ASTRAADA

Operation Manual

Astraada SRV-63
AC Servo drives

The owner of Astraada brand is ASTOR Sp. z o.o.

Preface

Thanks for selecting SRV-63 servo drives.

SRV-63 servo drive series products adopt modular design with abundant functions and powerful performance. The upper PC software uses USB communication and the bus control is optional among Modbus bus, CANopen bus, EtherCAT bus, MotionNet bus and the PROFIBUS-DP bus which can be selected via extension card. Meanwhile, this product is equipped with online/offline inertia identification, gain switching, auto/manual notch filter, auto/manual vibration control filter, internal point-to-point (PTP) control, fully-closed loop control safety terminal STO, 16-bit analog input and supports multiple types of encoders, etc.

SRV-63 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 presents installation and configuration, parameters setup, fault diagnoses and daily maintenance and relative precautions to customers. Please read this manual carefully before installation to ensure SRV-63 drive is installed and operated properly to give full play to its excellent performance.

If the product is ultimately used for military affairs or manufacture of weapon, it will be listed on the export control formulated by ***Foreign Trade Law of the People's Republic of China***. Rigorous review and necessary export formalities are needed when exported.

Our company reserves the right to update the information of our products.

Note: Models mentioned in this operation manual are standard type unless otherwise specified.

Safety precautions

Safety icons:


Read manual carefully and follow the directions


Disconnect all power and wait 15 min.before servicing.May cause electric shock.


Don't touch heatsink,May cause burn.


Contact currents up to 0.5mA, Before use must be reliable grounding.

Following safety precautions should be paid attention to before any installation, configuration, operation, maintenance and inspection:

- 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.
- Do not connect the input power cables to the output terminals, otherwise damage to the drive may occur.
- 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.
- Connect the drive and motor as correct phase sequence, otherwise drive fault or damage may occur.
- De-couple the motor load and run the motor independently before operation to avoid accidents.
- Please ensure the drive can be disconnected from the power supply by E-switch before any operation.
- Set the corresponding parameters before operation, otherwise the drive may run abnormally or beyond the expectation because of the load.
- Only qualified electrical engineers can carry out the wiring, otherwise electric shock or fire 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.
- Rewire the drive after 15 minutes when disconnecting the power supply, otherwise electric shock may occur.
- Do ground with proper techniques because the touch current may be 0.5mA, otherwise electric shock may occur.

- Do not touch the heat sink and external braking resistor during operation, otherwise burning may occur for the hot sides.
- 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.
- The leakage current may exceed 3.5mA during the drive running. 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).
- The components inside the drive contain heavy metal which should be disposed as industrial waste.

Content

Chapter 1 Product overview

1.1 Servo drive

1.1.1 Instruction to the drive

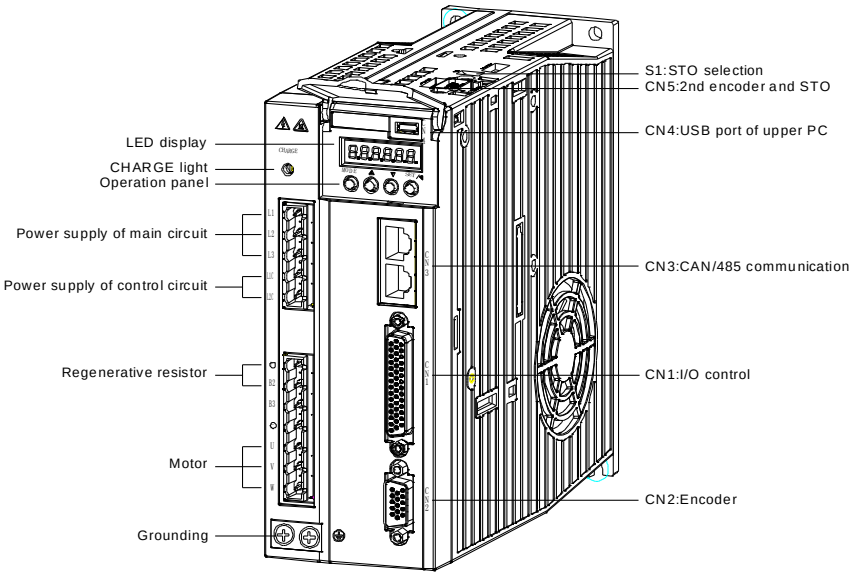
SRV-63 series servo drive (200W~5.5kW)			
Specification			Description
Power supply	230V system input voltage		1P/3P AC220V(-15%)~240V(+10%) 47Hz~63Hz
	400V system input voltage		3P AC380V(-15%)~440V(+10%) 47Hz~63Hz
Interface	Control signal	Input	10 inputs for standard type, pulse type and CANopen bus type; 7 inputs for EtherCAT bus type; 5 inputs for MotionNet bus type (the function can be configured by relevant parameters)
		Output	6 single-end outputs for standard type, pulse type and CANopen bus type; 4 differential outputs for EtherCAT bus type; 1 single-end output for MotionNet bus type (the function can be configured by related parameters)
	Analog value	Input	3 inputs for standard type (one 16-bit, two 12-bit analog inputs), 2 inputs for others (two 12-bit analog inputs)
		Output	2 outputs (analog output)
	Pulse signal	Input	1 group (mode: open collector input or differential input)
		Output	1 group (differential outputs (A+,A-;B+,B-;Z+,Z-) or open collector outputs (A;B;Z))
	2nd encoder	Input	Incremental encoder interface (2nd encoder or linear encoder)
	Communication	USB	1:1 communication upper PC software (standard)
		RS485	1:n communication (standard)
		CANopen	1:n communication (optional)
		Profibus-DP	1:n communication (optional)
		EtherCAT	1:n communication (optional
	Safety terminals	STO	Safe torque off (conform to the latest European safety standards) (optional)
Control mode			1 Position control; 2 Speed control; 3 Torque control; 4 Position/Speed mode switching; 5 Speed/Torque mode switching; 6 Position/Torque mode switching; 7 Fully-closed loop control; 8 CANopen mode; 9 EtherCAT mode; 10 MotionNet mode

SRV-63 series servo drive (200W~5.5kW)				
Specification			Description	
Function	Position control	Control input	1. Retention pulse clearing; 2. Command pulse input disabled; 3. Electronic gear ratio switching; 4. 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;
			Pulse input mode	1. Pulse + direction; 2. CW+CCW; 3. Quadrature
			Electric gear	1/10000~1000 times
			Filter	1. Command smoothing filter; 2. FIR filter
		Analog input	Torque limit command input	Can independently perform clockwise/ counterclockwise torque limit
		Vibration control	Control 5~200Hz forward and whole machine vibration	
		Pulse output	1. Can perform arbitrary frequency division settings under the encoder resolution; 2. B phase reverse function	
	Speed control	Control input	1. Internal command speed 1; 2. Internal command speed 2; 3. Internal command speed 3; 4. Zero speed clamp, etc	
		Control output	Speed reaching, etc	
		Analog input	Speed command input	Can be speed command input after relevant setting based on analog voltage DC±10V
			Torque limit input	Can independently arrange 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	In the speed mode, it can set the operation mode as	

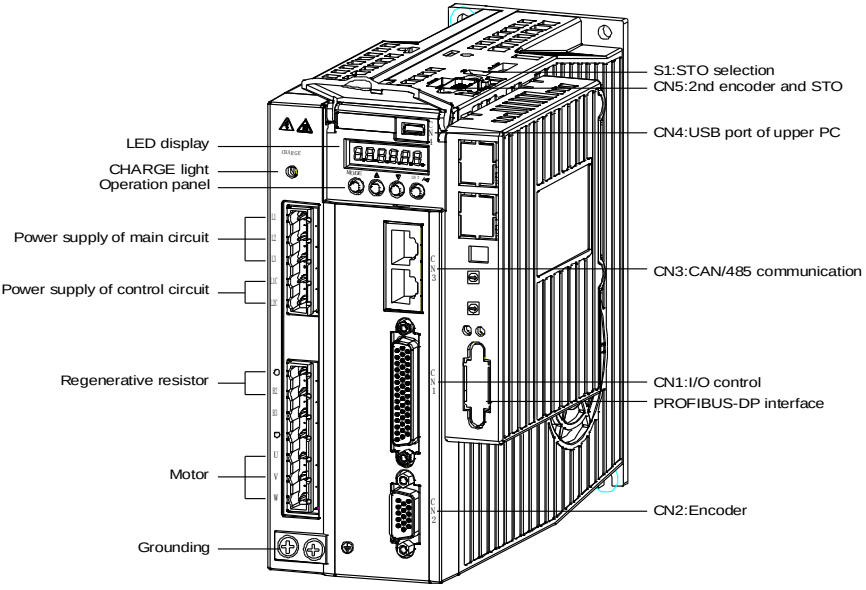
SRV-63 series servo drive (200W~5.5kW)				
Specification			**Description**	
		clamp	the speed mode and position mode	
		Speed command filter	A delay filter of analog input speed command	
		Speed command zero drift control	Zero drift control against outside interference with 0.3mV precision	
	Torque control	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 with 4.88mV precision
			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 the outside interference with 4.88mV precision	
	Internal position plan	Plan bits	128 bits internal position planning, the positioning can be controlled through communication	
		Route setting	1. Position; 2. Speed; 3. ACC time; 4. DEC time; 5. Stop timer; 6. Various state output; 7. Operational mode	
		Homing	1. LS signal; 2. Z phase signal; 3. LS signal+Z phase signal; 4. Torque limit signal	
Protection	Hardware protection		Overvoltage, undervoltage, overcurrent, overspeed, overload, braking resistor overload, drive overheat, encoder fault and so on	
	Software protection		Storage fault, initialization fault, I/O distribution abnormalities and large position deviation	
	Protection and fault record		1. Record up to 10 faults 2. Can record the key parameters when fault occurs	
Environment	Operation temperature		0~45℃	
	Storage temperature		-20~80℃(no frozen)	
	Operation/storage humidity		Operation/storage: ≤90%RH (no condensation)	
	IP degree		IP20	
	Elevation		Below 1000m altitude	
	Vibration		≤5.88m/s2, 10~60Hz(Working at the resonance point is not allowed)	

1.1.2 External appearance of the drive

◆ Standard model



◆ Models which carry extension cards with DP function



1.1.3 Naming of the drive

AS63SRV | 2 | 0C2 | - | S

A B C D

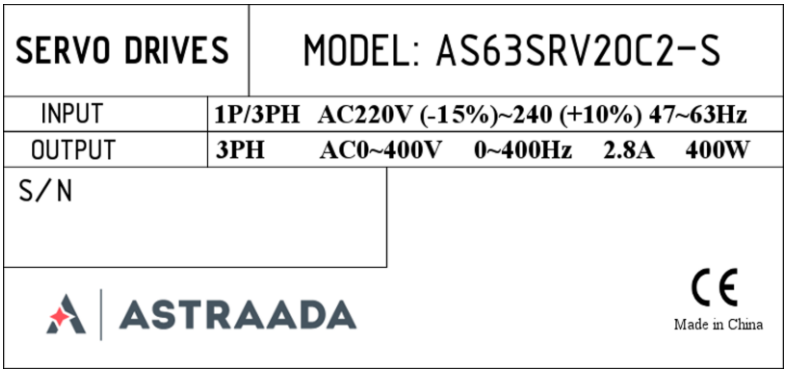
Key	Description
A	Astraada SRV-63 series
B	Input voltage
	2: 230VAC; 4: 400VAC
C	Power ratings:
	C05: 50W 0C4: 400W 0C7: 750W 1C0: 1.0kW 2C0: 2.0kW 5C5: 5.5kW
D	Machine type
	S: Standard; C: CANopen bus; P: PROFIBUS-DP bus; E: EtherCAT bus;

Function difference between different machine types:

Code	Type	Pulse input	16bit analog	Full closed-loop	STO	RS485	CAN open	PROFIBUS-DP	EtherCAT	Motion Net	ECAM
S	Standard	√	√	√	√	√	×	×	×	×	×
C	CAN	×	×	×	×	×	√	×	×	×	×
P	PROFIBUS-DP	×	×	×	×	×	×	√	×	×	×
E	EtherCAT	×	×	×	×	×	×	×	√	×	×

Note: In above table, "√" means this function is available, "×" means this function is unavailable.

1.1.4 Name plate of the drive

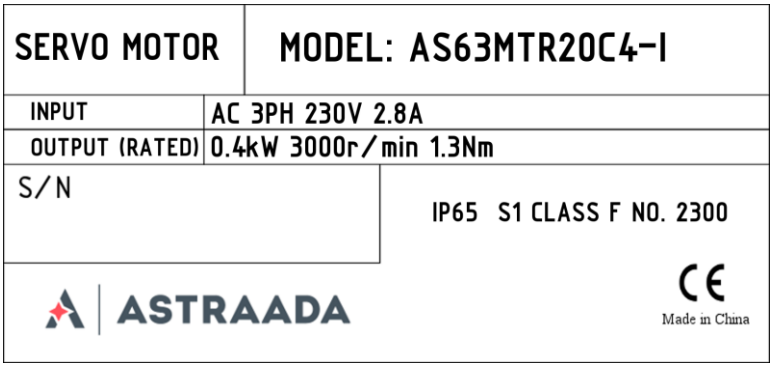


1.1.5 Power ratings and cabinet volumes

Model	Input		Output		Cabinet volume
	Voltage (V)	Rated current (A)	Power (kW)	Rated current (A)	
AS63SRV20C2	Single/Three phase 220	1.8/0.8	0.2	1.8	A
AS63SRV20C4	Single/Three phase 220	3.6/1.5	0.4	2.8	A
AS63SRV20C7	Single/Three phase 220	6.8/2.8	0.75	4.5	B
AS63SRV21C0	Single/Three phase 220	9.1/3.7	1.0	5	B
AS63SRV41C5	Three phase 400	3.1	1.5	4.5	B
AS63SRV42C0	Three phase 400	4.1	2.0	6.5	C
AS63SRV43C0	Three phase 400	6.2	3.0	8.5	C
AS63SRV44C4	Three phase 400	9.1	4.4	12	D
AS63SRV45C5	Three phase 400	11.3	5.5	16	D

1.2 Servo motor

1.2.1 Nameplate of the motor



Note: "2300" on the name plate is the motor model, and please input the number into P0.00 correctly (P0.00 is long parameter which can be set via keypad. See details at chapter 5.2.1 (8), otherwise, the servo system may not operate normally and major fault may occur to the drive and motor.

1.2.2 Naming of the servo motor

AS63	MTR	2	0C2	-	I
A	B	C	D		E

Key	No.	Description	Example
Product	A	Astraada SRV-63	
Brake	B		MTR – without brake MTB – with brake
Voltage degree	C	Voltage degree	2 - 230VAC 4 - 400VAC
Power + Load/Speed	D	Rated power	C02 – 200W 0C4 - 400W 0C7 - 750W 1C0 - 1.0kW 1C5 - 1.5kW 3C0 - 3.0kW 5C5 - 5.5kW
Lot No.	E	Encoder type	I - Incremental A - Absolute value

1.3 Cables

1.3.1 Nameplate of cables

1.3.2 Naming of the power cables

AS63	CBL	07	03	-	A
A	B	C	D		E

Key	No.	Description	Example
Product	A	Manufacturer Astraada SRV-63	
Power cable	B	Power cable	CBL - Power cable
Coil diameter	C	Coil diameter	07 - 0.75mm^2 10 - 1.0mm^2 15 - 1.5mm^2 25 - 2.5mm^2
Length	D	Cable length	03 - 3 meters 05 - 5 meters 10 - 10 meters 20 - 20 meters
Pin for motors	E	Pin for motors	A - 4PIN plastic pin B - 4PIN general aviation pin YD28 C - 4PIN metal pin

1.3.3 Naming of the encoder cables

AS63	**CBE**	**06**	**03**	**-**	**A**	**D**
A	B	C	D		E	F

Key	No.	Description	Example
Product	A	Manufacturer Astraada SRV-63	
Encoder cable	B	Encoder cable	CBE - Encoder cable
Cable core	C	Core	06 - 6 - core cable 09 - 9 - core cable 15 - 15 - core cable
Length	D	Cable length	03 - 3 meters 05 - 5 meters 10 - 10 meters 20 - 20 meters
Pin for motors	E	Pin for motors	A - 15PIN DB pin B - 15PIN general aviation pin YD28 C - 9PIN metal pin
Options	F	Cable options	Null – without battery D - with battery

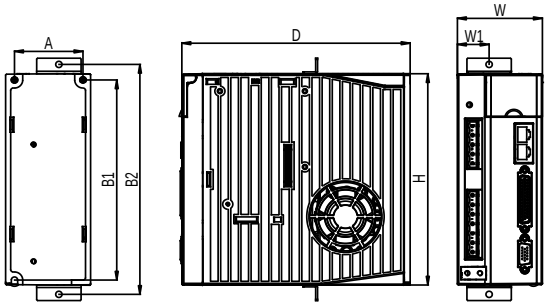
1.4 Braking resistor specification

Drive model	Embedded braking resistor	Min. resistance of external braking resistors
AS63SRV20C2	/	60Ω
AS63SRV20C4	/	60Ω
AS63SRV20C7	30Ω 60W	30Ω
AS63SRV21C0	30Ω 60W	30Ω
AS63SRV41C5	60Ω 60W	60Ω
AS63SRV42C0	60Ω 60W	40Ω
AS63SRV43C0	60Ω 60W	30Ω
AS63SRV44C4	30Ω 120W	30Ω
AS63SRV45C5	30Ω 120W	30Ω

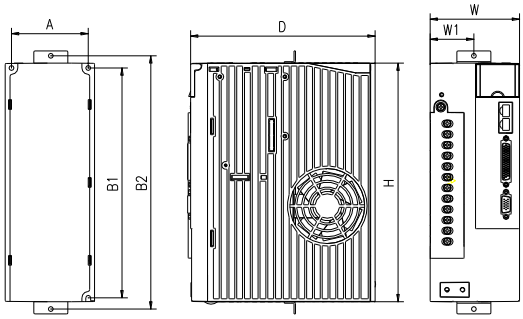
Chapter 2 Installation instruction

2.1 Drive dimension

2.1.1 A/B/C volume and dimension diagram



2.1.2 D volume and dimension diagram

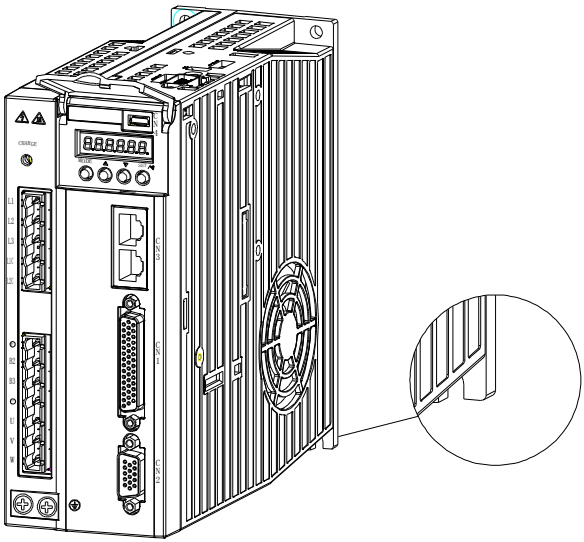


Volume	Model	External dimension			Installation dimension				Installation hole (mm)
		H(mm)	W(mm)	D(mm)	A (mm)	B1 (mm)	B2 (mm)	W1(mm)	
A	AS63SRV20C2	170	45	170	33	162	185	22.5	M4(Φ5)
	AS63SRV20C4								
B	AS63SRV20C7	170	67	180	54	162	185	25	M4(Φ5)
	AS63SRV21C0								
	AS63SRV41C5								
C	AS63SRV42C0	170	84	180	71	162	185	42	M4(Φ5)
	AS63SRV43C0								
D	AS63SRV44C4	245	92	190	79	237	260	45	M4(Φ5)
	AS63SRV45C5								

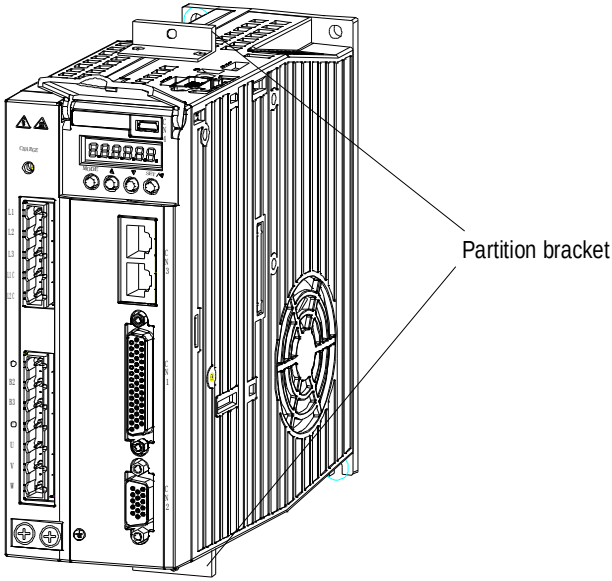
2.2 Drive installation

2.2.1 Installation mode

1) Base installation (there is a Φ5 installation hole at the lower left corner and upper right corner of the rear board respectively)



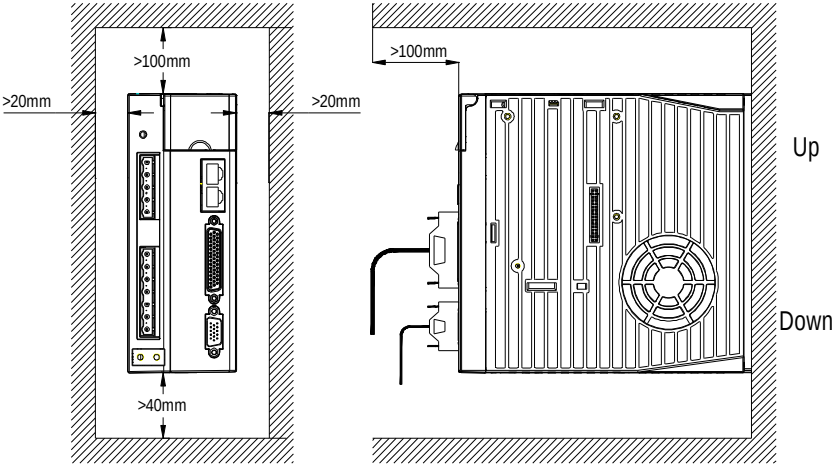
2) Bracket installation (the installation bracket is optional)



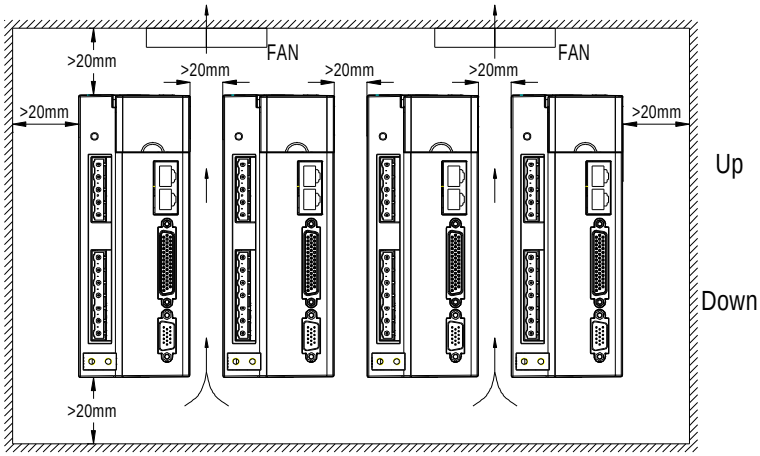
2.2.2 Installation space and direction

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℃.

1) Single drive installation



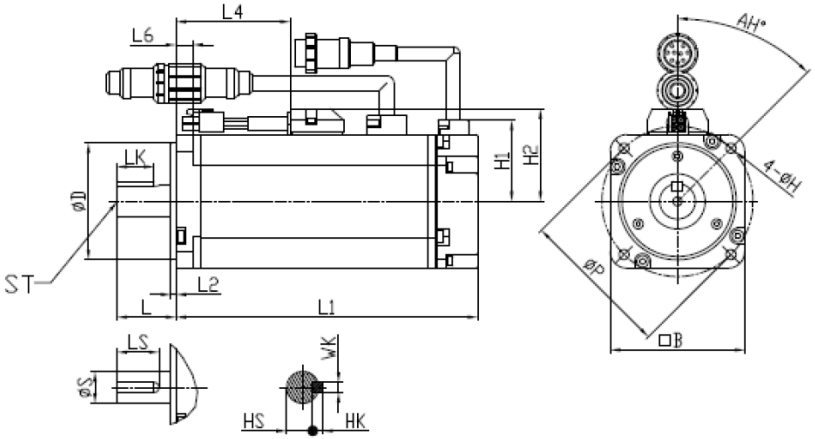
2) Multiple drives installation



2.3 Motor dimension

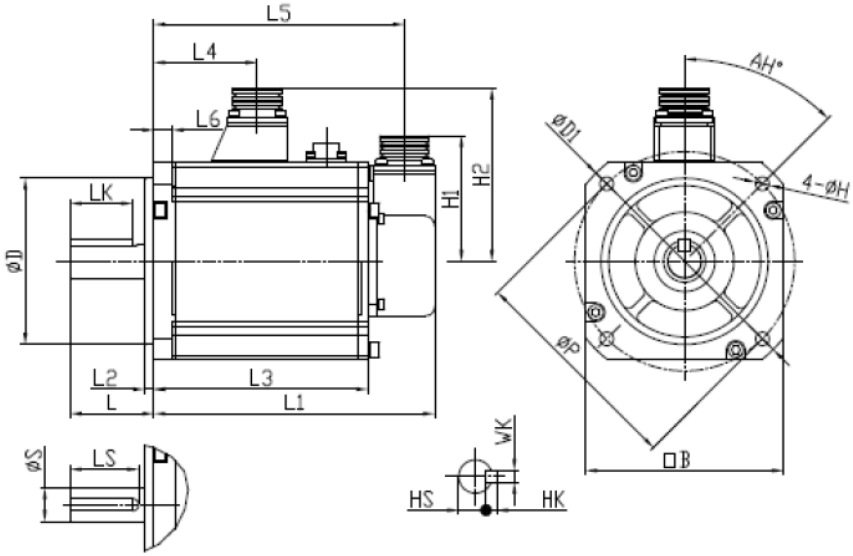
Note: As motor structure and dimension may vary slightly with design modification, for those who are sensitive to the installation length of motor, please confirm the installation length with our business staff before ordering.

2.3.1 Motor dimensions with 60 and 80mm base (mm)



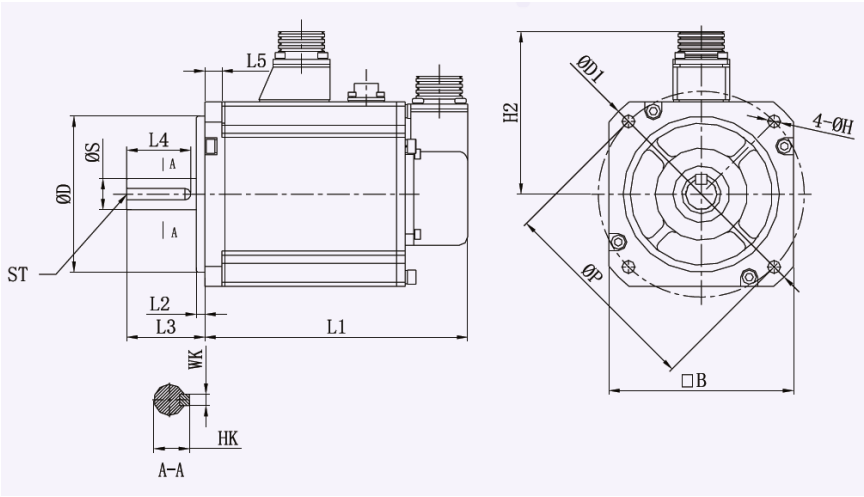
Model	Flange dimensions							Main dimensions							L1	L4	H1	H2	ST	
	D	L2	L6	P	H	AH	B	S	L	WK	HK	LK	HS	LS						
AS63MTR20C2-A	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	114.5	41	38.5	45.5	M5	D10
AS63MTR20C4-A	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	138.5	65	38.5	45.5	M5	D10
AS63MTR20C7-A	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	140	68	48.5	55.5	M5	D10
AS63MTR20C2-I	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	114.5	41	38.5	45.5	M5	D10
AS63MTR20C4-I	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	138.5	65	38.5	45.5	M5	D10
AS63MTR20C7-I	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	140	68	48.5	55.5	M5	D10
AS63MTR21C0-I	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	183	68	48.5	55.5	M5	D10
AS63MTB20C2-A	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	151.5	41	38.5	45.5	M5	D10
AS63MTB20C4-A	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	175.5	65	38.5	45.5	M5	D10
AS63MTB20C7-A	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	186.5	68	48.5	55.5	M5	D10
AS63MTB21C0-I	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	237	68	48.5	55.5	M5	D10
AS63MTB20C2-I	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	151.5	41	38.5	45.5	M5	D10
AS63MTB20C4-I	50(h7)	3	6.5	70	5.5	45	60	14(h6)	30	5	5	22.5	11	25	175.5	65	38.5	45.5	M5	D10
AS63MTB20C7-I	70(h7)	3	10	90	7	45	80	19(h6)	35	6	6	22	15.5	25	186.5	68	48.5	55.5	M5	D10

2.3.2 Motor dimensions with 130 base (mm)



Model	Flange dimensions									Main dimensions											
	D	L2	L6	P	H	AH	D1	B	S	L	WK	HK	LK	HS	LS	L1	L3	L4	L5	H1	H2
AS63MTR21C0-A	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	143	99	68	123	83	114.5
AS63MTR42C0-A	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	175	131	100	155	83	114.5
AS63MTR41C5-I	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	195	143	106	163	83	114.5
AS63MTR42C0-I	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	175	131	100	155	83	114.5
AS63MTB21C0-A	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	185	141	68	165	83	114.5
AS63MTB42C0-A	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	217	173	100	197	83	114.5
AS63MTB41C5-I	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	261	217	106	228	83	114.5
AS63MTB42C0-I	110(h7)	6	12	145	9	45	165	130	22(h6)	55	6h9	7	41	18	45	217	173	100	197	83	114.5

2.3.3 Motor dimensions with 180 base (mm)

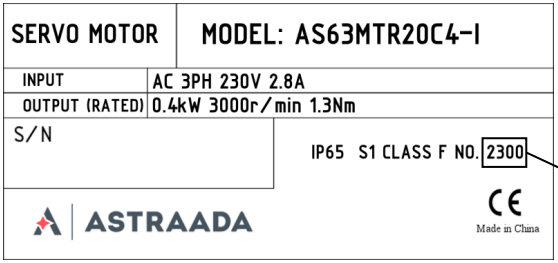


Model	Dimensions														
	D	L1	L2	L3	L4	L5	S	WK	HK	B	D1	P	H	H2
AS63MTR43C0-A	114.3(h7)	232	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTR44C4-A	114.3(h7)	262	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTR45C5-A	114.3(h7)	292	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTR43C0-I	114.3(h7)	232	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTR44C4-I	114.3(h7)	262	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTR45C5-I	114.3(h7)	292	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB43C0-A	114.3(h7)	304	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB44C4-A	114.3(h7)	334	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB45C5-A	114.3(h7)	364	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB43C0-I	114.3(h7)	304	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB44C4-I	114.3(h7)	334	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5
AS63MTB45C5-I	114.3(h7)	364	3.2	65	54	18	35(h7)	10(h9)	38	180.5	233	200	13.5	138.5

2.4 Motor installation

- 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.

Note: Please ensure the motor code of the name plate is the same as P0.00 before using for the best performance. The motor code is shown as below:



the last 4 figures are the motor code

2.5 Technical parameters of servo motor

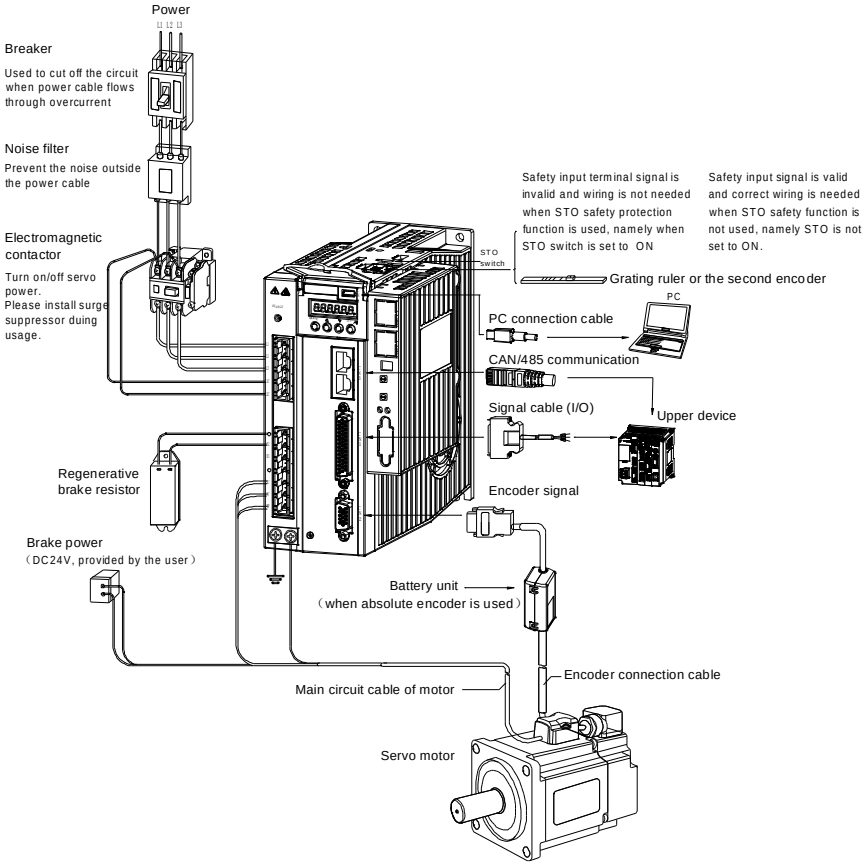
ASTRAADA SRV PARAMETERS

Model	AS63MTR20C2-A AS63MTR20C2-I AS63MTB20C2-A AS63MTB20C2-I	AS63MTR20C4-A AS63MTR20C4-I AS63MTB20C4-A AS63MTB20C4-I	AS63MTR20C7-A AS63MTR20C7-I AS63MTB20C7-A AS63MTB20C7-I	AS63MTR21C0-A AS63MTR21C0-I AS63MTR21C0- AS63MTR21C0-I
Rated Power	0.2 kW	0.4 kW	0.75 kW	1 kW
Rated torque	0.64 Nm	1.27 Nm	2.4 Nm	4.78 Nm / 4 Nm
Max. Torque	1.92 Nm	3.8 Nm	7.2 Nm	14.3 Nm / 12 Nm
Rated speed	3000 rpm	3000 rpm	3000 rpm	2000 rpm / 2500 rpm
Max. speed	6000 rpm	6000 rpm	6000 rpm	3000 rpm
Rated current	1.5 A	2.8 A	4.5 A	4.8 A / 4.4 A
Max. current	4.5 A	8.4 A	13.5 A	14.4 A / 13.2 A
Motor inertia	0.21 kg cm^2	0.32 kg cm^2	1.26 kg cm^2	6.3 kg cm2 / 2.97 kg cm2
Isolation class	Class F(155℃)	Class F(155℃)	Class (155℃)	Class (155℃)
Brake current	0.5 A	0.5 A	0.55 A	1.1 A / 0.56 A
Work temperature	-20 ÷ 50 ºC	-20 ÷ 50 ºC	-20 ÷ 50 ºC	-20 ÷ 50 ºC
Operation humidity	≤90%	≤90%	≤90%	≤90%
Protection class	IP65			
Certificate	CE			

Model	AS63MTR41C5-I AS63MTB41C5-I	AS63MTR42C0-A AS63MTR42C0-I AS63MTB42C0-A AS63MTB42C0-I	AS63MTR43C0-A AS63MTR43C0-I AS63MTB43C0-A AS63MTB43C0-I	AS63MTR44C4-A AS63MTR44C4-I AS63MTB44C4-A AS63MTB44C4-I	AS63MTR45C5-A AS63MTR45C5-I AS63MTB45C5-A AS63MTB45C5-I
Rated Power	1.5 kW	2 kW	3 kW	4.4 kW	5.5 kW
Rated torque	7.7 Nm	9.55 Nm	19 Nm	27 Nm	35 Nm
Max. Torque	22 Nm	28.6 Nm	47 Nm	67 Nm	70 Nm
Rated speed	2500 rpm	2000 rpm	1500 rpm	1500 rpm	1500 rpm
Max. speed	3000 rpm	3000 rpm	2000 rpm	2000 rpm	2000 rpm
Rated current	4.5 A	5.5 A	7.5 A	10 A	12 A
Max. current	13.5 A	16.5 A	18.75 A	25 A	30 A
Motor inertia	12.6 kg cm^2	12.16 kg cm^2	38 kg cm^2	61 kg cm^2	86 kg cm^2
Isolation class	Klasa F(155℃)	Klasa F(155℃)	Klasa F(155℃)	Klasa F(155℃)	Klasa F(155℃)
Brake current	1.1 A	1.1 A	1.2 A	1.2 A	1.2 A
Work temperature	-20 ÷ 50 ℃	-20 ÷ 50 ℃	-20 ÷ 50 ℃	-20 ÷ 50 ℃	-20 ÷ 50 ℃
Operation humidity	≤90%	≤90%	≤90%	≤90%	≤90%
Protection class	IP65				
Certificate	CE				

Chapter 3 Wiring instruction

3.1 System wiring



◆ Check to ensure the input power supply indicated on the name plate is the same as that of the grid before connecting the input power supply of the drive.

◆ The electromagnetic contactor is used to switch on/off the power supply of the main circuit of the servo drive. Do not use it to start/stop the servo drive.

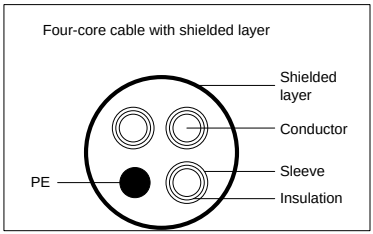
◆ In the above figure, the external regenerative brake resistor is connected, and the short connection wire between B2 and B3 should be removed, refer to chapter 3.2 for details. The external regenerative brake resistor must be installed on flame-resistance material which has good cooling effect eg metal.

3.1.1 Requirements on input power cable

The dimension of input power cable shall comply with local regulations.

- The input power cable must be able to withstand corresponding load current.
- The max rated temperature margin of input power cable should not be lower than 70℃ under continuous operation.
- See IEC/EN 61800-3:2004 for EMC requirements.

