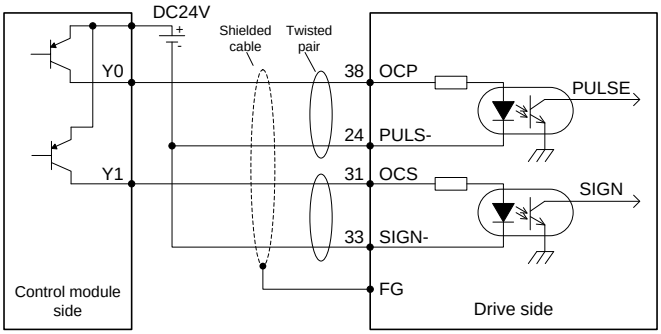
- The wiring method shown in the above figure can only be applied to 5V differential, 12–24V single-ended collector can not be wired according to the above diagram, otherwise the circuit damage may be caused.
- The maximum frequency of input pulse is 4MHz and the input signal voltage is ±5V.
- With the superior anti-noise capability, this signal transmit method is recommended as the preferred.
- The shielded twisted-pair cables must be used and the length should be less than 3m.

5.6.2.2 Wiring method 2: Open-collector mode 24V

The control module is NPN type (common cathode):



The control module is PNP type (common anode):

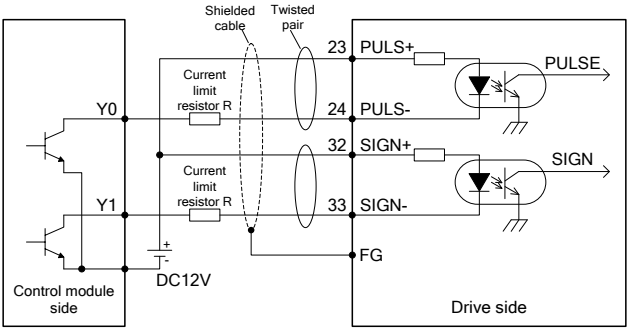


Note:

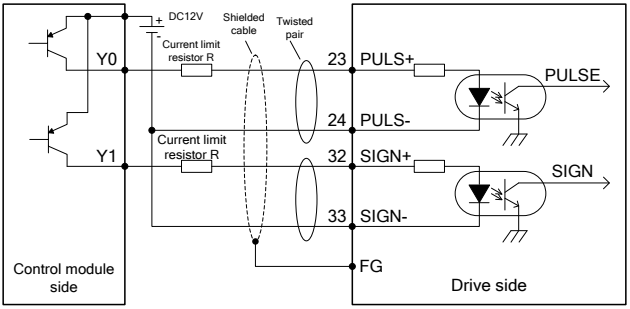
- The max. input pulse frequency is 200kHz.
- You need to connect an external 24V power supply. There is no need to connect a current-limiting resistor.
- Generally, most of Japanese PLC is NPN type, while most of European PLC is PNP type.
- The shielded twisted-pair cables must be used and the length should be less than 3m.

5.6.2.3 Wiring method 3: Open-collector mode 12V

The control module is NPN type (common cathode):



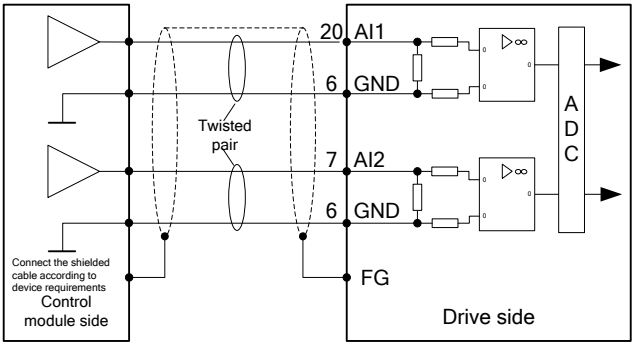
The control module is PNP type (common anode):



Note:

- The max. input pulse frequency is 200kHz.
- When you use an external 12V power supply, be sure to connect the current-limiting resistor R in series according to the above diagram. Otherwise, the internal circuit will be burnt down. R resistance is 1kΩ, and the power is not less than 1/4W.
- The shielded twisted-pair cables must be used and the length should be less than 3m.

5.6.3 Wiring of the analog input circuit

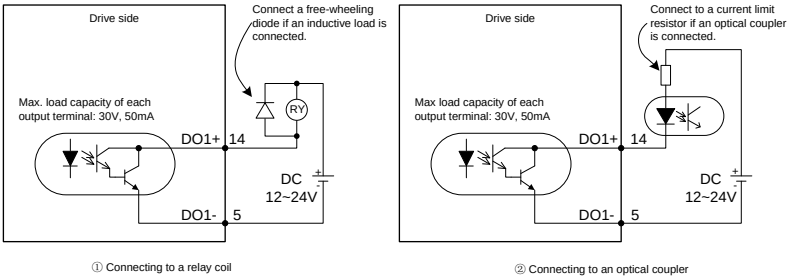


Note:

- There are two analog input circuits, AI1 and AI2, both of which are accurate to 12 bits.
- The input impedance is 13kΩ. The input voltage range is -10V–+10V. If the voltage is higher than ±11V, the circuits may be damaged.

5.6.4 Wiring of digital output circuit

Wiring when using the user-provided power supply:

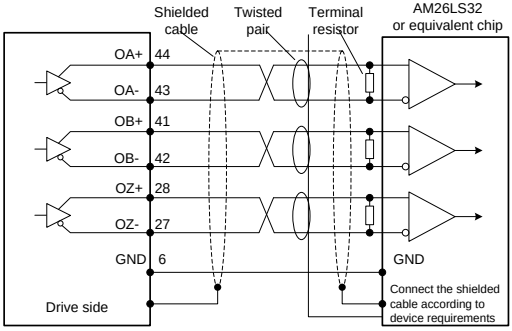


Note:

- There are four digital output circuits, all of which are open-collector output structures. They can be used to drive relay coils or optocoupler loads with the load capacity shown in the figure.
- When connecting inductive loads such as relay coils, install current-continuing diodes in the way shown in the figure. When connecting optocouplers, a current-limiting resistor must be connected; otherwise, damage to the drive may occur.

5.6.5 Wiring of frequency division output circuit of encoder feedback signal

Differential mode:



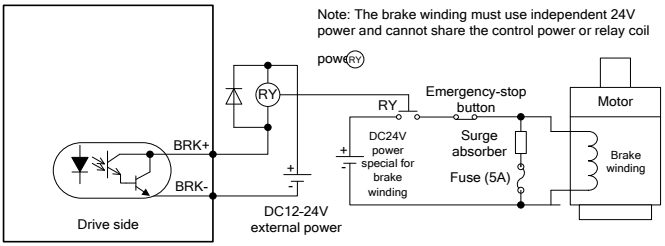
Note:

- Phase A, B and Z all provide differential output signals. It is recommended to use AM26C32 or equivalent differential receiving chip and be sure to fit a terminal matching resistor of about 220Ω.

- Output circuits have no isolation.

5.6.6 Wiring of the electromagnetic brake

If the servo drive is used in the vertical shaft applications, the electromagnetic brake can be used to stop and keep the dropping speed when servo drive is power off. The wiring diagram is:



Note:

- BRK+ and BRK- can be connected to any digital output.
- 24V power supply specific for the electromagnetic brake cannot be used with the power supply for control signal.
- (RY) is the relay coil. Please pay attention to the direction of the diode.
- The electromagnetic brake is used to keep the speed, other than stop.
- Please install the external braking devices besides the electromagnetic brake.
- Any DO output can be configured as 0x005 to use this function.

6 Operation and running

6.1 Running

6.1.1 Connect to the power

Please check following items before power on.

Category	Check item	Complete
Wiring	The power supply of the servo drive (L1 and L2) should be connect to proper techniques. See chapter 3.2 for details.	☐
	The output phase of the servo drive (U, V and W) should be the same as that of the cables of the servo motor.	☐
	There is no short circuit between the output of the servo drive (U, V and W) and the input power supply (L1 and L2).	☐
	All wiring comply with the standard wiring shown in chapter 4.	☐
	Ensure the external terminal (SON) for servo enabling is set to OFF.	☐
	Ensure the servo drive and the servo motor are grounded to properly.	☐
	When using external braking resistor, for products with small power range, the short connection cable between B2 and B3 must be removed.	☐
	Do not put voltage above DC24V on CN1.	☐
	The cable stress is within the designated range.	☐
Environment	There are no foreign objections, such as metal and other wire lead which can cause short connection of signal and power wires.	☐
Mechanical parts	The installation of the servo motor and the connection of shafts and mechanics are reliable.	☐
	The servo motor and the machines are available to run.	☐
	Do not run the motor at negative load (the direction of the output torque of the motor is contrary to the motor speed direction).	☐

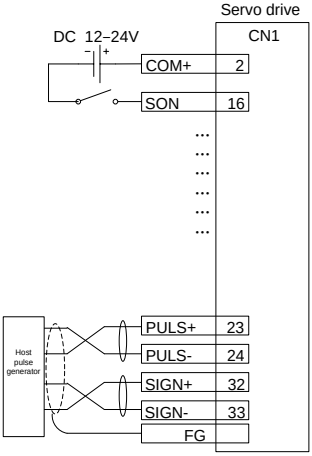
6.1.2 Trial jogging

Trial jogging can check whether the servo drive and the servo motor are intact and conduct preliminary debugging of the system including the servo drive, servo motor and peripheral equipment. Run the servo motor by JOG operation after ensuring that the wiring is correct and there is no fault alarm and no abnormal running, See section 5.2 Display and operation for detailed instructions. Before jog running, ensure:

- The motor isn't in running state. If the motor is running, JOG operation is invalid.
- The load inertia shouldn't exceed 15 times of the motor inertia. Otherwise it may cause serious mechanical vibration.
- The jog speed can be set via parameter P0.05.
- The accelerating/decelerating time during jogging can be set via parameters P0.54, P0.55, P0.56 and P0.57.

6.1.3 Running in position control mode

Simple wiring:



Parameter	Function	Set value
P0.03[1]	Control mode selection	0
P0.22[1]	Pulse number per motor resolution	Set according to the actual situation
P0.23[1]	Pulse input form	Set according to the actual situation
P0.24[1]	Reverse of pulse input direction	0

Step 1 Complete the connection between the drive and the servo motor.

Step 2 Set P0.03 to "0" (position control mode).

Step 3 Confirm the pulse output of the upper controller and adjust P0.23. Keep the pulse type the same with that of the upper controller. Please refer to the instruction of P0.23.

Step 4 Disconnect the control power supply after the modification of P0.03, P0.23 and then power on again.

Step 5 Connect the CN1 to the drive and power on, and ensure that SON and 24V GND are connected. Then the servo enters into the locking state.

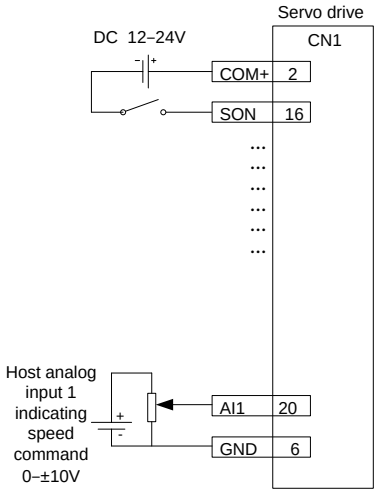
Step 6 Send the low frequency pulse command from the upper controller and rotate the motor at low speed.

Step 7 Ensure the rotating direction of the motor is as the designated. The direction can be modified through the upper controller or operate on P0.24.

Step 8 Ensure the input pulse count complies with the design. You can set P0.22 [Pulses per motor resolution] or the electronic gear ratio parameters P0.25 and P0.26 to divide or multiply frequency. See the description for P0.22, P0.25 and P0.26 for details.

6.1.4 Running at the speed control mode

Simple wiring:



Parameter	Function	Set value
P0.03[1]	Control mode selection	1
P0.40	Speed command selection	1
P3.26	Function of AI 1	3
P0.42	Analog input 1 gain	500
P3.20	Offset of analog input 1	Set according to the actual situation

Step 1 Complete the connection between the drive and the servo motor.

Step 2 Set P0.03 to "1" (speed control mode).

Step 3 After modifying and saving parameter P0.03, it takes effect only after disconnecting and then reconnecting the control power supply.

Step 4 Set P0.40 to "1" (external analog speed command mode).

Step 5 Set P3.26 to "3", i.e. the function of analog input 1 is speed command.

Step 6 Set P0.42 to the required value. See the description for P0.42 for details.

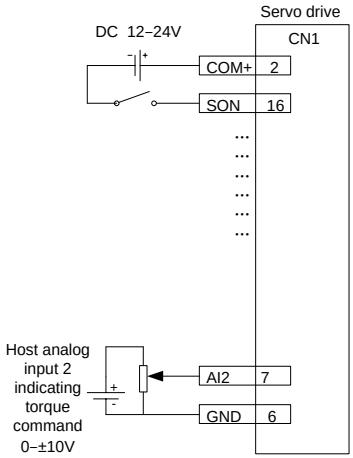
Step 7 Connect the corresponding terminals of CN1.

Step 8 Connect the CN1 to the drive and power on, and ensure that SON and 24V GND are connected. Then the servo enters into the locking state.

Step 9 The motor shaft may rotate at a low speed if there is no upper command voltage. It is necessary to adjust P3.20. Please refer to the detailed instruction of P3.20.

6.1.5 Running at the torque control mode

Simple wiring:



Parameter	Function	Set value
P0.03[1]	Mode selection	2
P0.60	Torque command selection	1
P3.27	Function of AI 2	4
P0.61	Torque command direction selection	Set according to the actual situation
P0.62	Analog input 2 gain	10
P3.23	Offset of analog input 2	Set according to the actual situation
P0.46	Speed limit 1	100

Step 1 Complete the connection between the drive and the servo motor.

Step 2 Set P0.03 to "2" (torque control mode).

Step 3 After modifying and saving parameter P0.03, it takes effect only after disconnecting and then reconnecting the control power supply.

Step 4 Set P0.60 to "1" (external analog torque command mode).

Step 5 Set P0.61 to the required value. See the description for P0.61 for details.

Step 6 Set P3.27 to "4", i.e. the function of analog input 1 is torque command.

Step 7 Set P0.62 to the required value. See the description for P0.62 for details.

Step 8 Connect the corresponding terminals of CN1.

Step 9 Connect the CN1 to the drive and power on, and ensure that SON and 24V GND are connected. Then the servo enters into the locking state.

Step 10 The motor shaft may rotate at a low speed if there is no upper command voltage. It is necessary to adjust P3.23. Please refer to the detailed instruction of P3.23.

Step 11 In the torque mode, please adjust the speed limit and set P0.46 to the required value. Please refer to the detailed instruction of P0.46. Please refer to the instruction of P0.46.

6.1.6 Parameter settings before running the servo

Parameter setting must be conducted before running the servo. Relevant parameters can be set via the panel, PC software or communication to meet the function and performance requirements of the site application. See chapter 7 Function codes for the detailed description of all parameters of the servo drive. Some of these parameters need to be set according to the site application demand. For examples, pulse input mode, electronic gear, frequency division coefficient of encoder output, upper/lower limit of analog input, etc. Some of these parameters need to be set according to the site debugging. For example, the parameters of the regulator loop which affect the system performance and other similar parameters. For most parameters the factory default values are appropriate.

Hereunder only some necessary parameters are listed:

Mode setting

The control mode (position mode, speed mode, torque mode or other compound control mode) can be set through setting parameter P0.03 according to the control requirements on the site. The mode will be valid after repowering on.

Command input

Set or enter relevant commands to control the position, speed or torque of the servo motor's shaft according to the setting of parameter P0.03.

- In the position mode: pulse command (3 kinds of input mode), internal torque limit command or external analog torque limit command.
- In the speed mode: internal speed command or external analog speed command, internal torque limit command or external analog torque limit command.
- In the torque mode: internal torque command or external analog torque command, internal speed limit command or external analog speed limit command.

6.1.7 Servo enabled

Enable the servo via the external servo enabling terminal (SON) or internal servo enabling parameter (P0.04). See the function description of terminal SON and detailed explanation of parameter P0.04 in section 7.1 Group P0 Basic control.

When servo is enabled:

- If no alarm occurs, the panel will display the default monitoring parameters.
- The fan starts to run.
- In position mode, if there is no pulse command input, the servo is in locked state.
- In the speed mode, the servo motor runs at the given speed.

- In the torque mode, if no torque is applied externally, the servo motor accelerates from zero speed to the limit speed. If the external torque is larger than the internal setting one, the servo motor maintains the state of zero speed output.
- If a servo alarm occurs, the panel will display **ErXX-X** and flicker and the servo motor will get into the inertia running state.

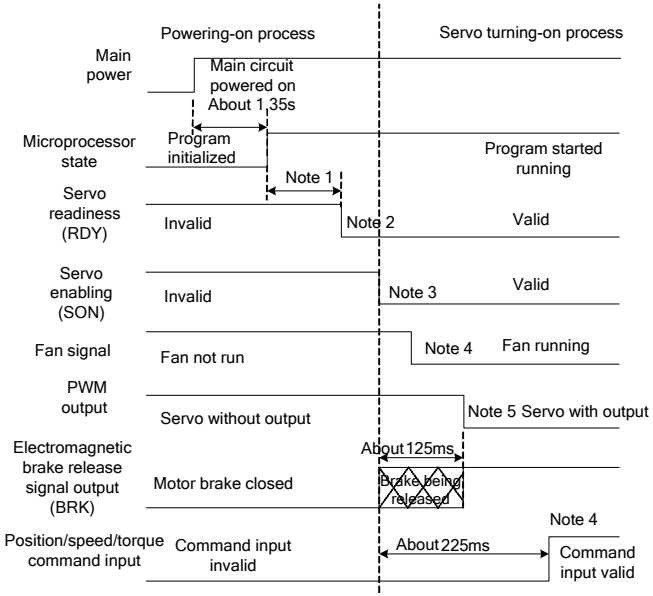
6.1.8 Servo stop/Stop running

If the servo drive is in the following conditions, the servo motor will coast to stop or stop normally. Coasting to stop means the drive cuts off output immediately, the motor coasts to stop under the action of inertia, and does not keep in locked state. Stopping means the drive outputs reverse torque to make the motor to decelerate to zero speed and, after that, the motor is in a locked state.

- When the servo enabling terminal (SON) signal is set to OFF, the servo motor will stop. Select the stopping method through setting parameter P4.30. This process will not cause regenerative braking.
- When a fault alarm occurs, the servo motor will stop. Select the stopping method of the servo motor when an alarm occurs through setting parameter P4.30. This process will not cause regenerative braking.
- When the digital input terminal configured as zero speed clamp (ZRS) is set to ON and P0.58 is at non-zero value, the servo motor stops running. When P0.58 is set to 1–3, the motor stops running based on the DEC time set by P0.55 and P0.57 in speed mode, and servo is in locked state after stop; in torque mode, the servo motor stops running immediately. Such stopping process may cause regenerative braking. If braking overload fault alarm occurred, please connect to proper external braking resistor.
- If the travel limit switch block function is invalid (parameter P3.40=0), and digital input terminal signal configured as travel limit (POT/NOT) is set to ON, P0.55 and P0.57 of the servo motor will immediately decelerate to stop based on the set value of P0.55 and P0.57. it will be in locked state after stop. If reverse running command input is generated after motor stops, the motor can run in reverse direction.
- If the emergency stop switch block function is invalid (parameter P3.41=0), and the digital input terminal configured as EMG is set to ON, the servo motor will coast to stop.
- If the duration of servo disable signal is too short (less than 500ms), PWM signal may be in off state once servo is enabled again.

6.1.9 Timing diagram

6.1.9.1 Sequence diagram of power-on and servo ON



Note 1: The delay time from microprocessor initialization completion to servo readiness output can be set through P4.54.

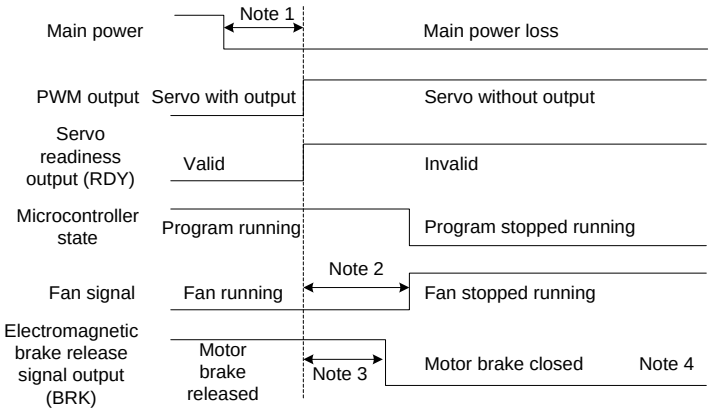
Note 2: The condition for the RDY output signal electric level to become low is: The servo has no fault and main circuit DC voltage has been established with 250V/430V (for 220V/400V series). If the main circuit DC voltage is less than 170V/310V (for 220V/400V series), the Er13-1 alarm is reported. The time interval from servo readiness to servo enabling can be user controlled.

Note 3: The servo enabling signal can be valid only when the RDY output signal is valid.

Note 4: The time interval from servo enabling to fan running is 0-1s.

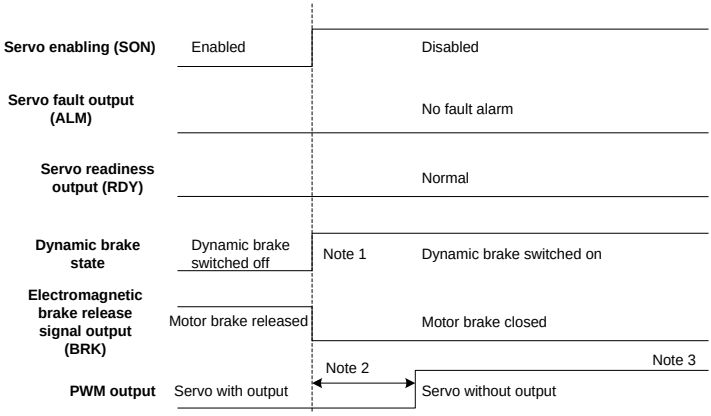
Note 5: The time interval from servo enabling to PWM output valid signal is 125ms, in which bootstrap time of about 3ms is included.

6.1.9.2 Sequence diagram of power loss during running



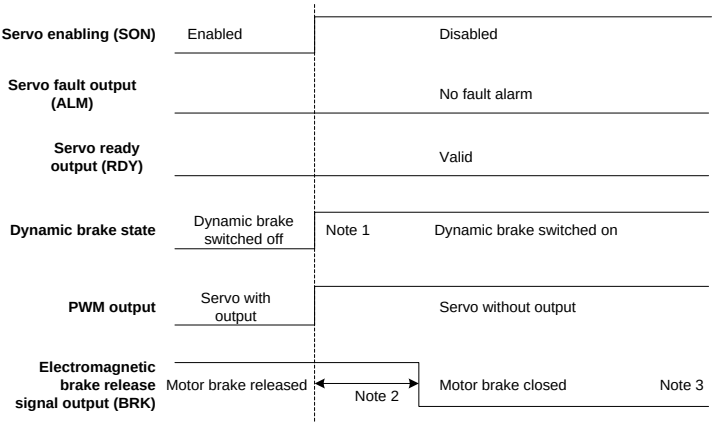
Note 1: If the voltage of the control power supply is less than 170V/330V(for 220V/400V series), the undervoltage fault will occur and the output level of the servo fault (ALM) will increase.
Note 2: If the drive temperature is less than 45 °C, the fan stops. If the module temperature is higher than 45 °C, the fan stops after the microprocessor stops.
Note 3: The output delay of the electromagnetic brake release signal can be set through P3.57. If the speed slows down under the setting of P3.58 (30r/min by default) during the time specified by P3.57, the BRK signal becomes invalid.
Note 4: The actual electrical levels corresponding to valid I/O states can be set through P3.00–P3.15.

6.1.9.3 Servo OFF sequence in a locked state



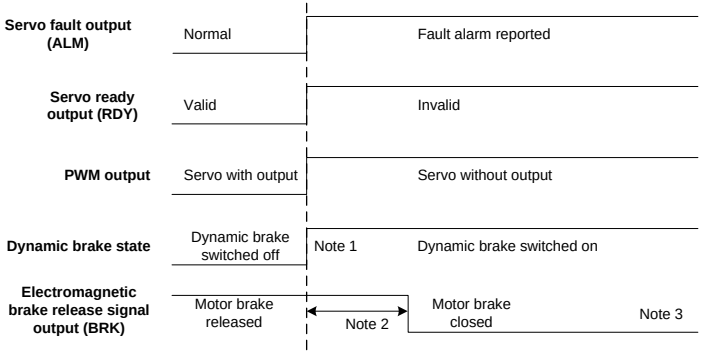
Note 1: Whether to immediately start the dynamic brake can be set through P4.30.
Note 2: The servo locking time after braking can be set through P3.56.
Note 3: The actual electrical levels corresponding to valid I/O states can be set through P3.00–P3.15.

6.1.9.4 Servo OFF sequence in running state



Note 1: Whether to immediately enable the dynamic brake can be set through P4.30.
Note 2: The output delay of the electromagnetic brake release signal is specified by P3.57. If the speed slows down under the setting of P3.58 during the time specified by P3.57, the BRK signal becomes invalid.
Note 3: The actual electrical levels corresponding to valid I/O states can be set through P3.00–P3.15.

6.1.9.5 Sequence of fault alarm



Note 1: Whether to immediately enable the dynamic brake can be set through P4.30.
Note 2: The output delay of the electromagnetic brake release signal is specified by P3.57. If the speed slows down under the setting (30r/min by default) of P3.58 during the time specified by P3.57, the BRK signal becomes invalid.
Note 3: The actual electrical levels corresponding to valid I/O states can be set through P3.00–P3.15.

6.2 Display and operation

6.2.1 Keypad display

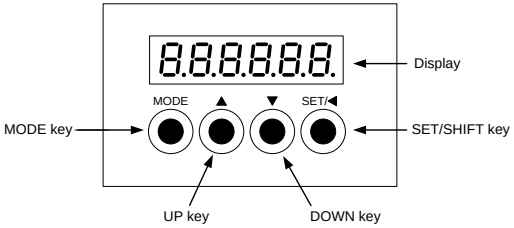


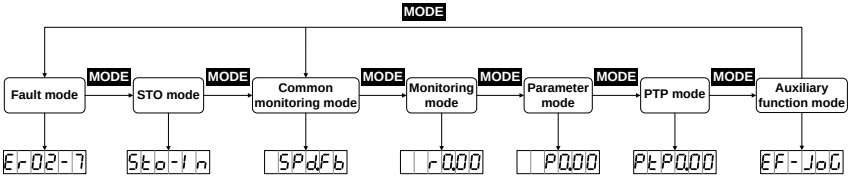
Table 6-1 LED display character (reference table)

Display	Means	Display	Means	Display	Means	Display	Means
0	0	1	1	2	2	3	3
4	4	5	5	6	6	7	7
8	8	9	9	.	.	-	-
a	a	b	b	c	c	d	d
e	e	f	f	g	g	h	h
i	i	j	j	k	k	l	l
m	m	n	n	o	o	p	p
q	q	r	r	s	s	t	t
u	u	v	v	w	w	x	x
y	y	z	z				

Table 6-2 Key description

Key	Function
MODE key: MODE	To switch between modes or return to the previous menu level
UP key: ▲	To select parameter upwards or increase value
DOWN key: ▼	To select parameter downwards or decrease value
SET/SHIFT key: SET/◀	**Press for a long time = SET** (about 0.6s): To enter next menu in parameter mode and to confirm the setting of parameter in edit mode. **Press for a short time = SHIFT:** When setting a parameter, it is used to select the position of the current digit.

6.2.2 Operation flowchart

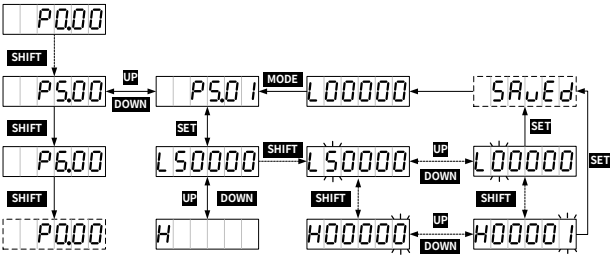


If the drive is power on, the screen will display 000000 for about 1 second, and then display 8.8.8.8.8.8. for about 1 second, after that, enter into the "General monitoring mode".

- Press **MODE** key to switch **General monitoring mode** > **Parameters mode** > **PTP mode** > **Auxiliary function mode** > **Fault mode** > **STO mode** as a cycle mode. If no fault or no STO input, the **fault mode** and **STO mode** can be ignored.
- If new fault occurs, it will switch to **Fault mode** by pressing **MODE** key. If no key is pressed in 20 seconds, it will switch to **Fault mode** automatically.
- In **General monitoring mode**, **UP/DOWN** key can be used to switch monitoring parameters. The name of parameters will display for 2.5 seconds, and then the current value will be displayed.
- In parameters mode, **SHIFT** key can be used to switch the group number and **UP/DOWN** key can be used to select the internal parameters number.
- In the parameters setting mode, pressing the **SHIFT** key to make the flickering words move left and use the **UP/DOWN** key to modify the setting value of the MSB.

- After parameters setting, pressing **SET** key to save the parameters or execute the commands.
- After parameters setting, the screen will display SAVED (for storage parameter and when P0.17 is set to 0 [individual storage]) or SUCCES (for non-storage parameter or P0.17 is set to 1 [batch storage]), and then return to the parameters mode automatically.

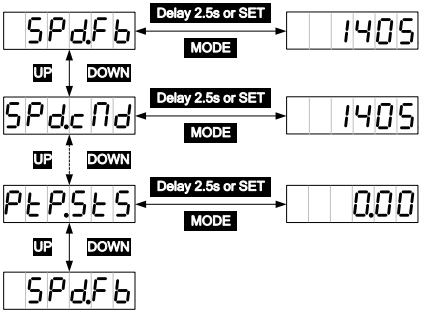
Setting of long parameters (corresponds to parameters with over 6 digits) in parameter area:



6.2.3 Common monitoring mode

After power on, the screen will enter into **Common monitoring mode**, display the parameters name for about 2.5s and then display the current value. After pressing **MODE** key, **UP**/**DOWN** key can be used to switch monitoring parameters. See section A.2 Common monitoring parameters for details. The monitoring parameters displayed by default can be set via P0.15. If no operation is carried out under interfaces other than parameter value display interface, it will return to the monitoring parameter interface in 20s.

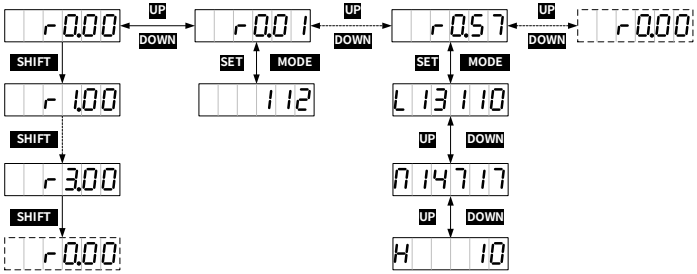
Operation flowchart:



6.2.4 Monitoring mode

MODE key can be used to switch into the monitoring mode. **SHIFT** key can be used to select the group number of the monitoring parameters, **UP**/**DOWN** can be used to select the internal parameter number and pressing for a long time, it can be used to select the parameter number quickly. After finding the target, **SET** key can be used to view the current value and **MODE** can be used to return the displaying interface. If no operation in R3 menu interface, it will return to the monitoring interface in 20 seconds. If no operation in R0 and R1 menu interface, it will stay on the displaying interface.

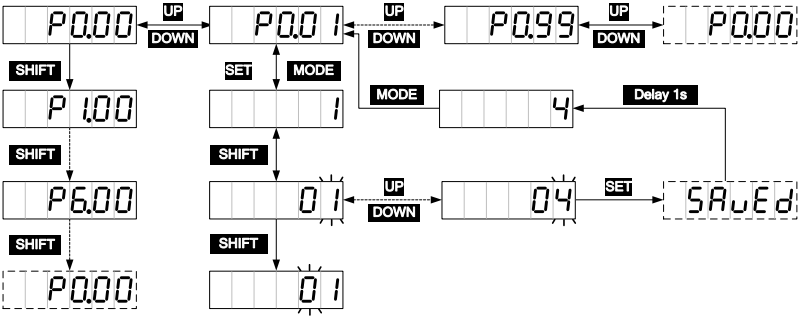
Operation flowchart:



6.2.5 Parameter setting mode instruction

MODE key can be used to switch into the parameters setting mode. **SHIFT** key can be used to select the group number of the monitoring parameters, **UP**/**DOWN** can be used to select the internal parameter number and pressing for a long time, it can be used to select the parameter number quickly. After locating a target parameter, you can press **SET** to enter the current parameter value display screen and then press **SHIFT** to enter the parameter setting screen where the parameter LSB blinks. In the setting interface, **UP**/**DOWN** key can be used to set the value, the **SHIFT** key can be used to select the setting bit. After setting is completed, press the **SET** key to save the parameters. After finishing, the screen will display SAvEd (for storage parameters and P0.17 is set to 0) or SUccES (for non-storage parameter or P0.17 is set to 1), and then return to the parameters mode automatically.

Operation flowchart:



6.2.6 Auxiliary function instruction

6.2.6.1 Auxiliary function menu

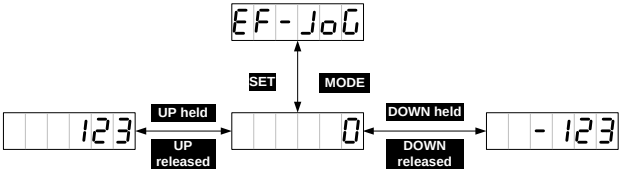
Press **MODE** to switch to the auxiliary function mode, and press **UP/DOWN** to select auxiliary functions, the auxiliary function table is shown as follows:

Sign	Name
EF-JoG	Jogging test
EF-dAF	Restore to default values
EF-PJo	Program commissioning
EF-AA1	Analog input 1 zero drift clear
EF-AA2	Analog input 2 zero drift clear
EF-AA3	Analog input 3 zero drift clear
EF-JId	Inertia identification
EF-Enc	Absolute value encoder clear

Note: The auxiliary functions can be operated only when servo is disabled, otherwise users cannot enter the auxiliary function menu.

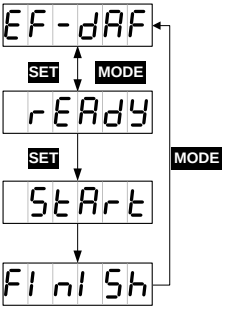
6.2.6.2 Operation flowchart of trial jogging

Press **MODE** key to switch to the auxiliary function mode. Press **UP/DOWN** key to enter the EF-JoG menu, and press and hold **SET** key to the jogging interface. The interface will display the current speed of the motor. When the **UP** key is pressed, the motor rotates in the forward direction as defined by parameter P0.02 at the jog speed set in P0.05. When the **DOWN** key is pressed, the motor reverses rotates in the reverse direction relative to the forward direction defined by P0.02 at the jog speed set in P0.05.



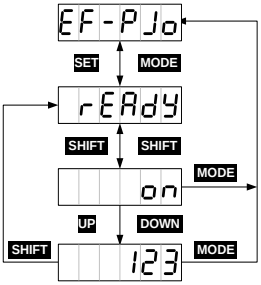
6.2.6.3 Operation flowchart of restoring the factory parameter

Press **MODE** key to switch to the auxiliary function mode. Press **UP**/**DOWN** key to enter the EF-dAF menu, and press **SET** key to enter the default parameter restoring screen, displaying rEAdY. Then you can press **SET** to restore parameters. During the restoring process, the screen displays StArt. When the process ends, the screen displays FInISh. The zero-drift clearing process for analog input 1, 2, and 3 is similar to the factory parameter restoring process.



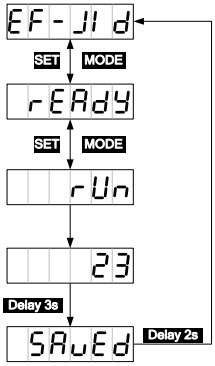
6.2.6.4 Operation flowchart of program jogging

Set the running parameters P5.00–P5.05. Press **MODE** key to switch to the auxiliary function mode. Press **UP**/**DOWN** key to enter the EF-PJo menu, and press **SET** key to enter the program jogging screen, displaying rEAdY. On the rEAdY screen, you can press **SHIFT** to switch between rEAdY and on to enable and disable program jogging. On the on screen, you can press **UP** or **DOWN** to start program jogging. The use of the **UP** or **DOWN** key is associated with P5.00. If the motor running direction is counterclockwise, the **UP** key must be used for the starting. If the motor running direction is clockwise, the **Down** key must be used for the starting. After the starting, the current rotation speed of the motor is displayed.



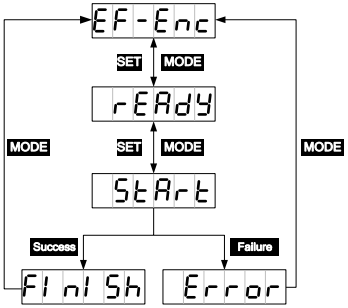
6.2.6.5 Operation flowchart of inertia identification

Press **MODE** key to switch to the auxiliary function mode. Press **UP**/**DOWN** key to enter the EF-JId menu, and press **SET** key to enter the program jogging screen, displaying rEAdy. Then you can press **SET** to enable inertia identifying. After inertia identifying is complete, the result data such as 23 is displayed about three seconds and then saved automatically. The screen returns to the parameter setting menu automatically after displaying SAuEd about two seconds.



6.2.6.6 Operation flowchart of absolute encoder clearing

If a multiturn absolute encoder is used, the homing operation for the mechanical system must be performed after the first power-on. Then you can press **MODE** to enter the auxiliary function mode, press **UP**/**DOWN** to enter the EF-Enc menu, and press **SET** to enter the absolute encoder clearing menu, which displays rEAdy. Then you can press **SET** to enable absolute encoder clearing. The screen displays StArt. If the clearing is successful, the screen displays FInISh. If the encoder type does not match or the clearing fails, the screen displays Error.



6.2.7 Alarm display

If the servo drive runs abnormally, it reports a fault alarm and stops automatically, while the LED panel displays the fault alarm symbol in the format of ErXX-X, in which XX is the main code and X is the sub code.

For details, see section A.3 Fault codes.

6.2.8 Alarm clearing

For those faults that can be cleared online, if the fault condition is removed, fault alarm display can be cleared by short connecting the digital input terminal configured as fault clearing function (P3.00–P3.09 configured as 0x004 or 0x104) with COM-. If the servo still has enabling command input, the drive will not be able to clear the fault automatically.

For the fault alarms which cannot be cleared online, it can be cleared after repower on.

7 Function codes

Applicable mode: P-position mode; S-speed mode; T-torque mode.

The definition of direction: From the angle of facing motor shaft, the counterclockwise direction is forward (CCW for short); clockwise (CW) is reverse; in terms of speed and torque reference value, positive value means position direction and negative value means negative direction.

The function codes with the superscript of "[1]" indicate that these parameters can be valid only when the system is reset and restarted or repowered after disconnection.

The function codes with the superscript of "[2]" indicate that these parameters are valid when the servo drive stops. The modification during operation is invalid.

The function codes with the superscript of "*" indicate that these parameters are not saved after power off.

Modbus communication address is decimal, the address of PROFIBUS-DP is the same with Modbus; CANopen communication address is hex and the length of 16-bit is the primary code and the length of 8-bit is the sub-code.

7.1 Group P0 Basic control

7.1.1 Basic settings

<table>
<tr><td rowspan="2">P0.00[1]</td><td rowspan="2">Motor model</td><td>Setting range</td><td>Default</td><td>Unit</td><td colspan="3">Applicable mode</td></tr>
<tr><td>0–9999999</td><td>0</td><td>-</td><td>P</td><td>S</td><td>T</td></tr>
<tr><td colspan="8">This parameter is set to 0 by default. Users must set according to motor nameplate.
If the motor model is 0, and the motor is standard communication-type encoder motor, the drive will read the motor parameters automatically.
Note: Improper parameter value will result in abnormal operation of servo system, or even lead to serious drive or motor faults. Double check whether this parameter matches with the motor before the initial power up.</td></tr>
<tr><td rowspan="2">P0.00[1]</td><td>Data size</td><td>32bit</td><td>Data format</td><td colspan="4">DEC</td></tr>
<tr><td>Modbus communication address</td><td>1000, 1001</td><td>CANopen communication address</td><td colspan="4">0x2000, 0x00</td></tr>
</table>

<table>
<tr><td rowspan="2">P0.01[1]</td><td rowspan="2">Encoder type</td><td>Setting range</td><td>Default</td><td>Unit</td><td colspan="3">Applicable mode</td></tr>
<tr><td>1–17</td><td>1*[1]</td><td>-</td><td>P</td><td>S</td><td>T</td></tr>
</table>

In most cases, if P0.00 is set correctly, the system assigns a value to this parameter. If an encoder disconnection fault is reported during power-on though the motor is connected correctly, check whether the drive supports the encoder used by the motor. For details, see section 2.1.1 Drive overview. The servo motor code contains the encoder type. For details, see the motor manual.

The mapping between encoder types and settings of P0.01 is as follows:

Motor nameplate encoder type*2	Set value	Meaning
1	1	2500-PPR standard incremental type
2	2	2500-PPR economical incremental type
3	3	17-bit single-turn absolute value
4	[4]	17-bit multi-turn absolute value*3
5	5	20-bit Nikon single-turn absolute value
6	6	20-bit Nikon multi-turn absolute value*3
7	8	16-bit rotary transformer
8	9	23-bit single-turn absolute value
9	10	23-bit multi-turn absolute value*3
10	11	17-bit Nikon single-turn absolute value
11	12	17-bit Nikon multi-turn absolute value*3
12	13	24-bit Nikon single-turn absolute value
13	14	24-bit Nikon multi-turn absolute value*3
14	15	BISS_C protocol encoder
15	16	EnDat protocol encoder
16	17	Reagle 10000-PPR encoder

*1 The encoder type varies with the motor type.

*2 See the motor manual for encoder types.

*3 If you use a multiturn encoder, change the battery only when the drive power is on, which prevents the absolute position from being lost. The standard battery is 2000 mAh and the replacement cycle is 1.5–2 years.

P0.01[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1002, 1003	CANopen communication address	0x2001, 0x00

P0.02[1]	Forward rotation of motor	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

Set the forward rotation of motor:

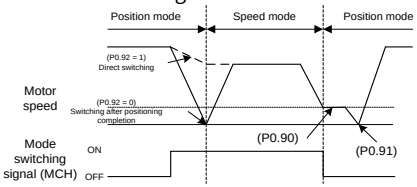
Set value	Meaning
[0]	Anticlockwise is forward rotation
1	Clockwise is forward rotation

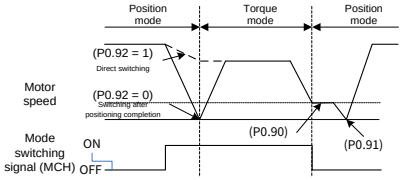
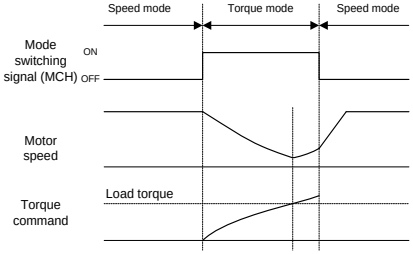
Note: Definition of forward rotation of motor. The view angle faces shaft output direction of motor.

P0.02[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1004, 1005	CANopen communication address	0x2002, 0x00

P0.03[1]	Control mode selection	Setting range	Default	Unit	Applicable mode		
		0–9	0	-	P	S	T

This parameter can be used to set the operating mode of the system:

Set value	1st working mode	2nd working mode	Description
[0]	P	-	Position mode: Control the angular displacement of servo motor via internal/external position command, thus achieving controlling over mechanical motion displacement.
1	S	-	Speed mode: Control the rotation speed of the servo motor with the internal or external speed command.
2	T	-	Torque mode: Control the torque of the servo motor with the internal or external torque command.
3	P	S	Switching between the position and speed modes: The position mode and speed mode can be switched through the control mode switching terminal.  **Note:** There are two methods (specified by P0.92) to switch from the position mode to the speed mode. In the process of switching from the speed mode to the position mode, the motor stops at the reference position specified by P0.91 before switching to the position mode.

P0.03[1]	Control mode selection	Setting range	Default	Unit	Applicable mode		
		0–9	0	-	P	S	T
4	P	T	Switching between the position and torque modes: The position mode and torque mode can be switched through the control mode switching terminal.  **Note:** There are two methods (specified by P0.92) to switch from the position mode to the torque mode. In the process of switching from the torque mode to the position mode, the motor stops at the reference position specified by P0.91 before switching to the position mode.					
5	S	T	Switching between the speed and torque modes: The speed mode and torque mode can be switched through the control mode switching terminal.  **Note:** The switching is not limited by the current working condition.					
6	-	-	Reserved				
7	CANopen	-	CANopen mode (supported by the CANopen servo)				
8	EtherCAT	-	EtherCAT mode (supported by the EtherCAT servo)				
9	MotionNet	-	MotionNet mode (supported by the MotionNet servo)				
0: OFF (The internal optical coupler corresponding to the input is not conducted.) 1: ON (The internal optical coupler corresponding to the input is conducted.)							

P0.03[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1006, 1007	CANopen communication address	0x2003, 0x00

P0.04*	Internal enabling command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter is used to control the running state of the servo drive.
The mapping between the settings of this parameter and external terminal enabling commands are as follows:

Set value	External terminal command state	Working state of servo drive
0	0 (The internal optical coupler corresponding to the input is not conducted.)	Stand-by (OFF)
0	1 (The internal optical coupler corresponding to the input is conducted.)	Enabled (ON)
1	0 (The internal optical coupler corresponding to the input is not conducted.)	Enabled (ON)
1	1 (The internal optical coupler corresponding to the input is conducted.)	Enabled (ON)

Note: If P0.04 is set to 1, but the external terminal command status is changed from 1 to 0, the drive is disabled, that is, P0.04 is changed to 0 automatically.
The method for setting this parameter on the LED panel is different from that for setting other parameters. You can use only the **SET** key to switch between 0 and 1. The **UP/DOWN** key is invalid on the screen for setting this parameter.

P0.04*	Data size	16bit	Data format	DEC
	Modbus communication address	1008, 1009	CANopen communication address	0x2004, 0x00

P0.05	Jogging speed	Setting range	Default	Unit	Applicable mode		
		0–1000	200	r/min	P	S	T

The jog speed can be set via parameter P0.05. For details about jogging, see section 6.1.2 Trial jogging. During the jogging process, the ACC/DEC time parameters (P0.54, P0.55, P0.56, and P0.57) are active, and the motor accelerates, decelerates, starts, or stops based on the settings.

P0.05	Data size	16bit	Data format	DEC
	Modbus communication address	1010, 1011	CANopen communication address	0x2005, 0x00

P0.06[1]	Numerator of frequency division output coefficient	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	10000	-	P	S	T
P0.07[1]	Denominator of frequency division output coefficient	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–(2^{31}-1)	131072	-	P	S	T

By setting the numerator and denominator of the frequency division output coefficient, the position from the encoder feedback can be frequency divided by any integer or decimal fraction and then output through the encoder pulse output signal terminals (OA+, OA-, OB+ and OB-, corresponding to pins 44, 43, 41, and 42) of the CN1 plug.

$$\text{Drive output pulses} = \frac{\text{P0.06}}{\text{P0.07}} \times \text{Encoder resolution}$$

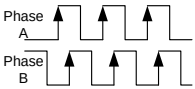
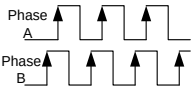
Note: In position control mode, if the encoder output signal of the upper-level servo motor is used as the position pulse command input of the current-level servo drive, that is, executing the master/slave follow-up of the start/stop type, in order to ensure high positioning accuracy of the current-level servo drive, the frequency division coefficient must be 1:1. Otherwise, the accuracy of master/slave position follow-up is affected.

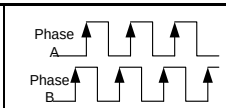
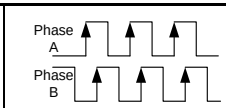
By default, P0.07 is 131072 and P0.06 is 10000, indicating the encoder pulse output terminal outputs 10000 pulse signals each time the motor rotates a circle. If P0.06 is changed to 5000, the encoder pulse output terminal outputs 5000 pulse signals in the same situation.

P0.06[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1012, 1013	CANopen communication address	0x2006, 0x00
P0.07[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1014, 1015	CANopen communication address	0x2007, 0x00

P0.08[1]	Reverse of frequency division output	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies whether to reverse the phase-B pulse logic of pulse output. Then the phase relationship between phase-A pulses and phase-B pulses can be changed.

Set value	Logic of phase B	CCW	CW
[0]	Not reverse		

	1	Reverse			

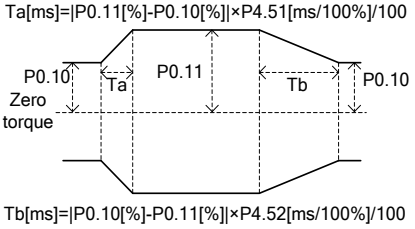
P0.08[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1016, 1017	CANopen communication address	0x2008, 0x00

P0.09	Torque limit mode setting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6	1	-	P	S	

This parameter is used to set the torque limit mode.

Set value	Forward direction	Reverse direction
0	Torque limit (analog input 0V–10V)	Torque limit (analog input -10V–0V)
[1]	Max. torque limit 1 (P0.10)	
2	Max. torque limit 1 (P0.10)	Max. torque limit 2 (P0.11)
3	TLC OFF→ Max. torque limit 1 (P0.10) TLC ON→ Max. torque limit 2 (P0.11)	
4	Forward torque limit (analog input 0V–10V)	Reverse torque limit (analog input 0V–10V)
5	Forward torque limit (analog input 0V–10V)	
6	Torque command (analog input 0V–10V)	

Note: If P0.09 is set to 3, torque switching does not take effect immediately, but limited by the settings of P4.51 and P4.52. The torque switching limit is shown in the following figure.



P0.09	Data size	16bit	Data format	DEC
	Modbus communication address	1018, 1019	CANopen communication address	0x2009, 0x00

P0.10	Max. torque limit 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–500.0	300.0	%	P	S	T

P0.11	Max. torque limit 2	Setting range	Default	Unit	Applicable mode		
		0.0–500.0	300.0	%	P	S	-

These parameters can be used to set the maximum torque of the servo motor output. Taking the rated torque of the servo motor as 100%, the setting is the percentage of the rated torque of the servo motor. If the absolute value of the torque command is larger than the value of this parameter, then the actual output torque will be limited by the parameter.

Note: These parameters are used with P0.09. In torque mode, the limit value is determined by P0.10.

P0.10	Data size	16bit	Data format	DEC
	Modbus communication address	1020, 1021	CANopen communication address	0x200A, 0x00
P0.11	Data size	16bit	Data format	DEC
	Modbus communication address	1022, 1023	CANopen communication address	0x200B, 0x00

P0.13[1]	External braking resistor power	Setting range	Default	Unit	Applicable mode		
		0–30000	200	W	P	S	T
P0.14[1]	Resistance of the external braking resistor	Setting range	Default	Unit	Applicable mode		
		1–1000	60	Ω	P	S	T

If an external brake resistor is used, the settings of the parameters must be the same as the power and resistance of the external brake resistor.

Note: Brake overload detection should be used with P4.34. If P4.34 is set to 2, the brake overload detection logic uses the external brake resistor parameters to execute fault detection. If this group of parameter does not match the power and resistance of the external brake resistor, the brake overload fault (Er07-0) may be reported by mistake or even the brake resistor may be burnt down. The regenerative brake overload protection time of the external brake resistor is in direct proportion to the two parameters and is in inverse proportion to the brake rate during actual running. The two parameters are invalid when P4.34 is not 2.

P0.13[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1026, 1027	CANopen communication address	0x200D, 0x00
P0.14[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1028, 1029	CANopen communication address	0x200E, 0x00

P0.15	Default monitoring parameters	Setting range	Default	Unit	Applicable mode		
		0–23	0	-	P	S	T

This parameter specifies the status parameters that are monitored upon power-on. For details, see section A.2 Common monitoring parameters.

P0.15	Data size	16bit	Data format	DEC
	Modbus communication address	1030, 1031	CANopen communication address	0x200F, 0x00

P0.16	Parameter modification operation locked	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter is used to lock the parameter modification function (exclude P0.16 and parameters which cannot be saved after power off) to avoid mis-operation by users.

Set value	Panel operation	Communication operation
[0]	Parameter modification valid	Parameter modification valid
1	Parameter modification invalid	Parameter modification invalid

P0.16	Data size	16bit	Data format	DEC
	Modbus communication address	1032, 1033	CANopen communication address	0x2010, 0x00

P0.17	Mode for writing to EEPROM	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies the mode for writing parameter settings that are modified through the panel to the EEPROM.

Set value	Command pulse input
[0]	Saved one by one (automatic saved after modification)
1	Bulk saving (be saved in bulk by P4.91 after modification)

P0.17	Data size	16bit	Data format	DEC
	Modbus communication address	1034, 1035	CANopen communication address	0x2011, 0x00

P0.18*	Factory password	Setting range	Default	Unit	Applicable mode		
		0–32767	0	-	P	S	T

This parameter enables you to view factory parameters and modify menus.

P0.18*	Data size	16bit	Data format	DEC
	Modbus communication address	1036, 1037	CANopen communication address	0x2012, 0x00

7.1.2 Position control

P0.20[1]	Position command selection	Setting range	Default	Unit	Applicable mode		
		0–4	0	-	P	-	-

This parameter specifies the position command source in the position, fully-closed loop, and hybrid position control modes.

Set value	Position command source
[0]	Pulse input
1	Communication bus input
2	PTP control
3	Reserved
4	Second encoder input

P0.20[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1040, 1041	CANopen communication address	0x2014, 0x00

P0.22[1]	Pulses per motor resolution	Setting range	Default	Unit	Applicable mode		
		0–(2^{31}-1)	10000	reference unit	P	-	-

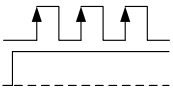
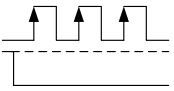
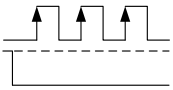
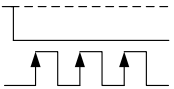
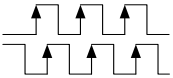
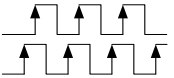
This parameter specifies the number of pulses required per motor resolution.

Note: If P0.22 is set to a non-zero value, the settings of P0.25–P0.29 are invalid. If a 17-bit or 20-bit encoder is used together, you are recommended to set a greater value to achieve higher accuracy.

P0.22[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1044, 1045	CANopen communication address	0x2016, 0x00

P0.23[1]	Pulse input form	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	-	-

This parameter specifies the pulse input mode. There are three pulse input modes available.

Set value	Pulse input form	Signal form	Diagram	
			CCW	CW
[0]	Pulse + sign	Pulse+Sign		
1	CCW/CW pulse train	CW+CCW		
2	Quadrature encoder pulse mode	QEP		

Note: The pulse direction specified by this parameter can be reversed by P0.24[1]. See P0.24[1] for details.

P0.23[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1046, 1047	CANopen communication address	0x2017, 0x00

		Setting range	Default	Unit	Applicable mode		
P0.24[1]	Reverse of pulse input direction	0–1	0	-	P		

By setting this parameter, the input pulse direction can be reversed. At this time, the actual output speed direction of the servo drive is opposite to the direction specified by P0.23[1].

Set value	Command pulse input
[0]	Pulse input direction does not change.
1	Pulse input direction is opposite to the original input direction.

P0.24[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1048, 1049	CANopen communication address	0x2018, 0x00

		Setting range	Default	Unit	Applicable mode		
P0.25	Numerator of electronic gear ratio 1	0–(2^{31}-1)	0	-	P	-	-
P0.26	Denominator of electronic gear ratio	1–(2^{31}-1)	10000	-	P	-	-

P0.27	Numerator of electronic gear ratio 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	0	-	P	-	-
P0.28	Numerator of electronic gear ratio 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	0	-	P	-	-
P0.29	Numerator of electronic gear ratio 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	0	-	P	-	-

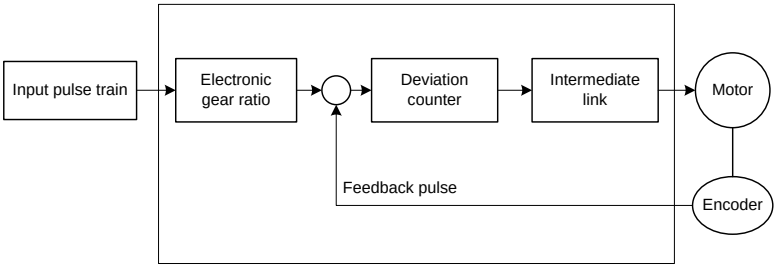
Concept of the electronic gears: For any pulse input, the quantity and frequency of pulse actually received by the drive can be changed by multiplying a certain coefficient. This coefficient is electronic gear ratio. It can be divided into two parts: numerator and denominator:

Electronic gear ratio = $g1/g2$

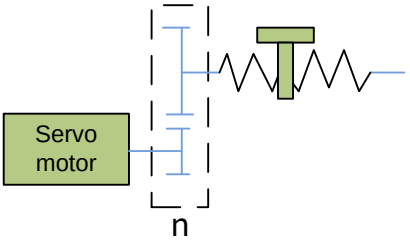
Of which, $g1$: indicates the numerator of the electronic gear ratio;

g2: indicates the denominator of the electronic gear ratio.

The following is the schematic diagram for the electronic gear ratio:



Example: The following is an example where 1 pulse is equivalent to a feed rate of 10μm.



Mechanical specifications: Feed of the ball screw Pb =10mm

DEC ratio n=3/5

Resolution of the servo motor encoder =10000

The electronic gear ratio is as follows: $\frac{g1}{g2}=\Delta\ell_0\bullet\frac{Pt}{\Delta S}=\Delta\ell_0\bullet\frac{Pt}{n\cdot Pb}=10\times10^{-3}\bullet\frac{10000}{(3/5)\cdot10}=\frac{50}{3}$

In the expression, $\Delta\ell_0$: Feed corresponding to each pulse (mm/pulse)

ΔS : Feed corresponding to each rotation motor (mm/rotation)

In this example, $g1$ = 50 and $g2$ = 3, so you can set P0.25 to 50 and P0.26 to 3.

The servo drive has four groups of electronic gear ratio. You can determine which parameters are selected from P0.25, P0.26, P0.27 P0.28, and P0.29 to make up the electronic gear ratio through the electronic gear ratio selection terminals SC1 and SC2 of the CN1 plug.

SC1	SC2	Position mode
0	0	Numerator of electronic gear ratio 1
1	0	Numerator of electronic gear ratio 2
0	1	Numerator of electronic gear ratio 3
1	1	Numerator of electronic gear ratio 4

Note:

- This group of parameters is valid only when P0.22[1] is 0.
- If SC1 and SC2 are used for electronic gear ratio switching, P4.10 must be set to 0.

P0.25	Data size	32bit	Data format	DEC
	Modbus communication address	1050, 1051	CANopen communication address	0x2019, 0x00
P0.26	Data size	32bit	Data format	DEC
	Modbus communication address	1052, 1053	CANopen communication address	0x201A, 0x00
P0.27	Data size	32bit	Data format	DEC
	Modbus communication address	1054, 1055	CANopen communication address	0x201B, 0x00
P0.28	Data size	32bit	Data format	DEC
	Modbus communication address	1056, 1057	CANopen communication address	0x201C, 0x00
P0.29	Data size	32bit	Data format	DEC
	Modbus communication address	1058, 1059	CANopen communication address	0x201D, 0x00

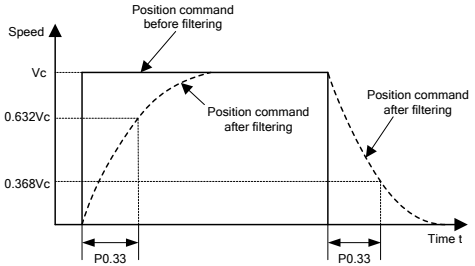
P0.30[1]	Input selection for 3PH input-type servo power supply	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter specifies the input type of a three-phase input-type servo unit power supply.							

P0.30[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1060, 1061	CANopen communication address	0x201E, 0x00

P0.31[1]	Main circuit power AC/DC input selection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T
This parameter specifies the power input type for the main circuit.							
P0.31[1]	Data size	16bit	Data format		DEC		
	Modbus communication address	1062, 1063	CANopen communication address		0x201F, 0x00		

P0.32	Sudden power-off hold time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		20–2000	36	ms	P	-	-
When the main circuit power supply of the servo unit experiences a momentary power-off, you can choose whether to continue supplying power to the motor or to cut off the power depending on the duration of the power-off.							
P0.32	Data size	16bit	Data format		DEC		
	Modbus communication address	1064, 1065	CANopen communication address		0x2020, 0x00		

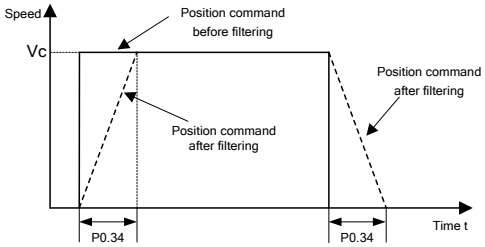
P0.33[2]	Smooth filtering of position command	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–1000.0	0.0	ms	P	-	-
This parameter is used to set the time constant of the first-order low-pass filter corresponding to the position command. This parameter is used to reduce the mechanical shock caused by sudden input pulse command frequency changes. See the figure below.							
P0.33[2]	Data size	16bit	Data format		DEC		



	Modbus communication address	1066, 1067	CANopen communication address	0x2021, 0x00

P0.34[2]	FIR filter of position command	Setting range	Default	Unit	Applicable mode		
		0.0–1000.0	0.0	ms	P	-	-

This parameter is used to set the time constant of the FIR filter corresponding to the position command. This parameter is used to reduce the mechanical shock caused by sudden input pulse command frequency changes. See the figure below.



Note: If this parameter is modified during servo running, the modification takes effect after stop.

P0.34[2]	Data size	16bit	Data format	DEC
	Modbus communication address	1068, 1069	CANopen communication address	0x2022, 0x00

P0.35	Software limit in CCW position control	Setting range	Default	Unit	Applicable mode		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This parameter specifies the software limit in CCW position control.
If P0.35 is 0 and P0.36 is 0, software limit is invalid.
Note: The software limit function is valid only when this parameter is greater than P0.36.

P0.35	Data size	32bit	Data format	DEC
	Modbus communication address	1070, 1071	CANopen communication address	0x2023, 0x00

P0.36	Software limit in CW position control	Setting range	Default	Unit	Applicable mode		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This parameter specifies the software limit in CW position control.
If P0.35 is 0 and P0.36 is 0, software limit is invalid.

Note: The software limit function is valid only when this parameter is less than P0.35.

P0.36	Data size	32bit	Data format	DEC
	Modbus communication address	1072, 1073	CANopen communication address	0x2024, 0x00

P0.37	Position command mode	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies the position command mode when P0.20 [Position command source] is set to 1, and it is invalid in other modes.

Set value	Position command mode
[0]	Incremental (The position command input is the variation relative to the current position.)
1	Absolute (The position command input is the target position.)

P0.37	Data size	16bit	Data format	DEC
	Modbus communication address	1074, 1075	CANopen communication address	0x2025, 0x00

P0.38	Fully-closed loop enable	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	-	-

This parameter specifies the enabling of the fully-closed loop function.
When it is set to 2, the switching between the fully closed and semi-closed loop function can be conducted through the IO port with function code of 0x34 or 0x134.
Note: When this parameter is set to 1 or 2, the definition of the electronic gear ratio differs under full closed-loop operation.

Set value	Fully-closed loop enable
[0]	Disable
1	Fully-closed loop enable
2	Enable switching between fully-closed loop and semi-closed loop

P0.38	Data size	16bit	Data format	DEC
	Modbus communication address	1076, 1077	CANopen communication address	0x2026, 0x00

7.1.3 Speed/Torque control

P0.40	Speed command selection	Setting range	Default	Unit	Applicable mode		
		0–5	1	-	-	S	-

This parameter specifies the command source in speed control.

Set value	Input mode	Description
0	Internal speed	P3.00–P3.09 can be used to control the internal multi-step speed (SPD1 is 0x00A, SPD2 is 0x00B, SPD3 is 0x00C). SPD3 / SPD2 / SPD1 / Parameter / Speed mode 0 / 0 / 0 / P0.46 / Internal speed 1 0 / 0 / 1 / P0.47 / Internal speed 2 0 / 1 / 0 / P0.48 / Internal speed 3 0 / 1 / 1 / P0.49 / Internal speed 4 1 / 0 / 0 / P0.50 / Internal speed 5 1 / 0 / 1 / P0.51 / Internal speed 6 1 / 1 / 0 / P0.52 / Internal speed 7 1 / 1 / 1 / P0.53 / Internal speed 8 See the descriptions for P0.46–P0.53.
[1]	Analog input	You need to set P3.26 [Function of AI 1], P3.27 [Function of AI 2] or P3.70 [Function of AI 3] to 3 [Speed command], and set associated parameters according to the actual situation.
2	Bus input	The communication bus interface can be used to receive speed commands from the upper computer. If P4.10 is 1 [Bus input], the motor speed can be changed by P4.13 [Bus speed command]. See the descriptions for P4.10 and P4.13.
3	Reserved	-
4	Reserved	-
5	Internal speed with high resolution	High resolution internal speed, precision 0.1r/min

P0.40	Data size	16bit	Data format	DEC
	Modbus communication address	1080, 1081	CANopen communication address	0x2028, 0x00

P0.41	Speed command direction setting	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	-	S	-

This parameter is used to set the forward/reverse direction when P0.40 is 0 and 1 and the speed command sign is selected as S-SIGN.

Set value	Internal speed step/analog input		Speed command sign	Speed command direction
[0]	Positive speed	0V–10V	Not work	Forward direction
	Negative speed	-10V–0V	Not work	Reverse direction
1	Not work		Valid	Forward direction
	Not work		Invalid	Reverse direction

P0.41	Data size	16bit	Data format	DEC
	Modbus communication address	1082, 1083	CANopen communication address	0x2029, 0x00

P0.42	Analog input 1 gain	Setting range	Default	Unit	Applicable mode		
		10–2000	100	[P3.26 unit]/V	P	S	T

This parameter specifies the gain of analog input 1, the gain unit is associated with P3.26.

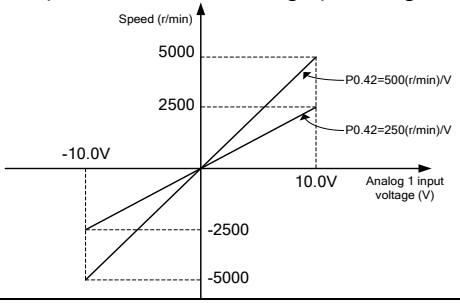
Note:

- Analog input 1 indicates the signal input from the terminals (that is, AD1 and GND, corresponding to pin 1 and pin 5) of analog input 1 of the CN1 plug.
- The voltage only in the -10V–+10V range can be applied to the connection between AD1 and GND. Otherwise, the drive may be damaged.

Application example:

1. The function of analog input 1 is speed command.
2. The voltage of analog input 1 corresponds to the conversion gain of the motor command speed.
3. When P0.40 is set to "1", this parameter is valid.
4. The relationship between the voltage of analog input 1 and speed command is as follows: Every 1V voltage corresponds to the 100 r/min speed by default.

Actual speed command = Analog input voltage x P0.42



Note:

- When P0.40 is set to "1", this parameter is valid.
- Set this parameter according to the motor working condition. If this parameter is set to a large value, the motor speed may fluctuate sharply.