It is recommended to use shielded four-core cable for input cable

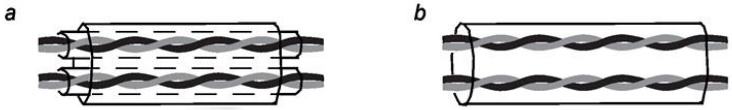


In order to protect the conductors, the crosssection of shielded cable must the same with that of the phase conductor when the shielded cable and phase conductor use the same material, which will help reduce grounding resistor to improve impedance continuity.

In order to suppress the emission and transmission of RF, the conductivity of shielded cable must be at least 1/10 of phase conductor conductivity. The coverage rate of shielded layer must be above 85% at least.

3.1.2 Requirements on control cable

All the analog control cables and the cables used for frequency input must use shielded cable. The analog signal cable uses shielded twisted pair (figure a). Each signal adopts a pair of independent shielded twisted pair. Different analog signal cannot use the same ground wire.



Multiple double-shielded twisted pairs Mutiple single-shielded twisted pairs

For low voltage digital signal, it is recommended to use double-layer shielded cables, single-layer shielded pairs or shieldless pairs (figure b), however, for pulse input signal, only shielded cable can be used.

Communication cable must use shielded twisted pairs.

3.1.3 Cable diameter of main circuit

Drive model	Recommended cable diameter (mm^2)			Connectable cable diameter (mm^2)			Terminal screw specification	Tightening torque (Nm)
	L1\L2\L3 UVW	PE	L1C\L2C	L1\L2\L3 UVW	(+), B2, B3, (-)	PE		
AS63SRV20C2	0.75	0.75	0.75	0.75~4	0.75~4	0.75~4	M2.5	0.3~0.6
AS63SRV20C4								
AS63SRV20C7								
AS63SRV21C0	1.5	1.5	0.75	1.5~4	1.5~4	1.5~4	M2.5	0.3~0.6
AS63SRV41C5								
AS63SRV42C0								
AS63SRV43C0								
AS63SRV44C4	2.5	2.5	0.75	2.5~6	2.5~6	2.5~6	M4	1.2~1.5
AS63SRV45C5								

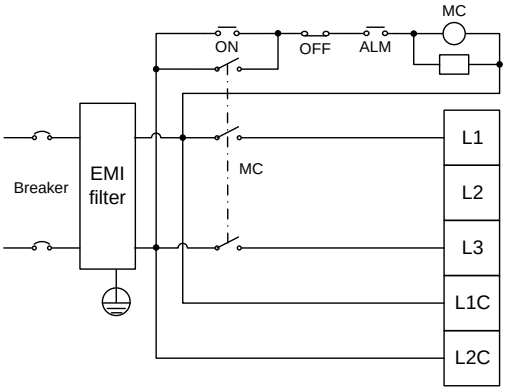
3.1.4 EMI filter

Drive model	EMI filter model
AS63SRV20C2	AS20FLI4006
AS63SRV20C4	
AS63SRV20C7	
AS63SRV41C5	
AS63SRV21C0	AS20FLI4016
AS63SRV42C0	
AS63SRV43C0	
AS63SRV44C4	AS20FLI4032
AS63SRV45C5	

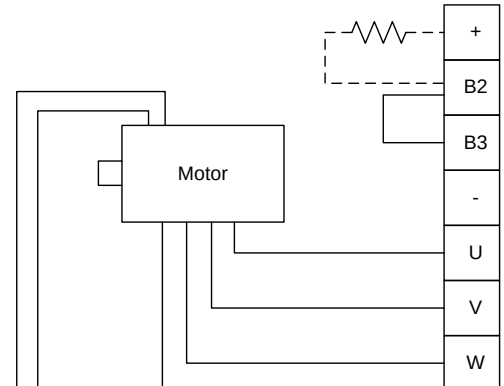
Note: The EMI filter models in the table are the models of our company and they are used for power input terminal.

3.2 Terminal wiring of the main circuit

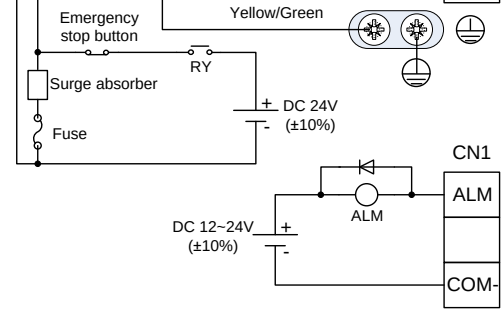
3.2.1 Wiring diagram of single phase 230V



- The user is required to make this emergency stop protection circuit.
- Add surge absorbing devices on both ends of the electromagnetic contactor winding.
- The power input voltage range: AC 220V(-15%)~240V(+10%)
- Connect main circuit to terminal L1 and terminal L3.
- Note: Please use 3-phase input power for the drive of 1.5kW and above.



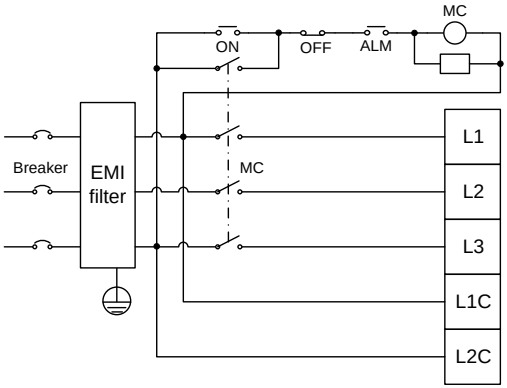
- Do not disconnect the short connection cable between B2 and B3, unless external regenerative brake resistor is used;
- When external regenerative brake resistor is used, disconnect the short connection cable between B2 and B3 and make connection based on the dotted lines in the diagram.
- Connect output U, V and W to the drive according to the motor cable phase sequence of servo motor, wrong phase sequence will cause drive fault



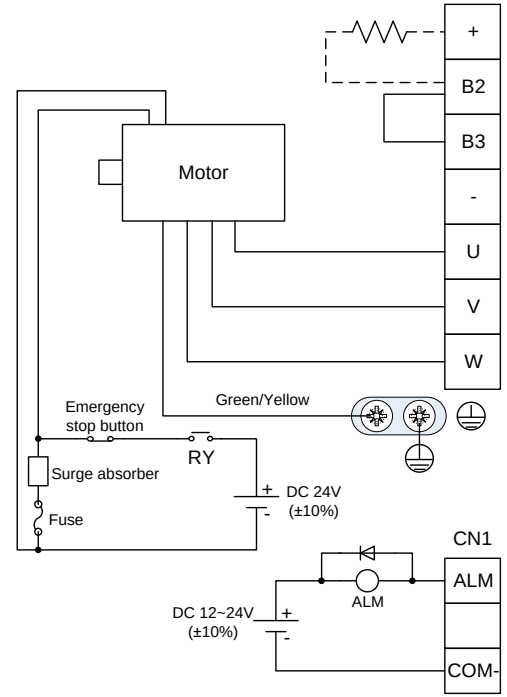
- Be sure to ground the servo drive to avoid accident of electrical shock.

- The electromagnetic brake uses 24V 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.

3.2.2 Wiring diagram of three phase 230V/400V



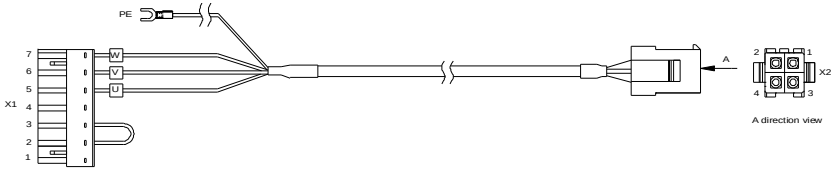
- The user is required to make this emergency stop protection circuit.
- Add surge absorbing devices on both ends of the electromagnetic contactor winding.
- Input voltage range of 220V system: AC 220V(-15%)~240V(+10%)
- Input voltage range of 400V system: AC 380V(-15%)~440V(+10%)



- Do not disconnect the short circuit wire between B2 and B3 unless an external regenerative braking resistor is used.
- When an external regenerative braking resistor is used, disconnect the short circuit wire between B2 and B3, and connect it according to the dotted line in the figure.
- Connect the output U, V and W of the drive to the servo motor correctly according to the phase sequence of the motor cable of the 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 power supply which should be provided by the user. Moreover, it must be isolated with 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.

3.3 Wiring of motor power cables

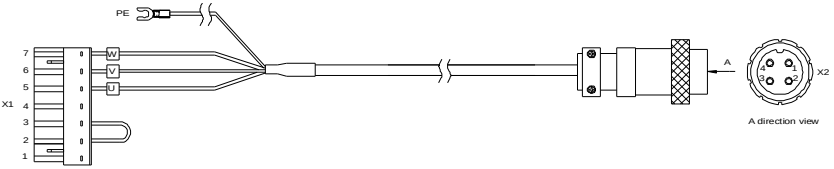
3.3.1 2500-PPR 60, 80-base 200W~750W motor power cable



Wiring relation

Definition	X1	X2	Core wire color
W	X1.7	X2.3	Brown
V	X1.6	X2.1	Red
U	X1.5	X2.2	Blue
PE	Ground terminal	X2.4	Yellow/green
/	X1.4	/	/
/	X1.3	Short connect with X1.2	
/	X1.2	Short connect with X1.3	
/	X1.1	/	/

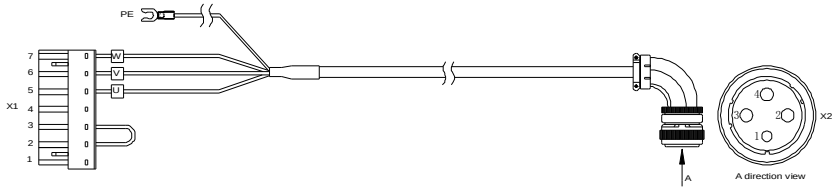
3.3.2 17-bit or 23-bit 60, 80-base 200W~750W motor power cable



Wiring relation

Definition	X1	X2	Core wire color
W	X1.7	X2.1	Brown
V	X1.6	X2.3	Red
U	X1.5	X2.4	Blue
PE	Ground terminal	X2.2	Yellow/green
/	X1.4	/	/
/	X1.3	Short connect with X1.2	
/	X1.2	Short connect with X1.3	
/	X1.1	/	/

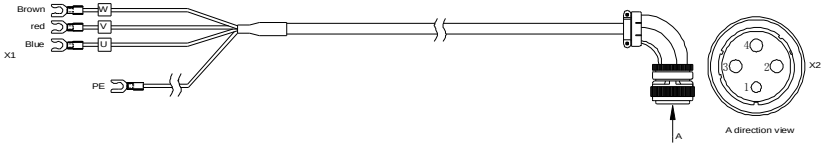
3.3.3 110, 130-base 1kW (220V) and 1kW~3kW (380V) motor power cable



Wiring relation

Definition	X1	X2	Core wire color
W	X1.7	X2.4	Brown
V	X1.6	X2.3	Red
U	X1.5	X2.2	Blue
PE	Ground terminal	X2.1	Yellow/green
/	X1.4	/	/
/	X1.3	Short connect with X1.2	
/	X1.2	Short connect with X1.3	
/	X1.1	/	/

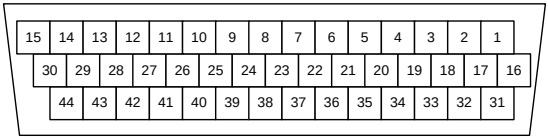
3.3.4 130, 180-base 2kW~4.4kW (230V) and 4.4kW~5.5kW (400V) motor power cable



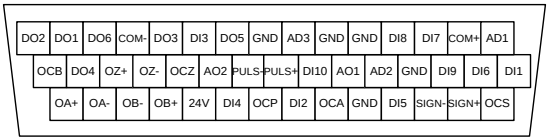
Wiring relation

Definition	X2	Core wire color
W	X2.4	Brown
V	X2.3	Red
U	X2.2	Blue
PE	X2.1	Yellow/green

3.4 Control I/O-CN1 terminal layout



CN1 plug pin layout

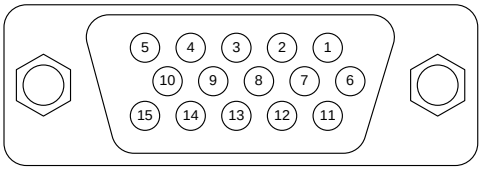


CN1 plug signal layout

Remark: This is the interface definition for standard model; refer to chapter 4 for terminal function and application. See corresponding operation guide for EtherCAT bus type.

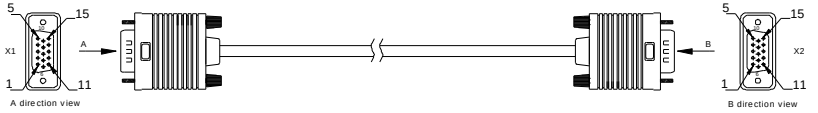
3.5 Wiring of encoder-CN2 terminals

3.5.1 CN2 terminals



CN2 terminal function			
Pin	**Name**	**Function**	**Remark**
1	V+/ SD+	Parallel encoder V+/Serial encoder data+	Different encoders use different cables
2	W+	Signal of parallel encoder W+	
3	A+	Signal of parallel encoder A+	
4	A-	Signal of parallel encoder A-	
5	5V	Encoder power supply	
6	U+	Signal of parallel encoder U+	
7	V- /SD-	Parallel encoder V-/Serial encoder data-	
8	W-	Signal of parallel encoder W-	
9	B-	Signal of parallel encoder B-	
10	B+	Signal of parallel encoder B+	
11	U-	Signal of parallel encoder U-	
12	GND	Power ground	
13	Z-	Signal of parallel encoder Z-	
14	Z+	Signal of parallel encoder Z+	
15	-	Unused	

3.5.2 60, 80-base absolute value encoder cable

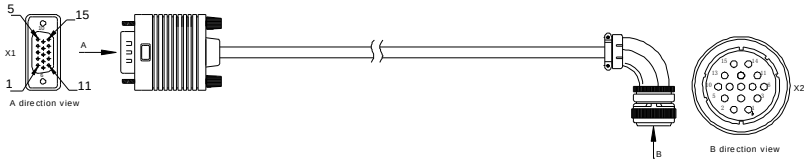


Wiring relation

Signal	X1	X2	Core wire structure
V+	X1.1	X2.1	Twisted pair
V-	X1.7	X2.7	
W+	X1.2	X2.2	Twisted pair
W-	X1.8	X2.8	
A+	X1.3	X2.3	Twisted pair
A-	X1.4	X2.4	
U+	X1.6	X2.6	Twisted pair
U-	X1.11	X2.11	
B-	X1.9	X2.9	Twisted pair
B+	X1.10	X2.10	
Z-	X1.13	X2.13	Twisted pair

Z+	X1.14	X2.14	
5V	X1.5	X2.5	Twisted pair
GND	X1.12	X2.12	
PE	Steel casing	Steel casing	

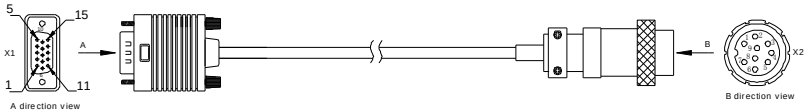
3.5.3 130, 180-base absolute value encoder cable



Wiring relation

Signal	X1	X2	Core wire structure
V+	X1.1	X2.11	Twisted pair
V-	X1.7	X2.14	
W+	X1.2	X2.12	Twisted pair
W-	X1.8	X2.15	
A+	X1.3	X2.7	Twisted pair
A-	X1.4	X2.4	
U+	X1.6	X2.10	Twisted pair
U-	X1.11	X2.13	
B-	X1.9	X2.8	Twisted pair
B+	X1.10	X2.5	
Z-	X1.13	X2.9	Twisted pair
Z+	X1.14	X2.6	
5V	X1.5	X2.2	Twisted pair
GND	X1.12	X2.3	
PE	Steel casing	Steel casing	

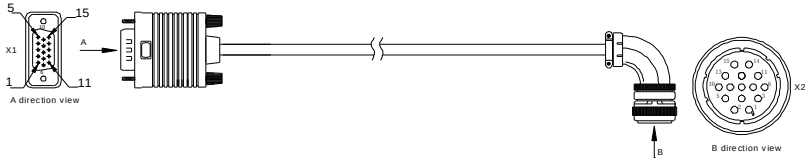
3.5.4 60, 80-base incremental encoder cable



Wiring relation

Signal	X1	X2	Core wire structure
SD+	X1.1	X2.1	Twisted pair
SD-	X1.7	X2.2	
5V	X1.5	X2.3	Twisted pair
GND	X1.12	X2.4	
VB-5V	/	X2.5	Twisted pair
VB-GND	/	X2.6	
PE	Steel casing	Steel casing	Weaving

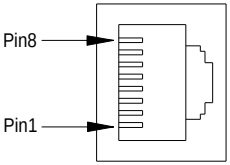
3.5.5 130, 180-base incremental encoder cable



Wiring relation

Signal	X1	X2	Core wire structure
SD+	X1.1	X2.2	Twisted pair
SD-	X1.7	X2.3	
5V	X1.5	X2.4	Twisted pair
GND	X1.12	X2.5	
VB-5V	/	X2.6	Twisted pair
VB-GND	/	X2.7	
PE	Steel casing	X2.1	Weaving

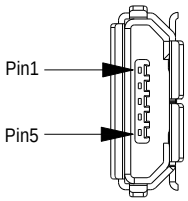
3.6 Wiring of 485/CAN-CN3 terminals



CN3 terminal function			
Pin	**Name**	**Function**	**Remark**
1	GND_CAN	CAN chip power GND	485 and CAN use the same interface and each signal has two pins for multiple networking.
2	GND_485	485 chip power GND	
4	RS485+	RS485 data +	
5	RS485-	RS485 data -	
7	CAN_L	CAN data -	
8	CAN_H	CAN data +	
3, 6	-	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.

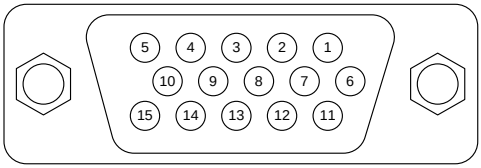
3.7 Wiring of USB-CN4 terminals



CN4 USB port function			
Pin	**Name**	**Functions**	**Remark**
2	D-	Data -	The standard cable for USB micro to USB-A conversion is available.
3	D+	Data +	
5	GND	Signal ground	
1, 4	-	Unused	

3.8 Encoder and STO-CN5 terminal wiring

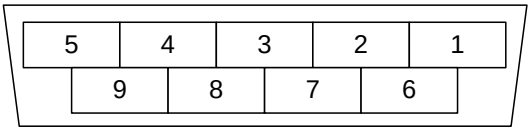
3.8.1 Terminal interface and definition



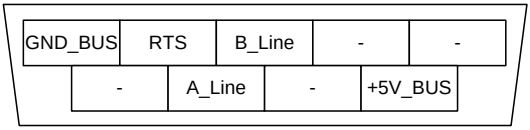
CN5 port function			
Pin	**Name**	**Function**	**Remark**
1	HWBB1+	Safety input 1+	Connect with linear encoder or 2nd encoder
2	HWBB2+	Safety input 2+	
3	EXA+	Linear encoder (2nd encoder) A+	
4	EXA-	Linear encoder (2nd encoder) A-	
5	EX5V	Power supply +5V	
6	EDM+	Safety monitoring output +	
7	HWBB1-	Safety input 1-	
8	HWBB2-	Safety input 2-	
9	EXB-	Linear encoder (2nd encoder) B-	
10	EXB+	Linear encoder (2nd encoder) B+	
11	EDM-	Safety monitoring output -	
12	EX0V	Power ground, be connected with internal GND	

CN5 port function			
Pin	**Name**	**Function**	**Remark**
13	EXZ-	Linear encoder (2nd encoder) Z-	
14	EXZ+	Linear encoder (2nd encoder) Z+	
15	-	Unused	

3.9 Wiring of PROFIBUS-DP terminals



DP plug pin layout

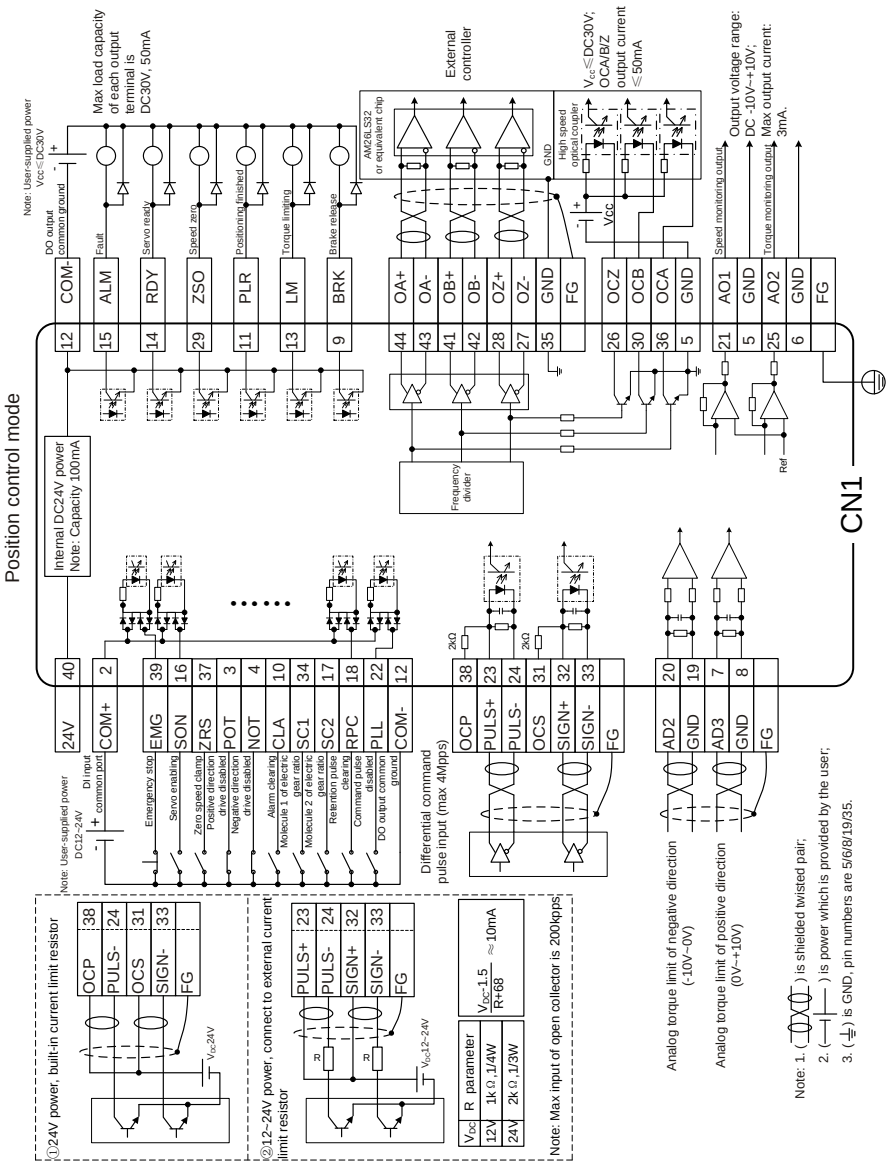


DP plug signal layout

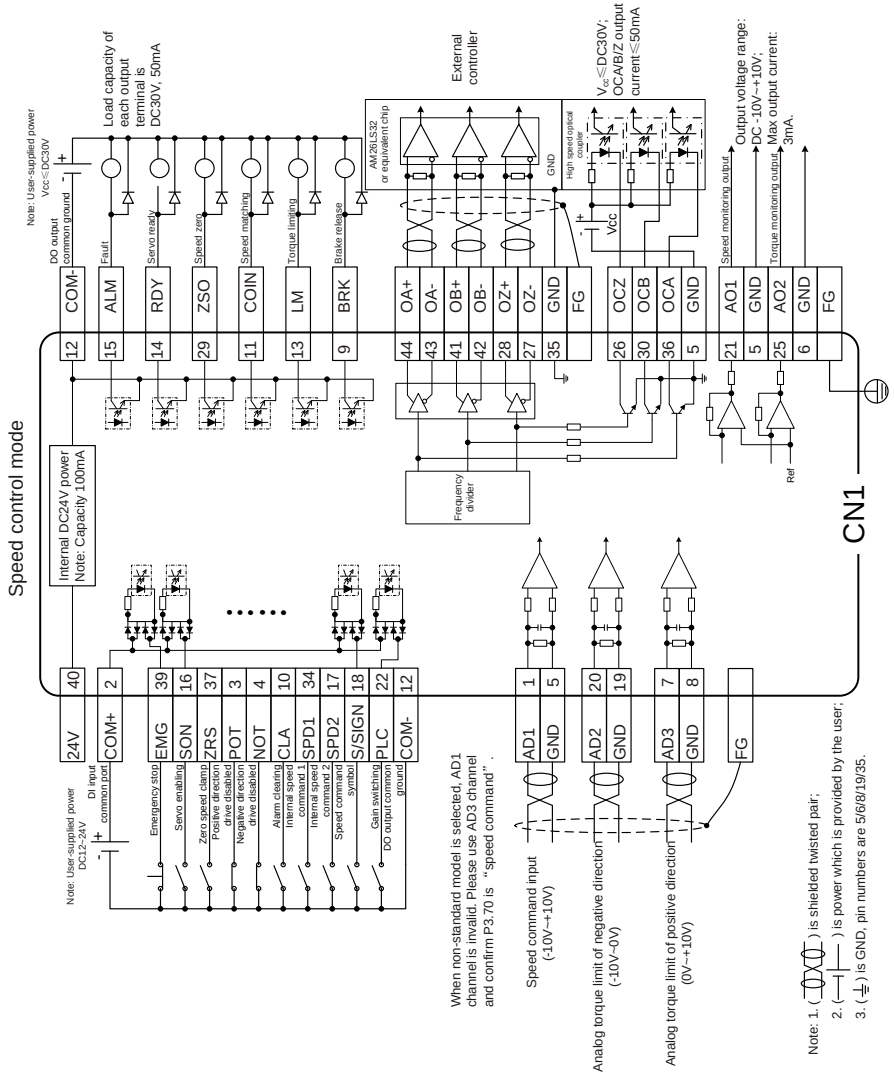
DP terminal function			
Pin	**Name**	**Function**	**Remark**
3	B-Line	Data +	DP standard terminals and pin connection; this terminal is on extension card
4	RTS	Request sending	
5	GND_BUS	Isolation ground	
6	+5V_BUS	Isolation of 5V power supply	
8	A-Line	Data -	
1, 2, 7, 9	-	Unused	

Chapter 4 Control mode applications

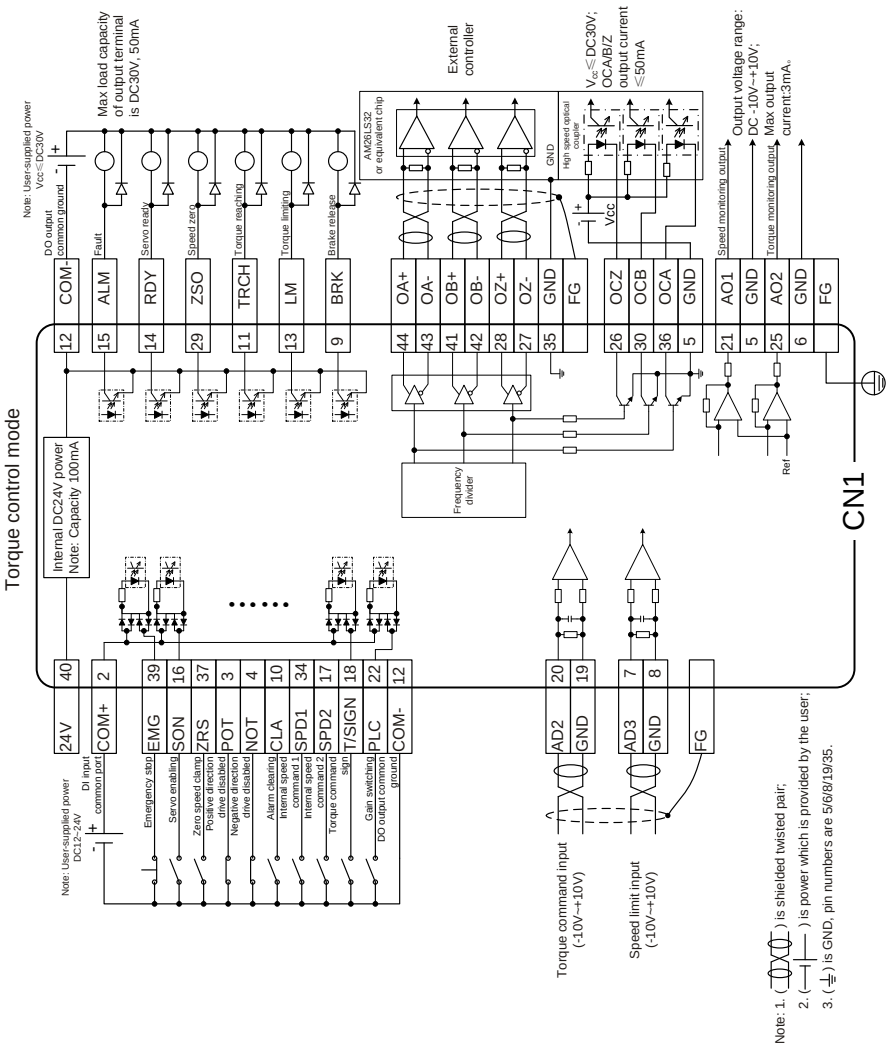
4.1 Standard wiring of the position mode



4.2 Standard wiring of the speed mode

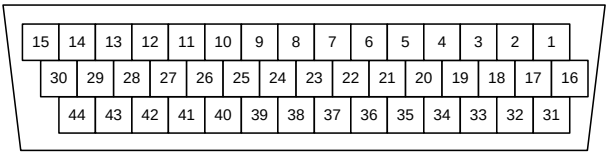


4.3 Standard wiring of the torque mode

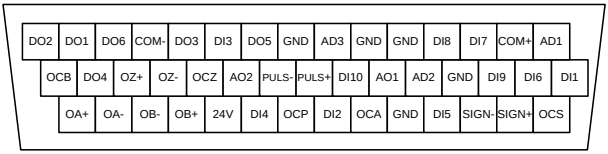


4.4 CN1 function instruction

4.4.1 Pins of CN1 terminal



CN1 plug pin layout



CN1 plug signal layout

4.4.2 Definition of CN1 terminals

Pin	Sign	Function	Pin	Sign	Function
1	AD1	Analog input 1	23	PULS+	Differential command pulse +
2	COM+	DI input common port	24	PULS-	Differential command pulse -
3	DI7	Digital input 7	25	AO2	Analog output 2
4	DI8	Digital input 8	26	OCZ	Open collector output of Z phase
5	GND	Analog signal ground	27	OZ-	Differential output - of Z phase
6	GND	Analog signal ground	28	OZ+	Differential output + of Z phase
7	AD3	Analog input 3	29	DO4	Digital output 4
8	GND	Analog signal ground	30	OCB	Open collector output of B phase
9	DO5	Digital output 5	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	COM-	DO output common ground	34	DI5	Digital input 5
13	DO6	Digital output 6	35	GND	Analog signal ground
14	DO1	Digital output 1	36	OCA	Open collector output of A phase
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	24V	Internal 24V power supply
19	GND	Analog signal ground	41	OB+	Differential output + of B phase
20	AD2	Analog input 2	42	OB-	Differential output - of B phase
21	AO1	Analog output 1	43	OA-	Differential output - of A phase
22	DI10	Digital input 10	44	OA+	Differential output + of A phase

4.4.3 Power supply signal

Sign	Pin no.	Name	Function
24V	40	Internal 24V power supply	COM- is the ground terminal of the 24V power. Its capacity is 100mA. If the actual load is higher than this value, the user shall provide the power supply by themselves.
GND	5,6,8,19,35	Signal ground	The ground of the internal power supply (except the 24V power supply) of the servo drive, it is also the ground of the phase A/B/Z open-collector signal of the encoder and the analog output signal. It is isolated from COM-.
COM+	2	DI input common port	● If DI is active-low (0V), COM+ connects to internal 24V power (pin 40) or external DC power (12V~24V); ● If DI is active-high (12V~24V), COM+ connects to the reference ground of corresponding signal.
COM-	12	DO output common ground	● Local 24V power ground ● If external DC power 12V~24V is used, power 0V is connected to this terminal.
FG	Enclosure	Enclosure ground	The enclosure of CN1 terminal is connected with the enclosure of the drive

4.4.4 Configuration table for different digital modes

Symbol	Pin no.	Name	Position/fully-closed loop mode			Speed mode		
			Default value	Mark	Function name	Default value	Mark	Function name
DI1	16	Digital input 1	0x003	SON	Servo enabling	0x003	SON	Servo enabling
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	Molecule 1 of electric gear ratio	0x00A	SPD1	Internal speed command 1
DI6	17	Digital input 6	0x01A	SC2	Molecule 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

Symbol	Pin no.	Name	Position/fully-closed loop mode			Speed mode		
			Default value	Mark	Function name	Default value	Mark	Function name
DI9	18	Digital input 9	0x007	RPC	Retention pulse clearing	0x00E	S-SIGN	Speed command sign
DI10	22	Digital input 10	0x008	PLL	Command pulse disabled	0x006	PLC	Gain switching
DO1	14	Digital output 1	0x001	RDY	Servo ready output	0x001	RDY	Servo ready output
DO2	15	Digital output 2	0x003	ALM	Fault output	0x003	ALM	Fault output
DO3	11	Digital output 3	0x007	PLR	Positioning finished	0x009	COIN	Speed matching
DO4	29	Digital output 4	0x00D	ZSO	Speed zero output	0x00D	ZSO	Speed zero output
DO5	9	Digital output 5	0x005	BRK	External brake release signal	0x005	BRK	External brake release signal
DO6	13	Digital output 6	0x00E	LM	Torque limiting	0x00E	LM	Torque limiting

Symbol	Pin no.	Name	Torque mode			MotionNet mode		
			Default value	Mark	Function name	Default value	Mark	Function name
DI1	16	Digital input 1	0x003	SON	Servo enabling	0x000	OFF	Invalid
DI2	37	Digital input 2	0x00D	ZRS	Zero speed clamp	0x000	OFF	Invalid
DI3	10	Digital input 3	0x004	CLA	Alarm clearing	0x000	OFF	Invalid
DI4	39	Digital input 4	0x016	EMG	Emergency stop	0x000	OFF	Invalid
DI5	34	Digital input 5	0x00A	SPD1	Internal speed command 1	0x000	OFF	Invalid
DI6	17	Digital input 6	0x00B	SPD2	Internal speed command 2	0x103	SON	Servo enabling
DI7	3	Digital input 7	0x001	POT	Positive direction drive disabled	0x107	RPC	Retention pulse clearing
DI8	4	Digital input 8	0x002	NOT	Negative direction drive disabled	0x104	CLA	Alarm clearing
DI9	18	Digital input 9	0x00F	T-SIGN	Torque command sign	0x116	EMG	Emergency stop
DI10	22	Digital input 10	0x006	PLC	Gain switching	0x000	OFF	Invalid
DO1	14	Digital output 1	0x001	RDY	Servo ready output	0x005	BRK	External brake release signal

Symbol	Pin no.	Name	Torque mode			MotionNet mode		
			Default value	Mark	Function name	Default value	Mark	Function name
DO2	15	Digital output 2	0x003	ALM	Fault output	0x001	RDY	Servo ready output
DO3	11	Digital output 3	0x010	TRCH	Torque reaching	0x003	ALM	Fault output
DO4	29	Digital output 4	0x00D	ZSO	Speed zero output	0x007	PLR	Positioning finished
DO5	9	Digital output 5	0x005	BRK	External brake release signal	0x00D	ZSO	Speed zero output
DO6	13	Digital output 6	0x00E	LM	Torque limiting	0x00E	LM	Torque limiting

4.4.4.1 Function description of the digital input:

Signal name	Sign	Function number	Available mode			
Positive direction drive disabled	POT	0x01	P	S	T	F
Negative direction drive disabled	NOT	0x02	P	S	T	F
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; P3.40 is 2, and prohibition of positive/negative drive input is valid, the drive alarms.						

Signal name	Sign	Function number	Available mode			
Servo enabling	SON	0x03	P	S	T	F
This function is 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	Sign	Function number	Available mode			
Alarm clearing	CLA	0x04	P	S	T	F
This function is the control signal of alarm clearing when the drive alarms. Some alarms cannot be cleared by this function. Please refer to chapter 10.4 for detailed information.						

Signal name	Sign	Function number	Available mode			
Control mode switching	MCH	0x05	P	S	T	
This function is 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	Sign	Function number	Available mode			
Gain switching	PLC	0x06	P	S	T	F
This function is the control signal of 1st and 2nd gain switching.						

Signal name	Sign	Function number	Available mode			
Retention pulse clearing	RPC	0x07	P			F
This function is 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	Sign	Function number	Available mode			
Command pulse disabled	PLL	0x08	P			F
This function is the control signal of stopping receiving the command pulse and the detailed operation is relative to the setting of P3.44. P3.44 is 0, the function is valid and when P3.44 is 1, the function is invalid.						

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

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

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

Control mode	P0.40 setting value	SPD3	SPD2	SPD1	Parameters and setting 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	Sign	Function number	Available mode			
Zero speed clamp	ZRS	0x0D		S	T	
This function serves as the control signal of zero speed clamp and please refer to P0.58 for detailed information.						

Signal name	Sign	Function number	Available mode			
Speed command sign	S-SIGN	0x0E		S		
This function is 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	Sign	Function number	Available mode			
Torque command sign	T-SIGN	0x0F			T	
This function is 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	Sign	Function number	Available 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 selections of 0~127 in the PTP (point-to-point) control mode. It has the same function with P5.20 and is valid when P0.20 is 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	Parameters and setting value
Position mode	0	0	0	0	0	0	0	PtP0.01[0th position]
	0	0	0	0	0	0	1	PtP0.03[1st position]
	0	0	0	0	0	1	0	PtP0.05[2nd position]
	0	0	0	0	0	1	1	PtP0.07[3rd position]
	0	0	0	0	1	0	0	PtP0.09[4th position]
	0	0	0	0	1	0	1	PtP0.11[5th position]
	0	0	0	0	1	1	0	PtP0.13[6th position]
	0	0	0	0	1	1	1	PtP0.15[7th position]
	0	0	0	1	0	0	0	PtP0.17[8th position]
	0	0	0	1	0	0	1	PtP0.19[9th position]
	0	0	0	1	0	1	0	PtP0.21[10th position]
	0	0	0	1	0	1	1	PtP0.23[11th position]
	0	0	0	1	1	0	0	PtP0.25[12th position]
	x	x	x	x	x	x	x	xxx

	1	1	1	1	1	1	0	PtP2.53[126th position]
	1	1	1	1	1	1	1	PtP2.55[127th position]

Signal name	Sign	Function number	Available mode			
External fault	EXT	0x14	P	S	T	F
This function is the signal of external input fault alarm. If the digital input is valid, the drive will report Er10-3 and stop.						

Signal name	Sign	Function number	Available mode			
Inertia ratio switching	JC	0x15	P	S	T	F
This function is 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	Sign	Function number	Available mode			
Emergency stop	EMG	0x16	P	S	T	F
This function is 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	Sign	Function number	Available mode			
HOME switch input	HOME	0x17	P			
This function is 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 is finished. Refer to P5.10 for information.						

Signal name	Sign	Function number	Available mode			
HOME trigger	HTRG	0x18	P			
This function is the trigger control signal of HOME function, and the rising edge is valid. In the bus control mode, the digital input function has the same function with P5.15.						

Signal name	Sign	Function number	Available mode			
Molecule 1 of electric gear ratio	SC1	0x19	P			F
Molecule 2 of electric gear ratio	SC2	0x1A	P			F

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 to 0.

SC1	SC2	Electric gear ratio	
		Molecule	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	Sign	Function number	Available mode			
PTP control trigger	TRIG	0x1B	P			
In the PTP control mode, it needs to be used with internal position command 1~4. During using, select the target step by the internal position command selection 1~4, and then trigger the switching action selected by target step via the rising edging of this digital value.						

Signal name	Sign	Function number	Available mode			
Vibration control switching input	VS-SEL	0x1C	P			F
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	Sign	Function number	Available mode			
Fast stop	Q-STOP	0x1D	P	S	T	F
This function is 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	Sign	Function number	Available mode			
PTP control stop	PTP-ST	0x1E	P			
This function is 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 100.						

Signal name	Sign	Function number	Available mode			
Absolute position clearing	PCLR	0x1F	P			
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	Sign	Function number	Available mode			
Forward jogging	FJOG	0x23	P			
This function is forward jogging. When this digital input is valid, forward jogging operation will be applied.						

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

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

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

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

Signal name	Sign	Function number	Available mode			
Master gantry synchronization alignment sensor	GSM	0x2E	P			
Master gantry synchronization alignment sensor						

Signal name	Sign	Function number	Available mode			
Slave gantry synchronization alignment sensor	GSS	0x2F	P			
Slave gantry synchronization alignment sensor						

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

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

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

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

4.4.4.2 Digital output instruction:

Signal name	Sign	Function number	Available mode			
Servo ready output	RDY	0x01	P	S	T	F
This function is 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	Sign	Function number	Available mode			
Servo operation output	RUN	0x02	P	S	T	F
This function is the state signal of the enabled drive. When valid, the motor is power on.						

Signal name	Sign	Function number	Available mode			
Fault output	ALM	0x03	P	S	T	F

The function is the state signal when the drive displays the fault alarm.
When it is valid, the drive has fault.

Signal name	Sign	Function number	Available mode			
External brake release signal	BRK	0x05	P	S	T	F
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	Sign	Function number	Available mode			
Position command or not	PCMD	0x06	P			F
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	Sign	Function number	Available mode			
Positioning finished	PLR	0x07	P			F
The function is the state signal of positioning finished. When it is valid, the positioning is finished.						

Signal name	Sign	Function number	Available mode			
Control mode switching	MCHS	0x08	P	S	T	
This function is 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	Sign	Function number	Available mode			
Speed matching	COIN	0x09	P	S	T	F
The function is the state signal of speed matching. When it is valid, the deviation between current speed feedback and speed command is in the range of P3.53.						

Signal name	Sign	Function number	Available mode			
Speed reaching	SR	0x0A	P	S	T	F
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	Sign	Function number	Available mode			
Speed limiting	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	Sign	Function number	Available mode			
Speed command or not	SCMD	0x0C	P	S	T	F

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	Sign	Function number	Available mode			
Speed zero output	ZSO	0x0D	P	S	T	F
The function is the state signal of whether the current speed feedback is 0.						

Signal name	Sign	Function number	Available mode			
Torque limiting	LM	0x0E	P	S	T	F
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	Sign	Function number	Available mode			
Zeroing finished	HEND	0x0F	P			
The function is the state signal of zero finished. When it is valid, the drive has finished returning to zero and found zero position successfully.						

Signal name	Sign	Function number	Available 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	Sign	Function number	Available mode			
PTP arrival	PTPF	0x16	P			
This function is output PTP arrival signal.						

Signal name	Sign	Function number	Available mode			
PTP output 1	PTPO1	0x17	P			
This function is output PTP output 1 signal.						

Signal name	Sign	Function number	Available mode			
PTP output 2	PTPO2	0x18	P			
This function is output PTP output 2 signal.						

Signal name	Sign	Function number	Available mode			
PTP output 3	PTPO3	0x19	P			
This function is output PTP output 3 signal.						

Signal name	Sign	Function number	Available mode			
PTP output 4	PTPO4	0x1A	P			
This function is output PTP output 4 signal.						

Signal name	Sign	Function number	Available mode			
PTP output 5	PTPO5	0x1B	P			

This function is output PTP output 5 signal.

Signal name	Sign	Function number	Available mode			
PTP output 6	PTPO6	0x1C	P			
This function is output PTP output 6 signal.						

Signal name	Sign	Function number	Available mode			
PTP output 7	PTPO7	0x1D	P			
This function is output PTP output 7 signal.						

Signal name	Sign	Function number	Available mode			
Gantry synchronization output clear	GSC	0x1E	P			
This function is to output the clearance signal of gantry synchronization						

Signal name	Sign	Function number	Available mode			
Dynamic brake relay control	DBRC	0x1F	P	S	T	F
This function is output dynamic brake relay control signal.						

4.4.5 Pulse input signals and functions

Sign	Pin no.	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		

4.4.6 Analog input signals and functions

Sign	Pin no.	Name	Default value	Function name	Function
AD1	1	Analog input 1	0x00	Invalid	● Precision of AD1 is 16-bit and precision of AD2,AD3 is 12-bit. ● If standard model (there is “-S” in the drive nameplate) is used as the speed control, AD1 channel is invalid, please take AD3 as the speed command input terminal and modify P3.70 to “speed command”. ● External analog input terminals. The input impedance is 10kΩ. 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.
AD2	20	Analog input 2	0x03	Speed command	
AD3	7	Analog input 3	0x04	Torque command	
GND	5,6,8, 19,35	Signal ground	-	-	

4.4.7 Encoder output signals and functions

Sign	Pin no.	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 B leads phase A by 90º. When it rotates in reverse, phase A leads phase B by 90º. ● 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

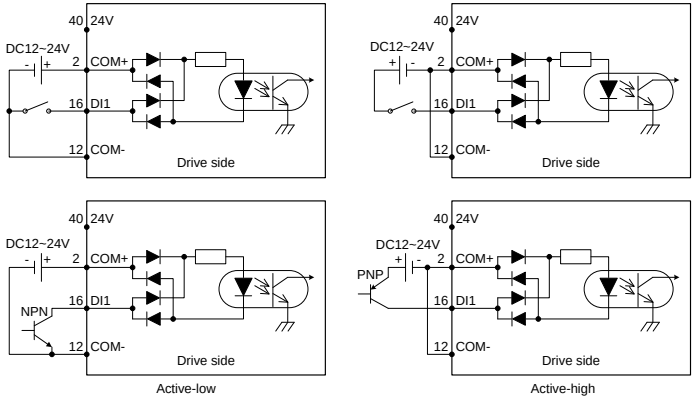
4.4.8 Analog output signals and functions

Sign	Pin no.	Name	Function
AO1	21	Analog output 1	Its output function definition can be set, and the range and offset settings can be set.
AO2	25	Analog output 2	Its output function definition can be set, and the range and offset settings can be set.

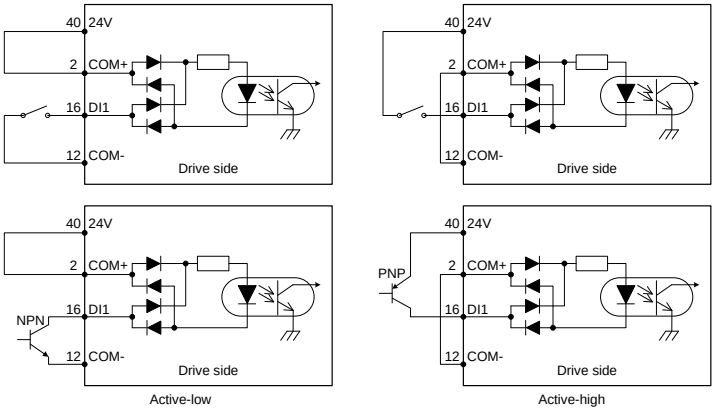
4.5 CN1 wiring instruction

4.5.1 Wiring of digital input circuit

Connection diagram when the power supply is provided by user:



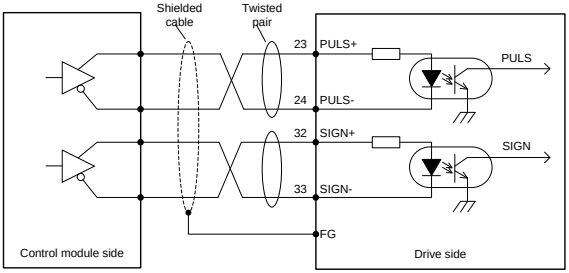
Connection diagram when the local power supply is used:



- As shown in above figure, digital input circuit supports mechanical switch connection mode and open collector connection mode of triode (NPN type and PNP type, mixed-use of these two types is not allowed);
- Users can use either the 24V power supply carried by the servo drive (it only can provide 100mA current) or 12V~24V power supply provided by the user.

4.5.2 Wiring of the pulse input circuit

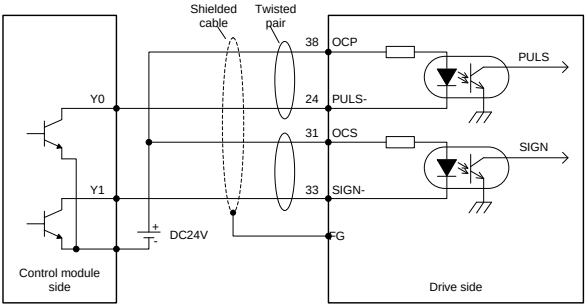
Connect mode 1: Differential mode



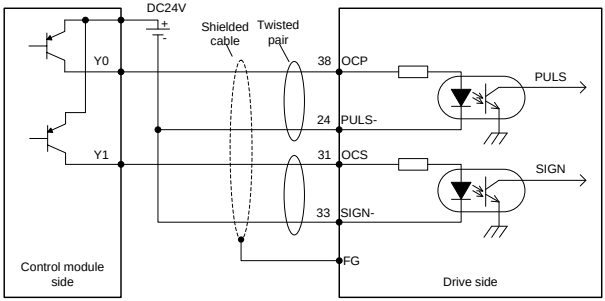
- The maximum frequency of input pulse is 4MHz and the input signal voltage is ±5V;
- With the best anti-noise capability, this signal transmit method is recommended as the preferred.

Connection mode 2: Open collector mode 1

The control module is NPN (common cathode)



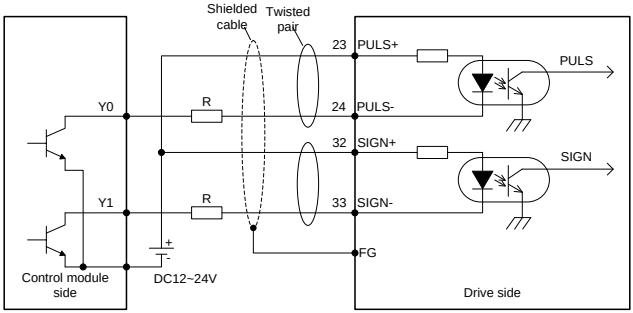
The control module is PNP module (common anode):



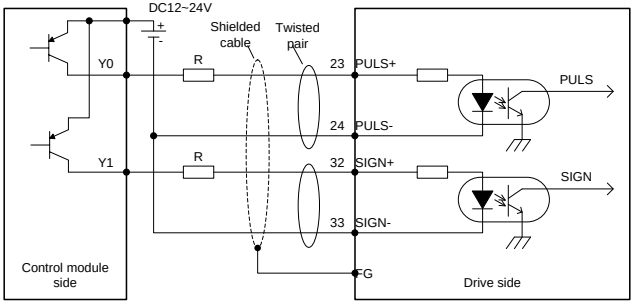
- The max. input pulse frequency is 200kHz; if the local 24V power supply (it only can provide 100mA current) or the 24V power supply provided by the user is used, there is no need to connect to current limit resistor. Generally, most of Japanese PLC is NPN module, while most of European PLC is PNP module.

Connection mode 3: Open collector mode 2

The control module is NPN (common cathode):



The control module is PNP (common anode):



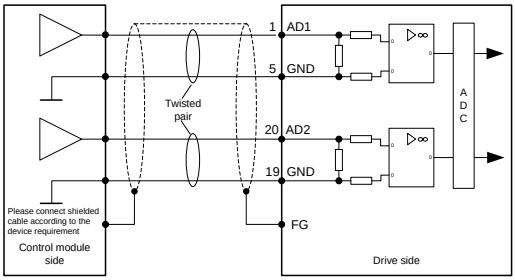
- The input pulse frequency is 200kHz; if the local 24V power supply (it only can provide 100mA current) or the 12~24V power supply provided by the user is used, it is required to connect to current-limiting resistor R(the resistance is selected as the below table).

V_{DC}	R parameter
12V	1kΩ,1/4W
24V	2kΩ,1/3W

$$\frac{V_{DC}-1.5}{R+68} \approx 10(mA)$$

For all the 3 methods, shielded twisted-pair must be used and the length should be less than 3m.

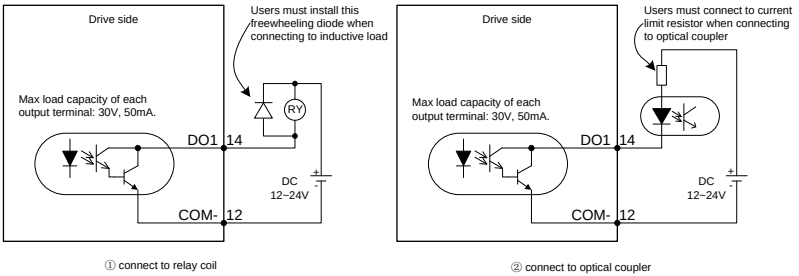
4.5.3 Wiring of the analog input circuit



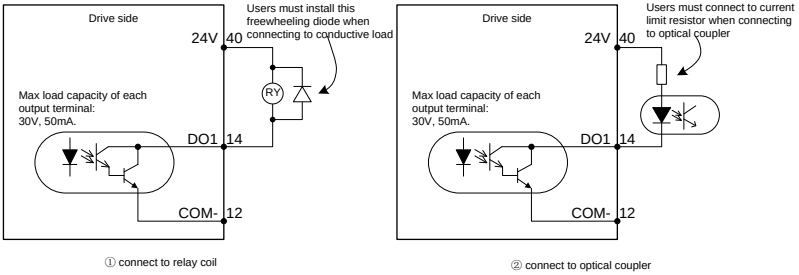
- There are three analog input circuits, AD1, AD2 and AD3, precision of AD1 is 16-bit (optional for standard models), precision of AD2 and AD3 is 12-bit (standard). The input impedance is 10kΩ. The input voltage range is -10V~+10V. If the voltage is higher than ±11V, the circuits may be damaged.
- If the non-standard model is used as the speed control, AD1 channel is invalid, please take AD3 as the speed command input terminal and modify P3.70 to “speed command”.

4.5.4 Wiring of digital output circuit

Connection diagram when the power supply is provided by user:



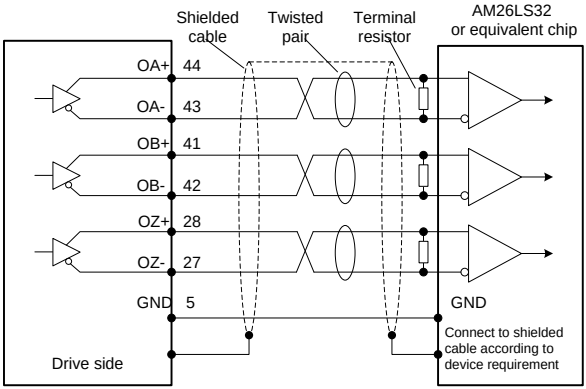
Connection method when the local power supply is used:



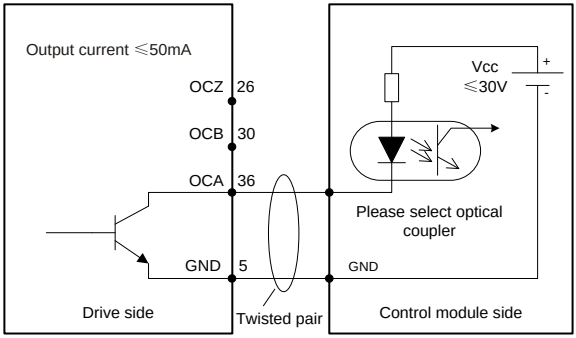
- There are 6 digital output circuits in total and all of them adopt the open-collector output as shown in the figure. They can be used to drive the relay coil or optical coupled load. The loading capacity is shown in the figure.
- When inductive loads such as relay coil are connected, a free wheel diode must be fitted as shown in the figure; when optical coupler is connected, current limit resistor must be connected, otherwise the drive will be damaged.
- The local 24V power supply only can provide 100mA current. If the actual load current is larger than 100mA, the user should provide the power supply by themselves. The recommended capacity is greater than 500mA.

4.5.5 Wiring of frequency division output circuit of encoder feedback signal

Differential mode:

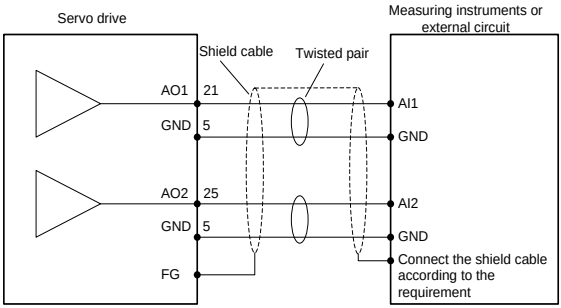


Open-collector mode:



- Phase A, B and Z all provide differential output and open-collector output signals.
- For differential output signal, it is recommended to use AM26C32 or equivalent differential receiving chip and be sure to fit a terminal matching resistor of about 230Ω.
- For the phase A, B, Z signal of open-collector output, as the signal pulse width is very narrow, the user shall use high speed optical coupler to receive this signal.
- Both output circuits have no isolation.

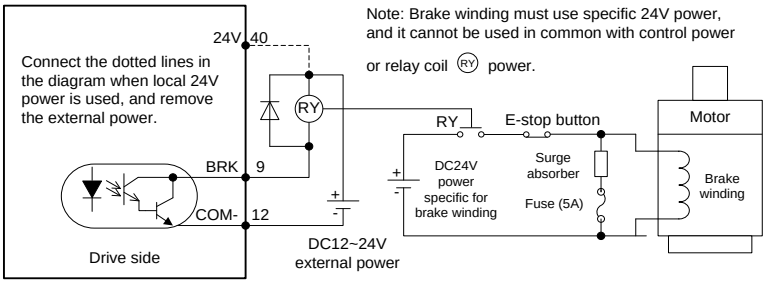
4.5.6 Wiring of the analog output circuit



- There are two analog output circuits in all. The output voltage range is -10V~10V. The Max output current is 3mA.

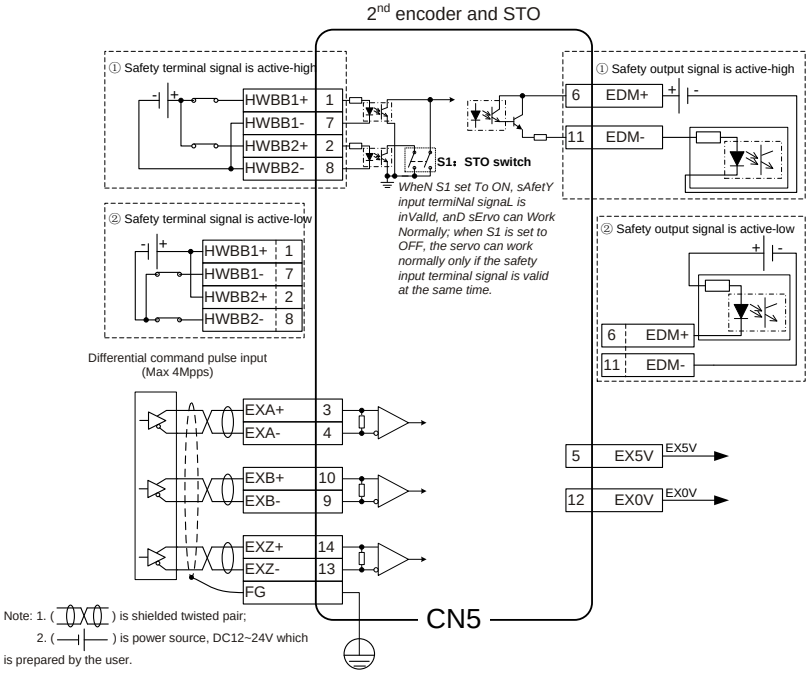
4.5.7 Wiring of the electromagnetic brake

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:



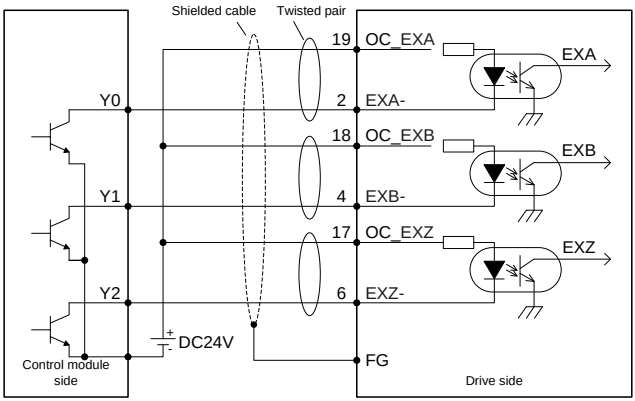
- 24V power supply specific for the electromagnetic brake cannot be used with the power supply for control signal;
- (RY) is the relay coil, please pay attention to the direction of the diode;
- The electromagnetic brake is used to keep the speed, other than stop;
- Please install the external braking devices besides the electromagnetic brake.

4.6 CN5 wiring diagram

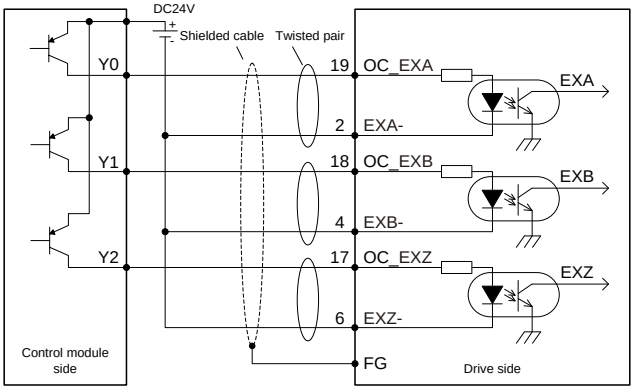


Connection mode 2: Open collector mode 1

Control module is NPN type (common cathode):



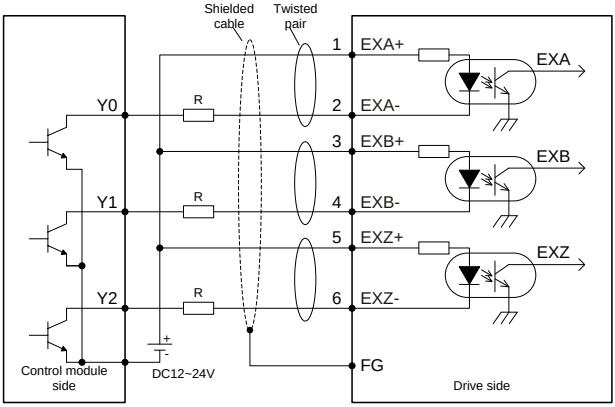
Control module is PNP type (common anode):



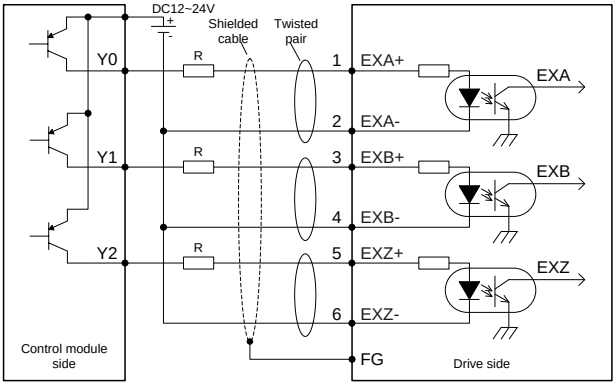
- Max input pulse frequency is 200kHz; if the local 24V power of SRV-63 (only 100mA power is available) or the 24V power provided by the user is used, there is no need to connect current limit resistor. Generally, PLC of Japanese brands mainly adopts NPN type while PLC under European brands mainly adopts PNP type.

Connection mode 3: Open collector mode 2

Control module is NPN type (common cathode):



Control mode is PNP type (common cathode):



- Max input pulse frequency is 200kHz; if the local 24V power of SRV-63 (only 100mA power is available) or the 24V power provided by the user is used, it is required to connect to current limit resistor R.

V_{DC}	R parameter
12V	1kΩ,1/4W
24V	2kΩ,1/3W

$$\frac{V_{DC}-1.5}{R+68} \approx 10(mA)$$

These three connection modes all require shielded twisted pair whose length should be less than 3m.

Chapter 5 Running and operation

5.1 Running

5.1.1 First powering on

Please check following items before power on:

1) Wiring

- The power supply of the servo drive (L1, L2, L3, L1C, L2C or R, S and T) should be connect with 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, L2, L3, R, S and T);
- 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, the short connection cable between B2-B3 must be removed;
- Do not put voltage above DC24V on CN1;
- The cable stress is within the designated range.

2) Environment

- There are no foreign objections, such as metal and other wire lead which can cause short connection of signal and power wires.

3) 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).

If all above items are checked OK, switch on the power supply:

5.1.1.1 Sequence of powering ON/OFF

The control circuit and the main circuit of the drive are supplied separately. In principle, when powering on, switch on the power supply of the control circuit (terminals L1C, L2C) first and then switch on the power supply of the main circuit (terminals L1, L2, L3). When powering off, switch off the power supply of the main circuit first and then switch off the power supply of the control circuit.

After switching on the control circuit power supply and before switching on the main circuit power supply, R0.30 will display "0" and after power on of the main circuit, R0.30 will display "2" and the servo drive can be enabled.

5.1.1.2 Checking after powering-on

After switching on both of the control circuit and main circuit power supplies, if the power supply is OK, the LED indicator will display 0 first and then display 8. If there is no fault alarm of the servo drive, the LED on the front panel displays the current speed of the servo motor as default. The default parameter can be set through parameter P0.15. If there is a fault of the servo drive, the LED displays current alarm sign and flickers. Please fix the fault by referring to chapter 9.

5.1.1.3 Set the motor code

Before enabling operation, please set P0.00 according to the motor code on motor nameplate, otherwise, the motor may operate abnormally or reversely and cause safety issues.

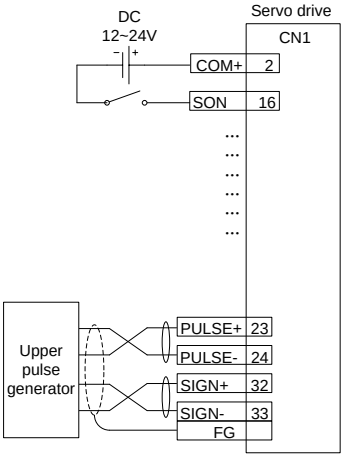
5.1.2 Trial jogging

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 chapter 5.2.5 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 and P0.56, P0.57.

5.1.3 Running at the position control mode

Simple connection:



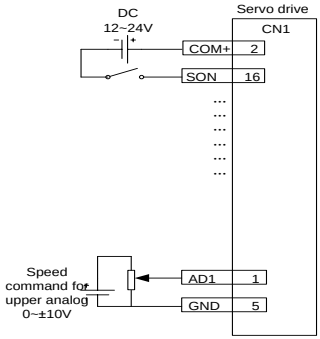
Parameter	Function	Setting value
P0.03[1]	Control mode selection	0
P0.22[1]	Pulse number per motor resolution	Set according to the requirement
P0.23[1]	Pulse input	Set according to the requirement
P0.24[1]	Reverse of pulse input direction	0

Steps:

1. Complete the connection between the drive and the servo motor.
2. Set P0.03 to “0”, the position control mode.
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.
4. Disconnect the control power supply after the modification of P0.03, P0.23 and then power on again.
5. Connect CN1 to the drive and apply the power supply. Control the connection between SON and COM-. And then, the servo enters into the locking state.
6. Send the low frequency pulse command from the upper controller and rotate the motor at low speed.
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.
8. Ensure the pulse number is as the designated. Please refer to the instruction of P0.22, P0.25 and P0.26.

5.1.4 Running at the speed control mode

Simple connection



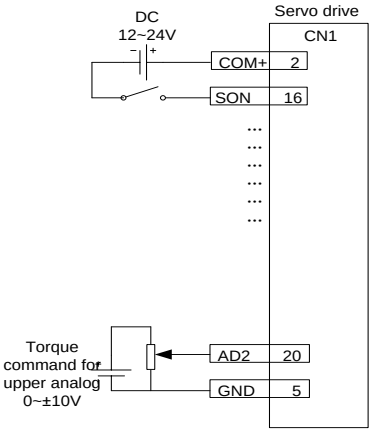
Parameter	Function	Setting value
P0.03[1]	Control mode selection	1
P0.40	Speed command selection	1
P0.42	Analog input 1 gain	500
P3.20	Analog speed command offset	Set according to the requirement

Steps:

1. Complete the connection between the drive and the servo motor.
2. Set P0.03 to “1”, the speed control mode.
3. It is necessary to disconnect the control power supply after saving the modified value of P0.03. And it will be valid after repowering on.
4. Set P0.40 to “1”, external analog speed command mode.
5. Set P0.42 to the required value. Please refer to the instruction of P0.42.
6. Connect the corresponding terminals of CN1.
7. Connect the CN1 to the drive and power on. Control the connection between SON and COM-. Then the servo enters into the locking state.
8. 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.

5.1.5 Running at the torque control mode

Simple connection:



Parameter	Function	Setting value
P0.03[1]	Mode selection	2
P0.60	Torque command selection	1
P0.61	Torque command direction selection	Set according to requirement
P0.62	Analog input 2 gain	10
P3.23	Analog input 2 offset	Set according to requirement
P0.46	Speed limit 1	100

Steps:

1. Complete the connection between the drive and the servo motor.
2. Set P0.03 to “2”, the torque control mode.
3. It is necessary to disconnect the control power supply after saving the modified value of P0.03. And it will be valid after repowering on.
4. Set P0.60 to “1”, external analog torque command mode.
5. Set P0.61 to the required value. Please refer to the instruction of P0.61.
6. Set P0.62 to the required value. Please refer to the instruction of P0.62.
7. Connect the corresponding terminals of CN1.
8. Connect the CN1 to the drive and power on. Control the connection between SON and COM-. Then the servo enters into the locking state.
9. 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.
10. 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.

5.1.6 Parameter setting 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 6 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:

1) Mode setting

The control mode (position mode, speed mode, torque mode, fully-closed loop 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.

2) 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, fully-closed loop 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.

5.1.7 Servo enabling

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.
When servo enabling:

- If no alarm occurs, the panel will display the default monitoring parameters;
- The fan starts to run;
- In position, fully-closed loop 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.

5.1.8 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.

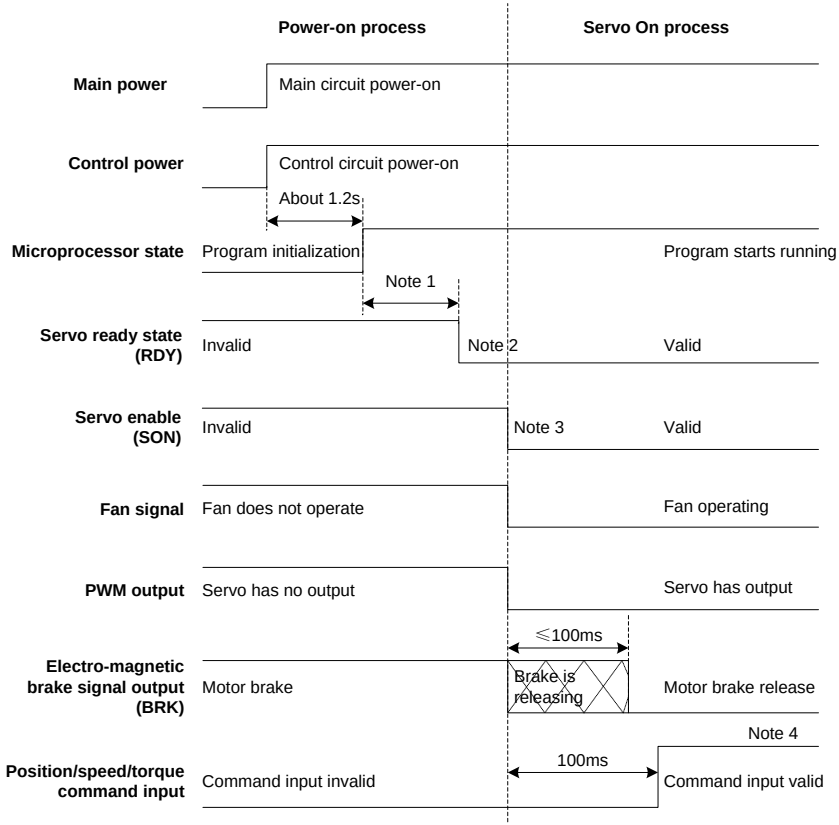
- When the servo enabling terminal (SON) signal is set to OFF, the servo motor will stop. Select the stopping method through setting parameter P4.30. See description of P4.30 for details. This process will not cause regenerative braking.
- When a fault alarm occurs, the servo motor will stop. Select the stopping method of the servo

motor when an alarm occurs through setting parameter P4.30. See description of P4.30 for details. 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 with proper external braking resistor.
- If the travellimit 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.

5.1.9 Sequence diagram

5.1.9.1 Sequence diagram of power-on and servo ON



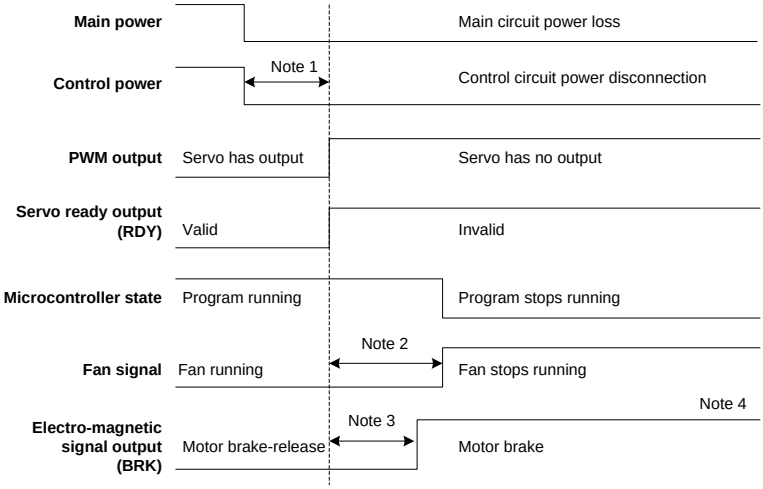
Note 1: The delay time from the completion of microprocessor initialization to the readiness of servo output can be set via P4.54;

Note 2: The condition for the RDY output signal electric leveL to become low is: servo has no fault and main circuit DC voltage has been established (voltage is higher than 250V/430V (220V series/400V series)); when the main circuit DC voltage is less than 170V/310V (220V series/400V series), Er13-1 alarm will occur. The time interval from the readiness of servo and enabling of servo can be controlled by users;

Note 3: The servo enable signal can become valid only when RDY output signal is valid;

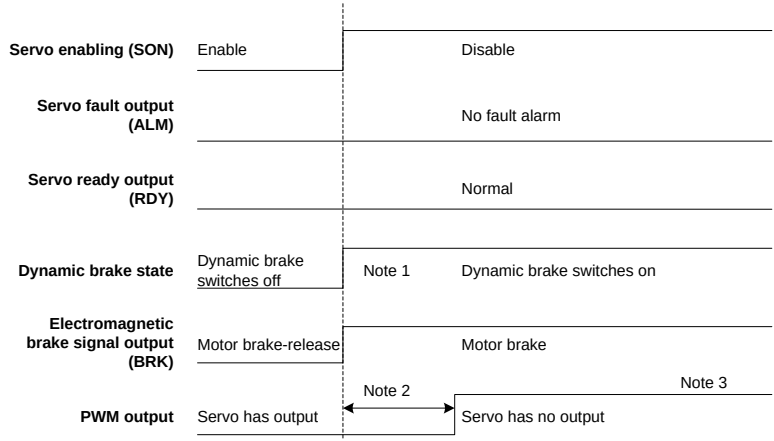
Note 4: The actual electric level corresponding to the IO valid state can be set via P3.00~P3.15.