P0.42	Data size	32bit	Data format	DEC
	Modbus communication address	1084, 1085	CANopen communication address	0x202A, 0x00

P0.43	Reverse of AI 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies the voltage polarity of analog input 1.

Set value	Actual detection result	
[0]	Positive polarity	[+Voltage]→[Positive value], [-Voltage]→[Negative value]
1	Negative polarity	[+Voltage]→[Negative value], [-Voltage]→[Positive value]

P0.43	Data size	16bit	Data format	DEC
	Modbus communication address	1086, 1087	CANopen communication address	0x202B, 0x00

P0.45	Dead zone of AI 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.000–3.000	0.000	V	P	S	T

If the absolute voltage value of analog input 1 falls in the range of this parameter, the corresponding command value is 0.

P0.45	Data size	16bit	Data format	DEC
	Modbus communication address	1090, 1091	CANopen communication address	0x202D, 0x00

P0.46	Internal speed 1/speed limit 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	100	r/min	-	S	T
P0.47	Internal speed 2/speed limit 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	T
P0.48	Internal speed 3/speed limit 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	T

P0.49	Internal speed 4/speed limit 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	T
P0.50	Internal speed 5	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	-
P0.51	Internal speed 6	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	-
P0.52	Internal speed 7	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	-
P0.53	Internal speed 8	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-20000–20000	0	r/min	-	S	-

The servo drive supports the 8-step internal speed commands and 4-step internal speed limits.

Control mode	Set value of P0.40	SPD3	SPD2	SPD1	Related parameter and set value
Speed mode	0	0	0	0	P0.46 internal speed 1
		0	0	1	P0.47 internal speed 2
		0	1	0	P0.48 internal speed 3
		0	1	1	P0.49 internal speed 4
		1	0	0	P0.50 internal speed 5
		1	0	1	P0.51 internal speed 6
		1	1	0	P0.52 internal speed 7
		1	1	1	P0.53 internal speed 8
Torque mode	0	0	0	0	P0.46 speed limit 1
		0	0	1	P0.47 speed limit 2
		0	1	0	P0.48 speed limit 3
		0	1	1	P0.49 speed limit 4

Note:

- SPD1, SPD2, SPD3 are the digital inputs of internal speed commands 1, 2, and 3 (corresponding to 0x00A, 0x00B, and 0x00C). 0: Off (The internal optical coupler corresponding to the input is not conducted.); 1: On (The internal optical coupler corresponding to the input is conducted.)
- The speed limits depend on the absolute values of the parameters and, the directions are the same as those in torque commands.

P0.46	Data size	16bit	Data format	DEC
	Modbus communication address	1092, 1093	CANopen communication address	0x202E, 0x00

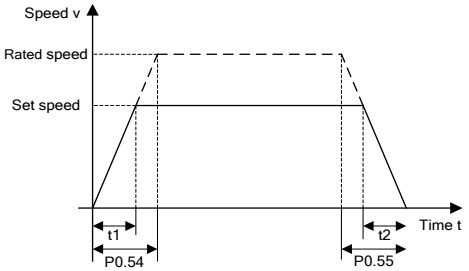
P0.47	Data size	16bit	Data format	DEC
	Modbus communication address	1094, 1095	CANopen communication address	0x202F, 0x00
P0.48	Data size	16bit	Data format	DEC
	Modbus communication address	1096, 1097	CANopen communication address	0x2030, 0x00
P0.49	Data size	16bit	Data format	DEC
	Modbus communication address	1098, 1099	CANopen communication address	0x2031, 0x00
P0.50	Data size	16bit	Data format	DEC
	Modbus communication address	1100, 1101	CANopen communication address	0x2032, 0x00
P0.51	Data size	16bit	Data format	DEC
	Modbus communication address	1102, 1103	CANopen communication address	0x2033, 0x00
P0.52	Data size	16bit	Data format	DEC
	Modbus communication address	1104, 1105	CANopen communication address	0x2034, 0x00
P0.53	Data size	16bit	Data format	DEC
	Modbus communication address	1106, 1107	CANopen communication address	0x2035, 0x00

P0.54	ACC time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000000	200	ms	-	S	-
P0.55	DEC time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000000	200	ms	-	S	-

ACC/DEC time is the time taken to accelerate from 0 r/min to the rated (3000 r/min by default) speed in the given command or decelerates from the rated speed to 0 r/min. If the given speed is not equal to the rated speed, the actual ACC/DEC time is the set ACC/DEC time multiplied by the ratio of the given speed to the rated speed. If the speed command is negative, the absolute value is used to calculate the ACC/DEC time.

Example: If the given speed is 2000 r/min, the rated speed is 3000 r/min, and the ACC/DEC time (P0.54/P0.55) is set to 1500, then the actual ACC time t1 is 1500×(2000/3000)=1000ms and the DEC time t2 is 1500×(2000/3000)=1000ms.

See the following figure:

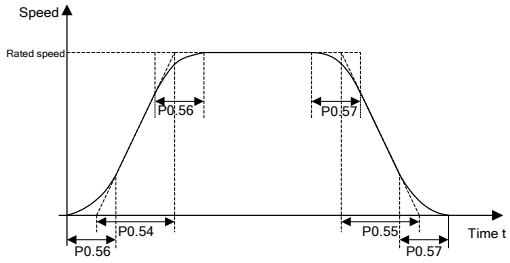


Note: ACC/DEC time can be used in the speed mode only.

P0.54	Data size	16bit	Data format	DEC
	Modbus communication address	1108, 1109	CANopen communication address	0x2036, 0x00
P0.55	Data size	16bit	Data format	DEC
	Modbus communication address	1110, 1111	CANopen communication address	0x2037, 0x00

P0.56	S-curve ACC time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1000	0	ms	-	S	-
P0.57	S-curve DEC time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1000	0	ms	-	S	-

In a rated-speed command, this group of parameter is used to set the duration of the circular arc segments in the S curve, thus achieving the goal of smooth starting. The S-curve ACC/DEC time is shown in the following figure:



Note:

- ACC/DEC time of S curve can be used in speed mode only.
- If the speed command is analog input, S curve ACC/DEC time is invalid.

If the setting value of P0.54 is less than that of P0.56 and P0.56 is not 0, P0.54 is equal to P0.56 during actual running.

If the setting value of P0.55 is less than that of P0.57 and P0.57 is not 0, P0.55 is equal to P0.57 during actual running.

P0.56	Data size	16bit	Data format	DEC
	Modbus communication address	1112, 1113	CANopen communication address	0x2038, 0x00
P0.57	Data size	16bit	Data format	DEC
	Modbus communication address	1114, 1115	CANopen communication address	0x2039, 0x00

P0.58	Zero speed clamp mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3	0	-	-	S	T

This parameter specifies the zero speed clamp mode.

Set value	**Position command mode**
[0]	Invalid (The zero speed clamp input is ignored.)
1	If the zero speed clamp control signal is valid, the speed command is forcibly set to 0.
2	If the zero speed clamp control signal is valid, the speed command is forcibly set to 0, the position control mode is used when the actual motor speed becomes less than P0.59 [Speed threshold in zero speed clamp], and the servo is locked at this position. Other actions are the same with setting value 1.
3	If the zero speed clamp control signal is valid, when the speed command changes to be -10r/min below P0.59, it will switch to position control and be locked in the position.

Note: If any one of P3.00–P3.09 is zero speed clamp function (0x00D), it can be controlled by the corresponding digital input of CN1; it can also be controlled by P4.19 (0: Disable zero speed clamp; 1: Enable zero speed clamp).

In the torque mode, mode 0 and 1 are valid, mode 2 and 3 are the same with mode 1.

P0.58	Data size	16bit	Data format	DEC
	Modbus communication address	1116, 1117	CANopen communication address	0x203A, 0x00

P0.59	Speed threshold of zero speed clamp	Setting range	Default	Unit	Applicable mode		
		10–20000	30	r/min	-	S	-

This parameter specifies the speed threshold for switching to position control when P0.58 is 2 or 3. When P0.58 is 3, there is a 10 r/min delay detected.

P0.59	Data size	16bit	Data format	DEC
	Modbus communication address	1118, 1119	CANopen communication address	0x203B, 0x00

P0.60	Torque command selection	Setting range	Default	Unit	Applicable mode		
		0–3	1	-	-	-	T

This parameter specifies the command source in torque control.

Set value	Input mode	Description
0	Internal setting	Set the torque command by P0.66.
[1]	Analog input	You need to set P3.26 [Function of AI 1] or P3.27 [Function of AI 2] to 4 [Torque command] and set associated parameters according to the actual situation.
2	Bus input	The communication bus interface can be used to receive torque commands from the upper computer. If P4.10 is 1 [Bus input], the motor speed can be changed by P4.14 [Bus torque command].
3	Reserved	-

P0.60	Data size	16bit	Data format	DEC
	Modbus communication address	1120, 1121	CANopen communication address	0x203C, 0x00

P0.61	Torque command direction setting	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	-	-	T

This parameter specifies the method for specifying the direction in a torque command.

Set value	Designated method
[0]	The torque command sign specifies the direction. For example, Torque command input [+] indicates forward, while [-] indicates reverse.
1	The torque command sign [0x00F] of the digital input function is used to specify the direction.

	1: Forward direction 2: Reverse direction

Note: 0x00F is valid when the input is a low electrical level, while 0x10F is valid when the input is a high electrical level.

P0.61	Data size	16bit	Data format	DEC
	Modbus communication address	1122, 1123	CANopen communication address	0x203D, 0x00

P0.62	Analog input 2 gain	Setting range	Default	Unit	Applicable mode		
		0–2000	100	[P3.27 unit]/V	P	S	T

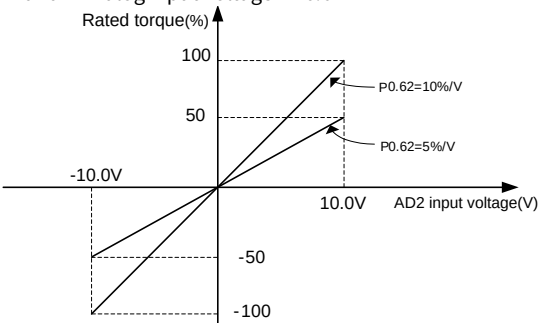
This parameter specifies the gain of analog input 2, the gain unit is associated with P3.27.

Note: Analog input 2 indicates the signal input from the analog speed/speed limit terminals (AD2 and GND, corresponding to pin 20 and pin 19) of the CN1 plug.

Application example:

1. Suppose analog input 2 functions is torque command.
2. The voltage of analog input 2 corresponds to the conversion gain of the motor torque command.
3. When P0.60 is set to "1", this parameter is valid.
4. The relationship between the voltage of analog input 2 and torque command is as follows: The torque corresponding to every 1V voltage is 10% of the rated torque by default.

Actual torque command = Analog input voltage x P0.62



Note: Set this parameter according to the motor working condition. If this parameter is set to a large value, the motor speed may fluctuate sharply.

P0.62	Data size	32bit	Data format	DEC
	Modbus communication address	1124, 1125	CANopen communication address	0x203E, 0x00

P0.63	Reverse of AI 2	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies the voltage polarity of analog input 2.

Set value	Actual detection result	
[0]	Positive polarity	[+Voltage]→[Positive value], [-Voltage]→[Negative value]
1	Negative polarity	[+Voltage]→[Negative value], [-Voltage]→[Positive value]

P0.63	Data size	16bit	Data format	DEC
	Modbus communication address	1126, 1127	CANopen communication address	0x203F, 0x00

P0.65	Dead zone of AI 2	Setting range	Default	Unit	Applicable mode		
		0.000–3.000	0.000	V	P	S	T

If the absolute voltage value of analog input 2 falls in the range of this parameter, the corresponding command value is 0.

P0.65	Data size	16bit	Data format	DEC
	Modbus communication address	1130, 1131	CANopen communication address	0x2041, 0x00

P0.66	Internal torque command	Setting range	Default	Unit	Applicable mode		
		-500.0–500.0	0.0	%	-	-	T

This parameter specifies the internal torque reference. If the servo motor rated torque is considered as 100%, the setting of this parameter is a percentage of the servo motor rated torque.

Note:

- If the absolute value of this parameter is greater than maximum torque limit 1 (P0.10), the output torque is the setting value of P0.10 and the direction is the same as this parameter.
- In torque mode, this parameter is valid only when P0.60 is 0.

P0.66	Data size	16bit	Data format	DEC
	Modbus communication address	1132, 1133	CANopen communication address	0x2042, 0x00

P0.67	Speed limit mode setting	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	-	-	T

This parameter specifies the speed limit mode for torque control.

Set value	Designated method
0	The analog input is selected as the speed limit source. You need to set either P3.26 [Function of AI 1] or P3.27 [Function of AI 2] and P3.70 [Function of AI 3] to 1 [Speed limit] and set associated parameters according to the actual situation.
[1]	Select the internal speed limit and anyone of P0.46–P0.49 may be selected.

Note: The speed limit value is processed with absolute value internally. The actual sign of speed limit is the same with that of the torque command.

P0.67	Data size	16bit	Data format	DEC
	Modbus communication address	1134, 1135	CANopen communication address	0x2043, 0x00

P0.68	RAMP time of torque command	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	-	-	T

This parameter is used to modify the planning curve when the torque command input changes. This parameter indicates the time taken to rise from 0 to 100% of the rated torque.

P0.68	Data size	16bit	Data format	DEC
	Modbus communication address	1136, 1137	CANopen communication address	0x2044, 0x00

P0.69	DEC time for quick stop	Setting range	Default	Unit	Applicable mode		
		0–10000	500	ms	P	S	T

This parameter specifies the DEC time for quick stop. It indicates the time taken to decelerate from 100% of the rated speed to 0.

P0.69	Data size	16bit	Data format	DEC
	Modbus communication address	1138, 1139	CANopen communication address	0x2045, 0x00

P0.70[1]	Absolute encoder mode setting	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies the running mode of the multiturn absolute encoder. Though the encoder working with the motor is a multiturn absolute encoder, it is still considered as a single-turn encoder by default. If the multiturn absolute function is needed, you need to prepare the spare battery for the encoder and set the work mode as the multiturn absolute mode.

Set value	Designated method
[0]	Single-turn absolute value
1	Multi-turn absolute value

P0.70[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1140, 1141	CANopen communication address	0x2046, 0x00

P0.71*	Clear absolute encoder multiturn	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to clear the multiturn data for the multiturn absolute encoder. If this function is enabled, the multiturn data is cleared while the single-turn data remains unchanged, but the absolute position in the feedback is cleared.

Note: If you use a multiturn absolute encoder, after machinery installation, you can clear the absolute encoder after detecting the absolute zero position of the mechanic system at first power-on.

P0.71*	Data size	16bit	Data format	DEC
	Modbus communication address	1142, 1143	CANopen communication address	0x2047, 0x00

P0.72	Mechanical gear-ratio numerator for absolute position rotary mode	Setting range	Default	Unit	Applicable mode		
		1–32767	1	-	P	S	T

This parameter specifies the mechanical gear ratio (numerator) for absolute position rotary mode.

P0.72	Data size	16bit	Data format	DEC
	Modbus communication address	1144, 1145	CANopen communication address	0x2048, 0x00

P0.73	Mechanical gear-ratio denominator for absolute position rotary mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–32767	1	-	P	S	T
This parameter specifies the mechanical gear ratio (denominator) for absolute position rotary mode.							
P0.73	Data size	16bit	Data format	DEC			
	Modbus communication address	1146, 1147	CANopen communication address	0x2049, 0x00			

P0.74	Number of pulses per revolution of the load side in absolute position rotary mode (Encoder unit-32 low-order bits)	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–4294967295	0	Encoder unit	P	S	T
This parameter specifies the number of pulses per revolution of the load side in absolute position rotary mode (Encoder unit - 32 low-order bits).							
P0.74	Data size	16bit	Data format	DEC			
	Modbus communication address	1148, 1149	CANopen communication address	0x204A, 0x00			

P0.75	Number of pulses per revolution of the load side in absolute position rotary mode (Encoder unit-32 high-order bits)	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–4294967295	0	Encoder unit	P	S	T
This parameter specifies the number of pulses per revolution of the load side in absolute position rotary mode (Encoder unit - 32 high-order bits).							
P0.75	Data size	16bit	Data format	DEC			
	Modbus communication address	1150, 1151	CANopen communication address	0x204B, 0x00			

7.1.4 Control mode switchover

P0.90	Max. speed limit of control mode switching	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–1000	100	r/min	P	S	T
This parameter specifies the maximum running speed during positioning for switching from the speed or torque mode to the position mode when the hybrid of position and speed or the hybrid of position and torque is used.							
P0.90	Data size	16bit	Data format	DEC			
	Modbus communication address	1180, 1181	CANopen communication address	0x205A, 0x00			

P0.91	Positioning reference of control mode switching	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-1–(2^{31}-1)	-1	pulse	P	S	T
This parameter specifies the motor position R0.14 [Rotor position relative to pulse Z] after the control mode is switched. The switching is made from the speed or torque mode to the position mode when the hybrid of position and speed or the hybrid of position and torque is used. **Note:** ● After the control mode switching, the reference point in the received position command is the setting of this parameter. The unit of this parameter is the encoder pulse unit. ● If this parameter is set to -1 and the control mode needs to switch from speed mode to position mode, switching is executed at the current position, without positioning to the reference point. ● If the mechanical angle corresponding to the setting of P3.50 is less than or equal to 0.5°, the positioning is accurate to ±P3.50. If the mechanical angle is greater than 0.5°, the positioning is accurate to the pulse number corresponding to ±0.5°.							
P0.91	Data size	32bit	Data format	DEC			
	Modbus communication address	1182, 1183	CANopen communication address	0x205B, 0x00			

P0.92	Position mode switching exit mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T
When P0.03 is 3 or 4, this parameter is used to set the exiting mode when the position mode can be switched to other control modes.							

Set value	Exiting mode
[0]	The position mode is switched to another mode after positioning is complete.
1	The position mode is immediately switched to another mode when the control mode switching command is invalid.

P0.92	Data size	16bit	Data format	DEC
	Modbus communication address	1184, 1185	CANopen communication address	0x205C, 0x00

P0.93	Exit mode from speed mode to position mode	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies the exit mode for switching from the speed or torque mode to the position mode when the hybrid of position and speed or the hybrid of position and torque is used. When set to 0, the switch occurs after decelerating to zero; when set to 1, the switch occurs immediately.

P0.93	Data size	16bit	Data format	DEC
	Modbus communication address	1186, 1187	CANopen communication address	0x205D, 0x00

7.1.5 Speed display filtering

P0.99	Speed detection FIR filtering class	Setting range	Default	Unit	Applicable mode		
		1–31	1	-	P	S	T

This parameter specifies the FIR filter level displayed by R0.00 [Motor rotation speed]. The default value is 1, which means no filtering. The larger the setting value, the smoother the speed display.

P0.99	Data size	16bit	Data format	DEC
	Modbus communication address	1198, 1199	CANopen communication address	0x2063, 0x00

7.2 Group P1 Autotuning control parameters

7.2.1 Inertia identification (Automatic gain)

P1.00	Inertia online tuning	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to automatically tune inertia online and adjust the gain.

Set value	Meaning
[0]	Online inertia identifying is invalid.
1	Online inertia identifying is valid.

P1.00	Data size	16bit	Data format	DEC
	Modbus communication address	1200, 1201	CANopen communication address	0x2100, 0x00

P1.01	Inertia ratio 1	Setting range	Default	Unit	Applicable mode		
		0–10000	250	%	P	S	T

Rotation inertia ratio = Load inertia/Motor rotation inertia x 100%
If P1.01 is set correctly, the setting unit of P2.00 and P2.05 is Hz.
If P1.01 is greater than the actual value, the speed loop gain unit will increase, and if it is smaller than the actual value, the speed loop gain unit will decrease.
If online automatic tuning is valid, the inertia ratio is updated to P1.01 in real time and written to the EEPROM every 30 minutes.

P1.01	Data size	16bit	Data format	DEC
	Modbus communication address	1202, 1203	CANopen communication address	0x2101, 0x00

P1.02	Inertia ratio 2	Setting range	Default	Unit	Applicable mode		
		0–10000	250	%	P	S	T

The meaning of P1.02 is similar to that of P1.01.
Note: Automatic online gain adjusting is invalid for this parameter.

P1.02	Data size	16bit	Data format	DEC
	Modbus communication address	1204, 1205	CANopen communication address	0x2102, 0x00

P1.03	Machine rigidity setting	Setting range	Default	Unit	Applicable mode		
		0–31	13	-	P	S	T

A greater mechanical rigidity value indicates quicker response and high rigidity performance, but it increases the possibility to cause vibration. In stable working condition, you can set a greater value to obtain quicker response.

Mechanical structure	Rigidity setting
Large transfer or transmission equipment	0–13
Belt drive mechanism	5–16
Ball screw + belt drive	5–16
Manipulator	15–22
Direct ball screw or rigid body	18–25

P1.03	Data size	16bit	Data format	DEC
	Modbus communication address	1206, 1207	CANopen communication address	0x2103, 0x00

P1.04*	Inertia offline tuning	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter is used to obtain the load inertial ratio of the motor rotation inertia. After inertia identifying is enabled, the motor runs six cycles to identify inertia. In each cycle, the motor runs at the mode specified by P1.05 [Inertia identifying mode]. The maximum rotation number of the motor is determined by P1.06 [Max. rotations by inertia identifying], and the ACC command time is determined by P1.07 [ACC time for inertia identifying].

Set value	Function
[0]	Disable inertia identifying
1	Enable inertia identifying

Note:

- The motor speed is fast during identifying if P1.06 and P1.07 are set to great values.
- If the drive reports the alarm Er25-7 during identifying, see section 10.1 Drive faults and solutions to handle it.
- This parameter is invalid when the servo is enabled.

P1.04*	Data size	16bit	Data format	DEC
	Modbus communication address	1208, 1209	CANopen communication address	0x2104, 0x00

P1.05	Operation mode of inertia identification	Setting range	Default	Unit	Applicable mode		
		0–3	0	-	P	S	T

This parameter is used to set the operation mode of inertia identification.

Set value	Function
[0]	Forward rotation and then reverse rotation
1	Forward rotation
2	Reverse rotation
3	Reverse rotation and then forward rotation

P1.05	Data size	16bit	Data format	DEC
	Modbus communication address	1210, 1211	CANopen communication address	0x2105, 0x00

P1.06	Movable range of inertia identification	Setting range	Default	Unit	Applicable mode		
		0.2–20.0	2.0	r	P	S	T

If the inertia identification mode is valid and specified in position mode, this parameter is used to limit the maximum rotation number of the motor in each cycle.

P1.06	Data size	16bit	Data format	DEC
	Modbus communication address	1212, 1213	CANopen communication address	0x2106, 0x00

P1.07	ACC time constant of inertia identification	Setting range	Default	Unit	Applicable mode		
		2–1000	200	ms	P	S	T

This parameter is used to set the motor ACC time during the inertia identification. If the load inertia is heavy, the ACC time can be set to a greater value, preventing overload alarms.

P1.07	Data size	16bit	Data format	DEC
	Modbus communication address	1214, 1215	CANopen communication address	0x2107, 0x00

P1.08	Speed level of inertia identification	Setting range	Default	Unit	Applicable mode		
		0–3	1	-	P	S	T

This parameter is used to set the speed level of inertia identification.
A large value of this parameter indicates a quick response to the load characteristic changes, resulting in large fluctuation of the presumption value. The presumption result is saved every 30 minutes.

Set value	Function	Meaning
0	No change	Stop the presumption of load characteristics.
[1]	No major change	There is no major change to load characteristics.

2	Slow change	Load characteristics change slowly.
3	Sharp change	Load characteristics change sharply.

P1.08	Data size	16bit	Data format	DEC
	Modbus communication address	1216, 1217	CANopen communication address	0x2108, 0x00

P1.09	Valid selection of new inertia identification	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter is used to set the algorithm of inertia identification.

Set value	Function	Meaning
[0]	Invalid	Original algorithm
1	Valid	New algorithm (synchronous identification friction)

P1.09	Data size	16bit	Data format	DEC
	Modbus communication address	1218, 1219	CANopen communication address	0x2109, 0x00

P1.10	Gain adjustment mode	Setting range	Default	Unit	Applicable mode		
		0–5	0	-	P	S	T

Select an appropriate gain adjustment mode according to the response and stability requirements. In all modes, the gain is automatically set according to the set machine rigidity.

Set value	Function	Meaning
[0]	Standard mode	Basic mode
1	Interpolation mode	Focuses on stability, stable positioning; suitable for multi-axis interpolation applications.
2	Positioning mode	Focuses on responsiveness; suitable for fast positioning applications.
3	Standard mode-automatic	Compared with the standard mode, this mode performs load autotuning for function compensation.
4	Interpolation mode-automatic	Compared with interpolation, this mode performs load autotuning for function compensation.
5	Positioning mode-automatic	Compared with positioning, this mode performs load autotuning for function compensation.

P1.10	Data size	16bit	Data format	DEC
	Modbus communication address	1220, 1221	CANopen communication address	0x210A, 0x00

P1.11	Gain fine-tuning mode selection	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

When linked adjustment is enabled, modify P2.00 (Speed gain), and the relevant gain parameters will be automatically changed accordingly.

Set value	Function	Meaning
[0]	Not linked	Manual setting
1	Linked	Once P2.00 is modified, P2.01, P2.02 and P2.04 will be automatically changed accordingly.

P1.11	Data size	16bit	Data format	DEC
	Modbus communication address	1222, 1223	CANopen communication address	0x210B, 0x00

7.2.2 Self-adaptive vibration control

P1.19	Resonance detection sensitivity	Setting range	Default	Unit	Applicable mode		
		0.2–100.0	5.0	%	P	S	T

This parameter is used to set the sensitivity of the automatic detection on mechanical resonance frequency. A smaller value of this parameter indicates higher sensitivity to the resonance.

Note: When the set value of P1.19 increases, the sensitivity to the resonance is reducing.

P1.19	Data size	16bit	Data format	DEC
	Modbus communication address	1238, 1239	CANopen communication address	0x2113, 0x00

P1.20	Resonance detection mode	Setting range	Default	Unit	Applicable mode		
		0–7	0	-	P	S	T

This parameter is used to set the working mode of resonance detection, resonant frequency presumed by the self-adaptive notch filter, and action after presumption.

If the function of automatically detecting the mechanical resonant frequency is valid (that is, this parameter is set to 1, 2, or 3), the system automatically collects data to conduct

mechanical resonant frequency analysis and saves results to P1.21 and P1.22. You can set the notch filter frequency according to the settings of P1.21 and P1.22 to eliminate the mechanical resonance.

Note: It is recommended to disable the function after the gain adjustment is complete.

Set value	Function	Meaning
[0]	Invalid	All parameters associated with the notch filter remain unchanged.
1	One notch filter valid	The parameters associated with the third notch filter are updated according to the self-adaptive result.
2	Two notch filters valid	The parameters related to the third and fourth notch filters are updated according to the self-adaptive result.
3	Resonant frequency test mode	The mechanical resonant frequency is detected automatically but the parameters associated with notch filters are not set.
4	Clearing notch filter parameters	The parameters associated with the four notch filters are restored to the default values.
5	Notch filter 3 →Notch filter 1	The parameters of the third notch filter to are automatically copied to the first notch filter and then restored to the default values.
6	Notch filter 4 →Notch filter 2	The parameters of the fourth notch filter to are automatically copied to the first notch filter and then restored to the default values.
7	Notch filters 3 and 4 → Notch filters 1 and 2	The parameters of the third and fourth notch filters to are automatically copied to the first and second notch filters and then restored to the default values.

P1.20	Data size	16bit	Data format	DEC
	Modbus communication address	1240, 1241	CANopen communication address	0x2114, 0x00

P1.21*	Mechanical resonant frequency 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–5000	5000	Hz	P	S	T
P1.22*	Mechanical resonant frequency 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–5000	5000	Hz	P	S	T

This group of parameter displays mechanical resonant frequency. When P1.20 is set to 1, indicating mechanical resonance frequency detection is valid, the system detects the frequency of the max. resonance point and displays it by function codes.

Note:

- The measurement results are accurate only when the rotation speed reaches 30 r/min at least.
- This function is read only. You can set the notch filter frequency through this group of parameter to eliminate mechanical resonance.
- The value 5000 indicates no resonance point is found.

P1.21	Data size	16bit	Data format	DEC
	Modbus communication address	1242, 1243	CANopen communication address	0x2115, 0x00
P1.22	Data size	16bit	Data format	DEC
	Modbus communication address	1244, 1245	CANopen communication address	0x2116, 0x00

P1.23	Frequency of notch filter 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		50–5000	5000	Hz	P	S	T

This parameter is used to set the frequency of notch filter 1 for suppressing resonance. The notch filter can simulate the mechanical resonant frequency, thus suppressing the resonant frequency.

The value 5000 indicates the notch filter function is invalid.

P1.23	Data size	16bit	Data format	DEC
	Modbus communication address	1246, 1247	CANopen communication address	0x2117, 0x00

P1.24	Q factor of notch filter 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.50–16.00	1.00	-	P	S	T

This parameter is used to set the Q value (quality factor) of notch filter 1.

Q = Center frequency of notch filter/Bandwidth of notch filter

Generally, the default value is kept.

P1.24	Data size	16bit	Data format	DEC
	Modbus communication address	1248, 1249	CANopen communication address	0x2118, 0x00

P1.25	Depth of notch filter 1	Setting range	Default	Unit	Applicable mode		
		0–100	0	%	P	S	T
This parameter is used to the amplitude attenuation rate of notch filter 1. A large value of this parameter indicates low notch filter depth and small phase lag.							
P1.25	Data size	16bit	Data format		DEC		
	Modbus communication address	1250, 1251	CANopen communication address		0x2119, 0x00		

P1.26	Frequency of notch filter 2	Setting range	Default	Unit	Applicable mode		
		50–5000	5000	Hz	P	S	T
P1.27	Q factor of notch filter 2	Setting range	Default	Unit	Applicable mode		
		0.50–16.00	1.00	-	P	S	T
P1.28	Depth of notch filter 2	Setting range	Default	Unit	Applicable mode		
		0–100	0	%	P	S	T
These parameters are used to set characteristics of notch filer 2, similar to P1.23, P1.24, and P1.25.							
P1.26	Data size	16bit	Data format		DEC		
	Modbus communication address	1252, 1253	CANopen communication address		0x211A, 0x00		
P1.27	Data size	16bit	Data format		DEC		
	Modbus communication address	1254, 1255	CANopen communication address		0x211B, 0x00		
P1.28	Data size	16bit	Data format		DEC		
	Modbus communication address	1256, 1257	CANopen communication address		0x211C, 0x00		

P1.29	Frequency of notch filter 3	Setting range	Default	Unit	Applicable mode		
		50–5000	5000	Hz	P	S	T
P1.30	Q factor of notch filter 3	Setting range	Default	Unit	Applicable mode		
		0.50–16.00	1.00	-	P	S	T

P1.31	Depth of notch filter 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	0	%	P	S	T
These parameters are used to set characteristics of notch filer 3, similar to P1.23, P1.24, and P1.25.							
P1.29	Data size	16bit	Data format		DEC		
	Modbus communication address	1258, 1259	CANopen communication address		0x211D, 0x00		
P1.30	Data size	16bit	Data format		DEC		
	Modbus communication address	1260, 1261	CANopen communication address		0x211E, 0x00		
P1.31	Data size	16bit	Data format		DEC		
	Modbus communication address	1262, 1263	CANopen communication address		0x211F, 0x00		

P1.32	Frequency of notch filter 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		50–5000	5000	Hz	P	S	T
P1.33	Q factor of notch filter 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.50–16.00	1.00	-	P	S	T
P1.34	Depth of notch filter 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	0	%	P	S	T
These parameters are used to set characteristics of notch filer 4, similar to P1.23, P1.24, and P1.25.							
P1.32	Data size	16bit	Data format		DEC		
	Modbus communication address	1264, 1265	CANopen communication address		0x2120, 0x00		
P1.33	Data size	16bit	Data format		DEC		
	Modbus communication address	1266, 1267	CANopen communication address		0x2121, 0x00		
P1.34	Data size	16bit	Data format		DEC		
	Modbus communication address	1268, 1269	CANopen communication address		0x2122, 0x00		

P1.35	Vibration control mode in position command	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	-	-

This parameter is used to set the switching mode of the filter used for vibration control.

Set value	Function
[0]	Vibration control with filter 1 is valid.
1	Filter 1 and filter 2 are switched according to VS-SEL.
2	Automatic
3	Vibration control with filter 1 and filter 2 is valid.

Note: If a digital input terminal is used for selection, one of parameters P3.00–P3.09 must be set to 0x11C or 0x01C (according to VS-SEL).

Relationship with COM+:

0: OFF (The internal optical coupler corresponding to the input is not conducted.)

1: ON (The internal optical coupler corresponding to the input is conducted.)

P1.35	Data size	16bit	Data format	DEC
	Modbus communication address	1270, 1271	CANopen communication address	0x2123, 0x00

P1.36	Vibration control frequency 1	Setting range	Default	Unit	Applicable mode		
		0.0–200.0	0.0	Hz	P	-	-

This parameter is used to set the frequency point at which the vibration at the load peak is suppressed.

Note: The set frequency must range from 1.0Hz to 200.0Hz. It is invalid if the setting value is below 1.0Hz.

P1.36	Data size	16bit	Data format	DEC
	Modbus communication address	1272, 1273	CANopen communication address	0x2124, 0x00

P1.37	Coefficient of vibration control filter 1	Setting range	Default	Unit	Applicable mode		
		0.00–1.00	1.00	-	P	-	-

This parameter is used to set the coefficient of the first vibration control filter.

P1.37	Data size	16bit	Data format	DEC
	Modbus communication address	1274, 1275	CANopen communication address	0x2125, 0x00

P1.38	Vibration control frequency 2	Setting range	Default	Unit	Applicable mode		
		0.0–200.0	0.0	Hz	P	-	-
P1.39	Coefficient of vibration control filter 2	Setting range	Default	Unit	Applicable mode		
		0.00–1.00	1.00	-	P	-	-

These parameters are used to set characteristics of the second vibration control filter, similar to P1.36 and P1.37.

P1.38	Data size	16bit	Data format	DEC
	Modbus communication address	1276, 1277	CANopen communication address	0x2126, 0x00
P1.39	Data size	16bit	Data format	DEC
	Modbus communication address	1278, 1279	CANopen communication address	0x2127, 0x00

P1.50	Autotuning switch	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies the autotuning switch.

Set value	Description
[0]	Disable
1	Startup

P1.50	Data size	16bit	Data format	DEC
	Modbus communication address	1300, 1301	CANopen communication address	0x2132, 0x00

P1.51	Autotuning mode	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies the autotuning mode.

Set value	Description
[0]	Positioning mode
1	Interpolation mode

P1.51	Data size	16bit	Data format	DEC
	Modbus communication address	1302, 1303	CANopen communication address	0x2133, 0x00

P1.52	Rigidity level of the autotuning mechanism	Setting range	Default	Unit	Applicable mode		
		0–2	1	-	P	-	-

This parameter specifies the autotuning mode.

Set value	Description
[0]	Low rigidity
1	Medium rigidity
2	High rigidity

P1.52	Data size	16bit	Data format	DEC
	Modbus communication address	1304, 1305	CANopen communication address	0x2134, 0x00

P1.53	Autotuning target tuning time	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	P		

This parameter specifies the autotuning target tuning time.

P1.53	Data size	16bit	Data format	DEC
	Modbus communication address	1306, 1307	CANopen communication address	0x2135, 0x00

P1.54	Autotuning target overshoot	Setting range	Default	Unit	Applicable mode		
		0–30000	0	pulse	P		

This parameter specifies the autotuning target overshoot.

P1.54	Data size	16bit	Data format	DEC
	Modbus communication address	1308, 1309	CANopen communication address	0x2136, 0x00

P1.55	Autotuning ACC/DEC time	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	P		

This parameter specifies the autotuning ACC/DEC time.

Note: When this parameter is set to a non-zero value, advanced mode is enabled, that is, the set values of P1.53–P1.55 will take effect. Otherwise, they shall not take effect.

P1.55	Data size	16bit	Data format	DEC
	Modbus communication address	1310, 1311	CANopen communication address	0x2137, 0x00

P1.56	Autotuning running direction	Setting range	Default	Unit	Applicable mode		
		0–3	2	-	P	-	-

This parameter specifies the autotuning mode.

Set value	Description
[0]	Forward rotation
1	Reverse rotation
2	Forward rotation and then reverse rotation
3	Reverse rotation and then forward rotation

P1.56	Data size	16bit	Data format	DEC
	Modbus communication address	1312, 1313	CANopen communication address	0x2138, 0x00

P1.57	Autotuning running cycles	Setting range	Default	Unit	Applicable mode		
		0.1–100	2	-	P		

This parameter specifies the number of running cycles for autotuning.

P1.57	Data size	16bit	Data format	DEC
	Modbus communication address	1314, 1315	CANopen communication address	0x2139, 0x00

P1.58	Autotuning running speed	Setting range	Default	Unit	Applicable mode		
		1–5000	500	rpm	P		

This parameter specifies the autotuning running speed.

P1.58	Data size	16bit	Data format	DEC
	Modbus communication address	1316, 1317	CANopen communication address	0x213A, 0x00

P1.59	Autotuning running wait time	Setting range	Default	Unit	Applicable mode		
		100–10000	300	ms	P		

This parameter specifies the autotuning running wait time.

P1.59	Data size	16bit	Data format	DEC
	Modbus communication address	1318, 1319	CANopen communication address	0x213B, 0x00

7.3 Group P2 Motor control parameters

7.3.1 Gain setting

P2.00	1st speed gain	Setting range	Default	Unit	Applicable mode		
		0.0–3276.7	27.0	Hz	P	S	T
The speed loop responsiveness of the servo system is determined by the speed gain. Increasing this parameter improves the speed response, but it increases the possibility to cause vibration and noise. **Note:** If the inertia ratio is set correctly, the unit of P2.00 is Hz.							
P2.00	Data size	16bit	Data format	DEC			
	Modbus communication address	1400, 1401	CANopen communication address	0x2200, 0x00			

P2.01	1st speed integral time constant	Setting range	Default	Unit	Applicable mode		
		0.1–1000.0	21.0	ms	P	S	T
This parameter is used to set the integral time constant of the speed loop. A smaller value of this parameter indicates quicker response, but it increases the possibility to cause vibration and noise. It should be noted particularly that when this parameter is set to 1000, it means the integral action is invalid.							
P2.01	Data size	16bit	Data format	DEC			
	Modbus communication address	1402, 1403	CANopen communication address	0x2201, 0x00			

P2.02	1st position gain	Setting range	Default	Unit	Applicable mode		
		0.0–3276.7	48.0	1/s	P	-	-
The position loop responsiveness of the servo system is determined by the position gain. A smaller value of this parameter indicates quicker response, but it increases the possibility to cause vibration and noise.							
P2.02	Data size	16bit	Data format	DEC			
	Modbus communication address	1404, 1405	CANopen communication address	0x2202, 0x00			

P2.03	1st speed detection filter	Setting range	Default	Unit	Applicable mode		
		100–5000	5000	Hz	P	S	T

This parameter is used to set 1st speed detection filter.

Note: The value 5000 indicates no filtering. A smaller value of this parameter indicates lower motor noise and speed fluctuation, but it slows down the responsiveness.

P2.03	Data size	16bit	Data format	DEC
	Modbus communication address	1406, 1407	CANopen communication address	0x2203, 0x00

P2.04	1st torque filter	Setting range	Default	Unit	Applicable mode		
		0.00–25.00	0.84	ms	P	S	T

This parameter is used to set the time constant of the torque filter.

P2.04	Data size	16bit	Data format	DEC
	Modbus communication address	1408, 1409	CANopen communication address	0x2204, 0x00

P2.05	2nd speed gain	Setting range	Default	Unit	Applicable mode		
		0.0–3276.7	27.0	Hz	P	S	T
P2.06	2nd speed integral time constant	Setting range	Default	Unit	Applicable mode		
		0.1–1000.0	1000.0	ms	P	S	T
P2.07	2nd position gain	Setting range	Default	Unit	Applicable mode		
		0.0–3276.7	57.0	1/s	P	-	-
P2.08	2nd speed detection filter	Setting range	Default	Unit	Applicable mode		
		100–5000	5000	Hz	P	S	T
P2.09	2nd torque filter	Setting range	Default	Unit	Applicable mode		
		0.00–25.00	0.84	ms	P	S	T

There are two groups of parameters respectively for position gain, speed gain, speed integral time constant, speed detection filter, and torque filter.

The definition of the function and content are the same with those of 1st group.

You can select or switch between 1st gain and 2nd gain as needed. See the descriptions for P2.20–P2.34.

P2.05	Data size	16bit	Data format	DEC
	Modbus communication address	1410, 1411	CANopen communication address	0x2205, 0x00
P2.06	Data size	16bit	Data format	DEC
	Modbus communication address	1412, 1413	CANopen communication address	0x2206, 0x00
P2.07	Data size	16bit	Data format	DEC
	Modbus communication address	1414, 1415	CANopen communication address	0x2207, 0x00
P2.08	Data size	16bit	Data format	DEC
	Modbus communication address	1416, 1417	CANopen communication address	0x2208, 0x00
P2.09	Data size	16bit	Data format	DEC
	Modbus communication address	1418, 1419	CANopen communication address	0x2209, 0x00

P2.10	Speed feed-forward gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–100.0	0.0	%	P	-	-
This parameter is used to set the speed feed-forward gain. If it is set to 100%, residual pulses are almost zero when the motor runs at a stable speed, but overshooting increases at sudden ACC/DEC.							
P2.10	Data size	16bit	Data format	DEC			
	Modbus communication address	1420, 1421	CANopen communication address	0x220A, 0x00			

P2.11	Speed feed-forward filter time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.00–64.00	0.50	ms	P	-	-
This parameter is used to set the speed feed-forward filter time.							
P2.11	Data size	16bit	Data format	DEC			
	Modbus communication address	1422, 1423	CANopen communication address	0x220B, 0x00			

P2.12	Torque feed-forward gain	Setting range	Default	Unit	Applicable mode		
		0.0–200.0	0.0	%	P	S	-

This parameter is used to set the torque feed-forward gain. After the torque is calculated according to the speed control command, the torque multiplied by the setting of this parameter is added to the torque command from speed control.
Increasing the torque feed-forward gain can improve response performance in ACC/DEC and reduce position deviation.

P2.12	Data size	16bit	Data format	DEC
	Modbus communication address	1424, 1425	CANopen communication address	0x220C, 0x00

P2.13	Torque feed-forward filter time	Setting range	Default	Unit	Applicable mode		
		0.00–64.00	0.00	ms	P	S	-

This parameter is used to set the torque feed-forward filter time.

P2.13	Data size	16bit	Data format	DEC
	Modbus communication address	1426, 1427	CANopen communication address	0x220D, 0x00

P2.14	1st IPPI coefficient	Setting range	Default	Unit	Applicable mode		
		0–1000	100	%	P	S	T

This parameter is used to set 1st IPPI coefficient.
Note: IP control is applied when it is set to 0, while PI control is applied when it is set to 100.

P2.14	Data size	16bit	Data format	DEC
	Modbus communication address	1428, 1429	CANopen communication address	0x220E, 0x00

P2.15	2nd IPPI coefficient	Setting range	Default	Unit	Applicable mode		
		0–1000	100	%	P	S	T

This parameter is used to set 2nd IPPI coefficient.
Note: IP control is applied when it is set to 0, while PI control is applied when it is set to 100.

P2.15	Data size	16bit	Data format	DEC
	Modbus communication address	1430, 1431	CANopen communication address	0x220F, 0x00

7.3.2 Gain switchover

P2.20	2nd gain setting	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies the proper adjustment for gain switching.

Set value	Exiting mode
0	1st gain is fixed. The speed loop action is switched to the PI or P action based on the gain switching input (that is, the digital input is configured as function gain switching, corresponding to 0x006) or P4.16 [Gain switching command]. Gain switching invalid → PI action Gain switching valid → P action **Note:** 0x006 is valid when the digital inputs a low electrical level, while 0x106 is valid when the digital inputs a high electrical level.
[1]	Switching between 1st gain [P2.00–P2.04] and 2nd gain [P2.05–P2.09] is valid.

P2.20	Data size	16bit	Data format	DEC
	Modbus communication address	1440, 1441	CANopen communication address	0x2214, 0x00

P2.22	Switching trigger in position control	Setting range	Default	Unit	Applicable mode		
		0–9	0	-	P	-	-

This parameter is used to set the trigger condition of gain switching in position control or fully-closed loop control.

Set value	Switching condition	Gain switching condition
[0]	1st gain fixed	Be fixed in 1st gain [P2.00–P2.04]
1	2nd gain fixed	Be fixed in 2nd gain [P2.05–P2.09]
2	Switching input with gain	Invalid: 1st gain Valid: 2nd gain

3	Large torque command	In the previous 1st gain, if the absolute value of torque command exceed (level+delay) [0.1%], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of torque command keeps below (level-delay) [0.1%] in the delay time, it will return to 1st gain.
4	Large speed command	In the previous 1st gain, if the absolute value of speed command exceed (level+delay) [r/min], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of speed command keeps below (level-delay) [r/min] in the delay time, it will return to 1st gain.
5	Large position deviation	In the previous 1st gain, if the absolute value of position deviation exceed (level+delay) [pulse], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of position deviation keeps below (level-delay) [pulse] in the delay time, it will return to 1st gain. **Note:** The unit of level and lag [pulse] acts as encoder resolution unit during position control and as linear encoder resolution unit during fully-closed loop control.
6	With position command	In the previous 1st gain, if the position command is not 0, it will switch to 2nd gain. In the previous 2nd gain, if the 0 position command lasts in the delay time, it will return to 1st gain.
7	Positioning not finished	In the previous 1st gain, if the positioning is not finished, it will switch to 2nd gain. In the previous 2nd gain, if the state of positioning finished lasts in the delay time, it will return to 1st gain.
8	Large actual speed	In the previous 1st gain, if the absolute value of the actual speed exceed (level+delay) [r/min], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the actual speed keeps below (level-delay) [r/min] and such state in the delay time, it will return to 1st gain.
9	With position command+actual speed	In the previous 1st gain, if the position command is not 0, it will switch to 2nd gain. In the previous 2nd gain, if the 0 position command lasts in the delay time and the absolute value of actual speed is below (level-delay) [r/min], it will return to 1st gain.

P2.22	Data size	16bit	Data format	DEC

	Modbus communication address	1444, 1445	CANopen communication address	0x2216, 0x00

P2.23	Switching delay in position control	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	P	-	-

In the position control, if set P2.22 to 3–9, when switching from 2nd gain to 1st gain, it is the time from meeting the trigger conditions to the actual switching.

P2.23	Data size	16bit	Data format	DEC
	Modbus communication address	1446, 1447	CANopen communication address	0x2217, 0x00

P2.24	Switching level in position control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	P	-	-

In the position control, if set P2.22 to 3–5, 8, 9, it is necessary to set triggering condition of gain switching. The unit will vary with the switching mode and setting.

Note: Please set the level ≥ the delay.

P2.24	Data size	16bit	Data format	DEC
	Modbus communication address	1448, 1449	CANopen communication address	0x2218, 0x00

P2.25	Switching delay in position control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	P	-	-

In the position control, if set P2.22 to 3–5, 8, 9, it is necessary to set the delay used to determine the gain switching trigger condition. The unit will vary with the switching mode and setting.

Note: If the level < the delay, tit will be internally reset to the delay = the level.

P2.25	Data size	16bit	Data format	DEC
	Modbus communication address	1450, 1451	CANopen communication address	0x2219, 0x00

P2.26	Position gain switching time	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	P	-	-

In position control, if the difference between P2.00 and P2.04 is great, you can set this parameter to control the torque change and vibration caused by the switching from the small gain to the large gain at the current position. This parameter is invalid when the position gain is switched from a large value to a small one, and the switching takes effect immediately.

P2.26	Data size	16bit	Data format	DEC
	Modbus communication address	1452, 1453	CANopen communication address	0x221A, 0x00

P2.27	Switching mode of speed control	Setting range	Default	Unit	Applicable mode		
		0–5	0	-	-	S	-

The trigger conditions of gain switching during speed control are as below:

Set value	Switching condition	Gain switching condition
[0]	1st gain fixed	Be fixed in 1st gain [P2.00–P2.04]
1	2nd gain fixed	Be fixed in 2nd gain [P2.05, P2.06, P2.08, P2.09]
2	Switching input with gain	Invalid: 1st gain Valid: 2nd gain
3	Torque command	In the previous 1st gain, if the absolute value of torque command exceed (level+delay) [0.1%], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of torque command keeps below (level-delay) [0.1%] in the delay time, it will return to 1st gain.
4	Speed command variable	In previous 1st gain, if the absolute value of speed command variable exceed (level+delay) [10r/min/s], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the speed command variable keeps below (level-delay) [10r/min/s] in the delay time, it will return to 1st gain.
5	Speed command	In the previous 1st gain, if the absolute value of speed command exceed (level+delay) [r/min], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of speed command keeps below (level-delay) [r/min] in the delay time, it will return to 1st gain.

Note: The parameter is invalid for the position gain. The actual position gain is always 1st gain.

P2.27	Data size	16bit	Data format	DEC
	Modbus communication address	1454, 1455	CANopen communication address	0x221B, 0x00

P2.28	Switching delay in position control	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	-	S	-
In the speed control, if P2.27 is set to 3–5, this parameter defines the delay time from when the trigger condition is met to the actual switching from 2nd gain to 1st gain.							

P2.28	Data size	16bit	Data format	DEC
	Modbus communication address	1456, 1457	CANopen communication address	0x221C, 0x00

P2.29	Switching level of speed control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	-	S	-
In the speed control, if set P2.27 to 3–5, it is necessary to set triggering condition of gain switching. The unit will vary with the switching mode and setting. **Note:** Please set the level ≥ the delay.							

P2.29	Data size	16bit	Data format	DEC
	Modbus communication address	1458, 1459	CANopen communication address	0x221D, 0x00

P2.30	Switching delay in speed control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	-	S	-
In the speed control, if set P2.27 to 3–5, it is necessary to set switching conditions. The unit will vary with the switching mode and setting. **Note:** If the level < the delay, tit will be internally reset to the delay = the level.							

P2.30	Data size	16bit	Data format	DEC
	Modbus communication address	1460, 1461	CANopen communication address	0x221E, 0x00

P2.31	Switching mode of torque control	Setting range	Default	Unit	Applicable mode		
		0–3	0	-	-	-	T

The trigger conditions of gain switching during torque control are as below:

Set value	Switching condition	Gain switching condition
[0]	1st gain fixed	Be fixed in 1st gain [P2.00–P2.04]
1	2nd gain fixed	Be fixed in 2nd gain [P2.05, P2.06, P2.08, P2.09]
2	Switching input with gain	Invalid: 1st gain Valid: 2nd gain
3	Torque command	In the previous 1st gain, if the absolute value of torque command exceed (level+delay) [0.1%], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of torque command keeps below (level-delay) [0.1%] in the delay time, it will return to 1st gain.

Note: The parameter is invalid for the position gain. The actual position gain is always 1st gain.

P2.31	Data size	16bit	Data format	DEC
	Modbus communication address	1462, 1463	CANopen communication address	0x221F, 0x00

P2.32	Switching delay in torque control	Setting range	Default	Unit	Applicable mode		
		0–10000	0	ms	-	-	T

In the torque control, if set P2.31 to 3, when switching from 2nd gain to 1st gain, it is the time from meeting the trigger conditions to the actual switching.

P2.32	Data size	16bit	Data format	DEC
	Modbus communication address	1464, 1465	CANopen communication address	0x2220, 0x00

P2.33	Switching level of torque control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	-	-	T

In the torque control, if set P2.31 to 3, it is necessary to set triggering condition of gain switching. The unit will vary with the switching mode and setting.

Note: Please set the level ≥ the delay.

P2.33	Data size	16bit	Data format	DEC
	Modbus communication address	1466, 1467	CANopen communication address	0x2221, 0x00

P2.34	Switching delay in torque control	Setting range	Default	Unit	Applicable mode		
		0–20000	0	Based on mode	-	-	T

In the torque control, if set P2.31 to 3, it is necessary to set switching condition. The unit will vary with the switching mode and setting.

Note: If the level < the delay, tit will be internally reset to the delay = the level.

P2.34	Data size	16bit	Data format	DEC
	Modbus communication address	1468, 1469	CANopen communication address	0x2222, 0x00

7.3.3 Special motor control

P2.41[2]	Disturbance observer	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	S	T

This parameter specifies whether the disturbance observer is valid.

Set value	Function
[0]	Invalid
1	Disturbance observation
2	Disturbance compensation

P2.41[2]	Data size	16bit	Data format	DEC
	Modbus communication address	1482, 1483	CANopen communication address	0x2229, 0x00

P2.42	Disturbance observer compensation gain	Setting range	Default	Unit	Applicable mode		
		0–100	0	%	P	S	-

This parameter specifies the compensation gain for disturbance torque. This parameter is used to set the compensation gain of disturbance torque. Increasing the gain may improve the effect of suppressing disturbance impact but the noise may enhanced. This parameter needs to be used with P2.43 to find the best setting point. After setting P2.43, please increase the set value of P2.42.

P2.42	Data size	16bit	Data format	DEC
	Modbus communication address	1484, 1485	CANopen communication address	0x222A, 0x00

P2.43	Disturbance observer cut-off frequency	Setting range	Default	Unit	Applicable mode		
		0–3000	200	Hz	P	S	-

This parameter is used to set the cut-off frequency of disturbance observer. Decreasing the set value can downgrade the noise, while increasing the setting may decrease the disturbance torque compensation delay. This parameter needs to be used with P2.42.

P2.43	Data size	16bit	Data format	DEC
	Modbus communication address	1486, 1487	CANopen communication address	0x222B, 0x00

P2.44	Torque command offset	Setting range	Default	Unit	Applicable mode		
		-500.0–500.0	0.0	%	P	S	T

This parameter is used to set the changeable load compensation which is added to the torque command. It is usually be used in the vertical shaft application scenario, which excludes the torque control mode.

P2.44	Data size	16bit	Data format	DEC
	Modbus communication address	1488, 1489	CANopen communication address	0x222C, 0x00

P2.50[2]	Fully-closed loop vibration suppressor	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	-	-	-

This parameter specifies whether the speed observer is valid.

Set value	Function
[0]	Invalid
1	Disturbance observation
2	Disturbance compensation

P2.50[2]	Data size	16bit	Data format	DEC
	Modbus communication address	1500, 1501	CANopen communication address	0x2232, 0x00

P2.51	Fully-closed loop vibration suppressor cut-off frequency	Setting range	Default	Unit	Applicable mode		
		1.0–500.0	100.0	Hz	-	-	-

This parameter is used to set the cut-off frequency of fully-closed loop vibration suppressor.

P2.51	Data size	16bit	Data format	DEC
	Modbus communication address	1502, 1503	CANopen communication address	0x2233, 0x00

P2.52	Fully-closed loop vibration suppressor compensation gain	Setting range	Default	Unit	Applicable mode		
		0–1000	0	%	-	-	-

This parameter is used to set the compensation gain of fully-closed loop vibration suppressor.

P2.52	Data size	16bit	Data format	DEC
	Modbus communication address	1504, 1505	CANopen communication address	0x2234, 0x00

P2.53	Medium frequency vibration control switch	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether the medium frequency vibration control is valid.

Set value	Function
[0]	Invalid
1	Valid

P2.53	Data size	16bit	Data format	DEC
	Modbus communication address	1506, 1507	CANopen communication address	0x2235, 0x00

P2.54	Medium frequency vibration control frequency	Setting range	Default	Unit	Applicable mode		
		1–2000	100	Hz	P	S	T

This parameter specifies the frequency for medium frequency vibration control.

P2.54	Data size	16bit	Data format	DEC
	Modbus communication address	1508, 1509	CANopen communication address	0x2236, 0x00

P2.55	Inertia fine tuning of medium frequency vibration control	Setting range	Default	Unit	Applicable mode		
		1–1000	100	%	P	S	T

This parameter specifies the inertia adjustment for medium frequency vibration control. The default value 100% indicates that no inertia adjustment is performed for medium frequency vibration control.

P2.55	Data size	16bit	Data format	DEC
	Modbus communication address	1510, 1511	CANopen communication address	0x2237, 0x00

P2.56	Attenuation gain of medium frequency vibration control	Setting range	Default	Unit	Applicable mode		
		0–1000	0	%	P	S	T

This parameter specifies the attenuation gain for medium frequency vibration control. The default value 0 indicates that there is no attenuation effect on medium frequency vibration control. You can set this parameter based on the actual commissioning result. Ideally, if this parameter is set to 100%, the medium frequency vibration is controlled completely.

P2.56	Data size	16bit	Data format	DEC
	Modbus communication address	1512, 1513	CANopen communication address	0x2238, 0x00

P2.57	Fine tuning of medium frequency vibration control filter time 1	Setting range	Default	Unit	Applicable mode		
		-10.00–10.00	0.00	ms	P	S	T

This parameter is used to set the fine tuning of medium frequency vibration control filter time 1, which can be calculated automatically based on P2.54 [Medium frequency vibration control frequency]. You can carry out fine tuning via this parameter.

P2.57	Data size	16bit	Data format	DEC
	Modbus communication address	1514, 1515	CANopen communication address	0x2239, 0x00

P2.58	Fine tuning of medium frequency vibration control filter time 2	Setting range	Default	Unit	Applicable mode		
		-10.00–10.00	0.00	ms	P	S	T

This parameter is used to set the fine tuning of medium frequency vibration control filter time 2, which can be calculated automatically based on P2.54 [Medium frequency vibration control frequency]. You can carry out fine tuning via this parameter.

P2.58	Data size	16bit	Data format	DEC
	Modbus communication address	1516, 1517	CANopen communication address	0x223A, 0x00

P2.60[2]	Speed observer	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	S	T

This parameter specifies whether the speed observer is valid.

Set value	Function
[0]	Invalid
1	Speed observation
2	Speed observation

P2.60[2]	Data size	16bit	Data format	DEC
	Modbus communication address	1520, 1521	CANopen communication address	0x223C, 0x00

P2.61	Speed observer gain	Setting range	Default	Unit	Applicable mode		
		1–1000	100	Hz	P	S	T

This parameter is used to set the gain of the speed observer. Increasing the setting value may increase the response speed of the actual speed, but the vibration and noise may be raised too.

P2.61	Data size	16bit	Data format	DEC
	Modbus communication address	1522, 1523	CANopen communication address	0x223D, 0x00

P2.64	Pole pairs for cogging torque autotuning	Setting range	Default	Unit	Applicable mode		
		0–64	3	-	P	S	T

This parameter specifies the number of pole pairs for cogging torque autotuning of a linear motor to avoid accidental error in single pole-pair autotuning.

P2.64	Data size	16bit	Data format	DEC
	Modbus communication address	1528, 1529	CANopen communication address	0x2240, 0x00

P2.65	Validity of cogging torque compensation	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable the cogging torque compensation.

Set value	Function
[0]	Invalid
1	Cogging torque compensation

P2.65	Data size	16bit	Data format	DEC
	Modbus communication address	1530, 1531	CANopen communication address	0x2241, 0x00

		Setting range	Default	Unit	Applicable mode		
P2.66	Effective starting speed for cogging torque compensation	0–1000	0	r/min	P	S	T

This parameter specifies the minimum effective speed for enabling cogging torque compensation. The compensation is valid when the speed command exceeds this value.

P2.66	Data size	16bit	Data format	DEC
	Modbus communication address	1532, 1533	CANopen communication address	0x2242, 0x00

		Setting range	Default	Unit	Applicable mode		
P2.67	Cogging torque autotuning	0–4	0	-	P	S	T

This parameter is used to start cogging torque autotuning. It is recommended to perform the autotuning under no-load conditions.

Set value	Function
[0]	Disable
1	Forward rotation and then reverse rotation
2	Reverse rotation and then forward rotation
3	Forward rotation
4	Reverse rotation

P2.67	Data size	16bit	Data format	DEC
	Modbus communication address	1534, 1535	CANopen communication address	0x2243, 0x00

		Setting range	Default	Unit	Applicable mode		
P2.68	Cogging torque autotuning speed	0–100	50	r/min	P	S	T

This parameter specifies the motor running speed during cogging torque autotuning.				
P2.68	Data size	16bit	Data format	DEC
	Modbus communication address	1536, 1537	CANopen communication address	0x2244, 0x00

P2.69	Viscous friction compensation gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	0	%/1000rpm	P	S	T
This parameter specifies the viscous friction compensation gain.							
P2.69	Data size	16bit	Data format	DEC			
	Modbus communication address	1538, 1539	CANopen communication address	0x2245, 0x00			

P2.70	Friction compensation cut-off speed	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1000	20	r/min	P	S	-
This parameter is used to set the cut-off speed of friction compensation.							
P2.70	Data size	16bit	Data format	DEC			
	Modbus communication address	1540, 1541	CANopen communication address	0x2246, 0x00			

P2.71	Positive torque coefficient of friction compensation	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–100.0	0.0	%/(10r/min)	P	S	-
This parameter is used to set the friction compensation value added to torque command when a forward position command or speed command is received.							
P2.71	Data size	16bit	Data format	DEC			
	Modbus communication address	1542, 1543	CANopen communication address	0x2247, 0x00			

P2.72	Negative torque coefficient of friction compensation	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-100.0–0.0	0.0	%/(10r/min)	P	S	-
This parameter is used to set the friction compensation value added to torque command							

when a negative position command or speed command is received.				
P2.72	Data size	16bit	Data format	DEC
	Modbus communication address	1544, 1545	CANopen communication address	0x2248, 0x00

P2.73	Friction compensation	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	-

This parameter specifies whether friction compensation is valid.

Set value	Function
[0]	Valid during ACC only
1	Valid during both ACC and DEC

P2.73	Data size	16bit	Data format	DEC
	Modbus communication address	1546, 1547	CANopen communication address	0x2249, 0x00

P2.74	Automatic mode switch	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies whether the automatic mode is valid.

Set value	Function
[0]	Invalid
1	Valid

P2.74	Data size	16bit	Data format	DEC
	Modbus communication address	1548, 1549	CANopen communication address	0x224A, 0x00

P2.75	Automatic mode gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–3276.7	40.0	-	P	S	T

This parameter specifies the automatic mode gain.

P2.75	Data size	16bit	Data format	DEC
	Modbus communication address	1550, 1551	CANopen communication address	0x224B, 0x00

P2.76	Automatic mode inertia fine-tuning	Setting range	Default	Unit	Applicable mode		
		0–1000	100	%	P	S	T
This parameter specifies the automatic mode inertia fine-tuning.							
P2.76	Data size	16bit	Data format		DEC		
	Modbus communication address	1552, 1553	CANopen communication address		0x224C, 0x00		

P2.77	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.77	Data size	16bit	Data format		DEC		
	Modbus communication address	1554, 1555	CANopen communication address		0x224D, 0x00		

P2.78	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.78	Data size	16bit	Data format		DEC		
	Modbus communication address	1556, 1557	CANopen communication address		0x224E, 0x00		

P2.79	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.79	Data size	16bit	Data format		DEC		
	Modbus communication address	1558, 1559	CANopen communication address		0x224F, 0x00		

P2.80	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							

P2.80	Data size	16bit	Data format	DEC
	Modbus communication address	1560, 1561	CANopen communication address	0x2250, 0x00

P2.81	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.81	Data size	32bit	Data format	DEC			
	Modbus communication address	1562, 1563	CANopen communication address	0x2251, 0x00			

P2.82	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.82	Data size	32bit	Data format	DEC			
	Modbus communication address	1564, 1565	CANopen communication address	0x2252, 0x00			

P2.83	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.83	Data size	32bit	Data format	DEC			
	Modbus communication address	1566, 1567	CANopen communication address	0x2253, 0x00			

P2.84	(Reserved)	Setting range	Default	Unit	Applicable mode		
		-	-	-	P	S	T
This parameter cannot be modified.							
P2.84	Data size	32bit	Data format	DEC			
	Modbus communication address	1568, 1569	CANopen communication address	0x2254, 0x00			

P2.85	Torque feed-forward selection	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter is used to set the torque feed-forward selection.

Set value	Function
[0]	Speed command feed-forward
1	Position command feed-forward

P2.85	Data size	16bit	Data format	DEC
	Modbus communication address	1570, 1571	CANopen communication address	0x2255, 0x00

P2.86	Flux-weakening control switch	Setting range	Default	Unit	Applicable mode		
		0–3	0	-	P	S	T

This parameter specifies whether the flux-weakening control is effective and the mode of flux-weakening control.

Set value	Function
[0]	Invalid
1	Open-loop flux-weakening
2	Closed-loop flux-weakening
3	Closed-loop flux-weakening with feed-forward

P2.86	Data size	16bit	Data format	DEC
	Modbus communication address	1572, 1573	CANopen communication address	0x2256, 0x00

P2.87	Voltage utilization in flux-weakening control	Setting range	Default	Unit	Applicable mode		
		1–99	90	%	P	S	T

This parameter specifies voltage utilization in flux-weakening control.