5.1.9.2 Sequence diagram of power loss during running



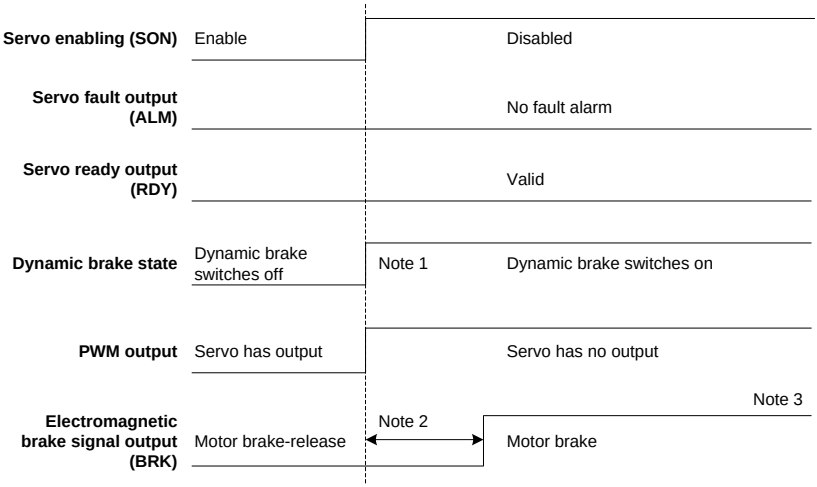
Note 1: If the voltage of the control circuit is less than 170V/330V(220V series/400V series), the undervoltage fault will occur and the output level of the servo fault (ALM) will increase;
Note 2: If the drive temperature is Less than 45 ℃, the fan stops, if the drive temperature is higher than 45 ℃, the fan will stop after the micro processor stops;
Note 3: The electromagnetic brake signal iS set by P3.57; if the speed is less than the setting value of P3.58 during the time of P3.57, the BRK signal will become valid;
Note 4: The actual level corresponding to input/output valid state can be set by P3.00~P3.15

5.1.9.3 Servo OFF sequence in a locked state



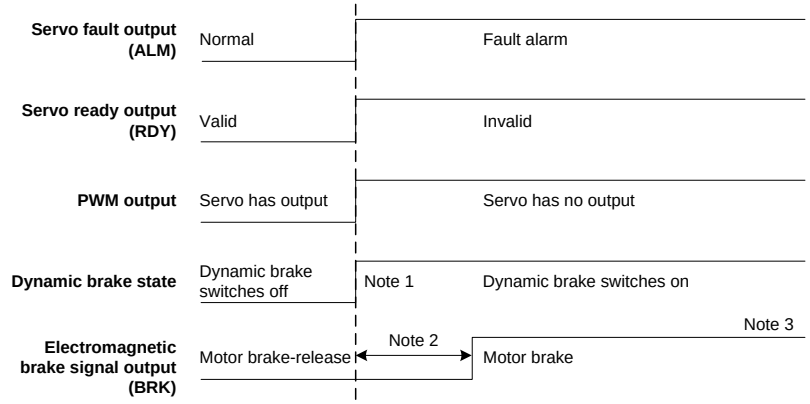
Note 1: The startup of dynamic brake can be set by P4.30;
Note 2: The servo locking time after braking can be set by P3.56;
Note 3: The actual electric level corresponding to I/O valid state can be set by P3.00~P3.15.

5.1.9.4 Servo OFF sequence in running state



Note 1: The switch on/off of the dynamic brake can be controlled by P4.30;
Note 2: The electromagnetic brake signal iS set by P3.57; if the speed is less than the setting value of P3.58 during the time of P3.57, the BRK signal will become valid;
Note 3: The actual Electric level corresponding to input/output valid state Can be set by P3.00~P3.15.

5.1.9.5 Sequence of fault alarm

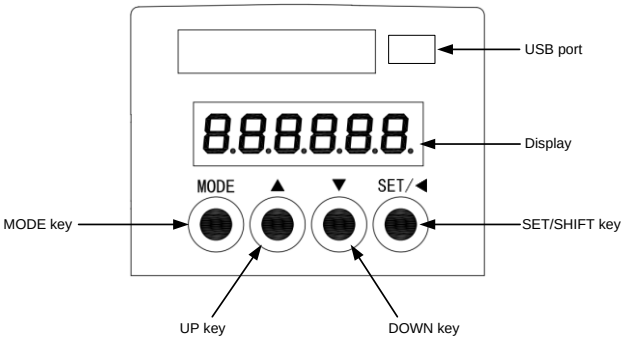


Note 1: The switch on/off of the dynamic brake can be controlled by P4.30;
Note 2: The electromagnetic brake signal iS set by P3.57; if the speed is less than the setting value of P3.58 during the time of P3.57, the BRK signal will become valid;
Note 3: The actual Electric level corresponding to input/output valid state Can be set by P3.00~P3.15.

5.2 Display and operation

5.2.1 Display

Keypad diagram:



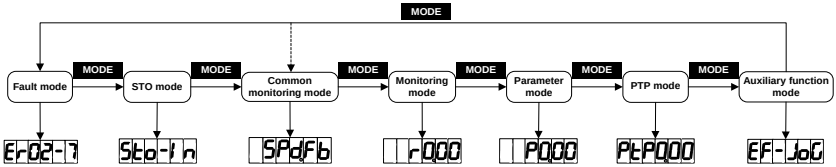
LED display character (reference table):

LED display character	Corresponding symbol	LED display character	Corresponding symbol	LED display character	Corresponding symbol	LED display character	Corresponding symbol
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
n	m	h	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				

Button function table:

Key	Function
MODE	Used to switch between different modes or return to previous menu
UP	Used to select parameter upwards or increase value
DOWN	Used to select parameter downwards or decrease value
SET/SHIFT	**Press for a long time =SET** (about 0.6 seconds) Used to select parameter downwards or decrease value **Press for a short time =SHIFT:** When setting a parameter, it is used to select the position of the current digit

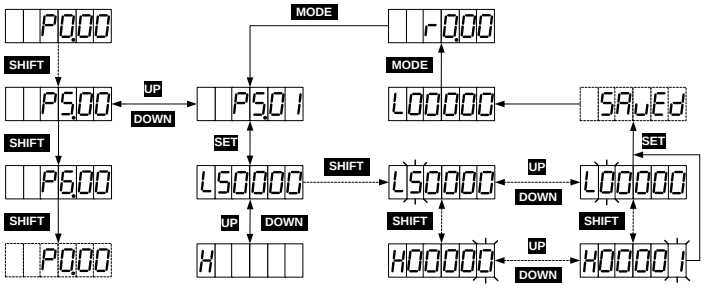
Operation flowchart:



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

1. 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.
2. 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.
3. 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.
4. 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.
5. In the parameters setting mode, pressing **SHIFT** to make the flickering words move left and use the **UP/DOWN** key to modify the setting value of the high bit.
6. After parameters setting, pressing **SET** key to save the parameters or execute the commands.
7. After parameters setting, the screen will display  (for storage parameter and when P0.17 is set to 0 [individual storage]) or  (for non-storage parameter or P0.17 is set to 1 [batch storage]), and then return to the parameters mode automatically.

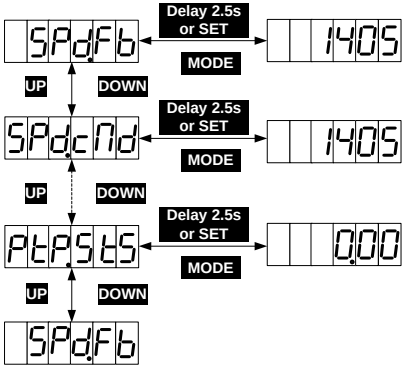
8. Setting of long parameters (corresponds to parameters with over 6 digits) in parameter area:



5.2.2 State monitoring mode

After power on, the screen will enter into “General monitoring mode”, display the parameters name for about 2.5 seconds and then display the current value. After pressing **MODE** key, **UP/DOWN** key can be used to switch monitoring parameters. See chapter 10.3 *Common monitoring parameter table* 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 20 seconds.

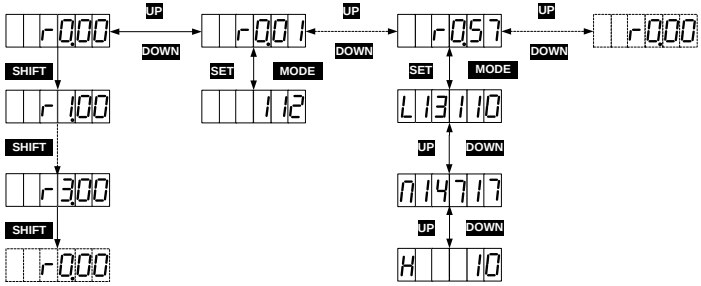
Operation flowchart:



5.2.3 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

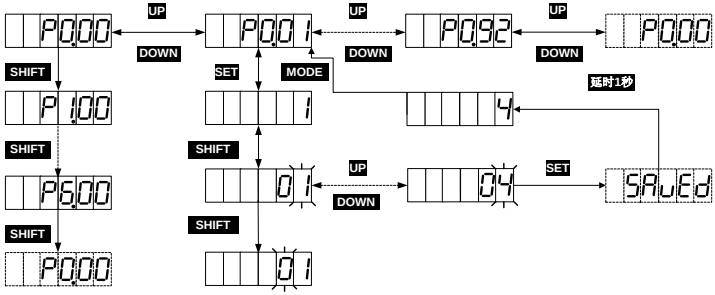
the displaying interface. If no operation in R3 menu interface, it will return to the monitoring interface in 20 seconds. If no operation in R0 and R1 menu interface, it will stay on the displaying interface. Operation flowchart:



5.2.4 Parameter setting

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 finding the target, **SET** key can be used to view the current value and **SHIFT** key to the parameters setting. In the setting interface, **UP/DOWN** key can be used to set the value, **SHIFT** key can be used to select the setting bit. After setting, press **SET** key to save the parameters. After finishing, the screen will display SAVED (for storage parameters and P0.17 is set to 0) or SUCCESS (for non-storage parameter or P0.17 is set to 1), and then return to the parameters mode automatically.

Operation flowchart:



5.2.5 Auxiliary function instruction

5.2.5.1 Auxiliary function menu

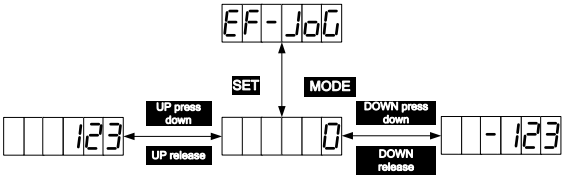
Press **MODE** to the auxiliary mode and press **UP/DOWN** to select auxiliary functions, the auxiliary function table is shown below:

Sign	Name
EF-JoG	Jogging test
EF-dAF	Restore the factory parameter
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.

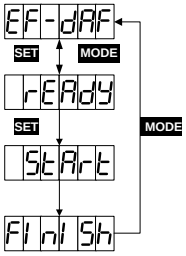
5.2.5.2 Operation flowchart of trial jogging

Press **MODE** key to switch to the auxiliary function mode. Press **UP/DOWN** key to the EF-JoG menu, and press **SET** key to the jogging interface. The interface will display the current speed of the motor. Press **UP** key, the motor will rotate to the setting speed anticlockwise and stops when releasing the key. Press **DOWN** key, the motor will rotate to the setting speed clockwise and stops when releasing the key.



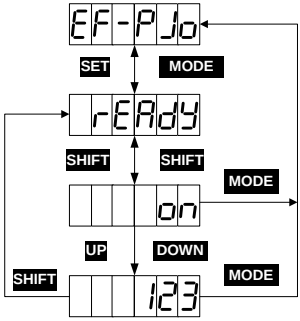
5.2.5.3 Operation flowchart of restoring the factory parameter

Press **MODE** key to switch to the auxiliary function mode. Press **UP/DOWN** key to the EF-dAF menu, and press **SET** key to the interface. The interface will display rEAdy. Press **SET** key to restore to the factory values, it will display StArt, after finishing, it will display FInISh. The Operation flowchart of analog speed reference zero drift clear, analog torque reference zero drift clear and analog torque reference zero drift clear are the same.



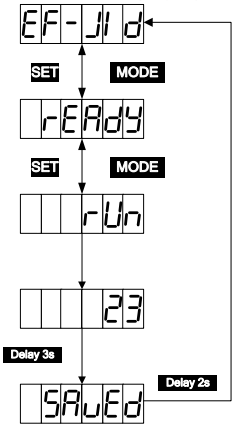
5.2.5.4 Operation flowchart of program commissioning

Press **MODE** key to the auxiliary function mode. Press **UP/DOWN** key to the EF-PJo menu, and press **SET** key to the interface. The interface will display rEAdy. In the interface of rEAdy, **SHIFT** key can be used to switch between rEAdy and on, start and stop the commissioning function. In the interface of on, **UP/DOWN** key can be used to start the program commissioning and has no relationship with P5.00. If the motor direction is counterclockwise, it can be started by **UP** key. If the motor direction is clockwise, it can be started by **DOWN** key. After starting, the interface will display the current speed.



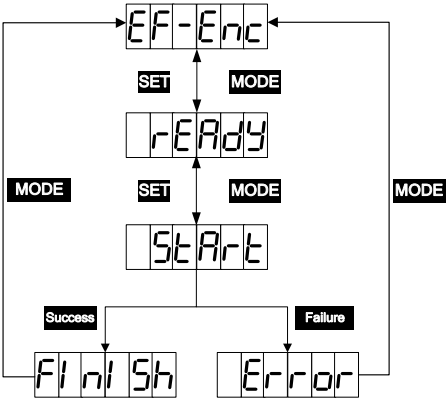
5.2.5.5 Operation flowchart of inertia identification

Press **MODE** key to the auxiliary function mode. Press **UP/DOWN** key to the EF-JId menu, and press **SET** key to the interface. The interface will display rEAdy. Press **SET** key to start the inertia identification. After finishing, the result 23 will be displayed for about 3 seconds and saved automatically. It will return to eh parameters after displaying SAvEd for about 2 seconds.



5.2.5.6 Operation flowchart of absolute encoder clear

If the multi-turn encoders are used, the zeroing of mechanical system is needed after first power on. Press **MODE** key to switch to the auxiliary function mode. Press **UP/DOWN** key to the EF-Enc menu, and press **SET** key to the interface. The interface will display rEAdy. Press **SET** key to start the clearing, the interface will display StArt, and after finishing, it will display FInISh; if the encoder model is not matched or the operation is failed, it will display Error.



5.2.6 Alarm display

When the servo drive runs abnormally, it will perform fault alarm and stop automatically. At this time the panel will display the fault alarm warning sign. The format is ErXX-X, of which, XX is the master code and X is the sub code.

Please refer to appendix 10.4 for the meanings of the alarm or warning identifiers.

5.2.7 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.

Chapter 6 Detailed parameter description

P-position mode; S-speed mode; T-torque mode;F- fully-closed loop 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.

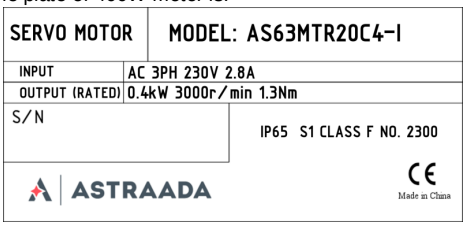
6.1 Basic control (P0 group parameters)

6.1.1 Basic setting

P0.00[1]	Motor model	Setting range	Default	Unit	Available mode			
		0~9999999	236*[1]	-	P	S	T	F

The parameter is standard motor model by default. Users must set the parameter according to the name plate of the motor.

For example, the name plate of 400W motor is:



of which, No.: 2300 is the set value of the parameter.

Note: Setting the parameter incorrectly will cause abnormal running of the servo system and even serious fault of the drive and motor.

*[1] Different drive models are fitted with different default motor models as standard, 2300-corresponding default motor model of 400W drive; as for the motor mounted with communication encoder, the motor model is read by encoder EEPROM automatically.

P0.00[1]	Data size	32bit	Data format	DEC
	Modbus address	1000, 1001	CANopen address	0x2000, 0x00

P0.01[1]	Encoder type	Setting range	Default	Unit	Available mode

		1~12	4*1	-	P	S	T	F

Generally, the system will set this parameter automatically after P0.00 is set correctly. In cases where encoder disconnection fault is reported during power up when motor is connected correctly, please check whether the drive supports motor encoder type, refer to chapter 1.1.3. The naming of servo motor contains encoder type, refer to chapter 1.2.2.

Relation between encoder type and P0.01 setting value:

Motor nameplate Encoder type*2	Setting value	Meaning
1	1	2500-PPR standard incremental
3	3	17-bit single-turn absolute value
4	[4]	17-bit multi-turn absolute value *3
7	8	Rotary transformer
9	10	23-bit multi-turn absolute value *3
-	Other value	Reserved

*1 Different motors correspond to different types of encoders.

*2 Refer to chapter 1.2.2 ⑧.

*3 When the multi-turn encoders are used, it is necessary to change the battery when the drive is power on to prevent losing absolute position. The standard battery is 2000mAh and the replacement cycle is 1.5~2 years.

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

P0.02[1]	Forward rotation of motor *1	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

Set the forward rotation of motor:

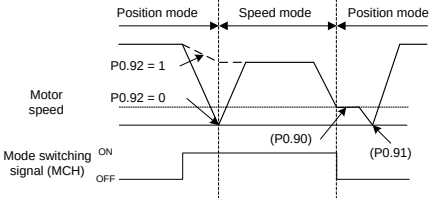
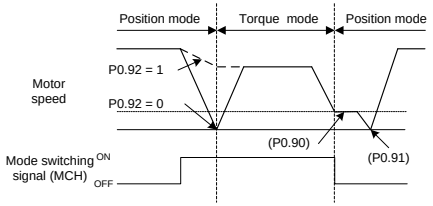
Setting value	Definition
[0]	Anticlockwise is forward rotation
1	Clockwise is forward rotation

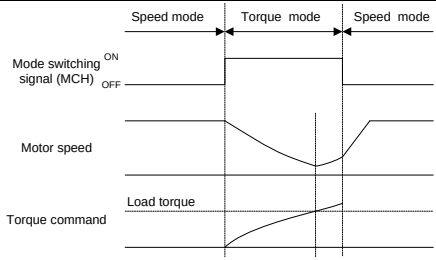
*1 Definition of forward rotation of motor. The view angle faces shaft output direction of motor.

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

P0.03[1]	Control mode selection	Setting range	Default	Unit	Available mode			
		0~9	0	-	P	S	T	F

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

Setting value	1st working mode	2nd working mode	Instruction
[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	Position/speed mode switching: The position mode and speed mode can be switched with the control mode switching terminal.  **Note:** For switching from position mode to speed mode, there are two kinds of switching methods which can be selected via P0.92; When switching from speed mode to position mode, the motor will stop at the reference position of P0.91 before switching to position mode.
4	P	T	Position/torque mode: The position mode and torque mode can be switched with the control mode switching terminal  **Note:** For switching from position mode to torque mode, there are two kinds of switching methods which can be selected via P0.92; When switching from torque mode to position mode, the motor will stop at the reference position of P0.91 before switching to position mode.
5	S	T	Speed/torque mode: The speed mode and torque mode can be switched with control mode switching terminal

			 **Note:** The switching mode is not limited by actual operation.
6	F	/	Fully-closed loop mode: Use the linear encoder to detect the devices of control object and conduct information feedback position control.
7	CANopen	/	CANopen mode (CANopen type servo support)
8	EtherCAT	/	EtherCAT mode (EtherCAT type servo support)
9	MotionNet	/	MotionNet mode (MotionNet type servo support)

Remark: Set P0.03 and P3.00~P3.09 will switch automatically according to the selected control mode.

Note:0:OFF (internal optical coupler corresponding to the input is not conducted);

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

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

P0.04*	Internal enabling command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to control the operation state of the servo drive.

The relation between internal enable instruction and external terminal enable instruction is shown below:

Setting value	External terminal command state	Working state of servo drive
0	0 (internal optical coupler which corresponds to the input is not conducted)	Stand-by (OFF)
0	1(internal optical coupler which corresponds to the input is conducted)	Enabling running (ON)
1	0 (internal optical coupler which corresponds to the input is not conducted)	Enabling running (ON)
1	1 (internal optical coupler which corresponds to the input is conducted)	Enabling running (ON)

Note:

1. When P0.04 is 1 and the external terminal command converts from 1 to 0, the servo drive will be disabled, namely P0.04 will change to 0 automatically.
2. When this parameter is operated via the LED panel, it can only be switched between 0 and 1 via **SET** key and **UP/DOWN** key is invalid under the setup interface of this parameter.

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

P0.05	JOG speed	Setting range	Default	Unit	Available mode			
		0~1000	200	r/min	P	S	T	F

This parameter can be used to set the jog speed. For jogging, please refer to chapter 5.2.5.2 During jogging, the ACC/DEC time parameters (P0.54, P0.56, P0.55, and P0.57) are active. The motor will accelerate, decelerate, start and stop according to the settings.

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

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

By setting the numerator and denominator of the frequency division output, the signal of the encoder can be frequency divided by any integer or decimal fraction and then outputted through the encoder's pulse output signal terminals(OA+, OA-, OB+ and OB- pin "44""43""41" and "42")

$$\text{Number of drive output pulse} = \frac{\text{P0.06}}{\text{P0.07}} \times \text{encoder resolution}$$

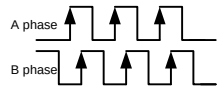
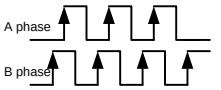
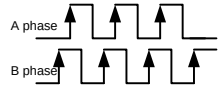
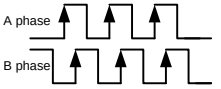
Note:

1. In the position control mode, if the encoder output signal of the preceding stage servo motor is used as the position pulse command input of the succeeding stage servo drive, i.e. as start/stop type master-slave follow-up, in order to ensure high positioning accuracy of the succeeding stage servo drive, the frequency division coefficient must be 1:1. Otherwise the accuracy of master-slave position follow-up will be affected in this case.
2. In factory setting, P0.07 is 131072, P0.06 is 10000, which means the output terminal of the encoder will output 10000 pulse signal when the motor rotates a circle. If P0.06 is 5000, the output terminal of the encoder will output 5000 pulse signal.

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

P0.08[1]	Reverse of frequency division output	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

The reverse of B phase can be carried out through this parameter and the phase relation between A phase and B phase can be changed:

Setting value	Logic of B phase	CCW	CW
[0]	Non-reverse		
1	Reverse		

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

P0.09	Torque limit mode setting	Setting range	Default	Unit	Available mode			
		0~6	1	-	P	S		F

This parameter is used to set the torque limit mode.

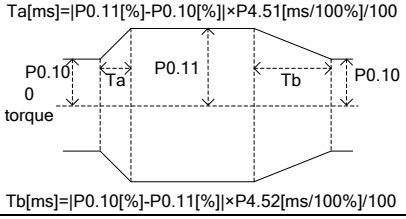
In speed mode, the analog input 3 is set to the torque limit, and:

Setting value	Forward direction	Reverse direction
0	Analog input 3(0V~10V)	Analog torque command (-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	Analog input 3(0V~10V)	Analog torque command (0V~10V)
5	Analog input 3(0~10V)	
6	Analog torque command (0V~10V)	

If analog input 3 is the speed input (non-torque limit), the meaning of the parameter is as below:

Setting value	Forward direction	Reverse direction
0	0	Analog torque command (-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	0	Analog torque command (0V~10V)
5	0	
6	Analog torque command (0V~10V)	

Note: If P0.09 is 3, the torque switching is not valid instantly and is limited by P4.51 and P4.52, the detailed information is as the figure below:



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

P0.10	Max torque limit 1	Setting range	Default	Unit	Available mode			
		0.0~500.0	300.0	%	P	S	T	F
P0.11	Max torque limit 2	Setting range	Default	Unit	Available mode			
		0.0~500.0	300.0	%	P	S		F

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:

1. These parameters are used with P0.09;
2. In torque mode, the limit value is determined by P0.10.

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

P0.13[1]	Power of the external braking resistor	Setting range	Default	Unit	Available mode			
		0~5000	200	W	P	S	T	F
P0.14[1]	Resistance of the external braking resistor	Setting range	Default	Unit	Available mode			
		1~1000	60	Ω	P	S	T	F

When an external braking resistor is connected, this group of parameters should be set with the values equal to the resistance and power of the external braking resistor.

Note: Braking overload detection should be used in combination with P4.34, when P4.34 is set to 2, braking overload uses external braking resistor parameter to perform fault detection; please set this group of parameters correctly. If the value of this group of parameters does not match with external braking resistor, braking overload fault (Er07-0) may be reported by mistake or braking resistor may be burnt down. The regenerative braking overload protection time of external braking resistor is in proportion to these two parameters and is in reverse proportion to the braking rate during actual operation.

When P4.34 is set to other values, these two parameters are invalid.

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

P0.15	Default monitoring parameters	Setting range	Default	Unit	Available mode			
		0~22	0	-	P	S	T	F

This parameter is used to set the parameters which can be monitored while powering-on of the system:

Setting value	Parameter meaning	Sign	Unit
[0]	Motor rotation speed	SPdFb	r/min
1	Speed command	SPdcMd	r/min
2	Pulse feedback accumulation	PLSFb	reference unit
3	Pulse command accumulation	PLScMd	reference unit
4	Retention pulse	PLSEr1	reference unit
5	Hybrid control deviation	PLSEr2	reference unit
6	Current torque	trqFb	%
7	Main circuit DC voltage	UbUS1	V
8	Voltage of control power	UbUS2	V
9	Output voltage	UoUt	Vrms
10	Output current	IoUt	Arms
11	Drive temperature	MdLtMP	℃
12	Torque limit	trqLMt	%
13	Encoder feedback value	EncFb	pulse
14	Rotor position to Z pulse	EncAbS	pulse
15	Load inertia ratio	J-r	%
16	Output power	PoWEr	%
17	Motor load rate	LoAd-r	%
18	Molecule of actual electronic gear	nUM	-
19	Denominator of actual electronic gear	dEn	-
20	Pulse speed command	PLSSPd	r/min
21	Instant speed	SPdFb1	r/min
22	PTP state	PtPSts	-

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

P0.16	Parameter modification operation locked	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to mask the parameter setting function and thus to avoid incorrect modification of the parameters by the user:

Setting value	Operation	Communication operation
[0]	Parameter modification valid	Parameter modification valid
1	Parameter modification invalid	Parameter modification valid

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

P0.17	EEPROM write mode	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to set the EEPROM write mode

Setting 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 address	1034,1035	CANopen address	0x2011, 0x00

P0.18*	Factory password	Setting range	Default	Unit	Available mode			
		0~65536	0	-	P	S	T	F

This parameter is used to view and modify the menu.

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

6.1.2 Position control

P0.20[1]	Position command selection	Setting range	Default	Unit	Available mode			
		0~4	0	-	P			F

This parameter is used to select the position command source.

Setting value	Position command source
[0]	Pulse input
1	Communication bus input
2	PTP (point-to-point) control
3	Factory use
4	The second encoder input

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

P0.22[1]	Pulse number per motor resolution	Setting range	Default	Unit	Available mode			
		$0\sim2^{23}$	10000	reference unit	P			F

This parameter is used to set the number of pulses per motor resolution.

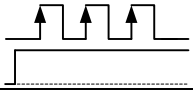
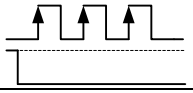
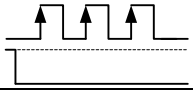
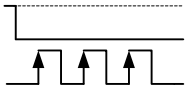
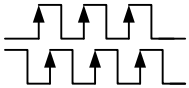
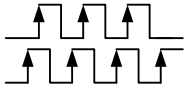
Note: P0.22 is set to a non-zero value, the setting of P0.25~P0.29 is invalid. If 17-bit and 20-bit encoder is used, the more pulse number can be set for the higher precision.

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

P0.23[1]	Pulse input form	Setting range	Default	Unit	Available mode			
		0~2	0	-	P			F

This parameter is used to set the manner of pulse input.

There are 3 types of pulse input manners:

Setting value	Pulse input form	Signal form	Shown in the picture	
			CCW	CW
[0]	Pulse + mode	Pulse+Sign		
1	FWD/REV pulse mode	CW+CCW		
2	Quadrature encoder pulse mode	QEP		

Remark: The pulse direction of the parameter can be reversed by P0.24[1]. Please refer to P0.24[1] for detailed information.

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

P0.24[1]	Reverse of pulse input direction	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			F

By setting this parameter, the direction of the input pulse can be reversed. At this time the actual output speed direction of the servo drive is opposite to the direction indicated by the pulse input form in P0.23.

Setting value	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 address	1048,1049	CANopen address	0x2018, 0x00

P0.25	Numerator of 1st electronic gear ratio	Setting range	Default	Unit	Available mode			
		0~(2^{31}-1)	0	-	P			F
P0.26[2]	Denominator of the electronic gear ratio	Setting range	Default	Unit	Available mode			
		1~(2^{31}-1)	10000	-	P			F
P0.27	Numerator of 2nd electronic gear ratio	Setting range	Default	Unit	Available mode			
		0~(2^{31}-1)	0	-	P			F
P0.28	Numerator of 3rd electronic gear ratio	Setting range	Default	Unit	Available mode			
		0~(2^{31}-1)	0	-	P			F
P0.29	Numerator of 4th electronic gear ratio	Setting range	Default	Unit	Available mode			
		0~(2^{31}-1)	0	-	P			F

Concept of the electronic gears: for any pulse input, the number and frequency of the pulse actually received by the drive can be changed by multiplying a certain coefficient and this coefficient is electronic gear ratio. It can be indicated in two parts: numerator and denominator:

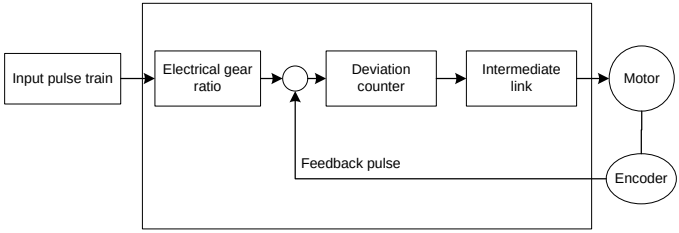
Electronic gear ratio = $g1/g2$;

Of which

$g1$: The numerator of the electronic gear ratio;

$g2$: The denominator of the electronic gear ratio;

Below is the schematic diagram of the electronic gear ratio in the system:



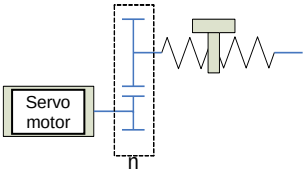
Example: Below is a case where 1 pulse is equivalent to a feed rate of $10\mu m$

Mechanical specifications:

Feed of the ball screw Pb =10mm;

Reduction ratio n=3/5;

Resolution of the servo motor encoder =10000;



At this time calculate the electronic gear ratio:

$$\frac{g1}{g2}=\Delta\ell_0\bullet\frac{Pt}{\Delta S}=\Delta\ell_0\bullet\frac{Pt}{n\cdot Pb}=10\times10^{-3}\bullet\frac{10000}{(3/5)\cdot10}=\frac{50}{3}$$

In the formula :

$\Delta\ell_0$: Feed rate corresponding to each pulse (mm/pulse);

ΔS : Feed rate corresponding to each rotation of the motor (mm/rot).

i.e. in this example, $g1$=50, $g2$=3.

Set P0.25 to 50 and P0.26 to 3.

The servo drive has 4 groups of electric gear ratio: P0.25, P0.26, P0.27 and P0.28, P0.29 can select to adopt which parameter group to provide the electronic gear ratio through the digital input configured as electronic gear ratio selection function (SC1, SC2) on CN1,plug, the corresponding relation is shown below:

SC1	SC2	Position mode/Fully-closed loop mode
0	0	Numerator of 1st electronic gear ratio
1	0	Numerator of 2nd electronic gear ratio
0	1	Numerator of 3rd electronic gear ratio
1	1	Numerator of 4th electronic gear ratio

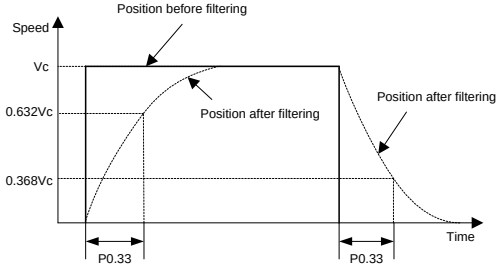
Note:

1. The parameters are valid when P0.22[1] is 0.
2. Switch the electronic gear ratio via digital quantity (SC1, SC2), P4.10 must be set to 0.

P0.25	Data size	32bit	Data format	DEC
	Modbus address	1050,1051	CANopen address	0x2019, 0x00
P0.26[2]	Data size	32bit	Data format	DEC
	Modbus address	1052,1053	CANopen address	0x201A, 0x00
P0.27	Data size	32bit	Data format	DEC
	Modbus address	1054,1055	CANopen address	0x201B, 0x00
P0.28	Data size	32bit	Data format	DEC
	Modbus address	1056,1057	CANopen address	0x201C, 0x00
P0.29	Data size	32bit	Data format	DEC
	Modbus address	1058,1059	CANopen address	0x201D, 0x00

P0.33[2]	Smooth filtering of position command	Setting range	Default	Unit	Available mode			
		0.0~1000.0	0.0	ms	P			F

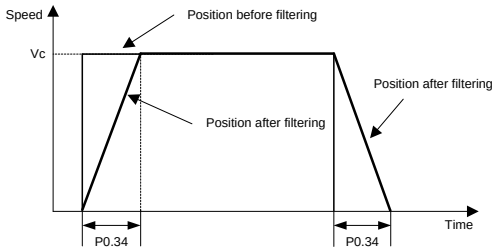
This parameter is used to set the time constant of the low pass filter of the corresponding position and reduce the mechanical shock when the input pulse commands frequency changes. It is shown as the figure below:



P0.33[2]	Data size	16bit	Data format	DEC
	Modbus address	1066,1067	CANopen address	0x2021, 0x00

P0.34[2]	FIR filter of position command	Setting range	Default	Unit	Available mode			
		0.0~1000.0	0.0	ms	P			F

This parameter is used to set the time constant of the FIR filter of the corresponding position and reduce the mechanical shock when the input pulse commands frequency changes. It is shown as the figure below:



Note: If the parameter is modified during the operation, it will be valid after stopping.				
P0.34[2]	Data size	16bit	Data format	DEC
	Modbus address	1068,1069	CANopen address	0x2022, 0x00

P0.35	Software limit of forward position control	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				F
This parameter is used to set the software limit of the forward position control. **Note:** The function is valid when it is above P0.36.									
P0.35	Data size	32bit	Data format	DEC					
	Modbus address	1070,1071	CANopen address	0x2023, 0x00					

P0.36	Software limit of reverse position control	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				F
This parameter is used to set the software limit of the reverse position control. **Note:** The function is valid when it is less than P0.35.									
P0.36	Data size	32bit	Data format	DEC					
	Modbus address	1072,1073	CANopen address	0x2024, 0x00					

P0.37	Position command mode	Setting range	Default	Unit	Available mode				
		0~1	0	-	P				F

This parameter is used to set the position command mode when P0.20 is set to 1 and it is invalid for other modes.

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

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

6.1.3 Speed and torque control

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

This parameter is used to select the command source of the speed control:

Setting value	Input mode	Instruction
0	Internal speed	P3.00~P3.09 can be selected 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

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>0</td><td>1</td><td>1</td><td>P0.49</td><td>Internal speed 4</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>P0.50</td><td>Internal speed 5</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>P0.51</td><td>Internal speed 6</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>P0.52</td><td>Internal speed 7</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>P0.53</td><td>Internal speed 8</td></tr>
</table>
Please refer to the detailed instruction of P0.46~P0.53.
</td></tr>
<tr><td>[1]</td><td>Analog input</td><td>The motor speed can be controlled by applying -10V~10V voltage between analog speed input terminals (AD1, GND, pin “1” and “5”) of CN1. In the factory default, the positive value means the forward direction and the negative value means the reverse direction.
The direction of analog speed command can be changed by P0.41.
Please refer to the detailed instruction of P0.41.</td></tr>
<tr><td>2</td><td>Bus input</td><td>The speed command from upper PC can be received by the interface of communication bus. When P4.10 is 1, the motor speed can be changed by P4.13.
Please refer to the detailed instruction of P4.10 and P4.13.</td></tr>
<tr><td>3</td><td>Factory use</td><td>-</td></tr>
<tr><td>4</td><td>2nd encoder input</td><td>The speed is the speed calculated via P0.22 of 2nd encoder pulse.</td></tr>
<tr><td>5</td><td>High resolution internal speed</td><td>High resolution internal speed, precision 0.1r/min</td></tr>
</table>

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

P0.41	Setting of speed command direction	Setting range	Default	Unit	Available 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.

Setting value	Internal speed step/analog input		Speed command sign	Speed command direction
[0]	Positive speed	0V ~10V	No use	Forward direction
	Negative speed	-10V~0V	No use	Reverse direction
1	No use		Valid	Forward direction
	No use		Invalid	Reverse direction

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

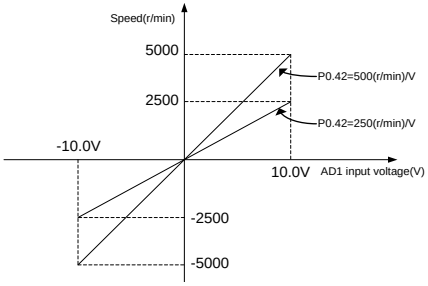
P0.42	Analog input 1 gain	Setting range	Default	Unit	Available mode			
		10~2000	100	(r/min)/V		S		

1. Suppose the analog input 1 function selection is speed command.

2. The voltage of the analog speed command input corresponds to the changing gain of the motor command speed.

3. The relation between analog speed command input voltage and the speed, the default value is that each 1V corresponds to 100r/min.

Analog speed command = Input voltage x P0.42



Note:

1. The default is the input signal from analog input terminal 1 of CN1 (AD1, GND and pin "1","5").
2. This parameter is valid when the setting value of P0.40 is "1".
3. Set the parameter correctly after confirming the motor operation, if the setting is too large, the motor speed will fluctuate a lot.
4. The voltage above -10~10V cannot be applied between AD1 and GND, otherwise, the drive may be damaged.

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

P0.43	Analog input 1 reverse	Setting range	Default	Unit	Available mode			
		0~1	0	-		S		

Suppose the analog input 1 function selection is speed command.

This parameter is used to set the voltage polarity of the analog speed command.

Setting value	Motor direction	
[0]	Positive polarity	[+voltage]→[Positive],[- voltage]→[Negative]
1	Negative polarity	[+voltage]→[Negative],[- voltage]→[Positive]

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

P0.45	Dead zone of analog input 1	Setting range	Default	Unit	Available mode			
		0.000~3.000	0.000	V		S		

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

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

P0.46	Internal speed 1/Speed limit 1	Setting range	Default	Unit	Available mode			
		-20000~20000	100	r/min		S	T	
P0.47	Internal speed 2/Speed limit 2	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S	T	
P0.48	Internal speed 3/Speed limit 3	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S	T	
P0.49	Internal speed 4/Speed limit 4	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S	T	
P0.50	Internal speed 5	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S		
P0.51	Internal speed 6	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S		
P0.52	Internal speed 7	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S		
P0.53	Internal speed 8	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S		

There are 8 internal speed commands and 4 internal speed limits.

Control mode	P0.40 Setting value	SPD3	SPD2	SPD1	Parameters and setting 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:

1. SPD1, SPD2, SPD3 are the digital input of internal command 1~3(0x00A,0x00B,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)
2. The speed limit depends on the absolute value of the parameters and the direction is the same with that of the torque command.

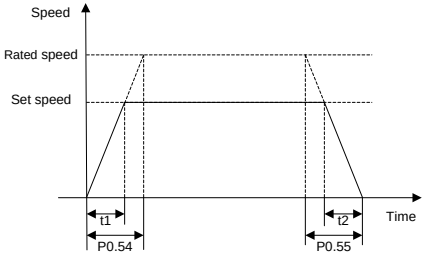
P0.46	Data size	16bit	Data format	DEC
	Modbus address	1092,1093	CANopen address	0x202E, 0x00
P0.47	Data size	16bit	Data format	DEC
	Modbus address	1094,1095	CANopen address	0x202F, 0x00

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

P0.54	ACC time	Setting range	Default	Unit	Available mode			
		0~30000	0	ms		S		
P0.55	DEC time	Setting range	Default	Unit	Available mode			
		0~30000	0	ms		S		

ACC/DEC time is the time needed from 0r/min to the rated (3000r/min by default) speed under the reference command. When the reference speed is higher than or less than the rated speed, the actual ACC/DEC time will be accounted according to the percentage. If the speed is negative, the absolute value will be used to count the time.

Example: If the reference speed is 2000r/min, the rated speed is 3000r/min and the ACC/DEC (P0.54, P0.55) time 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. Please refer to the figure below:



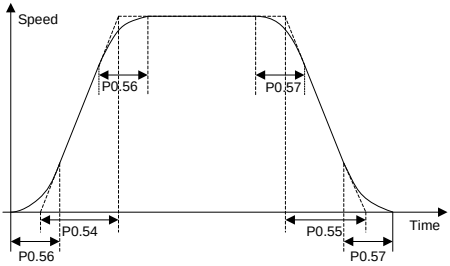
Note:

1. ACC/DEC time can only be used in the speed mode.
2. If the speed command is analog input, this function is invalid.

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

P0.56	ACC time of S curve	Setting range	Default	Unit	Available mode			
		0~1000	0	ms		S		
P0.57	DEC time of S curve	Setting range	Default	Unit	Available mode			
		0~1000	0	ms		S		

In a case of reference speed command, this parameter is used to set the duration of the circular arc segment during S curve decelerating and thus to achieve the goal of smooth starting. The ACC/DEC time of S curve is shown in the figure below:



Note:

1. ACC/DEC time of S curve can only be used in the speed mode;
2. If the speed command is analog input, this function is invalid;
3. If the setting value of P0.54<2*P0.56 and P0.56 is not 0, actual acc time= 2*P0.56;
4. If the setting value of P0.55<2*P0.57 and P0.57 is not 0, actual dec time= 2*P0.57.

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

P0.58	Zero speed clamp mode	Setting range	Default	Unit	Available mode			
		0~3	0	-		S	T	

This parameter is used to set the zero speed clamp mode.

Setting value	Position command mode
[0]	Invalid
1	If the control signal is valid, the speed command is forced to be 0
2	If the control signal is valid, the speed command is forced to be 0 and when the actual speed of the motor is below P0.59, it will switch to position control and be locked in the position. Other actions are the same with setting value 1.
3	If the 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:

1. 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; in the bus communication, it can be controlled by P4.19:0: Disabled;1: Enabled

2. 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 address	1116,1117	CANopen address	0x203A, 0x00

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

This parameter is used to set the position when P0.58 is 2 or 3. When P0.58 is 3, there is 10r/min delay when detection.

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

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

This parameter is used to set the command source of the torque control.

Setting value	Input method	Instruction
0	Internal setting	Set the torque command by P0.66.
[1]	Analog input	The input torque can be controlled by applying a voltage between -10V and 10V on the analog torque input terminals (AD2, GND and pin 20 and 19). By factory default, the positive value means forward and negative value means reverse. The direction of analog torque command can be changed via P0.61. Please refer to the detailed instruction of P0.61.
2	Bus input	The torque command can be received by the communication bus interface. When P4.10 is 1, the motor torque can be changed by P4.14. Please refer to the detailed instruction of P4.10 and P4.14.
3	For factory	-

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

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

This parameter is used to select the torque command direction.

Setting value	Designated method
[0]	The direction is designated by the torque command sign. For example: torque command input [+] → Positive direction,[-] → Negative direction
1	Determined by [0x00F] 1: Positive direction; 0:Negative direction

Note: 0x00F is valid when input low electric level and it is 0x10F when high electric level is valid.

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

P0.62	Analog input 2 gain	Setting range	Default	Unit	Available mode			
		0~2000	100	(0.1%)/V			T	

Suppose the analog input 2 function selection is torque command:

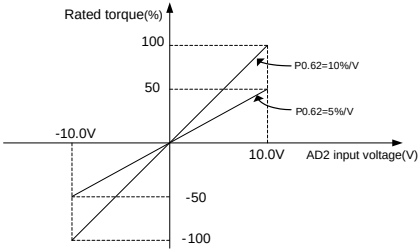
Parameter instruction:

1. The voltage of the analog torque command input corresponds to the changing gain of the motor command torque.

2. This parameter is valid when P0.60 is set to “1”.

3. The relation between the analog torque command input voltage and the torque, the default value is that each 1V corresponds to 10% of the rated torque.

Analog torque command = Input voltage x P0.62



Note:

1. The default is the input signal from analog input terminal 1 of CN1 (AD1, GND and pin “20”, “19”).

2. Set the parameter correctly after confirming the motor operation, if the setting is too large, the motor torque will fluctuate a lot.

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

P0.63	Analog input 2 reverse	Setting range	Default	Unit	Available mode			
		0~1	0	-			T	

Suppose the analog input 2 function selection is torque command:

This parameter is used to set the polarity of the analog torque command.

Setting value	Motor direction	
[0]	Positive polarity	[+voltage]→[Positive],[- voltage]→[Negative]
1	Negative polarity	[+voltage]→[Negative],[- voltage]→[Positive]

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

P0.65	Dead zone of analog input 2	Setting range	Default	Unit	Available mode			
		0.000~3.000	0.000	V			T	

The analog input 2 function selection is torque command by default:
If the absolute value of analog torque command voltage is in this range, the corresponding torque value is 0.

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

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

Set internal torque reference value via this parameter and take the rated torque of servo motor as 100%. This set value is the percentage value of rated torque of servo motor.

Note:

1. If the absolute value of this parameter is larger than the max. torque limit 1 (P0.10), then the output torque is the setting value of P0.10, the direction is the same with this parameter.
2. In the torque mode, this parameter is valid when the setting value of P0.60 is "0".

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

P0.67	Speed limit mode setting	Setting range	Default	Unit	Available mode			
		0~1	1	-			T	

In the torque control mode, this parameter is used to set the speed limit mode.

Setting value	Designated method
0	Select the analog input as the speed limit. It is necessary to configure analog input 3 as the speed limit function [set P3.70 to 1] and refer to P0.42~P0.45 for the marking mode.
[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 address	1134,1135	CANopen address	0x2043, 0x00

P0.68	RAMP time of torque command	Setting range	Default	Unit	Available mode			
		0~10000	0	ms			T	

This parameter is used to modify the planning curve when the torque command input changes, and it is the rising time from 0 to 100% of rated torque.

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

P0.69	DEC time of fast stop	Setting range	Default	Unit	Available mode			
		0~10000	500	ms	P	S	T	F

This parameter is used to modify the DEC time in fast stop mode, and it is the DEC time from 100% rated speed to 0.

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

P0.70[1]	Absolute encoder mode setting	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to modify the operation mode of the multi-turn absolute encoder. When the matching encoder for the motor is multi-turn absolute encoder, it will be taken as single-turn encoder by default; when multi-turn function is needed, it is necessary to prepare the spare battery and set it as the multi-turn modes.

Setting value	Method
[0]	Single circle
1	Multiple circles

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

P0.71*	Absolute encoder multi-turn zeroing	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

Clear the multi-turn absolute encoder via this parameter. The multi-turn data of the encoder will be cleared after this parameter is enabled while the single-turn data will remain unchanged, however, the absolute position feedback of the system will be cleared.

Note: When using multi-turn absolute encoder, after machinery installation is done, please clear the absolute encoder after detecting absolute zero position of the mechanic system at initial power up.

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

6.1.4 Control mode switching

P0.90	Max. speed limit of control mode switching	Setting range	Default	Unit	Available mode			
		1~1000	100	r/min	P	S	T	

Set the max. running speed during positioning when switching from speed mode or torque mode to position mode under position/speed, position/torque compound mode.

P0.90	Data size	16bit	Data format	DEC
	Modbus address	1180,1181	CANopen address	0x205A, 0x00

P0.91	Positioning reference of control mode switching	Setting range	Default	Unit	Available mode			
		$-1 \sim 2^{23}$	-1	reference unit	P	S	T	

Set the motor positioning position after control mode switching is done when switching from speed mode or torque mode to position mode under position/speed, position/torque compound mode.

Note:

1. After the switching, the reference point of the received position command is the setting value of

the parameter and the unit is the unit of the encoder pulse.
2. When it is set to -1 and switches from speed mode to position mode, there is no positioning action and it will switch at the current position.
3. If the mechanical angle of P3.50 is no more than 0.5°, then the positioning precision is±P3.50; if the angle is larger than 0.5°, then the positioning precision is the pulse number of ±0.5°.

P0.91	Data size	32bit	Data format	DEC
	Modbus address	1182,1183	CANopen address	0x205B, 0x00

P0.92	Position mode switching exit mode	Setting range	Default	Unit	Available 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.

Setting value	Exiting mode
[0]	Switch from position mode to other mode after positioning
1	Switch to other mode when the control mode switching command is invalid

P0.92	Data size	32bit	Data format	DEC
	Modbus address	1184,1185	CANopen address	0x205C, 0x00

6.2 Autotuning control parameters (P1)

6.2.1 Inertia identification (Automatic gain)

P1.00	Inertia online automatic estimation	Setting range	Default	Unit	Available mode			
		0~1	0	%	P	S	T	F

This parameter is used to set whether to adjust the inertia ratio and adjust the gain automatically.

Setting value	Meaning
[0]	Invalid
1	Valid

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

P1.01	1st inertia ratio	Setting range	Default	Unit	Available mode			
		0~10000	250	%	P	S	T	F

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 larger 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 the online adjustment is valid, the real time inertia ratio will be updated to P1.01 and saved into EEPROM every 30 minutes.

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

P1.02	2nd inertia ratio	Setting range	Default	Unit	Available mode			
		0~10000	250	%	P	S	T	F

The definition is the same as P1.01.

Note: The automatic online gain adjustment is invalid for this parameter.

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

P1.03	Machine rigidity setting	Setting range	Default	Unit	Available mode			
		0~31	13	-	P	S	T	F

The bigger the value is the faster response and higher rigidity and easier vibration. In stable system, higher rigidity setting makes fast response.

Mechanical structure	Rigidity set
Big handling, transmission equipment	0~13
Belt drive mechanism	5~16
Ball screw + Belt drive	5~16
Manipulator	15~22
Direct ball screw or rigid bodies	18~25

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

P1.04	Inertia offline automatic estimation	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

The load inertial ratio of motor rotation inertia can be gained by setting this parameter. After setting the inertia identification, the motor will run 6 cycles to carry out the inertia identification. In each cycle, the motor will run at the mode of P1.05, the maximum rotation cycles are determined by P1.06 and the ACC command time is determined by P1.07.

Setting value	Function
[0]	Inertia identification switch off
1	Inertia identification switch on

Note:

1. The motor speed during identification will be faster if the value of P1.06 and P1.07 are bigger.
2. Refer to chapter 10.1 if the drive reports Er25-7.
3. This parameter is invalid in the servo enabling state.

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

P1.05	Operation mode of inertia identification	Setting range	Default	Unit	Available mode			
		0~3	0	-	P	S	T	F

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

Setting 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 address	1210,1211	CANopen address	0x2105,0x00

P1.06	Movable range of inertia identification	Setting range	Default	Unit	Available mode			
		0.2~20.0	2.0	r	P	S	T	F

In the position mode, this parameter is used to limit the maximum circle number in each cycle.

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

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

This parameter is used to set the motor ACC time during the inertia identification. If the load inertia is large, the ACC time can be set to a large value to avoid the overload alarm.

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

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

This parameter is used to set the speed level of inertia identification.

The larger the setting value, the faster the response and larger fluctuation of the presumption value. The presumption result can be saved every 30 minutes.

Setting value	Function	Meaning
0	No change	Stop the presumption of load characteristic
[1]	No change basically	No change to the load characteristic
2	Change slowly	Slow change to the load characteristic
3	Change fast	Rapid change to the load characteristic

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

6.2.2 Self-adaptive vibration control

P1.19	Valid resonance detection bit	Setting range	Default	Unit	Available mode			
		0.2~100.0	5.0	%	P	S	T	F

This parameter is used to set the sensitivity of the automatic detection on mechanical resonance frequency. The smaller the value, the higher sensitivity to the resonance.

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

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

P1.20	Resonance detection mode	Setting range	Default	Unit	Available mode			
		0~7	0	-	P	S	T	F

This parameter is used to set the working mode of resonance detection and the resonance frequency number presumed by self-adaptive notch filter as well as the action after presumption. If the function is valid (1, 2, 3), the system will automatically collect data to conduct mechanical resonance frequency analysis and the result is saved in P1.21 and P1.22. Users can set the frequency of notch filter according to P1.21 and P1.22 to eliminate the mechanical resonance.

Note: The setting value is invalid after gain adjustment.

Setting value	Function	Meaning
[0]	Invalid	All parameters related to notch filter remain unchanged
1	one notch filter valid	The parameters related to 3rd notch filter will be updated according to the self-adaptive result.
2	two notch filters valid	The parameters related to 3rd and 4th notch filters will be updated according to the self-adaptive result.
3	Resonance frequency test mode	Detect mechanical resonance frequency automatically but does not set the parameters related to notch filter.
4	Notch filter parameters clear	Restore to the default values
5	3rd notch filter→1st notch filter	Copy the parameters of 3rd notch filter to 1st notch filter and then restore the parameter of 3rd notch filter to the default values
6	4th notch filter→2nd notch filter	Copy the parameters of 4th notch filter to 1st notch filter and then restore the parameter of 4th notch filter to the default values
7	3rd and 4th notch filter→1st and 2nd notch filter	Copy the parameters of 3rd and 4th notch filter to 1st and 2nd notch filter and then restore the parameter of 3rd and 4th notch filter to the default values

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

P1.21*	1st mechanical resonance frequency	Setting range	Default	Unit	Available mode			
		0~5000	5000	Hz	P	S	T	F
P1.22*	2nd mechanical resonance frequency	Setting range	Default	Unit	Available mode			
		0~5000	5000	Hz	P	S	T	F

This parameter is used to display the resonance frequency. When P1.20 is set to “1”, the system will detect the frequency of the max. resonance point and display it by function codes.

Note:

1. Only when the speed reaches above 30r/min will the measuring value be correct.

2. This function is only for read and cannot be set. The user can set the frequency of notch filter according to the function code to remove the mechanical resonance.
3. 5000 indicates the resonance point is not found.

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

P1.23	1st notch filter frequency	Setting range	Default	Unit	Available mode			
		50~5000	5000	Hz	P	S	T	F

This parameter is used to set the frequency of 1st notch filter for suppressing resonance. The notch filter can simulate the mechanical resonant frequency and thus suppressing the resonant frequency.
When this parameter is set to 5000, the function of notch filter will be invalid.

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

P1.24	1st notch filter Q value	Setting range	Default	Unit	Available mode			
		0.50~16.00	1.00	-	P	S	T	F

This parameter is used to set the Q value (quality factor) of 1st notch filter
Q=Center frequency of 1st notch filter/bandwidth of the notch. Generally, this parameter should remain in default value.

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

P1.25	1st notch filter depth selection	Setting range	Default	Unit	Available mode			
		0~100	0	%	P	S	T	F

This parameter is used to set the amplitude attenuation rate of 1st notch filter.
When the setting value increases, the notch filter depth becomes shallow and phase lag will be smaller.

P1.25	Data size	16bit	Data format	DEC
	Modbus address	1250,1251	CANopen address	0x2119,0x00

P1.26	2nd notch filter frequency	Setting range	Default	Unit	Available mode			
		50~5000	5000	Hz	P	S	T	F
P1.27	2nd notch filter Q value	Setting range	Default	Unit	Available mode			
		0.50~16.00	1.00	-	P	S	T	F
P1.28	2nd notch filter depth selection	Setting range	Default	Unit	Available mode			
		0~100	0	%	P	S	T	F

Refer to P1.23, P1.24 and P1.25 for detailed parameters setting.

P1.26	Data size	16bit	Data format	DEC
	Modbus address	1252,1253	CANopen address	0x211A,0x00

P1.27	Data size	16bit	Data format	DEC
	Modbus address	1254,1255	CANopen address	0x211B,0x00
P1.28	Data size	16bit	Data format	DEC
	Modbus address	1256,1257	CANopen address	0x211C,0x00

P1.29	3rd notch filter frequency	Setting range	Default	Unit	Available mode			
		50~5000	5000	Hz	P	S	T	F
P1.30	3rd notch filter Q value	Setting range	Default	Unit	Available mode			
		0.50~16.00	1.00	-	P	S	T	F
P1.31	3rd notch filter depth selection	Setting range	Default	Unit	Available mode			
		0~100	0	%	P	S	T	F
Refer to P1.23, P1.24 and P1.25 for detailed parameters setting.								
P1.29	Data size	16bit	Data format	DEC				
	Modbus address	1258,1259	CANopen address	0x211D,0x00				
P1.30	Data size	16bit	Data format	DEC				
	Modbus address	1260,1261	CANopen address	0x211E,0x00				
P1.31	Data size	16bit	Data format	DEC				
	Modbus address	1262,1263	CANopen address	0x211F,0x00				

P1.32	4th notch filter frequency	Setting range	Default	Unit	Available mode			
		50~5000	5000	Hz	P	S	T	F
P1.33	4th notch filter Q value	Setting range	Default	Unit	Available mode			
		0.50~16.00	1.00	-	P	S	T	F
P1.34	4th notch filter depth selection	Setting range	Default	Unit	Available mode			
		0~100	0	%	P	S	T	F
Refer to P1.23, P1.24 and P1.25 for detailed parameters setting.								
P1.32	Data size	16bit	Data format	DEC				
	Modbus address	1264,1265	CANopen address	0x2120,0x00				
P1.33	Data size	16bit	Data format	DEC				
	Modbus address	1266,1267	CANopen address	0x2121,0x00				
P1.34	Data size	16bit	Data format	DEC				
	Modbus address	1268,1269	CANopen address	0x2122,0x00				

P1.35	Vibration control mode of position command	Setting range	Default	Unit	Available mode			
		0~2	0	-	P			F

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

Setting value	Function
[0]	The 1st vibration control is valid
1	Switch between 1 and 2 according to VS-SEL
2	Automatic

Note: When selecting by digital input terminals, it is necessary to configure one of P3.00~P3.09

with 0x11C or 0x01C (VS-SEL). Relation 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 address	1270,1271	CANopen address	0x2123,0x00

P1.36	1st vibration control frequency	Setting range	Default	Unit	Available mode			
		0.0~200.0	0.0	Hz	P			F
It is used to set the frequency point used to suppress the vibration at the peak of the load. **Note:** Invalid if the setting value is below 1.0Hz.								
P1.36	Data size	16bit	Data format	DEC				
	Modbus address	1272,1273	CANopen address	0x2124,0x00				

P1.37	1st vibration control filter factor	Setting range	Default	Unit	Available mode			
		0.00~1.00	1.00	-	P			F
This parameter is used to set the filter factor of 1st vibration control filter.								
P1.37	Data size	16bit	Data format	DEC				
	Modbus address	1274,1275	CANopen address	0x2125,0x00				

P1.38	2nd vibration control frequency	Setting range	Default	Unit	Available mode			
		0.0~200.0	0.0	Hz	P			F
P1.39	2nd vibration control filter factor	Setting range	Default	Unit	Available mode			
		0.00~1.00	1.00	-	P			F
Please refer to P1.36 and P1.37 for the detailed information.								
P1.38	Data size	16bit	Data format	DEC				
	Modbus address	1276,1277	CANopen address	0x2126,0x00				
P1.39	Data size	16bit	Data format	DEC				
	Modbus address	1278,1279	CANopen address	0x2127,0x00				

6.3 Motor control parameters (P2)

6.3.1 Gain setting

P2.00	1st speed gain	Setting range	Default	Unit	Available mode			
		0.1~3276.7	27.0	Hz	P	S	T	F
The responsiveness of the servo system speed loop is determined by the speed gain. When increase the value of P2.00, the speed response will be improved, but it may easily 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 address	1400,1401	CANopen address	0x2200,0x00				

P2.01	1st speed integral time constant	Setting range	Default	Unit	Available mode			
		0.1~1000.0	21.0	ms	P	S	T	F
This parameter is used to set the integral time constant of the speed loop. Decreasing the setting value may improve the response, but it may easily 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 address	1402,1403	CANopen address		0x2201, 0x00			

P2.02	1st position gain	Setting range	Default	Unit	Available mode			
		0.0~3276.7	48.0	1/s	P			F
The responsiveness of servo system position loop is determined by the position gain. Increasing the setting value may improve the position responsiveness and shorten the positioning time, but it may easily cause vibration and noise.								
P2.02	Data size	16bit	Data format		DEC			
	Modbus address	1404,1405	CANopen address		0x2202, 0x00			

P2.03	1st speed detection filter	Setting range	Default	Unit	Available mode			
		100~5000	5000	Hz	P	S	T	F
This parameter is used to set 1st speed detection filter. **Note:** 5000 means there is no filter. Setting this parameter to a small value may reduce motor noise and speed fluctuation, but it also lower down the responsiveness.								
P2.03	Data size	16bit	Data format		DEC			
	Modbus address	1406,1407	CANopen address		0x2203, 0x00			

P2.04	1st torque filter	Setting range	Default	Unit	Available mode			
		0.00~25.00	0.84	ms	P	S	T	F
This parameter is used to set the time constant of torque filter.								
P2.04	Data size	16bit	Data format		DEC			
	Modbus address	1408,1409	CANopen address		0x2204,0x00			

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

There are two groups of parameters respectively for position gain, speed gain and 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.
The user can select or switch between 1st gain and 2nd gain as needed. Please refer to the detailed information of P2.20 and P2.34.

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

P2.10	Speed feed-forward gain	Setting range	Default	Unit	Available mode			
		0.0~100.0	0.0	%	P			F

This parameter is used to set the speed feed-forward gain. When the parameter is 100%, the retention pulse running at a certain speed will be almost zero; sudden ACC/DEC will enlarge overshooting.

P2.10	Data size	16bit	Data format	DEC
	Modbus address	1420,1421	CANopen address	0x220A, 0x00

P2.11	Speed feed-forward filter time	Setting range	Default	Unit	Available mode			
		0.00~64.00	0.50	ms	P			F

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

P2.11	Data size	16bit	Data format	DEC
	Modbus address	1422,1423	CANopen address	0x220B,0x00

P2.12	Torque feed-forward gain	Setting range	Default	Unit	Available mode			
		0.0~100.0	0.0	%	P	S		F

This parameter is used to set the torque feed-forward gain. After the torque command calculated according to speed control command multiplies the rate of the parameter, add to the torque command from speed control step.
Increasing torque feed-forward gain can improve response performance in ACC/DEC and reduce position deviation.

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

P2.13	Torque feed-forward filter time	Setting range	Default	Unit	Available mode			
		0.00~64.00	0.00	ms	P	S		F
This parameter is used to set the torque feed-forward filter time.								
P2.13	Data size	16bit	Data format		DEC			
	Modbus address	1426,1427	CANopen address		0x220D,0x00			

P2.14	1st IPPI coefficient	Setting range	Default	Unit	Available mode			
		0~1000	100	%	P	S	T	F
This parameter is used to set 1st IPPI coefficient. **Note:** IP control will be applied when it is set to 0 and PI control will be applied when it is set to 100.								
P2.14	Data size	16bit	Data format		DEC			
	Modbus address	1428, 1429	CANopen address		0x220E, 0x00			

P2.15	2nd IPPI coefficient	Setting range	Default	Unit	Available mode			
		0~1000	100	%	P	S	T	F
This parameter is used to set 2nd IPPI coefficient. **Note:** IP control will be applied when it is set to 0 and PI control will be applied when it is set to 100.								
P2.15	Data size	16bit	Data format		DEC			
	Modbus address	1430, 1431	CANopen address		0x220F, 0x00			

6.3.2 Gain switching

P2.20	2nd gain setting	Setting range	Default	Unit	Available mode			
		0~1	1	-	P	S	T	F

This parameter is used to set the right adjustment.

Setting value	Mode
0	1st gain is fixed. Gain switching invalid→PI action Gain switching valid→P action **Note:** 0x006 is the digital input low level valid and the high level valid is 0x106.
[1]	Valid between 1st gain [P2.00~P2.04] and 2nd gain [P2.05~P2.09].

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

P2.22	Position control switching mode	Setting range	Default	Unit	Available mode			
		0~9	0	-	P			F
This parameter is used to set the triggering condition of gain switching during position control or fully-closed-loop control.								

Setting value	Switching condition	Gain 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 the speed command exceed (level+delay) [r/min], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the speed command keeps below (level-delay) [r/min] and such state in the delay time, it will return to 1st gain.
5	Large position deviation	In the previous 1st gain, if the absolute value of the position deviation exceed (level+delay) [pulse], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the position deviation keeps below (level-delay) [pulse] and such state 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 address	1444,1445	CANopen address	0x2216,0x00

P2.23	Delay time of position control switching	Setting range	Default	Unit	Available mode			
		0~10000	0	ms	P			F
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 address	1446,1447	CANopen address		0x2217,0x00			

P2.24	Switching level of position control	Setting range	Default	Unit	Available mode			
		0~20000	0	Based on mode	P			F
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 address	1448,1449	CANopen address		0x2218,0x00			

P2.25	Switching delay of position control	Setting range	Default	Unit	Available mode			
		0~20000	0	Based on mode	P			F
In the position control, if set P2.22 to 3~5, 8, 9, it is necessary to set switching conditions. The unit will vary with the switching mode and setting. **Note:** Please set the level<the delay, in the actual internal application, the delay=the level								
P2.25	Data size	16bit	Data format		DEC			
	Modbus address	1450,1451	CANopen address		0x2219,0x00			

P2.26	Switching time of position gain	Setting range	Default	Unit	Available mode			
		0~10000	0	ms	P			F
In position control, if the offset between P2.00 and P2.04 is large, setting this parameter can control the torque changing and vibration caused by increasing gain during switching from small gain to large gain. The parameter is invalid when the position gain is switched from a large value to a smaller one.								
P2.26	Data size	16bit	Data format		DEC			
	Modbus address	1452,1453	CANopen address		0x221A,0x00			

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

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

Setting value	Switching condition	Gain 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 the torque command exceed (level+delay) [0.1%], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the 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 the speed command exceed (level+delay) [r/min/s], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the speed command keeps below (level-delay) [r/min/s] and 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 address	1454,1455	CANopen address	0x221B,0x00

P2.28	Delay time of speed control switching	Setting range	Default	Unit	Available mode			
		0~10000	0	ms		S		

In the speed control, if set P2.27 to 3~5, when switching from 2nd gain to 1st gain, it is the time from meeting the trigger conditions to the actual switching.

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

P2.29	Switching level of speed control	Setting range	Default	Unit	Available 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 address	1458,1459	CANopen address	0x221D,0x00

P2.30	Switching delay of speed control	Setting range	Default	Unit	Available 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 be vary with the mode and setting.

Note: Please set the level<the delay, in the actual application, the delay=the level.

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

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

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

Setting value	Switching condition	Gain 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	Torque command	In the previous 1st gain, if the absolute value of the torque command exceed (level+delay)[0.1%], it will switch to 2nd gain. In the previous 2nd gain, if the absolute value of the torque command keeps below (level-delay) and such state in the delay time, it will return to 1st gain.

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

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

P2.32	Delay time of torque control switching	Setting range	Default	Unit	Available mode			
		0~10000	0	ms			T	

In 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 address	1464,1465	CANopen address	0x2220,0x00

P2.33	Switching level of torque control	Setting range	Default	Unit	Available mode			
		0~20000	0	Based on mode			T	

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

Note: Please set the level ≥ the delay

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

P2.34	Switching delay of torque control	Setting range	Default	Unit	Available mode			
		0~20000	0	Based on mode			T	

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

Note: Please set the level<the delay, in the actual application, the delay=the level

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

6.3.3 Special motor control

P2.41[2]	Disturbances observer valid	Setting range	Default	Unit	Available mode			
		0~2	0	-	P	S	T	F

Set whether the disturbance observer is valid or not via this parameter.

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

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

P2.42	Disturbance observer compensation gain	Setting range	Default	Unit	Available mode			
		0~100	0.0	%	P	S		F

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; it is necessary to use 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 address	1484,1485	CANopen address	0x222A,0x00

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

This parameter is used to set the cut-off frequency of disturbance observer. Decreasing the set value can downgrade the noise; while increase the set value can reduce the delay of disturbance torque compensation, it is necessary to be used in combination with P2.42.

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

P2.44	Torque command offset	Setting range	Default	Unit	Available mode			
		-500.0~500.0	0.0	%	P	S	T	F

This parameter is used to set the changing load compensation which is added to the torque command. It is usually be used in the vertical shaft application and other control modes except for the torque control mode.

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

P2.50[2]	Fully-loop vibration suppressor valid	Setting range	Default	Unit	Available mode			
		0~2	0	-				F

Set whether the speed detector is valid by this parameter

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

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

P2.51	Fully-loop vibration suppressor cut-off frequency	Setting range	Default	Unit	Available mode			
		1.0~500.0	100.0	Hz				F

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 address	1502, 1503	CANopen address	0x2233, 0x00

P2.52	Fully-loop vibration suppressor compensation gain	Setting range	Default	Unit	Available mode			
		0~1000	0	%				F

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

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

P2.60[2]	Speed observer valid	Setting range	Default	Unit	Available mode			
		0~2	0	-	P	S	T	F

Set whether speed observer is valid via this parameter.

Setting value	Function
[0]	Invalid
1	Speed observation
2	Speed compensation

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

P2.61	Speed observer gain	Setting range	Default	Unit	Available mode			
		1~1000	100	Hz	P	S	T	F

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 address	1522,1523	CANopen address	0x223D,0x00

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

P2.71	Positive torque coefficient of friction compensation	Setting range	Default	Unit	Available mode			
		0.0~100.0	0.0	%/(10 r/min)	P	S		F
Set the friction compensation value added to torque command when receiving the forward position command or speed command.								
P2.71	Data size	16bit	Data format		DEC			
	Modbus address	1542,1543	CANopen address		0x2247,0x00			

P2.72	Negative torque coefficient of friction compensation	Setting range	Default	Unit	Available mode			
		-100.0~0.0	0.0	%/(10 r/min)	P	S		F
Set friction compensation value added to the torque command when receiving negative position command or speed command.								
P2.72	Data size	16bit	Data format		DEC			
	Modbus address	1544, 1545	CANopen address		0x2248, 0x00			

P2.73	Friction compensation valid	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S		F
Set whether friction compensation is valid by this parameter								
	Setting value	Function						
	[0]	Invalid						
	1	Friction compensation						
P2.73	Data size	16bit	Data format		DEC			
	Modbus address	1546, 1547	CANopen address		0x2249, 0x00			

6.4 I/O management parameters (P3)

6.4.1 Digital input/output

P3.00[1]	Input configuration of digital input 1	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x003	-	P	S	T	F
This parameter is used to select the configuration of the digital value 1 input function. It is a hex number. 0x * ——: * means the valid mode: 0: optical coupler conduction valid; 1: optical coupler non-conduction valid. 0x— * * : * * means the selected function, the detailed information is as below:								

Signal name	Sign	Setting value		Available mode			
		Optical coupler non-conduction valid	Optical coupler conduction valid				
Invalid	—	0x100	0x000	P	S	T	F
Positive direction drive disabled	POT	0x101	0x001	P	S	T	F
Negative direction drive disabled	NOT	0x102	0x002	P	S	T	F
Servo enabling	SON	0x103	0x003	P	S	T	F
Alarm clearing	CLA	0x104	0x004	P	S	T	F
Control mode switching	MCH	0x105	0x005	P	S	T	
Gain switching	PLC	0x106	0x006	P	S	T	F
Retention pulse clearing	RPC	0x107	0x007	P			F
Command pulse disabled	PLL	0x108	0x008	P			F
Torque limit switching	TLC	0x109	0x009	P	S		F
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	F
Inertia ratio switching	JC	0x115	0x015	P	S	T	F
Emergency stop	EMG	0x116	0x016	P	S	T	F
HOME switch input	HOME	0x117	0x017	P			
HOME trigger	HTRG	0x118	0x018	P			
Molecule 1 of electronic gear ratio	SC1	0x119	0x019	P			F
Molecule 2 of electronic gear ratio	SC2	0x11A	0x01A	P			F
PTP control trigger	TRIG	0x11B	0x01B	P			
Vibration control switching input	VS-SEL	0x11C	0x01C	P			F
Fast stop	Q-STOP	0x11D	0x01D	P	S	T	F
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				
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	F
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			

Note: The default value is the function selection corresponding to the position mode.

P3.00[1]	Data size	16bit	Data format	HEX
	Modbus address	1600,1601	CANopen address	0x2300, 0x00

P3.01[1]	Input configuration of digital 2	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x00D	-	P	S	T	F
P3.02[1]	Input configuration of digital 3	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x004	-	P	S	T	F
P3.03[1]	Input configuration of digital 4	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x016	-	P	S	T	F
P3.04[1]	Input configuration of digital 5	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x019	-	P	S	T	F
P3.05[1]	Input configuration of digital 6	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x01A	-	P	S	T	F
P3.06[1]	Input configuration of digital 7	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x001	-	P	S	T	F
P3.07[1]	Input configuration of digital 8	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x002	-	P	S	T	F
P3.08[1]	Input configuration of digital 9	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x007	-	P	S	T	F
P3.09[1]	Input configuration of digital 10	Setting range	Default	Unit	Available mode			
		0x000~0x133	0x008	-	P	S	T	F

These parameters are used to set the input function of digital value 2~10, and they are hex numbers.

The setting method is the same as P3.00.

Note: The default value is the function selection corresponds to position mode.

P3.01[1]	Data size	16bit	Data format	HEX
	Modbus address	1602, 1603	CANopen address	0x2301, 0x00
P3.02[1]	Data size	16bit	Data format	HEX
	Modbus address	1604, 1605	CANopen address	0x2302, 0x00
P3.03[1]	Data size	16bit	Data format	HEX
	Modbus address	1606, 1607	CANopen address	0x2303, 0x00
P3.04[1]	Data size	16bit	Data format	HEX
	Modbus address	1608, 1609	CANopen address	0x2304, 0x00
P3.05[1]	Data size	16bit	Data format	HEX
	Modbus address	1610, 1611	CANopen address	0x2305, 0x00
P3.06[1]	Data size	16bit	Data format	HEX
	Modbus address	1612, 1613	CANopen address	0x2306, 0x00
P3.07[1]	Data size	16bit	Data format	HEX
	Modbus address	1614, 1615	CANopen address	0x2307, 0x00
P3.08[1]	Data size	16bit	Data format	HEX
	Modbus address	1616, 1617	CANopen address	0x2308, 0x00
P3.09[1]	Data size	16bit	Data format	HEX
	Modbus address	1618, 1619	CANopen address	0x2309, 0x00

P3.10[1]	Output configuration of digital 1	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x001	-	P	S	T	F

This parameter is used to select the configuration of the digital value 1 output function. It is a hex number.

0x * ——: * means valid mode: 0: optical coupler conduction valid; 1: optical coupler non-conduction valid

0x— * * : * * means the selected function, the detailed information is as below:

Signal name	Sign	Setting value		Available mode			
		Optical coupler non-conduction valid	Optical coupler conduction valid				
Invalid	—	0x100	0x000	P	S	T	F
Servo ready output	RDY	0x101	0x001	P	S	T	F
Servo operation output	RUN	0x102	0x002	P	S	T	F
Fault output	ALM	0x103	0x003	P	S	T	F
Reserved	RSV	0x104	0x004	P	S	T	F
External brake release signal	BRK	0x105	0x005	P	S	T	F
Position command or not	PCMD	0x106	0x006	P			F
Positioning finished	PLR	0x107	0x007	P			F
Switching state of control mode	MCHS	0x108	0x008	P	S	T	
Speed matching	COIN	0x109	0x009		S	T	

Speed reaching	SR	0x10A	0x00A		S	T	
Speed limiting	SL	0x10B	0x00B	P	S	T	
Speed command or not	SCMD	0x10C	0x00C		S		
Speed zero output	ZSO	0x10D	0x00D	P	S	T	F
Torque limiting	LM	0x10E	0x00E	P	S	T	F
Zeroing finished	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	F

Note: The default value is the function selection corresponds to position mode.

P3.10[1]	Data size	16bit	Data format	HEX
	Modbus address	1620,1621	CANopen address	0x230A, 0x00

P3.11[1]	Output configuration of digital 2	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x003	-	P	S	T	F
P3.12[1]	Output configuration of digital 3	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x007	-	P	S	T	F
P3.13[1]	Output configuration of digital 4	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x00D	-	P	S	T	F
P3.14[1]	Output configuration of digital 5	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x005	-	P	S	T	F
P3.15[1]	Output configuration of digital 6	Setting range	Default	Unit	Available mode			
		0x000~0x11F	0x00E	-	P	S	T	F

These parameters are used to set the output function of digital value 2~6, and they are hex numbers.

The setting method is the same as P3.10.

Note: The default value is the function selection corresponds to position mode.

P3.11[1]	Data size	16bit	Data format	HEX
	Modbus address	1622, 1623	CANopen address	0x230B, 0x00

P3.12[1]	Data size	16bit	Data format	HEX
	Modbus address	1624, 1625	CANopen address	0x230C, 0x00
P3.13[1]	Data size	16bit	Data format	HEX
	Modbus address	1626, 1627	CANopen address	0x230D, 0x00
P3.14[1]	Data size	16bit	Data format	HEX
	Modbus address	1628, 1629	CANopen address	0x230E, 0x00
P3.15[1]	Data size	16bit	Data format	HEX
	Modbus address	1630, 1631	CANopen address	0x230F, 0x00

P3.16	Function configuration of DI capture encoder	Setting range	Default	Unit	Available mode			
		0~778	0	-	P	S	T	F

DI port capture function configuration, capture the encoder position via the jump edge of DI port in real time, check encoder value captured via R1.16.

Data bit	Setup instruction	Remark
bit0~3	bit0~3=0x1~0xA, corresponds to capture port DI1~DI10	Others are invalid state

bit8~9	bit8=1, bit9=0, capture only on DI port falling edge;
	bit8=0, bit9=1, capture only on DI port rising edge;
	bit8=1, bit9=1, capture on both DI port rising edge and falling edge.	

P3.16	Data size	16bit	Data format	DEC
	Modbus address	1632, 1633	CANopen address	0x2310, 0x00

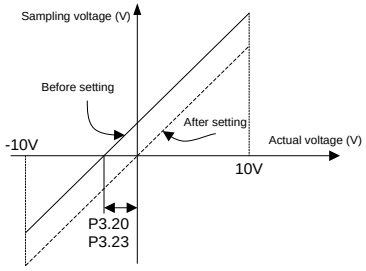
6.4.2 Analog input / output adjustment

P3.20	Offset of analog input 1	Setting range	Default	Unit	Available mode			
		-10.000~10.000	0.000	V		S		

This parameter can be used to adjust the analog input 1 to improve the effective accuracy of the analog input.