P2.87	Data size	16bit	Data format	DEC
	Modbus communication address	1574, 1575	CANopen communication address	0x2257, 0x00

P2.88	Open-loop flux-weakening bandwidth	Setting range	Default	Unit	Applicable mode		
		1–500	50	%	P	S	T

This parameter specifies the open-loop flux-weakening bandwidth.				
P2.88	Data size	16bit	Data format	DEC
	Modbus communication address	1576, 1577	CANopen communication address	0x2258, 0x00

P2.89	Closed-loop flux-weakening bandwidth	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.01–100	2.00	%	P	S	T
This parameter specifies the closed-loop flux-weakening bandwidth.							
P2.89	Data size	16bit	Data format	DEC			
	Modbus communication address	1578, 1579	CANopen communication address	0x2259, 0x00			

P2.90	Max. flux-weakening current in closed-loop flux-weakening control	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–100	90	%	P	S	T
This parameter specifies the max. flux-weakening current in closed-loop flux-weakening control.							
P2.90	Data size	16bit	Data format	DEC			
	Modbus communication address	1580, 1581	CANopen communication address	0x225A, 0x00			

P2.91	Unbiased control gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–2000	300	1/s	P	S	T
This parameter specifies the unbiased control gain, which determines the position response of the model loop. A higher gain results in faster response but may cause overshoot. It is typically set to 1 to 5 times the position loop gain.							
P2.91	Data size	16bit	Data format	DEC			
	Modbus communication address	1582, 1583	CANopen communication address	0x225B, 0x00			

P2.92	Unbiased control decay coefficient	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		50–200	100	%	P	S	T
This parameter specifies the unbiased control decay coefficient, which determines the control damping of the model loop. Since the model loop is decoupled based on accurately identified inertia, any deviation in the inertia ratio may lead to incorrect damping, potentially causing overshoot or oscillation. Therefore, it is recommended to set this parameter after performing inertia ratio learning. Increasing the damping suppresses vibration, while decreasing it improves response speed.							
P2.92	Data size	16bit	Data format	DEC			
	Modbus communication address	1584, 1585	CANopen communication address	0x225C, 0x00			

7.4 Group P3 I/O management parameters

7.4.1 Digital input/output configuration

P3.00[1]	Input configuration of digital 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x003	-	P	S	T

This parameter specifies the input of digital 1. It is in the hexadecimal format.
In the expression of 0x*——, * indicates the valid mode, the value 0 indicates the input is valid when the optical coupler is conductive, while the value 1 indicates the input is valid when the optical coupler is not conductive.
In the expression of 0x—**, ** indicate the function settings.
The detailed function settings are listed as follows:

Signal name	**Symbol**	**Set value**		**Applicable mode**		
		Valid when optical coupler not conducted	**Valid when optical coupler conducted**			
Invalid	—	0x100	0x000	P	S	T
Positive direction drive disabled	POT	0x101	0x001	P	S	T
Negative direction drive disabled	NOT	0x102	0x002	P	S	T
Servo enabled	SON	0x103	0x003	P	S	T

Alarm clearing	CLA	0x104	0x004	P	S	T
Control mode switchover	MCH	0x105	0x005	P	S	T
Gain switchover	PLC	0x106	0x006	P	S	T
Residual pulses clearing	RPC	0x107	0x007	P	-	-
Command pulse disabled	PLL	0x108	0x008	P	-	-
Torque limit switchover	TLC	0x109	0x009	P	S	-
Internal speed command 1	SPD1	0x10A	0x00A	-	S	T
Internal speed command 2	SPD2	0x10B	0x00B	-	S	T
Internal speed command 3	SPD3	0x10C	0x00C	-	S	-
Zero-speed clamp	ZRS	0x10D	0x00D	-	S	T
Speed command sign	S-SIGN	0x10E	0x00E	-	S	-
Torque command sign	T-SIGN	0x10F	0x00F	-	-	T
Internal position command 1	POS1	0x110	0x010	P	-	-
Internal position command 2	POS2	0x111	0x011	P	-	-
Internal position command 3	POS3	0x112	0x012	P	-	-
Internal position command 4	POS4	0x113	0x013	P	-	-
External fault	EXT	0x114	0x014	P	S	T
Inertia ratio switchover	JC	0x115	0x015	P	S	T
Emergency stop	EMG	0x116	0x016	P	S	T
HOME switch input	HOME	0x117	0x017	P	-	-
Triggering homing	HTRG	0x118	0x018	P	-	-
Numerator 1 of electric gear ratio	SC1	0x119	0x019	P	-	-
Numerator 2 of electric gear ratio	SC2	0x11A	0x01A	P	-	-
PTP control trigger	TRIG	0x11B	0x01B	P	-	-
Input switchover for vibration suppression	VS-SEL	0x11C	0x01C	P	-	-
Quick stop	Q-STOP	0x11D	0x01D	P	S	T

PTP control stop	PTP-ST	0x11E	0x01E	P	-	-
Absolute position clearing	PCLR	0x11F	0x01F	P	-	-
Internal position command 5	POS5	0x120	0x020	P	-	-
Internal position command 6	POS6	0x121	0x021	P	-	-
Internal position command 7	POS7	0x122	0x022	P	-	-
Forward jogging	FJOG	0x123	0x023	P	-	-
Reverse jogging	RJOG	0x124	0x024	P	-	-
High/low speed switching of jogging	JOGC	0x125	0x025	P	-	-
Reserved	-	0x126	0x026	-	-	-
Reserved	-	0x127	0x027	-	-	-
Reserved	-	0x128	0x028	-	-	-
Reserved	-	0x129	0x029	-	-	-
Reserved	-	0x12A	0x02A	-	-	-
Reserved	-	0x12B	0x02B	-	-	-
Terminal JOG enabling	DJOG	0x12C	0x02C	P	-	-
Gantry synchronization input clear	GIN	0x12D	0x02D	P	-	-
Master gantry synchronization alignment sensor	GSM	0x12E	0x02E	P	-	-
Slave gantry synchronization alignment sensor	GSS	0x12F	0x02F	P	-	-
Dynamic braking relay feedback	DBS	0x130	0x030	P	S	T
Manual and automatic switching of turret	DAT	0x131	0x031	P	-	-
Forward jogging of turret	DFJ	0x132	0x032	P	-	-
Reverse jogging of turret	DRJ	0x133	0x033	P	-	-
Switching between fully-closed loop and semi-closed loop	FCS	0x134	0x034	P	-	-

PTP terminal pause	PSTOP	0x135	0x035	P	-	-
EzJOG terminal pause	ESTOP	0x136	0x036	P	-	-
Magnetic pole detection enable	-	0x138	0x038	P	S	T

Note: The default values indicate the functions applied in position mode.

P3.00[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1600, 1601	CANopen communication address	0x2300, 0x00

P3.01[1]	Input configuration of digital 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x00D	-	P	S	T
P3.02[1]	Input configuration of digital 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x004	-	P	S	T
P3.03[1]	Input configuration of digital 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x016	-	P	S	T
P3.04[1]	Input configuration of digital 5	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x019	-	P	S	T
P3.05[1]	Input configuration of digital 6	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x01A	-	P	S	T
P3.06[1]	Input configuration of digital 7	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x001	-	P	S	T
P3.07[1]	Input configuration of digital 8	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x002	-	P	S	T
P3.08[1]	Input configuration of digital 9	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x007	-	P	S	T
P3.09[1]	Input configuration of digital 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x136	0x008	-	P	S	T

These parameters are used to set the input functions for digitals 2 to 10. These parameters are in the hexadecimal format. The setting method is the same as P3.00.

Note: The default values indicate the functions applied in position mode.

P3.01[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1602, 1603	CANopen communication address	0x2301, 0x00
P3.02[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1604, 1605	CANopen communication address	0x2302, 0x00
P3.03[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1606, 1607	CANopen communication address	0x2303, 0x00
P3.04[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1608, 1609	CANopen communication address	0x2304, 0x00
P3.05[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1610, 1611	CANopen communication address	0x2305, 0x00
P3.06[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1612, 1613	CANopen communication address	0x2306, 0x00
P3.07[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1614, 1615	CANopen communication address	0x2307, 0x00
P3.08[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1616, 1617	CANopen communication address	0x2308, 0x00
P3.09[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1618, 1619	CANopen communication address	0x2309, 0x00

P3.10[1]	Output configuration of digital 1	Setting range	Default	Unit	Applicable mode		
		0x000–0x11F	0x001	-	P	S	T

This parameter specifies the output of digital 1. It is in the hexadecimal format.
In the expression of 0x*——, * indicates the valid mode, the value 0 indicates the input is valid when the optical coupler is conductive, while the value 1 indicates the input is valid when the optical coupler is not conductive.
In the expression of 0x—**, ** indicate the function settings.
The detailed function settings are listed as follows:

Signal name	Symbol	Set value		Applicable mode		
		Valid when optical coupler not conducted	Valid when optical coupler conducted			
Invalid	—	0x100	0x000	P	S	T
Servo ready for output	RDY	0x101	0x001	P	S	T
Servo run output	RUN	0x102	0x002	P	S	T
Fault output	ALM	0x103	0x003	P	S	T
Reserved	-	0x104	0x004	-	-	-
Electromagnetic brake release signal	BRK	0x105	0x005	P	S	T
Position command validity	PCMD	0x106	0x006	P	-	-
Positioning completed	PLR	0x107	0x007	P	-	-
Control mode switchover status	MCHS	0x108	0x008	P	S	T
Speed consistent	COIN	0x109	0x009	P	S	T
Speed reached	SR	0x10A	0x00A	P	S	T
Speed being limited	SL	0x10B	0x00B	-	-	T
Speed command validity	SCMD	0x10C	0x00C	-	S	-
Zero output of speed	ZSO	0x10D	0x00D	P	S	T
Torque being limited	LM	0x10E	0x00E	P	S	T
Zeroing completed	HEND	0x10F	0x00F	P	-	-
Torque reaching	TRCH	0x110	0x010	-	-	T
Reserved	-	0x111	0x011	-	-	-
Reserved	-	0x112	0x012	-	-	-
Reserved	-	0x113	0x013	-	-	-
Reserved	-	0x114	0x014	-	-	-

Reserved	-	0x115	0x015	-	-	-
PTP arrival	PTPF	0x116	0x016	P	-	-
PTP output 1	PTPO1	0x117	0x017	P	-	-
PTP output 2	PTPO2	0x118	0x018	P	-	-
PTP output 3	PTPO3	0x119	0x019	P	-	-
PTP output 4	PTPO4	0x11A	0x01A	P	-	-
PTP output 5	PTPO5	0x11B	0x01B	P	-	-
PTP output 6	PTPO6	0x11C	0x01C	P	-	-
PTP output 7	PTPO7	0x11D	0x01D	P	-	-
Gantry synchronization output clear	GSC	0x11E	0x01E	P	-	-
Dynamic braking relay control	DBRC	0x11F	0x01F	P	S	T

Note: The default values indicate the functions applied in position mode.

P3.10[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1620, 1621	CANopen communication address	0x230A, 0x00

P3.11[1]	Output configuration of digital 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x11F	0x003	-	P	S	T
P3.12[1]	Output configuration of digital 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x11F	0x007	-	P	S	T
P3.13[1]	Output configuration of digital 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x000–0x11F	0x00D	-	P	S	T

These parameters are used to set the output functions for digitals 2 to 6. These parameters are in the hexadecimal format. The setting method is the same as P3.10.

Note: The default values indicate the functions applied in position mode.

P3.11[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1622, 1623	CANopen communication address	0x230B, 0x00
P3.12[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1624, 1625	CANopen communication address	0x230C, 0x00

P3.13[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1626, 1627	CANopen communication address	0x230D, 0x00

P3.16	Channel 1 DI-captured encoder function configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–30A	0	-	P	S	T
DI capture settings: 1–10 correspond to capture ports DI1–DI10. For falling edge capture, add 256 to the corresponding value; for rising edge capture, add 512; for both rising and falling edge capture, add 768.							
P3.16	Data size	16bit	Data format	HEX			
	Modbus communication address	1632, 1633	CANopen communication address	0x2310, 0x00			

P3.17	Channel 2 DI-captured encoder function configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–30A	0	-	P	S	T
DI capture settings: 1–10 correspond to capture ports DI1–DI10. For falling edge capture, add 256 to the corresponding value; for rising edge capture, add 512; for both rising and falling edge capture, add 768.							
P3.17	Data size	16bit	Data format	HEX			
	Modbus communication address	1634, 1635	CANopen communication address	0x2311, 0x00			

P3.18	Encoder sampling delay for probe capture	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-1–30000	0	10ns	P	S	T
When using the DI1/2 probe function, this parameter sets the sampling delay time of the communication encoder. **Note:** If this parameter is set to -1, no probe compensation is performed, and the probe capture accuracy is low.							
P3.18	Data size	16bit	Data format	HEX			
	Modbus communication address	1636, 1637	CANopen communication address	0x2312, 0x00			

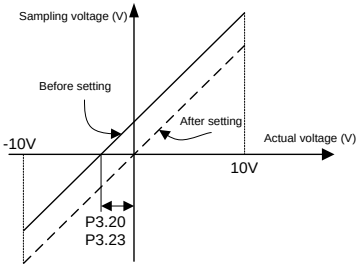
7.4.2 Analog input/output adjustment

P3.20	Offset of analog input 1	Setting range	Default	Unit	Applicable mode		
		-10.000–10.000	0.000	V	P	S	T

This parameter is used to adjust analog input 1 to improve the effective accuracy of the analog input.

Due to reasons such as the zero drift of analog input devices or induced voltage in the ambient environment, the actual analog input value may deviate from the expected value, and such deviation can be eliminated by setting the offset of AI.

See the following figure for the analog input offset voltage:

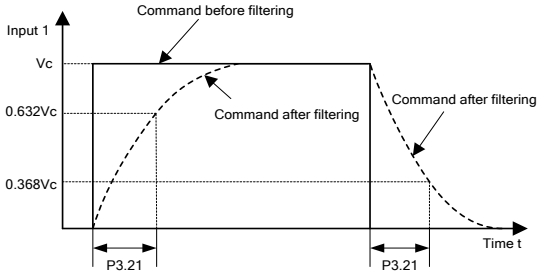


Example: After analog input 1 command terminal of the drive is connected to the analog reference signal, even if the analog reference signal is 0, the voltage value of analog input 1 (R1.05) displayed by the panel will be 0.02V, P3.20 must be set to 0.02 at this time. The drive automatically subtracts 0.02V from the analog input value received. If the analog input 2 voltage displayed by the panel is -0.02V, P3.20 must be set to -0.02. The drive automatically adds 0.02V to the analog input value received, and the value displayed by the panel changes at the same time.

P3.20	Data size	32bit	Data format	DEC
	Modbus communication address	1640, 1641	CANopen communication address	0x2314, 0x00

P3.21	Filter of AI 1	Setting range	Default	Unit	Applicable mode		
		0.0–1000.0	1.0	ms	P	S	T

This parameter is used to set the time constant of the first-order low-pass filter corresponding to analog input 1. Setting this parameter can smooth the command change when the analog input changes sharply. See the figure below.



P3.21	Data size	16bit	Data format	DEC
	Modbus communication address	1642, 1643	CANopen communication address	0x2315, 0x00

P3.22	OV protection threshold of AI 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.000–10.000	0.000	V	P	S	T

This parameter is used to set the overvoltage protection threshold of analog input 1.
If the absolute value of R1.05 exceeds the set value of this parameter, the system reports a fault.

Note:

- The default value 0 indicates OV protection is not used.
- The setting of this parameter cannot be greater than 10V. Otherwise, the drive may be damaged.

P3.22	Data size	32bit	Data format	DEC
	Modbus communication address	1644, 1645	CANopen communication address	0x2316, 0x00

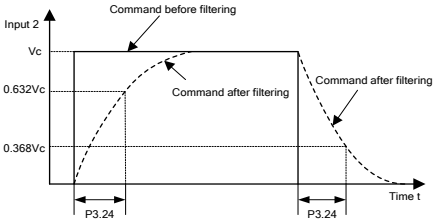
P3.23	Offset of analog input 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-10.000–10.000	0.000	V	P	S	T

This parameter is used to adjust analog input 2 to improve the effective accuracy of the analog input. The setting method is the same as P3.20.

P3.23	Data size	32bit	Data format	DEC
	Modbus communication address	1646, 1647	CANopen communication address	0x2317, 0x00

P3.24	Filter of AI 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–1000.0	1.0	ms	P	S	T

This parameter is used to set the time constant of the first-order low-pass filter corresponding to the command. Setting this parameter can smooth the changing of actual output command when the command changes sharply. See the figure below.



P3.24	Data size	16bit	Data format	DEC
	Modbus communication address	1648, 1649	CANopen communication address	0x2318, 0x00

P3.25	OV protection threshold of AI 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.000–10.000	0.000	V	P	S	T

This parameter is used to set the overvoltage protection threshold of analog input 2.

Note:

- The default value 0 indicates OV protection is not used.
- The setting of this parameter cannot be greater than 10V. Otherwise, the drive may be damaged.

P3.25	Data size	32bit	Data format	DEC
	Modbus communication address	1650, 1651	CANopen communication address	0x2319, 0x00

P3.26[1]	Function of AI 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–7	0	-	P	S	T
P3.27[1]	Function of AI 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–7	3	-	P	S	T

Select the analog input channel function via these parameters.

Set value	Definition	Unit
[0]	Invalid	-
1	Speed limit	r/min
2	Forward torque limit	0.1%
3	Speed command	r/min

	4	Torque command	0.1%
	5	Speed observation	r/min
	6	Torque compensation	0.1%
	7	Negative torque limit	0.1%

P3.26[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1652, 1653	CANopen communication address	0x231A, 0x00
P3.27[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1654, 1655	CANopen communication address	0x231B, 0x00

P3.28	Analog speed compensation gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–100.0	0.0	%	P		
This parameter is used to set the analog speed compensation gain.							
P3.28	Data size	16bit	Data format	DEC			
	Modbus communication address	1656, 1657	CANopen communication address	0x231C, 0x00			

P3.29	Analog torque compensation gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–100.0	0.0	%	P	S	T
This parameter is used to set the analog torque compensation gain.							
P3.29	Data size	16bit	Data format	DEC			
	Modbus communication address	1658, 1659	CANopen communication address	0x231D, 0x00			

P3.30[1]	Function of analog output 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–19	0	-	P	S	T
P3.32[1]	Function of analog output 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–19	0	-	P	S	T
These parameters are used to select the monitoring parameters to be outputted in analog form.							

Set value	Definition	Unit
[0]	Invalid	-
1	Motor speed	r/min
2	Speed of position command	r/min
3	Internal position command	pulse (encoder unit)
4	Speed command	r/min
5	Torque command	0.1%
6	Torque feedback	0.1%
7	Command position deviation	reference unit
8	Encoder position deviation	pulse (encoder unit)
9	Fully-closed loop position deviation	pulse (grating ruler unit)
10	Hybrid control deviation	reference unit
11	Main circuit DC voltage	V
12	Forward torque limit	0.1%
13	Negative torque limit	0.1%
14	Speed limit	r/min
15	Inertia ratio	%
16	Analog input 1*	V
17	Analog input 2*	V
18	Analog input 3*	V
19	Drive temperature	℃

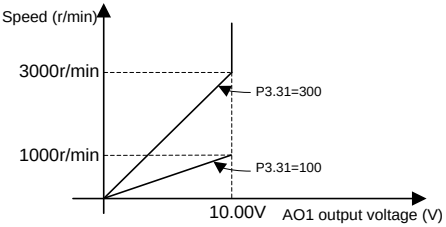
Note: * If P3.31 and P3.33 are set to 1000, analog input 1, analog input 2 and analog input 3 can output the voltage value inputted from the analog input terminals at any time.

P3.30[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1660, 1661	CANopen communication address	0x231E, 0x00
P3.32[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1664, 1665	CANopen communication address	0x2320, 0x00

P3.31	Voltage gain of analog output 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–214748364	1	[P3.30 unit]/V	P	S	T
P3.33	Voltage gain of analog output 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–214748364	1	[P3.32 unit]/V	P	S	T
These parameters are used to set the gain of analog output. The detailed unit is relative to							

P3.30 and P3.32.

Example: Suppose the actual speed is outputted from the AO1 terminal, 10V corresponds to a speed of 3000r/min and 0V corresponds to 0. Then set P3.30=1, P3.31=300, the relation between the actual speed reference and output voltage is shown as below:



Note:

- In the example, when the actual output speed is equal to or greater than 3000r/min, AO1 output is 10V. Select proper gain according to the actual situation.
- If other functions are set for P3.30 and P3.32, the gain setting method is similar.

P3.31	Data size	32bit	Data format	DEC
	Modbus communication address	1662, 1663	CANopen communication address	0x231F, 0x00
P3.33	Data size	32bit	Data format	DEC
	Modbus communication address	1666, 1667	CANopen communication address	0x2321, 0x00

P3.34	Offset voltage of analog output 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-10.000–10.000	0.000	V	P	S	T
P3.35	Offset voltage of analog output 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-10.000–10.000	0.000	V	P	S	T

These parameters can be used to adjust the AO1 and AO2 to regulate the actual value of analog output voltage. Actual value of analog output voltage = Original value of analog output voltage + Offset value of analog output voltage

P3.34	Data size	32bit	Data format	DEC
	Modbus communication address	1668, 1669	CANopen communication address	0x2322, 0x00
P3.35	Data size	32bit	Data format	DEC
	Modbus communication	1670, 1671	CANopen communication	0x2323, 0x00

	address		address	

P3.36[1]	Analog output monitoring setting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–2	0	-	P	S	T

This parameter is used to set the output mode and voltage range of the analog output.

Set value	**Output mode**
[0]	Voltage output with sign (-10V–10V)
1	Absolute voltage output (0V–10V)
2	Voltage output with zero offset (0V–10V, 5V center)

P3.36[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1672, 1673	CANopen communication address	0x2324, 0x00

P3.37*	Communication-based control analog output 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483648–2147483648	0	-	P	S	T

Communication-based control analog output 1 is valid when P3.30 is 0.

P3.37*	Data size	32bit	Data format	DEC
	Modbus communication address	1674, 1675	CANopen communication address	0x2325, 0x00

P3.38*	Communication-based control analog output 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483648–2147483648	0	-	P	S	T

Communication-based control analog output 2 is valid when P3.32 is 0.

P3.38*	Data size	32bit	Data format	DEC
	Modbus communication address	1676, 1677	CANopen communication address	0x2326, 0x00

P3.39	Communication-based control I/O output	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0FFF	0	-	P	S	T

Communication control I/O output, enabled by the bit 12 of P4.43. A, B, C indicates three hex numbers, corresponding to digital outputs 1–4 respectively.
Ah: Digital output state after communication disconnection (24-D alarm).
0: Invalid, by default, and digital output state is unchanged;

1: Enable, digital output state becomes 0.
Bh: Digital output enable.
0: Invalid, by default;
1: Enable, corresponding to digital output enable.
Ch: Digital output control.
0: Corresponding to digital output 0 (logic state);
1: Corresponding to digital output 1 (logic state).

P3.39	Data size	16bit	Data format	HEX
	Modbus communication address	1678, 1679	CANopen communication address	0x2327, 0x00

7.4.3 Digital input/output settings

P3.40[1]	Disable travel limit switch	Setting range	Default	Unit	Applicable mode		
		0–2	1	-	P	S	T

This parameter specifies whether the forward drive disabling (0x001 or 0x101) digital input and reverse drive disabling (0x002 or 0x102) digital inputs in P3.00–P3.09 are valid. You can disable the travel limit switch function by setting this parameter.

Set value	Function
0	The travel limit switch is normal
[1]	The travel limit switch is disabled
2	A limit exceeding fault occurs.

Note: When the travel limit switch is normal and the digital input configured as forward drive disabling is active, the motor will stop immediately and cannot continue to run forward, but it is able to receive the reverse running command.

P3.40[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1680, 1681	CANopen communication address	0x2328, 0x00

P3.41[1]	Disable emergency stop switch	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies whether the emergency stop (0x016 or 0x116) digital inputs in P3.00–P3.09 are valid. You can disable the emergency stop function by setting this parameter.

Set value	Function
0	The emergency stop switch is normal.
[1]	The emergency stop switch is disabled.

If the digital input of emergency stop is valid, the alarm Er10-4 is reported.

Note:

- If the alarm Er10-4 is reported, the servo motor stops in the mode specified by P4.30.
- To clear the alarm Er10-4, ensure there is no danger for operating, clear the alarm signal (that is, disable the digital input of emergency stop), clear the alarm display, and then restart the servo drive.

P3.41[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1682, 1683	CANopen communication address	0x2329, 0x00

P3.43[1]	Digital input filter	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–800	1	0.125ms	P	S	T

This parameter specifies the filter time of the digital input.

Note: This parameter independently functions for 10 digital inputs.

P3.43[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1686, 1687	CANopen communication address	0x232B, 0x00

P3.44	Command pulse input invalid setting disabled	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-

This parameter specifies whether the command pulse disabling (0x008 or 0x108) digital inputs in P3.00–P3.09 are valid. You can disable the command pulse disabling function by setting this parameter.

0: The command pulse disabled input function is valid.

0: The command pulse disabled input function is invalid.

P3.44	Data size	16bit	Data format	DEC
	Modbus communication address	1688, 1689	CANopen communication address	0x232C, 0x00

P3.45[1]	Residual pulse clearing mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	1	-	P	-	-

This parameter specifies the valid mode for the residual pulse clearing (0x007 or 0x107) digital inputs in P3.00–P3.09.

Set value	Function
0	ON level clearing
[1]	Rising edge clearing

P3.45[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1690, 1691	CANopen communication address	0x232D, 0x00

P3.46	Internal speed limit accuracy setting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-
This parameter specifies the accuracy of speed limits P4.31, P4.40 and P4.41.							
P3.46	Data size	16bit	Data format	DEC			
	Modbus communication address	1692, 1693	CANopen communication address	0x232E, 0x00			

P3.50	Range of position arrival	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–2^{18}	100	reference unit	P	-	-
This parameter specifies the position arrival range. If the deviation between the position feedback pulse and position command pulse is in this range, it indicates position arrival.							
P3.50	Data size	32bit	Data format	DEC			
	Modbus communication address	1700, 1701	CANopen communication address	0x2332, 0x00			

P3.51	Output mode of position arrival	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–4	0	-	P	-	-

This parameter specifies the condition for the position arrival output signal and the action mode after output.

Set value	Output mode
[0]	The output is valid when the position deviation is in the range of P3.50.
1	The output is valid when there is no position command and the position deviation is in the range of P3.50.
2	The output is valid when there is no position command, the zero-speed detection signal is valid, and the position deviation is in the range of P3.50.
3	The output is valid when there is a transition from with a position command to without a position command and the position deviation is in the range of P3.50. Subsequently, the system continuously outputs the valid state within the time specified by P3.52. Then, the system updates the output status of position arrival based on the position command and position deviation.

4	The output is valid when there is a transition from with a position command to without a position command and the position deviation is in the range of P3.50. Subsequently, the system continuously outputs the valid state within the time specified by P3.52.

P3.51	Data size	16bit	Data format	DEC
	Modbus communication address	1702, 1703	CANopen communication address	0x2333, 0x00

P3.52	Hold time of position arrival output terminal	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–30000	0	ms	P	-	-

This parameter specifies the hold time of the position arrival output terminal.

Set value	Action
[0]	The hold time becomes infinite and remains active until the next position command is received.
1–30000	The hold time only remains active for the set duration [ms]. It immediately becomes inactive if a position command is received during the hold period.

P3.52	Data size	16bit	Data format	DEC
	Modbus communication address	1704, 1705	CANopen communication address	0x2334, 0x00

P3.53	Speed consistency range	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		10–20000	50	r/min	P	S	T

This parameter specifies the condition for detecting speed consistency.
If the difference between the speed command and motor speed is less than the setting of this parameter, then the speed consistency output status is valid.
If the detection finds there is a lag of 10 r/min, the actual speed consistency range is as follows:
Speed consistent output:
Threshold for transition from invalid to valid: (P3.53 – 10) r/min.
Threshold for transition from valid to invalid: (P3.53 + 10) r/min.

P3.53	Data size	16bit	Data format	DEC
	Modbus communication address	1706, 1707	CANopen communication address	0x2335, 0x00

P3.54	Speed reaching range	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		10–20000	1000	r/min	P	S	T
This parameter specifies the condition for detecting speed reaching output. If the transient motor speed [R0.21] exceeds the setting of this parameter, the output is valid. The detection finds a lag of 10 r/min.							
P3.54	Data size	16bit	Data format	DEC			
	Modbus communication address	1708, 1709	CANopen communication address	0x2336, 0x00			

P3.55	Zero speed range	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		10–20000	50	r/min	P	S	T
This parameter specifies the condition for detecting zero speed output. When the absolute value of the motor speed is within this range, the speed is considered as zero speed and the zero speed output signal is valid. The detection finds a lag of 10 r/min.							
P3.55	Data size	16bit	Data format	DEC			
	Modbus communication address	1710, 1711	CANopen communication address	0x2337, 0x00			

P3.56	Servo lock time after braking	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1000	50	ms	P	S	T
This parameter specifies the locked time of the servo after braking in locked state. If the servo is off in locked state, the digital output of the electromagnetic brake release signal (0x005 or 0x105) is invalid. Then the servo keeps being locked for a period of time so that the motor does not rotate during the action of the relay.							
P3.56	Data size	16bit	Data format	DEC			
	Modbus communication address	1712, 1713	CANopen communication address	0x2338, 0x00			

P3.57	Electromagnetic brake closing delay	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–30000	500	ms	P	S	T
This parameter specifies the delay time of closing the electromagnetic brake. If the servo is off or an alarm is reported in running state and the speed may be too fast, the digital output of the electromagnetic brake release signal (0x005 or 0x105) becomes invalid after a period of delay. If the motor speed drops below the setting of P3.58 during the delay period, the							

digital output becomes invalid in advance.				
P3.57	Data size	16bit	Data format	DEC
	Modbus communication address	1714, 1715	CANopen communication address	0x2339, 0x00

P3.58[1]	Motor speed threshold at brake release	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	30	r/min	P	S	T
This parameter specifies the motor speed threshold when the brake is released.							
P3.58[1]	Data size	16bit	Data format	DEC			
	Modbus communication address	1716, 1717	CANopen communication address	0x233A, 0x00			

P3.59	Torque reaching range	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		5.0–300.0	50.0	%	-	-	T
This parameter specifies the condition for detecting torque reaching output. If the motor torque feedback exceeds the setting of this parameter, the output of torque reaching (0x010 or 0x110) is valid. There is 5% lag in detection.							
P3.59	Data size	16bit	Data format	DEC			
	Modbus communication address	1718, 1719	CANopen communication address	0x233B, 0x00			

7.4.4 Analog input 3 adjustment

P3.70[1]	Function of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–7	4	-	P	S	T

This parameter is used to select the functions of analog input 3.

Set value	Definition	Unit
0	Invalid	-
1	Speed limit	r/min
2	Forward torque limit*[1]	0.1%
3	Speed command*[2]	r/min
[4]	Torque command	0.1%
5	Speed observation	r/min
6	Torque compensation	0.1%
7	Negative torque limit	0.1%

*1 When P3.70 is set to 2 and P0.09 is set to 0 or 4, analog input 3 corresponds internally to a forward torque limiting function; parameters P0.62–P0.65 and P3.23–P3.25 correspond internally to a reverse torque limiting function.
*2 When P3.70 is set to 3, parameters P0.42–P0.45 and P3.20–P3.22 become invalid.

P3.70[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1740, 1741	CANopen communication address	0x2346, 0x00

P3.71	Zero offset of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-10.000–10.000	0.000	V	P	S	T

This parameter specifies the zero offset voltage of analog input 3.

P3.71	Data size	32bit	Data format	DEC
	Modbus communication address	1742, 1743	CANopen communication address	0x2347, 0x00

P3.72	Deadzone of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.000–3.000	0.000	V	P	S	T

This parameter specifies the deadzone range of analog input 3.

P3.72	Data size	16bit	Data format	DEC
	Modbus communication address	1744, 1745	CANopen communication address	0x2348, 0x00

P3.73	Analog input 3 gain	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–2000	300	[P3.70 unit]/V	P	S	T

This parameter specifies the gain of analog input 3, the gain unit is associated with P3.70.

P3.73	Data size	32bit	Data format	DEC
	Modbus communication address	1746, 1747	CANopen communication address	0x2349, 0x00

P3.74	Reverse of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies the voltage polarity of analog input 3.

Set value	**Actual detection result**

	[0]	Positive polarity	[+Voltage]→[Positive value], [-Voltage]→[Negative value]
	1	Negative polarity	[+Voltage]→[Negative value], [-Voltage]→[Positive value]

P3.74	Data size	16bit	Data format	DEC
	Modbus communication address	1748, 1749	CANopen communication address	0x234A, 0x00

P3.75	OV protection threshold of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.000–10.000	0.000	V	P	S	T

This parameter is used to set the overvoltage protection threshold of analog input 3.
If the absolute value of R1.07 exceeds the set value of this parameter, the system reports a fault.

P3.75	Data size	32bit	Data format	DEC
	Modbus communication address	1750, 1751	CANopen communication address	0x234B, 0x00

P3.76	Filter of AI 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0.0–1000.0	0.0	ms	P	S	T

This parameter is used to set the time constant of the first-order low-pass filter corresponding to analog input 3.

P3.76	Data size	16bit	Data format	DEC
	Modbus communication address	1752, 1753	CANopen communication address	0x234C, 0x00

P3.77	Analog input deadzone mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies the voltage mode of the analog input deadzone.

Set value	Meaning
[0]	Normal mode
1	CNC mode: If the analog input is equal to or less than the deadzone, the valid value is 0. If the analog input is greater than the deadzone, the valid value is (Analog input – Deadzone).

P3.77	Data size	16bit	Data format	DEC
	Modbus communication address	1754, 1755	CANopen communication address	0x234D, 0x00

P3.89	Probe DI-captured filter time	Setting range	Default	Unit	Applicable mode		
		1–250	50	20ns	P	S	T
This parameter specifies the proper probe DI-captured filter time to increase the anti-interference capability of the pulse input.							

P3.89	Data size	16bit	Data format	DEC
	Modbus communication address	1778, 1779	CANopen communication address	0x2359, 0x00

P3.90	Pulse input filter time	Setting range	Default	Unit	Applicable mode		
		1–250	20	20ns	P	S	T
This parameter specifies the filter time for detecting pulse input to increases the anti-interference capability of the input pulse.							

P3.90	Data size	16bit	Data format	DEC
	Modbus communication address	1780, 1781	CANopen communication address	0x235A, 0x00

P3.91	1st encoder filter time	Setting range	Default	Unit	Applicable mode		
		1–250	20	20ns	P	S	T
This parameter specifies the proper first encoder filter time to increase the anti-interference capability of the first encoder.							

P3.91	Data size	16bit	Data format	DEC
	Modbus communication address	1782, 1783	CANopen communication address	0x235B, 0x00

P3.92	2nd encoder filter time	Setting range	Default	Unit	Applicable mode		
		1–250	20	20ns	P	S	T
This parameter specifies the proper second encoder filter time to increase the anti-interference capability of the second encoder.							

P3.92	Data size	16bit	Data format	DEC
	Modbus communication address	1784, 1785	CANopen communication address	0x235C, 0x00

7.5 Group P4 Extension and application

7.5.1 Communication settings

P4.00[1]	EtherCAT node address	Setting range	Default	Unit	Applicable mode		
		-1–32767	-1	-	P	S	T
This parameter specifies the EtherCAT communication address.							
	Data size	16bit	Data format	DEC			
P4.00[1]	Modbus communication address	1800, 1801	CANopen communication address	0x2400, 0x00			

P4.01[1]	485 local communication address	Setting range	Default	Unit	Applicable mode		
		1–255	1	-	P	S	T
This parameter specifies the local (or slave) communication address of 485 serial communication.							
	Data size	16bit	Data format	DEC			
P4.01[1]	Modbus communication address	1802, 1803	CANopen communication address	0x2401, 0x00			

P4.02[1]	CAN communication baud rate	Setting range	Default	Unit	Applicable mode		
		0–5	1	-	P	S	T

This parameter is used to select CAN communication baud rate. Available baud rates are as follow:

Set value	Baud rate
0	1000kbps
【1】	500kbps
2	250kbps
3	125kbps
4	50kbps
5	20kbps

P4.02[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1804, 1805	CANopen communication address	0x2402, 0x00

P4.03[1]	485 communication baud rate	Setting range	Default	Unit	Applicable mode		
		0–3	1	-	P	S	T

This parameter is used to select RS485 communication baud rate. Available baud rates are as follow:

Set value	Baud rate
0	9600bps
[1]	19200bps
2	38400bps
3	57600bps

P4.03[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1806, 1807	CANopen communication address	0x2403, 0x00

P4.04[1]	485 communication parity mode	Setting range	Default	Unit	Applicable mode		
		0–5	0	-	P	S	T

This parameter is used to set the 485 communication parity mode and it only supports RTU mode.

Set value	Baud rate
[0]	No check (N, 8, 1)
1	Even check (E, 8, 1)
2	Odd check (O, 8, 1)
3	No check (N, 8, 2)
4	Even check (E, 8, 2)
5	Odd check (O, 8, 2)

P4.04[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1808, 1809	CANopen communication address	0x2404, 0x00

P4.05[1]	CAN communication node	Setting range	Default	Unit	Applicable mode		
		1–127	1	-	P	S	T

This parameter is used to set the local (or salve) node number in CAN communication.

P4.05[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1810, 1811	CANopen communication address	0x2405, 0x00

P4.06	485 communication fault clearing mode	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies the mode for handling a fault that occurs in RS485 communication.

Set value	Meaning
0	The fault is not cleared.
[1]	The fault is cleared automatically.

P4.06	Data size	16bit	Data format	DEC
	Modbus communication address	1812, 1813	CANopen communication address	0x2406, 0x00

P4.07[1]	EtherCAT synchronous cycle	Setting range	Default	Unit	Applicable mode		
		0–30	1	ms	P	S	T

This parameter specifies the synchronous cycle in EtherCAT communication.

Note: In DC mode, the synchronization cycle can be automatically identified. In Free-run mode, it must be set manually.

P4.07[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1814, 1815	CANopen communication address	0x2407, 0x00

P4.08[1]	EtherCAT synchronous type	Setting range	Default	Unit	Applicable mode		
		0–2	0	-	P	S	T

This parameter specifies the type of synchronization between the master and the slave in EtherCAT communication.

Set value	Meaning
[0]	Free-run
2	DC mode (sync0)

P4.08[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1816, 1817	CANopen communication address	0x2408, 0x00

P4.09[1]	EtherCAT fault detection time	Setting range	Default	Unit	Applicable mode		
		0–1000	100	ms	P	S	T

This parameter specifies the fault detection time in EtherCAT communication.

Note: The value 0 indicates that EtherCAT faults are not detected.

P4.09[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1818, 1819	CANopen communication address	0x2409, 0x00

7.5.2 Servo types and communication control commands

P4.10[1]	Upper computer type	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies the upper computer type which is identified by the drive control interface type of the upper computer.

Set value	Upper computer type	Control interface type
[0]	Pulse + analog	Position control/fully-closed-loop: pulse and PTP control Speed control/torque control: analog and internal settings
1	Communication bus	485 (protocol: Modbus) CAN (protocol: CANopen CiA301/402) PROFIBUS (protocol: PROFIBUS-DPV0)

P4.10[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1820, 1821	CANopen communication address	0x240A, 0x00

P4.11*	Bus servo enabling	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable the drive.

Set value	Function
[0]	Disable
1	Enable

Note: If the drive is enabled by P0.04, the drive will be disabled if P4.11 is changed from 1 to 0.

P4.11*	Data size	16bit	Data format	DEC
	Modbus communication address	1822, 1823	CANopen communication address	0x240B, 0x00

P4.12*	Bus position command	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-(2^31-1)–(2^31-1)	0	reference unit	P	-	-
This parameter specifies the position command for the drive when P4.10 is set to 1.							
P4.12*	Data size	32bit	Data format	DEC			
	Modbus communication address	1824, 1825	CANopen communication address	0x240C, 0x00			

P4.13*	Bus speed command	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-6000–6000	0	r/min	-	S	-
This parameter specifies the speed command for the drive when P4.10 is set to 1.							
P4.13*	Data size	32bit	Data format	DEC			
	Modbus communication address	1826, 1827	CANopen communication address	0x240D, 0x00			

P4.14*	Bus torque command	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-500.0–500.0	0.0	%	-	-	T
This parameter specifies the torque command for the drive when P4.10 is set to 1.							
P4.14*	Data size	16bit	Data format	DEC			
	Modbus communication address	1828, 1829	CANopen communication address	0x240E, 0x00			

P4.15*	Control mode switching command	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter can be used to switch the control mode in hybrid control mode.

Set value	Function	Actual control mode	
[0]	Disable	Position/speed	Position
		Position/torque	Position
		Position/torque	Speed

	1	Enable	Position/speed	Speed
			Position/torque	Torque
			Position/torque	Torque

Note: If the control mode switching command is updated, the actual switching process of the drive and motor will operate based on the settings of P0.90–P0.92 and actual feedback state.

P4.15*	Data size	16bit	Data format	DEC
	Modbus communication address	1830, 1831	CANopen communication address	0x240F, 0x00

P4.16*	Gain switching command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable gain switching for the drive. When P2.22, P2.27, and P2.31 are set to 2, the actual gain settings are used for switching.

Set value	Function	Actual gain
[0]	Disable	1st gain setting
1	Enable	2nd gain setting

P4.16*	Data size	16bit	Data format	DEC
	Modbus communication address	1832, 1833	CANopen communication address	0x2410, 0x00

P4.17*	Electronic gear ratio switching command	Setting range	Default	Unit	Applicable mode		
		0–3	0	-	P		

This parameter is used to switch electronic gear ratios for the drive when P4.10 is set to 1.

Set value	Numerator of actual electronic gear ratio	Denominator of actual electronic gear ratio
[0]	Numerator of electronic gear ratio 1 (P0.25)	Denominator of electronic gear ratio (P0.26)
1	Numerator of electronic gear ratio 2 (P0.27)	
2	Numerator of electronic gear ratio 3 (P0.28)	
3	Numerator of electronic gear ratio 4 (P0.29)	

P4.17*	Data size	16bit	Data format	DEC
	Modbus communication address	1834, 1835	CANopen communication address	0x2411, 0x00

P4.18*	Inertia ratio switching command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable inertia ratio switching for the drive.

Set value	Function	Actual inertia ratio
[0]	Disable	Inertia ratio 1 (P1.01)
1	Enable	Inertia ratio 2 (P1.02)

P4.18*	Data size	16bit	Data format	DEC
	Modbus communication address	1836, 1837	CANopen communication address	0x2412, 0x00

P4.19*	Zero speed clamp command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	-	S	T

This parameter specifies whether to carry out zero speed clamp operation on the drive.

Set value	Function
[0]	Disable
1	Enable

P4.19*	Data size	16bit	Data format	DEC
	Modbus communication address	1838, 1839	CANopen communication address	0x2413, 0x00

P4.20*	Residual pulses clearing	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies whether to enable residual pulse clearing on the drive. P3.45 specifies the mode for clearing residual pulses. If residual pulses are cleared, R0.04 is changed to 0.

Set value	Function
[0]	Disable
1	Enable

P4.20*	Data size	16bit	Data format	DEC
	Modbus communication address	1840, 1841	CANopen communication address	0x2414, 0x00

P4.21*	Torque limit switching command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable torque limit switching for the drive.

Set value	Function
[0]	Disable
1	Enable

P4.21*	Data size	16bit	Data format	DEC
	Modbus communication address	1842, 1843	CANopen communication address	0x2415, 0x00

P4.22*	External fault command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable external fault reporting for the drive.

Set value	Function
[0]	Disable
1	Enable

P4.22*	Data size	16bit	Data format	DEC
	Modbus communication address	1844, 1845	CANopen communication address	0x2416, 0x00

P4.23*	Emergency stop command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to carry out emergency stop operation on the drive.

Set value	Function
[0]	Disable
1	Enable

P4.23*	Data size	16bit	Data format	DEC
	Modbus communication address	1846, 1847	CANopen communication address	0x2417, 0x00

P4.24*	Input command of vibration control switching	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies whether to enable vibration control switching for the drive.

Set value	Function
[0]	Disable
1	Enable

P4.24*	Data size	16bit	Data format	DEC
	Modbus communication address	1848, 1849	CANopen communication address	0x2418, 0x00

P4.25	EtherCAT control unit type	Setting range	Default	Unit	Applicable mode		
		0–3	1	-	P	S	-

EtherCAT control unit type

Set value	Meaning
0	Manufacturer unit
[1]	CIA402 Unit
2	CIA402 OMRON
3	CIA402 standard

P4.25	Data size	16bit	Data format	DEC
	Modbus communication address	1850, 1851	CANopen communication address	0x2419, 0x00

P4.26	EtherCAT PDO input offset	Setting range	Default	Unit	Applicable mode		
		0–63	2	125μs	P	S	-

This parameter specifies the delay time for the PDO data to start taking effect after DC interruption, to avoid the command loss caused by large command cycle fluctuation.

P4.26	Data size	16bit	Data format	DEC
	Modbus communication address	1852, 1853	CANopen communication address	0x241A, 0x00

P4.27	Compensation times of EtherCAT position interpolation mode	Setting range	Default	Unit	Applicable mode		
		0–10	0	-	P	S	-

This parameter specifies the max. number of times to compensate for a position command if the position command is not received in the position interpolation mode.

P4.27	Data size	16bit	Data format	DEC
	Modbus communication address	1854, 1855	CANopen communication address	0x241B, 0x00

P4.28[1]	EtherCAT digital output control enabling	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	-

The digital outputs are controlled via 0x60FE in EtherCAT mode.

Set value	Function
[0]	Disable
1	Enable

P4.28[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1856, 1857	CANopen communication address	0x241C, 0x00

P4.29[1]	EtherCAT main cycle setting	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	-

This parameter specifies EtherCAT main cycle setting.

Set value	Meaning
[0]	1ms
1	10ms

P4.29[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1858, 1859	CANopen communication address	0x241D, 0x00

7.5.3 Extension and application

P4.30	Stop mode	Setting range	Default	Unit	Applicable mode		
		0–3	0	-	P	S	T

When the servo is turned OFF and when fault alarm occurs, this parameter is used to set whether the dynamic brake works or not and the state of the servo motor after stop:

Set value of P4.30	Action	
	During deceleration	After stopping
[0]	Coast to stop	Keep the inertia running state
1	Dynamic brake to stop	Keep the inertia running state
2	Dynamic brake to stop	Dynamic braking state
3	External dynamic brake acting	Dynamic braking state
4	Quick stop	Dynamic braking state

Note:

- If P4.30 is set to 1, the dynamic brake works when the motor speed is higher than the setting (30 r/min by default) of P3.58 and it does not work otherwise. After the motor stops, the dynamic brake does not work.
- If P4.30 is set to 4, when enabling is stopped or a non-fatal fault (faults other than 1-0 or 1-5) occurs, a shutdown will be performed according to P0.69 with constant enabling during the fast shutdown.
- If the servo motor runs at a speed higher than the rated one, you cannot enable the dynamic brake. If the servo motor runs at a high speed with a large inertia load, exercise caution before using the dynamic brake. Do not restart the dynamic brake frequently. Otherwise, the servo drive may be damaged.
- When 5.5kW and 7.5kW servo drives use the dynamic braking function, the rotating inertia ratio of the load is required to be less than 500% at the rated speed of the motor. The inertia ratio obtained through drive inertia autotuning shall prevail.

P4.30	Data size	16bit	Data format	DEC
	Modbus communication address	1860, 1861	CANopen communication address	0x241E, 0x00

P4.31	Max. speed limit	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–20000	5000	r/min	P	S	T

This parameter specifies the maximum speed of the servo motor. If the absolute value of the speed command is greater than the setting of this parameter, the actually-set speed is limited by this parameter, and the actual direction is the same as that in the original speed command. This parameter is valid in all modes.

Note: The default value and setting range of this parameter are associated with the drive power class.

P4.31	Data size	16bit	Data format	DEC
	Modbus communication address	1862, 1863	CANopen communication address	0x241F, 0x00

P4.32	Overspeed threshold	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–20000	6000	r/min	P	S	T

This parameter specifies the overspeed level for the servo motor. When the motor runs at a speed higher than the setting of this parameter, an overspeed fault alarm is reported.

Note: The default value and setting range of this parameter are associated with the drive power class.

P4.32	Data size	16bit	Data format	DEC
	Modbus communication address	1864	CANopen communication address	0x2420, 0x00

P4.33	Pulse threshold of position deviation	Setting range	Default	Unit	Applicable mode		
		0–227	100000	reference unit	P	-	-

This parameter is used to set the alarm threshold for the position deviation (Er22-0). In position mode, when the number of the residual pulses exceed the setting of this parameter, the fault alarm is reported. When P4.33=0, it means position deviation will not be detected.

P4.33	Data size	32bit	Data format	DEC
	Modbus communication address	1866, 1867	CANopen communication address	0x2421, 0x00

P4.34[1]	Brake overload detection selection	Setting range	Default	Unit	Applicable mode		
		0–4	4	-	P	S	T

This parameter is used to set the regenerative brake mode and overload protection mode.

Set value	Regenerative brake and overload protection
0	Disable (no regenerative brake)
1	Built-in
2	External
3	Built-in (First-order thermal model)
[4]	Built-in (Second-order thermal model)

P4.34[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1868, 1869	CANopen communication address	0x2422, 0x00

P4.35	Enable out-of-control speed detection	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies whether out-of-control speed detection is enabled.

Set value	Function
0	Disable
[1]	Enable

P4.35	Data size	16bit	Data format	DEC

	Modbus communication address	1870, 1871	CANopen communication address	0x2423, 0x00

P4.36[1]	Main power UV protection	Setting range	Default	Unit	Applicable mode		
		0–1	1	-	P	S	T

This parameter specifies whether the drive reports a main circuit undervoltage alarm when the main power encounters a main circuit undervoltage fault.

Set value	Protection
0	In servo enabling state, the drive does not report the fault Er13-1 when main circuit undervoltage occurs.
[1]	In servo enabling state, the drive reports the fault Er13-1 and stops when main circuit undervoltage occurs.

P4.36[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1872, 1873	CANopen communication address	0x2424, 0x00

P4.37	Main power UV detection time	Setting range	Default	Unit	Applicable mode		
		70–2000	70	ms	P	S	T

This parameter specifies the time taken to detect main power undervoltage.

Note: The value 2000 indicates that the function of detecting main power undervoltage is invalid.

P4.37	Data size	16bit	Data format	DEC
	Modbus communication address	1874, 1875	CANopen communication address	0x2425, 0x00

P4.38	Motor overload rate	Setting range	Default	Unit	Applicable mode		
		0.0–500.0	115.0	%	P	S	T

This parameter specifies the motor overload rate. When increasing the value of this parameter, please take the motor overload capacity into consideration.

P4.38	Data size	16bit	Data format	DEC
	Modbus communication address	1876, 1877	CANopen communication address	0x2426, 0x00

P4.39	Speed deviation setting	Setting range	Default	Unit	Applicable mode		
		0–20000	0	r/min	P	S	-
This parameter specifies the condition for detecting the speed deviation fault. If the absolute value of the actual speed command minus the motor speed is greater than the setting of this parameter and the deviation lasts more than 100ms, a speed deviation alarm is reported. **Note:** The value 0 indicates that the speed deviation fault will not be detected.							
P4.39	Data size	16bit	Data format		DEC		
	Modbus communication address	1878, 1879	CANopen communication address		0x2427, 0x00		

P4.40	Forward speed limit	Setting range	Default	Unit	Applicable mode		
		0–20000	20000	r/min	P	S	T
This parameter specifies the maximum limit on the forward speed command. **Note:** The default value and setting range of this parameter are associated with the drive power class.							
P4.40	Data size	16bit	Data format		DEC		
	Modbus communication address	1880, 1881	CANopen communication address		0x2428, 0x00		

P4.41	Reverse speed limit	Setting range	Default	Unit	Applicable mode		
		-20000–0	-20000	r/min	P	S	T
This parameter specifies the maximum limit on the reverse speed command. **Note:** The default value and setting range of this parameter are associated with the drive power class.							
P4.41	Data size	16bit	Data format		DEC		
	Modbus communication address	1882, 1883	CANopen communication address		0x2429, 0x00		

P4.42	Internal speed with high resolution	Setting range	Default	Unit	Applicable mode		
		-20000.0–20000.0	0.0	r/min	-	S	-
This parameter specifies the internal speed with high resolution.							
P4.42	Data size	32bit	Data format		DEC		

	Modbus communication address	1884, 1885	CANopen communication address	0x242A, 0x00

P4.43[1]	EtherCAT-related control	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3FFF	2183	-	P	S	T

Bit 0: Screen out torque limit ($60E0_h$, $60E1_h$) command. Default: 1, screening out.
Bit 1: Screen out speed limit ($607F_h$) command. Default: 1, screening out (not controlled by this bit in torque mode; always active).
Bits 2–3: Reserved.
Bit 4: Whether to use $60B1_h$ as speed feedforward. Default: 0, using the servo internal speed as the feedforward.
Bit 5: Whether to use $60B0_h$ as position feedforward. Default: 0, not using $60B0_h$ as the position offset.
Bit 6: Effective range of $607D_h$. Default: 0, only valid only in position mode (including position mode under bus control). 1: valid in position/speed/torque modes (including position/speed/torque modes under bus control).
Bit 7: Position command processing after limit. Default: 0, the position command is discarded after limit.
Bit 8: EtherCAT running cycle. Default: 0, operates in the main interrupt.
Bits 9–11: Reserved.
Bit 12: 0x60FD resolution. 0 (default): standard CIA402 protocol; 1: Customized.
Bits 13–15: Reserved.

P4.43[1]	Data size	16bit	Data format	HEX
	Modbus communication address	1886, 1887	CANopen communication address	0x242B, 0x00

P4.44[1]	Out-of-control speed threshold	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–20000	50	r/min	P	S	T

This parameter specifies the speed threshold for out-of-control protection. Stall detection activates when speed exceeds this set value.

P4.441	Data size	16bit	Data format	DEC
	Modbus communication address	1888, 1889	CANopen communication address	0x242C, 0x00

P4.45	Fault mask bit setting	Setting range	Default	Unit	Applicable mode		
		0x0000–0x7FFF	0x0000	-	P	S	T
This parameter specifies whether to shield some faults. Bit 0: Motor code check fault shielding, 0: Not shielded; 1: Shielded Bits 1–14: Reserved.							
P4.45	Data size	16bit	Data format		HEX		
	Modbus communication address	1890, 1891	CANopen communication address		0x242D, 0x00		

P4.46	Motor temperature sampling resistor selection	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
By setting this parameter, you can select the resistor specification for motor temperature protection. 0: PT100 resistor; 1: KTY84-130 resistor							
P4.46	Data size	16bit	Data format		HEX		
	Modbus communication address	1892, 1893	CANopen communication address		0x242E, 0x00		

P4.47	Out-of-control speed detection filter time	Setting range	Default	Unit	Applicable mode		
		0–100	2.0	ms	P	S	T
This parameter specifies the out-of-control speed detection filter time.							
P4.47	Data size	32bit	Data format		DEC		
	Modbus communication address	1894, 1895	CANopen communication address		0x242F, 0x00		

P4.48	Out-of-control current threshold	Setting range	Default	Unit	Applicable mode		
		0–400	100.0	%	P	S	T
This parameter specifies the out-of-control current threshold.							
P4.48	Data size	32bit	Data format		DEC		
	Modbus communication address	1896, 1897	CANopen communication address		0x2430, 0x00		

P4.49	Out-of-control detection time	Setting range	Default	Unit	Applicable mode		
		10–1000	30	ms	P	S	T
This parameter specifies the out-of-control detection time.							
P4.49	Data size	32bit	Data format		DEC		
	Modbus communication address	1898, 1899	CANopen communication address		0x2431, 0x00		

P4.50[1]	Encoder phase-Z offset	Setting range	Default	Unit	Applicable mode		
		0–(2^{20}-1)	0	pulse	P	S	T
This parameter specifies the output position of phase Z. The phase-Z offset is the pulses in the CCW direction.							
P4.50[1]	Data size	32bit	Data format		DEC		
	Modbus communication address	1900, 1901	CANopen communication address		0x2432, 0x00		

P4.51	Torque limit switching time 1	Setting range	Default	Unit	Applicable mode		
		0–4000	0	ms/(100%)	P	S	-
This parameter specifies the time taken to switch from the first torque limit to the second torque limit.							
P4.51	Data size	16bit	Data format		DEC		
	Modbus communication address	1902, 1903	CANopen communication address		0x2433, 0x00		

P4.52	Torque limit switching time 2	Setting range	Default	Unit	Applicable mode		
		0–4000	0	ms/(100%)	P	S	-
This parameter specifies the time taken to switch from the second torque limit to the first torque limit.							
P4.52	Data size	16bit	Data format		DEC		
	Modbus communication address	1904, 1905	CANopen communication address		0x2434, 0x00		

P4.53	Current loop response adjustment	Setting range	Default	Unit	Applicable mode		
		10.0–200.0	100.0	%	P	S	T
This parameter specifies the adjustment coefficient of current loop response width.							
P4.53	Data size	16bit	Data format		DEC		
	Modbus communication address	1906, 1907	CANopen communication address		0x2435, 0x00		

P4.54[1]	Delay after power-on initialization	Setting range	Default	Unit	Applicable mode		
		0–200000	0	ms	P	S	T
This parameter specifies the delay time of servo enabling after power-on initialization is completed.							
P4.54[1]	Data size	32bit	Data format		DEC		
	Modbus communication address	1908, 1909	CANopen communication address		0x2436, 0x00		

P4.77	Detection time for motor phase loss	Setting range	Default	Unit	Applicable mode		
		0–800	200	ms	P	S	T
Detection time for motor phase loss is valid when it is set to a non-zero value.							
P4.77	Data size	16bit	Data format		DEC		
	Modbus communication address	1954, 1955	CANopen communication address		0x244D, 0x00		

P4.78	Motor overtemperature protection threshold	Setting range	Default	Unit	Applicable mode		
		0–200	0	°C	P	S	T
Temperature sampling from temperature resistors PT100 and KTY84-130 is supported. If the temperature exceeds the setting of this parameter, a motor overtemperature (OT) fault is reported. The value 0 indicates temperature sampling is not conducted.							
P4.78	Data size	16bit	Data format		DEC		
	Modbus communication address	1956, 1957	CANopen communication address		0x244E, 0x00		

P4.79	Quick stop method	Setting range	Default	Unit	Applicable mode		
		0–2	2	-	P	S	T

0: Auto disable after reaching quick stop zero speed (requires re-enabling by host controller)
1: Auto disable after reaching quick stop zero speed and trigger Er10-4 fault
2: Default. Quick stop with zero-speed clamping

P4.79	Data size	16bit	Data format	DEC
	Modbus communication address	1958, 1959	CANopen communication address	0x244F, 0x00

7.5.4 Special commands

P4.90*	Fault recovery	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter can be set by the upper computer via communication mode to clear the drive fault.

Set value	Function
[0]	Disable
1	Enable

Note:

- If fault recovery command is enabled, the servo is not enabled for the drive, and the fault occurring condition is not triggered, the fault that can be automatically cleared recovers automatically. Other faults cannot be automatically cleared online but can be cleared after repower-on.
- You can set this parameter on the LED panel to clear faults.

P4.90*	Data size	16bit	Data format	DEC
	Modbus communication address	1980, 1981	CANopen communication address	0x245A, 0x00

P4.91*	Parameter saving	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

If P0.17 is set to 1 (saving in batches), this parameter can be used to send a parameter saving command so that any parameter modification can be written to the EEPROM.

Set value	Function
[0]	Disable
1	Enable

P4.91*	Data size	16bit	Data format	DEC
	Modbus communication address	1982, 1983	CANopen communication address	0x245B, 0x00

P4.92*	Restore to default values	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable the function of restoring factory settings. If the function is enabled, all user parameters (groups P0–P6) are restored to factory settings.

Set value	Function
[0]	Disable
1	Enable

P4.92*	Data size	16bit	Data format	DEC
	Modbus communication address	1984, 1985	CANopen communication address	0x245C, 0x00

P4.93*	Read fault records	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable the function of reading fault records. If the function is enabled, the fault records specified by P4.95 are read and displayed.

Set value	Function
[0]	Disable
1	Enable

P4.93*	Data size	16bit	Data format	DEC
	Modbus communication address	1986, 1987	CANopen communication address	0x245D, 0x00

P4.94*	Clear fault records	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable the function of clearing fault records. If the function is enabled, all the fault records are cleared.

Set value	Function
[0]	Disable
1	Enable

P4.94*	Data size	16bit	Data format	DEC

	Modbus communication address	1988, 1989	CANopen communication address	0x245E, 0x00

P4.95*	Group number of the fault record	Setting range	Default	Unit	Applicable mode		
		0–9	0	-	P	S	T
This parameter specifies the group number of fault records that are read. The value 0 indicates the fault records in group 1 are read and the faults have occurred most recently. The value 9 indicates the fault records in group 10 are read and the faults have occurred earliest.							
P4.95*	Data size	16bit	Data format	DEC			
	Modbus communication address	1990, 1991	CANopen communication address	0x245F, 0x00			

P4.96*	Encoder initial angle test	Setting range	Default	Unit	Applicable mode		
		0–4	0	-	P	S	T
Encoder initial angle test. If using an absolute encoder, the motor's initial angle will be written into the encoder's EEPROM. **Note:** The motor shaft must not be connected to any load.							
P4.96*	Data size	16bit	Data format	DEC			
	Modbus communication address	1992, 1993	CANopen communication address	0x2460, 0x00			

P4.97*	EEPROM operation of communication encoder	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter specifies whether to write all motor-related parameters to the EEPROM equipped with the communication encoder. In any following startup, the drive uses the data in the EEPROM for parameter initialization.							
P4.97*	Data size	16bit	Data format	DEC			
	Modbus communication address	1994, 1995	CANopen communication address	0x2461, 0x00			

P4.98	EEPROM data fault block of communication encoder	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter allows you to shield faults caused by missing or incorrect data in the							

EEPROM of a communication-type encoder. When a fault with error code Er2-c or Er2-d occurs, set the correct motor model and restart the system to continue using the motor. At this point, the drive will use the motor data stored in its own EEPROM to initialize the relevant parameters.				
P4.98	Data size	16bit	Data format	DEC
	Modbus communication address	1996, 1997	CANopen communication address	0x2462, 0x00

7.5.5 Frequency-division output and second encoder settings

P4.58[1]	Frequency division output Z pulse width setting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–255	2	pulse	P	S	T
This parameter is used to set the Z pulse width of frequency-division output. This setting is only valid when P4.69 = 0 [Normal frequency-division output].							
P4.58[1]	Data size	16bit	Data format	DEC			
	Modbus communication address	1916, 1917	CANopen communication address	0x243A, 0x00			

P4.59	Z pulse offset of frequency-division output	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	0	pulse	P	S	T
This parameter is used to set the Z pulse offset of frequency-division output. The max. offset cannot exceed the single-turn resolution of frequency-division output. This setting is only valid when P4.69 = 0 [Normal frequency-division output].							
P4.59	Data size	32bit	Data format	DEC			
	Modbus communication address	1918, 1919	CANopen communication address	0x243B, 0x00			

P4.60[1]	Frequency-division numerator of external linear encoder	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–(2^{31}-1)	10000	-	P	-	-
This parameter specifies the frequency-division numerator of the external grating ruler.							
P4.60[1]	Data size	32bit	Data format	DEC			
	Modbus communication address	1920, 1921	CANopen communication address	0x243C, 0x00			

P4.61[1]	Frequency-division denominator of external linear encoder	Setting range	Default	Unit	Applicable mode		
		1–(2^{31}-1)	10000	-	P	-	-

This parameter specifies the frequency-division denominator of the external grating ruler. It corresponds to the grating ruler pulses needed for each motor rotation.

P4.61[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1922, 1923	CANopen communication address	0x243D, 0x00

P4.62[1]	Direction reversal of external linear encoder	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter is used to set the direction reversal of external grating ruler feedback counting.

Set value	Function
[0]	Use the count from the external grating ruler directly.
1	Reverse the count from the external grating ruler and then use the reversed count.

P4.62[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1924, 1925	CANopen communication address	0x243E, 0x00

P4.64[1]	Hybrid control deviation limit	Setting range	Default	Unit	Applicable mode		
		1–2^{27}	160000	pulse	P	-	-

In the fully-closed loop control, set the tolerance (mixed deviation) between the user unit (reference unit) corresponding to the encoder feedback position and user unit (reference unit) corresponding to the grating ruler feedback position. If R0.05 exceeds the setting value, the drive will report Er22-1.

P4.64[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1928, 1929	CANopen communication address	0x2440, 0x00

P4.65[1]	Threshold for hybrid-control deviation clearing	Setting range	Default	Unit	Applicable mode		
		0–100	0	rotations	P	-	-

This parameter specifies the condition for clearing the hybrid-control deviation. When the motor rotation number reaches the specified one, the hybrid-control deviation is cleared. The value 0 indicates the hybrid-control deviation is not cleared.

P4.65[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1930, 1931	CANopen communication address	0x2441, 0x00

P4.67[1]	External grating pulse output mode of phase AB	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-

It is used to set the signal source of pulse feedback output when fully-closed loop function is enabled under position mode.

Set value	**Pulse feedback signal source**
[0]	Encoder feedback
1	Grating ruler feedback

P4.67[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1934, 1935	CANopen communication address	0x2443, 0x00

P4.68[1]	External linear encoder (or encoder 2) resolution	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–(2^{31}-1)	10000	pulse	P	-	-

This parameter specifies the resolution of the external grating ruler (or second encoder). If the second encoder is connected, the output is the pulses needed for each encoder rotation.

P4.68[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1936, 1937	CANopen communication address	0x2444, 0x00

P4.69[1]	Frequency division output source	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–4	0	-	P	S	T

This parameter specifies the signal source of frequency division output.

Set value	**Pulse feedback signal source**
[0]	Normal frequency-division output
1	Second encoder bypass
2	Quadrature pulse input bypass in phases A and B
3	Internal virtual shaft
4	First encoder bypass (valid only for incremental encoders)

P4.69[1]	Data size	32bit	Data format	DEC
	Modbus communication address	1938, 1939	CANopen communication address	0x2445, 0x00

P4.70[1]	External linear encoder (2nd encoder) Z signal type	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3	0	-	P	S	T
As Z signal width is divided into 1/4, 1/2 and 1/1, the starting phase of the signal for each width corresponds to 4 kinds of AB levels, so there are in total 12 kinds of combinations. However, in order to adapt to these combinations and ensure the capture value is normal in both forward and reverse directions, it is necessary to set the AB state value corresponds to the middle of Z signal high level. For 1/4 and 1/2, they require any one of AB states during high level period after Z type signal setting; for 1/1 width encoder, the set Z type must be the AB value corresponds to the middle of high level. If unknown, trial-and-error testing is recommended.							

P4.70[1]	Data size	16bit	Data format	DEC
	Modbus communication address	1940, 1941	CANopen communication address	0x2446, 0x00

P4.75	User-defined control word (PROFIdrive)	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3	0	-	P	S	T
Default 0: No function. 1: Torque command bias (P2.44), 16-bit signed number, 0x4000=P8.03 (Rated torque); 2: Speed feedforward, 16-bit signed number, 0x4000=P8.02 (Rated speed), while P2.10 (Speed feed-forward gain) is valid. 3: IO output control, the last 4 bits are valid, requires P4.28 to be enabled.							

P4.75	Data size	16bit	Data format	DEC
	Modbus communication address	1950, 1951	CANopen communication address	0x244B, 0x00

P4.76	User-defined state word (PROFIdrive)	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–4	3	-	P	S	T
Default 3: IO input. 0: No function. 1: Current torque, 16-bit signed number, 0x4000=P8.03 (Rated torque). 2: Output current (absolute value), 0x4000=P8.01 (Rated current).							

4: IO output state.				
P4.76	Data size	16bit	Data format	DEC
	Modbus communication address	1952, 1953	CANopen communication address	0x244C, 0x00

P4.80	PZD setting parameter 1 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1000–3999	1998	-	P	S	T
This parameter specifies the mapping content of setting parameter 1 in the PROFIBUS-DP communication process data (PZD), (1998 corresponds to the reserved parameter).							
P4.80	Data size	16bit	Data format	DEC			
	Modbus communication address	1960, 1961	CANopen communication address	0x2450, 0x00			

P4.81	PZD setting parameter 2 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1000–3999	1998	-	P	S	T
This parameter specifies the mapping content of setting parameter 2 in the PROFIBUS-DP communication process data (PZD), (1998 corresponds to the reserved parameter).							
P4.81	Data size	16bit	Data format	DEC			
	Modbus communication address	1962, 1963	CANopen communication address	0x2451, 0x00			

P4.82	PZD setting parameter 3 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1000–3999	1998	-	P	S	T
This parameter specifies the mapping content of setting parameter 3 in the PROFIBUS-DP communication process data (PZD), (1998 corresponds to the reserved parameter).							
P4.82	Data size	16bit	Data format	DEC			
	Modbus communication address	1964, 1965	CANopen communication address	0x2452, 0x00			

P4.83	PZD feedback parameter 1 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		4000–5852	4012	-	P	S	T
This parameter specifies the mapping content of feedback parameter 1 in the PROFIBUS-DP communication process data (PZD), (4012 corresponds to R0.04[Residual pulses]).							

P4.83	Data size	16bit	Data format	DEC
	Modbus communication address	1966, 1967	CANopen communication address	0x2453, 0x00

P4.84	PZD feedback parameter 2 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		4000–5852	4018	-	P	S	T
This parameter specifies the mapping content of feedback parameter 2 in the PROFIBUS-DP communication process data (PZD), (4018 corresponds to R0.07[Main circuit DC voltage]).							
P4.84	Data size	16bit	Data format	DEC			
	Modbus communication address	1968, 1969	CANopen communication address	0x2454, 0x00			

P4.85	PZD feedback parameter 3 configuration	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		4000–5852	4032	-	P	S	T
This parameter specifies the mapping content of feedback parameter 3 in the PROFIBUS-DP communication process data (PZD), (4032 corresponds to R0.14[Rotor position relative to Z pulse].							
P4.85	Data size	16bit	Data format	DEC			
	Modbus communication address	1970, 1971	CANopen communication address	0x2455, 0x00			

P4.86	CANopen master heartbeat offset time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–200	2	-	P	S	T
This parameter specifies the CANopen master heartbeat offset time.							
P4.86	Data size	16bit	Data format	DEC			
	Modbus communication address	1972, 1973	CANopen communication address	0x2456, 0x00			

P4.87	CANopen communication cycle	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–(2^{31}-1)	0	μs	P	S	T
This parameter specifies the synchronization signal cycle of a CANopen slave. **Note:** The recommended unit is 1000μs.							
P4.87	Data size	32bit	Data format	DEC			

	Modbus communication address	1974, 1975	CANopen communication address	0x2457, 0x00

P4.88	CANopen heartbeat cycle	Setting range	Default	Unit	Applicable mode		
		0–32767	1000	ms	P	S	T
This parameter specifies the heartbeat signal cycle of a CANopen slave.							
P4.88	Data size	16bit	Data format	DEC			
	Modbus communication address	1976, 1977	CANopen communication address	0x2458, 0x00			

P4.89	Automatic stop at CANopen disconnection	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T

This parameter specifies whether to enable automatic stop when CANopen communication is disconnected.

Set value	Function
[0]	Disable
1	Enable

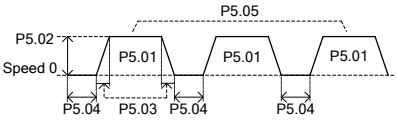
P4.89	Data size	16bit	Data format	DEC
	Modbus communication address	1978, 1979	CANopen communication address	0x2459, 0x00

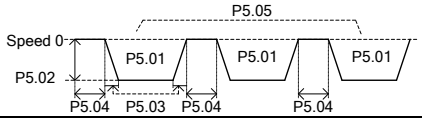
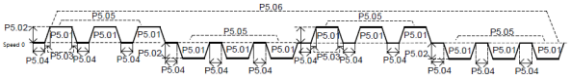
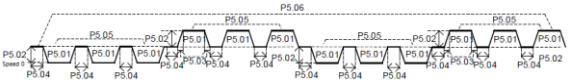
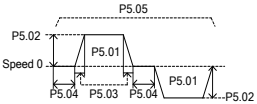
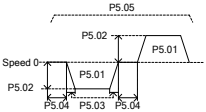
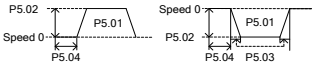
7.6 Group P5 Program jog, homing, and PTP control

7.6.1 Program jog

P5.00	Jog mode selection	Setting range	Default	Unit	Applicable mode		
		0–6	0	-	P	-	-

This parameter is used to set the program jog running mode:

Mode	Key	Function
[0]		(Wait time P5.04→Forward moving P5.01) × Cycles P5.05 

1		(Wait time P5.04→Reverse moving P5.01) × Cycles P5.05 
2		((Wait time P5.04→Forward moving P5.01) × Cycles P5.05→(Wait time P5.04→Reverse moving P5.01) × Cycles P5.05)× Cycles 2 P5.06 
3		((Wait time P5.04→Reverse moving P5.01) × Cycles P5.05→(Wait time P5.04→Forward moving P5.01) × Cycles P5.05)× Cycles 2 P5.06 
4		(Wait time P5.04→Forward moving P5.01→Wait time P5.04→Reverse moving P5.01) × Cycles P5.05 
5		(Wait time P5.04→Reverse moving P5.01→Wait time P5.04→Forward moving P5.01) × Cycles P5.05 
6	or	(Wait time P5.04→Forward/reverse moving P5.01) × 1 cycle 

P5.00	Data size	16bit	Data format	DEC
	Modbus communication address	2000, 2001	CANopen communication address	0x2500, 0x00

P5.01	JOG movement amount	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–2^{30}	50000	reference unit	P	-	-

This parameter specifies the increment of the position movement at jogging.				
P5.01	Data size	32bit	Data format	DEC
	Modbus communication address	2002, 2003	CANopen communication address	0x2501, 0x00

P5.02	Jogging speed setting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		1–5000	500	r/min	P	-	-
This parameter specifies the maximum running speed at jogging.							
P5.02	Data size	16bit	Data format	DEC			
	Modbus communication address	2004, 2005	CANopen communication address	0x2502, 0x00			

P5.03	Jogging ACC/DEC time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		2–10000	100	ms	P	-	-
This parameter specifies the acceleration or deceleration time at jogging. The setting of this parameter corresponds to the time taken to accelerate from the zero speed to the rated rotation speed. If you need to improve the speed from zero to 50% of the rated speed, the time taken to reach the target speed is 50% of the time specified by this parameter.							
P5.03	Data size	16bit	Data format	DEC			
	Modbus communication address	2006, 2007	CANopen communication address	0x2503, 0x00			

P5.04	Jogging wait time	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–10000	100	ms	P	-	-
This parameter specifies the wait time at jogging. The setting of this parameter corresponds to the time from jogging starting to the actual running or to the time taken to wait for next displacement after the current displacement.							
P5.04	Data size	16bit	Data format	DEC			
	Modbus communication address	2008, 2009	CANopen communication address	0x2504, 0x00			

P5.05	Jogging cycle times	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–10000	1	-	P	-	-

This parameter specifies the number of jogging cycles. For details, see the description for P5.00.

P5.05	Data size	16bit	Data format	DEC
	Modbus communication address	2010, 2011	CANopen communication address	0x2505, 0x00

P5.06	Jogging cycle times	Setting range	Default	Unit	Applicable mode		
		0–10000	1	-	P	-	-

This parameter specifies the number of jogging cycles. For details, see the description for P5.00.

P5.06	Data size	16bit	Data format	DEC
	Modbus communication address	2012, 2013	CANopen communication address	0x2506, 0x00

7.6.2 Homing

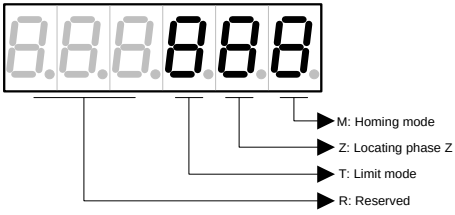
P5.09	Homing ACC/DEC time	Setting range	Default	Unit	Applicable mode		
		0–6000000	0	ms	-	S	-

This parameter specifies Homing ACC/DEC time.

P5.09	Data size	32bit	Data format	DEC
	Modbus communication address	2018, 2019	CANopen communication address	0x2509, 0x00

P5.10[2]	Homing mode	Setting range	Default	Unit	Applicable mode		
		0–128	0	-	P	-	-

This parameter specifies the homing mode. Display mode: DEC



<table>
<tr><th>R</th><th>T</th><th>Z</th><th>M</th></tr>
<tr><td rowspan="11">Reserved</td><td>Limit mode</td><td>Phase Z locating mode</td><td>Homing mode</td></tr>
<tr><td>0–1</td><td>0–2</td><td>0–8</td></tr>
<tr><td>T: Invalid</td><td rowspan="4">Z=0: Returning to locate phase Z is defined as the home position.
Z=1: Forwarding to locate phase Z is defined as the home position.
Z=2: No locating phase Z. The recurrent point is defined as the home position.</td><td>M=0: Forward rotation. The forward limit switch is the recurrent point.</td></tr>
<tr><td>T: Invalid</td><td>M=1: Reverse rotation. The reverse limit switch is the recurrent point.</td></tr>
<tr><td rowspan="6">Limit encountered:
T=0: Report an offside fault.
T=1: Reverse the direction.</td><td>M=2: Forward rotation. The rising edge of the home switch is the recurrent point.</td></tr>
<tr><td>M=3: Reverse rotation. The rising edge of the reverse limit switch is the recurrent point.</td></tr>
<tr><td>Z: Invalid</td><td>M=4: Forward rotation. The first phase-Z signal is regarded as the home position.</td></tr>
<tr><td>Z: Invalid</td><td>M=5: Reverse rotation. The first phase-Z signal is regarded as the home position.</td></tr>
<tr><td rowspan="2">Z=0: Returning to locate phase Z is defined as the home position.
Z=1: Forwarding to locate phase Z is defined as the home position.
Z=2: No locating phase Z. The recurrent point is defined as the home position.</td><td>M=6: Forward rotation. The falling edge of the home switch is the recurrent point.</td></tr>
<tr><td>M=7: Reverse rotation. The falling edge of the home switch is the recurrent point.</td></tr>
<tr><td>T: Invalid</td><td>Z: Invalid</td><td>M=8: The current position is defined as the home position.</td></tr>
</table>

P5.10[2]	Data size	16bit	Data format	DEC
	Modbus communication address	2020, 2021	CANopen communication address	0x2505, 0x00

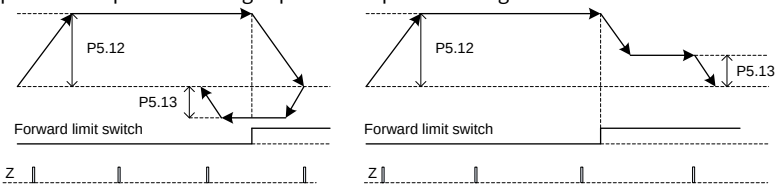
P5.11	Homing automatically after power-on and homing action method	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–7FFF	0	-	P	-	-

Bit0–bit3 are used to set whether to perform automatic homing on power-on. 1: Automatically perform homing on power-on when no fault is present and the system is in enabled state.
Bit4–bit7 are used to set the handling method of the homing completion flag. 0: Flag is held after homing completion but lost after power-off;
1: Flag is cleared after jog operation;
2: For multi-turn absolute encoders, the flag is retained even after power-off.
Bit8–bit11 are used to select the homing trigger mode (P5.15). 0: Level trigger, automatically reset to 0 after homing is complete;
1: Rising edge trigger, the value of P5.15 remains unchanged after homing is complete.
Bit12 is used to set the digital input homing action. 0 (default): Trigger homing on rising edge without stopping;
1: Stop homing on falling edge.
Bit13 is used to enable the multi-turn absolute encoder ERR2-7 faults. 0 (default): Disabled.
Bit14–bit15: Reserved.

P5.11	Data size	16bit	Data format	HEX
	Modbus communication address	2022, 2023	CANopen communication address	0x250B, 0x00

P5.12	High speed at homing step 1	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–2000	100	r/min	P	-	-

This parameter specifies the high speed at step 1 of homing.



P5.12	Data size	16bit	Data format	DEC
	Modbus communication address	2024, 2025	CANopen communication address	0x250C, 0x00

P5.13	Low speed at homing step 2	Setting range	Default	Unit	Applicable mode		
		0–60	20	r/min	P	-	-

This parameter specifies the low speed at step 2 of homing. For details, see the diagram in the description for P5.12.

P5.13	Data size	16bit	Data format	DEC
	Modbus communication address	2026, 2027	CANopen communication address	0x250D, 0x00

P5.14	Home setting	Setting range	Default	Unit	Applicable mode		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This parameter is used to set the value of the home.

P5.14	Data size	32bit	Data format	DEC
	Modbus communication address	2028, 2029	CANopen communication address	0x250E, 0x00

P5.15*	Homing trigger command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies whether to trigger the homing function. It has the same function as the homing trigger terminal with digital input.

P5.15*	Data size	16bit	Data format	DEC
	Modbus communication address	2030, 2031	CANopen communication address	0x250F, 0x00

P5.16	Homing associated action	Setting range	Default	Unit	Applicable mode		
		0–3	1	-	P	-	-

This parameter specifies the action associated with homing.

Set value	Description
0	No action
[1]	Move to specified target position.
2	Move to predefined Segment 0 position.
3	Skip homing and proceed directly to target position.

P5.16	Data size	16bit	Data format	DEC

	Modbus communication address	2032, 2033	CANopen communication address	0x2510, 0x00

P5.17	Target speed after homing	Setting range	Default	Unit	Applicable mode		
		1–5000	100	r/min	P	-	-
This parameter specifies the target speed after homing. The change takes effect before homing.							
P5.17	Data size	16bit	Data format	DEC			
	Modbus communication address	2034, 2035	CANopen communication address	0x2511, 0x00			

P5.18	ACC/DEC time for target speed after homing	Setting range	Default	Unit	Applicable mode		
		0–32767	300	ms	P	-	-
This parameter specifies the acceleration or deceleration time taken to reach the target speed after homing. The setting of this parameter corresponds to the time taken to accelerate from the zero speed to the rated rotation speed. If you need to improve the speed from zero to 50% of the rated speed, the time taken to reach the target speed is 50% of the time specified by this parameter.							
P5.18	Data size	16bit	Data format	DEC			
	Modbus communication address	2036, 2037	CANopen communication address	0x2512, 0x00			

P5.19	Target position after homing	Setting range	Default	Unit	Applicable mode		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
This parameter specifies the target position after homing.							
P5.19	Data size	32bit	Data format	DEC			
	Modbus communication address	2038, 2039	CANopen communication address	0x2513, 0x00			

7.6.3 PTP control

P5.20*	PTP trigger signal	Setting range	Default	Unit	Applicable mode		
		-1–2048	-1	-	P	-	-

This parameter specifies whether to trigger the target segment.
If data is written, PTP is triggered, and the internal buffer can receive 8 trigger signals at most.

Trigger signal	Function
[-1]	Invalid
0–127	Triggers segment 0–127 in point-to-point (PtP) control mode, equivalent to digital input function: TRIG + POSn.
128–2047	Invalid
2048	Forcible stop.

Example: If segment signal 3 is written, segment program 3 is triggered.

P5.20*	Data size	16bit	Data format	DEC
	Modbus communication address	2040, 2041	CANopen communication address	0x2514, 0x00

P5.21	Target speed 00	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	20	r/min	P	-	-
P5.22	Target speed 01	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	50	r/min	P	-	-
P5.23	Target speed 02	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	100	r/min	P	-	-
P5.24	Target speed 03	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	200	r/min	P	-	-
P5.25	Target speed 04	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	300	r/min	P	-	-
P5.26	Target speed 05	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	500	r/min	P	-	-
P5.27	Target speed 06	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	600	r/min	P	-	-
P5.28	Target speed 07	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	800	r/min	P	-	-
P5.29	Target speed 08	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	1000	r/min	P	-	-

P5.30	Target speed 09	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	1300	r/min	P	-	-
P5.31	Target speed 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	1500	r/min	P	-	-
P5.32	Target speed 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	1800	r/min	P	-	-
P5.33	Target speed 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	2000	r/min	P	-	-
P5.34	Target speed 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	2300	r/min	P	-	-
P5.35	Target speed 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	2500	r/min	P	-	-
P5.36	Target speed 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	3000	r/min	P	-	-
This group of parameter specifies the target speed for each segment.							
P5.21	Data size	16bit	Data format	DEC			
	Modbus communication address	2042, 2043	CANopen communication address	0x2515, 0x00			
P5.22	Data size	16bit	Data format	DEC			
	Modbus communication address	2044, 2045	CANopen communication address	0x2516, 0x00			
P5.23	Data size	16bit	Data format	DEC			
	Modbus communication address	2046, 2047	CANopen communication address	0x2517, 0x00			
P5.24	Data size	16bit	Data format	DEC			
	Modbus communication address	2048, 2049	CANopen communication address	0x2518, 0x00			

P5.25	Data size	16bit	Data format	DEC
	Modbus communication address	2050, 2051	CANopen communication address	0x2519, 0x00
P5.26	Data size	16bit	Data format	DEC
	Modbus communication address	2052, 2053	CANopen communication address	0x251A, 0x00
P5.27	Data size	16bit	Data format	DEC
	Modbus communication address	2054, 2055	CANopen communication address	0x251B, 0x00
P5.28	Data size	16bit	Data format	DEC
	Modbus communication address	2056, 2057	CANopen communication address	0x251C, 0x00
P5.29	Data size	16bit	Data format	DEC
	Modbus communication address	2058, 2059	CANopen communication address	0x251D, 0x00
P5.30	Data size	16bit	Data format	DEC
	Modbus communication address	2060, 2061	CANopen communication address	0x251E, 0x00
P5.31	Data size	16bit	Data format	DEC
	Modbus communication address	2062, 2063	CANopen communication address	0x251F, 0x00
P5.32	Data size	16bit	Data format	DEC
	Modbus communication address	2064, 2065	CANopen communication address	0x2520, 0x00
P5.33	Data size	16bit	Data format	DEC
	Modbus communication address	2066, 2067	CANopen communication address	0x2521, 0x00
P5.34	Data size	16bit	Data format	DEC
	Modbus communication address	2068, 2069	CANopen communication address	0x2522, 0x00

P5.35	Data size	16bit	Data format	DEC
	Modbus communication address	2070, 2071	CANopen communication address	0x2523, 0x00
P5.36	Data size	16bit	Data format	DEC
	Modbus communication address	2072, 2073	CANopen communication address	0x2524, 0x00

P5.37	ACC/DEC time 00	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	200	ms	P	-	-
P5.38	ACC/DEC time 01	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	300	ms	P	-	-
P5.39	ACC/DEC time 02	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	500	ms	P	-	-
P5.40	ACC/DEC time 03	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	600	ms	P	-	-
P5.41	ACC/DEC time 04	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	800	ms	P	-	-
P5.42	ACC/DEC time 05	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	900	ms	P	-	-
P5.43	ACC/DEC time 06	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	1000	ms	P	-	-
P5.44	ACC/DEC time 07	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	1200	ms	P	-	-
P5.45	ACC/DEC time 08	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	1500	ms	P	-	-
P5.46	ACC/DEC time 09	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	2000	ms	P	-	-

P5.47	ACC/DEC time 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	2500	ms	P	-	-
P5.48	ACC/DEC time 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	3000	ms	P	-	-
P5.49	ACC/DEC time 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	5000	ms	P	-	-
P5.50	ACC/DEC time 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	8000	ms	P	-	-
P5.51	ACC/DEC time 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	50	ms	P	-	-
P5.52	ACC/DEC time 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	30	ms	P	-	-
This group of parameter specifies the acceleration or deceleration time for each segment.							
P5.37	Data size	16bit	Data format	DEC			
	Modbus communication address	2074, 2075	CANopen communication address	0x2525, 0x00			
P5.38	Data size	16bit	Data format	DEC			
	Modbus communication address	2076, 2077	CANopen communication address	0x2526, 0x00			
P5.39	Data size	16bit	Data format	DEC			
	Modbus communication address	2078, 2079	CANopen communication address	0x2527, 0x00			
P5.40	Data size	16bit	Data format	DEC			
	Modbus communication address	2080, 2081	CANopen communication address	0x2528, 0x00			
P5.41	Data size	16bit	Data format	DEC			
	Modbus communication address	2082, 2083	CANopen communication address	0x2529, 0x00			
P5.42	Data size	16bit	Data format	DEC			

	Modbus communication address	2084, 2085	CANopen communication address	0x252A, 0x00
P5.43	Data size	16bit	Data format	DEC
	Modbus communication address	2086, 2087	CANopen communication address	0x252B, 0x00
P5.44	Data size	16bit	Data format	DEC
	Modbus communication address	2088, 2089	CANopen communication address	0x252C, 0x00
P5.45	Data size	16bit	Data format	DEC
	Modbus communication address	2090, 2091	CANopen communication address	0x252D, 0x00
P5.46	Data size	16bit	Data format	DEC
	Modbus communication address	2092, 2093	CANopen communication address	0x252E, 0x00
P5.47	Data size	16bit	Data format	DEC
	Modbus communication address	2094, 2095	CANopen communication address	0x252F, 0x00
P5.48	Data size	16bit	Data format	DEC
	Modbus communication address	2096, 2097	CANopen communication address	0x2530, 0x00
P5.49	Data size	16bit	Data format	DEC
	Modbus communication address	2098, 2099	CANopen communication address	0x2531, 0x00
P5.50	Data size	16bit	Data format	DEC
	Modbus communication address	2100, 2101	CANopen communication address	0x2532, 0x00
P5.51	Data size	16bit	Data format	DEC
	Modbus communication address	2102, 2103	CANopen communication address	0x2533, 0x00

P5.52	Data size	16bit	Data format	DEC
	Modbus communication address	2104, 2105	CANopen communication address	0x2534, 0x00

P5.53	Delay time 00	Setting range	Default	Unit	Applicable mode		
		0–32767	0	ms	P	-	-
P5.54	Delay time 01	Setting range	Default	Unit	Applicable mode		
		0–32767	100	ms	P	-	-
P5.55	Delay time 02	Setting range	Default	Unit	Applicable mode		
		0–32767	200	ms	P	-	-
P5.56	Delay time 03	Setting range	Default	Unit	Applicable mode		
		0–32767	400	ms	P	-	-
P5.57	Delay time 04	Setting range	Default	Unit	Applicable mode		
		0–32767	500	ms	P	-	-
P5.58	Delay time 05	Setting range	Default	Unit	Applicable mode		
		0–32767	800	ms	P	-	-
P5.59	Delay time 06	Setting range	Default	Unit	Applicable mode		
		0–32767	1000	ms	P	-	-
P5.60	Delay time 07	Setting range	Default	Unit	Applicable mode		
		0–32767	1500	ms	P	-	-
P5.61	Delay time 08	Setting range	Default	Unit	Applicable mode		
		0–32767	2000	ms	P	-	-
P5.62	Delay time 09	Setting range	Default	Unit	Applicable mode		
		0–32767	2500	ms	P	-	-
P5.63	Delay time 10	Setting range	Default	Unit	Applicable mode		
		0–32767	3000	ms	P	-	-
P5.64	Delay time 11	Setting range	Default	Unit	Applicable mode		
		0–32767	3500	ms	P	-	-

P5.65	Delay time 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	4000	ms	P	-	-
P5.66	Delay time 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	4500	ms	P	-	-
P5.67	Delay time 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	5000	ms	P	-	-
P5.68	Delay time 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–32767	5500	ms	P	-	-
This group of parameter specifies the delay time for each segment.							
P5.53	Data size	16bit	Data format	DEC			
	Modbus communication address	2106, 2107	CANopen communication address	0x2535, 0x00			
P5.54	Data size	16bit	Data format	DEC			
	Modbus communication address	2108, 2109	CANopen communication address	0x2536, 0x00			
P5.55	Data size	16bit	Data format	DEC			
	Modbus communication address	2110, 2111	CANopen communication address	0x2537, 0x00			
P5.56	Data size	16bit	Data format	DEC			
	Modbus communication address	2112, 2113	CANopen communication address	0x2538, 0x00			
P5.57	Data size	16bit	Data format	DEC			
	Modbus communication address	2114, 2115	CANopen communication address	0x2539, 0x00			
P5.58	Data size	16bit	Data format	DEC			
	Modbus communication address	2116, 2117	CANopen communication address	0x253A, 0x00			
P5.59	Data size	16bit	Data format	DEC			
	Modbus communication address	2118, 2119	CANopen communication address	0x253B, 0x00			

P5.60	Data size	16bit	Data format	DEC
	Modbus communication address	2120, 2121	CANopen communication address	0x253C, 0x00
P5.61	Data size	16bit	Data format	DEC
	Modbus communication address	2122, 2123	CANopen communication address	0x253D, 0x00
P5.62	Data size	16bit	Data format	DEC
	Modbus communication address	2124, 2125	CANopen communication address	0x253E, 0x00
P5.63	Data size	16bit	Data format	DEC
	Modbus communication address	2126, 2127	CANopen communication address	0x253F, 0x00
P5.64	Data size	16bit	Data format	DEC
	Modbus communication address	2128, 2129	CANopen communication address	0x2540, 0x00
P5.65	Data size	16bit	Data format	DEC
	Modbus communication address	2130, 2131	CANopen communication address	0x2541, 0x00
P5.66	Data size	16bit	Data format	DEC
	Modbus communication address	2132, 2133	CANopen communication address	0x2542, 0x00
P5.67	Data size	16bit	Data format	DEC
	Modbus communication address	2134, 2135	CANopen communication address	0x2543, 0x00
P5.68	Data size	16bit	Data format	DEC
	Modbus communication address	2136, 2137	CANopen communication address	0x2544, 0x00

P5.69	PTP control buffer switch	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	1	-	P	-	-

If buffering is enabled for PTP control, eight buffers can be received successively and executed sequentially.

P5.69	Data size	16bit	Data format	DEC
	Modbus communication address	2138, 2139	CANopen communication address	0x2545, 0x00

P5.70	Disk single-turn resolution	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)-(2^{31}-1)$	10000	pulse	P	-	-

This parameter specifies the single-turn resolution of the disk that the motor drives.

P5.70	Data size	32bit	Data format	DEC
	Modbus communication address	2140, 2141	CANopen communication address	0x2546, 0x00

P5.71	Disk homing switch	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3	0	-	P	-	-

This parameter specifies the homing mode of the disk.

P5.71	Data size	16bit	Data format	DEC
	Modbus communication address	2142, 2143	CANopen communication address	0x2547, 0x00

P5.72	Super multiturn mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-

Note: When the servo motor rotates continuously in one direction, the multi-turn counting overflow error may occur. The multi-turn encoder can only count 2^{16} turns normally, i.e., the super multi-turn mode. After this function is enabled, the number of turns counted by the multi-turn encoder can be extended from 16 bits to 32 bits.

Set value	**Meaning**
[0]	Normal mode
1	Super multiturn mode

P5.72	Data size	16bit	Data format	DEC
	Modbus communication address	2144, 2145	CANopen communication address	0x2548, 0x00

P5.73	Digital trigger mode for PTP control	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

Set value	Description
[0]	Binary input + Terminal trigger mode
1	Single terminal trigger mode (supporting 7 PTPs only)

P5.73	Data size	16bit	Data format	DEC
	Modbus communication address	2146, 2147	CANopen communication address	0x2549, 0x00

P5.74	Digital output mode for PTP control	Setting range	Default	Unit	Applicable mode		
		0–4	0	-	P	-	-

Set value	Description
[0]	Output before PTP arrival
1	Output after PTP arrival
2	Single-point output + Output before PTP arrival
3	Single-point output + Output after PTP arrival
4	Single-point output + Output after PTP arrival (only the control word in the absolute position supported)

P5.74	Data size	16bit	Data format	DEC
	Modbus communication address	2148, 2149	CANopen communication address	0x254A, 0x00

P5.75	PTP interrupt pause enable	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter enables the PTP interruption pause function. When set to 1, PTP running pauses.

P5.75	Data size	16bit	Data format	DEC
	Modbus communication address	2150, 2151	CANopen communication address	0x254B, 0x00

P5.76	Positioning compensation value 22	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T

This parameter specifies the positioning compensation value 22.				
P5.76	Data size	32bit	Data format	DEC
	Modbus communication address	2152, 2153	CANopen communication address	0x254C, 0x00

P5.77	Positioning compensation value 23	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 23.							
P5.77	Data size	32bit	Data format	DEC			
	Modbus communication address	2154, 2155	CANopen communication address	0x254D, 0x00			

P5.78	Positioning compensation value 24	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 24.							
P5.78	Data size	32bit	Data format	DEC			
	Modbus communication address	2156, 2157	CANopen communication address	0x254E, 0x00			

P5.79	Positioning compensation value 25	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 25.							
P5.79	Data size	32bit	Data format	DEC			
	Modbus communication address	2158, 2159	CANopen communication address	0x254F, 0x00			

P5.80	Positioning compensation value 26	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 26.							
P5.80	Data size	32bit	Data format	DEC			

	Modbus communication address	2160, 2161	CANopen communication address	0x2550, 0x00

P5.81	Positioning compensation value 27	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 27.							
P5.81	Data size	32bit	Data format	DEC			
	Modbus communication address	2162, 2163	CANopen communication address	0x2551, 0x00			

P5.82	Positioning compensation value 28	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 28.							
P5.82	Data size	32bit	Data format	DEC			
	Modbus communication address	2164, 2165	CANopen communication address	0x2552, 0x00			

P5.83	Positioning compensation value 29	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 29.							
P5.83	Data size	32bit	Data format	DEC			
	Modbus communication address	2166, 2167	CANopen communication address	0x2553, 0x00			

P5.84	Positioning compensation value 30	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 30.							
P5.84	Data size	32bit	Data format	DEC			

	Modbus communication address	2168, 2169	CANopen communication address	0x2554, 0x00

P5.85	Positioning compensation value 31	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 31.							
P5.85	Data size	32bit	Data format	DEC			
	Modbus communication address	2170, 2171	CANopen communication address	0x2555, 0x00			

P5.86	Positioning compensation value 32	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 32.							
P5.86	Data size	32bit	Data format	DEC			
	Modbus communication address	2172, 2173	CANopen communication address	0x2556, 0x00			

P5.87	Positioning compensation value 33	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 33.							
P5.87	Data size	32bit	Data format	DEC			
	Modbus communication address	2174, 2175	CANopen communication address	0x2557, 0x00			

P5.88	Positioning compensation value 34	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 34.							
P5.88	Data size	32bit	Data format	DEC			

	Modbus communication address	2176, 2177	CANopen communication address	0x2558, 0x00

P5.89	Positioning compensation value 35	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 35.							
P5.89	Data size	32bit	Data format	DEC			
	Modbus communication address	2178, 2179	CANopen communication address	0x2559, 0x00			

P5.90	Positioning compensation value 36	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 36.							
P5.90	Data size	32bit	Data format	DEC			
	Modbus communication address	2180, 2181	CANopen communication address	0x255A, 0x00			

P5.91	Positioning compensation value 37	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 37.							
P5.91	Data size	32bit	Data format	DEC			
	Modbus communication address	2182, 2183	CANopen communication address	0x255B, 0x00			

P5.92	Positioning compensation value 38	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 38.							
P5.92	Data size	32bit	Data format	DEC			

	Modbus communication address	2184, 2185	CANopen communication address	0x255C, 0x00

P5.93	Positioning compensation value 39	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 39.							
P5.93	Data size	32bit	Data format	DEC			
	Modbus communication address	2186, 2187	CANopen communication address	0x255D, 0x00			

P5.94	Positioning compensation value 40	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 40.							
P5.94	Data size	32bit	Data format	DEC			
	Modbus communication address	2188, 2189	CANopen communication address	0x255E, 0x00			

P5.95	Positioning compensation value 41	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 41.							
P5.95	Data size	32bit	Data format	DEC			
	Modbus communication address	2190, 2191	CANopen communication address	0x255F, 0x00			

P5.96	Positioning compensation value 42	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 42.							
P5.96	Data size	32bit	Data format	DEC			

	Modbus communication address	2192, 2193	CANopen communication address	0x2560, 0x00

P5.97	Positioning compensation value 43	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 43.							
P5.97	Data size	32bit	Data format	DEC			
	Modbus communication address	2194, 2195	CANopen communication address	0x2561, 0x00			

P5.98	Positioning compensation value 44	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 44.							
P5.98	Data size	32bit	Data format	DEC			
	Modbus communication address	2196, 2197	CANopen communication address	0x2562, 0x00			

P5.99	Positioning compensation value 45	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 45.							
P5.99	Data size	32bit	Data format	DEC			
	Modbus communication address	2198, 2199	CANopen communication address	0x2563, 0x00			

7.7 Group P6 Application functions

P6.00	Forward low jogging speed	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–6000	5	r/min	P	-	-
This parameter specifies the speed of slow forward jogging, which is triggered by the							

forward jogging terminal and high-low jogging speed switching terminal.				
P6.00	Data size	16bit	Data format	DEC
	Modbus communication address	2200, 2201	CANopen communication address	0x2600, 0x00

P6.01	Reverse low jogging speed	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-6000–0	-5	r/min	P	-	-
This parameter specifies the speed of slow reverse jogging, which is triggered by the reverse jogging terminal and high-low jogging speed switching terminal.							
P6.01	Data size	16bit	Data format	DEC			
	Modbus communication address	2202, 2203	CANopen communication address	0x2601, 0x00			

P6.02[1]	Data latching switch	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-

This parameter specifies whether to enable the data latching switch. If the switch is enabled, the position information is written to the EEPROM each time the terminal is latched. However, frequent latching may cause EEPROM damage.

Set value	**Description**
[0]	Disable
1	Enable

P6.02[1]	Data size	16bit	Data format	DEC
	Modbus communication address	2204, 2205	CANopen communication address	0x2602, 0x00

P6.03	Position latching save mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	-	-

This parameter specifies whether to save position latching.

Set value	**Description**
[0]	Not save
1	Save

P6.03	Data size	16bit	Data format	DEC
	Modbus communication address	2206, 2207	CANopen communication address	0x2603, 0x00

P6.04	Forward high jogging speed	Setting range	Default	Unit	Applicable mode		
		0–6000	60	r/min	P	-	-

This parameter specifies the speed of fast forward jogging, which is triggered by the forward jogging terminal and high-low jogging speed switching terminal.

P6.04	Data size	16bit	Data format	DEC
	Modbus communication address	2208, 2209	CANopen communication address	0x2604, 0x00

P6.05	Reverse high jogging speed	Setting range	Default	Unit	Applicable mode		
		-6000–0	-60	r/min	P	-	-

This parameter specifies the speed of fast reverse jogging, which is triggered by the reverse jogging terminal and high-low jogging speed switching terminal.

P6.05	Data size	16bit	Data format	DEC
	Modbus communication address	2210, 2211	CANopen communication address	0x2605, 0x00

P6.06	Enable terminal jogging	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies whether to set terminal jogging function.

Set value	Description
[0]	Invalid
1	Valid

P6.06	Data size	16bit	Data format	DEC
	Modbus communication address	2212, 2213	CANopen communication address	0x2606, 0x00

P6.20[1]	Turret function switch	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	-	-

This parameter specifies whether to set turret function switch.

Set value	Description
[0]	Disable
1	Enable

P6.20[1]	Data size	16bit	Data format	DEC
	Modbus communication address	2240, 2241	CANopen communication address	0x2614, 0x00

P6.21	Knives per turret	Setting range	Default	Unit	Applicable mode		
		1–128	16	piece	P	-	-
This parameter specifies the number of knives in a turret.							
P6.21	Data size	16bit	Data format	DEC			
	Modbus communication address	2242, 2243	CANopen communication address	0x2615, 0x00			

P6.22	Pulses per turret rotation	Setting range	Default	Unit	Applicable mode		
		2–(2^{31}-1)	10000	reference unit	P	-	-
This parameter specifies the number of pulses needed for each turret rotation.							
P6.22	Data size	32bit	Data format	DEC			
	Modbus communication address	2244, 2245	CANopen communication address	0x2616, 0x00			

P6.23[1]	Turret starting point	Setting range	Default	Unit	Applicable mode		
		-(2^{31}-1)–(2^{31}-1)	0	reference unit	P	-	-
This parameter is used to set the starting point of turret.							
P6.23[1]	Data size	32bit	Data format	DEC			
	Modbus communication address	2246, 2247	CANopen communication address	0x2617, 0x00			

P6.47	Magnetic pole detection method selection	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter specifies the magnetic pole detection method. For incremental encoders without Hall sensors, when the electrical angle is not determined, enabling via DI terminal, bus enable, internal enable, or starting JOG, EzJOG, etc., will trigger the pole detection method specified by this parameter to determine the pole position. When pole detection is performed via the DI terminal, the detection method set by this parameter is also used.							

Set value	Meaning
[0]	Micromotion detection magnetic pole position
1	Static detection magnetic pole position

Note: Micromotion detection magnetic pole position: The rotor or mover slightly moves left and right during detection. This method is not suitable for applications with bias force. Static detection magnetic pole position: Six-pulse mode, the rotor or mover remains static during detection, and the brake is not opened.

P6.47	Data size	16bit	Data format	DEC
	Modbus communication address	2294, 2295	CANopen communication address	0x262F, 0x00

P6.48	One-key autotuning current setting	Setting range	Default	Unit	Applicable mode		
		0–100	0	%	P	S	T

This parameter specifies the current value during the one-key autotuning process.

Note: 100% corresponds to the motor rated current.

P6.48	Data size	16bit	Data format	DEC
	Modbus communication address	2296, 2297	CANopen communication address	0x2630, 0x00

P6.49	Autotuning with one click	Setting range	Default	Unit	Applicable mode		
		0–4	0	-	P	S	T

This parameter enables one-key autotuning of the motor's magnetic pole angle, offset angle, and phase sequence.

Set value	Meaning
[0]	Disable
1	Motor magnetic pole angle autotuning
2	Motor magnetic pole angle + phase sequence autotuning
3	Motor magnetic pole angle + offset angle autotuning
4	Motor phase sequence + offset angle autotuning

P6.49	Data size	16bit	Data format	DEC
	Modbus communication address	2298, 2299	CANopen communication address	0x2631, 0x00

P6.50*	Magnetic pole detection startup command	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter is used to enable the magnetic pole detection. Corresponding encoders without Hall sensor can determine the electrical angle with this function.							
P6.50*	Data size	16bit	Data format		DEC		
	Modbus communication address	2300, 2301	CANopen communication address		0x2632, 0x00		

P6.51	Magnetic pole detection speed gain	Setting range	Default	Unit	Applicable mode		
		1–2000	40	Hz	P	S	T
The parameter specifies the magnetic pole detection speed gain.							
P6.51	Data size	16bit	Data format		DEC		
	Modbus communication address	2302, 2303	CANopen communication address		0x2633, 0x00		

P6.52	Speed integral time constant of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		0.15–512	30	ms	P	S	T
The parameter specifies the speed integral time constant of magnetic pole detection.							
P6.52	Data size	16bit	Data format		DEC		
	Modbus communication address	2304, 2305	CANopen communication address		0x2634, 0x00		

P6.53	Magnetic pole detection inertia ratio	Setting range	Default	Unit	Applicable mode		
		0–20000	100	%	P	S	T
Magnetic pole detection inertia ratio							
P6.53	Data size	16bit	Data format		DEC		
	Modbus communication address	2306, 2307	CANopen communication address		0x2635, 0x00		

P6.54	Rotary speed command of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		0–1000	50	mm/s	P	S	T
This parameter specifies the rotary speed command of magnetic pole detection.							
P6.54	Data size	16bit	Data format		DEC		
	Modbus communication address	2308, 2309	CANopen communication address		0x2636, 0x00		

P6.55	Linear speed command of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		0–100	20	mm/s	P	S	T
This parameter specifies the linear speed command of magnetic pole detection.							
P6.55	Data size	16bit	Data format		DEC		
	Modbus communication address	2310, 2311	CANopen communication address		0x2637, 0x00		

P6.56	ACC/DEC time of magnetic pole detection command	Setting range	Default	Unit	Applicable mode		
		0–100	25	ms	P	S	T
This parameter specifies the ACC/DEC time of magnetic pole detection speed command.							
P6.56	Data size	16bit	Data format		DEC		
	Modbus communication address	2312, 2313	CANopen communication address		0x2638, 0x00		

P6.57	Constant speed time of magnetic pole detection speed command	Setting range	Default	Unit	Applicable mode		
		0–300	0	ms	P	S	T
This parameter specifies the constant speed time of magnetic pole detection speed command.							
P6.57	Data size	16bit	Data format		DEC		
	Modbus communication address	2314, 2315	CANopen communication address		0x2639, 0x00		

P6.58	Wait time of magnetic pole detection speed command	Setting range	Default	Unit	Applicable mode		
		50–500	100	ms	P	S	T
This parameter specifies the wait time of magnetic pole detection speed command.							
P6.58	Data size	16bit	Data format		DEC		
	Modbus communication address	2316, 2317	CANopen communication address		0x263A, 0x00		

P6.59	Repetition times of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		0–10	4	-	P	S	T
This parameter specifies the repeat times of magnetic pole detection.							
P6.59	Data size	16bit	Data format		DEC		
	Modbus communication address	2318, 2319	CANopen communication address		0x263B, 0x00		

P6.60	Rotary movable range of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		0.001–32.767	0.250	rev	P	S	T
This parameter specifies the rotary movable range of magnetic pole detection.							
P6.60	Data size	16bit	Data format		DEC		
	Modbus communication address	2320, 2321	CANopen communication address		0x263C, 0x00		

P6.61	Linear movable range of magnetic pole detection	Setting range	Default	Unit	Applicable mode		
		1–32767	10	mm	P	S	T
This parameter specifies the linear movable range of magnetic pole detection.							
P6.61	Data size	16bit	Data format		DEC		
	Modbus communication address	2322, 2323	CANopen communication address		0x263D, 0x00		

P6.62	Gain without integral for pole detection	Setting range	Default	Unit	Applicable mode		
		0–100	0.3	%	P	S	T

This parameter specifies the gain without integral for pole detection.				
P6.62	Data size	16bit	Data format	DEC
	Modbus communication address	2324, 2325	CANopen communication address	0x263E, 0x00

P6.63	Starting time without integral for pole detection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	30	%	P	S	T
This parameter specifies the starting time without integral for pole detection.							
P6.63	Data size	16bit	Data format		DEC		
	Modbus communication address	2326, 2327	CANopen communication address		0x263F, 0x00		

P6.64	Torque in checking process for pole detection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–200	100	%	P	S	T
This parameter specifies the torque in checking process for pole detection.							
P6.64	Data size	16bit	Data format		DEC		
	Modbus communication address	2328, 2329	CANopen communication address		0x2640, 0x00		

P6.65	ACC/DEC time of torque in checking process for pole detection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1000	10	ms	P	S	T
This parameter specifies the ACC/DEC time of torque in checking process for pole detection.							
P6.65	Data size	16bit	Data format		DEC		
	Modbus communication address	2330, 2331	CANopen communication address		0x2641, 0x00		

P6.66	Constant time of torque in checking process for pole detection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–3000	1500	ms	P	S	T
This parameter specifies the constant time of torque in checking process for pole detection.							
P6.66	Data size	16bit	Data format		DEC		

	Modbus communication address	2332, 2333	CANopen communication address	0x2642, 0x00

P6.67	Allowable error range of magnetic pole detection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–30	10	deg	P	S	T
This parameter specifies the allowable error range of magnetic pole detection.							
P6.67	Data size	16bit	Data format		DEC		
	Modbus communication address	2334, 2335	CANopen communication address		0x2643, 0x00		

P6.68	Retrograde threshold in magnetic pole detection operation	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	15	%	P	S	T
This parameter specifies the retrograde threshold in magnetic pole detection operation.							
P6.68	Data size	16bit	Data format		DEC		
	Modbus communication address	2336, 2337	CANopen communication address		0x2644, 0x00		

P6.69	Retrograde threshold in magnetic pole detection waiting	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–100	50	%	P	S	T
This parameter specifies the retrograde threshold in magnetic pole detection waiting.							
P6.69	Data size	16bit	Data format		DEC		
	Modbus communication address	2338, 2339	CANopen communication address		0x2645, 0x00		

P6.70	Magnetic pole detection overspeed threshold	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		100–500	180	%	P	S	T
This parameter specifies the magnetic pole detection overspeed threshold.							
P6.70	Data size	16bit	Data format		DEC		
	Modbus communication address	2340, 2341	CANopen communication address		0x2646, 0x00		

P6.71	Positioning compensation enabling	Setting range	Default	Unit	Applicable mode		
		0–1	0	-	P	S	T
This parameter specifies the positioning compensation enabling.							
P6.71	Data size	16bit	Data format		DEC		
	Modbus communication address	2342, 2343	CANopen communication address		0x2647, 0x00		

P6.72	Positioning compensation unit	Setting range	Default	Unit	Applicable mode		
		0–6	0	-	P	S	T
This parameter specifies the positioning compensation unit.							
P6.72	Data size	16bit	Data format		DEC		
	Modbus communication address	2344, 2345	CANopen communication address		0x2648, 0x00		

P6.73	Starting position of positioning compensation	Setting range	Default	Unit	Applicable mode		
		-2147483646–2147483647	0	-	P	S	T
This parameter specifies the starting position of positioning compensation.							
P6.73	Data size	32bit	Data format		DEC		
	Modbus communication address	2346, 2347	CANopen communication address		0x2649, 0x00		

P6.74	Points of position compensation	Setting range	Default	Unit	Applicable mode		
		0–1000	100	-	P	S	T
This parameter specifies the points of position compensation.							
P6.74	Data size	16bit	Data format		DEC		
	Modbus communication address	2348, 2349	CANopen communication address		0x264A, 0x00		

P6.75	Starting index bias of positioning compensation	Setting range	Default	Unit	Applicable mode		
		0–1000	0	-	P	S	T
This parameter specifies the starting index bias of positioning compensation.							
P6.75	Data size	16bit	Data format		DEC		

	Modbus communication address	2350, 2351	CANopen communication address	0x264B, 0x00

P6.76	Positioning compensation distance	Setting range	Default	Unit	Applicable mode		
		0–100000	100	-	P	S	T
This parameter specifies the positioning compensation distance.							
P6.76	Data size	32bit	Data format		DEC		
	Modbus communication address	2352, 2353	CANopen communication address		0x264C, 0x00		

P6.77	Gear ratio numerator of positioning compensation	Setting range	Default	Unit	Applicable mode		
		-2147483646–2147483647	1	-	P	S	T
This parameter specifies the gear ratio numerator of positioning compensation.							
P6.77	Data size	32bit	Data format		DEC		
	Modbus communication address	2354, 2355	CANopen communication address		0x264D, 0x00		

P6.78	Gear ratio denominator of positioning compensation	Setting range	Default	Unit	Applicable mode		
		1–2147483647	1	-	P	S	T
This parameter specifies the gear ratio denominator of positioning compensation.							
P6.78	Data size	32bit	Data format		DEC		
	Modbus communication address	2356, 2357	CANopen communication address		0x264E, 0x00		

P6.79	Positioning compensation value 1	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 1.							
P6.79	Data size	32bit	Data format		DEC		
	Modbus communication address	2358, 2359	CANopen communication address		0x264F, 0x00		

P6.80	Positioning compensation value 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 2.							
P6.80	Data size	32bit	Data format		DEC		
	Modbus communication address	2360, 2361	CANopen communication address		0x2650, 0x00		

P6.81	Positioning compensation value 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 3.							
P6.81	Data size	32bit	Data format		DEC		
	Modbus communication address	2362, 2363	CANopen communication address		0x2651, 0x00		

P6.82	Positioning compensation value 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 4.							
P6.82	Data size	32bit	Data format		DEC		
	Modbus communication address	2364, 2365	CANopen communication address		0x2652, 0x00		

P6.83	Positioning compensation value 5	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 5.							
P6.83	Data size	32bit	Data format		DEC		
	Modbus communication address	2366, 2367	CANopen communication address		0x2653, 0x00		

P6.84	Positioning compensation value 6	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 6.							
P6.84	Data size	32bit	Data format		DEC		
	Modbus communication address	2368, 2369	CANopen communication address		0x2654, 0x00		

P6.85	Positioning compensation value 7	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 7.							
P6.85	Data size	32bit	Data format		DEC		
	Modbus communication address	2370, 2371	CANopen communication address		0x2655, 0x00		

P6.86	Positioning compensation value 8	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 8.							
P6.86	Data size	32bit	Data format		DEC		
	Modbus communication address	2372, 2373	CANopen communication address		0x2656, 0x00		

P6.87	Positioning compensation value 9	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 9.							
P6.87	Data size	32bit	Data format		DEC		
	Modbus communication address	2374, 2375	CANopen communication address		0x2657, 0x00		

P6.88	Positioning compensation value 10	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 10.							
P6.88	Data size	32bit	Data format		DEC		
	Modbus communication address	2376, 2377	CANopen communication address		0x2658, 0x00		

P6.89	Positioning compensation value 11	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 11.							
P6.89	Data size	32bit	Data format		DEC		
	Modbus communication address	2378, 2379	CANopen communication address		0x2659, 0x00		

P6.90	Positioning compensation value 12	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 12.							
P6.90	Data size	32bit	Data format		DEC		
	Modbus communication address	2380, 2381	CANopen communication address		0x265A, 0x00		

P6.91	Positioning compensation value 13	Setting range	Default	Unit	Applicable mode		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 13.							
P6.91	Data size	32bit	Data format		DEC		
	Modbus communication address	2382, 2383	CANopen communication address		0x265B, 0x00		

P6.92	Positioning compensation value 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 14.							
P6.92	Data size	32bit	Data format		DEC		
	Modbus communication address	2384, 2385	CANopen communication address		0x265C, 0x00		

P6.93	Positioning compensation value 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 15.							
P6.93	Data size	32bit	Data format		DEC		
	Modbus communication address	2386, 2387	CANopen communication address		0x265D, 0x00		

P6.94	Positioning compensation value 16	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 16.							
P6.94	Data size	32bit	Data format		DEC		
	Modbus communication address	2388, 2389	CANopen communication address		0x265E, 0x00		

P6.95	Positioning compensation value 17	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 17.							
P6.95	Data size	32bit	Data format		DEC		
	Modbus communication address	2390, 2391	CANopen communication address		0x265F, 0x00		

P6.96	Positioning compensation value 18	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 18.							
P6.96	Data size	32bit	Data format		DEC		
	Modbus communication address	2392, 2393	CANopen communication address		0x2660, 0x00		

P6.97	Positioning compensation value 19	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 19.							
P6.97	Data size	32bit	Data format		DEC		
	Modbus communication address	2394, 2395	CANopen communication address		0x2661, 0x00		

P6.98	Positioning compensation value 20	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 20.							
P6.98	Data size	32bit	Data format		DEC		
	Modbus communication address	2396, 2397	CANopen communication address		0x2662, 0x00		

P6.99	Positioning compensation value 21	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483.646–2147483.647	0	-	P	S	T
This parameter specifies the positioning compensation value 21.							
P6.99	Data size	32bit	Data format		DEC		
	Modbus communication address	2398, 2399	CANopen communication address		0x2663, 0x00		

7.8 Group PtP0, PtP1, PtP2 PTP control

PtP0.00	Control word of segment 00	Setting range	Default	Unit	Applicable mode		
		0–0x7FFFFFFF	0x00000000	-	P		

General description:

Data bit	Symbol	Function
Bit0–bit3	MODE	PTP running mode.
Bit4–bit7	OPT	PTP attribute.
Bit8–bit11	ACC	ACC/DEC time index
Bit12–bit15	SPD	Target speed index
Bit16–bit19	DLY	Delay time index
Bit20–bit23	CYL	Number of cycles for executing the current segment
Bit24–bit30	JMP	The program jumps to the next segment.

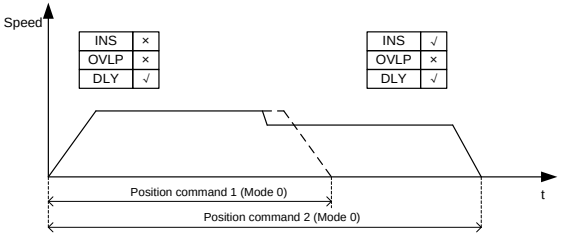
Description for MODE:

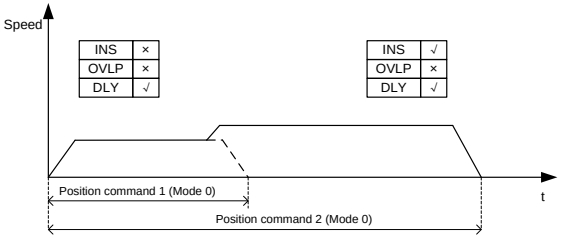
MODE	Description
0	The program stops after the current segment is executed.
1	The program jumps to the next segment after the current segment is executed.
2	The program stops after circular execution. If CMD is 1, the circulation is invalid.
3	The program jumps to the next segment after circular execution. If CMD is 1, the circulation is invalid.

Description for OPT:

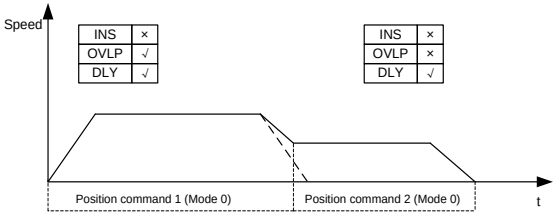
Data bit	Symbol	Function
Bit4	INS	Insertion. The current segment can suspend segments that are being executed or not executed.
Bit5	OVLP	Overlap. The current segment and next segment can overlap and then be executed.
Bit6–bit7	CMD	Position command type: 0 indicates incremental position while 1 indicates absolute position.

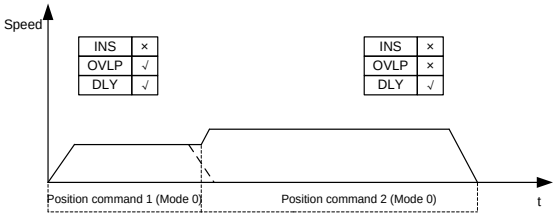
Description for INS



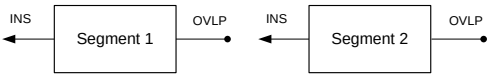


Description for OVLP





Relationship between INS and OVLP



Note:

- INS indicates the current segment has execution priority over the previous one, while OVLP indicates the current segment is executed after the overlap with the next one is checked.

- INS takes priority over OVLP. For example, if both OVLP for segment 1 and INS for segment 2 are enabled, OVLP for segment 1 is invalid.
- The two segments in the reverse directions cannot overlap.

PtP0.00	Data size	32bit	Data format	HEX
	Modbus communication address	3200, 3201	CANopen communication address	0x2B00, 0x00

PtP0.01	Position of segment 00	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This parameter specifies the position of segment 00. The CMD attribute determines the command mode of this PTP position. P0.37 is inapplicable to this PTP position.

PtP0.01	Data size	32bit	Data format	DEC
	Modbus communication address	3202, 3203	CANopen communication address	0x2B01, 0x00

PtP0.02	Control word of segment 01	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.04	Control word of segment 02	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.06	Control word of segment 03	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.08	Control word of segment 04	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.10	Control word of segment 05	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.12	Control word of segment 06	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.14	Control word of segment 07	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.16	Control word of segment 08	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP0.18	Control word of segment 09	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.20	Control word of segment 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.22	Control word of segment 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.24	Control word of segment 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.26	Control word of segment 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.28	Control word of segment 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.30	Control word of segment 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.32	Control word of segment 16	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.34	Control word of segment 17	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.36	Control word of segment 18	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.38	Control word of segment 19	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.40	Control word of segment 20	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.42	Control word of segment 21	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP0.44	Control word of segment 22	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.46	Control word of segment 23	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.48	Control word of segment 24	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.50	Control word of segment 25	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.52	Control word of segment 26	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.54	Control word of segment 27	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.56	Control word of segment 28	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.58	Control word of segment 29	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.60	Control word of segment 30	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.62	Control word of segment 31	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.64	Control word of segment 32	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.66	Control word of segment 33	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.68	Control word of segment 34	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP0.70	Control word of segment 35	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.72	Control word of segment 36	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.74	Control word of segment 37	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.76	Control word of segment 38	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.78	Control word of segment 39	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.80	Control word of segment 40	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.82	Control word of segment 41	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.84	Control word of segment 42	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.86	Control word of segment 43	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.88	Control word of segment 44	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.90	Control word of segment 45	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.92	Control word of segment 46	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.94	Control word of segment 47	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP0.96	Control word of segment 48	Setting range	Default	Unit	Applicable mode		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP0.98	Control word of segment 49	Setting range	Default	Unit	Applicable mode		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
This group of parameters specify the control words of segment 01 to segment 49. For details, see the description for PtP0.00.							
PtP0.02	Data size	32bit	Data format	HEX			
	Modbus communication address	3204, 3205	CANopen communication address	0x2B02, 0x00			
PtP0.04	Data size	32bit	Data format	HEX			
	Modbus communication address	3208, 3209	CANopen communication address	0x2B04, 0x00			
PtP0.06	Data size	32bit	Data format	HEX			
	Modbus communication address	3212, 3213	CANopen communication address	0x2B06, 0x00			
PtP0.08	Data size	32bit	Data format	HEX			
	Modbus communication address	3216, 3217	CANopen communication address	0x2B08, 0x00			
PtP0.10	Data size	32bit	Data format	HEX			
	Modbus communication address	3220, 3221	CANopen communication address	0x2B0A, 0x00			
PtP0.12	Data size	32bit	Data format	HEX			
	Modbus communication address	3224, 3225	CANopen communication address	0x2B0C, 0x00			
PtP0.14	Data size	32bit	Data format	HEX			
	Modbus communication address	3228, 3229	CANopen communication address	0x2B0E, 0x00			
PtP0.16	Data size	32bit	Data format	HEX			
	Modbus communication address	3232, 3233	CANopen communication address	0x2B10, 0x00			

PtP0.18	Data size	32bit	Data format	HEX
	Modbus communication address	3236, 3237	CANopen communication address	0x2B12, 0x00
PtP0.20	Data size	32bit	Data format	HEX
	Modbus communication address	3240, 3241	CANopen communication address	0x2B14, 0x00
PtP0.22	Data size	32bit	Data format	HEX
	Modbus communication address	3244, 3245	CANopen communication address	0x2B16, 0x00
PtP0.24	Data size	32bit	Data format	HEX
	Modbus communication address	3248, 3249	CANopen communication address	0x2B18, 0x00
PtP0.26	Data size	32bit	Data format	HEX
	Modbus communication address	3252, 3253	CANopen communication address	0x2B1A, 0x00
PtP0.28	Data size	32bit	Data format	HEX
	Modbus communication address	3256, 3257	CANopen communication address	0x2B1C, 0x00
PtP0.30	Data size	32bit	Data format	HEX
	Modbus communication address	3260, 3261	CANopen communication address	0x2B1E, 0x00
PtP0.32	Data size	32bit	Data format	HEX
	Modbus communication address	3264, 3265	CANopen communication address	0x2B20, 0x00
PtP0.34	Data size	32bit	Data format	HEX
	Modbus communication address	3268, 3269	CANopen communication address	0x2B22, 0x00
PtP0.36	Data size	32bit	Data format	HEX
	Modbus communication address	3272, 3273	CANopen communication address	0x2B24, 0x00

PtP0.38	Data size	32bit	Data format	HEX
	Modbus communication address	3276, 3277	CANopen communication address	0x2B26, 0x00
PtP0.40	Data size	32bit	Data format	HEX
	Modbus communication address	3280, 3281	CANopen communication address	0x2B28, 0x00
PtP0.42	Data size	32bit	Data format	HEX
	Modbus communication address	3284, 3285	CANopen communication address	0x2B2A, 0x00
PtP0.44	Data size	32bit	Data format	HEX
	Modbus communication address	3288, 3289	CANopen communication address	0x2B2C, 0x00
PtP0.46	Data size	32bit	Data format	HEX
	Modbus communication address	3292, 3293	CANopen communication address	0x2B2E, 0x00
PtP0.48	Data size	32bit	Data format	HEX
	Modbus communication address	3296, 3297	CANopen communication address	0x2B30, 0x00
PtP0.50	Data size	32bit	Data format	HEX
	Modbus communication address	3300, 3301	CANopen communication address	0x2B32, 0x00
PtP0.52	Data size	32bit	Data format	HEX
	Modbus communication address	3304, 3305	CANopen communication address	0x2B34, 0x00
PtP0.54	Data size	32bit	Data format	HEX
	Modbus communication address	3308, 3309	CANopen communication address	0x2B36, 0x00
PtP0.56	Data size	32bit	Data format	HEX
	Modbus communication address	3312, 3313	CANopen communication address	0x2B38, 0x00

PtP0.58	Data size	32bit	Data format	HEX
	Modbus communication address	3316, 3317	CANopen communication address	0x2B3A, 0x00
PtP0.60	Data size	32bit	Data format	HEX
	Modbus communication address	3320, 3321	CANopen communication address	0x2B3C, 0x00
PtP0.62	Data size	32bit	Data format	HEX
	Modbus communication address	3324, 3325	CANopen communication address	0x2B3E, 0x00
PtP0.64	Data size	32bit	Data format	HEX
	Modbus communication address	3328, 3329	CANopen communication address	0x2B40, 0x00
PtP0.66	Data size	32bit	Data format	HEX
	Modbus communication address	3332, 3333	CANopen communication address	0x2B42, 0x00
PtP0.68	Data size	32bit	Data format	HEX
	Modbus communication address	3336, 3337	CANopen communication address	0x2B44, 0x00
PtP0.70	Data size	32bit	Data format	HEX
	Modbus communication address	3340, 3341	CANopen communication address	0x2B46, 0x00
PtP0.72	Data size	32bit	Data format	HEX
	Modbus communication address	3344, 3345	CANopen communication address	0x2B48, 0x00
PtP0.74	Data size	32bit	Data format	HEX
	Modbus communication address	3348, 3349	CANopen communication address	0x2B4A, 0x00
PtP0.76	Data size	32bit	Data format	HEX
	Modbus communication address	3352, 3353	CANopen communication address	0x2B4C, 0x00

PtP0.78	Data size	32bit	Data format	HEX
	Modbus communication address	3356, 3357	CANopen communication address	0x2B4E, 0x00
PtP0.80	Data size	32bit	Data format	HEX
	Modbus communication address	3360, 3361	CANopen communication address	0x2B50, 0x00
PtP0.82	Data size	32bit	Data format	HEX
	Modbus communication address	3364, 3365	CANopen communication address	0x2B52, 0x00
PtP0.84	Data size	32bit	Data format	HEX
	Modbus communication address	3368, 3369	CANopen communication address	0x2B54, 0x00
PtP0.86	Data size	32bit	Data format	HEX
	Modbus communication address	3372, 3373	CANopen communication address	0x2B56, 0x00
PtP0.88	Data size	32bit	Data format	HEX
	Modbus communication address	3376, 3377	CANopen communication address	0x2B58, 0x00
PtP0.90	Data size	32bit	Data format	HEX
	Modbus communication address	3380, 3381	CANopen communication address	0x2B5A, 0x00
PtP0.92	Data size	32bit	Data format	HEX
	Modbus communication address	3384, 3385	CANopen communication address	0x2B5C, 0x00
PtP0.94	Data size	32bit	Data format	HEX
	Modbus communication address	3388, 3389	CANopen communication address	0x2B5E, 0x00
PtP0.96	Data size	32bit	Data format	HEX
	Modbus communication address	3392, 3393	CANopen communication address	0x2B60, 0x00

PtP0.98	Data size	32bit	Data format	HEX
	Modbus communication address	3396, 3397	CANopen communication address	0x2B62, 0x00

PtP0.03	Position of segment 01	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.05	Position of segment 02	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.07	Position of segment 03	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.09	Position of segment 04	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.11	Position of segment 05	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.13	Position of segment 06	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.15	Position of segment 07	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.17	Position of segment 08	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.19	Position of segment 09	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.21	Position of segment 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.23	Position of segment 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP0.25	Position of segment 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.27	Position of segment 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.29	Position of segment 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.31	Position of segment 15	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.33	Position of segment 16	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.35	Position of segment 17	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.37	Position of segment 18	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.39	Position of segment 19	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.41	Position of segment 20	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.43	Position of segment 21	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.45	Position of segment 22	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.47	Position of segment 23	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.49	Position of segment 24	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP0.51	Position of segment 25	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.53	Position of segment 26	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.55	Position of segment 27	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.57	Position of segment 28	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.59	Position of segment 29	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.61	Position of segment 30	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.63	Position of segment 31	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.65	Position of segment 32	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.67	Position of segment 33	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.69	Position of segment 34	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.71	Position of segment 35	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.73	Position of segment 36	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.75	Position of segment 37	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP0.77	Position of segment 38	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.79	Position of segment 39	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.81	Position of segment 40	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.83	Position of segment 41	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.85	Position of segment 42	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.87	Position of segment 43	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.89	Position of segment 44	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.91	Position of segment 45	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.93	Position of segment 46	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.95	Position of segment 47	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.97	Position of segment 48	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP0.99	Position of segment 49	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
This group of parameters specify the positions of segment 01 to segment 49. The CMD attribute determines the command mode of this PTP position. P0.37 is inapplicable to this PTP position.							