Due to zero drift of the AI devices or induced voltage of ambient environment and other reasons, the actual corresponding quantity of AI may deviate from the expected value, and such deviation can be eliminated by setting the offset of AI.

The meaning of the analog offset voltage is shown in below figure:

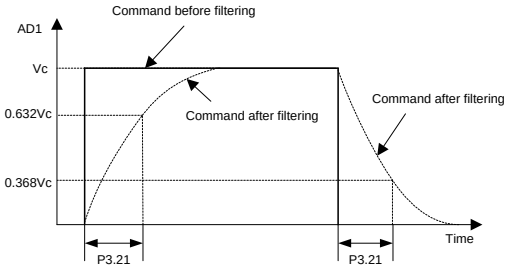


For example, after analog input 1 command terminal of the drive is connected with analog reference signal, then even if the analog reference signal is 0, the voltage value of analog input 1 (R1.05) displayed by the panel will be 0.02V, P3.20 should be set to 0.02 at this time. The drive will automatically subtract 0.02V from the analog input value received. If the analog input 2 voltage displayed by the panel is -0.02V, then parameter P3.20 should be set to -0.02. The drive will automatically add 0.02V to the analog input value received and the value displayed by the panel will change at the same time.

P3.20	Data size	32bit	Data format	DEC
	Modbus address	1640,1641	CANopen address	0x2314,0x00

P3.21	Filter of analog input 1	Setting range	Default	Unit	Available mode			
		0.0~1000.0	1.0	ms		S		

This parameter is used to set the time constant of the first order low-pass filter corresponds to analog input 1. Setting this parameter can smooth the command changing when the analog input changes violently. Please refer to the figure below:



P3.21	Data size	16bit	Data format	DEC
	Modbus address	1642,1643	CANopen address	0x2315,0x00

P3.22	Voltage protection of analog input 1	Setting range	Default	Unit	Available mode			
		0.000~10.000	0.000	V		S		

This parameter is used to set the overvoltage protection of analog input 1.

If the absolute value of R1.05 exceeds the setting value, the system will report fault.

Note:

1. The default value 0 means no overvoltage protection;
2. The input voltage should be no more than 10V, otherwise damage may occur to the drive.

P3.22	Data size	32bit	Data format	DEC
	Modbus address	1644,1645	CANopen address	0x2316,0x00

P3.23	Offset of analog input 2	Setting range	Default	Unit	Available mode			
		-10.000~10.000	0.000	V	P	S	T	F

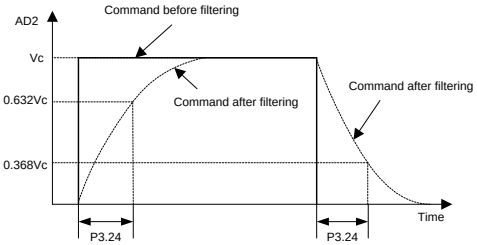
This parameter can be used to adjust the analog input 2 to improve the effective accuracy of analog input.

The setting method is the same with P3.20.

P3.23	Data size	32bit	Data format	DEC
	Modbus address	1646,1647	CANopen address	0x2317,0x00

P3.24	Filter of analog input 2	Setting range	Default	Unit	Available mode			
		0.0~1000.0	1.0	ms	P	S	T	F

This parameter is used to set the time constant of the first order low-pass filter corresponds to the command . Setting this parameter can smooth the changing of actual output command when the command changes violently. Please refer to the figure below:



P3.24	Data size	16bit	Data format	DEC
	Modbus address	1648,1649	CANopen address	0x2318,0x00

P3.25	Voltage protection of analog input 2	Setting range	Default	Unit	Available mode			
		0.000~10.000	0.000	V	P	S	T	F

This parameter is used to set the overvoltage protection value of analog input 2.

Note:

1. The default value 0 means no overvoltage protection;
2. The input voltage should be no more than 10V, otherwise damage may occur to the drive.

P3.25	Data size	32bit	Data format	DEC
	Modbus address	1650,1651	CANopen address	0x2319,0x00

P3.26[1]	Function selection of analog input 1	Setting range	Default	Unit	Available mode			
		0~7	0	-	P	S	T	F
P3.27[1]	Function selection of analog input 2	Setting range	Default	Unit	Available mode			
		0~7	3	-	P	S	T	F

Select the analog input channel function via this parameter

Setting 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 compensation	r/min
6	Torque compensation	0.1%
7	Negative torque limit	0.1%

P3.26[1]	Data size	16bit	Data format	DEC
	Modbus address	1652, 1653	CANopen address	0x231A, 0x00
P3.27[1]	Data size	16bit	Data format	DEC
	Modbus address	1654, 1655	CANopen address	0x231B, 0x00

P3.28	Analog speed compensation gain	Setting range	Default	Unit	Available mode			
		0.0~100.0	0.0	%	P	S	T	F
Set the analog speed compensation gain via this parameter.								
P3.28	Data size	16bit	Data format	DEC				
	Modbus address	1656, 1657	CANopen address	0x231C, 0x00				

P3.29	Analog torque compensation gain	Setting range	Default	Unit	Available mode			
		0.0~100.0	0.0	%	P	S	T	F
Set the analog torque compensation gain via this parameter.								
P3.29	Data size	16bit	Data format	DEC				
	Modbus address	1658, 1659	CANopen address	0x231D, 0x00				

P3.30[1]	analog output 1 selection	Setting range	Default	Unit	Available mode			
		0~19	0	-	P	S	T	F
P3.32[1]	analog output 2 selection	Setting range	Default	Unit	Available mode			
		0~19	0	-	P	S	T	F

This group of parameters is used to select the monitoring parameters to be outputted in analog form.

Setting 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(Linear encoder unit)
10	Hybrid control deviation	reference unit
11	DC voltage of main circuit	V
12	Positive torque limit	0.1%
13	Negative torque limit	0.1%
14	Speed limit value	r/min
15	Inertia ratio	%
16	Analog speed command*	V
17	Analog torque command*	V

18	Analog input 3*	V
19	Drive temperature	℃

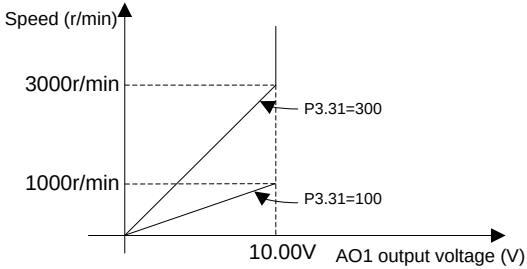
Note: When P3.31, P3.33 is set to 1000, the analog speed command, analog torque command and analog input 3 outputs the voltage value inputted from the analog input terminal at any time.

P3.30[1]	Data size	16bit	Data format	DEC
	Modbus address	1660, 1661	CANopen address	0x231E, 0x00
P3.32[1]	Data size	16bit	Data format	DEC
	Modbus address	1664, 1665	CANopen address	0x2320, 0x00

P3.31	Voltage gain of analog output 1	Setting range	Default	Unit	Available mode			
		0~214748364	0	[P3.30 Unit]/V	P	S	T	F
P3.33	Voltage gain of analog output 2	Setting range	Default	Unit	Available mode			
		0~214748364	0	[P3.32 Unit]/V	P	S	T	F

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:

1. If the actual output speed is more than 3000r/min, AO1 output is 10V. Please select the gain according to the actual range of the parameter.
2. When P3.30 and P3.32 select other functions, the gain setting is the same.

P3.31	Data size	32bit	Data format	DEC
	Modbus address	1662, 1663	CANopen address	0x231F, 0x00
P3.33	Data size	32bit	Data format	DEC
	Modbus address	1666, 1667	CANopen address	0x2321, 0x00

P3.34	Offset voltage of analog output 1	Setting range	Default	Unit	Available mode			
		-10.000~10.000	0.000	V	P	S	T	F
P3.35	Offset voltage of analog output 2	Setting range	Default	Unit	Available mode			
		-10.000~10.000	0.000	V	P	S	T	F

This parameter 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 address	1668,1669	CANopen address	0x2322,0x00
P3.35	Data size	32bit	Data format	DEC
	Modbus address	1670,1671	CANopen address	0x2323,0x00

P3.36[1]	Analog output monitor setting	Setting range	Default	Unit	Available mode				
		0~2	0	-	P	S	T	F	

This parameter is used to set the output mode and voltage range of the analog output.

Setting 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 address	1672,1673	CANopen address	0x2324,0x00

6.4.3 Digital input / output settings

P3.40[1]	Travel limit switch shield	Setting range	Default	Unit	Available mode			
		0~2	1	-	P	S	T	F

This parameter is used to set whether the digital input configured as forward drive disabling (0x001 or 0x101) and reverse drive disabling (0x002 or 0x102) is valid or not. If the function of the travel limit switch needs to be shielded , this parameter can do the trick.

Setting value	Function
0	Travel limit switch is normal
[1]	Travel limit switch is disabled
2	Ultralimit fault

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 address	1680,1681	CANopen address	0x2328,0x00

P3.41[1]	Emergency stop switch shield	Setting range	Default	Unit	Available mode			
		0~1	1	-	P	S	T	F

This parameter is used to set whether digital input configured as EMG (0x016 or 0x116) is valid or not. If the function of the emergency stop switch needs to be shielded, this parameter can do the trick.

Setting value	Function
0	Emergency stop switch is normal
[1]	Emergency stop switch is disabled

If the digital input set as EMG is active, then Er10-4 will occur.

Note:

1. If Er10-4 occurs, the servo drive will stop at the stopping mode set by P4.30.
2. Clearance of Er10-4: Please ensure there is no danger, and then clear the alarm signal (disable the digital input configured as EMG). After clearing the alarm displayed, it is necessary to enable the servo drive again to operate the servo system.

P3.41[1]	Data size	16bit	Data format	DEC
	Modbus address	1682,1683	CANopen address	0x2329,0x00

P3.43[1]	Digital input filter	Setting range	Default	Unit	Available mode			
		1~800	1	0.125ms	P	S	T	F

This parameter is used to set the filter time of the digital input.

Note: The parameter works alone for 10 digital inputs.

P3.43[1]	Data size	16bit	Data format	DEC
	Modbus address	1686,1687	CANopen address	0x232B,0x00

P3.44	Command pulse input invalid setting disabled	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			F

This parameter can set whether the digital input configured as command pulse disabling (0x008 or x0108) among P3.00~P3.09 is valid or not. If command pulse disabling function needs to be blocked, this parameter will do the trick.

0:Valid; 1:Invalid

P3.44	Data size	16bit	Data format	DEC
	Modbus address	1688,1689	CANopen address	0x232C,0x00

P3.45[1]	Clearing mode of retention pulse	Setting range	Default	Unit	Available mode			
		0~1	1	-	P			F

This parameter is used to set valid mode of the digital input configured as RPC (0x007 or 0x107) among P3.00~P3.09.

Setting value	Function
0	ON level clear
[1]	Rising edge clear

P3.45[1]	Data size	16bit	Data format	DEC
	Modbus address	1690,1691	CANopen address	0x232D,0x00

P3.50	Range of position arrival	Setting range	Default	Unit	Available mode			
		$0\sim2^{18}$	100	reference unit	P			F

This parameter is used to set the range of position arrival. When 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 address	1700,1701	CANopen address	0x2332,0x00

P3.51	Output mode of position arrival	Setting range	Default	Unit	Available mode			
		0~4	0	-	P			F

This parameter can be used to set the condition for the position arrival output signal and the action mode after output.

Setting value	Output mode
[0]	Output is valid if the position deviation is within the range of P3.50.
1	Output is valid when there is no position command and the position deviation is within the range of P3.50.
2	Output is valid when when there is no position command, the zero speed detection signal is valid and position deviation is within the range of P3.50.
3	Output is valid when transiting from the position command to no position command and the position deviation is within the range of P3.50. And then, valid state of output continues until passing the time set by P3.52, after that, updates the position arrival output state according to the position command and the position deviation.
4	Output is valid when transiting from position command to no position command while position deviation is within P3.50. Thereafter, the valid state of output continues until passing the set time by P3.52.

P3.51	Data size	16bit	Data format	DEC
	Modbus address	1702,1703	CANopen address	0x2333,0x00

P3.52	Hold time of position arrival output terminal	Setting range	Default	Unit	Available mode			
		0~30000	0	ms	P			F

This parameter is used to set the hold time of position arrival output terminal.

Setting value	Action
[0]	Hold time is infinite, continuous valid state to the next position command position
1~30000	Valid only within the setting value [ms]. If position command is received during hold time, it will change to invalid state immediately.

P3.52	Data size	16bit	Data format	DEC
	Modbus address	1704,1705	CANopen address	0x2334,0x00

P3.53	Speed matching range	Setting range	Default	Unit	Available mode			
		10~20000	50	r/min	P	S	T	F

This parameter is used to set the detection condition of speed matching output.

If the difference between the speed command and the motor speed is below the setting value, then the output state of the speed matching is valid.

The threshold of the speed matching when there is 10r/min lag:

Speed matching output: Invalid → Valid threshold: (P3.53 – 10)r/min

Valid → The critical value of invalid: (P3.53 + 10) r/min				
P3.53	Data size	16bit	Data format	DEC
	Modbus address	1706,1707	CANopen address	0x2335,0x00

P3.54	Speed reaching range	Setting range	Default	Unit	Available mode			
		10~20000	1000	r/min	P	S	T	F
This parameter is used to set the detection condition for speed reaching output. If the transient motor speed exceeds the setting value, the output is valid. There is 10r/min lag in detection.								
P3.54	Data size	16bit	Data format	DEC				
	Modbus address	1708,1709	CANopen address	0x2336,0x00				

P3.55	Zero speed range	Setting range	Default	Unit	Available mode			
		10~20000	50	r/min	P	S	T	F
This parameter is used to set the detection condition for speed zero output. When the absolute value of motor speed is within this range, it is deemed as zero speed and the zero speed output signal will become valid. There is 10r/min lag in detection.								
P3.55	Data size	16bit	Data format	DEC				
	Modbus address	1710,1711	CANopen address	0x2337,0x00				

P3.56	Locked time of servo after braking	Setting range	Default	Unit	Available mode			
		0~1000	50	ms	P	S	T	F
This parameter is used to set the locked time of the servo after braking in the locked state. The servo is OFF in the locked state, the digital output state configured as BRK (0x005 or 0x105) is invalid. At this time, the servo will continue to be locked for a period of time so that the motor will not rotate during the action of the relay.								
P3.56	Data size	16bit	Data format	DEC				
	Modbus address	1712,1713	CANopen address	0x2338,0x00				

P3.57	Braking delay of electromagnetic brake	Setting range	Default	Unit	Available mode			
		0~30000	500	ms	P	S	T	F
This parameter is used to set the braking delay time of the electromagnetic brake. When the servo is OFF or alarm is reported in running state, it indicates the speed may be too fast, so it will delay for a period time before rendering the digital output signal configured as BRK (0x005 or 0x105) invalid. If the motor speed drops below the set value of P3.58 during the delay period, the output of BRK will be invalid in advance.								
P3.57	Data size	16bit	Data format	DEC				
	Modbus address	1714,1715	CANopen address	0x2339,0x00				

P3.58[1]	Motor speed of brake release	Setting range	Default	Unit	Available mode			
		0~1000	30	r/min	P	S	T	F
This parameter is used to set the motor speed threshold value when the brake is released.								

P3.58[1]	Data size	16bit	Data format	DEC
	Modbus address	1716,1717	CANopen address	0x233A,0x00

P3.59	Torque reaching range	Setting range	Default	Unit	Available mode			
		5.0~300.0	50.0	%			T	
This parameter is used to set the detection condition for torque reaching output. If the motor torque feedback exceeds this setting value, the output of TRCH (0x010 of 0x110) is valid. There is 5% lag in detection.								
P3.59	Data size	16bit	Data format	DEC				
	Modbus address	1718,1719	CANopen address	0x233B,0x00				

6.4.4 Analog input 3 adjustment

P3.70[1]	Function of analog input 3	Setting range	Default	Unit	Available mode			
		0~7	4	-	P	S	T	F

This parameter is used to set the function of analog input 3:

Setting value	Definition	Unit
0	Invalid	-
1	Speed limit	(r/min)/V
2	Torque limit *1	0.1%/V
3	Speed command *2	(r/min)/V
[4]	Torque command	0.1%/V
5	Speed compensation	(r/min)/V
6	Torque compensation	0.1%/V
7	Negative-direction torque limit	0.1%/V

Note:

*1 If P3.70 is 2 and P0.09 is 0 or 4, the analog input 3 corresponds to the positive torque limit internally and P0.62~P0.65, P3.23~P3.25 correspond to the negative torque limit internally.

*2 If P3.70 is 3, P0.42~P0.45, P3.20~P3.22 are invalid.

P3.70[1]	Data size	16bit	Data format	DEC
	Modbus address	1740,1741	CANopen address	0x2346,0x00

P3.71	Zero offset of analog input 3	Setting range	Default	Unit	Available mode			
		-10.000~10.000	0.000	V	P	S	T	F
The zero offset voltage of analog input 3.								
P3.71	Data size	32bit	Data format	DEC				
	Modbus address	1742,1743	CANopen address	0x2347,0x00				

P3.72	Dead zone of analog input 3	Setting range	Default	Unit	Available mode			
		0.000~3.000	0.000	V	P	S	T	F
Dead zone range of analog input 3.								

P3.72	Data size	16bit	Data format	DEC
	Modbus address	1744,1745	CANopen address	0x2348,0x00

P3.73	Gain of analog input 3	Setting range	Default	Unit	Available mode			
		0~2000	300	-	P	S	T	F

This parameter is used to set the gain of analog input 3. The units correspond to different function of P3.70 are listed below:

P3.70 Setting value	Definition	P3.73 unit
[0]	Invalid	-
1	Speed limit	(r/min)/V
2	Torque limit	0.1%/V
3	Speed command	(r/min)/V
4	Torque command	0.1%/V
5	Speed compensation	(r/min)/V
6	Torque compensation	0.1%/V
7	Negative torque limit	0.1%/V

P3.73	Data size	32bit	Data format	DEC
	Modbus address	1746,1747	CANopen address	0x2349,0x00

P3.74	Analog input 3 reverse	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to set the voltage polarity of analog input 3.

Setting value	Detection result	
[0]	Positive polarity	[+voltage] → [positive],[- voltage] → [negative]
1	Negative polarity	[+voltage] → [negative],[- voltage] → [positive]

P3.74	Data size	16bit	Data format	DEC
	Modbus address	1748,1749	CANopen address	0x234A,0x00

P3.75	Voltage protection of analog input 3	Setting range	Default	Unit	Available mode			
		0.000~10.000	0.000	V	P	S	T	F

This parameter is used to set the overvoltage protection value of analog input 3.
If the absolute value of analog input 3 voltage exceeds the set value, the system will report alarm.

P3.75	Data size	32bit	Data format	DEC
	Modbus address	1750,1751	CANopen address	0x234B,0x00

P3.76	Analog input 3 filter	Setting range	Default	Unit	Available mode			
		0.0~1000.0	0.0	ms	P	S	T	F

This parameter is used to set the time constant of first order low-pass filter of analog input 3.

P3.76	Data size	16bit	Data format	DEC
	Modbus address	1752,1753	CANopen address	0x234C,0x00

P3.77	Deadzone mode of analog input	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

Set the deadzone voltage mode of analog input by this parameter

Setting value	Definition
[0]	Normal mode
1	CNC mode. When AI is smaller than the deadzone, the valid value is 0: When AI is larger than the deadzone, the valid value is AI-deadzone.

P3.77	Data size	16bit	Data format	LIST
	Modbus address	1754, 1755	CANopen address	0x234D, 0x00

P3.90	Pulse input filter	Setting range	Default	Unit	Available mode			
		0~7	2	-	P	S	T	F

This parameter is used to set filter time of the pulse input.

Setting value	Width of pulse input
0	400kHz
1	500kHz
[2]	1MHz
3	2MHz
4	4MHz
5	>4MHz
6	200kHz
7	100kHz

P3.90	Data size	16bit	Data format	DEC
	Modbus address	1780,1781	CANopen address	0x235A,0x00

6.5 Extension and application (P4)

6.5.1 Communication setting

P4.01[1]	485 local communication address	Setting range	Default	Unit	Available mode			
		1~255	1	-	P	S	T	F

This parameter is used to set local (slave) communication address of 485 serial communication.

P4.01[1]	Data size	16bit	Data format	DEC
	Modbus address	1802,1803	CANopen address	0x2401, 0x00

P4.02[1]	CAN communication baud rate	Setting range	Default	Unit	Available mode			
		0~5	1	-	P	S	T	F

This parameter is used to select CAN communication baud rate. Available baud rate are as follow:

Setting 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 address	1804,1805	CANopen address	0x2402, 0x00

P4.03[1]	485 communication baud rate	Setting range	Default	Unit	Available mode			
		0~3	1	-	P	S	T	F

This parameter is used to select 485 communication baud rate. Available baud rate are as follow:

Setting value	Baud rate
0	9600bps
[1]	19200bps
2	38400bps
3	57600bps

P4.03[1]	Data size	16bit	Data format	DEC
	Modbus address	1806,1807	CANopen address	0x2403,0x00

P4.04[1]	485 communication parity mode	Setting range	Default	Unit	Available mode			
		0~5	0	-	P	S	T	F

This parameter is used to set the 485 communication parity mode and it only supports RTU mode.

Setting value	Baud rate
[0]	None (N, 8, 1)
1	Even (E, 8, 1)
2	Odd (O, 8, 1)
3	None(N, 8, 2)
4	Even(E, 8, 2)
5	Odd(O, 8, 2)

P4.04[1]	Data size	16bit	Data format	DEC
	Modbus address	1808,1809	CANopen address	0x2404,0x00

P4.05[1]	CAN communication node	Setting range	Default	Unit	Available mode			
		1~127	1	-	P	S	T	F

This parameter is used to set the local (salve) CAN communication node no..

P4.05[1]	Data size	16bit	Data format	DEC
	Modbus address	1810,1811	CANopen address	0x2405,0x00

P4.06	485 communication fault clearing mode	Setting range	Default	Unit	Available mode			
		0~1	1	-	P	S	T	F

Set the processing method of the drive during 485 communication fault.

Setting value	Meaning
0	Do not clear fault
[1]	Clear fault automatically

P4.06	Data size	16bit	Data format	DEC
	Modbus address	1812, 1813	CANopen address	0x2406, 0x00

P4.07[1]	EtherCAT synchronous cycle	Setting range	Default	Unit	Available mode			
		0~3	2	-	P	S	T	F

This parameter is used to the the synchronous interruption cycle of DC sync0 when DC mode is adopted for EtherCAT communication.

Setting value	Meaning
0	250us
1	500us
[2]	1ms
3	2ms

P4.07[1]	Data size	16bit	Data format	DEC
	Modbus address	1814, 1815	CANopen address	0x2407, 0x00

P4.08[1]	EtherCAT synchronous type	Setting range	Default	Unit	Available mode			
		0~2	0	-	P	S	T	F

Set the synchronous mode between master station and slave station of EtherCAT communication.

Setting value	Meaning
[0]	Free-run
2	DC mode(sync0)

P4.08[1]	Data size	16bit	Data format	DEC
	Modbus address	1816, 1817	CANopen address	0x2408, 0x00

P4.09[1]	EtherCAT fault detection time	Setting range	Default	Unit	Available mode			
		0~1000	100	ms	P	S	T	F

Set EtherCAT communication fault detection time.

Note: When setting the parameter to 0, do not detect EtherCAT fault.

P4.09[1]	Data size	16bit	Data format	DEC
	Modbus address	1818, 1819	CANopen address	0x2409, 0x00

6.5.2 Servo type and communication control command

P4.10[1]	Upper PC type	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter is used to set the upper PC type which is classified by the interface of upper PC control drive.

Setting value	Upper PC	Control interface
[0]	Pulse + analog	Position control/fully-closed-loop: pulse and PTP control Speed control/torque control: analog and internal setting
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 address	1820,1821	CANopen address	0x240A,0x00

P4.11*	Bus servo enabling	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

Carry out enabling control on the drive via this parameter.

Setting value	Function
[0]	Disabled
1	Enabled

Note: If the drive is enabled by P0.04, the drive can be disabled if P4.11 is from state 1 to state 0.

P4.11*	Data size	16bit	Data format	DEC
	Modbus address	1822,1823	CANopen address	0x240B,0x00

P4.12*	Bus position command	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)$~$(2^{31}-1)$	0	reference unit	P			F

If P4.10 is 1, the drive position command can be set via this parameter.

P4.12*	Data size	32bit	Data format	DEC
	Modbus address	1824,1825	CANopen address	0x240C,0x00

P4.13*	Bus speed command	Setting range	Default	Unit	Available mode			
		-20000~20000	0	r/min		S		

If P4.10 is 1, the drive speed command can be set via this parameter.

P4.13*	Data size	16bit	Data format	DEC
	Modbus address	1826,1826	CANopen address	0x240D,0x00

P4.14*	Bus torque command	Setting range	Default	Unit	Available mode			
		-500.0~500.0	0.0	%			T	

If P4.10 is 1, the drive torque command can be set via this parameter.

P4.14*	Data size	16bit	Data format	DEC
	Modbus address	1828,1829	CANopen address	0x240E,0x00

P4.15*	Switching command of control mode	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

When P4.10 is 1, this parameter can be used to switch the control mode in hybrid control mode.

Setting value	Function	Actual control mode	
[0]	Disabled	Position/speed	Position
		Position/torque	Position
		Speed/torque	Speed
1	Enabled	Position/speed	Speed
		Position/torque	Torque
		Speed/torque	Torque

Note: After the updating of the control mode switching command, the actual switching process of the drive and motor will act based on the setting of P0.90~P.92 and actual feedback state.

P4.15*	Data size	16bit	Data format	DEC
	Modbus address	1830,1831	CANopen address	0x240F,0x00

P4.16*	Gain switching command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P4.10 is 1, this parameter can be used to set the gain switching command. When P2.22, P2.27, P2.31 is 2, the actual controlled gain setting can be switched.

Setting value	Function	Actual gain
[0]	Disabled	1st gain setting
1	Enabled	2nd gain setting

P4.16*	Data size	16bit	Data format	DEC
	Modbus address	1832,1833	CANopen address	0x2410,0x00

P4.17*	Switching command of electronic gear ratio	Setting range	Default	Unit	Available mode			
		0~3	0	-	P			F

If P4.10 is 1, this parameter can be used to set the switching command of electronic gear ratio.

Setting value	Molecule of actual electronic gear ratio	Denominator of actual electronic gear ratio
[0]	Molecule of 1st electronic gear ratio (P0.25)	Denominator of electronic gear ratio (P0.26)
1	Molecule of 2nd electronic gear ratio (P0.27)	
2	Molecule of 3rd electronic gear ratio (P0.28)	
3	Molecule of 4th electronic gear ratio (P0.29)	

P4.17*	Data size	16bit	Data format	DEC
	Modbus address	1834,1835	CANopen address	0x2411,0x00

P4.18*	Inertia ratio switching command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P4.10 is 1, this parameter can be used to set the inertia ratio switching command.

Setting value	Function	Actual inertia ratio
[0]	Disabled	The first inertia ratio (P1.01)
1	Enabled	The second inertia ratio (P1.02)

P4.18*	Data size	16bit	Data format	DEC
	Modbus address	1836,1837	CANopen address	0x2412,0x00

P4.19*	Zero speed clamp command	Setting range	Default	Unit	Available mode			
		0~1	0	-		S	T	

If P4.10 is 1, this parameter can be used to set the zero speed clamp command.

Setting value	Function
[0]	Disabled
1	Enabled

P4.19*	Data size	16bit	Data format	DEC
	Modbus address	1838,1839	CANopen address	0x2413,0x00

P4.20*	Retention pulse clearing	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			F

If P4.10 is 1, this parameter can be used to set the retention pulse clearing. The detailed mode is determined by P3.45 and after clearing, R0.04 is 0.

Setting value	Function
[0]	Disabled
1	Enabled

P4.20*	Data size	16bit	Data format	DEC
	Modbus address	1840,1841	CANopen address	0x2414,0x00

P4.21*	Torque limit switching command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P4.10 is 1, this parameter can be used to set the torque limit switching control.

Setting value	Function
[0]	Disabled
1	Enabled

P4.21*	Data size	16bit	Data format	DEC
	Modbus address	1842,1843	CANopen address	0x2415,0x00

P4.22*	External fault command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P4.10 is 1, this parameter can be used to set the external fault command.

Setting value	Function
[0]	Disabled
1	Enabled

P4.22*	Data size	16bit	Data format	DEC
	Modbus address	1844,1845	CANopen address	0x2416,0x00

P4.23*	Emergency stop command	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P4.10 is 1, this parameter can be used to set emergency stop command.

Setting value	Function
[0]	Disabled
1	Enabled

P4.23*	Data size	16bit	Data format	DEC
	Modbus address	1846,1847	CANopen address	0x2417,0x00

P4.24*	Input command of vibration control switching	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			F

If P4.10 is 1, this parameter can be used to set vibration control switching of the drive.

Setting value	Function
[0]	Disabled
1	Enabled

P4.24*	Data size	16bit	Data format	DEC
	Modbus address	1848,1849	CANopen address	0x2418,0x00

6.5.3 Extension and application

P4.30	Stop mode	Setting range	Default	Unit	Available mode			
		0~3	0	-	P	S	T	F

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:

P4.30 Setting value	Action	
	During deceleration	After stopping
[0]	Coast to stop	Keep the inertia operation state
1	Dynamic brake to stop	Keep the inertia operation state
2	Dynamic brake stop	Dynamic braking state
3	External dynamic brake acts	Dynamic braking state

Note:

1. When P4.30 is set to 1, the dynamic brake works when motor speed is higher than the value of P3.58 and does not work otherwise. After motor stops, dynamic brake will stop working.
2. If the running speed of servo motor is faster than rated speed, do not use the dynamic brake. If

the running speed is high with large inertia load, please use the dynamic brake with caution. Do not start the dynamic brake frequently; otherwise, damage may occur to the servo drive.

P4.30	Data size	16bit	Data format	DEC
	Modbus address	1860,1861	CANopen address	0x241E,0x00

P4.31	Max. speed limit	Setting range	Default	Unit	Available mode			
		0~20000	5000	r/min	P	S	T	F

This parameter can be used to set the highest running speed of servo motor. If the absolute value of the speed command is larger than the value of this parameter, the magnitude of the actual speed setting will be limited by this parameter; the direction is the same with that of the original speed command. This parameter is active in all modes.

Note: The default value of this parameter is related to the power level of the drive.

P4.31	Data size	16bit	Data format	DEC
	Modbus address	1862,1863	CANopen address	0x241F,0x00

P4.32	Overspeed level	Setting range	Default	Unit	Available mode			
		0~20000	6000	r/min	P	S	T	F

This parameter is used to set the overspeed level of the servo motor. When the rotation speed of the motor exceeds this setting speed, overspeed fault alarm will be reported.

Note: The default value of this parameter is related to the power level of the drive.

P4.32	Data size	16bit	Data format	DEC
	Modbus address	1864,1865	CANopen address	0x2420,0x00

P4.33	Pulse range of position deviation	Setting range	Default	Unit	Available mode			
		$0\sim2^{27}$	100000	reference unit	P			F

This parameter is used to set the alarm threshold for the position deviation (Er22-0). In position or fully-closed loop mode, when the number of retention pulses exceeds this setting value, position error fault will be alarmed.

P4.33	Data size	32bit	Data format	DEC
	Modbus address	1866,1867	CANopen address	0x2421,0x00

P4.34[1]	Brake overload detection selection	Setting range	Default	Unit	Available mode			
		0~2	0	-	P	S	T	F

This parameter is used to set the regenerative brake mode and overload protection mode.

Setting value	Regenerative brake and overload protection
[0]	Disabled (no regenerative brake)
1	Embedded
2	External

P4.34[1]	Data size	16bit	Data format	DEC
	Modbus address	1868,1869	CANopen address	0x2422,0x00

P4.36[1]	Undervoltage protection of main power supply	Setting range	Default	Unit	Available mode			
		0~1	1	-	P	S	T	F

This parameter is used to set whether the drive will report main circuit undervoltage alarm when undervoltage occurs to the main power supply.

Setting value	Protection
0	Do not display the undervoltage fault of the main circuit (Er13-1)
[1]	Display the undervoltage fault of the main circuit (Er13-1) and stop

P4.36[1]	Data size	16bit	Data format	DEC
	Modbus address	1872,1873	CANopen address	0x2424,0x00

P4.37	Undervoltage detection time of main power supply	Setting range	Default	Unit	Available mode			
		70~2000	70	ms	P	S	T	F

This parameter is used to set the undervoltage detection time of the main power supply.

Note: The function is invalid if it is set to 2000.

P4.37	Data size	16bit	Data format	DEC
	Modbus address	1874,1875	CANopen address	0x2425,0x00

P4.39	Speed deviation setting	Setting range	Default	Unit	Available mode			
		0~20000	0	r/min	P	S		F

This parameter is used to set the detection condition of the speed error. If the absolute value of the minus of actual speed command and motor speed is larger than this value and lasts for more than 100ms, it will report speed error alarm.

Note: If it is set to 0, the speed error will not be detected.

P4.39	Data size	16bit	Data format	DEC
	Modbus address	1878,1879	CANopen address	0x2427,0x00

P4.40	Forward speed limit	Setting range	Default	Unit	Available mode			
		0~20000	20000	r/min	P	S	T	F

This parameter is used to set the max. speed limit for forward speed command.

Note: The default value and setting range of the parameter is relative to the drive power level.

P4.40	Data size	16bit	Data format	DEC
	Modbus address	1880,1881	CANopen address	0x2428,0x00

P4.41	Reverse speed limit	Setting range	Default	Unit	Available mode			
		-20000~0	-20000	r/min	P	S	T	F

This parameter is used to set the max. speed limit of reverse speed command.

Note: The default value and setting range of the parameter is relative to the drive power level.

P4.41	Data size	16bit	Data format	DEC
	Modbus address	1882,1883	CANopen address	0x2429,0x00

P4.42	Internal speed of high resolution	Setting range	Default	Unit	Available mode			
		-20000.0~20000.0	0.0	r/min	P	S	T	F
This parameter is used to set the internal speed of high resolution								
P4.42	Data size	32bit	Data format		DEC			
	Modbus address	1884, 1885	CANopen address		0x242A, 0x00			

P4.50[1]	Offset of encoder Z phase	Setting range	Default	Unit	Available mode			
		0~(2^{20}-1)	0	pulse	P	S	T	F
This parameter is used to set the output position of Z phase, and the setting value of the offset of Z phase is the pulse of CCW direction.								
P4.50[1]	Data size	32bit	Data format		DEC			
	Modbus address	1900,1901	CANopen address		0x2432,0x00			

P4.51	Switching time 1 of torque limit	Setting range	Default	Unit	Available mode			
		0~4000	0	ms/(100%)	P	S		F
This parameter is used to set the transition time between switching from the first torque limit to the second torque limit.								
P4.51	Data size	16bit	Data format		DEC			
	Modbus address	1902,1903	CANopen address		0x2433,0x00			

P4.52	Switching time 2 of torque limit	Setting range	Default	Unit	Available mode			
		0~4000	0	ms/(100%)	P	S		F
This parameter is used to set the transition time between switching from the second torque limit to the first torque limit.								
P4.52	Data size	16bit	Data format		DEC			
	Modbus address	1904,1905	CANopen address		0x2434,0x00			

P4.53	Current loop response adjustment	Setting range	Default	Unit	Available mode			
		10.0~200.0	100.0	%	P	S	T	F
This parameter is used to set the adjustment coefficient of current loop response width.								
P4.53	Data size	16bit	Data format		DEC			
	Modbus address	1906,1907	CANopen address		0x2435,0x00			

P4.54[1]	Initialization time after power on	Setting range	Default	Unit	Available mode			
		0~200000	0	ms	P	S	T	F
This parameter is used to set the delay time before allowing servo enabling after power on initialization is completed.								
P4.54[1]	Data size	32bit	Data format		DEC			
	Modbus address	1908,1909	CANopen address		0x2436,0x00			

6.5.4 Fully-closed loop control

P4.60[1]	Frequency division molecular of external linear encoder	Setting range	Default	Unit	Available mode			
		0~2^{23}	0	-				F
This parameter is used to set the frequency division molecular of external linear encoder. When the setting value is 0, the encoder resolution is the frequency division molecular by default.								
P4.60[1]	Data size	32bit	Data format		DEC			
	Modbus address	1920,1921	CANopen address		0x243C,0x00			

P4.61[1]	Frequency division denominator of external linear encoder	Setting range	Default	Unit	Available mode			
		1~2^{23}	10000	-				F
This parameter is used to set the frequency division denominator of external linear encoder, which corresponds to the linear encoder pulse number needed by one-circle rotation of motor.								
P4.61[1]	Data size	32bit	Data format		DEC			
	Modbus address	1922,1923	CANopen address		0x243D,0x00			

P4.62[1]	Direction reversal of external linear encoder	Setting range	Default	Unit	Available mode			
		0~1	0	-				F

This parameter is used to set the direction reversal of external linear encoder feedback counting.

Setting value	Function
[0]	Use the counting value of the linear encoder directly
1	Use after the reversing of the counting value of the linear encoder

P4.62[1]	Data size	16bit	Data format	DEC
	Modbus address	1924,1925	CANopen address	0x243E,0x00

P4.64[1]	Large mixed deviation setting	Setting range	Default	Unit	Available mode			
		1~2^{27}	160000	reference unit				F
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 linear encoder 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 address	1928,1929	CANopen address		0x2440,0x00			

P4.65[1]	Mixed deviation clearing	Setting range	Default	Unit	Available mode			
		0~100	0	Circle				F
This parameter is used to set the condition of mixed control deviation clearing. After rotating for the set circles, the mixed control deviation will be cleared. If it is set to 0, the deviation will not be cleared.								
P4.65[1]	Data size	16bit	Data format		DEC			
	Modbus address	1930,1931	CANopen address		0x2441,0x00			

P4.67[1]	External grating pulse output mode of AB phase	Setting range	Default	Unit	Available mode			
		0~1	0	-				F

In fully-closed loop mode, this parameter is used to set the signal source of pulse feedback output.

Setting value	Pulse feedback signal source
[0]	Encoder feedback
1	Linear encoder feedback

P4.67[1]	Data size	16bit	Data format	DEC
	Modbus address	1934,1935	CANopen address	0x2443,0x00

P4.68[1]	External linear encoder (2nd encoder) resolution	Setting range	Default	Unit	Available mode			
		$1\sim2^{23}$	10000	pulse	P			F

Set the resolution of external linear encoder (2nd encoder). When connecting 2nd encoder, output the number of pulses per circle.