PtP0.03	Data size	32bit	Data format	DEC
	Modbus communication address	3206, 3207	CANopen communication address	0x2B03, 0x00
PtP0.05	Data size	32bit	Data format	DEC
	Modbus communication address	3210, 3211	CANopen communication address	0x2B05, 0x00
PtP0.07	Data size	32bit	Data format	DEC
	Modbus communication address	3214, 3015	CANopen communication address	0x2B07, 0x00
PtP0.09	Data size	32bit	Data format	DEC
	Modbus communication address	3218, 3219	CANopen communication address	0x2B09, 0x00
PtP0.11	Data size	32bit	Data format	DEC
	Modbus communication address	3222, 3223	CANopen communication address	0x2B0B, 0x00
PtP0.13	Data size	32bit	Data format	DEC
	Modbus communication address	3226, 3227	CANopen communication address	0x2B0D, 0x00
PtP0.15	Data size	32bit	Data format	DEC
	Modbus communication address	3230, 3231	CANopen communication address	0x2B0F, 0x00
PtP0.17	Data size	32bit	Data format	DEC
	Modbus communication address	3234, 3235	CANopen communication address	0x2B11, 0x00
PtP0.19	Data size	32bit	Data format	DEC
	Modbus communication address	3238, 3239	CANopen communication address	0x2B13, 0x00
PtP0.21	Data size	32bit	Data format	DEC
	Modbus communication address	3242, 3243	CANopen communication address	0x2B15, 0x00

PtP0.23	Data size	32bit	Data format	DEC
	Modbus communication address	3246, 3247	CANopen communication address	0x2B17, 0x00
PtP0.25	Data size	32bit	Data format	DEC
	Modbus communication address	3250, 3251	CANopen communication address	0x2B19, 0x00
PtP0.27	Data size	32bit	Data format	DEC
	Modbus communication address	3254, 3255	CANopen communication address	0x2B1B, 0x00
PtP0.29	Data size	32bit	Data format	DEC
	Modbus communication address	3258, 3259	CANopen communication address	0x2B1D, 0x00
PtP0.31	Data size	32bit	Data format	DEC
	Modbus communication address	3262, 3263	CANopen communication address	0x2B1F, 0x00
PtP0.33	Data size	32bit	Data format	DEC
	Modbus communication address	3266, 3267	CANopen communication address	0x2B21, 0x00
PtP0.35	Data size	32bit	Data format	DEC
	Modbus communication address	3270, 3271	CANopen communication address	0x2B23, 0x00
PtP0.37	Data size	32bit	Data format	DEC
	Modbus communication address	3274, 3075	CANopen communication address	0x2B25, 0x00
PtP0.39	Data size	32bit	Data format	DEC
	Modbus communication address	3278, 3279	CANopen communication address	0x2B27, 0x00
PtP0.41	Data size	32bit	Data format	DEC
	Modbus communication address	3282, 3283	CANopen communication address	0x2B29, 0x00

PtP0.43	Data size	32bit	Data format	DEC
	Modbus communication address	3286, 3287	CANopen communication address	0x2B2B, 0x00
PtP0.45	Data size	32bit	Data format	DEC
	Modbus communication address	3290, 3291	CANopen communication address	0x2B2D, 0x00
PtP0.47	Data size	32bit	Data format	DEC
	Modbus communication address	3294, 3295	CANopen communication address	0x2B2F, 0x00
PtP0.49	Data size	32bit	Data format	DEC
	Modbus communication address	3298, 3299	CANopen communication address	0x2B31, 0x00
PtP0.51	Data size	32bit	Data format	DEC
	Modbus communication address	3302, 3303	CANopen communication address	0x2B33, 0x00
PtP0.53	Data size	32bit	Data format	DEC
	Modbus communication address	3306, 3307	CANopen communication address	0x2B35, 0x00
PtP0.55	Data size	32bit	Data format	DEC
	Modbus communication address	3310, 3311	CANopen communication address	0x2B37, 0x00
PtP0.57	Data size	32bit	Data format	DEC
	Modbus communication address	3314, 3315	CANopen communication address	0x2B39, 0x00
PtP0.59	Data size	32bit	Data format	DEC
	Modbus communication address	3318, 3319	CANopen communication address	0x2B3B, 0x00
PtP0.61	Data size	32bit	Data format	DEC
	Modbus communication address	3322, 3323	CANopen communication address	0x2B3D, 0x00

PtP0.63	Data size	32bit	Data format	DEC
	Modbus communication address	3326, 3327	CANopen communication address	0x2B3F, 0x00
PtP0.65	Data size	32bit	Data format	DEC
	Modbus communication address	3330, 3331	CANopen communication address	0x2B41, 0x00
PtP0.67	Data size	32bit	Data format	DEC
	Modbus communication address	3334, 3335	CANopen communication address	0x2B43, 0x00
PtP0.69	Data size	32bit	Data format	DEC
	Modbus communication address	3338, 3339	CANopen communication address	0x2B45, 0x00
PtP0.71	Data size	32bit	Data format	DEC
	Modbus communication address	3342, 3343	CANopen communication address	0x2B47, 0x00
PtP0.73	Data size	32bit	Data format	DEC
	Modbus communication address	3346, 3347	CANopen communication address	0x2B49, 0x00
PtP0.75	Data size	32bit	Data format	DEC
	Modbus communication address	3350, 3351	CANopen communication address	0x2B4B, 0x00
PtP0.77	Data size	32bit	Data format	DEC
	Modbus communication address	3354, 3355	CANopen communication address	0x2B4D, 0x00
PtP0.79	Data size	32bit	Data format	DEC
	Modbus communication address	3358, 3359	CANopen communication address	0x2B4F, 0x00
PtP0.81	Data size	32bit	Data format	DEC
	Modbus communication address	3362, 3363	CANopen communication address	0x2B51, 0x00

PtP0.83	Data size	32bit	Data format	DEC
	Modbus communication address	3366, 3367	CANopen communication address	0x2B53, 0x00
PtP0.85	Data size	32bit	Data format	DEC
	Modbus communication address	3370, 3371	CANopen communication address	0x2B55, 0x00
PtP0.87	Data size	32bit	Data format	DEC
	Modbus communication address	3374, 3375	CANopen communication address	0x2B57, 0x00
PtP0.89	Data size	32bit	Data format	DEC
	Modbus communication address	3378, 3379	CANopen communication address	0x2B59, 0x00
PtP0.91	Data size	32bit	Data format	DEC
	Modbus communication address	3382, 3383	CANopen communication address	0x2B5B, 0x00
PtP0.93	Data size	32bit	Data format	DEC
	Modbus communication address	3386, 3387	CANopen communication address	0x2B5D, 0x00
PtP0.95	Data size	32bit	Data format	DEC
	Modbus communication address	3390, 3391	CANopen communication address	0x2B5F, 0x00
PtP0.97	Data size	32bit	Data format	DEC
	Modbus communication address	3394, 3395	CANopen communication address	0x2B61, 0x00
PtP0.99	Data size	32bit	Data format	DEC
	Modbus communication address	3398, 3399	CANopen communication address	0x2B63, 0x00

PtP1.00	Control word of segment 50	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP1.02	Control word of segment 51	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.04	Control word of segment 52	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.06	Control word of segment 53	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.08	Control word of segment 54	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.10	Control word of segment 55	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.12	Control word of segment 56	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.14	Control word of segment 57	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.16	Control word of segment 58	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.18	Control word of segment 59	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.20	Control word of segment 60	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.22	Control word of segment 61	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.24	Control word of segment 62	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.26	Control word of segment 63	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP1.28	Control word of segment 64	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.30	Control word of segment 65	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.32	Control word of segment 66	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.34	Control word of segment 67	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.36	Control word of segment 68	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.38	Control word of segment 69	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.40	Control word of segment 70	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.42	Control word of segment 71	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.44	Control word of segment 72	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.46	Control word of segment 73	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.48	Control word of segment 74	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.50	Control word of segment 75	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.52	Control word of segment 76	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP1.54	Control word of segment 77	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.56	Control word of segment 78	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.58	Control word of segment 79	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.60	Control word of segment 80	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.62	Control word of segment 81	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.64	Control word of segment 82	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.66	Control word of segment 83	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.68	Control word of segment 84	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.70	Control word of segment 85	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.72	Control word of segment 86	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.74	Control word of segment 87	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.76	Control word of segment 88	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.78	Control word of segment 89	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP1.80	Control word of segment 90	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.82	Control word of segment 91	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.84	Control word of segment 92	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.86	Control word of segment 93	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.88	Control word of segment 94	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.90	Control word of segment 95	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.92	Control word of segment 96	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.94	Control word of segment 97	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.96	Control word of segment 98	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP1.98	Control word of segment 99	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
This group of parameters specify the control words of segment 50 to segment 99. For details, see the description for PtP0.00.							
PtP1.00	Data size	32bit	Data format	HEX			
	Modbus communication address	3400, 3401	CANopen communication address	0x2C00, 0x00			
PtP1.02	Data size	32bit	Data format	HEX			
	Modbus communication address	3404, 3405	CANopen communication address	0x2C02, 0x00			

PtP1.04	Data size	32bit	Data format	HEX
	Modbus communication address	3408, 3409	CANopen communication address	0x2C04, 0x00
PtP1.06	Data size	32bit	Data format	HEX
	Modbus communication address	3412, 3413	CANopen communication address	0x2C06, 0x00
PtP1.08	Data size	32bit	Data format	HEX
	Modbus communication address	3416, 3417	CANopen communication address	0x2C08, 0x00
PtP1.10	Data size	32bit	Data format	HEX
	Modbus communication address	3420, 3421	CANopen communication address	0x2C0A, 0x00
PtP1.12	Data size	32bit	Data format	HEX
	Modbus communication address	3424, 3425	CANopen communication address	0x2C0C, 0x00
PtP1.14	Data size	32bit	Data format	HEX
	Modbus communication address	3428, 3429	CANopen communication address	0x2C0E, 0x00
PtP1.16	Data size	32bit	Data format	HEX
	Modbus communication address	3432, 3433	CANopen communication address	0x2C10, 0x00
PtP1.18	Data size	32bit	Data format	HEX
	Modbus communication address	3436, 3437	CANopen communication address	0x2C12, 0x00
PtP1.20	Data size	32bit	Data format	HEX
	Modbus communication address	3440, 3441	CANopen communication address	0x2C14, 0x00
PtP1.22	Data size	32bit	Data format	HEX
	Modbus communication address	3444, 3445	CANopen communication address	0x2C16, 0x00

PtP1.24	Data size	32bit	Data format	HEX
	Modbus communication address	3448, 3449	CANopen communication address	0x2C18, 0x00
PtP1.26	Data size	32bit	Data format	HEX
	Modbus communication address	3452, 3453	CANopen communication address	0x2C1A, 0x00
PtP1.28	Data size	32bit	Data format	HEX
	Modbus communication address	3456, 3457	CANopen communication address	0x2C1C, 0x00
PtP1.30	Data size	32bit	Data format	HEX
	Modbus communication address	3460, 3461	CANopen communication address	0x2C1E, 0x00
PtP1.32	Data size	32bit	Data format	HEX
	Modbus communication address	3464, 3465	CANopen communication address	0x2C20, 0x00
PtP1.34	Data size	32bit	Data format	HEX
	Modbus communication address	3468, 3469	CANopen communication address	0x2C22, 0x00
PtP1.36	Data size	32bit	Data format	HEX
	Modbus communication address	3472, 3473	CANopen communication address	0x2C24, 0x00
PtP1.38	Data size	32bit	Data format	HEX
	Modbus communication address	3476, 3477	CANopen communication address	0x2C26, 0x00
PtP1.40	Data size	32bit	Data format	HEX
	Modbus communication address	3480, 3481	CANopen communication address	0x2C28, 0x00
PtP1.42	Data size	32bit	Data format	HEX
	Modbus communication address	3484, 3485	CANopen communication address	0x2C2A, 0x00

PtP1.44	Data size	32bit	Data format	HEX
	Modbus communication address	3488, 3489	CANopen communication address	0x2C2C, 0x00
PtP1.46	Data size	32bit	Data format	HEX
	Modbus communication address	3492, 3493	CANopen communication address	0x2C2E, 0x00
PtP1.48	Data size	32bit	Data format	HEX
	Modbus communication address	3496, 3497	CANopen communication address	0x2C30, 0x00
PtP1.50	Data size	32bit	Data format	HEX
	Modbus communication address	3500, 3501	CANopen communication address	0x2C32, 0x00
PtP1.52	Data size	32bit	Data format	HEX
	Modbus communication address	3504, 3505	CANopen communication address	0x2C34, 0x00
PtP1.54	Data size	32bit	Data format	HEX
	Modbus communication address	3508, 3509	CANopen communication address	0x2C36, 0x00
PtP1.56	Data size	32bit	Data format	HEX
	Modbus communication address	3512, 3513	CANopen communication address	0x2C38, 0x00
PtP1.58	Data size	32bit	Data format	HEX
	Modbus communication address	3516, 3517	CANopen communication address	0x2C3A, 0x00
PtP1.60	Data size	32bit	Data format	HEX
	Modbus communication address	3520, 3521	CANopen communication address	0x2C3C, 0x00
PtP1.62	Data size	32bit	Data format	HEX
	Modbus communication address	3524, 3525	CANopen communication address	0x2C3E, 0x00

PtP1.64	Data size	32bit	Data format	HEX
	Modbus communication address	3528, 3529	CANopen communication address	0x2C40, 0x00
PtP1.66	Data size	32bit	Data format	HEX
	Modbus communication address	3532, 3533	CANopen communication address	0x2C42, 0x00
PtP1.68	Data size	32bit	Data format	HEX
	Modbus communication address	3536, 3537	CANopen communication address	0x2C44, 0x00
PtP1.70	Data size	32bit	Data format	HEX
	Modbus communication address	3540, 3541	CANopen communication address	0x2C46, 0x00
PtP1.72	Data size	32bit	Data format	HEX
	Modbus communication address	3544, 3545	CANopen communication address	0x2C48, 0x00
PtP1.74	Data size	32bit	Data format	HEX
	Modbus communication address	3548, 3549	CANopen communication address	0x2C4A, 0x00
PtP1.76	Data size	32bit	Data format	HEX
	Modbus communication address	3552, 3553	CANopen communication address	0x2C4C, 0x00
PtP1.78	Data size	32bit	Data format	HEX
	Modbus communication address	3556, 3557	CANopen communication address	0x2C4E, 0x00
PtP1.80	Data size	32bit	Data format	HEX
	Modbus communication address	3560, 3561	CANopen communication address	0x2C50, 0x00
PtP1.82	Data size	32bit	Data format	HEX
	Modbus communication address	3564, 3565	CANopen communication address	0x2C52, 0x00

PtP1.84	Data size	32bit	Data format	HEX
	Modbus communication address	3568, 3569	CANopen communication address	0x2C54, 0x00
PtP1.86	Data size	32bit	Data format	HEX
	Modbus communication address	3572, 3573	CANopen communication address	0x2C56, 0x00
PtP1.88	Data size	32bit	Data format	HEX
	Modbus communication address	3576, 3577	CANopen communication address	0x2C58, 0x00
PtP1.90	Data size	32bit	Data format	HEX
	Modbus communication address	3580, 3581	CANopen communication address	0x2C5A, 0x00
PtP1.92	Data size	32bit	Data format	HEX
	Modbus communication address	3584, 3585	CANopen communication address	0x2C5C, 0x00
PtP1.94	Data size	32bit	Data format	HEX
	Modbus communication address	3588, 3589	CANopen communication address	0x2C5E, 0x00
PtP1.96	Data size	32bit	Data format	HEX
	Modbus communication address	3592, 3593	CANopen communication address	0x2C60, 0x00
PtP1.98	Data size	32bit	Data format	HEX
	Modbus communication address	3596, 3597	CANopen communication address	0x2C62, 0x00

PtP1.01	Position of segment 50	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.03	Position of segment 51	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.05	Position of segment 52	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP1.07	Position of segment 53	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.09	Position of segment 54	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.11	Position of segment 55	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.13	Position of segment 56	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.15	Position of segment 57	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.17	Position of segment 58	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.19	Position of segment 59	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.21	Position of segment 60	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.23	Position of segment 61	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.25	Position of segment 62	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.27	Position of segment 63	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.29	Position of segment 64	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.31	Position of segment 65	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP1.33	Position of segment 66	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.35	Position of segment 67	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.37	Position of segment 68	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.39	Position of segment 69	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.41	Position of segment 70	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.43	Position of segment 71	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.45	Position of segment 72	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.47	Position of segment 73	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.49	Position of segment 74	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.51	Position of segment 75	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.53	Position of segment 76	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.55	Position of segment 77	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.57	Position of segment 78	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP1.59	Position of segment 79	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.61	Position of segment 80	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.63	Position of segment 81	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.65	Position of segment 82	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.67	Position of segment 83	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.69	Position of segment 84	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.71	Position of segment 85	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.73	Position of segment 86	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.75	Position of segment 87	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.77	Position of segment 88	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.79	Position of segment 89	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.81	Position of segment 90	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.83	Position of segment 91	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP1.85	Position of segment 92	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.87	Position of segment 93	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.89	Position of segment 94	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.91	Position of segment 95	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.93	Position of segment 96	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.95	Position of segment 97	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.97	Position of segment 98	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP1.99	Position of segment 99	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This group of parameters specify the positions of segment 50 to segment 99. The CMD attribute determines the command mode of this PTP position. P0.37 is inapplicable to this PTP position.

PtP1.01	Data size	32bit	Data format	DEC
	Modbus communication address	3402, 3403	CANopen communication address	0x2C03, 0x00
PtP1.03	Data size	32bit	Data format	DEC
	Modbus communication address	3406, 3407	CANopen communication address	0x2C03, 0x00
PtP1.05	Data size	32bit	Data format	DEC
	Modbus communication address	3410, 3411	CANopen communication address	0x2C05, 0x00

PtP1.07	Data size	32bit	Data format	DEC
	Modbus communication address	3414, 3415	CANopen communication address	0x2C07, 0x00
PtP1.09	Data size	32bit	Data format	DEC
	Modbus communication address	3418, 3419	CANopen communication address	0x2C09, 0x00
PtP1.11	Data size	32bit	Data format	DEC
	Modbus communication address	3422, 3423	CANopen communication address	0x2C0B, 0x00
PtP1.13	Data size	32bit	Data format	DEC
	Modbus communication address	3426, 3427	CANopen communication address	0x2C0D, 0x00
PtP1.15	Data size	32bit	Data format	DEC
	Modbus communication address	3430, 3431	CANopen communication address	0x2C0F, 0x00
PtP1.17	Data size	32bit	Data format	DEC
	Modbus communication address	3434, 3435	CANopen communication address	0x2C11, 0x00
PtP1.19	Data size	32bit	Data format	DEC
	Modbus communication address	3438, 3439	CANopen communication address	0x2C13, 0x00
PtP1.21	Data size	32bit	Data format	DEC
	Modbus communication address	3442, 3443	CANopen communication address	0x2C15, 0x00
PtP1.23	Data size	32bit	Data format	DEC
	Modbus communication address	3446, 3447	CANopen communication address	0x2C17, 0x00
PtP1.25	Data size	32bit	Data format	DEC
	Modbus communication address	3450, 3451	CANopen communication address	0x2C19, 0x00

PtP1.27	Data size	32bit	Data format	DEC
	Modbus communication address	3454, 3455	CANopen communication address	0x2C1B, 0x00
PtP1.29	Data size	32bit	Data format	DEC
	Modbus communication address	3458, 3459	CANopen communication address	0x2C1D, 0x00
PtP1.31	Data size	32bit	Data format	DEC
	Modbus communication address	3462, 3463	CANopen communication address	0x2C1F, 0x00
PtP1.33	Data size	32bit	Data format	DEC
	Modbus communication address	3466, 3467	CANopen communication address	0x2C21, 0x00
PtP1.35	Data size	32bit	Data format	DEC
	Modbus communication address	3470, 3471	CANopen communication address	0x2C23, 0x00
PtP1.37	Data size	32bit	Data format	DEC
	Modbus communication address	3474, 3475	CANopen communication address	0x2C25, 0x00
PtP1.39	Data size	32bit	Data format	DEC
	Modbus communication address	3478, 3479	CANopen communication address	0x2C27, 0x00
PtP1.41	Data size	32bit	Data format	DEC
	Modbus communication address	3482, 3483	CANopen communication address	0x2C29, 0x00
PtP1.43	Data size	32bit	Data format	DEC
	Modbus communication address	3486, 3487	CANopen communication address	0x2C2B, 0x00
PtP1.45	Data size	32bit	Data format	DEC
	Modbus communication address	3490, 3491	CANopen communication address	0x2C2D, 0x00

PtP1.47	Data size	32bit	Data format	DEC
	Modbus communication address	3494, 3495	CANopen communication address	0x2C2F, 0x00
PtP1.49	Data size	32bit	Data format	DEC
	Modbus communication address	3498, 3499	CANopen communication address	0x2C31, 0x00
PtP1.51	Data size	32bit	Data format	DEC
	Modbus communication address	3502, 3503	CANopen communication address	0x2C33, 0x00
PtP1.53	Data size	32bit	Data format	DEC
	Modbus communication address	3506, 3507	CANopen communication address	0x2C35, 0x00
PtP1.55	Data size	32bit	Data format	DEC
	Modbus communication address	3510, 3511	CANopen communication address	0x2C37, 0x00
PtP1.57	Data size	32bit	Data format	DEC
	Modbus communication address	3514, 3515	CANopen communication address	0x2C39, 0x00
PtP1.59	Data size	32bit	Data format	DEC
	Modbus communication address	3518, 3519	CANopen communication address	0x2C3B, 0x00
PtP1.61	Data size	32bit	Data format	DEC
	Modbus communication address	3522, 3523	CANopen communication address	0x2C3D, 0x00
PtP1.63	Data size	32bit	Data format	DEC
	Modbus communication address	3526, 3527	CANopen communication address	0x2C3F, 0x00
PtP1.65	Data size	32bit	Data format	DEC
	Modbus communication address	3530, 3531	CANopen communication address	0x2C41, 0x00

PtP1.67	Data size	32bit	Data format	DEC
	Modbus communication address	3534, 3535	CANopen communication address	0x2C43, 0x00
PtP1.69	Data size	32bit	Data format	DEC
	Modbus communication address	3538, 3539	CANopen communication address	0x2C45, 0x00
PtP1.71	Data size	32bit	Data format	DEC
	Modbus communication address	3542, 3543	CANopen communication address	0x2C47, 0x00
PtP1.73	Data size	32bit	Data format	DEC
	Modbus communication address	3546, 3547	CANopen communication address	0x2C49, 0x00
PtP1.75	Data size	32bit	Data format	DEC
	Modbus communication address	3550, 3551	CANopen communication address	0x2C4B, 0x00
PtP1.77	Data size	32bit	Data format	DEC
	Modbus communication address	3554, 3555	CANopen communication address	0x2C4D, 0x00
PtP1.79	Data size	32bit	Data format	DEC
	Modbus communication address	3558, 3559	CANopen communication address	0x2C4F, 0x00
PtP1.81	Data size	32bit	Data format	DEC
	Modbus communication address	3562, 3563	CANopen communication address	0x2C51, 0x00
PtP1.83	Data size	32bit	Data format	DEC
	Modbus communication address	3566, 3567	CANopen communication address	0x2C53, 0x00
PtP1.85	Data size	32bit	Data format	DEC
	Modbus communication address	3570, 3571	CANopen communication address	0x2C55, 0x00

PtP1.87	Data size	32bit	Data format	DEC
	Modbus communication address	3574, 3575	CANopen communication address	0x2C57, 0x00
PtP1.89	Data size	32bit	Data format	DEC
	Modbus communication address	3578, 3579	CANopen communication address	0x2C59, 0x00
PtP1.91	Data size	32bit	Data format	DEC
	Modbus communication address	3582, 3583	CANopen communication address	0x2C5B, 0x00
PtP1.93	Data size	32bit	Data format	DEC
	Modbus communication address	3586, 3587	CANopen communication address	0x2C5D, 0x00
PtP1.95	Data size	32bit	Data format	DEC
	Modbus communication address	3590, 3591	CANopen communication address	0x2C5F, 0x00
PtP1.97	Data size	32bit	Data format	DEC
	Modbus communication address	3594, 3595	CANopen communication address	0x2C61, 0x00
PtP1.99	Data size	32bit	Data format	DEC
	Modbus communication address	3598, 3599	CANopen communication address	0x2C63, 0x00

PtP2.00	Control word of segment 100	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.02	Control word of segment 101	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.04	Control word of segment 102	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.06	Control word of segment 103	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP2.08	Control word of segment 104	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.10	Control word of segment 105	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.12	Control word of segment 106	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.14	Control word of segment 107	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.16	Control word of segment 108	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.18	Control word of segment 109	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.20	Control word of segment 110	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.22	Control word of segment 111	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.24	Control word of segment 112	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.26	Control word of segment 113	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.28	Control word of segment 114	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.30	Control word of segment 115	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.32	Control word of segment 116	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-

PtP2.34	Control word of segment 117	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.36	Control word of segment 118	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.38	Control word of segment 119	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.40	Control word of segment 120	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.42	Control word of segment 121	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.44	Control word of segment 122	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.46	Control word of segment 123	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.48	Control word of segment 124	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.50	Control word of segment 125	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.52	Control word of segment 126	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
PtP2.54	Control word of segment 127	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–0x7FFFFFFF	0x00000000	-	P	-	-
This group of parameters specify the control words of segment 100 to segment 127. For details, see the description for PtP0.00.							
PtP2.00	Data size	32bit	Data format	HEX			
	Modbus communication address	3600, 3601	CANopen communication address	0x2D00, 0x00			

PtP2.02	Data size	32bit	Data format	HEX
	Modbus communication address	3604, 3605	CANopen communication address	0x2D02, 0x00
PtP2.04	Data size	32bit	Data format	HEX
	Modbus communication address	3608, 3609	CANopen communication address	0x2D04, 0x00
PtP2.06	Data size	32bit	Data format	HEX
	Modbus communication address	3612, 3613	CANopen communication address	0x2D06, 0x00
PtP2.08	Data size	32bit	Data format	HEX
	Modbus communication address	3616, 3617	CANopen communication address	0x2D08, 0x00
PtP2.10	Data size	32bit	Data format	HEX
	Modbus communication address	3620, 3621	CANopen communication address	0x2D0A, 0x00
PtP2.12	Data size	32bit	Data format	HEX
	Modbus communication address	3624, 3625	CANopen communication address	0x2D0C, 0x00
PtP2.14	Data size	32bit	Data format	HEX
	Modbus communication address	3628, 3629	CANopen communication address	0x2D0E, 0x00
PtP2.16	Data size	32bit	Data format	HEX
	Modbus communication address	3632, 3633	CANopen communication address	0x2D10, 0x00
PtP2.18	Data size	32bit	Data format	HEX
	Modbus communication address	3636, 3637	CANopen communication address	0x2D12, 0x00
PtP2.20	Data size	32bit	Data format	HEX
	Modbus communication address	3640, 3641	CANopen communication address	0x2D14, 0x00

PtP2.22	Data size	32bit	Data format	HEX
	Modbus communication address	3644, 3645	CANopen communication address	0x2D16, 0x00
PtP2.24	Data size	32bit	Data format	HEX
	Modbus communication address	3648, 3649	CANopen communication address	0x2D18, 0x00
PtP2.26	Data size	32bit	Data format	HEX
	Modbus communication address	3652, 3653	CANopen communication address	0x2D1A, 0x00
PtP2.28	Data size	32bit	Data format	HEX
	Modbus communication address	3656, 3657	CANopen communication address	0x2D1C, 0x00
PtP2.30	Data size	32bit	Data format	HEX
	Modbus communication address	3660, 3661	CANopen communication address	0x2D1E, 0x00
PtP2.32	Data size	32bit	Data format	HEX
	Modbus communication address	3664, 3665	CANopen communication address	0x2D20, 0x00
PtP2.34	Data size	32bit	Data format	HEX
	Modbus communication address	3668, 3669	CANopen communication address	0x2D22, 0x00
PtP2.36	Data size	32bit	Data format	HEX
	Modbus communication address	3672, 3673	CANopen communication address	0x2D24, 0x00
PtP2.38	Data size	32bit	Data format	HEX
	Modbus communication address	3676, 3677	CANopen communication address	0x2D26, 0x00
PtP2.40	Data size	32bit	Data format	HEX
	Modbus communication address	3680, 3681	CANopen communication address	0x2D28, 0x00

PtP2.42	Data size	32bit	Data format	HEX
	Modbus communication address	3684, 3685	CANopen communication address	0x2D2A, 0x00
PtP2.44	Data size	32bit	Data format	HEX
	Modbus communication address	3688, 3689	CANopen communication address	0x2D2C, 0x00
PtP2.46	Data size	32bit	Data format	HEX
	Modbus communication address	3692, 3693	CANopen communication address	0x2D2E, 0x00
PtP2.48	Data size	32bit	Data format	HEX
	Modbus communication address	3696, 3697	CANopen communication address	0x2D30, 0x00
PtP2.50	Data size	32bit	Data format	HEX
	Modbus communication address	3700, 3701	CANopen communication address	0x2D32, 0x00
PtP2.52	Data size	32bit	Data format	HEX
	Modbus communication address	3704, 3705	CANopen communication address	0x2D34, 0x00
PtP2.54	Data size	32bit	Data format	HEX
	Modbus communication address	3708, 3709	CANopen communication address	0x2D36, 0x00

PtP2.01	Position of segment 100	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)-(2^{31}-1)$	0	reference unit	P	-	-
PtP2.03	Position of segment 101	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)-(2^{31}-1)$	0	reference unit	P	-	-
PtP2.05	Position of segment 102	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)-(2^{31}-1)$	0	reference unit	P	-	-
PtP2.07	Position of segment 103	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)-(2^{31}-1)$	0	reference unit	P	-	-

PtP2.09	Position of segment 104	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.11	Position of segment 105	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.13	Position of segment 106	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.15	Position of segment 107	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.17	Position of segment 108	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.19	Position of segment 109	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.21	Position of segment 110	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.23	Position of segment 111	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.25	Position of segment 112	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.27	Position of segment 113	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.29	Position of segment 114	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.31	Position of segment 115	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.33	Position of segment 116	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

PtP2.35	Position of segment 117	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.37	Position of segment 118	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.39	Position of segment 119	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.41	Position of segment 120	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.43	Position of segment 121	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.45	Position of segment 122	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.47	Position of segment 123	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.49	Position of segment 124	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.51	Position of segment 125	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.53	Position of segment 126	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-
PtP2.55	Position of segment 127	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		$-(2^{31}-1)$–$(2^{31}-1)$	0	reference unit	P	-	-

This group of parameters specify the positions of segment 100 to segment 127. The CMD attribute determines the command mode of this PTP position. P0.37 is inapplicable to this PTP position.

PtP2.01	Data size	32bit	Data format	DEC
	Modbus communication address	3602, 3603	CANopen communication address	0x2D01, 0x00

PtP2.03	Data size	32bit	Data format	DEC
	Modbus communication address	3606, 3607	CANopen communication address	0x2D03, 0x00
PtP2.05	Data size	32bit	Data format	DEC
	Modbus communication address	3610, 3611	CANopen communication address	0x2D05, 0x00
PtP2.07	Data size	32bit	Data format	DEC
	Modbus communication address	3614, 3615	CANopen communication address	0x2D07, 0x00
PtP2.09	Data size	32bit	Data format	DEC
	Modbus communication address	3618, 3619	CANopen communication address	0x2D09, 0x00
PtP2.11	Data size	32bit	Data format	DEC
	Modbus communication address	3622, 3623	CANopen communication address	0x2D0B, 0x00
PtP2.13	Data size	32bit	Data format	DEC
	Modbus communication address	3626, 3627	CANopen communication address	0x2D0D, 0x00
PtP2.15	Data size	32bit	Data format	DEC
	Modbus communication address	3630, 3631	CANopen communication address	0x2D0F, 0x00
PtP2.17	Data size	32bit	Data format	DEC
	Modbus communication address	3634, 3635	CANopen communication address	0x2D11, 0x00
PtP2.19	Data size	32bit	Data format	DEC
	Modbus communication address	3638, 3639	CANopen communication address	0x2D13, 0x00
PtP2.21	Data size	32bit	Data format	DEC
	Modbus communication address	3642, 3643	CANopen communication address	0x2D15, 0x00

PtP2.23	Data size	32bit	Data format	DEC
	Modbus communication address	3646, 3647	CANopen communication address	0x2D17, 0x00
PtP2.25	Data size	32bit	Data format	DEC
	Modbus communication address	3650, 3651	CANopen communication address	0x2D19, 0x00
PtP2.27	Data size	32bit	Data format	DEC
	Modbus communication address	3654, 3655	CANopen communication address	0x2D1B, 0x00
PtP2.29	Data size	32bit	Data format	DEC
	Modbus communication address	3658, 3659	CANopen communication address	0x2D1D, 0x00
PtP2.31	Data size	32bit	Data format	DEC
	Modbus communication address	3662, 3663	CANopen communication address	0x2D1F, 0x00
PtP2.33	Data size	32bit	Data format	DEC
	Modbus communication address	3666, 3667	CANopen communication address	0x2D21, 0x00
PtP2.35	Data size	32bit	Data format	DEC
	Modbus communication address	3670, 3671	CANopen communication address	0x2D23, 0x00
PtP2.37	Data size	32bit	Data format	DEC
	Modbus communication address	3674, 3675	CANopen communication address	0x2D25, 0x00
PtP2.39	Data size	32bit	Data format	DEC
	Modbus communication address	3678, 3679	CANopen communication address	0x2D27, 0x00
PtP2.41	Data size	32bit	Data format	DEC
	Modbus communication address	3682, 3683	CANopen communication address	0x2D29, 0x00

PtP2.43	Data size	32bit	Data format	DEC
	Modbus communication address	3686, 3687	CANopen communication address	0x2D2B, 0x00
PtP2.45	Data size	32bit	Data format	DEC
	Modbus communication address	3690, 3691	CANopen communication address	0x2D2D, 0x00
PtP2.47	Data size	32bit	Data format	DEC
	Modbus communication address	3694, 3695	CANopen communication address	0x2D2F, 0x00
PtP2.49	Data size	32bit	Data format	DEC
	Modbus communication address	3698, 3699	CANopen communication address	0x2D31, 0x00
PtP2.51	Data size	32bit	Data format	DEC
	Modbus communication address	3702, 3703	CANopen communication address	0x2D33, 0x00
PtP2.53	Data size	32bit	Data format	DEC
	Modbus communication address	3706, 3707	CANopen communication address	0x2D35, 0x00
PtP2.55	Data size	32bit	Data format	DEC
	Modbus communication address	3710, 3711	CANopen communication address	0x2D37, 0x00

7.9 Group P11 Position comparison output

P11.00	Position comparison output enabling	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies the enable switch of the position comparison output function.

Set value	**Description**
[0]	Disable
1	Enable

P11.00	Data size	16bit	Data format	DEC

	Modbus communication address	3800, 3801	CANopen communication address	0x2E00, 0x00

P11.01	Time from encoder update to PWM interrupt	Setting range	Default	Unit	Applicable mode		
		0–12500	0	10ns	P	S	T
This parameter specifies the time interval between the encoder update and the PWM interrupt. **Note:** Adjust the value of this parameter according to the value of the encoder used.							
P11.01	Data size	16bit	Data format	DEC			
	Modbus communication address	3802, 3803	CANopen communication address	0x2E01, 0x00			

P11.02	Position comparison adjustment value	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	Pulse (user unit)	P	S	T
This parameter specifies the adjustment value of the position comparison value by performing addition and subtraction operations.							
P11.02	Data size	32bit	Data format	DEC			
	Modbus communication address	3804, 3805	CANopen communication address	0x2E02, 0x00			

P11.03	Position comparison starting point value	Setting range	Default	Unit	Applicable mode		
		1–40	1	-	P	S	T
This parameter specifies the serial value of the position starting comparison point, 1 represents comparison point position 1, 2 represents comparison point position 2, and so on...							
P11.03	Data size	16bit	Data format	DEC			
	Modbus communication address	3806, 3807	CANopen communication address	0x2E03, 0x00			

P11.04	Position comparison end point value	Setting range	Default	Unit	Applicable mode		
		1–40	1	-	P	S	T

This parameter specifies the serial value of the position end comparison point, 1 represents comparison point position 1, 2 represents comparison point position 2, and so on...

P11.04	Data size	16bit	Data format	DEC
	Modbus communication address	3808, 3809	CANopen communication address	0x2E04, 0x00

P11.05	Position comparison mode selection	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–2	0	-	P	S	T

This parameter specifies the position comparison mode.

Set value	Description
[0]	Single comparison mode
1	Cyclic comparison mode
2	Fixed-cycle comparison mode

P11.05	Data size	16bit	Data format	DEC
	Modbus communication address	3810, 3811	CANopen communication address	0x2E05, 0x00

P11.06	Number of cycles in fixed-cycle mode	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–65536	0	-	P	S	T

This parameter specifies the number of position comparison cycles in fixed-cycle mode.

P11.06	Data size	16bit	Data format	DEC
	Modbus communication address	3812, 3813	CANopen communication address	0x2E06, 0x00

P11.07	Position comparison source	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0–1	0	-	P	S	T

This parameter specifies the position comparison source.

Set value	Description
[0]	First encoder
1	Second encoder

P11.07	Data size	16bit	Data format	DEC
	Modbus communication address	3814, 3815	CANopen communication address	0x2E07, 0x00

P11.08	Position pulse output width	Setting range	Default	Unit	Applicable mode		
		0–4000	0	125μs	P	S	T
The parameter specifies the pulse output width.							
P11.08	Data size	16bit	Data format		HEX		
	Modbus communication address	3816, 3817	CANopen communication address		0x2E08, 0x00		

P11.09	Position pulse output polarity	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x0F	-	P	S	T
This parameter specifies the position pulse output polarity (when the DO ports are used as the position comparison output, the default level states are as follows): Bit0: DO1 output polarity, 0: Outputs 0 when valid, 1: Outputs 1 when valid. Bit1: DO2 output polarity, 0: Outputs 0 when valid, 1: Outputs 1 when valid. Bit2: DO3 output polarity, 0: Outputs 0 when valid, 1: Outputs 1 when valid. Bit3: DO4 output polarity, 0: Outputs 0 when valid, 1: Outputs 1 when valid.							
P11.09	Data size	16bit	Data format		DEC		
	Modbus communication address	3818, 3819	CANopen communication address		0x2E09, 0x00		

P11.10	Comparison value of position comparison point 1	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 1.							
P11.10	Data size	32bit	Data format		DEC		
	Modbus communication address	3820, 3821	CANopen communication address		0x2E0A, 0x00		

P11.11	DO function configuration of position comparison point 1	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.							

Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.				
P11.11	Data size	16bit	Data format	HEX
	Modbus communication address	3822, 3823	CANopen communication address	0x2E0B, 0x00

P11.12	Comparison value of position comparison point 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 2.							
P11.12	Data size	32bit	Data format	DEC			
	Modbus communication address	3824, 3825	CANopen communication address	0x2E0C, 0x00			

P11.13	IO setting of position comparison point 2	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.13	Data size	16bit	Data format	HEX			
	Modbus communication address	3826, 3827	CANopen communication address	0x2E0D, 0x00			

P11.14	Comparison value of position comparison point 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 3.							
P11.14	Data size	32bit	Data format	DEC			

	Modbus communication address	3828, 3829	CANopen communication address	0x2E0E, 0x00

P11.15	IO setting of position comparison point 3	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.15	Data size	16bit	Data format	HEX
	Modbus communication address	3830, 3831	CANopen communication address	0x2E0F, 0x00

P11.16	Comparison value of position comparison point 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 4.

P11.16	Data size	32bit	Data format	DEC
	Modbus communication address	3832, 3833	CANopen communication address	0x2E10, 0x00

P11.17	IO setting of position comparison point 4	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.17	Data size	16bit	Data format	HEX

	Modbus communication address	3834, 3835	CANopen communication address	0x2E11, 0x00

P11.18	Comparison value of position comparison point 5	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 5.							
P11.18	Data size	32bit	Data format		DEC		
	Modbus communication address	3836, 3837	CANopen communication address		0x2E12, 0x00		

P11.19	IO setting of position comparison point 5	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.19	Data size	16bit	Data format		HEX		
	Modbus communication address	3838, 3839	CANopen communication address		0x2E13, 0x00		

P11.20	Comparison value of position comparison point 6	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 6.							
P11.20	Data size	32bit	Data format		DEC		
	Modbus communication address	3840, 3841	CANopen communication address		0x2E14, 0x00		

P11.21	IO setting of position comparison point 6	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is still a common DO port, and 1 indicates that the DO port acts as a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output.

Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.21	Data size	16bit	Data format	HEX
	Modbus communication address	3842, 3843	CANopen communication address	0x2E15, 0x00

P11.22	Comparison value of position comparison point 7	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 7.

P11.22	Data size	32bit	Data format	DEC
	Modbus communication address	3844, 3845	CANopen communication address	0x2E16, 0x00

P11.23	IO setting of position comparison point 7	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is still a common DO port, and 1 indicates that the DO port acts as a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output.

Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.23	Data size	16bit	Data format	HEX
	Modbus communication address	3846, 3847	CANopen communication address	0x2E17, 0x00

P11.24	Comparison value of position comparison point 8	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 8.							
P11.24	Data size	32bit	Data format	DEC			
	Modbus communication address	3848, 3849	CANopen communication address	0x2E18, 0x00			

P11.25	IO setting of position comparison point 8	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.25	Data size	16bit	Data format	HEX			
	Modbus communication address	3850, 3851	CANopen communication address	0x2E19, 0x00			

P11.26	Comparison value of position comparison point 9	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 9.							
P11.26	Data size	32bit	Data format	DEC			
	Modbus communication address	3852, 3853	CANopen communication address	0x2E1A, 0x00			

P11.27	IO setting of position comparison point 9	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison							

output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.27	Data size	16bit	Data format	HEX
	Modbus communication address	3854, 3855	CANopen communication address	0x2E1B, 0x00

P11.28	Comparison value of position comparison point 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 10.							

P11.28	Data size	32bit	Data format	DEC
	Modbus communication address	3856, 3857	CANopen communication address	0x2E1C, 0x00

P11.29	IO setting of position comparison point 10	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							

P11.29	Data size	16bit	Data format	HEX
	Modbus communication address	3858, 3859	CANopen communication address	0x2E1D, 0x00

P11.30	Comparison value of position comparison point 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 11.							

P11.30	Data size	32bit	Data format	DEC
	Modbus communication address	3860, 3861	CANopen communication address	0x2E1E, 0x00

P11.31	IO setting of position comparison point 11	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.31	Data size	16bit	Data format	HEX
	Modbus communication address	3862, 3863	CANopen communication address	0x2E1F, 0x00

P11.32	Comparison value of position comparison point 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 12.

P11.32	Data size	32bit	Data format	DEC
	Modbus communication address	3864, 3865	CANopen communication address	0x2E20, 0x00

P11.33	IO setting of position comparison point 12	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.33	Data size	16bit	Data format	HEX
	Modbus communication address	3866, 3867	CANopen communication address	0x2E21, 0x00

P11.34	Comparison value of position comparison point 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 13.							
P11.34	Data size	32bit	Data format	DEC			
	Modbus communication address	3868, 3869	CANopen communication address	0x2E22, 0x00			

P11.35	IO setting of position comparison point 13	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.35	Data size	16bit	Data format	HEX			
	Modbus communication address	3870, 3871	CANopen communication address	0x2E23, 0x00			

P11.36	Comparison value of position comparison point 14	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 14.							
P11.36	Data size	32bit	Data format	DEC			
	Modbus communication address	3872, 3873	CANopen communication address	0x2E24, 0x00			

P11.37	IO setting of position comparison point 14	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.37	Data size	16bit	Data format	HEX
	Modbus communication address	3874, 3875	CANopen communication address	0x2E25, 0x00

P11.38	Comparison value of position comparison point 15	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 14.

P11.38	Data size	32bit	Data format	DEC
	Modbus communication address	3876, 3877	CANopen communication address	0x2E26, 0x00

P11.39	IO setting of position comparison point 15	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.39	Data size	16bit	Data format	HEX
	Modbus communication address	3878, 3879	CANopen communication address	0x2E27, 0x00

P11.40	Comparison value of position comparison point 16	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 15.							
P11.40	Data size	32bit	Data format	DEC			
	Modbus communication address	3880, 3881	CANopen communication address	0x2E28, 0x00			

P11.41	IO setting of position comparison point 16	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.41	Data size	16bit	Data format	HEX			
	Modbus communication address	3882, 3883	CANopen communication address	0x2E29, 0x00			

P11.42	Comparison value of position comparison point 17	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 16.							
P11.42	Data size	32bit	Data format	DEC			
	Modbus communication address	3884, 3885	CANopen communication address	0x2E2A, 0x00			

P11.43	IO setting of position comparison point 17	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that							

the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.43	Data size	16bit	Data format	HEX
	Modbus communication address	3886, 3887	CANopen communication address	0x2E2B, 0x00

P11.44	Comparison value of position comparison point 18	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 17.				
P11.44	Data size	32bit	Data format	DEC
	Modbus communication address	3888, 3889	CANopen communication address	0x2E2C, 0x00

P11.45	IO setting of position comparison point 18	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.				
P11.45	Data size	16bit	Data format	HEX
	Modbus communication address	3890, 3891	CANopen communication address	0x2E2D, 0x00

P11.46	Comparison value of position comparison point 19	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 18.				
P11.46	Data size	32bit	Data format	DEC
	Modbus communication address	3892, 3893	CANopen communication address	0x2E2E, 0x00

P11.47	IO setting of position comparison point 19	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.47	Data size	16bit	Data format	HEX			
	Modbus communication address	3894, 3895	CANopen communication address	0x2E2F, 0x00			

P11.48	Comparison value of position comparison point 20	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 19.							
P11.48	Data size	32bit	Data format	DEC			
	Modbus communication address	3896, 3897	CANopen communication address	0x2E30, 0x00			

P11.49	IO setting of position comparison point 20	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output.							

Bit 3: 0: Normal DO4 output, 1: Position comparison output.				
P11.49	Data size	16bit	Data format	HEX
	Modbus communication address	3898, 3899	CANopen communication address	0x2E31, 0x00

P11.50	Comparison value of position comparison point 21	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 19.

P11.50	Data size	32bit	Data format	DEC
	Modbus communication address	3900, 3901	CANopen communication address	0x2E32, 0x00

P11.51	IO setting of position comparison point 21	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.51	Data size	16bit	Data format	HEX
	Modbus communication address	3902, 3903	CANopen communication address	0x2E33, 0x00

P11.52	Comparison value of position comparison point 22	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 21.

P11.52	Data size	32bit	Data format	DEC
	Modbus communication address	3904, 3905	CANopen communication address	0x2E34, 0x00

P11.53	IO setting of position comparison point 22	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.53	Data size	16bit	Data format	HEX
	Modbus communication address	3906, 3907	CANopen communication address	0x2E35, 0x00

P11.54	Comparison value of position comparison point 23	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 22.

P11.54	Data size	32bit	Data format	DEC
	Modbus communication address	3908, 3909	CANopen communication address	0x2E36, 0x00

P11.55	IO setting of position comparison point 23	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.55	Data size	16bit	Data format	HEX
	Modbus communication address	3910, 3911	CANopen communication address	0x2E37, 0x00

P11.56	Comparison value of position comparison point 24	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 23.							
P11.56	Data size	32bit	Data format	DEC			
	Modbus communication address	3912, 3913	CANopen communication address	0x2E38, 0x00			

P11.57	IO setting of position comparison point 24	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.57	Data size	16bit	Data format	HEX			
	Modbus communication address	3914, 3915	CANopen communication address	0x2E39, 0x00			

P11.58	Comparison value of position comparison point 25	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 24.							
P11.58	Data size	32bit	Data format	DEC			
	Modbus communication address	3916, 3917	CANopen communication address	0x2E3A, 0x00			

P11.59	IO setting of position comparison point 25	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison							

output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.59	Data size	16bit	Data format	HEX
	Modbus communication address	3918, 3919	CANopen communication address	0x2E3B, 0x00

P11.60	Comparison value of position comparison point 26	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 25.

P11.60	Data size	32bit	Data format	DEC
	Modbus communication address	3920, 3921	CANopen communication address	0x2E3C, 0x00

P11.61	IO setting of position comparison point 26	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.61	Data size	16bit	Data format	HEX
	Modbus communication address	3922, 3923	CANopen communication address	0x2E3D, 0x00

P11.62	Comparison value of position comparison point 27	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 27.

P11.62	Data size	32bit	Data format	DEC
	Modbus communication address	3924, 3925	CANopen communication address	0x2E3E, 0x00

P11.63	IO setting of position comparison point 27	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output.

Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.63	Data size	16bit	Data format	HEX
	Modbus communication address	3926, 3927	CANopen communication address	0x2E3F, 0x00

P11.64	Comparison value of position comparison point 28	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 27.

P11.64	Data size	32bit	Data format	DEC
	Modbus communication address	3928, 3929	CANopen communication address	0x2E40, 0x00

P11.65	IO setting of position comparison point 28	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.				
P11.65	Data size	16bit	Data format	HEX
	Modbus communication address	3930, 3931	CANopen communication address	0x2E41, 0x00

P11.66	Comparison value of position comparison point 29	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 28.							
P11.66	Data size	32bit	Data format	DEC			
	Modbus communication address	3932, 3933	CANopen communication address	0x2E42, 0x00			

P11.67	IO setting of position comparison point 29	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.67	Data size	16bit	Data format	HEX			
	Modbus communication address	3934, 3935	CANopen communication address	0x2E43, 0x00			

P11.68	Comparison value of position comparison point 30	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 29.							
P11.68	Data size	32bit	Data format	DEC			
	Modbus communication address	3936, 3937	CANopen communication address	0x2E44, 0x00			

P11.69	IO setting of position comparison point 30	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.69	Data size	16bit	Data format	HEX
	Modbus communication address	3938, 3939	CANopen communication address	0x2E45, 0x00

P11.70	Comparison value of position comparison point 31	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 30.

P11.70	Data size	32bit	Data format	DEC
	Modbus communication address	3940, 3941	CANopen communication address	0x2E46, 0x00

P11.71	IO setting of position comparison point 31	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.71	Data size	16bit	Data format	HEX
	Modbus communication address	3942, 3943	CANopen communication address	0x2E47, 0x00

P11.72	Comparison value of position comparison point 32	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 31.							
P11.72	Data size	32bit	Data format	DEC			
	Modbus communication address	3944, 3945	CANopen communication address	0x2E48, 0x00			

P11.73	IO setting of position comparison point 32	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.73	Data size	16bit	Data format	HEX			
	Modbus communication address	3946, 3947	CANopen communication address	0x2E49, 0x00			

P11.74	Comparison value of position comparison point 33	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 32.							
P11.74	Data size	32bit	Data format	DEC			
	Modbus communication address	3948, 3949	CANopen communication address	0x2E4A, 0x00			

P11.75	IO setting of position comparison point 33	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison							

output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.75	Data size	16bit	Data format	HEX
	Modbus communication address	3950, 3951	CANopen communication address	0x2E4B, 0x00

P11.76	Comparison value of position comparison point 34	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 33.

P11.76	Data size	32bit	Data format	DEC
	Modbus communication address	3952, 3953	CANopen communication address	0x2E4C, 0x00

P11.77	IO setting of position comparison point 34	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.77	Data size	16bit	Data format	HEX
	Modbus communication address	3954, 3955	CANopen communication address	0x2E4D, 0x00

P11.78	Comparison value of position comparison point 35	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 34.

P11.78	Data size	32bit	Data format	DEC
	Modbus communication address	3956, 3957	CANopen communication address	0x2E4E, 0x00

P11.79	IO setting of position comparison point 35	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output.

Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.79	Data size	16bit	Data format	HEX
	Modbus communication address	3958, 3959	CANopen communication address	0x2E4F, 0x00

P11.80	Comparison value of position comparison point 36	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 35.

P11.80	Data size	32bit	Data format	DEC
	Modbus communication address	3960, 3961	CANopen communication address	0x2E50, 0x00

P11.81	IO setting of position comparison point 36	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.

Bit 0: 0: Normal DO1 output, 1: Position comparison output.

Bit 1: 0: Normal DO2 output, 1: Position comparison output.

Bit 2: 0: Normal DO3 output, 1: Position comparison output.

Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.81	Data size	16bit	Data format	HEX
	Modbus communication address	3962, 3963	CANopen communication address	0x2E51, 0x00

P11.82	Comparison value of position comparison point 37	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 36.							
P11.82	Data size	32bit	Data format	DEC			
	Modbus communication address	3964, 3965	CANopen communication address	0x2E52, 0x00			

P11.83	IO setting of position comparison point 37	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.83	Data size	16bit	Data format	HEX			
	Modbus communication address	3966, 3967	CANopen communication address	0x2E53, 0x00			

P11.84	Comparison value of position comparison point 38	**Setting range**	**Default**	**Unit**	**Applicable mode**		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 37.							
P11.84	Data size	32bit	Data format	DEC			
	Modbus communication address	3968, 3969	CANopen communication address	0x2E54, 0x00			

P11.85	IO setting of position comparison point 38	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.85	Data size	16bit	Data format	HEX
	Modbus communication address	3970, 3971	CANopen communication address	0x2E55, 0x00

P11.86	Comparison value of position comparison point 39	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T

This parameter specifies the comparison value of position comparison point 38.

P11.86	Data size	32bit	Data format	DEC
	Modbus communication address	3872, 3973	CANopen communication address	0x2E56, 0x00

P11.87	IO setting of position comparison point 39	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T

This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port.
Bit 0: 0: Normal DO1 output, 1: Position comparison output.
Bit 1: 0: Normal DO2 output, 1: Position comparison output.
Bit 2: 0: Normal DO3 output, 1: Position comparison output.
Bit 3: 0: Normal DO4 output, 1: Position comparison output.

P11.87	Data size	16bit	Data format	HEX
	Modbus communication address	3974, 3975	CANopen communication address	0x2E57, 0x00

P11.88	Comparison value of position comparison point 40	Setting range	Default	Unit	Applicable mode		
		-2147483647–2147483647	0	pulse (user unit)	P	S	T
This parameter specifies the comparison value of position comparison point 39.							
P11.88	Data size	32bit	Data format	DEC			
	Modbus communication address	3976, 3977	CANopen communication address	0x2E58, 0x00			

P11.89	IO setting of position comparison point 40	Setting range	Default	Unit	Applicable mode		
		0x00–0x0F	0x00	-	P	S	T
This parameter specifies the DO port function in position comparison mode. 0 indicates that the DO port is a common DO port, and 1 indicates that the DO port is a position comparison output port. Bit 0: 0: Normal DO1 output, 1: Position comparison output. Bit 1: 0: Normal DO2 output, 1: Position comparison output. Bit 2: 0: Normal DO3 output, 1: Position comparison output. Bit 3: 0: Normal DO4 output, 1: Position comparison output.							
P11.89	Data size	16bit	Data format	HEX			
	Modbus communication address	3978, 3979	CANopen communication address	0x2E59, 0x00			

7.10 Group R0 User monitoring parameters

R0.00	Motor rotation speed	Setting range	Precision	Unit
		-9999.9–9999.9	0.1	r/min
This parameter displays the actual speed of the servo motor. **Note:** This parameter is processed with filtering when displaying.				
R0.00	Data size	32bit	Data format	DEC
	Modbus communication address	4000, 4001	CANopen communication address	0x3000, 0x00

R0.01	Speed command	Setting range	Precision	Unit
		-9999.9–9999.9	0.1	r/min
This parameter displays the current speed command of the servo motor. **Note:** If the ACC/DEC time function is enabled, the command indicates the command that is executed after the ACC/DEC.				

R0.01	Data size	32bit	Data format	DEC
	Modbus communication address	4002, 4003	CANopen communication address	0x3001, 0x00

R0.02	Accumulated feedback pulses	**Setting range**	**Precision**	**Unit**
		$-(2^{63}-1)$–$(2^{63}-1)$	1	pulse
This parameter accumulates and displays the feedback pulses (with signs) of the servo motor. The unit is the user unit.				
R0.02	Data size	64bit	Data format	DEC
	Modbus communication address	4004, 4005, 4006, 4007	CANopen communication address	0x3002, 0x00, 0x3002, 0x01

R0.03	Accumulated command pulses	**Setting range**	**Precision**	**Unit**
		$-(2^{63}-1)$–$(2^{63}-1)$	1	pulse
This parameter accumulates and displays the position command pulses with signs. The unit is the user unit.				
R0.03	Data size	64bit	Data format	DEC
	Modbus communication address	4008, 4009, 4010, 4011	CANopen communication address	0x3003, 0x00 0x3003, 0x01

R0.04	Residual pulses	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse
This parameter displays the residual pulses with signs of the position deviation counter. The unit is the user unit.				
R0.04	Data size	32bit	Data format	DEC
	Modbus communication address	4012, 4013	CANopen communication address	0x3004, 0x00

R0.05	Hybrid control deviation	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse
This parameter displays the tolerance with a sign between the encoder feedback position and grating ruler feedback position when the fully-closed loop function is enabled. The unit is the user unit.				
R0.05	Data size	32bit	Data format	DEC
	Modbus communication address	4014, 4015	CANopen communication address	0x3005, 0x00

R0.06	Current torque	Setting range	Precision	Unit
		-500.0–500.0	0.1	%
This parameter displays the current torque, which is expressed in percentage, assuming the servo motor rated torque is 100.0%.				
R0.06	Data size	16bit	Data format	DEC
	Modbus communication address	4016, 4017	CANopen communication address	0x3006, 0x00

R0.07	Main circuit DC voltage	Setting range	Precision	Unit
		0.0–1000.0	0.1	V
This parameter displays the DC bus voltage of the main circuit power.				
R0.07	Data size	16bit	Data format	DEC
	Modbus communication address	4018, 4019	CANopen communication address	0x3007, 0x00

R0.08	Control power voltage	Setting range	Precision	Unit
		0.0–1000.0	0.1	V
This parameter displays the DC bus voltage of the control circuit power.				
R0.08	Data size	16bit	Data format	DEC
	Modbus communication address	4020, 4021	CANopen communication address	0x3008, 0x00

R0.09	Output voltage	Setting range	Precision	Unit
		0.0–1000.0	0.1	Vrms
This parameter displays the present output line voltage.				
R0.09	Data size	16bit	Data format	DEC
	Modbus communication address	4022, 4023	CANopen communication address	0x3009, 0x00

R0.10	Output current	Setting range	Precision	Unit
		0.00–1000.00	0.01	Arms
This parameter displays the valid value of the present output line current.				
R0.10	Data size	32bit	Data format	DEC
	Modbus communication address	4024, 4025	CANopen communication address	0x300A, 0x00

R0.11	Drive temperature	Setting range	Precision	Unit
		-55.0–180.0	0.1	℃
This parameter displays the present temperature of the drive IGBT module.				
R0.11	Data size	16bit	Data format	DEC
	Modbus communication address	4026, 4027	CANopen communication address	0x300B, 0x00

R0.12	Torque limit	Setting range	Precision	Unit
		-500.0–500.0	0.1	%
This parameter displays the actual torque limit, which is expressed in percentage, assuming the servo motor rated torque is 100.0%.				
R0.12	Data size	16bit	Data format	DEC
	Modbus communication address	4028, 4029	CANopen communication address	0x300C, 0x00

R0.13	Encoder feedback value	Setting range	Precision	Unit
		0–(2^{31}-1)	1	pulse
This parameter displays the current feedback value of the encoder.				
R0.13	Data size	32bit	Data format	DEC
	Modbus communication address	4030, 4031	CANopen communication address	0x300D, 0x00

R0.14	Rotor position relative to Z pulse	Setting range	Precision	Unit
		0–(2^{31}-1)	1	pulse
This parameter displays the absolute mechanical position of the motor in one encoder rotation cycle. The unit is encoder resolution.				
R0.14	Data size	32bit	Data format	DEC
	Modbus communication address	4032, 4033	CANopen communication address	0x300E, 0x00

R0.15	Load inertia ratio	Setting range	Precision	Unit
		0–10000	1	%
This parameter displays the ratio of the load rotation inertia on the servo motor shaft to that on the servo motor.				
R0.15	Data size	16bit	Data format	DEC
	Modbus communication address	4034, 4035	CANopen communication address	0x300F, 0x00

R0.16	Output power	**Setting range**	**Precision**	**Unit**
		-500.0–500.0	0.1	%
This parameter displays the present output mechanical power, which is expressed in percentage, assuming the servo motor rated power is 100%. **Note:** A negative value indicates the motor is in power generation state.				
R0.16	Data size	16bit	Data format	DEC
	Modbus communication address	4036, 4037	CANopen communication address	0x3010, 0x00

R0.17	Motor load ratio	**Setting range**	**Precision**	**Unit**
		0.0–500.0	0.1	%
This parameter displays the actual motor load ratio, which is expressed in percentage, assuming the servo motor rated power is 100%.				
R0.17	Data size	16bit	Data format	DEC
	Modbus communication address	4038, 4039	CANopen communication address	0x3011, 0x00

R0.18	Numerator of actual electronic gear ratio	**Setting range**	**Precision**	**Unit**
		0–(2^{31}-1)	1	-
This parameter displays the numerator of the actual electronic gear ratio.				
R0.18	Data size	32bit	Data format	DEC
	Modbus communication address	4040, 4041	CANopen communication address	0x3012, 0x00

R0.19	Denominator of actual electronic gear ratio	**Setting range**	**Precision**	**Unit**
		1–(2^{31}-1)	1	-
This parameter displays the denominator of actual electronic gear ratio.				
R0.19	Data size	32bit	Data format	DEC
	Modbus communication address	4042, 4043	CANopen communication address	0x3013, 0x00

R0.20	Position command speed	**Setting range**	**Precision**	**Unit**
		-9999.9–9999.9	0.1	r/min
This parameter displays the speed corresponding to a position command.				
R0.20	Data size	32bit	Data format	DEC
	Modbus communication address	4044, 4045	CANopen communication address	0x3014, 0x00

R0.21	Motor speed (filtering)	Setting range	Precision	Unit
		-9999.9–9999.9	0.1	r/min

This parameter displays the rotation speed that is used after filtering is executed for the servo motor.

R0.21	Data size	32bit	Data format	DEC
	Modbus communication address	4046, 4047	CANopen communication address	0x3015, 0x00

R0.22	PTP state	Setting range	Precision	Unit
		-1–4223	1	-

This parameter displays the status of PTP control. The value -1 indicates PTP control is not executed. Any value from 0 to 127 indicates the number of segment that is being executed. A segment number plus 4096 indicates the current segment has been executed.

R0.22	Data size	16bit	Data format	DEC
	Modbus communication address	4048, 4049	CANopen communication address	0x3016, 0x00

R0.23	Encoder absolute position feedback	Setting range	Precision	Unit
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse

This parameter displays the encoder absolute position feedback. After absolute position clearing is executed, the setting of this parameter is 0.

R0.23	Data size	32bit	Data format	DEC
	Modbus communication address	4050, 4051	CANopen communication address	0x3017, 0x00

R0.24	Encoder EEPROM data state	Setting range	Precision	Unit
		0–3	-	-

This parameter displays the EEPROM state of the absolute encoder. If motor parameter data is not found in EEPROM or incorrect, the system uses the internal motor parameters of the drive.

Set value	Meaning
[0]	No EEPROM
1	No data found in the EEPROM
2	EEPROM data error
3	Data in the EEPROM is valid.

R0.24	Data size	16bit	Data format	DEC
	Modbus communication address	4052, 4053	CANopen communication address	0x3018, 0x00

R0.25	Turns of multiturn encoder	Setting range	Precision	Unit
		-32768–32767	1	-

This parameter displays the number of turns of the multiturn encoder.

R0.25	Data size	16bit	Data format	DEC
	Modbus communication address	4054, 4055	CANopen communication address	0x3019, 0x00

R0.26	Available encoder type	Setting range	Precision	Unit
		0–6	-	-

This parameter displays the encoder type supported by hardware circuit.

Set value	Meaning
[3]	Photoelectric encoder
5	Rotary transformer
Other	Reserved

R0.26	Data size	16bit	Data format	DEC
	Modbus communication address	4056, 4057	CANopen communication address	0x301A, 0x00

R0.27	EtherCAT clock synchronous correction state	Setting range	Precision	Unit
		0–1	-	-

This parameter displays whether the drive internal clock has been synchronized with DC Sync0 in DC mode which is used for EtherCAT communication synchronization.

Display	Meaning
【0】	Not synchronized
1	Synchronized

R0.27	Data size	16bit	Data format	DEC
	Modbus communication address	4058, 4059	CANopen communication address	0x301B, 0x00

R0.28	State of CANopen state machine	Setting range	Precision	Unit
		0–18	-	-

This parameter displays the current state of the internal CANopen state machine when CAN is used for communication or that of the CANopen over EtherCAT (CoE) state machine when EtherCAT is used for communication.

Display	Communication mode	Meaning
[0]	-	Invalid
1	CAN	Init

	2		Pre-Op	
	5		Stop	
	8		Op (that is, Operational)	
	11	EtherCAT	Init	
	12		Pre-Op	
	14		Safe-Op	
	18		Op (that is, Operational)	

R0.28	Data size	16bit	Data format	DEC
	Modbus communication address	4060, 4061	CANopen communication address	0x301C, 0x00

R0.29	PROFIBUS-DP slave node number	**Setting range**	**Precision**	**Unit**
		0–99	-	-

This parameter displays the currently obtained slave node number on the PROFIBUS-DP communication card, corresponding to the setting of the rotary switch.

R0.29	Data size	16bit	Data format	DEC
	Modbus communication address	4062, 4063	CANopen communication address	0x301D, 0x00

R0.30	System state	**Setting range**	**Precision**	**Unit**
		0–8	-	-

This parameter displays the system state of the drive.

Set value	**Meaning**
[0]	Initialization
1	Main power supply power-on
2	Electrical angle not determined
3	Ready
4	Bootstrapped
5	Running
6	Fault response
7	Fault
8	STO-In

R0.30	Data size	16bit	Data format	DEC
	Modbus communication address	4064, 4065	CANopen communication address	0x301E, 0x00

R0.31	IGBT state	**Setting range**	**Precision**	**Unit**
		0–1	-	-

This parameter displays the IGBT state.

Set value	Meaning
[0]	Closed
1	Open

R0.31	Data size	16bit	Data format	DEC
	Modbus communication address	4066, 4067	CANopen communication address	0x301F, 0x00

R0.32	Current mode	**Setting range**	**Precision**	**Unit**
		0–2	-	-

This parameter displays the control mode that the drive uses currently.

Set value	Meaning
[0]	Position mode
1	Speed mode
2	Torque mode

R0.32	Data size	16bit	Data format	DEC
	Modbus communication address	4068, 4069	CANopen communication address	0x3020, 0x00

R0.33	Power-on time	**Setting range**	**Precision**	**Unit**
		0–(2^{31}-1)	1	s

This parameter displays the total power-on time used by the drive.

R0.33	Data size	32bit	Data format	DEC
	Modbus communication address	4070, 4071	CANopen communication address	0x3021, 0x00

R0.34	Running time	**Symbol**	**Precision**	**Unit**
		0–(2^{31}-1)	1	s

This parameter displays the time used by the drive to enable the servo.

R0.34	Data size	32bit	Data format	DEC
	Modbus communication address	4072, 4073	CANopen communication address	0x3022, 0x00

R0.35	DSP software version	**Setting range**	**Precision**	**Unit**
		0.00–10.00	0.01	-

This parameter displays the DSP version number.

R0.35	Data size	16bit	Data format	DEC
	Modbus communication address	4074, 4075	CANopen communication address	0x3023, 0x00

R0.36	FPGA software version	Setting range	Precision	Unit
		0.00–10.00	0.01	-
This parameter displays the FPGA version number.				
R0.36	Data size	16bit	Data format	DEC
	Modbus communication address	4076, 4077	CANopen communication address	0x3024, 0x00

R0.37	Communication card software version	Setting range	Precision	Unit
		0.00–10.00	0.01	-
This parameter displays the version number of the present communication card software.				
R0.37	Data size	16bit	Data format	DEC
	Modbus communication address	4078, 4079	CANopen communication address	0x3025, 0x00

R0.38	Drive SN 1	Setting range	Precision	Unit
		0–65535	1	-
This parameter displays serial number 1 of the drive.				
R0.38	Data size	16bit	Data format	DEC
	Modbus communication address	4080, 4081	CANopen communication address	0x3026, 0x00

R0.39	Drive SN 2	Setting range	Precision	Unit
		0–65535	1	-
This parameter displays serial number 2 of the drive.				
R0.39	Data size	16bit	Data format	DEC
	Modbus communication address	4082, 4083	CANopen communication address	0x3027, 0x00

R0.40	Drive SN 3	Setting range	Precision	Unit
		0–65535	1	-
This parameter displays serial number 3 of the drive.				

R0.40	Data size	16bit	Data format	DEC
	Modbus communication address	4084, 4085	CANopen communication address	0x3028, 0x00

R0.41	Drive SN 4	**Setting range**	**Precision**	**Unit**
		0–65535	1	-
This parameter displays serial number 4 of the drive.				
R0.41	Data size	16bit	Data format	DEC
	Modbus communication address	4086, 4087	CANopen communication address	0x3029, 0x00

R0.42	Drive SN 5	**Setting range**	**Precision**	**Unit**
		0–65535	1	-
This parameter displays serial number 5 of the drive.				
R0.42	Data size	16bit	Data format	DEC
	Modbus communication address	4088, 4089	CANopen communication address	0x302A, 0x00

R0.43	Drive SN 6	**Setting range**	**Precision**	**Unit**
		0–65535	1	-
This parameter displays serial number 6 of the drive.				
R0.43	Data size	16bit	Data format	DEC
	Modbus communication address	4090, 4091	CANopen communication address	0x302B, 0x00

R0.44	Absolute position of grating ruler (2nd encoder) in single circle	**Setting range**	**Precision**	**Unit**
		0–(2^{31}-1)	1	pulse
This parameter displays the feedback value of absolute position of grating ruler (2nd encoder) in single circle.				
R0.44	Data size	32bit	Data format	DEC
	Modbus communication address	4092, 4093	CANopen communication address	0x302C, 0x00

R0.45	Speed feedback of 2nd encoder	**Setting range**	**Precision**	**Unit**
		-9999.9–9999.9	0.1	r/min
This parameter displays the actual speed of the servo motor.				