P4.68[1]	Data size	32bit	Data format	DEC
	Modbus address	1936, 1937	CANopen address	0x2444, 0x00

P4.69[1]	Frequency division output source	Setting range	Default	Unit	Available mode			
		0~3	0	-	P	S	T	F

Set the signal source of frequency division output.

Setting value	Pulse feedback signal source
[0]	Normal frequency division output
1	2nd encoder Bypass
2	AB quadrature pulse input Bypass
3	Internal virtual spindle

P4.69[1]	Data size	32bit	Data format	DEC
	Modbus address	1938, 1939	CANopen address	0x2445, 0x00

P4.70[1]	External linear encoder (2nd encoder) Z signal type	Setting range	Default	Unit	Available mode			
		0~3	0	-	P	S	T	F

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 level, 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 direction, 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.

P4.70[1]	Data size	16bit	Data format	DEC
	Modbus address	1940, 1941	CANopen address	0x2446k 0x00

P4.78[1]	MotionNet node number	Setting range	Default	Unit	Available mode			
		0~63	0	-	P	S	T	F
Set communication node number of local machine (slave station) in MotionNet communication.								
P4.78[1]	Data size	16bit	Data format		DEC			
	Modbus address	1956, 1957	CANopen address		0x244E, 0x00			

P4.79[1]	MotionNet baud rate	Setting range	Default	Unit	Available mode			
		0~3	2	-	P	S	T	F

Set MotionNet baud rate as follows:

Setting value	Baud rate
0	2.5Mbps
1	5.0Mbps
[2]	10.0Mbps
3	20.0Mbps

P4.79[1]	Data size	16bit	Data format	DEC
	Modbus address	1958, 1959	CANopen address	0x244F, 0x00

P4.80	Configuration of PZD setting parameter 1	Setting range	Default	Unit	Available mode			
		1000~3999	1998	-	P	S	T	F
This parameter is used to set the mapping content of setting parameter 1 in PROFIBUS-DP communication (1998 corresponds to the reserved parameters).								
P4.80	Data size	16bit	Data format		DEC			
	Modbus address	1960, 1961	CANopen address		0x2450,0x00			

P4.81	Configuration of PZD setting parameter 2	Setting range	Default	Unit	Available mode			
		1000~3999	1998	-	P	S	T	F
This parameter is used to set the mapping content of setting parameter 2 in PROFIBUS-DP communication (1998 corresponds to the reserved parameters).								
P4.81	Data size	16bit	Data format		DEC			
	Modbus address	1962,1963	CANopen address		0x2451,0x00			

P4.82	Configuration of PZD setting parameter 3	Setting range	Default	Unit	Available mode			
		1000~3999	1998	-	P	S	T	F
This parameter is used to set the mapping content of setting parameter 3 in PROFIBUS-DP communication (1998 corresponds to the reserved parameters).								
P4.82	Data size	16bit	Data format		DEC			
	Modbus address	1964,1965	CANopen address		0x2452,0x00			

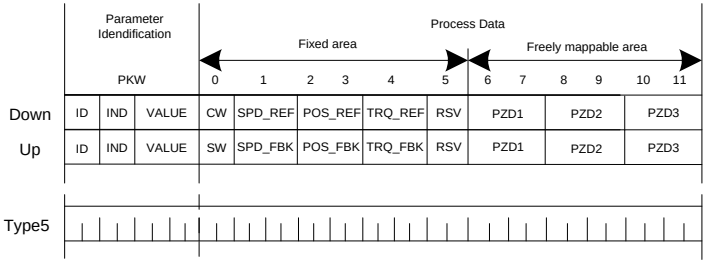
P4.83	Configuration of PZD feedback parameter 1	Setting range	Default	Unit	Available mode			
		4000~5852	4012	-	P	S	T	F
This parameter is used to set the mapping content of feedback parameter 1 in PROFIBUS-DP								

communication (4012 corresponds to R0.04).				
P4.83	Data size	16bit	Data format	DEC
	Modbus address	1966,1967	CANopen address	0x2453,0x00

P4.84	Configuration of PZD feedback parameter 2	Setting range	Default	Unit	Available mode			
		4000~5852	4018	-	P	S	T	F
This parameter is used to set the mapping content of feedback parameter 2 in PROFIBUS-DP communication (4018 corresponds to R0.07).								
P4.84	Data size	16bit	Data format	DEC				
	Modbus address	1968,1969	CANopen address	0x2454,0x00				

P4.85	Configuration of PZD feedback parameter 3	Setting range	Default	Unit	Available mode			
		4000~5852	4032	-	P	S	T	F
This parameter is used to set the mapping content of feedback parameter 3 in PROFIBUS-DP communication (4032 corresponds to R0.14).								
P4.85	Data size	16bit	Data format	DEC				
	Modbus address	1970,1971	CANopen address	0x2455,0x00				

P4.86	PPO type of DP communication	Setting range	Default	Unit	Available mode			
		5	5	-	P	S	T	F
This parameter is used to set the frame type of PROFIBUS-DP communication.								
P4.86	Data size	16bit	Data format	DEC				
	Modbus address	1972,1973	CANopen address	0x2456,0x00				



Note: SRV-63 only supports PROFIBUS-DPV0 and the PPO only supports 5.

P4.87	CANopen communication cycle	Setting range	Default	Unit	Available mode			
		0~(2^{31}-1)	0	us	P	S	T	F
CANopen communication cycle of the slave station. **Note:** The recommended unit for setting is 1000us.								
P4.87	Data size	32bit	Data format	DEC				
	Modbus address	1974,1975	CANopen address	0x2457,0x00				

P4.88	CANopen heartbeat cycle	Setting range	Default	Unit	Available mode			
		0~32767	1000	ms	P	S	T	F
CANopen heartbeat cycle of the salve station.								
P4.88	Data size	16bit	Data format		DEC			
	Modbus address	1976,1977	CANopen address		0x2458,0x00			

P4.89	Automatic stop at CANopen disconnection	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

Set whether to stop at CANopen disconnection by this parameter:

Setting value	Function
[0]	Disabled
1	Enabled

P4.89	Data size	16bit	Data format	DEC
	Modbus address	1978, 1979	CANopen address	0x2459, 0x00

6.5.5 Special instruction

P4.90*	Fault restore	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter can be set by upper PC via communication mode to clear drive fault.

Setting value	Function
[0]	Disabled
1	Enabled

Note:

1. If the fault restore command is enabled, and the servo drive is disabled, if the fault cannot happen, the fault can be restored automatically. But other faults cannot be cleared online but be cleared at re-power on
2. The user can clear the fault through LED panel.

P4.90*	Data size	16bit	Data format	DEC
	Modbus address	1980,1981	CANopen address	0x245A,0x00

P4.91*	Parameters saving	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

If P0.17 is 1 (bulk saving), the saving command can be sent via this parameter to write the changed savable parameter into EEPROM.

Setting value	Function
[0]	Disabled
1	Enabled

P4.91*	Data size	16bit	Data format	DEC
	Modbus address	1982,1983	CANopen address	0x245B,0x00

P4.92*	Restore to factory value	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

After this operation, all parameters (P0~P6 group) can be restored to the default value.

Setting value	Function
[0]	Disabled
1	Enabled

P4.92*	Data size	16bit	Data format	DEC
	Modbus address	1984,1985	CANopen address	0x245C,0x00

P4.93*	Reading enable of fault record	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter can set the enabling of reading the fault record.

Setting value	Function
[0]	Disabled
1	Enabled

P4.93*	Data size	16bit	Data format	DEC
	Modbus address	1986,1987	CANopen address	0x245D,0x00

P4.94*	Clearing enable of fault record	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F

This parameter can set the enabling of clearing the fault record.

Setting value	Function
[0]	Disabled
1	Enabled

P4.94*	Data size	16bit	Data format	DEC
	Modbus address	1988,1989	CANopen address	0x245E,0x00

P4.95*	Group number of fault record	Setting range	Default	Unit	Available mode			
		0~9	0	-	P	S	T	F

This parameter can set the group number of fault record.
0 corresponds to the group 1 fault recorded which is also the latest one, 9 corresponds to group 10 fault recorded which is also the earliest one.

P4.95*	Data size	16bit	Data format	DEC
	Modbus address	1990,1991	CANopen address	0x245F,0x00

P4.96*	Factory parameters	Setting range	Default	Unit	Available mode			
		-	0	-	P	S	T	F

-

P4.96*	Data size	16bit	Data format	DEC
	Modbus address	1992,1993	CANopen address	0x2460,0x00

P4.97*	EEPROM operation of communication encoder	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F
All the motor parameters can be written into the EEPROM and during the starting, the drive will initialize the data of the relative parameters.								
P4.97*	Data size	16bit	Data format	DEC				
	Modbus address	1994,1995	CANopen address	0x2461,0x00				

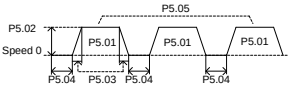
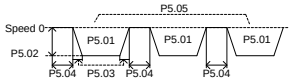
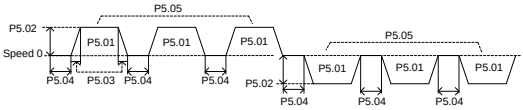
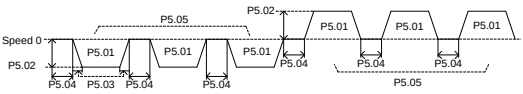
P4.98*	EEPROM data fault block of communication encoder	Setting range	Default	Unit	Available mode			
		0~1	0	-	P	S	T	F
This parameter can be used to block the no data and data error fault of encoder EEPROM. If Er2-c or Er2-d occurs, set correct motor model and power on, the motor can be used after re-power on, and then the drive will initialize relative parameters with motor data in EEPROM.								
P4.98*	Data size	16bit	Data format	DEC				
	Modbus address	1996,1997	CANopen address	0x2462,0x00				

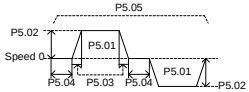
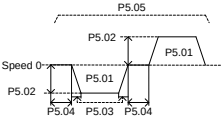
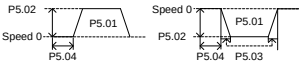
6.6 Program JOG, homing and PTP control (P5)

6.6.1 Program JOG

P5.00	JOG mode	Setting range	Default	Unit	Available mode			
		0~6	0	-	P			

This parameter is used to set the JOG operation mode:

Mode	Start key	Function
[0]		(waiting time P5.04→forward moving P5.01) × cycle time P5.05 
1		(waiting time P5.04→reverse moving P5.01) × cycle time P5.05 
2		(waiting time P5.04→forward moving P5.01) × cycle time P5.05→(waiting time P5.04→reverse movingP5.01) × cycle time P5.05 
3		(waiting time P5.04→reverse moving P5.01) × cycle time P5.05→(waiting time P5.04→forward movingP5.01) × cycle time P5.05 

4		(waiting time P5.04→forward moving P5.01→waiting time P5.04→reverse moving P5.01) × cycle time P5.05 
5		(waiting time P5.04→reverse moving P5.01→waiting time P5.04→forward moving P5.01) × cycle time P5.05 
6	or	(waiting time P5.04→forward or reverse moving P5.01) × cycle 1 time 

P5.00	Data size	16bit	Data format	DEC
	Modbus address	2000,2001	CANopen address	0x2500,0x00

P5.01	JOG movement amount	Setting range	Default	Unit	Available mode			
		$1\sim2^{30}$	50000	reference unit	P			
This parameter is used to set the increment of position movement amount of JOG.								
P5.01	Data size	32bit	Data format	DEC				
	Modbus address	2002,2003	CANopen address	0x2501,0x00				

P5.02	JOG speed setting	Setting range	Default	Unit	Available mode			
		1~5000	500	r/min	P			
This parameter is used to set the highest running speed of JOG.								
P5.02	Data size	16bit	Data format	DEC				
	Modbus address	2004,2005	CANopen address	0x2502,0x00				

P5.03	JOG ACC/DEC time	Setting range	Default	Unit	Available mode			
		2~10000	100	ms	P			
This parameter is used to set the JOG ACC/DEC time and the time corresponds to the time from zero speed to the rated speed. For example, if the target speed is from zero speed to 50% of the rated speed, it is 50% of the time to the target speed.								
P5.03	Data size	16bit	Data format	DEC				
	Modbus address	2006,2007	CANopen address	0x2503,0x00				

P5.04	JOG waiting time	Setting range	Default	Unit	Available mode			
		0~10000	100	ms	P			
This parameter is used to set JOG waiting time and the time is from JOG starting to actual operation								

time or the time from the finishing of one displacement to the starting of next displacement.				
P5.04	Data size	16bit	Data format	DEC
	Modbus address	2008,2009	CANopen address	0x2504,0x00

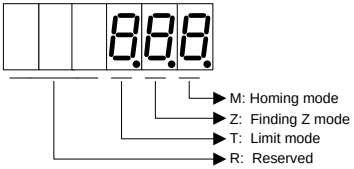
P5.05	JOG cycle times	Setting range	Default	Unit	Available mode
		0~10000	1	-	P
This parameter is used to set the JOG cycle times. Please refer to P5.00.					
P5.05	Data size	16bit	Data format		DEC
	Modbus address	2010,2011	CANopen address		0x2505,0x00

6.6.2 Homing

P5.10[2]	Homing mode	Setting range	Default	Unit	Available mode
		0~128	0	-	P F

This parameter is used to set the homing mode.

Display mode: DEC



R	T	Z	M
Reserved	Limit mode	Finding Z mode	Homing mode
	0-1	0-2	0-8
	T: Invalid	Z=0: define the point of finding Z as the home; Z=1 define the point of finding Z as the home; Z=2: not finding Z, define the returning point as the home	M=0: forward rotation, the forward limit switch is the returning point
	T: Invalid		M=1:reverse rotation, the reverse limit switch is the returning point
	To the limit: T=0: report the exceeding fault T=1: direction reverse		M=2: forward rotation, the rising edge of the home switch is the returning point
			M=3:reverse rotation, the rising edge of the home switch is the returning point
		Z: Invalid	M=4: forward rotation, the first Z signal is the returning point
		Z: Invalid	M=5: reverse rotation, the first Z signal is the returning point
		define the point of finding Z as the home; Z=1 define the point of finding Z as the home; Z=2: not finding Z, define the returning point as the home	M=6: forward rotation, the declining edge of the home switch is the returning point
			M=7: reverse rotation, the declining edge of the home switch is the returning point
	T: Invalid		M=8: the current position is defined as the home.

P5.10[2]	Data size	16bit	Data format	DEC
	Modbus address	2020,2021	CANopen address	0x2505,0x00

P5.11	Homing automatically after power on	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to set whether it can return to home automatically after power on.

Setting value	Instruction
[0]	Invalid
1	Valid

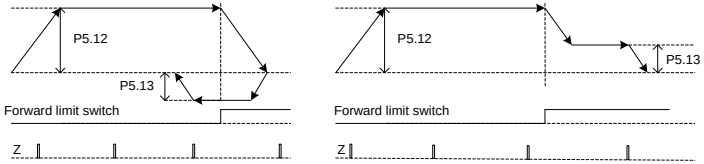
Note: It is valid when no fault occurs.

P5.11[1]	Data size	16bit	Data format	DEC
	Modbus address	2022,2023	CANopen address	0x250B,0x00

P5.12	High speed of 1st step of homing	Setting range	Default	Unit	Available mode
		0~2000	100	r/min	P

This parameter is used to set the high speed of 1st step of homing.

Diagram:



P5.12	Data size	16bit	Data format	DEC
	Modbus address	2024,2025	CANopen address	0x250C,0x00

P5.13	Low speed of 2nd step of homing	Setting range	Default	Unit	Available mode
		0~60	20	r/min	P

This parameter is used to set the low speed of 2nd step of homing. See details at P5.12.

P5.13	Data size	16bit	Data format	DEC
	Modbus address	2026,2027	CANopen address	0x250D,0x00

P5.14	Home setting	Setting range	Default	Unit	Available 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 address	2028,2029	CANopen address	0x250E,0x00

P5.15*	Trigger command of homing	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to trigger the homing command. It has the same function with HOME (0x017 or 0x117) of the digital output.

P5.15*	Data size	16bit	Data format	DEC
	Modbus address	2030,2031	CANopen address	0x250F,0x00

P5.16	Correlated action of homing	Setting range	Default	Unit	Available mode
		0~3	1	-	P

Set the correlated action of homing via this parameter

Setting value	Function
0	No action
[1]	To the designated target position
2	To the specified 0th PTP position.
3	To the designated target position directly without homing

P5.16	Data size	16bit	Data format	DEC
	Modbus address	2032, 2033	CANopen address	0x2510, 0x00

P5.17	Speed to designated target after homing	Setting range	Default	Unit	Available mode
		1~5000	100	r/min	P

Set to reach the target speed after homing by this parameter. Modifications made before homing will be valid.

P5.17	Data size	16bit	Data format	DEC
	Modbus address	2034, 2035	CANopen address	0x2511, 0x00

P5.18	ACC/DEC time to designated target after homing	Setting range	Default	Unit	Available mode
		0~32767	300	ms	P

This function is used to set the ACC/DEC time of reaching the target after homing. The setting value corresponds to the time needed to accelerate from zero speed to rated speed. For instance, the target speed is to accelerate from zero speed to 50% rated speed, then time of reaching the target speed of the speed command is 50% of the setting value.

P5.18	Data size	16bit	Data format	DEC
	Modbus address	2036, 2037	CANopen address	0x2512, 0x00

P5.19	Position to designated target after homing	Setting range	Default	Unit	Available mode
		$-(2^{31}-1)$~$(2^{31}-1)$	0	reference unit	P

Set to go to the designated target position after homing via this parameter

P5.19	Data size	32bit	Data format	DEC
	Modbus address	2038, 2039	CANopen address	0x2513, 0x00

6.6.3 PTP (Point-to-Point) control

P5.20*	PTP trigger command	Setting range	Default	Unit	Available mode
		-1~2048	-1	-	P

This parameter is used to trigger the target PTP.

Write: PTP trigger, the internal buffer can receive 8 trigger signals at most.

Signal	Function
[-1]	Invalid
0-127	Control 0-127 step, equivalent to digital input: TRIG + POSn function.
128-2047	Invalid
2048	Forced to stop

Example: Writing PTP signal 3 means to trigger the PTP program 3.

P5.20*	Data size	16bit	Data format	DEC
	Modbus address	2040,2041	CANopen address	0x2514,0x00

P5.21	00 target speed	Setting range	Default	Unit	Available mode
		0~6000	20	r/min	P
P5.22	01 target speed	Setting range	Default	Unit	Available mode
		0~6000	50	r/min	P
P5.23	02 target speed	Setting range	Default	Unit	Available mode
		0~6000	100	r/min	P
P5.24	03 target speed	Setting range	Default	Unit	Available mode
		0~6000	200	r/min	P
P5.25	04 target speed	Setting range	Default	Unit	Available mode
		0~6000	300	r/min	P
P5.26	05 target speed	Setting range	Default	Unit	Available mode
		0~6000	500	r/min	P
P5.27	06 target speed	Setting range	Default	Unit	Available mode
		0~6000	600	r/min	P
P5.28	07 target speed	Setting range	Default	Unit	Available mode
		0~6000	800	r/min	P
P5.29	08 target speed	Setting range	Default	Unit	Available mode
		0~6000	1000	r/min	P
P5.30	09 target speed	Setting range	Default	Unit	Available mode
		0~6000	1300	r/min	P
P5.31	10 target speed	Setting range	Default	Unit	Available mode
		0~6000	1500	r/min	P
P5.32	11 target speed	Setting range	Default	Unit	Available mode
		0~6000	1800	r/min	P
P5.33	12 target speed	Setting range	Default	Unit	Available mode
		0~6000	2000	r/min	P
P5.34	13 target speed	Setting range	Default	Unit	Available mode
		0~6000	2300	r/min	P
P5.35	14 target speed	Setting range	Default	Unit	Available mode
		0~6000	2500	r/min	P

P5.36	15 target speed	Setting range	Default	Unit	Available mode
		0~6000	3000	r/min	P

These parameters are used to set the target speed of each step bit.

P5.21	Data size	16bit	Data format	DEC
	Modbus address	2042,2043	CANopen address	0x2515,0x00
P5.22	Data size	16bit	Data format	DEC
	Modbus address	2044,2045	CANopen address	0x2516,0x00
P5.23	Data size	16bit	Data format	DEC
	Modbus address	2046,2047	CANopen address	0x2517,0x00
P5.24	Data size	16bit	Data format	DEC
	Modbus address	2048,2049	CANopen address	0x2518,0x00
P5.25	Data size	16bit	Data format	DEC
	Modbus address	2050,2051	CANopen address	0x2519,0x00
P5.26	Data size	16bit	Data format	DEC
	Modbus address	2052,2053	CANopen address	0x251A,0x00
P5.27	Data size	16bit	Data format	DEC
	Modbus address	2054,2055	CANopen address	0x251B,0x00
P5.28	Data size	16bit	Data format	DEC
	Modbus address	2056,2057	CANopen address	0x251C,0x00
P5.29	Data size	16bit	Data format	DEC
	Modbus address	2058,2059	CANopen address	0x251D,0x00
P5.30	Data size	16bit	Data format	DEC
	Modbus address	2060,2061	CANopen address	0x251E,0x00
P5.31	Data size	16bit	Data format	DEC
	Modbus address	2062,2063	CANopen address	0x251F,0x00
P5.32	Data size	16bit	Data format	DEC
	Modbus address	2064,2065	CANopen address	0x2520,0x00
P5.33	Data size	16bit	Data format	DEC
	Modbus address	2066,2067	CANopen address	0x2521,0x00
P5.34	Data size	16bit	Data format	DEC
	Modbus address	2068,2069	CANopen address	0x2522,0x00
P5.35	Data size	16bit	Data format	DEC
	Modbus address	2070,2071	CANopen address	0x2523,0x00
P5.36	Data size	16bit	Data format	DEC
	Modbus address	2072,2073	CANopen address	0x2524,0x00

P5.37	00 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	200	ms	P
P5.38	01 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	300	ms	P

P5.39	02 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	500	ms	P
P5.40	03 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	600	ms	P
P5.41	04 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	800	ms	P
P5.42	05 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	900	ms	P
P5.43	06 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	1000	ms	P
P5.44	07 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	1200	ms	P
P5.45	08 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	1500	ms	P
P5.46	09 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	2000	ms	P
P5.47	10 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	2500	ms	P
P5.48	11 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	3000	ms	P
P5.49	12 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	5000	ms	P
P5.50	13 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	8000	ms	P
P5.51	14 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	50	ms	P
P5.52	15 ACC/DEC time	Setting range	Default	Unit	Available mode
		0~32767	30	ms	P

These parameters are used to set the ACC/DEC time of each step bit.

P5.37	Data size	16bit	Data format	DEC
	Modbus address	2074,2075	CANopen address	0x2525,0x00
P5.38	Data size	16bit	Data format	DEC
	Modbus address	2076,2077	CANopen address	0x2526,0x00
P5.39	Data size	16bit	Data format	DEC
	Modbus address	2078,2079	CANopen address	0x2527,0x00
P5.40	Data size	16bit	Data format	DEC
	Modbus address	2080,2081	CANopen address	0x2528,0x00
P5.41	Data size	16bit	Data format	DEC
	Modbus address	2082,2083	CANopen address	0x2529,0x00

P5.42	Data size	16bit	Data format	DEC
	Modbus address	2084,2085	CANopen address	0x252A,0x00
P5.43	Data size	16bit	Data format	DEC
	Modbus address	2086,2087	CANopen address	0x252B,0x00
P5.44	Data size	16bit	Data format	DEC
	Modbus address	2088,2089	CANopen address	0x252C,0x00
P5.45	Data size	16bit	Data format	DEC
	Modbus address	2090,2091	CANopen address	0x252D,0x00
P5.46	Data size	16bit	Data format	DEC
	Modbus address	2092,2093	CANopen address	0x252E,0x00
P5.47	Data size	16bit	Data format	DEC
	Modbus address	2094,2095	CANopen address	0x252F,0x00
P5.48	Data size	16bit	Data format	DEC
	Modbus address	2096,2097	CANopen address	0x2530,0x00
P5.49	Data size	16bit	Data format	DEC
	Modbus address	2098,2099	CANopen address	0x2531,0x00
P5.50	Data size	16bit	Data format	DEC
	Modbus address	2100,2101	CANopen address	0x2532,0x00
P5.51	Data size	16bit	Data format	DEC
	Modbus address	2102,2103	CANopen address	0x2533,0x00
P5.52	Data size	16bit	Data format	DEC
	Modbus address	2104,2105	CANopen address	0x2534,0x00

P5.53	00 delay time	Setting range	Default	Unit	Available mode			
		0~32767	0	ms	P			
P5.54	01 delay time	Setting range	Default	Unit	Available mode			
		0~32767	100	ms	P			
P5.55	02 delay time	Setting range	Default	Unit	Available mode			
		0~32767	200	ms	P			
P5.56	03 delay time	Setting range	Default	Unit	Available mode			
		0~32767	400	ms	P			
P5.57	04 delay time	Setting range	Default	Unit	Available mode			
		0~32767	500	ms	P			
P5.58	05 delay time	Setting range	Default	Unit	Available mode			
		0~32767	800	ms	P			
P5.59	06 delay time	Setting range	Default	Unit	Available mode			
		0~32767	1000	ms	P			
P5.60	07 delay time	Setting range	Default	Unit	Available mode			
		0~32767	1500	ms	P			

P5.61	08 delay time	Setting range	Default	Unit	Available mode
		0~32767	2000	ms	P
P5.62	09 delay time	Setting range	Default	Unit	Available mode
		0~32767	2500	ms	P
P5.63	10 delay time	Setting range	Default	Unit	Available mode
		0~32767	3000	ms	P
P5.64	11 delay time	Setting range	Default	Unit	Available mode
		0~32767	3500	ms	P
P5.65	12 delay time	Setting range	Default	Unit	Available mode
		0~32767	4000	ms	P
P5.66	13 delay time	Setting range	Default	Unit	Available mode
		0~32767	4500	ms	P
P5.67	14 delay time	Setting range	Default	Unit	Available mode
		0~32767	5000	ms	P
P5.68	15 delay time	Setting range	Default	Unit	Available mode
		0~32767	5500	ms	P
These parameters are used to set the delay time of each step bit.					
P5.53	Data size	16bit	Data format	DEC	
	Modbus address	2106,2107	CANopen address	0x2535,0x00	
P5.54	Data size	16bit	Data format	DEC	
	Modbus address	2108,2109	CANopen address	0x2536,0x00	
P5.55	Data size	16bit	Data format	DEC	
	Modbus address	2110,2111	CANopen address	0x2537,0x00	
P5.56	Data size	16bit	Data format	DEC	
	Modbus address	2112,2113	CANopen address	0x2538,0x00	
P5.57	Data size	16bit	Data format	DEC	
	Modbus address	2114,2115	CANopen address	0x2539,0x00	
P5.58	Data size	16bit	Data format	DEC	
	Modbus address	2116,2117	CANopen address	0x253A,0x00	
P5.59	Data size	16bit	Data format	DEC	
	Modbus address	2118,2119	CANopen address	0x253B,0x00	
P5.60	Data size	16bit	Data format	DEC	
	Modbus address	2120,2121	CANopen address	0x253C,0x00	
P5.61	Data size	16bit	Data format	DEC	
	Modbus address	2122,2123	CANopen address	0x253D,0x00	
P5.62	Data size	16bit	Data format	DEC	
	Modbus address	2124,2125	CANopen address	0x253E,0x00	
P5.63	Data size	16bit	Data format	DEC	
	Modbus address	2126,2127	CANopen address	0x253F,0x00	

P5.64	Data size	16bit	Data format	DEC
	Modbus address	2128,2129	CANopen address	0x2540,0x00
P5.65	Data size	16bit	Data format	DEC
	Modbus address	2130,2131	CANopen address	0x2541,0x00
P5.66	Data size	16bit	Data format	DEC
	Modbus address	2132,2133	CANopen address	0x2542,0x00
P5.67	Data size	16bit	Data format	DEC
	Modbus address	2134,2135	CANopen address	0x2543,0x00
P5.68	Data size	16bit	Data format	DEC
	Modbus address	2136,2137	CANopen address	0x2544,0x00

P5.69	PTP trigger buffer switch	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			
After point trigger buffer is enabled, 8 buffer can be received consecutively by sequence.								
P5.69	Data size	16bit	Data format		DEC			
	Modbus address	2138, 2139	CANopen address		0x2545, 0x00			

P5.70	Single-turn resolution of the disk	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	10000	pulse	P			
The resolution of the disk at single-turn driven by the motor.								
P5.70	Data size	32bit	Data format		DEC			
	Modbus address	2140, 2141	CANopen address		0x2546, 0x00			

P5.71	Zero returning switch of disk	Setting range	Default	Unit	Available mode			
		0~3	0	-	P			
This function is used to set the mode for zero returning switch of the disk								
P5.71	Data size	16bit	Data format		DEC			
	Modbus address	2142, 2143	CANopen address		0x2547, 0x00			

P5.72	Multi-turn mode	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			
After enabling this function, the counting number of multi-turn encoder will change from 16-bit to 32-bit. Generally, the multi-turn encoder can only count to 2^16 turns.								
P5.72	Data size	16bit	Data format		DEC			
	Modbus address	2144, 2145	CANopen address		0x2548, 0x00			

P5.73	Digital trigger mode of PTP	Setting range	Default	Unit	Available mode			
		0~1	0	-	P			

Setting value	Instruction
[0]	Binary input + trigger terminal mode
1	Single terminal trigger mode (support 7-step point only)

P5.73	Data size	16bit	Data format	DEC
	Modbus address	2146,2147	CANopen address	0x2549,0x00

P5.74	Digital output mode of PTP	Setting range	Default	Unit	Available mode
		0~4	0	-	P

Setting value	Function
[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 (support the control word in absolute position only)

P5.74	Data size	16bit	Data format	DEC
	Modbus address	2148, 2149	CANopen address	0x254A, 0x00

6.7 Application function (P6)

P6.00	Forward low JOG speed	Setting range	Default	Unit	Available mode
		0~6000	5	r/min	P

This parameter is used to set the speed of slow forward jogging which is triggered by forward jogging terminal and switching terminal of high-low jogging speed.

P6.00	Data size	16bit	Data format	DEC
	Modbus address	2200, 2201	CANopen address	0x2600, 0x00

P6.01	Reverse low JOG speed	Setting range	Default	Unit	Available mode
		-6000~0	-5	r/min	P

This parameter is used to set the speed of slow reverse jogging which is triggered by reverse jogging terminal and switching terminal of high-low jogging speed.

P6.01	Data size	16bit	Data format	DEC
	Modbus address	2202, 2203	CANopen address	0x2601, 0x00

P6.02[1]	Position latch function switch	Setting range	Default	Unit	Available mode
		0~1	0	-	P

Position latch function switch can be set via this parameter. After this function is enabled, the position information will be saved in EEPROM after each terminal latch, however, too frequent saving operation may damage the EEPROM.

Setting value	Function
[0]	Disabled
1	Enabled

P6.02[1]	Data size	16bit	Data format	DEC
	Modbus address	2204, 2205	CANopen address	0x2602, 0x00

P6.03	Position latch save mode	Setting range	Default	Unit	Available mode
		0~1	0	-	P

Position latch save mode can be set via this parameter:

Setting value	Function
[0]	Do not save
1	Save

P6.03	Data size	16bit	Data format	DEC
	Modbus address	2206, 2207	CANopen address	0x2603, 0x00

P6.04	Forward high JOG speed	Setting range	Default	Unit	Available mode
		0~6000	60	r/min	P

This parameter is used to set the speed of fast forward jogging which is triggered by forward jogging terminal and switching terminal of high-low jogging speed.

P6.04	Data size	16bit	Data format	DEC
	Modbus address	2208, 2209	CANopen address	0x2604, 0x00

P6.05	Reverse high JOG speed	Setting range	Default	Unit	Available mode
		-6000~0	-60	r/min	P

This parameter is used to set the speed of fast reverse jogging which is triggered by reverse jogging terminal and switching terminal of high-low jogging speed.

P6.05	Data size	16bit	Data format	DEC
	Modbus address	2210, 2211	CANopen address	0x2605, 0x00

P6.06	Terminal JOG valid	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to set terminal JOG function:

Setting value	Function
[0]	Invalid
1	Valid

P6.06	Data size	16bit	Data format	DEC
	Modbus address	2212, 2213	CANopen address	0x2606, 0x00

P6.20[1]	Turret function switch	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to set turret function switch:

Setting value	Function
[0]	Disabled
1	Enabled

P6.20[1]	Data size	16bit	Data format	DEC
	Modbus address	2240, 2241	CANopen address	0x2614, 0x00

P6.21	Turret number	Setting range	Default	Unit	Available mode
		1~128	16	piece	P

This parameter is used to set turret number.

P6.21	Data size	16bit	Data format	DEC
	Modbus address	2242, 2243	CANopen address	0x2615, 0x00

P6.22	Turret pulse number per cycle	Setting range	Default	Unit	Available mode
		2~(2^{31}-1)	10000	reference unit	P

This parameter is used to set turret pulse number per cycle.

P6.22	Data size	32bit	Data format	DEC
	Modbus address	2244, 2245	CANopen address	0x2616, 0x00

P6.23[1]	Starting point of turret	Setting range	Default	Unit	Available mode
		-(2^{31}-1)~(2^{31}-1)	0	reference unit	P

This parameter is used to set starting point of turret.

P6.23[1]	Data size	32bit	Data format	DEC
	Modbus address	2246, 2247	CANopen address	0x2617, 0x00

P6.30[1]	Gantry synchronization function switch	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to set the gantry synchronization switch.

Setting value	Function
[0]	Disabled
1	Enabled

P6.30[1]	Data size	16bit	Data format	DEC
	Modbus address	2260, 2261	CANopen address	0x261E, 0x00

P6.31	Gantry synchronous speed control gain	Setting range	Default	Unit	Available mode
		0.0~3276.7	0.0	Hz	P

This parameter is used to set the gantry synchronous speed control gain.

P6.31	Data size	16bit	Data format	DEC
	Modbus address	2262, 2263	CANopen address	0x261F, 0x00

P6.32	Gantry synchronous speed control integral	Setting range	Default	Unit	Available mode
		0.1~1000.0	1000.0	ms	P

This parameter is used to set the time constant of gantry synchronous speed control integral. Please note that when this parameter is set to 1000, it means integral action is invalid.

P6.32	Data size	16bit	Data format	DEC
	Modbus address	2264, 2265	CANopen address	0x2620, 0x00

P6.33	Gantry synchronous position control gain	Setting range	Default	Unit	Available mode
		0.0~3276.7	1000.0	Hz	P

This parameter is used to set the gantry synchronous position control gain.

P6.33	Data size	16bit	Data format	DEC
	Modbus address	2266, 2267	CANopen address	0x2621, 0x00

P6.34	Gantry synchronous compensation torque filter	Setting range	Default	Unit	Available mode
		0.00~64.00	0.00	ms	P

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

P6.34	Data size	16bit	Data format	DEC
	Modbus address	2268, 2269	CANopen address	0x2622, 0x00

P6.35	Gantry synchronous compensation speed filter	Setting range	Default	Unit	Available mode
		0.00~64.00	0.00	ms	P

This parameter is used to set the time constant of gantry synchronous compensation speed filter.

P6.35	Data size	16bit	Data format	DEC
	Modbus address	2270, 2271	CANopen address	0x2623, 0x00

P6.36	Gantry synchronous control bandwidth ratio	Setting range	Default	Unit	Available mode
		0.0~1000.0	0.0	%	P

This parameter is used to set the gantry synchronous control bandwidth ratio: bandwidth ratio=servo bandwidth/(servo bandwidth+synchronous bandwidth).

P6.36	Data size	16bit	Data format	DEC
	Modbus address	2272, 2273	CANopen address	0x2624, 0x00

P6.37[1]	Gantry synchronization master/slave selection	Setting range	Default	Unit	Available mode
		0~1	0	-	P

This parameter is used to set the gantry synchronization master/slave:

Setting value	Instruction
[0]	Slave
1	Master

P6.37[1]	Data size	16bit	Data format	DEC
	Modbus address	2274, 2275	CANopen address	0x2625, 0x00

P6.38	Gantry synchronization alignment retreat distance	Setting range	Default	Unit	Available mode
		$-(2^{31}-2)$~$(2^{31}-2)$	10000	reference unit	P

This function is used to set the gantry synchronization alignment retreat distance: the retreat distance of the servo after contacting two alignment sensors.

P6.38	Data size	32bit	Data format	DEC
	Modbus address	2276, 2277	CANopen address	0x2626, 0x00

P6.39	Gantry synchronization alignment retreat speed	Setting range	Default	Unit	Available mode
		1~200	60	r/min	P

This function is used to set the gantry synchronization alignment retreat speed: the retreat speed of the servo after contacting two alignment sensors.

P6.39	Data size	16bit	Data format	DEC
	Modbus address	2278, 2279	CANopen address	0x2627, 0x00

P6.40	Gantry synchronization alignment approaching speed	Setting range	Default	Unit	Available mode
		1~60	5	r/min	P

This parameter is used to set the gantry synchronization alignment approaching speed: the speed of servo in approaching alignment sensor again after contacting two alignment sensors.