R0.45	Data size	32bit	Data format	DEC
	Modbus communication address	4094, 4095	CANopen communication address	0x302D, 0x00

R0.46	Detected speed of speed observer	**Setting range**	**Precision**	**Unit**
		-9999.9–9999.9	0.1	r/min
This parameter displays the detected speed of the speed observer.				
R0.46	Data size	32bit	Data format	DEC
	Modbus communication address	4096, 4097	CANopen communication address	0x302E, 0x00

R0.47	Feedback speed of speed observer	**Setting range**	**Precision**	**Unit**
		-9999.9–9999.9	0.1	r/min
This parameter displays the feedback speed of the speed observer.				
R0.47	Data size	32bit	Data format	DEC
	Modbus communication address	4098, 4099	CANopen communication address	0x302F, 0x00

R0.48	Observing disturbance torque of disturbance observer	**Setting range**	**Precision**	**Unit**
		-1000.0–1000.0	0.1	%
This parameter displays the compensation torque of the disturbance observer.				
R0.48	Data size	32bit	Data format	DEC
	Modbus communication address	4100, 4101	CANopen communication address	0x3030, 0x00

R0.49	Compensation value of fully-closed-loop vibration suppressor	**Setting range**	**Precision**	**Unit**
		-9999.9–9999.9	0.1	r/min
This parameter displays the compensation value of the fully-closed loop vibration suppressor.				
R0.49	Data size	32bit	Data format	DEC
	Modbus communication address	4102, 4103	CANopen communication address	0x3031, 0x00

R0.51	Observe load inertia ratio in real time	**Setting range**	**Precision**	**Unit**
		0–10000	1	%

This parameter displays the load inertia ratio observed in real time.				
R0.51	Data size	16bit	Data format	DEC
	Modbus communication address	4106, 4107	CANopen communication address	0x3033, 0x00

R0.52	Accumulated linear encoder (2nd encoder) position feedback (32-bit)	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse
This parameter accumulates and displays the 32-bit absolute position feedback from the grating ruler (2nd encoder). It can be read quickly. If the data range exceeds 32 bits, it is replaced by R0.57.				
R0.52	Data size	32bit	Data format	DEC
	Modbus communication address	4108, 4109	CANopen communication address	0x3034, 0x00

R0.53	Gantry synchronization position deviation	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	reference unit
This parameter displays the gantry synchronization position deviation.				
R0.53	Data size	32bit	Data format	DEC
	Modbus communication address	4110, 4111	CANopen communication address	0x3035, 0x00

R0.54	Linear encoder (2nd encoder) position feedback value	**Setting range**	**Precision**	**Unit**
		0–$(2^{31}-1)$	1	pulse
This parameter displays the feedback position of the grating ruler (2nd encoder).				
R0.54	Data size	32bit	Data format	DEC
	Modbus communication address	4112, 4113	CANopen communication address	0x3036, 0x00

R0.55	Encoder turn deviation after multiturn position cleared	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	-
This parameter displays the encoder turn deviation after multiturn positions are cleared.				
R0.55	Data size	32bit	Data format	DEC

	Modbus communication address	4114, 4115	CANopen communication address	0x3037, 0x00

R0.56	Encoder feedback deviation after multiturn position cleared	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse
This parameter displays the encoder feedback deviation after multiturn positions are cleared.				
R0.56	Data size	32bit	Data format	DEC
	Modbus communication address	4116, 4117	CANopen communication address	0x3038, 0x00

R0.57	Accumulated linear encoder (2nd encoder) position feedback (64-bit)	**Setting range**	**Precision**	**Unit**
		$-(2^{63}-1)$–$(2^{63}-1)$	1	pulse
Accumulated grating ruler (2nd encoder) position feedback, 64 bits				
R0.57	Data size	64bit	Data format	DEC
	Modbus communication address	4118, 4119, 4120, 4121	CANopen communication address	0x3039, 0x00 0x3039, 0x01

R0.58	Position inside the single-turn of the disk	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	pulse
This parameter displays the position inside the single-turn of the disk according to the set value of P5.70 [Disk single-turn resolution].				
R0.58	Data size	32bit	Data format	DEC
	Modbus communication address	4122, 4123	CANopen communication address	0x303A, 0x00

R0.60	Motor temperature	**Setting range**	**Precision**	**Unit**
		-55–200	1	℃
This parameter displays the current temperature of the motor with temperature resistor KTY84-130. Temperature is sampled only when P4.45 is not zero.				
R0.60	Data size	32bit	Data format	DEC
	Modbus communication address	4126, 4127	CANopen communication address	0x303C, 0x00

R0.61	Load rate of main interrupt task	Setting range	Precision	Unit
		0.00–100.00	2	%
This parameter displays the load ratio of the drive main interrupt task.				
R0.61	Data size	32bit	Data format	DEC
	Modbus communication address	4128, 4129	CANopen communication address	0x303D, 0x00

R0.62	Load rate of 1ms task	Setting range	Precision	Unit
		0.00–100.00	2	%
This parameter displays the load ratio of the drive 1ms task.				
R0.62	Data size	32bit	Data format	DEC
	Modbus communication address	4130, 4131	CANopen communication address	0x303E, 0x00

R0.63	EtherCAT slave IP address	Setting range	Precision	Unit
		-	-	-
This parameter displays the slave IP address under the EOE communication.				
R0.63	Data size	32bit	Data format	DEC
	Modbus communication address	4132, 4133	CANopen communication address	0x303F, 0x00

R0.64	CIA402 control word	Setting range	Precision	Unit
		0–FFFF	-	-
CIA402 control word.				
R0.64	Data size	16bit	Data format	HEX
	Modbus communication address	4134, 4135	CANopen communication address	0x3040, 0x00

R0.65	CIA402 state word	Setting range	Precision	Unit
		0–FFFF	-	-
CIA402 status word.				
R0.65	Data size	16bit	Data format	
	Modbus communication address	4136, 4137	CANopen communication address	0x3041, 0x00

R0.66	CIA402 control mode	Setting range	Precision	Unit
		0–65535	-	-

This parameter displays the CIA402 control mode.				
R0.66	Data size	16bit	Data format	DEC
	Modbus communication address	4138, 4139	CANopen communication address	0x3042, 0x00

R0.67	Network fault counting 0	**Setting range**	**Precision**	**Unit**
		0–65535	1	-
This parameter displays the fault count value 0 received and forwarded by EtherCAT network port.				
R0.67	Data size	32bit	Data format	DEC
	Modbus communication address	4140, 4141	CANopen communication address	0x3043, 0x00

R0.68	Network fault counting 1	**Setting range**	**Precision**	**Unit**
		0–65535	1	-
This parameter displays the fault count value 1 received and forwarded by EtherCAT network port.				
R0.68	Data size	32bit	Data format	DEC
	Modbus communication address	4142, 4143	CANopen communication address	0x3044, 0x00

R0.69	Rotary load single-turn position (Encoder unit)	**Setting range**	**Precision**	**Unit**
		-2147483647–2147483647	1	Encoder unit
This parameter displays the rotary load single-turn position (encoder unit).				
R0.69	Data size	32bit	Data format	DEC
	Modbus communication address	4144, 4145	CANopen communication address	0x3045, 0x00

R0.70	Rotary load single-turn position (User unit)	**Setting range**	**Precision**	**Unit**
		-2147483647–2147483647	1	User unit
This parameter displays the rotary load single-turn position (user unit).				
R0.70	Data size	32bit	Data format	DEC
	Modbus communication address	4146, 4147	CANopen communication address	0x3046, 0x00

R0.71	Angle value of rotary load side	Setting range	Precision	Unit
		0–360.00	1	-
This parameter displays the angle value of rotary load side.				
R0.71	Data size	32bit	Data format	DEC
	Modbus communication address	4148, 4149	CANopen communication address	0x3047, 0x00

R0.72	EtherCAT synchronization offset time	Setting range	Precision	Unit
		0–30000	1	us
This parameter specifies the EtherCAT synchronization offset time.				
R0.72	Data size	32bit	Data format	DEC
	Modbus communication address	4150, 4151	CANopen communication address	0x3048, 0x00

R0.73	Observed real-time load torque	Setting range	Precision	Unit
		-99999–99999	1	%
This parameter displays the load torque observed in real time.				
R0.73	Data size	32bit	Data format	DEC
	Modbus communication address	4152, 4153	CANopen communication address	0x3049, 0x00

R0.74	Observed real-time Coulomb friction	Setting range	Precision	Unit
		-99999–99999	1	%
This parameter displays the Coulomb friction observed in real time.				
R0.74	Data size	32bit	Data format	DEC
	Modbus communication address	4154, 4155	CANopen communication address	0x304A, 0x00

R0.75	Position overshoot	Setting range	Precision	Unit
		0–99999	0	Pulse
This parameter displays the position overshoot in position control.				
R0.75	Data size	32bit	Data format	DEC
	Modbus communication address	4156, 4157	CANopen communication address	0x304B, 0x00

R0.76	Tuning time	Setting range	Precision	Unit
		0–99999	0	ms
This parameter displays the tuning time in position control.				
R0.76	Data size	32bit	Data format	DEC
	Modbus communication address	4158, 4159	CANopen communication address	0x304C, 0x00

R0.77	INP transition count	Setting range	Precision	Unit
		0–99999	0	-
This parameter displays the INP transition count in position control.				
R0.77	Data size	32bit	Data format	DEC
	Modbus communication address	4160, 4161	CANopen communication address	0x304D, 0x00

R0.78	Speed overshoot	Setting range	Precision	Unit
		0–99999	0	r/min
This parameter displays the speed overshoot in position control.				
R0.78	Data size	32bit	Data format	DEC
	Modbus communication address	4162, 4163	CANopen communication address	0x304E, 0x00

R0.79	Autotuning state	Setting range	Precision	Unit
		0–18	0	-
This parameter displays the autotuning state of the automatic gain adjustment.				
R0.98	Data size	32bit	Data format	DEC
	Modbus communication address	4164, 4165	CANopen communication address	0x304F, 0x00

R0.80	EtherCAT synchronization offset time	Setting range	Precision	Unit
		0–30000	1	us
This parameter specifies the EtherCAT synchronization offset time.				
R0.80	Data size	32bit	Data format	DEC
	Modbus communication address	4166, 4167	CANopen communication address	0x3050, 0x00

R0.81	Positioning compensation state	Setting range	Precision	Unit
		0–3	1	-

This parameter specifies the positioning compensation state.

Set value	Meaning
[0]	Disable
1	Wait for homing
2	Homing completed
3	Enable

R0.81	Data size	16bit	Data format	DEC
	Modbus communication address	4168, 4169	CANopen communication address	0x3051, 0x00

R0.82	One-key autotuning-Electrical angle	Setting range	Precision	Unit
		0–359.9	1	°

This parameter displays the current electrical angle obtained by the one-key autotuning function.

R0.82	Data size	16bit	Data format	DEC
	Modbus communication address	4170, 4171	CANopen communication address	0x3052, 0x00

R0.83	One-key autotuning-Fault code	Setting range	Precision	Unit
		0–20	1	-

This parameter displays the error codes reported during the one-key autotuning process.

R0.83	Data size	16bit	Data format	DEC
	Modbus communication address	4172, 4173	CANopen communication address	0x3053, 0x00

R0.84	Communication encoder disconnection count	Setting range	Precision	Unit
		0–20000	1	-

This parameter displays the communication encoder disconnection count, with a maximum value of 20,000.

R0.84	Data size	16bit	Data format	DEC
	Modbus communication address	4174, 4175	CANopen communication address	0x3054, 0x00

R0.85	Communication encoder CRC error count	Setting range	Precision	Unit
		0–20000	1	-
This parameter displays the CRC error count of the communication encoder, with a maximum value of 20,000.				
R0.85	Data size	16bit	Data format	DEC
	Modbus communication address	4176, 4177	CANopen communication address	0x3055, 0x00

R0.86	Z capture error value	Setting range	Precision	Unit
		-2147483648–2147483647	1	pulse
This parameter displays the error between the current Z capture value and the first Z capture value in the Z interrupt.				
R0.86	Data size	16bit	Data format	DEC
	Modbus communication address	4178, 4179	CANopen communication address	0x3056, 0x00

R0.87	Z compensation cumulative value	Setting range	Precision	Unit
		-2147483648–2147483647	1	pulse
This parameter displays the cumulative pulse count of the current Z compensation.				
R0.87	Data size	16bit	Data format	DEC
	Modbus communication address	4180, 4181	CANopen communication address	0x3057, 0x00

R0.88	Current state of position comparison	Setting range	Precision	Unit
		-32768–32767	1	-
This parameter displays the current state of position comparison.				
R0.88	Data size	16bit	Data format	DEC
	Modbus communication address	4182, 4183	CANopen communication address	0x3058, 0x00

R0.89	Real-time position of position comparison	Setting range	Precision	Unit
		-32768–32767	1	-
This parameter displays the real-time position of position comparison.				
R0.89	Data size	16bit	Data format	DEC

	Modbus communication address	4184, 4185	CANopen communication address	0x3059, 0x00

R0.90	Completed count of position loop comparison	Setting range	Precision	Unit
		-32768–32767	1	-
This parameter displays the number of completed cycles in the position loop comparison.				
R0.90	Data size	16bit	Data format	DEC
	Modbus communication address	4186, 4187	CANopen communication address	0x305A, 0x00

R0.99	Fault code	Setting range	Precision	Unit
		-32768–32767	1	-
This parameter displays the fault code, in which the thousands and hundreds digits are the main fault code and the tens and ones digits are the sub fault code.				
R0.99	Data size	16bit	Data format	DEC
	Modbus communication address	4198, 4199	CANopen communication address	0x3063, 0x00

7.11 Group R1 I/O monitoring parameters

R1.00	Digital input state	Setting range	Precision	Unit
		0x000–0x3FF	-	-
R1.01	Digital output state	Setting range	Precision	Unit
		0x00–0x3F	-	-

This value is arranged in digital order and indicates the hex number of digital terminal state. When a terminal is in ON state, its corresponding bit is 1. When a terminal is in OFF state, its corresponding bit is 0. Then, this binary number is converted into a hexadecimal number. For example, 000000001011 is denoted as 0x00B.

The digital input state is denoted as 3-digit hexadecimal number. The arrangement sequence of the digital input is listed as below: (the digits not listed are filled with 0).

Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SI10	SI9	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1

The digital output state is denoted as 2-digit hexadecimal number. The arrangement sequence of the digital output is listed as below: (the digits not listed are filled with 0)

Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
SO6	SO5	SO4	SO3	SO2	SO1

R1.00	Data size	16bit	Data format	
	Modbus communication address	4200, 4201	CANopen communication address	0x3100, 0x00
R1.01	Data size	16bit	Data format	
	Modbus communication address	4202, 4203	CANopen communication address	0x3101, 0x00

R1.02	Original voltage of analog input 1	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the unprocessed voltage of the analog input channel 1.				
R1.02	Data size	32bit	Data format	DEC
	Modbus communication address	4204, 4205	CANopen communication address	0x3102, 0x00

R1.03	Original voltage of analog input 2	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the unprocessed voltage of the analog input channel 2.				
R1.03	Data size	32bit	Data format	DEC
	Modbus communication address	4206, 4207	CANopen communication address	0x3103, 0x00

R1.04	Original voltage of analog input 3	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the unprocessed voltage of the analog input channel 3.				
R1.04	Data size	32bit	Data format	DEC
	Modbus communication address	4208, 4209	CANopen communication address	0x3104, 0x00

R1.05	Voltage of analog input 1	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the corrected voltage of the analog input channel 1.				
R1.05	Data size	32bit	Data format	DEC
	Modbus communication address	4210, 4211	CANopen communication address	0x3105, 0x00

R1.06	Voltage of analog input 2	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the corrected voltage of the analog input channel 2.				
R1.06	Data size	32bit	Data format	DEC
	Modbus communication address	4212, 4213	CANopen communication address	0x3106, 0x00

R1.07	Voltage of analog input 3	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the corrected voltage of the analog input channel 3.				
R1.07	Data size	32bit	Data format	DEC
	Modbus communication address	4214, 4215	CANopen communication address	0x3107, 0x00

R1.08	Voltage of analog output 1	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the output voltage value after offset treatment of analog output channel 1.				
R1.08	Data size	32bit	Data format	DEC
	Modbus communication address	4216, 4217	CANopen communication address	0x3108, 0x00

R1.09	Voltage of analog output 2	**Setting range**	**Precision**	**Unit**
		-10.000–10.000	0.001	V
This parameter displays the output voltage value after offset treatment of analog output channel 2.				
R1.09	Data size	32bit	Data format	DEC
	Modbus communication address	4218, 4219	CANopen communication address	0x3109, 0x00

R1.11	Accumulated input pulses	**Setting range**	**Precision**	**Unit**
		$-(2^{31}-1)$–$(2^{31}-1)$	1	reference unit
This parameter accumulates and displays the number of pulses that are received from the external pulse input.				
R1.11	Data size	32bit	Data format	DEC
	Modbus communication address	4222, 4223	CANopen communication address	0x310B, 0x00

R1.12	Pulse position command	Setting range	Precision	Unit
		-(2^{31}-1)–(2^{31}-1)	1	reference unit
This parameter displays the position command value in each pulse input detection cycle (0.125ms by default).				
R1.12	Data size	32bit	Data format	DEC
	Modbus communication address	4224, 4225	CANopen communication address	0x310C, 0x00

R1.13	Pulse speed command	Setting range	Precision	Unit
		-10000.0–10000.0	0.1	r/min
This parameter displays the speed command corresponding to the pulse position command.				
R1.13	Data size	32bit	Data format	DEC
	Modbus communication address	4226, 4227	CANopen communication address	0x310D, 0x00

R1.14	Analog compensation speed	Setting range	Precision	Unit
		-10000.0–10000.0	0.1	r/min
This parameter displays the analog compensation speed.				
R1.14	Data size	32bit	Data format	DEC
	Modbus communication address	4228, 4229	CANopen communication address	0x310E, 0x00

R1.15	Analog compensation torque	Setting range	Precision	Unit
		-1000.0–1000.0	0.1	%
This parameter displays the analog compensation torque.				
R1.15	Data size	32bit	Data format	DEC
	Modbus communication address	4230, 4231	CANopen communication address	0x310F, 0x00

R1.16	Captured value of the first encoder in single circle	Setting range	Precision	Unit
		-214748364–214748364	1	pulse
This parameter displays the encoder value captured through DI input.				
R1.16	Data size	32bit	Data format	DEC
	Modbus communication address	4232, 4233	CANopen communication address	0x3110, 0x00

R1.17	Position feedback captured value of the first encoder	Setting range	Precision	Unit
		-214748364–214748364	1	pulse
This parameter displays the accumulated value of position (pulse) feedback.				
R1.17	Data size	64bit	Data format	DEC
	Modbus communication address	4234, 4235, 4236, 4237	CANopen communication address	0x3111, 0x00

R1.18	Captured value of the the second encoder in single circle	Setting range	Precision	Unit
		-214748364–214748364	1	pulse
This parameter displays the encoder value captured through DI input.				
R1.18	Data size	32bit	Data format	DEC
	Modbus communication address	4238, 4239	CANopen communication address	0x3112, 0x00

R1.19	Grating ruler (2nd encoder) position feedback value	Setting range	Precision	Unit
		-214748364–214748364	1	pulse
This parameter displays the accumulated value of position (pulse) feedback.				
R1.19	Data size	64bit	Data format	DEC
	Modbus communication address	4240, 4241, 4242, 4243	CANopen communication address	0x3113, 0x00

R1.20	Digital output function state	Setting range	Precision	Unit
		0–80000000	-	-
This parameter displays the present state of each digital output function.				
R1.20	Data size	32bit	Data format	
	Modbus communication address	4244, 4245	CANopen communication address	0x3114, 0x00

7.12 Group R3 Fault record parameters

R3.00	Fault code record	Setting range	Precision	Unit
		-	-	-
This parameter displays the code of the currently-read fault record. It contains the information on the last fault by default.				

R3.01	Power-on time when fault occurs	Setting range	Precision	Unit
		0–(2^{31}-1)	1	h
This parameter displays the power-on time when a fault occurs.				

R3.02	Running time when fault occurs	Setting range	Precision	Unit
		0–(2^{31}-1)	1	h
This parameter displays the running time when a fault occurs.				

R3.03	Motor speed when fault occurs	Setting range	Precision	Unit
		-20000–20000	1	r/min
This parameter displays the motor speed when a fault occurs.				

R3.04	Speed command when fault occurs	Setting range	Precision	Unit
		-20000–20000	1	r/min
This parameter displays the speed command when a fault occurs.				

R3.05	Feedback pulse accumulation when fault occurs	Setting range	Precision	Unit
		-(2^{63}-1)–(2^{63}-1)	1	reference unit
This parameter displays the feedback pulse accumulation when a fault occurs.				

R3.06	Command pulse accumulation when fault occurs	Setting range	Precision	Unit
		-(2^{63}-1)–(2^{63}-1)	1	reference unit
This parameter displays the command pulse accumulation when a fault occurs.				

R3.07	Residual pulses when fault occurs	Setting range	Precision	Unit
		-(2^{31}-1)–(2^{31}-1)	1	reference unit
This parameter displays the residual pulses when a fault occurs.				

R3.08	Current torque when fault occurs	Setting range	Precision	Unit
		-500.0–500.0	0.1	%
This parameter displays the torque output when a fault occurs.				

R3.09	Main circuit DC voltage when fault occurs	Setting range	Precision	Unit
		0.0–1000.0	0.1	V
This parameter displays the main circuit DC voltage when a fault occurs.				

R3.10	Output voltage when fault occurs	Setting range	Precision	Unit
		0.0–1000.0	0.1	Vrms
This parameter displays the valid value of the output line voltage when a fault occurs.				

R3.11	Output current when fault occurs	Setting range	Precision	Unit
		0.00–1000.00	0.01	Arms
This parameter displays the valid value of the output line current when a fault occurs.				

R3.20	Last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the last fault.				

R3.21	2nd-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 2nd-last fault.				

R3.22	3rd-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 3rd-last fault.				

R3.23	4th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 4th-last fault.				

R3.24	5th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 5th-last fault.				

R3.25	6th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 6th-last fault.				

R3.26	7th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 7th-last fault.				

R3.27	8th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 8th-last fault.				

R3.28	9th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 9th-last fault.				

R3.29	10th-last fault code	Setting range	Precision	Unit
		-	-	-
This parameter displays the fault code of the 10th-last fault.				

8 Commissioning

8.1 Operation instruction of inertia identification

Inertia identification is divided into online mode and offline mode.

8.1.1 Online inertia identification

It is necessary to set following parameters when online inertia identification is selected: P1.00[Tune inertia online]; P1.08[Speed level of inertia identification].

If P1.00 and P1.08 are greater than 0, the online mode is valid. If the following inertia identification requirements are met:

1. The speed is larger than 150r/min
2. The ACC time is longer than 20ms
3. The continuous acceleration range is more than 150r/min
4. In 0.3 seconds, the speed can accelerate from 0r/min to 3000 r/min)

Then the identification result will be updated to P1.01 and written into EEPROM every 30 minutes automatically.

8.1.2 Offline inertia identification

It is necessary to set following parameters when offline inertia identification is selected: P1.05[Operation mode of inertia identification]; P1.06[Movable range of inertia identification]; P1.07[ACC time constant of inertia identification].

The offline mode is available by the auxiliary function EF-JId of the panel operation. Refer to section 6.2.6.5 Operation flowchart of inertia identification for details. The offline mode is not affected by parameters P1.00[Tune inertia online] and P1.08[Speed level of inertia identification].

Before executing the auxiliary function of EF-JId, set P1.05[Operation mode of inertia identification] according to the operation mode of the motor, set P1.06 [Movable range of inertia identification] according to the rotating cycle and set P1.07[ACC time constant of inertia identification] according to the mechanical rigidity. The stronger the mechanical rigidity, the smaller the ACC/DEC time constant. Set P1.05[Operation mode of inertia identification] to 1 or 2. The smaller the value of P1.06[Movable range of inertia identification] and P1.07[ACC time constant of inertia identification] is, the more correct the identification result.

When executing the auxiliary function of EF-JId, please ensure P1.05[Operation mode of inertia identification] and P1.06[Movable range of inertia identification] meet the needs;

otherwise, there may be damage to the machine. Press Mode key can stop the execution.

If the execution EF-JId is finished normally, the identification result will be saved into P1.01[Inertia ratio 1] automatically. If there is fault, P1.01[Inertia ratio 1] will keep the result before identification. If it reports Er25-7, increase P1.06[Movable range of inertia identification] or reduce P1.07[ACC time constant of inertia identification].

If the following occurs onsite.

- Mechanical rigidity is low.
- The load inertia changes too fast.
- There is non-linear characteristics such as clearance.
- The external disturbance changes too fast.

The accuracy of the inertia identification result will be affected.

8.2 General methods for adjusting parameters

There are two kinds of parameters adjustment:

Method 1: Automatic adjustment setting of rigidity choice

You need to evaluate the load inertia ratio manually and set the servo system rigidity, which has 32 options from 0 to 31. Then different loop gains can be set automatically.

This method features quick adjusting servo system responsiveness.

Adjust the system rigidity based on the actual situation. The recommended rigidity settings are as follows:

Mechanical structure	Rigidity setting
Large transfer or transmission equipment	0–13
Belt drive mechanism	5–16
Ball screw + belt drive	5–16
Manipulator	15–22
Direct ball screw or rigid body	18–25

Increasing the servo system rigidity setting parameters can enhance system responsiveness, but may also cause issues such as noise and vibration. Therefore, please adjust the relevant parameters carefully based on the actual motion characteristics of the mechanical equipment to ensure stable system operation.

If the setting cannot meet your requirements, use manual adjustment.

Method 2: Manual adjustment

If the servo system encounters vibration or control performance cannot meet requirements, you can adjust speed loop and position loop parameters to eliminate

vibration or improve performance.

In a servo system, manual parameter tuning should be based on the actual conditions of the mechanical equipment and consider the interactions between various parameters. The following general principles and methods should be followed:

1. Speed loop gain

Function: Determines the response speed of the speed loop.

Adjustment principle: If the mechanical system has no vibration, a greater speed loop gain indicates a quicker response speed.

Note: Excessive speed loop gain may cause system vibration. A balance must be maintained between stability and responsiveness.

2. Speed loop integral time constant

Function: Allows the integral component to respond to small input changes but may delay servo operation.

Adjustment principle: For systems with large load inertia or those prone to vibration, set a larger integral time constant to prevent system oscillation. However, an overly large time constant will increase positioning time and reduce response speed.

Recommendation: Adjust to an appropriate response time while ensuring system stability.

3. Torque command filter

Function: Eliminates sharp noise and vibrations that may occur under resonant conditions in the mechanical system.

Adjustment method: Effectively suppresses resonance through notch filtering, enhancing system stability.

4. Position loop gain

Function: Determines the overall response speed of the servo system and affects positioning time.

Adjustment principle: Higher gain results in faster response and shorter positioning time. However, if the gain is too high, it should be matched with a mechanical system of high rigidity and natural frequency; otherwise, it may cause vibration and instability.

5. General relationship between gains

The speed loop gain should be greater than the position loop gain. If the position loop gain is significantly higher than the speed loop gain, the system may experience overshoot in response to a step signal, seriously affecting performance. When increasing the position loop gain, adjustments to other parameters must be made simultaneously to prevent instability in the position loop output command, which could lead to servo

system instability.

6. Interdependence of parameters

Parameters in a servo system are interrelated and should be adjusted comprehensively: Speed loop gain determines the upper limit of response speed.

Position loop gain affects positioning accuracy and system stability.

Integral time constant and filter parameters can be used to suppress vibration and resonance. To achieve optimal performance, parameters should be fine-tuned while ensuring the mechanical system remains stable and meets performance requirements.

Perform adjusting in the following sequence:

Step 1 Initially set the position loop gain to a low value. Then, gradually increase the speed loop gain to the maximum possible value without causing abnormal noise or vibration.

Step 2 Gradually reduce the speed loop gain while increasing the position loop gain. Maximize the position loop gain under the condition that the system response exhibits no overshoot or vibration.

Step 3 Decrease the speed loop integral time constant as much as possible without causing vibration since this time constant is determined by positioning time.

Step 4 Fine-tune the position loop gain, speed loop gain, and speed loop integral time constant to determine the optimal values.

Hereunder we illustrate several typical cases (in each case, only one parameter is changed relative to a case when the parameters are appropriate):

- Appropriate parameter settings

In this case, parameters are set appropriately, the motor speed is compliant with the position command, the speed is not overshot, and positioning time is short.

- Speed loop integral time constant too small

The servo drive speed loop must respond quickly. If the speed fluctuates, the speed loop integral time constant is too small, which deteriorates the speed loop stableness. Therefore, the running is unstable.

- Speed loop integral time constant too large

The difference from the case of appropriate parameter settings is not noticeable. The speed loop integral has no significant impact when the speed follows up the position command, but the response time of the speed loop is impacted if the speed loop integral time constant is too large.

- Speed loop gain too high

In this case, the motor speed fluctuates. If the speed loop integral time is too short, the similar impact is caused. You must increase both the speed loop gain and the speed loop integral time. Otherwise, the servo system may encounter vibration.

- Speed loop gain too low

If the speed loop gain is decreased, the motor speed fluctuates. According to the comparison the case of speed loop gain too large, the fluctuation frequency of the motor speed is lower in this case, which indicates that increasing the speed loop gain improves the system working frequency, control system responsiveness, and anti-interference.

- Position loop gain too low

In the servo system, the working frequency of the position loop is lower than that of the speed loop. If the position loop gain is too low, the system cannot counteract the position deviation that is caused during speed responding, which delays the interval at which the motor speed follows up the position command.

- Position loop gain too high

In the position servo system, the position loop gain also impacts stableness. If the position loop gain is too high, the motor speed fluctuates. According to the comparison with the case of position loop gain too low, the delay with which the motor speed follows up the position command is decreased in this case.

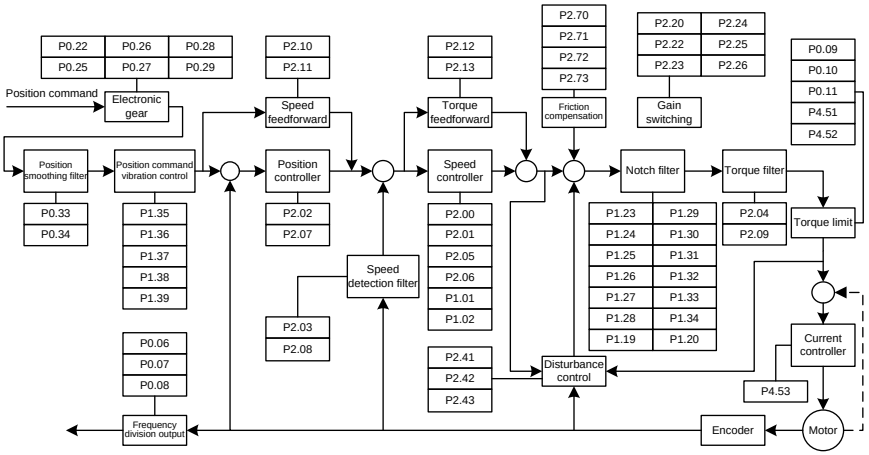
- Position loop gain too low

If the position loop gain is too low, the motor speed lags behind the position command noticeably, and positioning time is prolonged. The accuracy and response performance of the positioning system are impacted seriously.

8.2.1 Gain adjustment in position mode

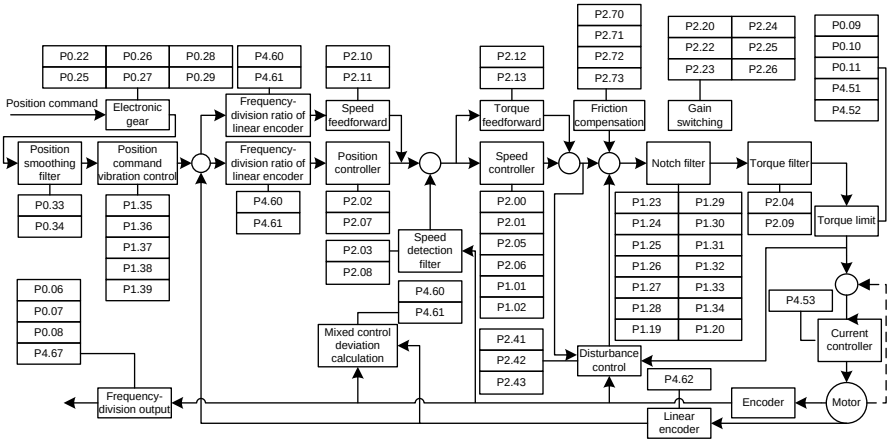
8.2.1.1 Semi-closed loop function

The position control diagram of the DA180A series servo drive is shown in the figure below. The gain parameters that can be adjusted in the position mode are marked out in the diagram.



8.2.1.2 Fully-closed loop function

The fully-closed loop control diagram of the DA180A series servo drive is shown in the figure below. The gain parameters that can be adjusted are marked out in the diagram.



The common procedures for adjusting parameters in position mode are as follows:

Step 1 Initial setting of the parameters. The defaults of the parameters can be recovered by the default parameter recovering operation (see section 6.2.6.3 Operation flowchart of restoring the factory parameter for details).

Step 2 Adjust the position loop gain. If the servo motor runs with default settings but the system vibrates with buzzes, decrease the position loop gain (that is, P2.02 or P2.07) or increase it when the system rigidity is low.

Step 3 Adjust the position smoothing filter. In position control, if the input frequency changes of position pulse commands are noticeable, huge surges may be caused. You need to adjust the P0.33 [Position command smooth filter time] or P0.34 [Position command FIR filter time].

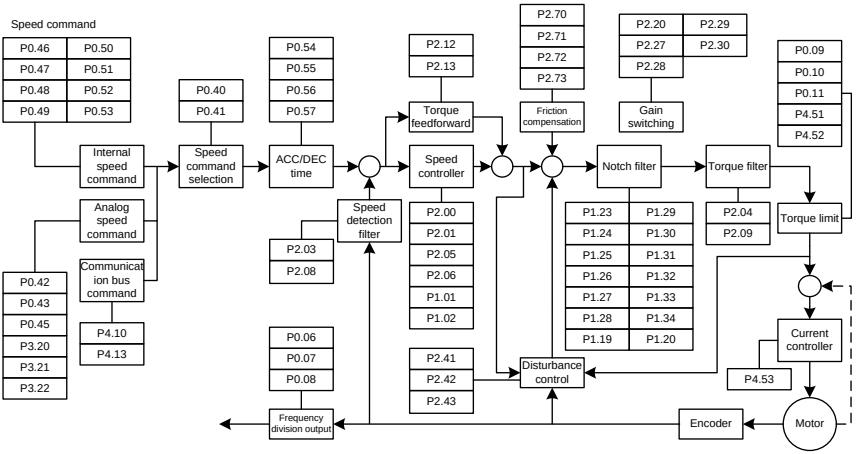
Step 4 Adjust the electronic gear. If the pulse generation device is limited on the pulse sending frequency or the sending frequency does not meet mechanical requirements, you can change the pulse input frequency by adjusting P0.22 [Pulses per motor resolution] or electronic gear ratio parameters P0.25, P0.26, P0.27, P0.28, and P0.29, so as to meet position control requirements.

Step 5 Adjust the position feed-forward. If the residual pulses are great or no-deviation tracking is required, you can adjust the speed feed-forward gain parameter P2.10 and speed feed-forward filtering parameter P2.11 to improve position tracking performance. However, if the speed feed-forward gain is too large, the system may vibrate.

Step 6 Set the frequency division for feedback pulse output. If feedback pulses need to be output, you can set the frequency-division output coefficient parameters P0.06 and P0.07 to change the pulse output frequency.

8.2.2 Gain adjustment in speed mode

The speed control diagram of the DA180A series servo drive is shown in the figure below. The gain parameters that can be adjusted in the speed mode are marked out in the diagram.



The common procedures for adjusting parameters in speed mode are as follows:

Step 1 Initial setting of the parameters. The defaults of the parameters can be recovered by the default parameter recovering operation (see section 6.2.6.3 Operation flowchart of restoring the factory parameter for details).

Step 2 Adjust the position loop gain. If the servo motor runs with default settings but the system vibrates with buzzes, you need to decrease the speed loop gain (that is, P2.00 or P2.05) or increase it when the system rigidity is low or the speed fluctuates sharply.

Step 3 Adjust the speed integral time constant. If the speed loop gain is increased, you need to increase the speed integral time constant (that is, P2.01 or P2.06) as well. Conversely, if the speed loop gain is decreased, you need to decrease the speed integral time constant as well.

Step 4 Adjust the ACC/DEC time. If the speed in the starting process changes sharply, huge surges or overcurrent may be caused. You need to adjust P0.54 [ACC time] to smooth the ramp-up. Similarly, you can adjust P0.55 [DEC time] to smooth the ramp-down for the stop.

Step 5 Adjust the S-curve ACC/DEC time. If the speed change cannot be smoothed by adjusting the ACC or DEC time, you can adjust P0.56 [S-curve ACC time] or P0.57 [S-curve DEC time].

Step 6 Adjust the speed smoothing filter. If the analog input is a speed command, you can adjust the analog input filter to smooth the speed change.

Step 7 Adjust the torque feed-forward. If the speed tracking performance is not improved after the parameter adjusting, you can adjust P2.12 [Torque feed-forward gain] and P2.13 [Torque feed-forward filter time] to improve it. However, if the torque feed-forward gain is too high, the system may become unstable.

Step 8 Adjust the speed filter. You can improve speed loop performance by adjusting the torque filter parameters P2.04 and P2.09 and speed detection filter parameters P2.03 and P2.08.

Step 9 Adjust notch filtering. For details, see section 8.3 Mechanical resonance suppressing.

Step 10 Set the frequency division for feedback pulse output. If the encoder feedback pulse signal need to be output, you can set the frequency-division output coefficient parameters P0.06 and P0.07 to change the pulse output frequency.

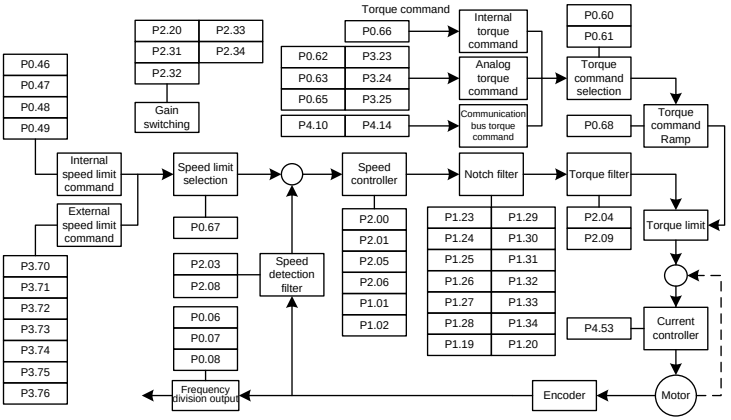
Step 11 Adjust disturbance suppression. If the load change is noticeable or sudden external disturbance on the torque occurred when the gain settings are small, you can adjust P2.42 [Disturbance observer compensation gain] and P2.43 [Disturbance observer cut-off frequency]to reduce the impact by external

disturbance, so as to improve speed loop performance.

Step 12 Adjust friction compensation. If the speed follow-up performance is poor in the process of the motor changing the direction for forward or reverse rotating, you can adjust P2.71 [Forward torque coefficient of friction compensation] and P2.72 [Reverse torque coefficient of friction compensation] to improve speed loop performance in the process.

8.2.3 Gain adjustment in torque mode

The torque control diagram of the DA180A series servo drive is shown in the figure below. The gain parameters that can be adjusted in the torque mode are marked out in the diagram.



The common procedures for adjusting parameters in torque mode are as follows:

Step 1 Initial setting of the parameters. The defaults of the parameters can be recovered by the default parameter recovering operation (see section 6.2.6.3 Operation flowchart of restoring the factory parameter for details).

Step 2 Adjust the torque smoothing filter. If the analog input is a torque command, you can adjust the analog input filter to smooth the torque change.

Step 3 Set the frequency division for feedback pulse output. If the encoder feedback pulse signal need to be output, you can set the frequency-division output coefficient parameters P0.06 and P0.07 to change the pulse output frequency.

8.3 Mechanical resonance suppressing

The mechanical systems have specific resonance frequencies. Especially in cases where mechanical rigidity is low, setting a high servo response speed may lead to resonance

(oscillation and abnormal noise) near the resonance frequency due to shaft twisting. In such cases, the resonance can be effectively suppressed by configuring notch filter parameters.

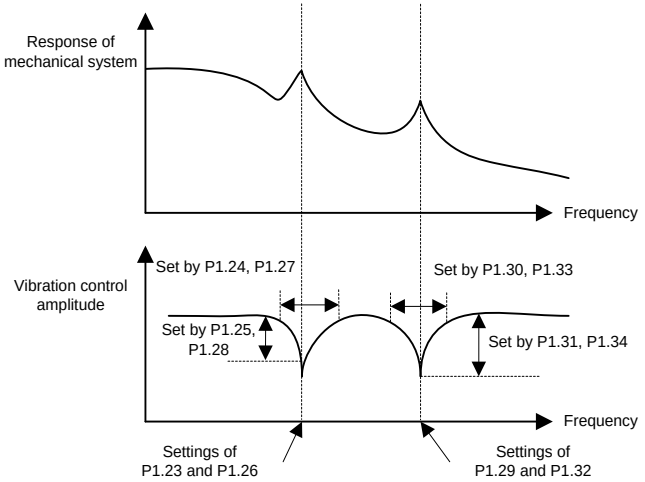
The notch filters achieve the goal of suppressing mechanical resonance by decreasing the gain of certain frequency. You can set notch filter parameters to suppress the resonant frequency, width, and depth, so as for the system to obtain higher gains or reduce vibration.

This servo drive is equipped with four notch filters which can be set by 1st notch filter parameter (P1.23, P1.24, P1.25), 2nd notch filter parameter (P1.26, P1.27, P1.28), 3rd notch filter parameter (P1.29, P1.30, P1.31) and 4th notch filter parameter (P1.32, P1.33, P1.34). 1st and 2nd notch filter parameters need to be set manually; 3rd and 4th notch filter parameters can be set by online self-adaption. The position of notch filter in speed loop is shown in section 8.2.2 Gain adjustment in speed mode. The setup of notch filter is shown in the diagram below.

Note: The notch filters are a lagging factor for the servo system. If the center frequency of a notch filter is incorrectly set or the suppression depth is too large, the vibration may be stronger. It is recommended to gradually increase the depth (the parameter setting changes from large to small) until requirements are met.

The relationship between the Q value, width, and depth of a notch filter is as follows:

- Q value of the notch filter = Center frequency of the notch wave/Width of the notch wave
- The width of the notch filter indicates the frequency difference between the -3dB–dropped power spectrums at the two sides of the center frequency when the depth of the notch filter is 0.
- The depth of the notch filter indicates the ratio of input to output. The power spectrum strength is attenuated by 20log (P1.25%, P1.28%, P1.31%, P1.34%) dB.



8.4 Gain switching function

Gain switching operation is performed through internal data or external signal:

1. Control motor vibration if the gain is reduced during stop.
2. Shorten tuning and positioning time if the gain is increased during stop.
3. Improve command follow-up and speed if the gain is increased during working.
4. Control gain switching through external signals based on external state of device.

Table 8-1 Position control mode and fully-closed loop control mode

Condition setting of gain switching			Parameters setting of position control and fully-closed loop control mode		
P2.22	Switch to 2nd gain	Figure	Delay time*1	Level	Lag*2
			P2.23	P2.24	P2.25
0	1st gain fixed	-	-	-	-
1	2nd gain fixed	-	-	-	-
2	Switching input with gain	-	-	-	-
3	Large torque command	1	●	●(0.1%)	●(0.1%)
4	Large speed command	3	●	●(r/min)	●(r/min)
5	Large position deviation	4	●	●*3(reference unit)	●*3(reference unit)
6	With position command	5	●	-	-

Condition setting of gain switching			Parameters setting of position control and fully-closed loop control mode		
P2.22	Switch to 2nd gain	Figure	Delay time*1	Level	Lag*2
			P2.23	P2.24	P2.25
7	Positioning not finished	6	●	-	-
8	Large actual speed	3	●	●(r/min)	●(r/min)
9	With position command+actual speed	7	●	●(r/min)*5	●(r/min)*5

Table 8-2 Speed control mode

Condition setting of gain switching			Parameters setting of speed control mode		
P2.27	Switch to 2nd gain	Figure	Delay time*1	Level	Lag*2
			P2.28	P2.29	P2.30
0	1st gain fixed	-	-	-	-
1	2nd gain fixed	-	-	-	-
2	Switching input with gain	-	-	-	-
3	Torque command	1	●	●(0.1%)	●(0.1%)
4	Speed command variable	2	-	●*4(10(r/min)/s)	●*4(10(r/min)/s)
5	Speed command	3	●	●(r/min)	●(r/min)

Table 8-3 Torque control mode

Condition setting of gain switching			Parameters setting of torque control mode		
P2.31	Switch to 2nd gain	Figure	Delay time*1	Level	Lag*2
			P2.32	P2.33	P2.34
0	1st gain fixed	-	-	-	-
1	2nd gain fixed	-	-	-	-
2	Switching input with gain	-	-	-	-
3	Torque command	1	●	●(0.1%)	●(0.1%)

Remarks:

- "●" indicates that this parameter is valid, and " -" indicates that this parameter is invalid.

- *1 Delay time (P2.23, P2.28, P2.32) is only valid when 2nd gain to 1st gain.
- *2 The definition of lag (P2.25, P2.30, P2.34) is shown as the figure below.
- *3 The encoder and external linear encoder can be designated in the control mode.
- *4 If 10r/min speed changing in 1s, the setting value is 1.
- *5 If P2.22=9, the delay time, level and lag have different meaning (see figure 7).

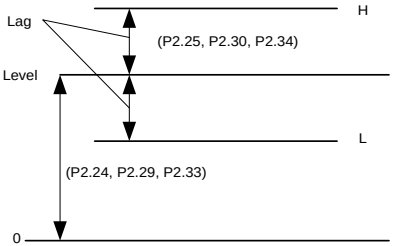


Figure 1

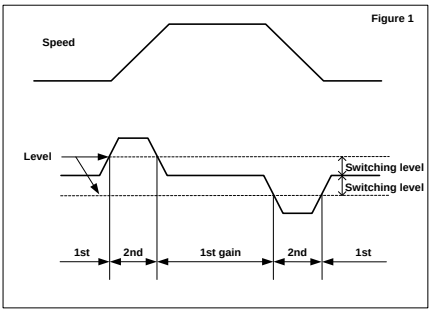


Figure 2

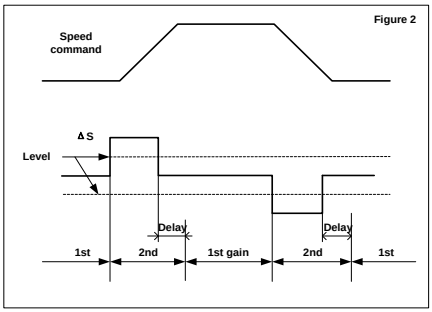


Figure 3

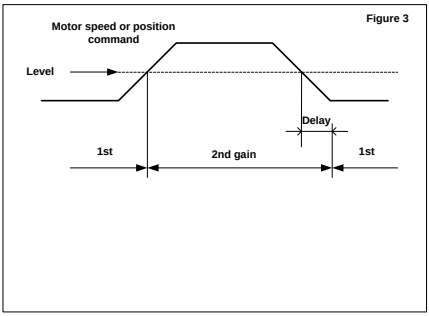


Figure 4

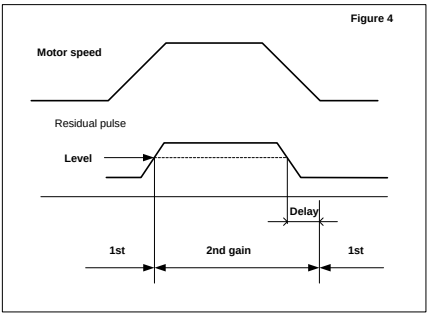


Figure 5

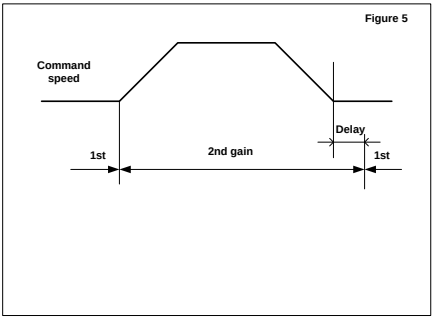


Figure 6

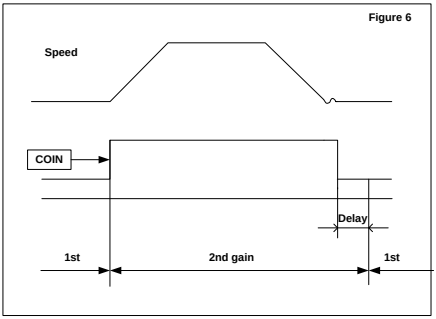
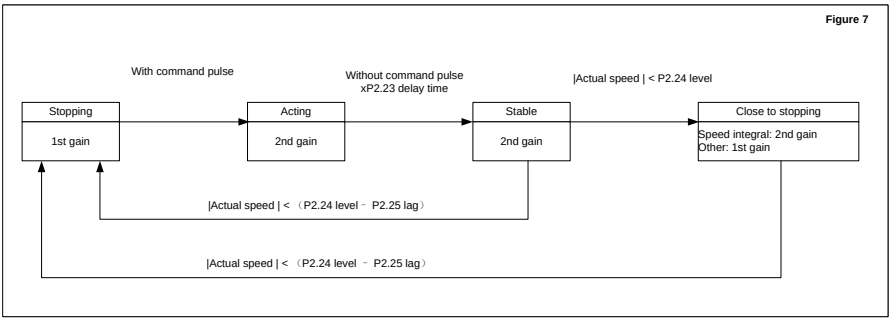


Figure 7



Note: The offset of gain switching sequence caused by lag (P2.25, P2.30, P2.34) is not reflected in above graphs.

9 Communication

9.1 Overview

DA180 servo drive provides RS485 and CANopen interfaces to communicate with the upper computer NC or PLC. The NC or PLC can implement asynchronous serial half-duplex communication with 31 servo drives simultaneously through the RS485 interface or with 127 servo drives simultaneously through the CAN interface to: The communication interface supports the following functions:

- Read/write the function parameters of the servo drives
- Monitor the operating state of the servo drives
- Form a multi-axis control system

The servo drive provides the USB and CANopen interfaces to communicate with the PC. Thus, the PC uses either of the interfaces to calibrate the parameter settings, monitor state, and read data from and write data to the servo drive.

9.2 RS485 communication protocol

DA180 servo drive provides the RS485 communication interface, which uses the standard Modbus communication protocol to implement master/slave communication. You can implement integrated control on the PC, PLC, or upper computer to meet specific application requirements. Integrated control includes setting servo drive control commands, running frequency, function codes, and working state, and monitoring fault information.

9.2.1 Protocol description

The Modbus serial communication protocol defines the frame content and format for asynchronous transmission in serial communication. This includes the format of master polling and broadcast frames, and slave response frames. The frame content organized by the master includes: slave address (or broadcast address), execution command, data, and error verification. The response from a slave also adopts the same structure, including action confirmation, returned data, and error verification. If the slave encounters an error when receiving a frame or it cannot complete the action requested by the master, it will generate a fault frame as a response feedback to the master.

9.2.2 Protocol description

DA180 servo drive uses the asynchronous serial master/slave Modbus communication protocol, which indicates only one device (that is, the master) in the network can

establish protocols (called "queries/commands"). The other devices (that is, the slave) can only provide data response to or react according to the "queries/commands" from the master. The master herein indicates the PC, industrial control device, or PLC, while the slave indicates DA180 servo drive or other control devices with the same communication protocol. The master can communicate with any single slave or broadcast with all slaves. For a separate access "query/command" from the master, a slave needs to return a response. For broadcast information, a slave does not need to return a response.

9.2.3 Communication frame structure

Modbus supports the RTU transmission mode only. You can set the serial communication parameters (including the baud rate and check method).

In an RTUmessage frame, each 8-bit byte consists of two 4-bit hexadecimal characters.

Table 9-1 RTU message frame

Start bit	Device address	Command	Data	CRC	Stop bit
T1-T2-T3-T4	8bit	8bit	n * 8 bits	16bit	T1-T2-T3-T4

In this mode, each message must be preceded by a time gap with a minimum length of 3.5 characters. During the transmission, the network device continuously detects the network bus even within the time gap. When the first domain (or address domain) is received, the corresponding device decodes the subsequent transmission characters. The message ends only when there is a time gap with a minimum length of 3.5 characters.

An entire RTU message frame must be transmitted as a continuous flow. If a receiver detects a time gap with a minimum length of 1.5 characters before the frame ends, the receiver refreshes the incomplete message and assumes that the next byte is the address domain of a new message. Similarly, if a new message follows the previous message within the time gap with a length of less than 3.5 characters, the receivers considers the new message as the continuity to the previous message. If either of the case occurs, a CRC error message is generated and sent back to the sender.

9.2.4 Command code and communication data

9.2.4.1 Command code: 03H

Function: read N words (can read no more than 16 words continuously).

For example, the servo drive with the salve address of 01H, if its starting address is 03F2H, read 2 words continuously, and then the structure of the frame is:

Table 9-2 Master command message

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
Read MSB in start address	03H
Read LSB in start address	F2H
MSB of data count (in word)	00H
LSB of data count (in word)	02H
CRC CHK LSB	65H
CRC CHK MSB	BCH
End	T1-T2-T3-T4 (transmission time of 3.5 bytes)

Table 9-3 Slave response message

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
Number of bytes	04H
Content MSB of start address 03F2H	00H
Content LSB of start address 03F2H	C8H
Content MSB of 2nd address 03F3H	00H
Content LSB of 2nd address 03F3H	00H
CRC CHK LSB	7BH
CRC CHK MSB	CDH
End	T1-T2-T3-T4 (transmission time of 3.5 bytes)

9.2.4.2 Command code: 10H

Function: write N words (N≥2)

For example, write 300 (0000012CH) into address 03F2H of the servo drive with the slave address 01H. The frame structure is as follows.

Table 9-4 Master command message

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	10H
MSB of data writing address	03H
LSB of data writing address	F2H
MSB of data count (in word)	00H
LSB of data count (in word)	02H

Number of bytes	04H
MSB of 1st word in data content	01H
LSB of 1st word in data content	2CH
MSB of 2nd word in data content	00H
LSB of 2nd word in data content	00H
CRC CHK LSB	A9H
CRC CHK MSB	F7H
End	T1-T2-T3-T4 (transmission time of 3.5 bytes)

Table 9-5 Slave response message

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	10H
MSB of data writing starting address	03H
LSB of of data writing starting address	F2H
MSB of data count (in word)	00H
LSB of data count (in word)	02H
CRC CHK LSB	E0H
CRC CHK MSB	7FH
End	T1-T2-T3-T4 (transmission time of 3.5 bytes)

9.2.5 Error checkout of the communication frame

The error check of a frame includes two parts, namely, bit check on bytes (odd/even check), and whole data check (CRC check or LRC check).

9.2.5.1 Byte-wise check

You can select the bit check mode as required, or you can choose not to perform the check, which will affect the check bit setting of each byte.

Definition of even check: Before the data is transmitted, an even check bit is added to indicate whether the number of "1" in the to-be-transmitted data is odd or even. If it is even, the check bit is set to "0, and if it is odd, the check bit is set to "1".

Definition of odd check: Before the data is transmitted, an odd check bit is added to indicate whether the number of "1" in the to-be-transmitted data is odd or even. If it is odd, the check bit is set to "0", and if it is even, the check bit is set to "1".

For example, the data bits to be sent are "11001110", including five "1". If the even check is applied, the even check bit is set to "1"; and if the odd check is applied, the odd check bit is set to "0". During the transmission of the data, the odd/even check bit is calculated

and placed in the check bit of the frame. The receiving device performs the odd/even check after receiving the data. If it finds that the odd/even parity of the data is inconsistent with the preset information, it determines that a communication error occurs.

9.2.5.2 CRC

A frame in the RTU format includes an error detection domain based on the CRC calculation. The CRC domain checks all the content of the frame. The CRC domain consists of two bytes, including 16 binary bits. It is calculated by the transmitter and added to the frame. The receiver calculates the CRC of the received frame, and compares the result with the value in the received CRC domain. If the two CRC values are not equal to each other, errors occur in the transmission.

During CRC, 0xFFFF is stored first, and then a process is invoked to process a minimum of 6 contiguous bytes in the frame based on the content in the current register. CRC is valid only for the 8-bit data in each character. It is invalid for the start, stop, and check bits.

During the generation of the CRC values, the "exclusive or" (XOR) operation is performed on the each 8-bit character and the content in the register. The result is placed in the bits from the least significant bit (LSB) to the most significant bit (MSB), and 0 is placed in the MSB. Then, LSB is detected. If LSB is 1, the XOR operation is performed on the current value in the register and the preset value. If LSB is 0, no operation is performed. This process is repeated 8 times. After the last bit (8th bit) is detected and processed, the XOR operation is performed on the next 8-bit byte and the current content in the register. The final values in the register are the CRC values obtained after operations are performed on all the bytes in the frame.

The calculation adopts the international standard CRC check rule. You can refer to the related standard CRC algorithm to compile the CRC calculation program as required.

9.2.6 Error message response

When returning a response, the slave uses a function code domain and fault address to indicate whether it is a normal response (no error) or exception response (an error occurs). In a normal response, the slave returns the corresponding function code and data address or sub-function code. In an exception response, the slave returns a code that is equal to a normal code, but the first bit is logic 1.

For example, if the master sends a request message to a slave for reading a group of function code address data, the following code is generated:

0 0 0 0 0 0 1 1 (03H in the hexadecimal form)

In a normal response, the slave returns the same function code. In an exception response, the slave returns the following code:

1 0 0 0 0 0 1 1 (83H in the hexadecimal form)

In addition to the modification of the code, the slave returns a byte of exception code that describes the cause of the exception.

After receiving the exception response, the typical processing of the master is to send the request message again or modify the command based on the fault information.

Table 9-6 Error code definition

Modbus exception codes		
Code	**Name**	**Meaning**
01H	Invalid function	The command code received by the upper computer is not allowed to be executed. The possible causes are as follows: ● The function code is applicable only on new devices and is not implemented on this device. ● The slave is in the faulty state when processing this request.
02H	Invalid data address	For the drive, the data address in the request of the host controller is not allowed. In particular, the combination of the register address and the number of the to-be-sent bytes is invalid.
03H	Invalid data value	The data value received is beyond the range of address parameters, leading the parameter modification invalid.
11H	Check error	In the frame message sent by the upper computer, if the CRC check bit of RTU format or the LRC check bit of ASCII format is different from the check number calculated by the lower devise, check error will be reported.

9.3 CANopen communication protocol

9.3.1 CANopen protocol description

CANopen is a high-layer communication protocol structured over the Control Area Network (CAN). It includes the communication profiles and device profiles for embedded systems. It is also an onsite bus widely used in industrial control. Common CANopen devices and communication profiles are defined in CAN in Automation (CiA) draft standard 301. Based on CiA 301, other profiles are developed for special devices, such as CiA 402 for motion control.

9.3.2 CANopen hardware configuration

For details on the pin definitions and functions of the CAN communication terminal CN3, see 3.6 Encoder-CN2 terminal wiring. The following table lists the mapping between baud

rates and maximum transmission lengths.

Communication baud rate	Communication length
1Mbit/s	25m
500kbit/s (default)	100m
250kbit/s	250m
125kbit/s	500m
50kbit/s	1000m
20kbit/s	2500m

Note:

- The CANL and CANH pins of all slaves can be directly connected in serial model, but not star model.
- A 120Ω terminal resistor must be connected between the master and final node of the slave.
- Shielded twisted pairs are recommended as CAN connection cables for anti-interference.
- A longer connection cable indicates a higher requirement on CAN chip drive ability.

9.3.3 CANopen software configuration

Configure following three parameters before the application of CANopen:

1. Set P0.03[Control mode selection] through LED panel or ServoPlorer software to 7 [CANopen mode].
2. Set P4.02[CAN communication baud rate] through LED panel or ServoPlorer software (0:1Mbps; 1:500kbps; 2:250kbps; 3:125kbps;4:50kbps; 5:20kbps).
3. Set P4.05[CAN communication node number] through LED panel or ServoPlorer software (range:1–127).

Note:

- Above three parameters are valid after restarting, so it is necessary to repower again or reset the drive.
- The node number of the salve cannot be the same as the node number of the master and other slaves (CNC or PLC).
- Synchronous signal is generated by the master or be configured by the slave. The unit of synchronous communication cycle is 1us and the minimum unit of DA180A is 1000μs (1ms).
- 0x1017 parameters is needed to be configured when the master needs the slave to

send a heartbeat message. The unit is 1ms.

- The drive will shut down automatically to ensure safety when CANopen state machine exits from OP state.

9.3.4 CANopen functions

As a standard slave of CANopen, DA180A servo drive supports some parameters of 301 standard protocol and 402 dynamic control protocol.

The basic CANopen protocols supported include NMT, SYNC, SDO, PDO, and EMCY.

The predefined connection set defines four Receive-PDOs, four Transmit-PDOs, one SDO (occupying two CAN-IDs), one emergency object, and one Node-Error-Control ID. The servo drive also supports the NMT-Module-Control service that needs no confirmation and broadcast of SYNC objects.

Table 9-7 CiA 402 protocol parameters supported by the servo drive

Index	Object Type	Name	Data Type	Access	Mappable
6040_h	VAR	Control word	UNSIGNED16	RW	Y
6041_h	VAR	Status word	UNSIGNED16	RO	Y
6042_h	VAR	vl target velocity	INTEGER16	RW	Y
6043_h	VAR	vl velocity demand	INTEGER16	RO	Y
6044_h	VAR	vl control effort	INTEGER16	RO	Y
6046_h	ARRAY	vl velocity min max amount	UNSIGNED32	RW	Y
6047_h	ARRAY	vl velocity min max	UNSIGNED32	RW	Y
6048_h	RECORD	vl velocity acceleration	UNSIGNED32	RW	Y
6049_h	RECORD	vl velocity deceleration	UNSIGNED32	RW	Y
6060_h	VAR	Mode of operation	INTEGER8	RW	Y
6061_h	VAR	Mode of operation display	INTEGER8	RO	Y
6062_h	VAR	Position demand value	INTEGER32	RO	Y
6063_h	VAR	Position actual value*	INTEGER32	RO	Y
6064_h	VAR	Position actual value	INTEGER32	RO	Y
6065_h	VAR	Following error window	UNSIGNED32	RW	Y
6066_h	VAR	Following error time out	UNSIGNED16	RW	Y
6067_h	VAR	Position window	UNSIGNED32	RW	Y
6069_h	VAR	Velocity sensor actual value	INTEGER32	RO	Y
$606B_h$	VAR	Velocity demand value	INTEGER32	RO	Y
$606C_h$	VAR	Velocity actual value	INTEGER32	RO	Y
$606D_h$	VAR	Velocity window	UNSIGNED16	RW	Y
$606F_h$	VAR	Velocity threshold	UNSIGNED16	RW	Y
6071_h	VAR	Target torque	INTEGER16	RW	Y

Index	Object Type	Name	Data Type	Access	Mappable
6072_h	VAR	Max torque	UNSIGNED16	RW	Y
6073_h	VAR	Max current	UNSIGNED16	RO	Y
6074_h	VAR	Torque demand value	INTEGER16	RO	Y
6075_h	VAR	Motor rated current	UNSIGNED32	RO	Y
6076_h	VAR	Motor rated torque	UNSIGNED32	RO	Y
6077_h	VAR	Torque actual value	INTEGER16	RO	Y
6078_h	VAR	Current actual value	INTEGER16	RO	Y
6079_h	VAR	DC link circuit voltage	UNSIGNED32	RO	Y
$607A_h$	VAR	Target position	INTEGER32	RW	Y
$607C_h$	VAR	Home offset	INTEGER32	RW	Y
$607D_h$	ARRAY	Software position limit	INTEGER32	RW	Y
6080_h	VAR	Max motor speed	UNSIGNED32	RW	Y
6081_h	VAR	Profile velocity	UNSIGNED32	RW	Y
6083_h	VAR	Profile acceleration	UNSIGNED32	RW	Y
6084_h	VAR	Profile deceleration	UNSIGNED32	RW	Y
6085_h	VAR	Quick stop deceleration	UNSIGNED32	RW	Y
6086_h	VAR	Motion profile type	INTEGER16	RO	Y
6087_h	VAR	Torque slope	UNSIGNED32	RW	Y
6088_h	VAR	Torque profile type	INTEGER16	RO	Y
6093_h	ARRAY	Position factor	UNSIGNED32	RW	Y
6098_h	VAR	Homing method	INTEGER8	RW	Y
6099_h	ARRAY	Homing speeds	UNSIGNED32	RW	Y
$60C0_h$	VAR	Interpolation sub mode select	INTEGER16	RO	Y
$60C1_h$	ARRAY	Interpolation data record	INTEGER32	RW	Y
$60C2_h$	RECORD	Interlopation time period	INTEGER8	RW	Y
$60F4_h$	VAR	Following error actual value	INTEGER32	RO	Y
$60F8_h$	VAR	Max slippage	INTEGER32	RW	Y
$60FA_h$	VAR	Control effort	INTEGER32	RO	Y
$60FC_h$	VAR	Position demand value*	INTEGER32	RO	Y
$60FD_h$	VAR	Digital inputs	UNSIGNED32	RO	Y
$60FE_h$	ARRAY	Digital outputs	UNSIGNED32	RO	Y
$60FF_h$	VAR	Target velocity	INTEGER32	RW	Y

Table 9-8 CANopen fault codes

Display	Fault name	32-bit fault code (16-bit ErrorCode + 16-bit additional information)
Er01-0	IGBT fault	FF01-0100h
Er01-1	Braking pipe fault (7.5kW and above models)	FF01-0101h
Er02-0	Encoder fault–Encoder disconnection	7300-0200h
Er02-1	Encoder fault–Encoder feedback deviation too large	7300-0201h
Er02-2	Encoder fault-odd/even check error	7300-0202h
Er02-3	Encoder fault–CRC check error	7300-0203h
Er02-4	Encoder fault–Frame error	7300-0204h
Er02-5	Encoder fault–Short frame error	7300-0205h
Er02-6	Encoder fault–Encoder timeout	7300-0206h
Er02-7	Encoder fault–FPGA timeout	7300-0207h
Er02-8	Encoder fault–Encoder battery low-voltage alarm	7300-0208h
Er02-9	Encoder fault–Encoder battery undervoltage fault	7300-0209h
Er02-a	Encoder fault–Encoder overheating	7300-020Ah
Er02-b	Encoder fault–Encoder EEPROM writing error	7300-020Bh
Er02-c	Encoder fault–No data in encoder EEPROM	7300-020Ch
Er02-d	Encoder fault– Encoder EEPROM data check error	7300-020Dh
Er03-0	Current sensor fault–Phase-U current sensor fault	7300-0300h
Er03-1	Current sensor fault–Phase-V current sensor fault	7300-0301h
Er03-2	Current sensor fault–Phase-W current sensor fault	7300-0302h
Er04-0	System initialization fault	FF01-0400h
Er05-1	Setting fault–Motor model not exist	FF01-0501h
Er05-2	Setting fault–Motor and drive model not match	FF01-0502h
Er05-3	Setting fault–Incorrect software limits	FF01-0503h
Er05-4	Setting fault–Incorrect homing mode	FF01-0504h
Er05-5	Setting fault–PTP-control travel overflow	FF01-0505h
Er07-0	Regenerative discharge overload fault	7100-0700h
Er08-0	AI overvoltage fault–AI 1	5441-0800h
Er08-1	AI overvoltage fault–AI 2	5442-0801h
Er08-2	AI overvoltage fault–AI 3	5443-0802h
Er09-0	EEPROM fault–Read/write error	5530-0900h
Er09-1	EEPROM fault–Data check error	5530-0901h
Er10-0	Hardware fault–FPGA fault	5544-0A00h
Er10-1	Hardware fault–Communication card fault	5544-0-A01h
Er10-2	Hardware fault–To-ground short circuit fault	5544-0A02h

Display	Fault name	32-bit fault code (16-bit ErrorCode + 16-bit additional information)
Er10-3	Hardware fault–External input fault	5544-0A03h
Er10-4	Hardware fault–Emergency stop fault	4458-0A04h
Er10-5	Hardware fault–485 communication fault	4458-0A05h
Er11-0	Software fault–Motor control task re-entry	6100-0B00h
Er11-1	Software fault–Periodic task re-entry	6100-0B01h
Er11-2	Software fault–Illegal operation	6100-0B02h
Er12-0	I/O fault–Duplicate DI assignment	FF01-0C00h
Er12-1	I/O fault–Duplicate AI assignment	FF01-0C01h
Er12-2	I/O fault–Pulse input frequency too high	FF01-0C02h
Er13-0	Main circuit overvoltage fault	3110-0D00h
Er13-1	Main circuit undervoltage fault	3120-0D01h
Er14-0	Control power undervoltage fault	5200-0E00h
Er17-0	Drive overload fault	FF01-1100h
Er18-0	Motor overload fault	2310-1200h
Er18-1	Motor overtemperature fault	2310-1201h
Er19-0	Speed fault–Overspeed fault	7180-1300h
Er19-1	Speed fault–FWD overspeed fault	7180-1301h
Er19-2	Speed fault–REV overspeed fault	7180-1302h
Er19-3	Speed fault–Incorrect overspeed parameter setting	7180-1303h
Er20-0	Speed out-of-tolerance fault	8400-1400h
Er21-0	Position overtravel - FWD overtravel	FF01-1500h
Er21-1	Position overtravel - REV overtravel	FF01-1501h
Er22-0	Position out-of-tolerance fault	8500-1600h
Er22-1	Hybrid control deviation too large	FF01-1601h
Er22-2	Position increment overflow fault	FF01-1602h
Er22-3	CANopen fault–Synchronization signal timeout	FF01-1603h
Er22-4	CANopen fault–Full position command buffer	FF01-1604h
Er23-0	Drive overtemperature fault	4210-1700h
Er25-4	Application fault–Encoder offset angle test timeout	FF01-1904h
Er25-5	Application fault–Encoder offset angle test failed	FF01-1905h
Er25-6	Application fault–Homing offside	FF01-1906h
Er25-7	Application fault–Inertia identifying failed	FF01-1907h
Er26-0	CANopen fault–CANopen disconnection	FF01-1A00h
Er26-1	CANopen fault–SDO index does not exist	FF01-1A01h
Er26-2	CANopen fault–SDO sub index does not exist	FF01-1A02h

Display	Fault name	32-bit fault code (16-bit ErrorCode + 16-bit additional information)
Er26-3	CANopen fault–SDO data length error	FF01-1A03h
Er26-4	CANopen fault–SDO write data beyond the range	FF01-1A04h
Er26-5	CANopen fault–Read-only and non-modifiable	FF01-1A05h
Er26-6	CANopen fault–PDO mapping length error	FF01-1A06h
Er26-7	CANopen fault–PDO mapping data does not exist	FF01-1A07h
Er26-8	CANopen fault–PDO is not allowed to be changed during operating	FF01-1A08h
Er26-9	CANopen fault–PDO mapping is not allowed	FF01-1A09h
Er26-a	CANopen fault–Sync signal is too fast	FF01-1A0Ah
Er26-b	CANopen fault–Receiving fault	FF01-1A0Bh
Er26-c	CANopen fault–Sending fault	FF01-1A0Ch
Er26-d	CANopen fault–Sync signal repeat	FF01-1A0Dh
Er26-e	CANopen fault–Bus load ratio too high	FF01-1A0Eh
Er26-f	CANopen fault–Incorrect parameter modification state	FF01-1A0Fh

9.4 EtherCAT communication protocol

9.4.1 Basic settings of EtherCAT application

Set the following parameters before using the DA180A AC servo drive for EtherCAT communication.

Use the LED panel or the ServoPlorer software to set P0.03[Control mode selection] to 8[EtherCAT mode].

In most cases, there is no need to set the node number parameter. The default physical node addressing (such as Twincat) is used. If you need to set the node number (such as OMRON PLC), use the LED panel or the Workshop software to set P4.00[EtherCAT communication node]. The default value of -1 means no node number is set.

Use the LED panel or the Workshop software to set P4.10 [EtherCAT synchronization cycle] (0: 250μs; 1: 500μs; 2: 1ms; 3: 2ms; 4: 4ms; 5: 8ms). When bit 13 of P4.43 is set to 1 (default value), the servo can automatically adapt to the synchronization cycle set by the master, and it will be displayed in P4.07. No manual setting is required, with a resolution of 0.001 ms.

Use the LED panel or the Workshop software to set P4.08 [EtherCAT synchronization type] (0: Free-Run; 2: DC Mode).

The servo can also automatically adapt to the synchronization cycle set by the master, and it will be displayed in P4.08. No manual setting is required.

Use the LED panel or the Workshop software to set P4.09 [EtherCAT fault detection time] (set the detection time of disconnection fault or PDO data loss fault as needed).

Use the LED panel or the Workshop software to set P4.25 [EtherCAT control unit type] (0: Manufacturer unit; 1: CIA402 unit; 2: CIA402 OMRON; 3: CIA402 Standard).

Use the LED panel or the Workshop software to set P4.26 [EtherCAT PDO input offset] (range: 0–63, unit: 125μs).

Use the LED panel or the Workshop software to set P4.27 [Compensation times of EtherCAT position interpolation mode (range: 0–10).

The digital output is servo controlled by default. If it is controlled by the master through EtherCAT communication, Use the LED panel or the Workshop software to set P4.28 [EtherCAT digital output control enabling] to 1 (Enable), or control the digital output through parameter 0x60FE of TPDO.

Note:

- The first five parameters and P4.28 will take effect after restarting. After modifying these parameters, please re-power on or soft reset the drive. P4.25–P4.27 will take effect immediately.
- When the control mode (0x6040) is set to position interpolation mode (8), P4.07 [EtherCAT synchronization cycle] is the same as the interpolation cycle of the CNC.

The meaning of P4.25 [EtherCAT control unit type]:

0: Manufacturer mode, supports the NC function of TwinCAT, the Beckhoff upper computer software.

Position unit: pulse; speed unit: rpm; acceleration unit: ms (time taken to accelerate from zero speed to rated motor speed).

Supports Z signal touch probes, and external IO capture values are stored in manufacturer parameters (see later sections).

1: CIA402 Unit, supports most motion controllers, such as CodeSys, Baoyuan, and ACS EtherCAT masters.

Position unit: pulse, speed unit: pulse/s, and acceleration unit: pulse/s^2.

Supports Z signal touch probes and standard touch probe I/O capture.

2: CIA402 OMRON, supports OMRON NJ controllers.

The content is basically the same as that for option 0, 1. Change 0x6041 status feedback to satisfy OMRON NJ status machine requirement.

3: CIA402 Standard, supports a small number of motion controllers.

The capture of only standard IO is supported.

The default number of pulses per revolution of DA180A is 10000, which which can be changed through P0.22 [Pulses per motor resolution]. The change takes effect after reset. The number can also be changed by modifying P0.25 [Numerator of electronic gear ratio] and P0.26 [Denominator of electronic gear ratio] after setting P0.22 to 0.

Note: The set value of P0.22 shall not exceed the actual resolution of the encoder.

Generally, you do not need to modify P4.26 and P4.27. When the master cycle is unstable or communication problems such as packet loss occur, you can try to modify them.

P4.26 [EtherCAT PDO input offset] is used to adjust the time from receiving the DC signal to processing the PDO data. It is used to adjust the PDO input time to the middle of the master cycle. This helps reduce data loss caused by unstable master clock. This parameter needs to be set according to the cycle of P4.07. If P4.07 is 1ms, the range of P4.26 is 0–7. 0 indicates no offset. 7 indicates an offset of 7*125μs. The specific value should be set based on actual conditions to ensure stable data reception.

P4.27 [Compensation times of EtherCAT position interpolation mode] is valid only in DC mode and when the control mode is set to position interpolation mode (8). It is used to achieve the position command smoothing function through position command prediction when P4.26 is set appropriately and one or several cycle position commands are lost. If a non-zero value is set, compensation will be applied by using the previous position increment when the position command is lost, and the compensation cycle is equal to the value set in P4.27.

P4.43 [EtherCAT-related control and operation cycle selection], with default value of 0x0003, is controlled by bit. The bit definitions are as follows:

Bit	Description	Other
0	Indicates whether to screen out torque limit ($60E0_h$, $60E1_h$) commands.	Default: 1, screening out.
1	Indicates whether to screen out the speed limit ($607F_h$) command.	Default: 1, screening out. $607F_h$ is always valid in torque mode.
2–3	Reserved	-
4	Indicates whether to use $60B1_h$ as speed feedforward. Default: 0, using the servo internal speed as the feedforward.	When using $60B1_h$ as speed feedforward, the unit is puu/s. P2.10 and P2.11 are still valid.
5	Indicates whether to use 60B0h as the position offset. Default: 0, not using $60B0_h$ as the position offset.	Unit: puu (user unit).

Bit	Description	Other
6	Indicates the effective range of soft limit ($607D_h$).	Default: 0. Only valid in position mode.
7	Indicates the position command processing mode after limit.	Default: 0. The position command is discarded after limit.
8	Change the EtherCAT running cycle. Default: 0, operates in the main interrupt.	1: Reducing the load rate of the main interrupt task. Set this when the servo reports the fault Er11-0.
9–11	Reserved	-
12	Indicating the parsing mode of the software limit ($607D_h$). Default: 0, standard CiA402 protocol.	-
13	Synchronization cycle self-adaptation	Default : 1, enable
14–15	Reserved	-

If the PDO parameter list in EtherCAT xml configuration file of DA180A includes torque limit parameters and P4.43 indicates no torque limit screening, a non-zero value needs to be given; otherwise, the servo torque is limited to 0, which causes no acting or alarm reporting. For example, the units of "Positive torque limit" and "Negtive torque limit" are 1‰ of the rated torque. The setting 1000 indicates 100% of the rated torque. Parameters about torque limit are valid in any control mode.

If the EtherCAT xml configuration file of DA180A includes Max profile velocity (607Fh), which indicates the max. speed limit in the torque loop, the unit is related to P4.25. If P4.25 is the manufacturer unit mode, the unit is rpm; if P4.25 is another value, the unit is puu/s. If the torque loop needs to be run, set this parameter to a non-zero value.

Sending and receiving PDO can be configured dynamically by the master, however, the max. number of each PDO parameter is 10. If the max. number is exceeded, the slave cannot enter the Op status.

When P4.08 is set to the DC mode, you can check the clock synchronization calibration status through R0.27.

You can view the CANopen status machine information through R0.28. The following table lists the mapping between states and values.

State	Init	Pre-Op	Safe-Op	Op
R0.28 value	11	12	14	18

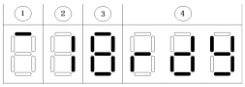
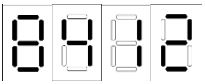
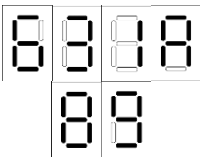
View R0.50 to check the configuration file version of the EtherCAT.

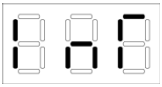
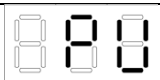
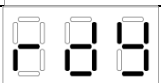
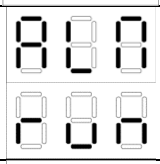
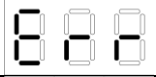
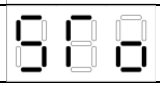
View R0.64 to check the control word (6040_h) sent by the master.

View R0.65 to check the state word (6041_h) sent by the servo (slave).

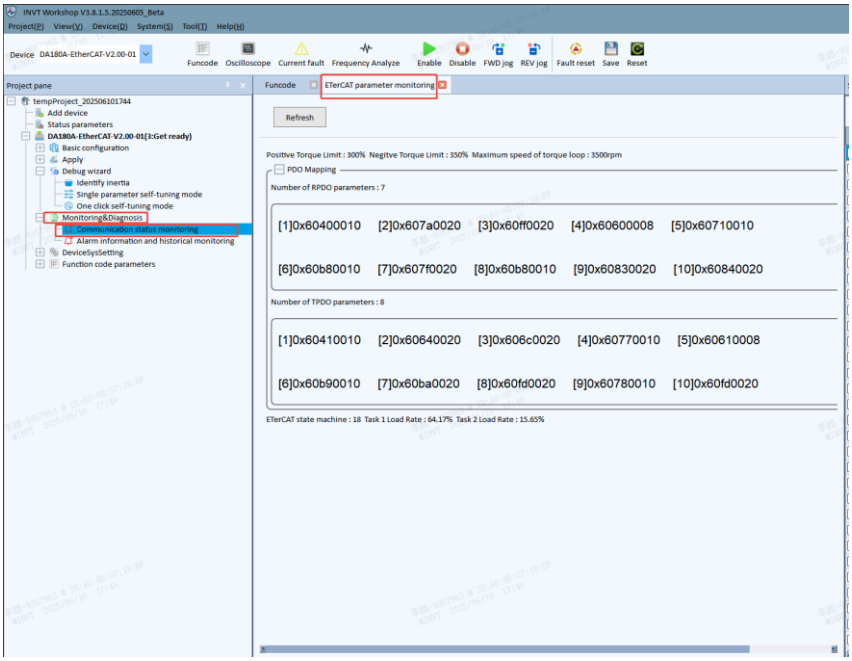
View R0.66 to check the current running mode (6060_h) of the servo (slave).

When P0.15 is set to 23, The LED pannel displays the EtherCAT communication-related status.

Sign		Name	Meaning
		EtherCAT communication monitoring mode	Indicates the initial entry into EtherCAT communication monitoring mode. "ECAT" is displayed.
		EtherCAT communication monitoring status	Displays the physical layer link state of upper and lower network ports, EtherCAT state machine, CiA402 control mode, and servo system status respectively.
1		Physical layer link state of EtherCAT communication interface Port1 (upstream interface)	On: Port1 is connected Off: Port1 is not connected
		Physical layer link state of EtherCAT communication interface Port2 (downstream interface)	On: Port2 is connected Off: Port2 is not connected
2		EtherCAT communication state machine	1: Init 2: Pre-Op 4: Safe-Op 8: Op
3		CiA402 control mode	1: Profile position control mode (pp) 3: Profile speed control mode (pv) 6: Homing control mode (hm) 8: Cycle synchronization position control mode (csp) 9: Cycle synchronization speed control mode (csv) A: Cycle synchronization torque control mode (cst)

Sign		Name	Meaning
4		Servo initialization	Strong electricity is not connected or the bus voltage does not reach the main relay switching-on voltage.
		Servo connected with strong electricity	The main relay is switched on but not ready.
		Servo ready (with alarm)	Wait for enabling signal
		Servo running (with alarm)	run is blinking at non-zero speed. ALM is displayed when an alarm occurred, but the servo is still running.
		Servo fault	Servo fault
		STO-In	STO action

You can check the PDO parameters configured on the master through the Workshop software. See the following figure.



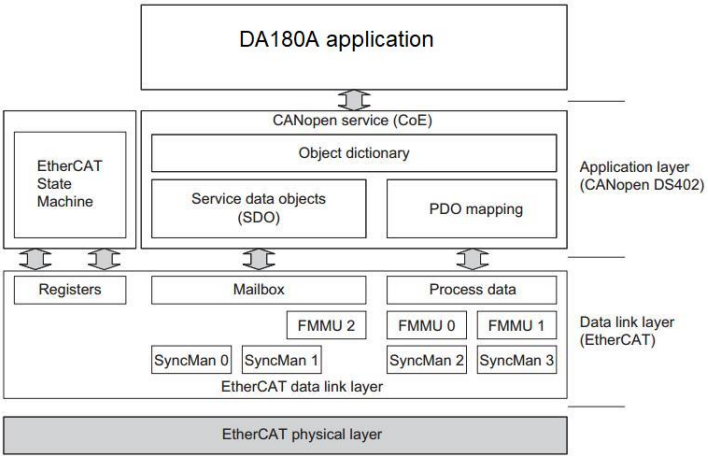
The network cable connection must follow up the top-in and bottom-out rule; otherwise, some nodes may be unable to enter the Op state.

9.4.2 EtherCAT communication

9.4.2.1 CANopen over EtherCAT (CoE) reference model

Figure 9-1 shows the CANopen over EtherCAT (CoE) network model inside DA180A.

Figure 9-1 CoE reference model



The EtherCAT (CoE) network reference model consists of two parts: the data link layer and the application layer. Data link layer is in charge of EtherCAT communication protocol while application layer is embedded with CANopen drive profile (DS402) communication protocol. The object dictionary in CoE contains parameters, application data, and process data object (PDO) mapping configuration information.

PDOs are composed of mappable objects from the object dictionary, and the content of PDO data is defined by PDO mappings. PDO data is periodically read and written, which does not require searching the object dictionary. However, mail box communication (SDO) is not periodic, which requires searching the object dictionary.

Note: In order to correctly parse SDO and PDO data on the EtherCAT data link layer, it is necessary to configure the FMMU and Sync Manager.

Table 9-9 Sync Manager settings

Sync Manager	Assignment(Fixed)	Size	Start Address(Fixed)
Sync Manager 0	Assigned to Receive Mailbox	40–512 Byte	0x1000
Sync Manager 1	Assigned to Transmit Mailbox	40–512 Byte	0x1200
Sync Manager 2	Assigned to Receive PDO	1–128 Byte	0x1400
Sync Manager 3	Assigned to Transmit PDO	1–128 Byte	0x1480

Table 9-10 FMMU settings

FMMU	Settings
FMMU 0	Mapped to Receive PDO
FMMU 1	Mapped to Transmit PDO
FMMU 2	Mapped to Fill Status of Transmit Mailbox

9.4.2.2 EtherCAT slave node information

EtherCAT slave information file (in XML format) is used for master reading and building the configuration between the master and slave. The XML file contains information required by EtherCAT communication setup. INVT provides " INVT_DA200A_EtherCAT_V###.xml " file for DA200A.

9.4.2.3 EtherCAT state machine

The EtherCAT state machine is used to describe the states of the slave application and state transitions. State change requests are typically initiated by the master station, with responses from the slave station. The specific state transition method is as shown in Figure 9-2.

Figure 9-2 Slave state machine

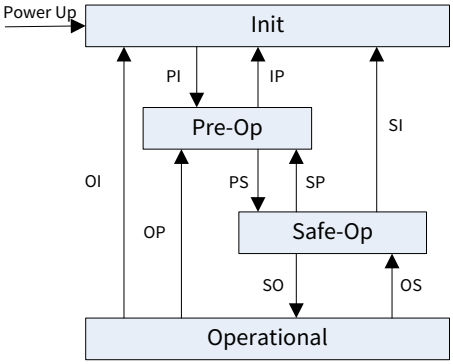


Table 9-11 State description

State	Description
Init	● Mail communication is unavailable. ● PDO communication is unavailable.
Init → Pre-Op	● The master configures link layer address and SM channel, and initiates mail communication. ● The master initializes DC clock synchronization. ● The master requests for the change to the Pre-Op state. ● The master sets the AL control register.

State	Description
	● The slave determines whether the mail is initialized normally.
Pre-Operation (Pre-Op)	● Mail communication is activated. ● PDO communication is unavailable.
Pre-Op → Safe-Op	● The master serves as the channel for process data configuration sync manager channel and FMMU. ● The master configures PDO data mapping and Sync Manager PDO parameters through SOD. ● The master requests for the Safe-Op state change. ● The slave checks whether the configuration of Sync Manager that is in charge of PDO data is correct. If the slave sends the request to initiate synchronization, check whether the distributed clocks are set correctly.
Safe-Operation (Safe-Op)	● The slave application program transmits actual input data, without output operations. ● Output is set to "safe state".
Safe-Op → Op	● The master sends valid output data. ● The master requests for the change to the Op state.
Operational (Op)	● Mailbox communication is available. ● PDO communication is available.

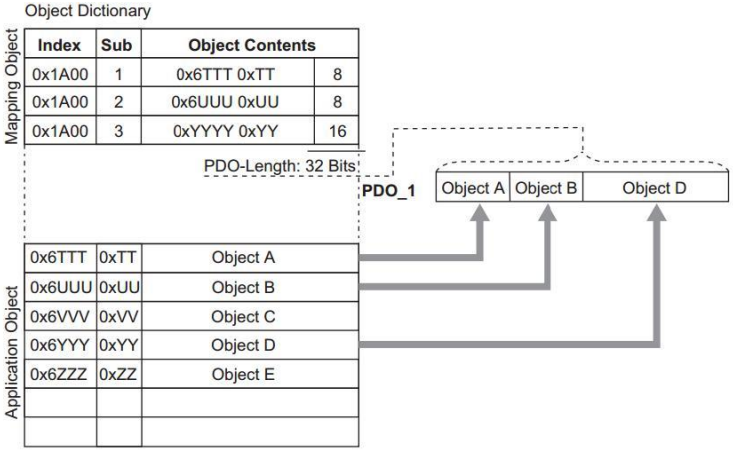
9.4.2.4 PDO process data mapping

The process data of an EtherCAT slave station is composed of synchronization manager channel objects. Each synchronization manager channel object describes the consistency area of the EtherCAT process data and contains multiple process data objects. EtherCAT slave stations with application control functions should support PDO mapping and the reading of SM PDOs Assign objects.

PDO mapping

PDO mapping designs the mapping relation between the object dictionary to PDOs application object. Index 0x1600 and 0x1A00 in the object dictionary are stored in RxPDO and TxPDO mapping table respectively. Figure 9-3 shows an example of PDO mapping.

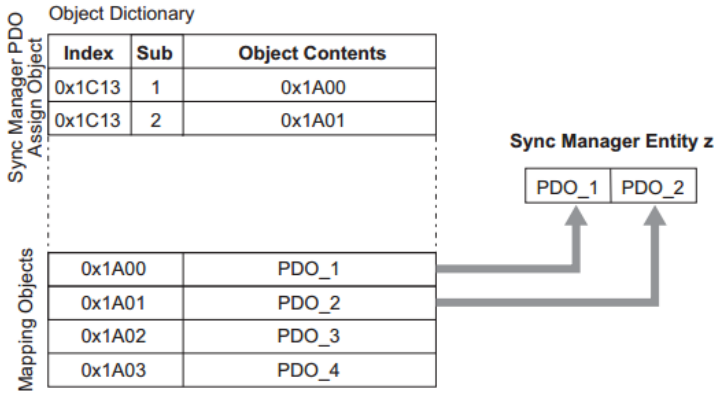
Figure 9-3 PDO mapping example



PDO allocation

In order to realize process data interaction of EtherCAT communication, it is necessary to distribute PDOs to Sync Manager. Sync Manager PDO distributes objects (Sync Manager PDO Assign objects: 0x1C12 and 0x1C13) to establish the relationship between PDOs and Sync Manager. Figure 9-4 shows an example of Sync Manager PDO allocation.

Figure 9-4 PDO allocation example



Note: PDO mapping objects (0x1600–0x1603 and 0x1A00–0x1A03) and SM PDO Assign objects (0x1C12 and 0x1C13) can only be effective in write operation under Pre-Op state.

PDO mapping procedure

Step 1 Stop PDO allocation function (Set sub-index 0 of 0x1C12 and 0x1C13 to 0).

Step 2 Stop PDO mapping function (Set sub-index 0 of 0x1600–0x1603 and 0x1A00–0x1A03 to 0).

Step 3 Set the mapping entry of PDO mapping objects (0x1600–0x1603 and 0x1A00–0x1A03).

Step 4 Set the mapping entry value of PDO mapping objects (0x1600–0x1603 and 0x1A00–0x1A03).

Step 5 Set PDO allocation objects (set sub-index 1 of 0x1C12 and 0x1C13).

Step 6 Re-open PDO allocation function (set sub-index 0 of 0x1C12 and 0x1C13 to 1).

Default PDO mapping

RxPDO (0x1600)	Controlword (0x6040)	Target Position (0x607A)	Target Velocity (0x60FF)	Mode of Operation (0x6060)	Target torque (0x6071)	Max profile velocity (0x607F)
TxPDO (0x1A00)	Statusword (0x6041)	Position Actual Value (0x6064)	Speed Actual Value (0x606C)	Torque Actual Value (0x6077)	Operation Mode Display (0x6061)	Digital inputs (0x60FD)

Note: For detailed PDO mapping information, see the xml file.

9.4.2.5 Network synchronization based on distributed clocks

Distributed clocks can make all EtherCAT devices use the same system time, thus controlling the synchronous execution of each device task. Among the slave clocks connected to the master, EtherCAT network takes the first slave clock equipped with distributed clock function as the reference clock for the whole network, and the remaining slaves and masters take the reference clock as their basis for synchronization.

DA180A EtherCAT communication card adopts the following synchronization modes, which can be switched through synchronization control registers (ESC 0x980 and 0x981).

Free-Run (ESC*register: 0x980 = 0x0000, P4.08 = 0).

In this mode, the local application program cycle, communication cycle, and master cycle of the servo drive are independent of each other.

DC mode (ESC register: 0x980 = 0x0300, P4.08 = 2)

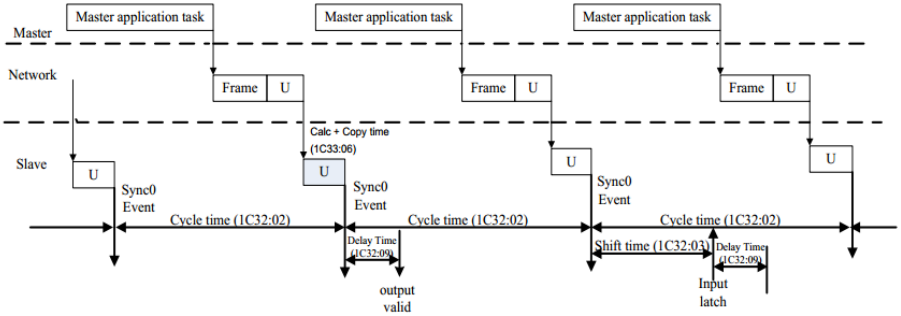
In this mode, the local application program is in synchronization with Sync0 time.

Note: ESC is the abbreviation of EtherCAT Slave Controller.

Index	Sub	Name	Access	PDO Mapping	Type	Value
0x1C32	Sync Manager channel 2 (process data output) Synchronization					
	-	Synchronization type	1	No	UINT	Current status of DC mode 0:Free-run

Index	Sub	Name	Access	PDO Mapping	Type	Value
						2:DC Mode(Synchronous with Sync0)
	2	Cycle time	RO	No	UDINT	Sync0 event cycle[ns](This value is set by master via ESC register) range:12500 * n(n = 2,4,8,16)[ns]
0x1C33	Sync Manager channel 2 (process data input) Synchronization					
	3	Shift time	RO	No	UINT	-
	6	Calc and copy time	RO	No	UINT	-

Figure 9-5 Timing diagram of the DC mode



9.4.2.6 Emergency Messages

When the drive generates an alarm, CoE initiates an Emergency message, informing you of the error information of the present drive.

Emergency Object:

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code		Error register	Panel Error Code		N/A		

9.4.3 Compatible communication specifications

Item		Description
EtherCAT communication	Applicable communication standard	IEC 61158 Type12, IEC 61800-7 CiA402 Drive Profile
	Physical layer	100BASE-TX (IEEE802.3)
	Bus connection	CN3 (RJ45): EtherCAT Signal IN CN3 (RJ45): EtherCAT Signal OUT
	Cable	CAT5

Item		Description
	SyncManager	SM0: output mail, SM1: input valid, SM2: output process data, SM3: input process data
	FMMU	FMMU0: Mapped to the process data (RxPDO) output area. FMMU1: Mapped to the process data (RxPDO) output area. FMMU2: Mapped to the mailbox state.
	PDO data	Dynamic PDO mapping
	Mailbox (CoE)	Emergency events, SDO requests, responses, and SDO information. **Note:** TxPDO/RxPDO and remote TxPDO/TxPDO are not supported.
	Distributed clock (DC)	Free-run, DC mode (needs to be activated through parameter selection). Supported DC cycle: 250μs–8ms
	Slave Information IF	256Bytes (read-only)
	LED indicator	EtherCAT Link/Activity indicator(L/A)×2 EtherCAT Status indicator×1 EtherCAT Error indicator×1
CiA402 Drive Profile		Homing mode(6) Profile position mode(1) Profile velocity mode(3) Cyclic synchronous position mode(8) Cyclic synchronous speed mode(9) Cyclic synchronous torque mode(10) Touch probe function

For specific commissioning of EtherCAT communication, see *DA180A Series AC Servo Drive_EtherCAT Commissioning Manual*.

10 Fault handling

10.1 Drive faults and solutions

Fault code	Name	Cause	Countermeasure
Er01-0	Software overcurrent	● The drive actual output current exceeds the specified value. ● A drive fault has occurred (drive circuit, current sampling circuit, or IGBT exception, or poor connection between drive and control board). ● Motor cables U, V, and W are short connected, or motor cables are grounded or contacted improperly. ● The motor internal windings are short-circuited. ● The motor cables U, V, and W are connected in reverse phases. ● The UVW motor cable is too long, especially when using a shielded motor cable, causing a false alarm on the drive. ● Improper parameter settings cause system exception. ● The ACC/DEC time in the start or stop process is too short. ● Instantaneous load is too heavy. ● The encoder is either interfered or damaged.	● Remove the motor cables and then enable the drive. If the fault persists, replace the drive. ● Ensure the motor cables and wiring are in good conditions. ● Replace the motor cable with the unshielded one. ● Reduce the settings of P0.10 and P0.11 to reduce the maximum output torque. ● Increase the ACC/DEC time. ● Replace the drive with a new one with greater power. ● Replace the motor.
Er01-1	Braking pipe fault	● A fault has occurred in the	● Check the wiring

Fault code	Name	Cause	Countermeasure
	(7.5kW and above models)	braking circuit (drive circuit, IGBT, or feedback detection circuit). ● The braking resistor has been incorrectly connected to PB and the bus negative terminal.	● Replace the drive.
Er01-2	U-phase IGBT fault	● U-phase IGBT is shorted. ● U-phase drive circuit is abnormal. ● U-phase short circuit detected.	● Check the wiring ● Replace the drive.
Er01-3	V-phase IGBT fault	● V-phase IGBT is shorted. ● V-phase drive circuit is abnormal. ● V-phase short circuit detected.	● Check the wiring ● Replace the drive.
Er01-4	W-phase IGBT fault	● W-phase IGBT is shorted. ● W-phase drive circuit is abnormal. ● W-phase short circuit detected.	● Check the wiring ● Replace the drive.
Er01-5	Bus hardware overcurrent	● The drive actual output current exceeds the specified value. ● Drive fault (such as drive circuit, bus overcurrent detection circuit, or IGBT fault). ● Motor cables U, V, and W are short connected, or motor cables are grounded or contacted improperly. ● The motor internal windings are short-circuited. ● The motor cables U, V, and W are connected in reverse phases.	● Remove the motor cables and then enable the drive. If the fault persists, replace the drive. ● Ensure the motor cables and wiring are in good conditions. ● Replace the motor cable with the unshielded one. ● Reduce the settings of P0.10 and P0.11 to reduce the maximum output torque. ● Increase the ACC/DEC time. ● Replace the drive with a new one with greater power.

Fault code	Name	Cause	Countermeasure
		• The UVW motor cable is too long, especially when using a shielded motor cable, causing a false alarm on the drive. • Improper parameter settings cause systematic divergence. • The ACC/DEC time in the start or stop process is too short. • Instantaneous load is too heavy.	• Replace the motor.
Er02-0	Encoder fault—(Incremental or resolver) encoder disconnection	• The encoder is not connected, or the connector is loose. • Incorrect parameter settings. • Encoder wiring exception (insulation damage, short circuit, incorrect connection, or disconnection) • Drive or encoder malfunction	• Connect the encoder according to the correct wiring method. Ensure the encoder plug contact is proper. Replace the encoder cable if the cable is broken. • Ensure the incremental encoder power and voltage are proper. • Perform cross check by replacing the motor or drive. If the fault is eliminated, replace the faulty motor or drive.
Er02-1	Encoder fault–Encoder feedback deviation too large	• Serious system interference. • Incorrect A and B pulse counts and Z signal correspondence in the incremental encoder. • Incorrect encoder related parameter settings. • The Z signal type set in P8.20 does not match the encoder's actual signal.	• Check whether the encoder shielding PE is properly grounded at both ends, and the PE wire at the terminal of the aviation connector has good contact and continuity. At the same time, check whether the motor power cable PE is properly grounded at both

Fault code	Name	Cause	Countermeasure
			ends. ● Check whether there is a grounding wire on site and whether the driver is properly grounded. ● If the encoder cable shield layer and power cable PE grounding are in good condition, you can appropriately increase the number of encoder error thresholds. ● Measure whether the Z signal type matches the setting value of P8.20.
Er02-2	Reserved	-	-
Er02-3	Encoder fault–CRC check error	● Interference causes communication data exceptions.	● Check whether the encoder shielding PE is properly grounded at both ends, and the PE wire at the terminal of the aviation connector has good contact and continuity. At the same time, check whether the motor power cable PE is properly grounded at both ends. ● Check whether there is a grounding wire on site and whether the driver is properly grounded. ● If the encoder cable shield layer and power cable PE grounding are in good condition, you can appropriately increase the encoder disconnection detection time (P9.84) but

Fault code	Name	Cause	Countermeasure
			not greater than 20.
Er02-4	Reserved	-	-
Er02-5	Reserved	-	-
Er02-6	Encoder fault–Encoder communication timeout	● The communication encoder is not connected, or the connector is loose. ● Incorrect parameter settings. ● Encoder wiring exception (insulation damage, short circuit, incorrect connection, or disconnection) ● Drive or encoder malfunction ● Interference causes communication interruptions or data exceptions. ● The encoder type or drive model is not supported. ● The encoder supply voltage is too low (the drive's 5V voltage is too low, or the encoder cable is too long, causing excessive voltage drop).	● Ensure that the encoder is reliably connected and the parameters are correctly set. ● Connect the encoder according to the correct wiring method. Ensure the encoder plug contact is proper. Replace the encoder cable if the cable is broken. ● For the handling of interference caused exception, see the handling solution for Er02-3. ● Ensure the encoder power voltage is proper. ● Perform cross check by replacing the motor or drive. If the fault is eliminated, replace the faulty motor or drive.
Er02-7	Encoder fault–Encoder multi-turn error	● When the drive is not powered on and only the encoder battery is supplying power, the motor shaft may move rapidly under external force. ● The encoder code disk is abnormal (damaged, contaminated with oil, or dusty). ● Strong external interference	● If the drive is not powered on and the motor without a brake has been moved or transported over a long distance, and this fault occurs after power-up, it is recommended to clear the multi-turn data using P0.71 and rehome the motor; then it can function normally. ● Check the motor

Fault code	Name	Cause	Countermeasure
		causes a false alarm by affecting the encoder itself, while actual multi-turn data remains normal.	appearance and whether the encoder harness at the rear cover is contaminated, and whether the motor shaft has signs of abrasion; if such issues exist, it is recommended to contact the manufacturer for motor replacement. ● If this fault occurs on site, but comparison between single-turn and multi-turn data and mechanical positions shows no loss of turn data, check whether the encoder cable shield PE and motor power cable PE are properly grounded.
Er02-8	Encoder fault–Encoder battery low-voltage alarm	● When a multi-turn absolute encoder is used, the external battery voltage of the encoder is between 3.0V–3.2V. ● The encoder battery cable has poor contact or is connected in reverse. ● The on-site environment is humid, resulting in rapid battery discharge. ● Encoder is abnormal.	● Ensure the encoder battery cable is connected properly. ● Use the multimeter to check whether the external battery voltage is lower than 3.2V. If yes, replace the battery. ● Replace the battery with the drive powered on; otherwise, the encoder's absolute data will be lost and it will need to be rehomed. ● Replace the motor or encoder.
Er02-9	Encoder fault–Encoder battery undervoltage fault	● When a multi-turn absolute encoder is used, the external battery voltage of the encoder is between 2.5V–3.0V.	● Ensure the encoder battery cable is connected properly. ● Use the multimeter to check whether the external battery voltage is lower

Fault code	Name	Cause	Countermeasure
		● The encoder battery cable has poor contact or is connected in reverse. ● The on-site environment is humid, resulting in rapid battery discharge. ● Encoder is abnormal.	than 3.0V. If yes, replace the battery. ● Replace the battery with the drive powered on; otherwise, the encoder's absolute data will be lost and it will need to be rehomed. ● Replace the motor or encoder.
Er02-a	Encoder fault–Encoder overheating	● The encoder feedback temperature is higher than the temperature threshold for protection against overheating.	● Ensure the temperature threshold for protection against overheating is correct. ● Check whether the motor temperature is too high and optimize the cooling conditions.
Er02-b	Encoder fault–Encoder EEPROM writing error	● If the motor is used with a communication encoder, a communication transmission or data check error occurs when the drive updates data to the encoder EEPROM.	● Ensure encoder cables are connected properly and eliminate the conditions that disturb encoder communication. ● Make multiple writing attempts. If the fault is reported repeatedly, replace the motor.
Er02-c	Encoder fault–No data in encoder EEPROM	● When working with a communication encoder, the motor fails to read data from the encoder EEPROM during power-on or reset. ● The encoder is subject to interference.	● Check whether the encoder ground wire is properly connected; contact the manufacturer or replace the motor. ● Select the motor model based on the setting of P0.00 and execute the operation of writing data to the encoder EEPROM through P4.97.

Fault code	Name	Cause	Countermeasure
			● Mask this fault by setting P4.98. The motor parameters in the drive EEPROM are used for initialization.
Er02-d	Encoder fault–Encoder EEPROM data check error	● When working with a communication encoder, the motor experiences a data checksum error while reading from the encoder EEPROM during power-on or reset. ● The encoder is subject to interference.	● Ensure encoder cables are connected properly and eliminate the conditions that disturb encoder communication. ● Select the motor model based on the setting of P0.00 and execute the operation of writing data to the encoder EEPROM through P4.97 so that data in the encoder EEPROM is updated. ● Mask this fault by setting P4.98. The motor parameters in the drive EEPROM are used for initialization.
Er02-e	Encoder fault–Encoder identification error	● FPGA initialization has not been completed.	● Perform repower-on. ● If the fault is reported repeatedly, contact the manufacturer or replace the drive.
Er02-f	Encoder fault–Failed to write the encoder offset angle	● The drive failed to write the encoder offset angle to the FPGA.	● Contact the manufacturer or replace the drive.
Er03-0	Current sensor fault–Phase-U current sensor fault	● Both V-phase and W-phase current sampling circuits are abnormal. ● Power-on is made when the motor shaft is in non-static state.	● Contact the manufacturer or replace the drive.

Fault code	Name	Cause	Countermeasure
		● The module cannot be properly enabled (only for bootstrap-type drives).	
Er03-1	Current sensor fault–Phase-V current sensor fault	● The V-phase current sampling circuit is abnormal. ● Power-on is made when the motor shaft is in non-static state. ● The module cannot be properly enabled (only for bootstrap-type drives).	● Contact the manufacturer or replace the drive.
Er03-2	Current sensor fault–Phase-W current sensor fault	● The W-phase current sampling circuit is abnormal. ● Power-on is made when the motor shaft is in non-static state. ● The module cannot be properly enabled (only for bootstrap-type drives).	● Contact the manufacturer or replace the drive.
Er04-0	System initialization fault	● The motor is moving during initialization and the filtered motor speed (R0.21) is greater than 250RPM.	● During servo power-up and soft reset, keep the motor stationary or ensure the filtered motor speed (R0.21) is less than 250RPM.
Er04-1	Motor identification initialization check failure	● The motor model saved in the drive does not match the actual motor model set by P0.00.	● Perform a soft reset. ● Set the correct motor model.
Er05-0	Setting fault–Motor model not exist	● P9.50 is set incorrectly.	● Ensure the drive model is correctly set in P9.50 and the parameter value is within the allowed range.
Er05-1	Setting fault–Motor model not exist	● A third-party motor is used. ● Incorrect motor model setting in P0.00.	● Check whether the motor model setting in P0.00 is correct.
Er05-2	Setting fault–Motor	● Incorrect motor model	● Check whether the motor

Fault code	Name	Cause	Countermeasure
	and drive model not match	setting in P0.00.	model in P0.00 matches the power rating of the drive.
Er05-3	Setting fault–Incorrect software limits	● Software limits are set incorrectly. The setting of P0.35 is equal to or less than that of P0.36.	● Reconfigure P0.35 and P0.36, and ensure that the value of P0.35 is less than P0.38.
Er05-4	Setting fault–Incorrect homing mode	● Unreasonable setting of P5.10 homing mode: T mode value exceeds 1, Z mode exceeds 2, or M mode exceeds 8.	● Incorrect setting of P5.10 homing mode: T mode value ⩽1, Z mode ⩽2, and M mode ⩽8.
Er05-5	Setting fault–PTP-control travel overflow	● Ensure that the single travel increment does not exceed ±(2^31-1) in the absolute position mode.	● Ensure that the single travel increment does not exceed ±(2^31-1) in the absolute position mode.
Er05-6	Setting fault–Power module setting error	● Imported configuration parameters are incorrect.	● Ensure the drive model is correctly set in P9.37 and the parameter value is within the allowed range.
Er07-0	Regenerative discharge overload fault	● Incorrect settings of braking resistor parameters (internal/external, resistance, power, braking switch voltage). ● The selected braking resistor power is too small (common in a motor with frequent deceleration, high inertia, or other regenerative conditions). ● The bus voltage is too high and exceeds the braking transistor threshold.	● Check whether the parameters related to the braking resistor are set correctly. ● Check whether the motor power lines (U, V, W), including those of other axes in the system, are shorted to the motor housing. ● Change the built-in braking resistor to an external one, and select an external resistor with higher power. ● Properly increase the deceleration time. ● In some cases, consider using a common DC bus or an external capacitor

Fault code	Name	Cause	Countermeasure
			module with buffering.
Er08-0	AI overvoltage fault–AI 1	● The actual analog input voltage exceeds the threshold. ● Abnormal terminal wiring. ● Incorrect setting of voltage threshold parameter P3.22, P3.25, or P3.75. ● Incorrect setting of analog input offset parameter P3.20, P3.23, or P3.71.	● Set P3.22, P3.25 and P3.75 correctly. ● Ensure the terminal wiring is proper. ● Set P3.22, P3.25 and P3.75 to 0 to disable protection. ● Set P3.20, P3.23 and P3.71 correctly.
Er08-1	AI overvoltage fault–AI 2		
Er08-2	AI overvoltage fault–AI 3		
Er09-0	EEPROM fault–Read/write error	● Data is damaged in the data storage area when the drive reads data from the EEPROM. ● Writing data to the EEPROM is disturbed.	● Try again after re-power on. ● If the fault occurs repeatedly, replace the drive.
Er09-1	EEPROM fault–Data check error	● Writing data to the EEPROM is disturbed. ● The drive software version is updated.	● Set all parameters again (through P9.97). ● If the fault occurs repeatedly, replace the drive.
Er10-0	Hardware fault–FPGA fault	● The FPGA on the control board reports a fault.	● Perform repower-on. ● If the fault occurs repeatedly, replace the drive.
Er10-1	Hardware fault–Communication card fault	● External communication card fault reported.	● Perform repower-on. ● If the fault occurs repeatedly, replace the communication card.
Er10-2	Hardware fault–To-ground short circuit fault	● One of the motor cables V and W is short connected to the ground, which is found in to-ground short circuit detection during drive power-on.	● Ensure motor cables are connected properly. ● Replace motor cables or check for aging of insulation.
Er10-3	Hardware fault–External input fault	● This fault occurs when the digital terminal configured	● Clear the external fault input and enable fault

Fault code	Name	Cause	Countermeasure
		with the external fault input function acts.	clearing. ● Re-power on the drive.
Er10-4	Hardware fault–Emergency stop fault	● This fault occurs when the emergency stop button (digital terminal configured with the emergency stop function) acts.	● Cancel the emergency stop input and enable fault clearing. ● Re-power on the drive.
Er10-5	Hardware fault–485 communication fault	● Strong EMI on RS485 communication circuit causes a drive serial communication alarm.	● Use shielded twisted pairs for RS485 communication. ● Route communication cables and motor cables separately.
Er10-6	Hardware fault–AC power phase loss	● Phase loss has occurred to R, S, or T.	● Check the power wiring. ● Set the power input parameter P0.12 correctly.
Er10-7	Hardware fault–Fan fault	● Fan or drive-related circuit exception.	● Check whether there is any foreign object blocking the fan causing the exception. ● Replace the fan. ● If the fault persists, reaplace the drive.
Er10-8	Hardware fault–Regenerative transistor fault	● The braking resistor is not connected. ● Braking circuit exception.	● Check whether the braking resistor value and its wiring are correct. ● If the fault persists, reaplace the drive.
Er10-9	Hardware fault–STO phase loss	● Both safety terminal inputs 1 and 2 are abnormal.	● Check the safety terminal input power and wiring. ● Perform cross check by replacing the drive. If the fault persists, replace the drive.
Er10-a	Hardware fault–STO DPIN1 fault	● Safety terminal input 1 is abnormal.	● Check the safety terminal input power and wiring. ● Perform cross check by replacing the drive. If the fault persists, replace the drive.

Fault code	Name	Cause	Countermeasure
Er10-b	Hardware fault–STO DPIN2 fault	● Safety terminal input 2 is abnormal.	● Check the safety terminal input power and wiring. ● Perform cross check by replacing the drive. If the fault persists, replace the drive.
Er10-e	STO terminal fault	● The STO function enabling parameter (P9.69) is set to disable, and the STO terminal is not plugged in.	● Check whether the STO terminal is correctly inserted. ● Check whether the STO terminal wiring is correct.
Er11-0	Software fault–Motor control task re-entry	● The DSP CPU utilization is too high.	● Contact customer service personnel to update the drive software.
Er11-1	Software fault–Periodic task re-entry		
Er11-2	Software fault–Illegal operation		
Er12-0	I/O fault–Duplicate DI assignment	● Two or more digital inputs are configured with the same function.	● Reset P3.00–P3.09 and ensure each setting is unique.
Er12-1	I/O fault–Duplicate AI assignment	● When the drive is a standard model, analog inputs 1 to 3 are configured as duplicate command inputs.	● Check whether analog inputs 1 to 3 are assigned as duplicates and configured to the correct values.
Er12-2	I/O fault–Pulse input frequency too high	● The pulse input frequency detected by the drive is higher than the specified frequency. ● External input pulse signal frequency is too high. ● The internal pulse frequency detection circuit of the drive is damaged.	● Reduce the external input pulse signal frequency. ● If the fault persists though the external input signal is normal, replace the drive.
Er13-0	Main circuit overvoltage fault	● The detected main circuit DC voltage of the drive exceeds the protection	● Ensure the grid input voltage is within the allowed range.

Fault code	Name	Cause	Countermeasure
		threshold. ● The grid voltage is too high. ● Under the braking condition, no braking resistor is connected or the resistance is too high, causing the braking circuit abnormal or braking resistor damaged. ● Incorrect drive parameter (overvoltage protection) setting. ● Internal voltage detection circuit of the drive is abnormal.	● Check the wiring of braking resistor is normal. ● Reduce the braking resistor resistance value appropriately. ● Check whether the bus voltage waveform monitored by the upper computer discharges normally after reaching the braking transistor activation threshold. ● Check R0.07 when the drive is disabled. If it is abnormal and does not match the grid input voltage, replace the drive.
Er13-1	Main circuit undervoltage fault	● The detected main circuit DC voltage of the drive is lower than the protection threshold. ● The grid voltage is too low. ● The buffer relay is not closed. ● Incorrect drive parameter (undervoltage protection) setting. ● Internal voltage detection circuit of the drive is abnormal. ● The drive output power is too high.	● Ensure the grid input voltage is within the allowed range. ● Re-power on the drive. Ensure the buffer relay is closed. If the buffer relay is closed, there is a sound indicating actuation. ● Check R0.07 when the drive is disabled. If it is abnormal and does not match the grid input voltage, replace the drive.
Er14-0	Control power undervoltage fault	● The detected control power voltage of the drive is lower than the protection threshold. ● The grid voltage is too low. ● Incorrect drive parameter	● Ensure the grid input voltage is within the allowed range. ● Check R0.08 when the drive is disabled. If it is abnormal and does not match the grid

Fault code	Name	Cause	Countermeasure
		(control power undervoltage protection) setting. ● Control power voltage detection circuit of the drive is abnormal.	input voltage, replace the drive.
Er17-0	Drive overload fault (for 7.5kW and higher models)	● The drive outputs excessive short-term current. ● Incorrect motor phase sequence, incorrect encoder initial angle, or incorrect motor parameter. ● The drive frequently runs in a low-frequency, high-torque state, causing stalling or excessive load, with the motor brake not released. ● Drive or motor damage.	● Check whether the load is abnormal. ● Check whether the motor's UVW wiring is correct, any phase loss has occurred, the encoder initial angle is accurate, and the motor brake is functioning. ● Check whether the drive matches the motor and actual load; consider selecting a higher-level drive. ● Replace the drive or motor.
Er17-1	Drive overload fault 2	● The estimated junction temperature of the drive IGBT exceeds the protection threshold. ● Incorrect motor phase sequence, incorrect encoder initial angle, or incorrect motor parameter. ● The drive frequently runs in a low-frequency, high-torque state, causing stalling or excessive load, with the motor brake not released. ● Abnormal drive temperature caused by high ambient temperature, fan malfunction, or other	● Check whether the load is abnormal. ● Check whether the motor's UVW wiring is correct, any phase loss has occurred, the encoder initial angle is accurate, and the motor brake is functioning. ● Check whether the drive matches the motor and actual load; consider selecting a higher-level drive. ● Replace the drive or motor.

Fault code	Name	Cause	Countermeasure
		factors. ● Drive or motor damage.	
Er18-0	Motor overload fault	● The motor load ratio exceeds the value of P4.38. ● Incorrect motor phase sequence, incorrect encoder initial angle, or incorrect motor parameter. ● The drive frequently runs in a low-frequency, high-torque state, causing stalling or excessive load, with the motor brake not released. ● Drive or motor damage.	● Check whether the load is abnormal. ● Check whether the motor's UVW wiring is correct, any phase loss has occurred, the encoder initial angle is accurate, and the motor brake is functioning. ● Check whether the drive matches the motor and actual load; consider selecting a higher-level drive. ● Replace the drive or motor.
Er18-1	Motor overtemperature fault	● The motor temperature sensor is damaged or has a loose connection. ● Incorrect parameter settings related to motor temperature sampling. ● Internal motor temperature sampling circuit of the drive is abnormal. ● Abnormal motor temperature caused by high ambient temperature, motor fan malfunction, excessive load, or other factors.	● Check the motor temperature sensor and its wiring. ● Replace the drive or motor.
Er18-2	Motor three-phase loss fault	● Any two phases or three phases of the motor power cable are not reliably connected to the drive, or the inside of the motor has been damaged.	● Check whether the motor power cable is broken or disconnected. ● Check whether the power cable terminal and the drive are plugged tightly. ● Check whether the power

Fault code	Name	Cause	Countermeasure
			cable terminal and the power cable are connected reliably. ● Check whether the motor is damaged. ● Check whether the drive U, V, and W outputs are normal.
Er18-4	Motor U-phase loss fault	● U phase of the motor power cable are not reliably connected to the drive, or the inside of the motor has been damaged. ● The detection time for motor phase loss is set too short.	● Check whether the motor power cable is broken or disconnected. ● Check whether the power cable terminal and the drive are plugged tightly. ● Check whether the power cable terminal and the power cable are connected reliably. ● Check whether the motor is damaged. ● Ensure that the wiring and equipment are normal. Then disable the function by setting the motor phase loss detection time parameter P4.77 to 0.
Er18-5	Motor V-phase loss fault	● V phase of the motor power cable are not reliably connected to the drive, or the inside of the motor has been damaged. ● The detection time for motor phase loss is set too short.	● Check whether the motor power cable is broken or disconnected. ● Check whether the power cable terminal and the drive are plugged tightly. ● Check whether the power cable terminal and the power cable are connected reliably. ● Check whether the motor is damaged.

Fault code	Name	Cause	Countermeasure
			● Ensure that the wiring and equipment are normal. Then disable the function by setting the motor phase loss detection time parameter P4.77 to 0.
Er18-6	Motor W-phase loss fault	● W phase of the motor power cable are not reliably connected to the drive, or the inside of the motor has been damaged. ● The detection time for motor phase loss is set too short.	● Check whether the motor power cable is broken or disconnected. ● Check whether the power cable terminal and the drive are plugged tightly. ● Check whether the power cable terminal and the power cable are connected reliably. ● Check whether the motor is damaged. ● Ensure that the wiring and equipment are normal. Then disable the function by setting the motor phase loss detection time parameter P4.77 to 0.
Er18-7	Motor temperature detection disconnection fault	● The motor temperature sensor is damaged or has a loose connection. ● The wiring for the motor temperature detection is disconnected. ● Internal motor temperature sampling circuit of the drive is abnormal.	● Check the motor temperature sensor and its wiring. ● Replace the drive or motor.
Er19-0	Speed fault– Overspeed fault	● The motor UVW wiring phase sequence is incorrect. ● The overspeed threshold parameter P4.32 is set improperly.	● Check whether the motor UVW wiring phase sequence is correct. ● Set the overspeed threshold reasonably based on actual

Fault code	Name	Cause	Countermeasure
		● The electronic gear ratio parameters are set improperly. ● The motor speed overshoot is too large. ● The encoder feedback signal is interfered.	needs. It is recommended to set P4.32 (Overspeed threshold) to 1.2 times P4.31 (Max. speed limit). ● Check the electronic gear ratio parameter settings. ● Check the motor speed loop control parameter settings. ● Check whether the motor encoder is wired properly.
Er19-1	Speed fault–FWD overspeed fault	● The forward speed limit parameter P4.40 is set improperly. ● See the cause of Er19-0.	● Check the setting of the forward speed limit parameter P4.40. ● See the handling solution of Er19-0.
Er19-2	Speed fault–REV overspeed fault	● The speed feedback exceeds P4.41 for more than 20 ms. ● P4.41 (Reverse speed limit) is set improperly. ● See the cause of Er19-0.	● Check the setting of the reverse speed limit parameter P4.41. ● See the handling solution of Er19-0.
Er19-3	Speed fault–Incorrect overspeed parameter setting	● The forward speed limit parameter P4.40 is equal to or less than 0. ● The reverse speed limit parameter P4.41 is equal to or greater than 0.	● Ensure that the forward speed limit parameter P4.40 is greater than 0. ● Ensure that the reverse speed limit parameter P4.41 is less than 0.
Er19-4	Overspeed fault–Out-of-control fault	● The motor UVW wiring phase sequence is incorrect. ● Encoder feedback data is subject to interference. ● The machine rigidity parameter P1.03 is set too high. ● The encoder offset angle parameter P8.19 is set incorrectly.	● Check whether the motor UVW wiring phase sequence is correct. ● Check whether the motor encoder is wired properly. ● Reduce the setting of the machine rigidity parameter P1.03. ● Set P4.96 to perform the encoder initial angle test again.
Er20-0	Speed	● The motor UVW wiring	● Check whether the motor

Fault code	Name	Cause	Countermeasure
	out-of-tolerance fault	phase sequence is incorrect. ● The motor load is too heavy, which causes motor stalling. ● The drive force is insufficient, which causes motor stalling. ● The setting of the speed deviation setting parameter P4.39 is too low. ● Incorrect motor model selection. ● The setting of the machine rigidity parameter P1.03 is improper. ● The acceleration of the speed reference is too high.	UVW wiring phase sequence is correct. ● Check whether the conveyor belt or chain is too tight or the workbench reaches the boundary or encounters obstacles. ● Ensure that the drive is intact and undamaged, and the servo system model is correct. ● Increase the setting of the speed deviation setting parameter P4.39. ● Select a motor with higher rated rotation speed. ● Check whether the machine rigidity setting parameter P1.03 is set properly. ● Increase ACC/DEC time.
Er21-0	Position overtravel - FWD overtravel	● Abnormal forward overtravel signal. ● For motor travel, the value of P0.35 (Accumulated feedback pulses) exceeds the value of P0.35 (Software limit in forward position control).	● Check whether the forward overtravel signal is correct. ● Check whether the value of P0.35 (Software limit in forward position control) is proper.
Er21-1	Position overtravel - REV overtravel	● Abnormal reverse overtravel signal. ● For motor travel, the value of R0.02 (Accumulated feedback pulses) exceeds the value of P0.36 (Software limit in reverse position control).	● Check whether the reverse overtravel signal is correct. ● Check whether the value of P0.36 (Software limit in reverse position control) is proper.
Er22-0	Position out-of-tolerance	● Servo control parameters are set improperly.	● Perform parameter autotuning or manually

Fault code	Name	Cause	Countermeasure
	fault	● The motor load is too heavy, which causes motor stalling. ● Pulse input frequency is too high, exceeding the max. motor speed. ● P4.33 (Pulse threshold of position deviation) is too small. ● Encoder feedback data is subject to interference. ● The step variable in the position command input exceeds the setting of P4.33 (Pulse threshold of position deviation).	adjust position loop gain, speed loop gain, and inertia ratio. ● Check whether the conveyor belt or chain is too tight or the workbench reaches the boundary or encounters obstacles. ● Adjust electronic gear ratio parameters. ● Increase the value of P4.33 (Pulse threshold of position deviation). ● Check whether the motor encoder is wired properly. ● Decrease the variation of position command input.
Er22-1	Hybrid control deviation too large	● The motor UVW wiring phase sequence is incorrect. ● Interference in grating encoder feedback data. ● Improper settings of P4.60 (Frequency-division numerator of external linear encoder), P4.61 (Frequency-division denominator of external linear encoder), and P4.62 (Direction reversal of external linear encoder). ● The machine rigidity parameter P1.03 is set too small. ● Encoder feedback data is subject to interference. ● Transmission mechanism is slipping or jammed. ● The setting of P4.64 (Hybrid	● Check whether the motor UVW wiring phase sequence is correct. ● Ensure the grating ruler and drive are connected properly. ● Check the settings of P4.60 (Frequency-division numerator of external linear encoder), P4.61 (Frequency-division denominator of external linear encoder), and P4.62 (Direction reversal of external linear encoder). ● Increase the setting of P1.03 (Machine rigidity). ● Check whether the motor encoder is wired properly. ● Check whether the conveyor belt or chain is too

Fault code	Name	Cause	Countermeasure
		control deviation limit) is too small.	tight or the workbench reaches the boundary or encounters obstacles. ● Increase the setting of P4.64 (Hybrid control deviation limit).
Er22-2	Position increment overflow fault	● The step change in the position command input is too large. ● The electronic gear ratio is set improperly.	● Reduce the step change in the position command input. ● Modify the electronic gear ratio to a proper setting.
Er23-0	Drive overtemperature fault	● The ambient temperature of the drive exceeds the specified temperature. ● Abnormal drive temperature caused by high ambient temperature, fan malfunction, or other factors. ● The drive is overloaded. ● The drive module model is set incorrectly.	● Reduce the ambient temperature and improve the ventilation condition. ● Replace the servo system with a new one with greater power. ● Increase the ACC/DEC time and reduce the load. ● Check whether the drive model and module model parameters are correct.
Er24-0	Communication fault-PWK parameter ID error	● The PWK parameter ID is incorrect.	● View the manual and ensure that the PWK parameter ID is the same as the corresponding parameter ID.
Er24-1	Communication fault-PWK parameter out-of-range	● The PWK parameter value is out of the allowed range.	● View the manual and ensure that the setting value of PWK parameter is within the allowed range of the corresponding parameter.
Er24-2	Communication fault-Read-only PWK parameter	● An attempt was made to write to read-only parameters in PWK.	● View the manual and ensure that the operation parameter is readable and writable.
Er24-3	Communication fault-PZD setting	● The parameter ID selected for PZD configuration is	● View the manual and ensure that the PZD configuration

Fault code	Name	Cause	Countermeasure
	parameter does not exist	incorrect.	parameter ID is the same as the corresponding parameter ID.
Er24-4	Communication fault-PZD setting parameter property does not match	● A parameter that does not take effect immediately has been selected for PZD configuration.	● View the manual and ensure that the PZD configuration parameter takes effect immediately.
Er25-3	Application fault — Phase sequence detection timeout / Phase sequence detection failure	● The motor is stalled or has excessive inertia. ● Phase loss in power lines, affecting correct phase sequence detection.	● Check whether the motor shaft can rotate freely or the load is heavy, and carry out the detection after repower-on. ● Check the power line wiring for phase loss. If phase loss is found, repair the power lines promptly.
Er25-4	Application fault– Encoder offset angle test timeout	● An exception occurred in the encoder offset angle test. ● There is great fluctuation in current feedback in the encoder offset angle test.	● Ensure the motor shaft can rotate freely and then carry out the test after repower-on. ● Reduce the setting of P4.53 and then carry out the test after repower-on.
Er25-5	Application fault– Encoder offset angle test failed	● The motor Z signal or Hall signal is not found. ● The motor Z signal or Hall signal is abnormal. ● Motor load is too heavy. ● Motor phase loss.	● Check whether R0.14 (Motor Z signal) and R2.50 (Hall signal) are normal. ● Ensure the motor shaft can rotate freely and then carry out the test after repower-on. ● Check the motor UVW wiring.
Er25-6	Application fault– Homing offside	● The system encountered the limit switch or software limit during the homing process.	● Modify P5.10 (Homing mode) to avoid exceeding the limit switch or software limit during homing. Re-power on the system and try again.

Fault code	Name	Cause	Countermeasure
			● The home switch or motor Z signal position exceeds the limit. Adjust the position of the home switch or motor Z signal. Re-power on the system and try again.
Er25-7	Application fault– Inertia identifying failed	● During inertia identifying, the motor stops rotating with vibration of longer than 4.375s. ● The actual ACC time for inertia identifying is too short. ● The inertia identifying speed is lower than 150r/min.	● Improve the mechanical rigidity properly. ● Increase the setting of P1.07. ● Increase the setting of P1.06.
Er25-8	Application fault — Magnetic pole detection failure	● The actual phase sequence of the power lines does not match the configured phase sequence. ● The incremental encoder is subject to interference. ● P6.53 (Magnetic pole detection inertia ratio) is set improperly. ● Pole detection parameters are set improperly. ● External force or overload occurs in the magnetic pole detection.	● Check whether the power line phase sequence is correct. ● Check whether the encoder cable is properly grounded and whether a ferrite core is installed on the power cable. ● Check whether P6.53 (Magnetic pole detection inertia ratio) is set properly. ● Check whether the pole detection data settings are correct or within parameter setting limits. ● Check whether external force occurs in the motor running.
Er25-9	Application fault– Overtravel/ overspeed in confirmation of magnetic pole	● The actual phase sequence of the power lines does not match the configured phase sequence. ● The incremental encoder is	● Check whether the power line phase sequence is correct. ● Check whether the encoder cable is properly grounded

Fault code	Name	Cause	Countermeasure
	detection	subject to interference.	and whether a ferrite core is installed on the power cable.
Er25-a	Application fault–Out-of-range in magnetic pole detection	● The setting of P6.54 or P6.55 (about pole detection speed command) is too high. ● The setting of P6.60 or P6.61 (about magnetic pole detection movable range) is too small.	● Adjust the setting of P6.54 or P6.55 (about pole detection speed command). ● Adjust the setting of P6.60 or P6.61 (about magnetic pole detection movable range).
Er25-b	Application fault–Short-circuit detection fault 1	● P9.50 (Drive type) is set incorrectly. ● At least one lower arm IGBT in the U, V, or W phase is short-circuited due to breakdown. ● When only control power is applied, the braking IGBT may experience breakdown-induced short circuit. ● Exception in the current sensor channel.	● Check whether P9.50 (Drive type) is set correctly. ● Check whether the U, V, W outputs of the drive are short-circuited to the bus positive or negative terminal. ● Contact the manufacturer or replace the drive.
Er25-c	Application fault–Short-circuit detection fault 2	● V-phase lower arm cannot be turned on; the V-phase lower-arm IGBT is open or the associated drive circuit is abnormal. ● Exception in the V-phase current sensor channel. ● One or more of the U, V, W phase upper-arm IGBTs have been short-circuited due to breakdown, or the associated drive circuits are faulty, causing the upper-arm IGBT to remain continuously on.	● Check whether the U, V, W outputs (including the drive itself, power cables, and internal motor windings) are shorted to ground. ● Check whether the U, V, W outputs of the drive are short-circuited to the bus positive or negative terminal. ● Contact the manufacturer or replace the drive.

Fault code	Name	Cause	Countermeasure
		● One or more of the U, V, W phases are short-circuited to PE (ground).	
Er25-d	Application fault–Short-circuit detection fault 3	● One or more of the U, V, W phase lower-arm IGBTs have been short-circuited due to breakdown, or the associated drive circuits are faulty, causing the lower-arm IGBT to remain continuously on.	● Contact the manufacturer or replace the drive.
Er25-e	Application fault–Short-circuit detection fault 4	● W-phase lower arm cannot be turned on; the W-phase lower-arm IGBT is open or the associated drive circuit is abnormal. ● Exception in the W-phase current sensor channel. ● One or more of the U, V, W phase upper-arm IGBTs have been short-circuited due to breakdown, or the associated drive circuits are faulty, causing the upper-arm IGBT to remain continuously on. ● One or more of the U, V, W phases are short-circuited to PE (ground).	● Check whether the U, V, W outputs (including the drive itself, power cables, and internal motor windings) are short-circuited to the ground. ● Check whether one or more of the U, V, W phases of the drive have been short-circuited to the bus positive or negative terminal due to breakdown. ● Check whether the U, V, W outputs are short-circuited to PE (ground). ● Contact the manufacturer or replace the drive.
Er25-f	Application fault–Short-circuit detection fault 5	● One or more of the U, V, W phase lower-arm IGBTs have been short-circuited due to breakdown, or the associated drive circuits are faulty, causing the lower-arm IGBT to remain continuously on.	● Contact the manufacturer or replace the drive.

10.2 CANopen communication faults and solutions

Fault code	Name	Cause	Countermeasure
Er22-3	Synchronization signal timeout	● In Interpolation position mode, the time interval between two adjacent synchronization frame signals is more than twice the communication cycle.	● Check communication cables to improve communication reliability. ● Ensure the synchronization frame generation interval of the signal generation source is correct. ● Use appropriate shielded cables to reduce bus interference and check whether the cables are properly connected. ● Avoid unnecessary delays and blocking caused by excessive nodes on the bus.
Er22-4	Full position command buffer	● CANopen PTP position command buffer is full.	● Increase the time interval for sending PTP control position commands.
Er26-0	SDO timeout	● The master does not receive heartbeat packets from a slave within a period of time.	● Check whether cables are loose or damaged to ensure reliable data transmission.
Er26-1	SDO index does not exist	● When the SDO reads or writes parameters, the index does not exist in the object dictionary or is not supported by the servo drive.	● Check the indexes queried by the master and supported by the drive, and modify the EDS file.
Er26-2	SDO sub-index does not exist	● When the SDO reads or writes parameters, the index exists in the object dictionary, but the sub-index does not exist in the dictionary or is not supported by the servo drive.	● Check the indexes and sub-indexes queried by the master and supported by the drive, and modify the EDS file.

Fault code	Name	Cause	Countermeasure
Er26-3	Incorrect SDO data length	● The length information in SDO read or write commands does not match the data length in the servo drive object dictionary.	● Adjust the length in SDO read or write commands according to the data length in the servo drive object dictionary.
Er26-4	SDO data out of range	● The data that the SDO writes exceeds the data range in the servo drive object dictionary.	● Adjust the size of data written by the SDO according to the data range in the object dictionary.
Er26-5	Read-only and non-modifiable	● There are attempts to modify read-only parameters.	● Check whether the parameter to be written is read-only data.
Er26-6	Incorrect PDO mapping length	● The total length of data mapped from the PDO exceeds 64 bits.	● Check the total length of PDO mapping.
Er26-7	PDO mapping data does not exist	● PDO mapping data cannot be found in the object dictionary.	● Check whether the PDO mapping index and sub-index exist in the object dictionary.
Er26-8	PDO is not allowed to be changed during operating	● There are attempts to modify PDO mappings.	● Switch the CANopen state machine to pre-operational and then modify PDO mappings.
Er26-9	PDO mapping is not allowed	● There are attempts to map parameters that disallow mapping to the PDO. ● Mapped objects are read-only and do not support write operations. ● PDO mapping is not allowed when the drive is in Init (Initialization) or OP (Operational) state.	● Check whether there are read-only PDO parameters being mapped into RPDO. ● Switch the CANopen state machine to Pre-OP (Pre-Operational) state before performing PDO mapping.
Er26-a	Synchronization signal is too fast	● In synchronization working mode, the number of frames received by a slave exceeds the range supported by the baud rate.	● Modify the time interval for the master to send data frame or synchronization frame. ● Change the communication baud rate.

Fault code	Name	Cause	Countermeasure
Er26-b	Receiving fault	● CAN communication is offline or the error receiving counter exceeds 128.	● Check communication connection. ● Restart the servo drive. ● Check whether there are faulty nodes on the bus.
Er26-c	Sending fault	● CAN communication is offline or the error sending counter exceeds 128.	● Check communication connection. ● Restart the servo drive. ● Check whether there are faulty nodes on the bus.
Er26-d	Duplicate synchronization signal	● In the case where a slave is configured to generate synchronization signals, external synchronization signals are received. ● Re-configure the synchronization signal generation source.	● Modify configuration so that there is only one synchronization signal generation source in the entire communication network. ● Ensure that the synchronization signal is not configured repeatedly.
Er26-e	Bus load ratio too high	● In asynchronous working mode, the number of frames received by a slave exceeds the range supported by the baud rate.	● Modify the time interval for the master to send data frame. ● Modify the transmission mode of the slave TPDO. ● Change the communication baud rate. ● Optimize the transmission data and reduce the amount of data per frame.
Er26-f	Incorrect parameter modification state	● The SDO attempts to modify parameters in a state that disallows modification.	● Adjust the CANopen state machine to the Pre-OP or OP state and then try to modify parameters.

10.3 EtherCAT communication faults and solutions

Fault code	Name	Cause	Countermeasure
Er24-8	Initialization fault	● The EtherCAT chip is in poor contact. ● The burned ARM firmware does not match the ESC hardware.	● Check whether the burned ARM firmware is correct. ● Contact the manufacturer.
Er24-9	EEPROM error	● There is no data in EtherCAT EEPROM or data reading failed. ● ESI file burning error ● The EEPROM chip is in poor contact.	● Use TwinCAT tool to download xml file to EtherCAT EEPROM. ● Re-burn the correct ESI file. ● Replace the drive.
Er24-a	DC Sync0 signal exception	● DC Sync0 interruption signal is not detected during a period of time under DC sync working mode.	● Check whether interruption causes data loss. ● Check whether EtherCAT master can work properly. ● Check whether the cable connection is proper.
Er24-b	Disconnection fault	● After the drive is enabled, the network cable is not inserted properly, or the EtherCAT master does not run properly. ● The EtherCAT network port does not establish effective communication after the servo drive is enabled.	● Check whether network cable is connected properly, the connection mode of network cable is top-in and bottom-out. ● Check the interference problems. ● Check whether EtherCAT master can work properly.
Er24-c	PDO data loss fault	● No PDO data is received after the drive has been enabled for a period of time. ● Drive hardware problems.	● Check whether EtherCAT master can work properly. ● Check whether interruption causes data loss. ● Replace the drive.
Er24-d	Exit the OP state.	● The servo switches from OP state to other states.	● Check whether there is any abnormal operation that causes an exit from the OP state.

For clearable alarms:	Method 1: After alarm codes are confirmed and the causes are located, for those faults that can be cleared online, if the fault conditions are removed, the faults can be cleared by short connecting the digital input terminal (P3.00–P3.09) with COM+. If the drive still has enabling command input, the drive will not be able to clear the fault automatically. See section 6.2.8 Alarm clearing. **Note:** Before clearing the fault through short-connecting configuration, set P3.00–P3.09 to 0x004 or 0x104. Method 2: For CAN or EtherCAT bus model, the fault can be cleared by writing to the fault bit of the control word 0x6040, or by setting parameter P4.90 to 1. For PN bus models, the fault can be reset through the associated function block or process axis. Method 3: You can clear the fault by setting P4.90 on the LED panel.
For non-clearable alarms:	Non-clearable alarms require the drive to be powered off. After eliminating the cause of the fault, the drive must be powered on again to clear the fault. If the alarm persists after re-powering on, contact our technical support.

Appendix A Parameter list

A.1 Setup parameter list

Applicable mode column:

P: position mode; S: speed mode; T: torque mode.

Function parameter column:

- The function codes with the superscript of "1" indicate that these parameters can be valid only when the system is reset and restarted or repowered after disconnection.
- The function codes with the superscript of "2" indicate that these parameters are valid when the servo drive stops. The modification during operation is invalid.
- The function codes with the superscript of "*" indicate that these parameters are not saved after power off.

A.1.1 Function parameter list

Function code	Name	Unit	Range	Default	Applicable mode
P0 Basic control					
P0.00[1]	Motor model	-	0–9999999	1010104	PST
P0.01[1]	Encoder type	-	1–12	4	PST
P0.02[1]	Forward rotation of motor	-	0–1	0	PST
P0.03[1]	Control mode selection	-	0–9	0	PST
P0.04*	Internal enabling command	-	0–1	0	PST
P0.05	Jogging speed	r/min	0–1000	200	PST
P0.06[1]	Numerator of frequency division output coefficient	-	0–(2^{31}-1)	10000	PST
P0.07[1]	Denominator of frequency division output coefficient	-	1–(2^{31}-1)	131072	PST
P0.08[1]	Reverse of frequency division output	-	0–1	0	PST
P0.09	Torque limit mode setting	-	0–6	1	PS
P0.10	Max. torque limit 1	%	0.0–500.0	300.0	PST

Function code	Name	Unit	Range	Default	Applicable mode
P0.11	Max. torque limit 2	%	0.0–500.0	300.0	PS
P0.13[1]	External braking resistor power	W	0–5000	200	PST
P0.14[1]	Resistance of the external braking resistor	Ω	1–1000	60	PST
P0.15	Default monitoring parameters	-	0–22	0	PST
P0.16	Parameter modification operation locked	-	0–1	0	PST
P0.17	Mode for writing to EEPROM	-	0–1	0	PST
P0.18*	Factory password	-	0–65535	0	PST
P0.19	Main circuit power AC/DC input selection	-	0–1	0	PST
P0.20[1]	Position command selection	-	0–4	0	P
P0.22[1]	Pulses per motor resolution	reference unit	0–(2^{31}-1)	10000	P
P0.23[1]	Pulse input form	-	0–2	0	P
P0.24[1]	Reverse of pulse input direction	-	0–1	0	P
P0.25	Numerator of electronic gear ratio 1	-	0–(2^{31}-1)	0	P
P0.26[2]	Denominator of electronic gear ratio	-	1–(2^{31}-1)	10000	P
P0.27	Numerator of electronic gear ratio 2	-	0–(2^{31}-1)	0	P
P0.28	Numerator of electronic gear ratio 3	-	0–(2^{31}-1)	0	P
P0.29	Numerator of electronic gear ratio 4	-	0–(2^{31}-1)	0	P
P0.33[2]	Smooth filtering of position command	ms	0.0–1000.0	0.0	P
P0.34[2]	FIR filter of position command	ms	0.0–1000.0	0.0	P

Function code	Name	Unit	Range	Default	Applicable mode
P0.35	Software limit in CCW position control	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
P0.36	Software limit in CW position control	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
P0.37	Position command mode	-	0–1	0	P
P0.40	Speed command selection	-	0–5	1	S
P0.41	Speed command direction setting	-	0–1	0	S
P0.42	Analog input 1 gain	[P3.26 unit]/V	10–2000	100	PST
P0.43	Reverse of AI 1	-	0–1	0	PST
P0.45	Dead zone of AI 1	V	0.000–3.000	0.000	PST
P0.46	Internal speed 1/speed limit 1	r/min	-20000–20000	100	ST
P0.47	Internal speed 2/speed limit 2	r/min	-20000–20000	0	ST
P0.48	Internal speed 3/speed limit 3	r/min	-20000–20000	0	ST
P0.49	Internal speed 4/speed limit 4	r/min	-20000–20000	0	ST
P0.50	Internal speed 5	r/min	-20000–20000	0	S
P0.51	Internal speed 6	r/min	-20000–20000	0	S
P0.52	Internal speed 7	r/min	-20000–20000	0	S
P0.53	Internal speed 8	r/min	-20000–20000	0	S
P0.54	ACC time	ms	0–30000	0	S
P0.55	DEC time	ms	0–30000	0	S
P0.56	S-curve ACC time	ms	0–1000	0	S
P0.57	S-curve DEC time	ms	0–1000	0	S
P0.58	Zero speed clamp mode	-	0–3	0	ST
P0.59	Speed threshold of zero speed clamp	r/min	10–20000	30	S
P0.60	Torque command selection	-	0–3	1	T
P0.61	Torque command direction setting	-	0–1	0	T

Function code	Name	Unit	Range	Default	Applicable mode
P0.62	Analog input 2 gain	[P3.27 unit]/V	0–2000	100	PST
P0.63	Reverse of AI 2	-	0–1	0	PST
P0.65	Dead zone of AI 2	V	0.000–3.000	0.000	PST
P0.66	Internal torque command	%	-500.0–500.0	0.0	T
P0.67	Speed limit mode setting	-	0–1	0	T
P0.68	RAMP time of torque command	ms	0–10000	0	T
P0.69	DEC time for quick stop	ms	0–10000	500	PST
P0.70[1]	Absolute encoder mode setting	-	0–1	0	PST
P0.71*	Clear absolute encoder multiturn	-	0–1	0	PST
P0.90	Max. speed limit of control mode switching	r/min	0–1000	100	PST
P0.91	Positioning reference of control mode switching	reference unit	-1–(2^{31}-1)	-1	PST
P0.92	Position mode switching exit mode	-	0–1	0	PST
P1 Autotuning control					
P1.00	Inertia online tuning	-	0–1	0	PST
P1.01	Inertia ratio 1	%	0–10000	250	PST
P1.02	Inertia ratio 2	%	0–10000	250	PST
P1.03	Machine rigidity setting	-	0–31	13	PST
P1.04*	Inertia offline tuning	-	0–1	0	PST
P1.05	Operation mode of inertia identification	-	0–3	0	PST
P1.06	Movable range of inertia identification	r	0.2–20.0	2.0	PST
P1.07	ACC time constant of inertia identification	ms	2–1000	200	PST
P1.08	Speed level of inertia identification	-	0–3	1	PST
P1.09	Valid selection of new	-	0–1	0	PST

Function code	Name	Unit	Range	Default	Applicable mode
	inertia identification				
P1.10	Gain adjustment mode	-	0–5	0	PST
P1.11	Gain fine-tuning mode selection	-	0–1	0	PST
P1.19	Resonance detection sensitivity	%	0.2–100.0	5.0	PST
P1.20	Resonance detection mode	-	0–7	0	PST
P1.21*	Mechanical resonant frequency 1	Hz	0–5000	5000	PST
P1.22*	Mechanical resonant frequency 2	Hz	0–5000	5000	PST
P1.23	Frequency of notch filter 1	Hz	50–5000	5000	PST
P1.24	Q factor of notch filter 1	-	0.50–16.00	1.00	PST
P1.25	Depth of notch filter 1	%	0–100	0	PST
P1.26	Frequency of notch filter 2	Hz	50–5000	5000	PST
P1.27	Q factor of notch filter 2	-	0.50–16.00	1.00	PST
P1.28	Depth of notch filter 2	%	0–100	0	PST
P1.29	Frequency of notch filter 3	Hz	50–5000	5000	PST
P1.30	Q factor of notch filter 3	-	0.50–16.00	1.00	PST
P1.31	Depth of notch filter 3	%	0–100	0	PST
P1.32	Frequency of notch filter 4	Hz	50–5000	5000	PST
P1.33	Q factor of notch filter 4	-	0.50–16.00	1.00	PST
P1.34	Depth of notch filter 4	%	0–100	0	PST
P1.35	Vibration control mode in position command	-	0–2	0	P
P1.36	Vibration control frequency 1	Hz	0.0–200.0	0.0	P
P1.37	Coefficient of vibration	-	0.00–1.00	1.00	P

Function code	Name	Unit	Range	Default	Applicable mode
	control filter 1				
P1.38	Vibration control frequency 2	Hz	0.0–200.0	0.0	P
P1.39	Coefficient of vibration control filter 2	-	0.00–1.00	1.00	P
P1.50	Autotuning switch	-	0–1	0	P
P1.51	Autotuning mode	-	0–1	0	P
P1.52	Rigidity level of the autotuning mechanism	-	0–2	1	P
P1.53	Autotuning target tuning time	ms	0–10000	0	P
P1.54	Autotuning target overshoot	pulse	0–30000	0	P
P1.55	Autotuning ACC/DEC time	ms	0–10000	0	P
P1.56	Autotuning running direction	-	0–3	2	P
P1.57	Autotuning running cycles	-	0.1–100	2	P
P1.58	Autotuning running speed	rpm	1–5000	500	P
P1.59	Autotuning running wait time	ms	100–10000	300	P
P2 Motor control					
P2.00	1st speed gain	Hz	0.0–3276.7	27.0	PST
P2.01	1st speed integral time constant	ms	0.1–1000.0	21.0	PST
P2.02	1st position gain	1/s	0.0–3276.7	48.0	P
P2.03	1st speed detection filter	Hz	100–5000	5000	PST
P2.04	1st torque filter	ms	0.00–25.00	0.84	PST
P2.05	2nd speed gain	Hz	0.0–3276.7	27.0	PST
P2.06	2nd speed integral time constant	ms	0.1–1000.0	1000.0	PST
P2.07	2nd position gain	1/s	0.0–3276.7	57.0	P
P2.08	2nd speed detection filter	Hz	100–5000	5000	PST

Function code	Name	Unit	Range	Default	Applicable mode
P2.09	2nd torque filter	ms	0.00–25.00	0.84	PST
P2.10	Speed feed-forward gain	%	0.0–100.0	0.0	P
P2.11	Speed feed-forward filter time	ms	0.00–64.00	0.50	P
P2.12	Torque feed-forward gain	%	0.0–100.0	0.0	PS
P2.13	Torque feed-forward filter time	ms	0.00–64.00	0.00	PS
P2.14	1st IPPI coefficient	%	0–1000	100	PST
P2.15	2nd IPPI coefficient	%	0–1000	100	PST
P2.20	2nd gain setting	-	0–1	1	PST
P2.22	Switching trigger in position control	-	0–9	0	P
P2.23	Switching delay in position control	ms	0–10000	0	P
P2.24	Switching level in position control	-	0–20000	0	P
P2.25	Switching delay in position control	-	0–20000	0	P
P2.26	Position gain switching time	ms	0–10000	0	P
P2.27	Switching mode of speed control	-	0–5	0	S
P2.28	Switching delay in position control	ms	0–10000	0	S
P2.29	Switching level of speed control	-	0–20000	0	S
P2.30	Switching delay in speed control	-	0–20000	0	S
P2.31	Switching mode of torque control	-	0–3	0	T
P2.32	Switching delay in torque control	ms	0–10000	0	T
P2.33	Switching level of torque control	-	0–20000	0	T
P2.34	Switching delay in	-	0–20000	0	T

Function code	Name	Unit	Range	Default	Applicable mode
	torque control				
P2.41[2]	Disturbance observer	-	0–2	0	PST
P2.42	Disturbance observer compensation gain	%	0–100	0	PS
P2.43	Disturbance observer cut-off frequency	Hz	0–3000	200	PS
P2.44	Torque command offset	%	-500.0–500.0	0.0	PST
P2.50[2]	Fully-closed loop vibration suppressor	-	0–2	0	PS
P2.51	Fully-closed loop vibration suppressor cut-off frequency	Hz	1.0–500.0	100.0	PS
P2.52	Fully-closed loop vibration suppressor compensation gain	%	0–1000	0	PS
P2.53	Medium frequency vibration control switch	-	0–1	0	PST
P2.54	Medium frequency vibration control frequency	Hz	1–2000	100	PST
P2.55	Inertia fine tuning of medium frequency vibration control	%	1–1000	100	PST
P2.56	Attenuation gain of medium frequency vibration control	%	0–1000	0	PST
P2.57	Fine tuning of medium frequency vibration control filter time 1	0.01ms	-10–10	0	PST
P2.58	Fine tuning of medium frequency vibration control filter time 2	0.01ms	-10–10	0	PST
P2.60[2]	Speed observer	-	0–2	0	PST
P2.61	Speed observer gain	Hz	1–1000	100	PST
P2.64	Pole pairs for cogging	-	0–64	3	PST

Function code	Name	Unit	Range	Default	Applicable mode
	torque autotuning				
P2.65	Validity of cogging torque compensation	-	0–1	0	PST
P2.66	Effective starting speed for cogging torque compensation	rpm	0–1000	0	PST
P2.67	Cogging torque autotuning	-	0–4	0	PST
P2.68	Cogging torque autotuning speed	rpm	0–100	50	PST
P2.69	Viscous friction compensation gain	%	0–100	0	PST
P2.70	Friction compensation cut-off speed	r/min	0–1000	20	PST
P2.71	Forward torque coefficient of friction compensation	%/(10r/min)	0.0–100.0	0.0	PST
P2.72	Reverse torque coefficient of friction compensation	%/(10r/min)	-100.0–0.0	0.0	PST
P2.73	Friction compensation	-	0–1	0	PST
P2.85	Torque feed-forward selection	-	0–1	0	PS
P2.86	Flux-weakening control switch	-	0–3	0	PST
P2.87	Voltage utilization in flux-weakening control	%	1–99	90	PST
P2.88	Open-loop flux-weakening bandwidth	%	1–500	50	PST
P2.89	Closed-loop flux-weakening bandwidth	%	0.01–100	2.00	PST
P2.90	Max. flux-weakening current in closed-loop flux-weakening control	%	1–100	90	PST
P2.91	Unbiased control gain	1/s	1–2000	300	PST

Function code	Name	Unit	Range	Default	Applicable mode
P2.92	Unbiased control decay coefficient	%	50–200	100	PST
P3 I/O management					
P3.00[1]	Input configuration of digital 1	-	0x000–0x136	0x003	PST
P3.01[1]	Input configuration of digital 2	-	0x000–0x136	0x00D	PST
P3.02[1]	Input configuration of digital 3	-	0x000–0x136	0x004	PST
P3.03[1]	Input configuration of digital 4	-	0x000–0x136	0x016	PST
P3.04[1]	Input configuration of digital 5	-	0x000–0x136	0x019	PST
P3.05[1]	Input configuration of digital 6	-	0x000–0x136	0x01A	PST
P3.06[1]	Input configuration of digital 7	-	0x000–0x136	0x001	PST
P3.07[1]	Input configuration of digital 8	-	0x000–0x136	0x002	PST
P3.08[1]	Input configuration of digital 9	-	0x000–0x136	0x007	PST
P3.08[1]	Input configuration of digital 10	-	0x000–0x136	0x008	PST
P3.10[1]	Output configuration of digital 1	-	0x000–0x11F	0x001	PST
P3.11[1]	Output configuration of digital 2	-	0x000–0x11F	0x003	PST
P3.12[1]	Output configuration of digital 3	-	0x000–0x11F	0x007	PST
P3.13[1]	Output configuration of digital 4	-	0x000–0x11F	0x00D	PST
P3.16	Channel 1 DI-captured encoder function configuration	-	0–30A	0	PST
P3.17	Channel 2 DI-captured encoder function configuration	-	0–30A	0	PST

Function code	Name	Unit	Range	Default	Applicable mode
P3.18	Encoder sampling delay for probe capture	ns	-1–30000	0	PST
P3.20	Offset of analog input 1	V	-10.000–10.000	0.000	PST
P3.21	Filter of AI 1	ms	0.0–1000.0	1.0	PST
P3.22	OV protection threshold of AI 1	V	0.000–10.000	0.000	PST
P3.23	Offset of analog input 2	V	-10.000–10.000	0.000	PST
P3.24	Filter of AI 2	ms	0.0–1000.0	0.0	PST
P3.25	OV protection threshold of AI 2	V	0.000–10.000	0.000	PST
P3.26[1]	Function of AI 1	-	0–7	0	PST
P3.27[1]	Function of AI 2	-	0–7	3	PST
P3.28	Analog speed compensation gain	%	0.0–100.0	0.0	P
P3.29	Analog torque compensation gain	%	0.0–100.0	0.0	PST
P3.30[1]	Function of analog output 1	-	0–19	0	PST
P3.31	Voltage gain of analog output 1	[P3.30 unit]/V	1–214748364	1	PST
P3.32[1]	Function of analog output 2	-	0–19	0	PST
P3.33	Voltage gain of analog output 2	[P3.32 unit]/V	1–214748364	1	PST
P3.34	Offset voltage of analog output 1	V	-10.000–10.000	0.000	PST
P3.35	Offset voltage of analog output 2	V	-10.000–10.000	0.000	PST
P3.36[1]	Analog output monitoring setting	-	0–2	0	PST
P3.40[1]	Disable travel limit switch	-	0–2	1	PST
P3.41[1]	Disable emergency stop switch	-	0–1	1	PST
P3.43[1]	Digital input filter	0.125ms	1–800	1	PST
P3.44	Command pulse input invalid setting disabled	-	0–1	0	P

Function code	Name	Unit	Range	Default	Applicable mode
P3.45[1]	Residual pulse clearing mode	-	0–1	1	P
P3.50	Range of position arrival	reference unit	0–2^{18}	100	P
P3.51	Output mode of position arrival	-	0–4	0	P
P3.52	Hold time of position arrival output terminal	ms	0–30000	0	P
P3.53	Speed consistency range	r/min	10–20000	50	PST
P3.54	Speed reaching range	r/min	10–20000	1000	PST
P3.55	Zero speed range	r/min	10–20000	50	PST
P3.56	Servo lock time after braking	ms	0–1000	50	PST
P3.57	Electromagnetic brake closing delay	ms	0–30000	500	PST
P3.58[1]	Motor speed threshold at brake release	r/min	0–1000	30	PST
P3.59	Torque reaching range	%	5.0–300.0	50.0	T
P3.77	Analog input deadzone mode	-	0–1	0	PST
P3.90	Pulse input filter	-	0–7	2	PST
P3.92	Pulse feedback filter	-	0–7	2	PST
P4 Extension and application					
P4.01[1]	485 local communication address	-	1–255	1	PST
P4.02[1]	CAN communication baud rate	-	0–5	1	PST
P4.03[1]	485 communication baud rate	-	0–3	1	PST
P4.04[1]	485 communication parity mode	-	0–5	0	PST
P4.05[1]	CAN communication node	-	1–127	1	PST
P4.06	485 communication fault clearing mode	-	0–1	1	PST

Function code	Name	Unit	Range	Default	Applicable mode
P4.07[1]	EtherCAT synchronous cycle	-	0–3	2	PST
P4.08[1]	EtherCAT synchronous type	-	0–2	0	PST
P4.09[1]	EtherCAT fault detection time	ms	0–1000	100	PST
P4.10[1]	Upper computer type	-	0–1	0	PST
P4.11*	Bus servo enabling	-	0–1	0	PST
P4.12*	Bus position command	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
P4.13*	Bus speed command	r/min	-20000–20000	0	S
P4.14*	Bus torque command	%	-500.0–500.0	0.0	T
P4.15*	Control mode switching command	-	0–1	0	PST
P4.16*	Gain switching command	-	0–1	0	PST
P4.17*	Electronic gear ratio switching command	-	0–3	0	P
P4.18*	Inertia ratio switching command	-	0–1	0	PST
P4.19*	Zero speed clamp command	-	0–1	0	ST
P4.20*	Residual pulses clearing	-	0–1	0	P
P4.21*	Torque limit switching command	-	0–1	0	PST
P4.22*	External fault command	-	0–1	0	PST
P4.23*	Emergency stop command	-	0–1	0	PST
P4.24*	Input command of vibration control switching	-	0–1	0	P
P4.25	EtherCAT control unit type	-	0–3	1	PS
P4.26	EtherCAT PDO input offset	125μs	0–63	2	PS
P4.27	Compensation times of	-	0–10	0	PS

Function code	Name	Unit	Range	Default	Applicable mode
	EtherCAT position interpolation mode				
P4.281	EtherCAT digital output control enabling	-	0–1	0	PS
P4.291	Check the EtherCAT synchronization cycle settings	-	0–1	0	PS
P4.30	Stop mode	-	0–3	0	PST
P4.31	Max. speed limit	r/min	0–20000	5000	PST
P4.32	Overspeed threshold	r/min	0–20000	6000	PST
P4.33	Pulse threshold of position deviation	reference unit	$0–2^{27}$	100000	P
P4.34[1]	Brake overload detection selection	-	0–2	0	PST
P4.36[1]	Main power UV protection	-	0–1	1	PST
P4.37	Main power UV detection time	ms	70–2000	70	PST
P4.39	Speed deviation setting	r/min	0–20000	0	PS
P4.40	Forward speed limit	r/min	0–20000	20000	PST
P4.41	Reverse speed limit	r/min	-20000–0	-20000	PST
P4.42	Internal speed with high resolution	r/min	-20000.0–20000.0	0.0	PST
P4.43	EtherCAT-related control	-	0–3FFF	2183	PST
P4.44	Out-of-control speed threshold	r/min	0–20000	50	PST
P4.45	Fault mask bit setting	-	0–7FFF	0	PST
P4.46	Motor temperature sampling resistor selection	-	0–1	0	PST
P4.47	Out-of-control speed detection filter time	ms	0–100	2	PST
P4.48	Out-of-control current threshold	%	0–400	100	PST
P4.49	Out-of-control	ms	10–1000	30	PST

Function code	Name	Unit	Range	Default	Applicable mode
	detection time				
P4.50[1]	Encoder phase-Z offset	pulse	0–(2^{20}-1)	0	PST
P4.51	Torque limit switching time 1	ms/100%	0–4000	0	PS
P4.52	Torque limit switching time 2	ms/100%	0–4000	0	PS
P4.53	Current loop response adjustment	%	10.0–200.0	100.0	PST
P4.54[1]	Delay after power-on initialization	ms	0–200000	0	PST
P4.60[1]	Frequency-division numerator of external linear encoder	-	1–(2^{31}-1)	10000	P
P4.61[1]	Frequency-division denominator of external linear encoder	-	1–(2^{31}-1)	10000	P
P4.62[1]	Direction reversal of external linear encoder	-	0–1	0	P
P4.64[1]	Hybrid control deviation limit	reference unit	0–2^{27}	160000	P
P4.65[1]	Threshold for hybrid-control deviation clearing	r	0–100	0	P
P4.67[1]	External linear encoder pulse output mode of phase AB	-	0–1	0	P
P4.68[1]	External linear encoder (or encoder 2) resolution	pulse	1–(2^{31}-1)	10000	P
P4.69[1]	Frequency division output source	-	0–4	0	PST
P4.70[1]	External linear encoder (2nd encoder) Z signal type	-	0–3	0	PST
P4.71[1]	Type of 2nd encoder		1–12	2	PST
P4.72[1]	Cascading mode of 2nd encoder		0–4	0	PST

Function code	Name	Unit	Range	Default	Applicable mode
P4.87	CANopen communication cycle	μs	0–(2^{31}-1)	0	PST
P4.88	CANopen heartbeat cycle	ms	0–32767	1000	PST
P4.89	Automatic stop at CANopen disconnection	-	0–1	0	PST
P4.90*	Fault recovery	-	0–1	0	PST
P4.91*	Parameter saving	-	0–1	0	PST
P4.92*	Restore to default values	-	0–1	0	PST
P4.93*	Read fault records	-	0–1	0	PST
P4.94*	Clear fault records	-	0–1	0	PST
P4.95*	Group number of the fault record	-	0–9	0	PST
P4.96*	Reserved	-	-	-	PST
P4.97*	EEPROM operation of communication encoder	-	0–1	0	PST
P4.98*	EEPROM data fault block of communication encoder	-	0–1	1	PST
P5 Program jog, homing, and PTP control					
P5.00	Jog mode selection	-	0–6	0	P
P5.01	JOG movement amount	reference unit	1–2^{30}	50000	P
P5.02	Jogging speed setting	r/min	1–5000	500	P
P5.03	Jogging ACC/DEC time	ms	2–10000	100	P
P5.04	Jogging wait time	ms	0–10000	100	P
P5.05	Jogging cycle times	-	0–10000	1	P
P5.10[2]	Homing mode	-	0–128	0	P
P5.11	Homing upon power-on	-	0–1	0	P
P5.12	High speed at homing step 1	r/min	0–2000	100	P
P5.13	Low speed at homing	r/min	0–60	20	P

Function code	Name	Unit	Range	Default	Applicable mode
	step 2				
P5.14	Home setting	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
P5.15*	Homing trigger command	-	0–1	0	P
P5.16	Homing associated action	-	0–3	0	P
P5.17	Target speed after homing	r/min	1–5000	100	P
P5.18	ACC/DEC time for target speed after homing	ms	0–32767	300	P
P5.19	Target position after homing	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
P5.20*	PTP trigger signal	-	-1–2048	-1	P
P5.21	Target speed 00	r/min	0–6000	20	P
P5.22	Target speed 01	r/min	0–6000	50	P
P5.23	Target speed 02	r/min	0–6000	100	P
P5.24	Target speed 03	r/min	0–6000	200	P
P5.25	Target speed 04	r/min	0–6000	300	P
P5.26	Target speed 05	r/min	0–6000	500	P
P5.27	Target speed 06	r/min	0–6000	600	P
P5.28	Target speed 07	r/min	0–6000	800	P
P5.29	Target speed 08	r/min	0–6000	1000	P
P5.30	Target speed 09	r/min	0–6000	1300	P
P5.31	Target speed 10	r/min	0–6000	1500	P
P5.32	Target speed 11	r/min	0–6000	1800	P
P5.33	Target speed 12	r/min	0–6000	2000	P
P5.34	Target speed 13	r/min	0–6000	2300	P
P5.35	Target speed 14	r/min	0–6000	2500	P
P5.36	Target speed 15	r/min	0–6000	3000	P
P5.37	ACC/DEC time 00	ms	0–32767	200	P
P5.38	ACC/DEC time 01	ms	0–32767	300	P
P5.39	ACC/DEC time 02	ms	0–32767	500	P
P5.40	ACC/DEC time 03	ms	0–32767	600	P
P5.41	ACC/DEC time 04	ms	0–32767	800	P
P5.42	ACC/DEC time 05	ms	0–32767	900	P

Function code	Name	Unit	Range	Default	Applicable mode
P5.43	ACC/DEC time 06	ms	0–32767	1000	P
P5.44	ACC/DEC time 07	ms	0–32767	1200	P
P5.45	ACC/DEC time 08	ms	0–32767	1500	P
P5.46	ACC/DEC time 09	ms	0–32767	2000	P
P5.47	ACC/DEC time 10	ms	0–32767	2500	P
P5.48	ACC/DEC time 11	ms	0–32767	3000	P
P5.49	ACC/DEC time 12	ms	0–32767	5000	P
P5.50	ACC/DEC time 13	ms	0–32767	8000	P
P5.51	ACC/DEC time 14	ms	0–32767	50	P
P5.52	ACC/DEC time 15	ms	0–32767	30	P
P5.53	Delay time 00	ms	0–32767	0	P
P5.54	Delay time 01	ms	0–32767	100	P
P5.55	Delay time 02	ms	0–32767	200	P
P5.56	Delay time 03	ms	0–32767	400	P
P5.57	Delay time 04	ms	0–32767	500	P
P5.58	Delay time 05	ms	0–32767	800	P
P5.59	Delay time 06	ms	0–32767	1000	P
P5.60	Delay time 07	ms	0–32767	1500	P
P5.61	Delay time 08	ms	0–32767	2000	P
P5.62	Delay time 09	ms	0–32767	2500	P
P5.63	Delay time 10	ms	0–32767	3000	P
P5.64	Delay time 11	ms	0–32767	3500	P
P5.65	Delay time 12	ms	0–32767	4000	P
P5.66	Delay time 13	ms	0–32767	4500	P
P5.67	Delay time 14	ms	0–32767	5000	P
P5.68	Delay time 15	ms	0–32767	5500	P
P5.69	PTP control buffer switch	-	0–1	0	P
P5.70	Disk single-turn resolution	pulse	$-(2^{31}-1)$–$(2^{31}-1)$	10000	P
P5.71	Disk homing switch	-	0–3	0	P
P5.72	Super multiturn mode	-	0–1	0	P
P5.73	Digital trigger mode for PTP control	-	0–1	0	P
P5.74	Digital output mode for PTP control	-	0–4	0	P

Function code	Name	Unit	Range	Default	Applicable mode
P5.75	PTP interrupt pause enable	-	0–1	0	P
P5.76–P5.99	Positioning compensation value 22–45	-	-2147483.646–2147483.647	0	PST
P6 Application functions					
P6.00	Forward low jogging speed	r/min	0–6000	5	P
P6.01	Reverse low jogging speed	r/min	-6000–0	-5	P
P6.02	Data latching switch	-	0–1	0	P
P6.03	Position latching save mode	-	0–1	0	P
P6.04	Forward high jogging speed	r/min	0–6000	60	P
P6.05	Reverse high jogging speed	r/min	-6000–0	-60	P
P6.06	Enable terminal jogging	-	0–1	1	P
P6.20	Turret function switch	-	0–1	0	P
P6.21	Knives per turret	piece	1–128	16	P
P6.22	Pulses per turret rotation	reference unit	2–(2^{31}-1)	10000	P
P6.23	Turret starting point	reference unit	-(2^{31}-2)–(2^{31}-2)	0	P
P6.47	Magnetic pole detection method selection	-	0–1	0	PST
P6.48	One-key autotuning current setting	%	0–100	0	PST
P6.49	Autotuning with one click	-	0–4	0	PST
P6.50*	Magnetic pole detection startup command	-	0–1	0	PST
P6.51	Magnetic pole detection speed gain	Hz	1–2000	40	PST
P6.52	Speed integral time	ms	0.15–512	30	PST

Function code	Name	Unit	Range	Default	Applicable mode
	constant of magnetic pole detection				
P6.53	Magnetic pole detection inertia ratio	%	0–20000	100	PST
P6.54	Rotary speed command of magnetic pole detection	mm/s	0–1000	50	PST
P6.55	Linear speed command of magnetic pole detection	mm/s	0–100	20	PST
P6.56	ACC/DEC time of magnetic pole detection command	ms	0–100	25	PST
P6.57	Constant speed time of magnetic pole detection speed command	ms	0–300	0	PST
P6.58	Wait time of magnetic pole detection speed command	ms	50–500	100	PST
P6.59	Repetition times of magnetic pole detection	-	0–10	4	PST
P6.60	Rotary movable range of magnetic pole detection	rev	0.001–32.767	0.250	PST
P6.61	Linear movable range of magnetic pole detection	mm	1–32767	10	PST
P6.62	Gain without integral for pole detection	%	0–100	0.30	PST
P6.63	Starting time without integral for pole detection	%	0–100	30	PST
P6.64	Torque in checking process for pole detection	%	0–200	100	PST

Function code	Name	Unit	Range	Default	Applicable mode
P6.65	ACC/DEC time of torque in checking process for pole detection	ms	0–1000	10	PST
P6.66	Constant time of torque in checking process for pole detection	ms	0–3000	1500	PST
P6.67	Allowable error range of magnetic pole detection	deg	0–30	10	PST
P6.68	Retrograde threshold in magnetic pole detection operation	%	0–100	15	PST
P6.69	Retrograde threshold in magnetic pole detection waiting	%	0–100	50	PST
P6.70	Magnetic pole detection overspeed threshold	%	100–500	180	PST
P6.71	Positioning compensation enabling	-	0–1	0	PST
P6.72	Positioning compensation unit	-	0–6	0	PST
P6.73	Starting position of positioning compensation	-	-2147483646–2147483647	0	PST
P6.74	Points of position compensation	-	0–1000	100	PST
P6.75	Starting index bias of positioning compensation	-	0–1000	0	PST
P6.76	Positioning compensation distance	-	0–100000	100	PST
P6.77	Gear ratio numerator of positioning	-	-2147483646–2147483647	1	PST

Function code	Name	Unit	Range	Default	Applicable mode
	compensation				
P6.78	Gear ratio denominator of positioning compensation	-	1–2147483647	1	PST
P6.79–P6.99	Positioning compensation value 1–21	-	-2147483.646–2147483.647	0	PST
PtP0 PTP control					
PtP0.00	Control word of segment 00	-	0–0x7FFFFFFF	0x00000000	P
PtP0.01	Position of segment 00	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.02	Control word of segment 01	-	0–0x7FFFFFFF	0x00000000	P
PtP0.03	Position of segment 01	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.04	Control word of segment 02	-	0–0x7FFFFFFF	0x00000000	P
PtP0.05	Position of segment 02	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.06	Control word of segment 03	-	0–0x7FFFFFFF	0x00000000	P
PtP0.07	Position of segment 03	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.08	Control word of segment 04	-	0–0x7FFFFFFF	0x00000000	P
PtP0.09	Position of segment 04	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.10	Control word of segment 05	-	0–0x7FFFFFFF	0x00000000	P
PtP0.11	Position of segment 05	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.12	Control word of segment 06	-	0–0x7FFFFFFF	0x00000000	P
PtP0.13	Position of segment 06	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.14	Control word of segment 07	-	0–0x7FFFFFFF	0x00000000	P
PtP0.15	Position of segment 07	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.16	Control word of segment 08	-	0–0x7FFFFFFF	0x00000000	P
PtP0.17	Position of segment 08	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.18	Control word of segment 09	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP0.19	Position of segment 09	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.20	Control word of segment 10	-	0–0x7FFFFFFF	0x00000000	P
PtP0.21	Position of segment 10	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.22	Control word of segment 11	-	0–0x7FFFFFFF	0x00000000	P
PtP0.23	Position of segment 11	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.24	Control word of segment 12	-	0–0x7FFFFFFF	0x00000000	P
PtP0.25	Position of segment 12	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.26	Control word of segment 13	-	0–0x7FFFFFFF	0x00000000	P
PtP0.27	Position of segment 13	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.28	Control word of segment 14	-	0–0x7FFFFFFF	0x00000000	P
PtP0.29	Position of segment 14	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.30	Control word of segment 15	-	0–0x7FFFFFFF	0x00000000	P
PtP0.31	Position of segment 15	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.32	Control word of segment 16	-	0–0x7FFFFFFF	0x00000000	P
PtP0.33	Position of segment 16	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.34	Control word of segment 17	-	0–0x7FFFFFFF	0x00000000	P
PtP0.35	Position of segment 17	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.36	Control word of segment 18	-	0–0x7FFFFFFF	0x00000000	P
PtP0.37	Position of segment 18	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.38	Control word of segment 19	-	0–0x7FFFFFFF	0x00000000	P
PtP0.39	Position of segment 19	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.40	Control word of segment 20	-	0–0x7FFFFFFF	0x00000000	P
PtP0.41	Position of segment 20	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.42	Control word of segment 21	-	0–0x7FFFFFFF	0x00000000	P
PtP0.43	Position of segment 21	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP0.44	Control word of segment 22	-	0–0x7FFFFFFF	0x00000000	P
PtP0.45	Position of segment 22	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.46	Control word of segment 23	-	0–0x7FFFFFFF	0x00000000	P
PtP0.47	Position of segment 23	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.48	Control word of segment 24	-	0–0x7FFFFFFF	0x00000000	P
PtP0.49	Position of segment 24	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.50	Control word of segment 25	-	0–0x7FFFFFFF	0x00000000	P
PtP0.51	Position of segment 25	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.52	Control word of segment 26	-	0–0x7FFFFFFF	0x00000000	P
PtP0.53	Position of segment 26	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.54	Control word of segment 27	-	0–0x7FFFFFFF	0x00000000	P
PtP0.55	Position of segment 27	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.56	Control word of segment 28	-	0–0x7FFFFFFF	0x00000000	P
PtP0.57	Position of segment 28	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.58	Control word of segment 29	-	0–0x7FFFFFFF	0x00000000	P
PtP0.59	Position of segment 29	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.60	Control word of segment 30	-	0–0x7FFFFFFF	0x00000000	P
PtP0.61	Position of segment 30	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.62	Control word of segment 31	-	0–0x7FFFFFFF	0x00000000	P
PtP0.63	Position of segment 31	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.64	Control word of segment 32	-	0–0x7FFFFFFF	0x00000000	P
PtP0.65	Position of segment 32	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.66	Control word of segment 33	-	0–0x7FFFFFFF	0x00000000	P
PtP0.67	Position of segment 33	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.68	Control word of	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
	segment 34				
PtP0.69	Position of segment 34	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.70	Control word of segment 35	-	0–0x7FFFFFFF	0x00000000	P
PtP0.71	Position of segment 35	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.72	Control word of segment 36	-	0–0x7FFFFFFF	0x00000000	P
PtP0.73	Position of segment 36	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.74	Control word of segment 37	-	0–0x7FFFFFFF	0x00000000	P
PtP0.75	Position of segment 37	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.76	Control word of segment 38	-	0–0x7FFFFFFF	0x00000000	P
PtP0.77	Position of segment 38	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.78	Control word of segment 39	-	0–0x7FFFFFFF	0x00000000	P
PtP0.79	Position of segment 39	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.80	Control word of segment 40	-	0–0x7FFFFFFF	0x00000000	P
PtP0.81	Position of segment 40	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.82	Control word of segment 41	-	0–0x7FFFFFFF	0x00000000	P
PtP0.83	Position of segment 41	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.84	Control word of segment 42	-	0–0x7FFFFFFF	0x00000000	P
PtP0.85	Position of segment 42	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.86	Control word of segment 43	-	0–0x7FFFFFFF	0x00000000	P
PtP0.87	Position of segment 43	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.88	Control word of segment 44	-	0–0x7FFFFFFF	0x00000000	P
PtP0.89	Position of segment 44	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.90	Control word of segment 45	-	0–0x7FFFFFFF	0x00000000	P
PtP0.91	Position of segment 45	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP0.92	Control word of segment 46	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP0.93	Position of segment 46	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.94	Control word of segment 47	-	0–0x7FFFFFFF	0x00000000	P
PtP0.95	Position of segment 47	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.96	Control word of segment 48	-	0–0x7FFFFFFF	0x00000000	P
PtP0.97	Position of segment 48	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP0.98	Control word of segment 49	-	0–0x7FFFFFFF	0x00000000	P
PtP0.99	Position of segment 49	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1 PTP control					
PtP1.00	Control word of segment 50	-	0–0x7FFFFFFF	0x00000000	P
PtP1.01	Position of segment 50	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.02	Control word of segment 51	-	0–0x7FFFFFFF	0x00000000	P
PtP1.03	Position of segment 51	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.04	Control word of segment 52	-	0–0x7FFFFFFF	0x00000000	P
PtP1.05	Position of segment 52	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.06	Control word of segment 53	-	0–0x7FFFFFFF	0x00000000	P
PtP1.07	Position of segment 53	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.08	Control word of segment 54	-	0–0x7FFFFFFF	0x00000000	P
PtP1.09	Position of segment 54	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.10	Control word of segment 55	-	0–0x7FFFFFFF	0x00000000	P
PtP1.11	Position of segment 55	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.12	Control word of segment 56	-	0–0x7FFFFFFF	0x00000000	P
PtP1.13	Position of segment 56	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.14	Control word of segment 57	-	0–0x7FFFFFFF	0x00000000	P
PtP1.15	Position of segment 57	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP1.16	Control word of segment 58	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP1.17	Position of segment 58	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.18	Control word of segment 59	-	0–0x7FFFFFFF	0x00000000	P
PtP1.19	Position of segment 59	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.20	Control word of segment 60	-	0–0x7FFFFFFF	0x00000000	P
PtP1.21	Position of segment 60	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.22	Control word of segment 61	-	0–0x7FFFFFFF	0x00000000	P
PtP1.23	Position of segment 61	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.24	Control word of segment 62	-	0–0x7FFFFFFF	0x00000000	P
PtP1.25	Position of segment 62	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.26	Control word of segment 63	-	0–0x7FFFFFFF	0x00000000	P
PtP1.27	Position of segment 63	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.28	Control word of segment 64	-	0–0x7FFFFFFF	0x00000000	P
PtP1.29	Position of segment 64	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.30	Control word of segment 65	-	0–0x7FFFFFFF	0x00000000	P
PtP1.31	Position of segment 65	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.32	Control word of segment 66	-	0–0x7FFFFFFF	0x00000000	P
PtP1.33	Position of segment 66	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.34	Control word of segment 67	-	0–0x7FFFFFFF	0x00000000	P
PtP1.35	Position of segment 67	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.36	Control word of segment 68	-	0–0x7FFFFFFF	0x00000000	P
PtP1.37	Position of segment 68	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.38	Control word of segment 69	-	0–0x7FFFFFFF	0x00000000	P
PtP1.39	Position of segment 69	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.40	Control word of segment 70	-	0–0x7FFFFFFF	0x00000000	P
PtP1.41	Position of segment 70	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP1.42	Control word of segment 71	-	0–0x7FFFFFFF	0x00000000	P
PtP1.43	Position of segment 71	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.44	Control word of segment 72	-	0–0x7FFFFFFF	0x00000000	P
PtP1.45	Position of segment 72	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.46	Control word of segment 73	-	0–0x7FFFFFFF	0x00000000	P
PtP1.47	Position of segment 73	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.48	Control word of segment 74	-	0–0x7FFFFFFF	0x00000000	P
PtP1.49	Position of segment 74	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.50	Control word of segment 75	-	0–0x7FFFFFFF	0x00000000	P
PtP1.51	Position of segment 75	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.52	Control word of segment 76	-	0–0x7FFFFFFF	0x00000000	P
PtP1.53	Position of segment 76	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.54	Control word of segment 77	-	0–0x7FFFFFFF	0x00000000	P
PtP1.55	Position of segment 77	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.56	Control word of segment 78	-	0–0x7FFFFFFF	0x00000000	P
PtP1.57	Position of segment 78	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.58	Control word of segment 79	-	0–0x7FFFFFFF	0x00000000	P
PtP1.59	Position of segment 79	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.60	Control word of segment 80	-	0–0x7FFFFFFF	0x00000000	P
PtP1.61	Position of segment 80	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.62	Control word of segment 81	-	0–0x7FFFFFFF	0x00000000	P
PtP1.63	Position of segment 81	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.64	Control word of segment 82	-	0–0x7FFFFFFF	0x00000000	P
PtP1.65	Position of segment 82	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.66	Control word of	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
	segment 83				
PtP1.67	Position of segment 83	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.68	Control word of segment 84	-	0–0x7FFFFFFF	0x00000000	P
PtP1.69	Position of segment 84	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.70	Control word of segment 85	-	0–0x7FFFFFFF	0x00000000	P
PtP1.71	Position of segment 85	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.72	Control word of segment 86	-	0–0x7FFFFFFF	0x00000000	P
PtP1.73	Position of segment 86	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.74	Control word of segment 87	-	0–0x7FFFFFFF	0x00000000	P
PtP1.75	Position of segment 87	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.76	Control word of segment 88	-	0–0x7FFFFFFF	0x00000000	P
PtP1.77	Position of segment 88	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.78	Control word of segment 89	-	0–0x7FFFFFFF	0x00000000	P
PtP1.79	Position of segment 89	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.80	Control word of segment 90	-	0–0x7FFFFFFF	0x00000000	P
PtP1.81	Position of segment 90	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.82	Control word of segment 91	-	0–0x7FFFFFFF	0x00000000	P
PtP1.83	Position of segment 91	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.84	Control word of segment 92	-	0–0x7FFFFFFF	0x00000000	P
PtP1.85	Position of segment 92	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.86	Control word of segment 93	-	0–0x7FFFFFFF	0x00000000	P
PtP1.87	Position of segment 93	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.88	Control word of segment 94	-	0–0x7FFFFFFF	0x00000000	P
PtP1.89	Position of segment 94	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.90	Control word of segment 95	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP1.91	Position of segment 95	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.92	Control word of segment 96	-	0–0x7FFFFFFF	0x00000000	P
PtP1.93	Position of segment 96	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.94	Control word of segment 97	-	0–0x7FFFFFFF	0x00000000	P
PtP1.95	Position of segment 97	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.96	Control word of segment 98	-	0–0x7FFFFFFF	0x00000000	P
PtP1.97	Position of segment 98	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP1.98	Control word of segment 99	-	0–0x7FFFFFFF	0x00000000	P
PtP1.99	Position of segment 99	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2 PTP control					
PtP2.00	Control word of segment 100	-	0–0x7FFFFFFF	0x00000000	P
PtP2.01	Position of segment 100	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.02	Control word of segment 101	-	0–0x7FFFFFFF	0x00000000	P
PtP2.03	Position of segment 101	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.04	Control word of segment 102	-	0–0x7FFFFFFF	0x00000000	P
PtP2.05	Position of segment 102	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.06	Control word of segment 103	-	0–0x7FFFFFFF	0x00000000	P
PtP2.07	Position of segment 103	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.08	Control word of segment 104	-	0–0x7FFFFFFF	0x00000000	P
PtP2.09	Position of segment 104	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.10	Control word of segment 105	-	0–0x7FFFFFFF	0x00000000	P
PtP2.11	Position of segment	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P

Function code	Name	Unit	Range	Default	Applicable mode
	105				
PtP2.12	Control word of segment 106	-	0–0x7FFFFFFF	0x00000000	P
PtP2.13	Position of segment 106	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.14	Control word of segment 107	-	0–0x7FFFFFFF	0x00000000	P
PtP2.15	Position of segment 107	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.16	Control word of segment 108	-	0–0x7FFFFFFF	0x00000000	P
PtP2.17	Position of segment 108	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.18	Control word of segment 109	-	0–0x7FFFFFFF	0x00000000	P
PtP2.19	Position of segment 109	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.20	Control word of segment 110	-	0–0x7FFFFFFF	0x00000000	P
PtP2.21	Position of segment 110	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.22	Control word of segment 111	-	0–0x7FFFFFFF	0x00000000	P
PtP2.23	Position of segment 111	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.24	Control word of segment 112	-	0–0x7FFFFFFF	0x00000000	P
PtP2.25	Position of segment 112	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.26	Control word of segment 113	-	0–0x7FFFFFFF	0x00000000	P
PtP2.27	Position of segment 113	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P
PtP2.28	Control word of segment 114	-	0–0x7FFFFFFF	0x00000000	P
PtP2.29	Position of segment 114	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	0	P

Function code	Name	Unit	Range	Default	Applicable mode
PtP2.30	Control word of segment 115	-	0–0x7FFFFFFF	0x00000000	P
PtP2.31	Position of segment 115	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.32	Control word of segment 116	-	0–0x7FFFFFFF	0x00000000	P
PtP2.33	Position of segment 116	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.34	Control word of segment 117	-	0–0x7FFFFFFF	0x00000000	P
PtP2.35	Position of segment 117	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.36	Control word of segment 118	-	0–0x7FFFFFFF	0x00000000	P
PtP2.37	Position of segment 118	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.38	Control word of segment 119	-	0–0x7FFFFFFF	0x00000000	P
PtP2.39	Position of segment 119	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.40	Control word of segment 120	-	0–0x7FFFFFFF	0x00000000	P
PtP2.41	Position of segment 120	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.42	Control word of segment 121	-	0–0x7FFFFFFF	0x00000000	P
PtP2.43	Position of segment 121	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.44	Control word of segment 122	-	0–0x7FFFFFFF	0x00000000	P
PtP2.45	Position of segment 122	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.46	Control word of segment 123	-	0–0x7FFFFFFF	0x00000000	P
PtP2.47	Position of segment 123	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.48	Control word of	-	0–0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Applicable mode
	segment 124				
PtP2.49	Position of segment 124	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.50	Control word of segment 125	-	-(2^{31}-1)–(2^{31}-1)	0x00000000	P
PtP2.51	Position of segment 125	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.52	Control word of segment 126	-	0–0x7FFFFFFF	0x00000000	P
PtP2.53	Position of segment 126	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P
PtP2.54	Control word of segment 127	-	0–0x7FFFFFFF	0x00000000	P
PtP2.55	Position of segment 127	reference unit	-(2^{31}-1)–(2^{31}-1)	0	P

A.1.2 Monitoring parameter list

The following table lists the parameters for monitoring servo drive state.

Function code	Name	Unit	Range	Applicable mode
R0 System monitoring				
R0.00	Motor rotation speed	r/min	-9999.9–9999.9	PST
R0.01	Speed command	r/min	-9999.9–9999.9	PST
R0.02	Accumulated feedback pulses	reference unit	-(2^{63}-1)–(2^{63}-1)	P
R0.03	Accumulated command pulses	reference unit	-(2^{63}-1)–(2^{63}-1)	P
R0.04	Residual pulses	reference unit	-(2^{31}-1)–(2^{31}-1)	P
R0.05	Hybrid control deviation	reference unit	-(2^{31}-1)–(2^{31}-1)	P
R0.06	Current torque	%	-500.0–500.0	PST
R0.07	Main circuit DC voltage	V	0.0–1000.0	PST
R0.09	Output voltage	Vrms	0.0–1000.0	PST
R0.10	Output current	Arms	0.00–1000.00	PST
R0.11	Drive temperature	°C	-55.0–180.0	PST
R0.12	Torque limit	%	-500.0–500.0	PST
R0.13	Encoder feedback value	pulse	0–(2^{32}-1)	PST

Function code	Name	Unit	Range	Applicable mode
R0.14	Rotor position relative to Z pulse	pulse	0–(2^{31}-1)	PST
R0.15	Load inertia ratio	%	0–10000	PST
R0.16	Output power	%	-500.0–500.0	PST
R0.17	Motor load ratio	%	0–500	PST
R0.18	Numerator of actual electronic gear ratio	-	0–(2^{31}-1)	P
R0.19	Denominator of actual electronic gear ratio	-	1–(2^{31}-1)	P
R0.20	Position command speed	r/min	-9999.9–9999.9	P
R0.21	Motor speed (filtering)	r/min	-9999.9–9999.9	PST
R0.22	PTP state	-	-1–4223	P
R0.23	Encoder absolute position feedback	pulse	-(2^{31}-1)–(2^{31}-1)	PST
R0.24	Encoder EEPROM data state	-	0–3	PST
R0.25	Turns of multiturn encoder	-	-32768–32767	PST
R0.26	Available encoder type	-	0–6	PST
R0.27	EtherCAT clock synchronous correction state	-	0–1	PST
R0.28	State of CANopen state machine	-	0–18	PST
R0.30	System state	-	0–6	PST
R0.31	IGBT state	-	0–1	PST
R0.32	Current mode	-	0–2	PST
R0.33	Power-on time	s	0–(2^{31}-1)	PST
R0.34	Running time	s	0–(2^{31}-1)	PST
R0.35	DSP software version	-	0.00–10.00	PST
R0.36	FPGA software version	-	0.00–10.00	PST
R0.38	Drive SN 1	-	0–65535	PST
R0.39	Drive SN 2	-	0–65535	PST
R0.40	Drive SN 3	-	0–65535	PST
R0.41	Drive SN 4	-	0–65535	PST
R0.42	Drive SN 5	-	0–65535	PST
R0.43	Drive SN 6	-	0–65535	PST
R0.44	Absolute position of grating ruler (2nd encoder) in single circle	pulse	0–(2^{31}-1)	PST
R0.45	Speed feedback of 2nd encoder	r/min	-9999.9–9999.9	PST

Function code	Name	Unit	Range	Applicable mode
R0.46	Detected speed of speed observer	r/min	-9999.9–9999.9	PST
R0.47	Feedback speed of speed observer	r/min	-9999.9–9999.9	PST
R0.48	Observing disturbance torque of disturbance observer	%	-1000.0–1000.0	PST
R0.49	Compensation value of fully-closed-loop vibration suppressor	r/min	-9999.9–9999.9	PST
R0.51	Observe load inertia ratio in real time	%	0–10000	PST
R0.52	Accumulated linear encoder (2nd encoder) position feedback (32-bit)	pulse	$-(2^{31}-1)$–$(2^{31}-1)$	PST
R0.53	Gantry synchronization position deviation	reference unit	$-(2^{31}-1)$–$(2^{31}-1)$	PST
R0.54	Linear encoder (2nd encoder) position feedback value	pulse	0–$(2^{31}-1)$	PST
R0.55	Encoder turn deviation after multiturn position cleared	-	$-(2^{31}-1)$–$(2^{31}-1)$	PST
R0.56	Encoder feedback deviation after multiturn position cleared	pulse	$-(2^{31}-1)$–$(2^{31}-1)$	PST
R0.57	Accumulated linear encoder (2nd encoder) position feedback (64-bit)	pulse	$-(2^{63}-1)$–$(2^{63}-1)$	PST
R0.58	Position inside the single-turn of the disk	pulse	$-(2^{31}-1)$–$(2^{31}-1)$	PST
R0.60	Medium-power motor temperature	°C	-55–200	PST
R0.99	Fault code	-	-32768–32767	PST
R1 I/O monitoring				
R1.00	Digital input state	-	0x000–0x3FF	PST
R1.01	Digital output state	-	0x00–0x3F	PST
R1.02	Original voltage of analog input 1	V	-10.000–10.000	PST
R1.03	Original voltage of analog input 2	V	-10.000–10.000	PST
R1.05	Voltage of analog input 1	V	-10.000–10.000	PST
R1.06	Voltage of analog input 2	V	-10.000–10.000	PST
R1.08	Voltage of analog output 1	V	-10.000–10.000	PST
R1.09	Voltage of analog output 2	V	-10.000–10.000	PST

Function code	Name	Unit	Range	Applicable mode
R1.11	Accumulated input pulses	reference unit	-(2^{31}-1)–(2^{31}-1)	PST
R1.12	Pulse position command	reference unit	-(2^{31}-1)–(2^{31}-1)	PST
R1.13	Pulse speed command	r/min	-10000.0–10000.0	PST
R1.14	Analog compensation speed	r/min	-10000.0–10000.0	PST
R1.15	Analog compensation torque	%	-1000.0–1000.0	PST
R1.16	DI-captured encoder value	pulse	-(2^{31}-1)–(2^{31}-1)	PST
R1.17	Display of drive state bit	-	0–0xFFFF	PST
R3 Fault recording				
R3.00	Fault code record	-	-	PST
R3.01	Power-on time when fault occurs	h	0–(2^{31}-1)	PST
R3.02	Running time when fault occurs	h	0–(2^{31}-1)	PST
R3.03	Motor speed when fault occurs	r/min	-20000–20000	PST
R3.04	Speed command when fault occurs	r/min	-20000–20000	PST
R3.05	Feedback pulse accumulation when fault occurs	reference unit	-(2^{31}-1)–(2^{31}-1)	P
R3.06	Command pulse accumulation when fault occurs	reference unit	-(2^{31}-1)–(2^{31}-1)	P
R3.07	Residual pulses when fault occurs	reference unit	-(2^{31}-1)–(2^{31}-1)	P
R3.08	Current torque when fault occurs	%	-500.0–500.0	PST
R3.09	Main circuit DC voltage when fault occurs	V	0.0–1000.0	PST
R3.10	Output voltage when fault occurs	Vrms	0.0–1000.0	PST
R3.11	Output current when fault occurs	Arms	0.00–1000.00	PST
R3.20	Last fault code	-	-	PST
R3.21	2nd-last fault code	-	-	PST
R3.22	3rd-last fault code	-	-	PST
R3.23	4th-last fault code	-	-	PST
R3.24	5th-last fault code	-	-	PST
R3.25	6th-last fault code	-	-	PST
R3.26	7th-last fault code	-	-	PST
R3.27	8th-last fault code	-	-	PST
R3.28	9th-last fault code	-	-	PST

Function code	Name	Unit	Range	Applicable mode
R3.29	10th-last fault code	-	-	PST

A.2 Common monitoring parameters

Set value of P0.15	Meaning	Display	Unit	Corresponding parameter
[0]	Motor rotation speed	SPdFb	r/min	R0.00
1	Speed command	SPdcMd	r/min	R0.01
2	Pulse feedback accumulation	PLSFb	reference unit	R0.02
3	Pulse command accumulation	PLScMd	reference unit	R0.03
4	Residual pulses	PLSEr1	reference unit	R0.04
5	Hybrid control deviation	PLSEr2	reference unit	R0.05
6	Current torque	trqFb	%	R0.06
7	Main circuit DC voltage	UbUS1	V	R0.07
8	Output voltage	UoUt	Vrms	R0.09
9	Output current	IoUt	Arms	R0.10
10	Drive temperature	MdLtMP	°C	R0.11
11	Torque limit	trqLMt	%	R0.12
12	Encoder feedback value	EncFb	pulse	R0.13
13	Rotor position relative to Z pulse	EncAbS	pulse	R0.14
14	Load inertia ratio	J-r	%	R0.15
15	Output power	PoWEr	%	R0.16
16	Motor load ratio	LoAd-r	%	R0.17
17	Numerator of actual electronic gear ratio	nUM	-	R0.18
18	Denominator of actual electronic gear ratio	dEn	-	R0.19
19	Pulse speed command	PLSSPd	r/min	R0.20
20	Instant speed	SPdFb1	r/min	R0.21

Set value of P0.15	Meaning	Display	Unit	Corresponding parameter
21	PTP state	PtP.StS	-	R0.22

A.3 Fault codes

A fault code is displayed in the format of ErXX-X, in which XX indicates the main code and X indicates the sub code.

For example, in Er01-0, 01 indicates the main code and 0 indicates the sub code.

Other codes are displayed in the similar way.

Fault code	Name	Attributes		
		History record	Can be cleared	Disable
Er01-0	IGBT fault	●	-	●
Er01-1	Braking pipe fault (7.5kW and above models)	●	-	●
Er01-2	U-phase IGBT fault	●	-	●
Er01-3	V-phase IGBT fault	●	-	●
Er01-4	W-phase IGBT fault	●	-	●
Er01-5	IPM fault	●	-	●
Er02-0	Encoder fault–Encoder disconnection	●	-	●
Er02-1	Encoder fault–Encoder feedback deviation too large	●	-	●
Er02-2	Encoder fault-odd/even check error	●	-	●
Er02-3	Encoder fault–CRC check error	●	-	●
Er02-4	Encoder fault–Frame error	●	-	●
Er02-5	Encoder fault–Short frame error	●	-	●
Er02-6	Encoder fault–Encoder timeout	●	-	●
Er02-7	Encoder fault–Second encoder timeout	●	-	●
Er02-8	Encoder fault–Encoder battery low-voltage alarm	-	-	-
Er02-9	Encoder fault–Encoder battery undervoltage fault	●	-	●
Er02-a	Encoder fault–Encoder overheating	●	-	●
Er02-b	Encoder fault–Encoder EEPROM writing error	●	-	●
Er02-c	Encoder fault–No data in encoder EEPROM	-	-	●
Er02-d	Encoder fault– Encoder EEPROM data check error	-	-	●
Er02-e	Encoder fault–Encoder identification error	-	-	●
Er02-f	Encoder fault–Failed to write the encoder offset angle	-	-	●

Fault code	Name	Attributes		
		History record	Can be cleared	Disable
Er03-0	Current sensor fault–Phase-U current sensor fault	●	-	●
Er03-1	Current sensor fault–Phase-V current sensor fault	●	-	●
Er03-2	Current sensor fault–Phase-W current sensor fault	●	-	●
Er04-0	System initialization fault	-	-	●
Er05-0	Setting fault–Motor model not exist	●	-	●
Er05-1	Setting fault–Motor model not exist	●	-	●
Er05-2	Setting fault–Motor and drive model not match	●	-	●
Er05-3	Setting fault–Incorrect software limits	●	●	●
Er05-4	Setting fault–Incorrect homing mode	●	●	●
Er05-5	Setting fault–PTP-control travel overflow	●	●	●
Er05-6	Setting fault–Power module setting error	●	●	●
Er06-0	Brake fault	●	●	●
Er07-0	Regenerative discharge overload fault	●	●	●
Er08-0	AI overvoltage fault–AI 1	●	●	●
Er08-1	AI overvoltage fault–AI 2	●	●	●
Er09-0	EEPROM fault–Read/write error	-	-	●
Er09-1	EEPROM fault–Data check error	-	-	●
Er10-0	Hardware fault–FPGA fault	●	-	●
Er10-1	Hardware fault–Communication card fault	●	●	●
Er10-2	Hardware fault–To-ground short circuit fault	●		●
Er10-3	Hardware fault–External input fault	●	●	●
Er10-4	Hardware fault–Emergency stop fault	●	●	●
Er10-5	Hardware fault–485 communication fault	●	●	●
Er10-6	Hardware fault–AC power phase loss	●	●	●
Er10-7	Hardware fault–Fan fault	●	●	●
Er10-8	Hardware fault–Regenerative transistor fault	●	●	●
Er10-9	Hardware fault–STO phase loss	●	●	●
Er10-a	Hardware fault–STO DPIN1 fault	●	●	●
Er10-b	Hardware fault–STO DPIN2 fault	●	●	●
Er11-0	Software fault–Motor control task re-entry	●	-	●
Er11-1	Software fault–Periodic task re-entry	●	-	●
Er11-2	Software fault–Illegal operation	●	-	●
Er12-0	I/O fault–Duplicate DI assignment	●	●	●
Er12-1	I/O fault–Duplicate AI assignment	●	●	●
Er12-2	I/O fault–Pulse input frequency too high	●	●	●

Fault code	Name	Attributes		
		History record	Can be cleared	Disable
Er13-0	Main circuit overvoltage fault	●	●	●
Er13-1	Main circuit undervoltage fault	-	●	●
Er14-0	Control power undervoltage fault	-	●	●
Er17-0	Drive overload fault	●	-	●
Er17-1	Drive overload fault 2	●	-	●
Er18-0	Motor overload fault	●	●	●
Er18-1	Motor overtemperature fault	●	●	●
Er18-2	Motor phase loss fault 1	●	-	●
Er18-3	Motor phase loss fault 2	●	-	●
Er19-0	Speed fault–Overspeed fault	●	●	●
Er19-1	Speed fault–FWD overspeed fault	●	●	●
Er19-2	Speed fault–REV overspeed fault	●	●	●
Er19-3	Speed fault–Incorrect overspeed parameter setting	●	●	●
Er19-4	Speed fault–Out-of-control fault	●	●	●
Er20-0	Speed out-of-tolerance fault	●	●	●
Er21-0	Position overtravel - FWD overtravel	-	●	-
Er21-1	Position overtravel - REV overtravel	-	●	-
Er22-0	Position out-of-tolerance fault	●	●	●
Er22-1	Hybrid control deviation too large	●	●	●
Er22-2	Position increment overflow fault	●		●
Er22-3	CANopen fault–Synchronization signal timeout	●	●	●
Er22-4	CANopen fault–Full position command buffer	●	●	●
Er23-0	Drive overtemperature fault	●	●	●
Er24-0	Communication fault-PWK parameter ID error	-	●	-
Er24-1	Communication fault-PWK parameter out-of-range	-	●	-
Er24-2	Communication fault-Read-only PWK parameter	-	●	-
Er24-3	Communication fault-PZD setting parameter does not exist	-	●	-
Er24-4	Communication fault-PZD setting parameter property does not match	-	●	-
Er24-8	EtherCAT fault-Initialization fault	●	-	●
Er24-9	EtherCAT fault-EEPROM fault	●	-	●
Er24-a	EtherCAT fault-DC Sync0 signal exception	●	●	●

Fault code	Name	Attributes		
		History record	Can be cleared	Disable
Er24-b	EtherCAT fault-Disconnection fault	●	●	●
Er24-c	EtherCAT fault-PDO data loss fault	●	●	●
Er25-2	Application fault–Phase sequence detection timeout	●	●	●
Er25-3	Application fault–Phase sequence detection failed	●	●	●
Er25-4	Application fault–Encoder offset angle test timeout	●	●	●
Er25-5	Application fault–Encoder offset angle test failed	●	●	●
Er25-6	Application fault–Homing offside	●	●	●
Er25-7	Application fault–Inertia identifying failed	●	●	●
Er25-8	Application fault–Magnetic pole detection failed	●	●	●
Er25-9	Application fault–Overtravel/overspeed in confirmation of magnetic pole detection	●	●	●
Er25-a	Application fault–Out-of-range in magnetic pole detection	●	●	●
Er26-0	CANopen fault–CANopen disconnection	-	●	-
Er26-1	CANopen fault–SDO index does not exist	-	●	-
Er26-2	CANopen fault–SDO sub index does not exist	-	●	-
Er26-3	CANopen fault–SDO data length error	-	●	-
Er26-4	CANopen fault–SDO write data beyond the range	-	●	-
Er26-5	CANopen fault–Read-only and non-modifiable	-	●	-
Er26-6	CANopen fault–PDO mapping length error	-	●	-
Er26-7	CANopen fault–PDO mapping data does not exist	-	●	-
Er26-8	CANopen fault–PDO is not allowed to be changed during operating	-	●	-
Er26-9	CANopen fault–PDO mapping is not allowed	-	●	-
Er26-a	CANopen fault–Sync signal is too fast	-	●	-
Er26-b	CANopen fault–Receiving fault	-	●	-
Er26-c	CANopen fault–Sending fault	-	●	-
Er26-d	CANopen fault–Sync signal repeat	-	●	-
Er26-e	CANopen fault–Bus load ratio too high	-	●	-
Er26-f	CANopen fault–Incorrect parameter modification state	-	●	-

A.4 Record table of parameter setting

Parameter	Default setting	Drive 1	Drive 2	Drive 3	Modified by	Modified on	Remarks

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