P6.40	Data size	16bit	Data format	DEC
	Modbus address	2280, 2281	CANopen address	0x2628, 0x00

P6.41	Gantry alignment direction	Setting range	Default	Unit	Available mode
		0~1	0	-	P

Gantry alignment direction can be set via this parameter:

Setting value	Instruction
[0]	Forward
1	Reverse

P6.41	Data size	16bit	Data format	DEC
	Modbus address	2282, 2283	CANopen address	0x2629, 0x00

6.8 PTP (point-to-point) control (PtP0, PtP1, PtP2)

PtP0.00	00^{th} control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P

Description:

Bit	Name	Function
Bit0~3	MODE	PTP operation mode
Bit4~7	OPT	PTP attribute
Bit8~11	ACC	ACC/DEC time index
Bit12~15	SPD	Target speed index
Bit16~19	DLY	Delay time index
Bit20~23	CYL	Cycle number of current PTP execution
Bit24~30	JMP	Jump to the next PTP

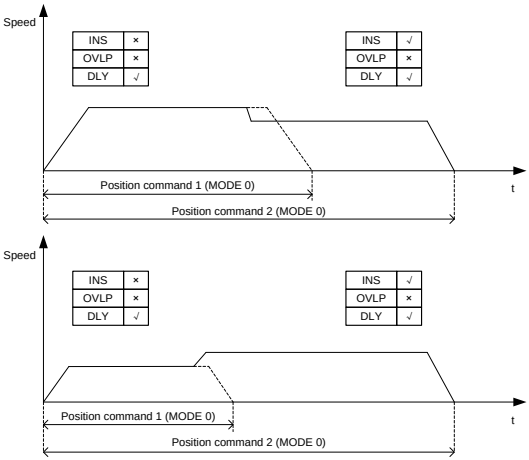
MODE:

MODE	Instruction
0	Stop after the execution of current PTP
1	Jump to the next PTP after the execution of current PTP
2	Stop after the cycle, the cycle is invalid if CMD=1
3	Jump to the next PTP after the cycle, the cycle is invalid if CMD=1

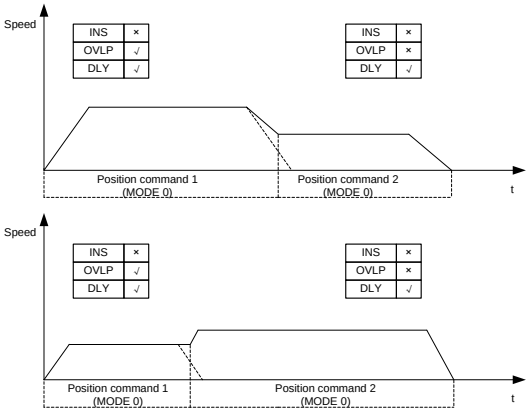
OPT:

Bit	Name	Function
Bit4	INS	Insert off, to stop the executing PTP or the PTP to be executed
Bit5	OVLP	Overlap, the PTP can be overlapped with the next PTP
Bit6~7	CMD	Position command, 0:incremental position, 1:absolute position

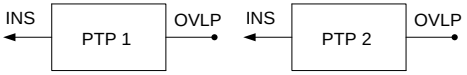
INS Instruction:



OVLP instruction:



Relation between INS and OVLP:



Note:

1. INS: current PTP has the authority of prior execution against the previous PTP;
   OVLP: current PTP has the authority to combine the next PTP for execution.
2. INS has higher priority against OVLP; if PTP 1 OVLP and PTP 2 INS are enabled at the same time, PTP 1 OVLP is invalid
3. Two PTPs which have opposite operation direction cannot be overlapped

PtP0.00	Data size	32bit	Data format	HEX
	Modbus address	3200,3201	CANopen address	0x2B00,0x00

PtP0.01	00th position	Setting range	Default	Unit	Available mode
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P

This parameter is used to set the 00th position. CMD determines the current position command mode and P0.37 is invalid.

PtP0.01	Data size	32bit	Data format	DEC
	Modbus address	3202,3203	CANopen address	0x2B01,0x00

PtP0.02	01st control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.04	02nd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.06	03rd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.08	04th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.10	05th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.12	06th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.14	07th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.16	08th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.18	09th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.20	10th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.22	11th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.24	12th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P

PtP0.26	13th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.28	14th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.30	15th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.32	16th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.34	17th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.36	18th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.38	19th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.40	20th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.42	21st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.44	22nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.46	23rd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.48	24th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.50	25th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.52	26th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.54	27th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.56	28th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.58	29th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.60	30th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.62	31st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP0.64	32nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			

PtP0.66	33rd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.68	34th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.70	35th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.72	36th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.74	37th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.76	38th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.78	39th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.80	40th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.82	41st control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.84	42nd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.86	43rd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.88	44th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.90	45th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.92	46th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.94	47th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.96	48th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP0.98	49th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P

This group of parameters are used to set the 01st ~49th control word. Please refer to “PtP0.00” for detailed information.

PtP0.02	Data size	32bit	Data format	HEX
	Modbus address	3204, 3205	CANopen address	0x2B02, 0x00
PtP0.04	Data size	32bit	Data format	HEX
	Modbus address	3208, 3209	CANopen address	0x2B04, 0x00

PtP0.06	Data size	32bit	Data format	HEX
	Modbus address	3212,3213	CANopen address	0x2B06,0x00
PtP0.08	Data size	32bit	Data format	HEX
	Modbus address	3216,3217	CANopen address	0x2B08,0x00
PtP0.10	Data size	32bit	Data format	HEX
	Modbus address	3220,3221	CANopen address	0x2B0A,0x00
PtP0.12	Data size	32bit	Data format	HEX
	Modbus address	3224,3225	CANopen address	0x2B0C,0x00
PtP0.14	Data size	32bit	Data format	HEX
	Modbus address	3228,3229	CANopen address	0x2B0E,0x00
PtP0.16	Data size	32bit	Data format	HEX
	Modbus address	3232,3233	CANopen address	0x2B10,0x00
PtP0.18	Data size	32bit	Data format	HEX
	Modbus address	3236,3237	CANopen address	0x2B12,0x00
PtP0.20	Data size	32bit	Data format	HEX
	Modbus address	3240,3241	CANopen address	0x2B14,0x00
PtP0.22	Data size	32bit	Data format	HEX
	Modbus address	3244,3245	CANopen address	0x2B16,0x00
PtP0.24	Data size	32bit	Data format	HEX
	Modbus address	3248,3249	CANopen address	0x2B18,0x00
PtP0.26	Data size	32bit	Data format	HEX
	Modbus address	3252,3253	CANopen address	0x2B1A,0x00
PtP0.28	Data size	32bit	Data format	HEX
	Modbus address	3256,3257	CANopen address	0x2B1C,0x00
PtP0.30	Data size	32bit	Data format	HEX
	Modbus address	3260,3261	CANopen address	0x2B1E,0x00
PtP0.32	Data size	32bit	Data format	HEX
	Modbus address	3264,3265	CANopen address	0x2B20,0x00
PtP0.34	Data size	32bit	Data format	HEX
	Modbus address	3268,3269	CANopen address	0x2B22,0x00
PtP0.36	Data size	32bit	Data format	HEX
	Modbus address	3272,3273	CANopen address	0x2B24,0x00
PtP0.38	Data size	32bit	Data format	HEX
	Modbus address	3276,3277	CANopen address	0x2B26,0x00
PtP0.40	Data size	32bit	Data format	HEX
	Modbus address	3280,3281	CANopen address	0x2B28,0x00
PtP0.42	Data size	32bit	Data format	HEX
	Modbus address	3284,3285	CANopen address	0x2B2A,0x00
PtP0.44	Data size	32bit	Data format	HEX
	Modbus address	3288,3289	CANopen address	0x2B2C,0x00

PtP0.46	Data size	32bit	Data format	HEX
	Modbus address	3292,3293	CANopen address	0x2B2E,0x00
PtP0.48	Data size	32bit	Data format	HEX
	Modbus address	3296,3297	CANopen address	0x2B30,0x00
PtP0.50	Data size	32bit	Data format	HEX
	Modbus address	3300,3301	CANopen address	0x2B32,0x00
PtP0.52	Data size	32bit	Data format	HEX
	Modbus address	3304,3305	CANopen address	0x2B34,0x00
PtP0.54	Data size	32bit	Data format	HEX
	Modbus address	3308,3309	CANopen address	0x2B36,0x00
PtP0.56	Data size	32bit	Data format	HEX
	Modbus address	3312,3313	CANopen address	0x2B38,0x00
PtP0.58	Data size	32bit	Data format	HEX
	Modbus address	3316,3317	CANopen address	0x2B3A,0x00
PtP0.60	Data size	32bit	Data format	HEX
	Modbus address	3320,3321	CANopen address	0x2B3C,0x00
PtP0.62	Data size	32bit	Data format	HEX
	Modbus address	3324,3325	CANopen address	0x2B3E,0x00
PtP0.64	Data size	32bit	Data format	HEX
	Modbus address	3328,3329	CANopen address	0x2B40,0x00
PtP0.66	Data size	32bit	Data format	HEX
	Modbus address	3332,3333	CANopen address	0x2B42,0x00
PtP0.68	Data size	32bit	Data format	HEX
	Modbus address	3336,3337	CANopen address	0x2B44,0x00
PtP0.70	Data size	32bit	Data format	HEX
	Modbus address	3340,3341	CANopen address	0x2B46,0x00
PtP0.72	Data size	32bit	Data format	HEX
	Modbus address	3344,3345	CANopen address	0x2B48,0x00
PtP0.74	Data size	32bit	Data format	HEX
	Modbus address	3348,3349	CANopen address	0x2B4A,0x00
PtP0.76	Data size	32bit	Data format	HEX
	Modbus address	3352,3353	CANopen address	0x2B4C,0x00
PtP0.78	Data size	32bit	Data format	HEX
	Modbus address	3356,3357	CANopen address	0x2B4E,0x00
PtP0.80	Data size	32bit	Data format	HEX
	Modbus address	3360,3361	CANopen address	0x2B50,0x00
PtP0.82	Data size	32bit	Data format	HEX
	Modbus address	3364,3365	CANopen address	0x2B52,0x00
PtP0.84	Data size	32bit	Data format	HEX
	Modbus address	3368,3369	CANopen address	0x2B54,0x00

PtP0.86	Data size	32bit	Data format	HEX
	Modbus address	3372,3373	CANopen address	0x2B56,0x00
PtP0.88	Data size	32bit	Data format	HEX
	Modbus address	3376,3377	CANopen address	0x2B58,0x00
PtP0.90	Data size	32bit	Data format	HEX
	Modbus address	3380,3381	CANopen address	0x2B5A,0x00
PtP0.92	Data size	32bit	Data format	HEX
	Modbus address	3384,3385	CANopen address	0x2B5C,0x00
PtP0.94	Data size	32bit	Data format	HEX
	Modbus address	3388,3389	CANopen address	0x2B5E,0x00
PtP0.96	Data size	32bit	Data format	HEX
	Modbus address	3392,3393	CANopen address	0x2B60,0x00
PtP0.98	Data size	32bit	Data format	HEX
	Modbus address	3396,3397	CANopen address	0x2B62,0x00

PtP0.03	01st position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.05	02nd position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.07	03rd position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.09	04th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.11	05th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.13	06th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.15	07th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.17	08th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.19	09th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.21	10th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.23	11th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				
PtP0.25	12th position	Setting range	Default	Unit	Available mode				
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P				

PtP0.27	13th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.29	14th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.31	15th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.33	16th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.35	17th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.37	18th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.39	19th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.41	20th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.43	21st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.45	22nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.47	23rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.49	24th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.51	25th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.53	26th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.55	27th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.57	28th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.59	29th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.61	30th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.63	31st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP0.65	32nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			

PtP0.67	33rd position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.69	34th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.71	35th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.73	36th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.75	37th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.77	38th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.79	39th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.81	40th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.83	41st position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.85	42nd position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.87	43rd position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.89	44th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.91	45th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.93	46th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.95	47th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.97	48th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P
PtP0.99	49th position	Setting range	Default	Unit	Available mode
		-(2^31-1)~(2^31-1)	0	reference unit	P

These parameters are used to set the 01st ~49th position. CMD determines the current position command mode and P0.37 is invalid.

PtP0.03	Data	32bit	Data format	DEC
	Modbus address	3206,3207	CANopen address	0x2B03,0x00
PtP0.05	Data	32bit	Data format	DEC
	Modbus address	3210,3211	CANopen address	0x2B05,0x00

PtP0.07	Data	32bit	Data format	DEC
	Modbus address	3214,3015	CANopen address	0x2B07,0x00
PtP0.09	Data	32bit	Data format	DEC
	Modbus address	3218,3219	CANopen address	0x2B09,0x00
PtP0.11	Data	32bit	Data format	DEC
	Modbus address	3222,3223	CANopen address	0x2B0B,0x00
PtP0.13	Data	32bit	Data format	DEC
	Modbus address	3226,3227	CANopen address	0x2B0D,0x00
PtP0.15	Data	32bit	Data format	DEC
	Modbus address	3230,3231	CANopen address	0x2B0F,0x00
PtP0.17	Data	32bit	Data format	DEC
	Modbus address	3234,3235	CANopen address	0x2B11,0x00
PtP0.19	Data	32bit	Data format	DEC
	Modbus address	3238,3239	CANopen address	0x2B13,0x00
PtP0.21	Data	32bit	Data format	DEC
	Modbus address	3242,3243	CANopen address	0x2B15,0x00
PtP0.23	Data	32bit	Data format	DEC
	Modbus address	3246,3247	CANopen address	0x2B17,0x00
PtP0.25	Data	32bit	Data format	DEC
	Modbus address	3250,3251	CANopen address	0x2B19,0x00
PtP0.27	Data	32bit	Data format	DEC
	Modbus address	3254,3255	CANopen address	0x2B1B,0x00
PtP0.29	Data	32bit	Data format	DEC
	Modbus address	3258,3259	CANopen address	0x2B1D,0x00
PtP0.31	Data	32bit	Data format	DEC
	Modbus address	3262,3263	CANopen address	0x2B1F,0x00
PtP0.33	Data	32bit	Data format	DEC
	Modbus address	3266,3267	CANopen address	0x2B21,0x00
PtP0.35	Data	32bit	Data format	DEC
	Modbus address	3270,3271	CANopen address	0x2B23,0x00
PtP0.37	Data	32bit	Data format	DEC
	Modbus address	3274,3075	CANopen address	0x2B25,0x00
PtP0.39	Data	32bit	Data format	DEC
	Modbus address	3278,3279	CANopen address	0x2B27,0x00
PtP0.41	Data	32bit	Data format	DEC
	Modbus address	3282,3283	CANopen address	0x2B29,0x00
PtP0.43	Data	32bit	Data format	DEC
	Modbus address	3286,3287	CANopen address	0x2B2B,0x00
PtP0.45	Data	32bit	Data format	DEC
	Modbus address	3290,3291	CANopen address	0x2B2D,0x00

PtP0.47	Data	32bit	Data format	DEC
	Modbus address	3294,3295	CANopen address	0x2B2F,0x00
PtP0.49	Data	32bit	Data format	DEC
	Modbus address	3298,3299	CANopen address	0x2B31,0x00
PtP0.51	Data	32bit	Data format	DEC
	Modbus address	3302,3303	CANopen address	0x2B33,0x00
PtP0.53	Data	32bit	Data format	DEC
	Modbus address	3306,3307	CANopen address	0x2B35,0x00
PtP0.55	Data	32bit	Data format	DEC
	Modbus address	3310,3311	CANopen address	0x2B37,0x00
PtP0.57	Data	32bit	Data format	DEC
	Modbus address	3314,3315	CANopen address	0x2B39,0x00
PtP0.59	Data	32bit	Data format	DEC
	Modbus address	3318,3319	CANopen address	0x2B3B,0x00
PtP0.61	Data	32bit	Data format	DEC
	Modbus address	3322,3323	CANopen address	0x2B3D,0x00
PtP0.63	Data	32bit	Data format	DEC
	Modbus address	3326,3327	CANopen address	0x2B3F,0x00
PtP0.65	Data	32bit	Data format	DEC
	Modbus address	3330,3331	CANopen address	0x2B41,0x00
PtP0.67	Data	32bit	Data format	DEC
	Modbus address	3334,3335	CANopen address	0x2B43,0x00
PtP0.69	Data	32bit	Data format	DEC
	Modbus address	3338,3339	CANopen address	0x2B45,0x00
PtP0.71	Data	32bit	Data format	DEC
	Modbus address	3342,3343	CANopen address	0x2B47,0x00
PtP0.73	Data	32bit	Data format	DEC
	Modbus address	3346,3347	CANopen address	0x2B49,0x00
PtP0.75	Data	32bit	Data format	DEC
	Modbus address	3350,3351	CANopen address	0x2B4B,0x00
PtP0.77	Data	32bit	Data format	DEC
	Modbus address	3354,3355	CANopen address	0x2B4D,0x00
PtP0.79	Data	32bit	Data format	DEC
	Modbus address	3358,3359	CANopen address	0x2B4F,0x00
PtP0.81	Data	32bit	Data format	DEC
	Modbus address	3362,3363	CANopen address	0x2B51,0x00
PtP0.83	Data	32bit	Data format	DEC
	Modbus address	3366,3367	CANopen address	0x2B53,0x00
PtP0.85	Data	32bit	Data format	DEC
	Modbus address	3370,3371	CANopen address	0x2B55,0x00

PtP0.87	Data	32bit	Data format	DEC
	Modbus address	3374,3375	CANopen address	0x2B57,0x00
PtP0.89	Data	32bit	Data format	DEC
	Modbus address	3378,3379	CANopen address	0x2B59,0x00
PtP0.91	Data	32bit	Data format	DEC
	Modbus address	3382,3383	CANopen address	0x2B5B,0x00
PtP0.93	Data	32bit	Data format	DEC
	Modbus address	3386,3387	CANopen address	0x2B5D,0x00
PtP0.95	Data	32bit	Data format	DEC
	Modbus address	3390,3391	CANopen address	0x2B5F,0x00
PtP0.97	Data	32bit	Data format	DEC
	Modbus address	3394,3395	CANopen address	0x2B61,0x00
PtP0.99	Data	32bit	Data format	DEC
	Modbus address	3398,3399	CANopen address	0x2B63,0x00

PtP1.00	50th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.02	51st control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.04	52nd control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.06	53rd control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.08	54th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.10	55th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.12	56th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.14	57th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.16	58th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.18	59th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.20	60th control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				
PtP1.22	61st control word	Setting range	Default	Unit	Available mode				
		0~0x7FFFFFFF	0x00000000	-	P				

PtP1.24	62nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.26	63rd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.28	64th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.30	65th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.32	66th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.34	67th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.36	68th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.38	69th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.40	70th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.42	71st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.44	72nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.46	73rd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.48	74th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.50	75th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.52	76th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.54	77th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.56	78th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.58	79th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.60	80th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP1.62	81st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			

PtP1.64	82nd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.66	83rd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.68	84th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.70	85th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.72	86th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.74	87th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.76	88th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.78	89th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.80	90th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.82	91st control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.84	92nd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.86	93rd control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.88	94th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.90	95th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.92	96th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.94	97th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.96	98th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
PtP1.98	99th control word	Setting range	Default	Unit	Available mode
		0~0x7FFFFFFF	0x00000000	-	P
This group of parameters are used to set the 50th~99th control word. Refer to PtP0.00 for detailed instruction.					
PtP1.00	Data size	32bit	Data format	HEX	
	Modbus address	3400,3401	CANopen address	0x2C00,0x00	

PtP1.02	Data size	32bit	Data format	HEX
	Modbus address	3404,3405	CANopen address	0x2C02,0x00
PtP1.04	Data size	32bit	Data format	HEX
	Modbus address	3408,3409	CANopen address	0x2C04,0x00
PtP1.06	Data size	32bit	Data format	HEX
	Modbus address	3412,3413	CANopen address	0x2C06,0x00
PtP1.08	Data size	32bit	Data format	HEX
	Modbus address	3416,3417	CANopen address	0x2C08,0x00
PtP1.10	Data size	32bit	Data format	HEX
	Modbus address	3420,3421	CANopen address	0x2C0A,0x00
PtP1.12	Data size	32bit	Data format	HEX
	Modbus address	3424,3425	CANopen address	0x2C0C,0x00
PtP1.14	Data size	32bit	Data format	HEX
	Modbus address	3428,3429	CANopen address	0x2C0E,0x00
PtP1.16	Data size	32bit	Data format	HEX
	Modbus address	3432,3433	CANopen address	0x2C10,0x00
PtP1.18	Data size	32bit	Data format	HEX
	Modbus address	3436,3437	CANopen address	0x2C12,0x00
PtP1.20	Data size	32bit	Data format	HEX
	Modbus address	3440,3441	CANopen address	0x2C14,0x00
PtP1.22	Data size	32bit	Data format	HEX
	Modbus address	3444,3445	CANopen address	0x2C16,0x00
PtP1.24	Data size	32bit	Data format	HEX
	Modbus address	3448,3449	CANopen address	0x2C18,0x00
PtP1.26	Data size	32bit	Data format	HEX
	Modbus address	3452,3453	CANopen address	0x2C1A,0x00
PtP1.28	Data size	32bit	Data format	HEX
	Modbus address	3456,3457	CANopen address	0x2C1C,0x00
PtP1.30	Data size	32bit	Data format	HEX
	Modbus address	3460,3461	CANopen address	0x2C1E,0x00
PtP1.32	Data size	32bit	Data format	HEX
	Modbus address	3464,3465	CANopen address	0x2C20,0x00
PtP1.34	Data size	32bit	Data format	HEX
	Modbus address	3468,3469	CANopen address	0x2C22,0x00
PtP1.36	Data size	32bit	Data format	HEX
	Modbus address	3472,3473	CANopen address	0x2C24,0x00
PtP1.38	Data size	32bit	Data format	HEX
	Modbus address	3476,3477	CANopen address	0x2C26,0x00
PtP1.40	Data size	32bit	Data format	HEX
	Modbus address	3480,3481	CANopen address	0x2C28,0x00

PtP1.42	Data size	32bit	Data format	HEX
	Modbus address	3484,3485	CANopen address	0x2C2A,0x00
PtP1.44	Data size	32bit	Data format	HEX
	Modbus address	3488,3489	CANopen address	0x2C2C,0x00
PtP1.46	Data size	32bit	Data format	HEX
	Modbus address	3492,3493	CANopen address	0x2C2E,0x00
PtP1.48	Data size	32bit	Data format	HEX
	Modbus address	3496,3497	CANopen address	0x2C30,0x00
PtP1.50	Data size	32bit	Data format	HEX
	Modbus address	3500,3501	CANopen address	0x2C32,0x00
PtP1.52	Data size	32bit	Data format	HEX
	Modbus address	3504,3505	CANopen address	0x2C34,0x00
PtP1.54	Data size	32bit	Data format	HEX
	Modbus address	3508,3509	CANopen address	0x2C36,0x00
PtP1.56	Data size	32bit	Data format	HEX
	Modbus address	3512,3513	CANopen address	0x2C38,0x00
PtP1.58	Data size	32bit	Data format	HEX
	Modbus address	3516,3517	CANopen address	0x2C3A,0x00
PtP1.60	Data size	32bit	Data format	HEX
	Modbus address	3520,3521	CANopen address	0x2C3C,0x00
PtP1.62	Data size	32bit	Data format	HEX
	Modbus address	3524,3525	CANopen address	0x2C3E,0x00
PtP1.64	Data size	32bit	Data format	HEX
	Modbus address	3528,3529	CANopen address	0x2C40,0x00
PtP1.66	Data size	32bit	Data format	HEX
	Modbus address	3532,3533	CANopen address	0x2C42,0x00
PtP1.68	Data size	32bit	Data format	HEX
	Modbus address	3536,3537	CANopen address	0x2C44,0x00
PtP1.70	Data size	32bit	Data format	HEX
	Modbus address	3540,3541	CANopen address	0x2C46,0x00
PtP1.72	Data size	32bit	Data format	HEX
	Modbus address	3544,3545	CANopen address	0x2C48,0x00
PtP1.74	Data size	32bit	Data format	HEX
	Modbus address	3548,3549	CANopen address	0x2C4A,0x00
PtP1.76	Data size	32bit	Data format	HEX
	Modbus address	3552,3553	CANopen address	0x2C4C,0x00
PtP1.78	Data size	32bit	Data format	HEX
	Modbus address	3556,3557	CANopen address	0x2C4E,0x00
PtP1.80	Data size	32bit	Data format	HEX
	Modbus address	3560,3561	CANopen address	0x2C50,0x00

PtP1.82	Data size	32bit	Data format	HEX
	Modbus address	3564,3565	CANopen address	0x2C52,0x00
PtP1.84	Data size	32bit	Data format	HEX
	Modbus address	3568,3569	CANopen address	0x2C54,0x00
PtP1.86	Data size	32bit	Data format	HEX
	Modbus address	3572,3573	CANopen address	0x2C56,0x00
PtP1.88	Data size	32bit	Data format	HEX
	Modbus address	3576,3577	CANopen address	0x2C58,0x00
PtP1.90	Data size	32bit	Data format	HEX
	Modbus address	3580,3581	CANopen address	0x2C5A,0x00
PtP1.92	Data size	32bit	Data format	HEX
	Modbus address	3584,3585	CANopen address	0x2C5C,0x00
PtP1.94	Data size	32bit	Data format	HEX
	Modbus address	3588,3589	CANopen address	0x2C5E,0x00
PtP1.96	Data size	32bit	Data format	HEX
	Modbus address	3592,3593	CANopen address	0x2C60,0x00
PtP1.98	Data size	32bit	Data format	HEX
	Modbus address	3596,3597	CANopen address	0x2C62,0x00

PtP1.01	50th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.03	51st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.05	52nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.07	53rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.09	54th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.11	55th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.13	56th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.15	57th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.17	58th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.19	59th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			

PtP1.21	60th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.23	61st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.25	62nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.27	63rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.29	64th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.31	65th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.33	66th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.35	67th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.37	68th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.39	69th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.41	70th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.43	71st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.45	72nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.47	73rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.49	74th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.51	75th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.53	76th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.55	77th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.57	78th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.59	79th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			

PtP1.61	80th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.63	81st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.65	82nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.67	83rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.69	84th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.71	85th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.73	86th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.75	87th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.77	88th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.79	89th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.81	90th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.83	91st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.85	92nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.87	93rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.89	94th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.91	95th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.93	96th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.95	97th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.97	98th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP1.99	99th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			

This group of parameters are used to set the 50th~99th position. CMD determines the current position command mode and P0.37 is invalid.				
PtP1.01	Data size	32bit	Data format	DEC
	Modbus address	3402,3403	CANopen address	0x2C03,0x00
PtP1.03	Data size	32bit	Data format	DEC
	Modbus address	3406,3407	CANopen address	0x2C03,0x00
PtP1.05	Data size	32bit	Data format	DEC
	Modbus address	3410,3411	CANopen address	0x2C05,0x00
PtP1.07	Data size	32bit	Data format	DEC
	Modbus address	3414,3415	CANopen address	0x2C07,0x00
PtP1.09	Data size	32bit	Data format	DEC
	Modbus address	3418,3419	CANopen address	0x2C09,0x00
PtP1.11	Data size	32bit	Data format	DEC
	Modbus address	3422,3423	CANopen address	0x2C0B,0x00
PtP1.13	Data size	32bit	Data format	DEC
	Modbus address	3426,3427	CANopen address	0x2C0D,0x00
PtP1.15	Data size	32bit	Data format	DEC
	Modbus address	3430,3431	CANopen address	0x2C0F,0x00
PtP1.17	Data size	32bit	Data format	DEC
	Modbus address	3434,3435	CANopen address	0x2C11,0x00
PtP1.19	Data size	32bit	Data format	DEC
	Modbus address	3438,3439	CANopen address	0x2C13,0x00
PtP1.21	Data size	32bit	Data format	DEC
	Modbus address	3442,3443	CANopen address	0x2C15,0x00
PtP1.23	Data size	32bit	Data format	DEC
	Modbus address	3446,3447	CANopen address	0x2C17,0x00
PtP1.25	Data size	32bit	Data format	DEC
	Modbus address	3450,3451	CANopen address	0x2C19,0x00
PtP1.27	Data size	32bit	Data format	DEC
	Modbus address	3454,3455	CANopen address	0x2C1B,0x00
PtP1.29	Data size	32bit	Data format	DEC
	Modbus address	3458,3459	CANopen address	0x2C1D,0x00
PtP1.31	Data size	32bit	Data format	DEC
	Modbus address	3462,3463	CANopen address	0x2C1F,0x00
PtP1.33	Data size	32bit	Data format	DEC
	Modbus address	3466,3467	CANopen address	0x2C21,0x00
PtP1.35	Data size	32bit	Data format	DEC
	Modbus address	3470,3471	CANopen address	0x2C23,0x00
PtP1.37	Data size	32bit	Data format	DEC
	Modbus address	3474,3475	CANopen address	0x2C25,0x00

PtP1.39	Data size	32bit	Data format	DEC
	Modbus address	3478,3479	CANopen address	0x2C27,0x00
PtP1.41	Data size	32bit	Data format	DEC
	Modbus address	3482,3483	CANopen address	0x2C29,0x00
PtP1.43	Data size	32bit	Data format	DEC
	Modbus address	3486,3487	CANopen address	0x2C2B,0x00
PtP1.45	Data size	32bit	Data format	DEC
	Modbus address	3490,3491	CANopen address	0x2C2D,0x00
PtP1.47	Data size	32bit	Data format	DEC
	Modbus address	3494,3495	CANopen address	0x2C2F,0x00
PtP1.49	Data size	32bit	Data format	DEC
	Modbus address	3498,3499	CANopen address	0x2C31,0x00
PtP1.51	Data size	32bit	Data format	DEC
	Modbus address	3502,3503	CANopen address	0x2C33,0x00
PtP1.53	Data size	32bit	Data format	DEC
	Modbus address	3506,3507	CANopen address	0x2C35,0x00
PtP1.55	Data size	32bit	Data format	DEC
	Modbus address	3510,3511	CANopen address	0x2C37,0x00
PtP1.57	Data size	32bit	Data format	DEC
	Modbus address	3514,3515	CANopen address	0x2C39,0x00
PtP1.59	Data size	32bit	Data format	DEC
	Modbus address	3518,3519	CANopen address	0x2C3B,0x00
PtP1.61	Data size	32bit	Data format	DEC
	Modbus address	3522,3523	CANopen address	0x2C3D,0x00
PtP1.63	Data size	32bit	Data format	DEC
	Modbus address	3526,3527	CANopen address	0x2C3F,0x00
PtP1.65	Data size	32bit	Data format	DEC
	Modbus address	3530,3531	CANopen address	0x2C41,0x00
PtP1.67	Data size	32bit	Data format	DEC
	Modbus address	3534,3535	CANopen address	0x2C43,0x00
PtP1.69	Data size	32bit	Data format	DEC
	Modbus address	3538,3539	CANopen address	0x2C45,0x00
PtP1.71	Data size	32bit	Data format	DEC
	Modbus address	3542,3543	CANopen address	0x2C47,0x00
PtP1.73	Data size	32bit	Data format	DEC
	Modbus address	3546,3547	CANopen address	0x2C49,0x00
PtP1.75	Data size	32bit	Data format	DEC
	Modbus address	3550,3551	CANopen address	0x2C4B,0x00
PtP1.77	Data size	32bit	Data format	DEC
	Modbus address	3554,3555	CANopen address	0x2C4D,0x00

PtP1.79	Data size	32bit	Data format	DEC
	Modbus address	3558,3559	CANopen address	0x2C4F,0x00
PtP1.81	Data size	32bit	Data format	DEC
	Modbus address	3562,3563	CANopen address	0x2C51,0x00
PtP1.83	Data size	32bit	Data format	DEC
	Modbus address	3566,3567	CANopen address	0x2C53,0x00
PtP1.85	Data size	32bit	Data format	DEC
	Modbus address	3570,3571	CANopen address	0x2C55,0x00
PtP1.87	Data size	32bit	Data format	DEC
	Modbus address	3574,3575	CANopen address	0x2C57,0x00
PtP1.89	Data size	32bit	Data format	DEC
	Modbus address	3578,3579	CANopen address	0x2C59,0x00
PtP1.91	Data size	32bit	Data format	DEC
	Modbus address	3582,3583	CANopen address	0x2C5B,0x00
PtP1.93	Data size	32bit	Data format	DEC
	Modbus address	3586,3587	CANopen address	0x2C5D,0x00
PtP1.95	Data size	32bit	Data format	DEC
	Modbus address	3590,3591	CANopen address	0x2C5F,0x00
PtP1.97	Data size	32bit	Data format	DEC
	Modbus address	3594,3595	CANopen address	0x2C61,0x00
PtP1.99	Data size	32bit	Data format	DEC
	Modbus address	3598,3599	CANopen address	0x2C63,0x00

PtP2.00	100th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.02	101st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.04	102nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.06	103rd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.08	104th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.10	105th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.12	106th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.14	107th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			

PtP2.16	108th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.18	109th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.20	110th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.22	111th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.24	112th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.26	113th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.28	114th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.30	115th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.32	116th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.34	117th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.36	118th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.38	119th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.40	120th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.42	121st control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.44	122nd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.46	123rd control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.48	124th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.50	125th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.52	126th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			
PtP2.54	127th control word	Setting range	Default	Unit	Available mode			
		0~0x7FFFFFFF	0x00000000	-	P			

This group of parameters are used to set the 100th~127th control word. Refer to PtP0.00 for detailed instruction.				
PtP2.00	Data size	32bit	Data format	HEX
	Modbus address	3600,3601	CANopen address	0x2D00,0x00
PtP2.02	Data size	32bit	Data format	HEX
	Modbus address	3604,3605	CANopen address	0x2D02,0x00
PtP2.04	Data size	32bit	Data format	HEX
	Modbus address	3608,3609	CANopen address	0x2D04,0x00
PtP2.06	Data size	32bit	Data format	HEX
	Modbus address	3612,3613	CANopen address	0x2D06,0x00
PtP2.08	Data size	32bit	Data format	HEX
	Modbus address	3616,3617	CANopen address	0x2D08,0x00
PtP2.10	Data size	32bit	Data format	HEX
	Modbus address	3620,3621	CANopen address	0x2D0A,0x00
PtP2.12	Data size	32bit	Data format	HEX
	Modbus address	3624,3625	CANopen address	0x2D0C,0x00
PtP2.14	Data size	32bit	Data format	HEX
	Modbus address	3628,3629	CANopen address	0x2D0E,0x00
PtP2.16	Data size	32bit	Data format	HEX
	Modbus address	3632,3633	CANopen address	0x2D10,0x00
PtP2.18	Data size	32bit	Data format	HEX
	Modbus address	3636,3637	CANopen address	0x2D12,0x00
PtP2.20	Data size	32bit	Data format	HEX
	Modbus address	3640,3641	CANopen address	0x2D14,0x00
PtP2.22	Data size	32bit	Data format	HEX
	Modbus address	3644,3645	CANopen address	0x2D16,0x00
PtP2.24	Data size	32bit	Data format	HEX
	Modbus address	3648,3649	CANopen address	0x2D18,0x00
PtP2.26	Data size	32bit	Data format	HEX
	Modbus address	3652,3653	CANopen address	0x2D1A,0x00
PtP2.28	Data size	32bit	Data format	HEX
	Modbus address	3656,3657	CANopen address	0x2D1C,0x00
PtP2.30	Data size	32bit	Data format	HEX
	Modbus address	3660,3661	CANopen address	0x2D1E,0x00
PtP2.32	Data size	32bit	Data format	HEX
	Modbus address	3664,3665	CANopen address	0x2D20,0x00
PtP2.34	Data size	32bit	Data format	HEX
	Modbus address	3668,3669	CANopen address	0x2D22,0x00
PtP2.36	Data size	32bit	Data format	HEX
	Modbus address	3672,3673	CANopen address	0x2D24,0x00

PtP2.38	Data size	32bit	Data format	HEX
	Modbus address	3676,3677	CANopen address	0x2D26,0x00
PtP2.40	Data size	32bit	Data format	HEX
	Modbus address	3680,3681	CANopen address	0x2D28,0x00
PtP2.42	Data size	32bit	Data format	HEX
	Modbus address	3684,3685	CANopen address	0x2D2A,0x00
PtP2.44	Data size	32bit	Data format	HEX
	Modbus address	3688,3689	CANopen address	0x2D2C,0x00
PtP2.46	Data size	32bit	Data format	HEX
	Modbus address	3692,3693	CANopen address	0x2D2E,0x00
PtP2.48	Data size	32bit	Data format	HEX
	Modbus address	3696,3697	CANopen address	0x2D30,0x00
PtP2.50	Data size	32bit	Data format	HEX
	Modbus address	3700,3701	CANopen address	0x2D32,0x00
PtP2.52	Data size	32bit	Data format	HEX
	Modbus address	3704,3705	CANopen address	0x2D34,0x00
PtP2.54	Data size	32bit	Data format	HEX
	Modbus address	3708,3709	CANopen address	0x2D36,0x00

PtP2.01	100th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.03	101st position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.05	102nd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.07	103rd position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.09	104th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.11	105th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.13	106th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.15	107th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.17	108th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			
PtP2.19	109th position	Setting range	Default	Unit	Available mode			
		$-(2^{31}-1)\sim(2^{31}-1)$	0	reference unit	P			

PtP2.21	110th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.23	111th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.25	112th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.27	113th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.29	114th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.31	115th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.33	116th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.35	117th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.37	118th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.39	119th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.41	120th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.43	121st position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.45	122nd position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.47	123rd position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.49	124th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.51	125th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.53	126th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
PtP2.55	127th position	Setting range	Default	Unit	Available mode			
		-(2^31-1)~(2^31-1)	0	reference unit	P			
This group of parameters are used to set the 100th~127th position. CMD determines the current position command mode and P0.37 is invalid.								
PtP2.01	Data size	32bit		Data format	DEC			
	Modbus address	3602,3603		CANopen address	0x2D01,0x00			

PtP2.03	Data size	32bit	Data format	DEC
	Modbus address	3606,3607	CANopen address	0x2D03,0x00
PtP2.05	Data size	32bit	Data format	DEC
	Modbus address	3610,3611	CANopen address	0x2D05,0x00
PtP2.07	Data size	32bit	Data format	DEC
	Modbus address	3614,3615	CANopen address	0x2D07,0x00
PtP2.09	Data size	32bit	Data format	DEC
	Modbus address	3618,3619	CANopen address	0x2D09,0x00
PtP2.11	Data size	32bit	Data format	DEC
	Modbus address	3622,3623	CANopen address	0x2D0B,0x00
PtP2.13	Data size	32bit	Data format	DEC
	Modbus address	3626,3627	CANopen address	0x2D0D,0x00
PtP2.15	Data size	32bit	Data format	DEC
	Modbus address	3630,3631	CANopen address	0x2D0F,0x00
PtP2.17	Data size	32bit	Data format	DEC
	Modbus address	3634,3635	CANopen address	0x2D11,0x00
PtP2.19	Data size	32bit	Data format	DEC
	Modbus address	3638,3639	CANopen address	0x2D13,0x00
PtP2.21	Data size	32bit	Data format	DEC
	Modbus address	3642,3643	CANopen address	0x2D15,0x00
PtP2.23	Data size	32bit	Data format	DEC
	Modbus address	3646,3647	CANopen address	0x2D17,0x00
PtP2.25	Data size	32bit	Data format	DEC
	Modbus address	3650,3651	CANopen address	0x2D19,0x00
PtP2.27	Data size	32bit	Data format	DEC
	Modbus address	3654,3655	CANopen address	0x2D1B,0x00
PtP2.29	Data size	32bit	Data format	DEC
	Modbus address	3658,3659	CANopen address	0x2D1D,0x00
PtP2.31	Data size	32bit	Data format	DEC
	Modbus address	3662,3663	CANopen address	0x2D1F,0x00
PtP2.33	Data size	32bit	Data format	DEC
	Modbus address	3666,3667	CANopen address	0x2D21,0x00
PtP2.35	Data size	32bit	Data format	DEC
	Modbus address	3670,3671	CANopen address	0x2D23,0x00
PtP2.37	Data size	32bit	Data format	DEC
	Modbus address	3674,3675	CANopen address	0x2D25,0x00
PtP2.39	Data size	32bit	Data format	DEC
	Modbus address	3678,3679	CANopen address	0x2D27,0x00
PtP2.41	Data size	32bit	Data format	DEC
	Modbus address	3682,3683	CANopen address	0x2D29,0x00

PtP2.43	Data size	32bit	Data format	DEC
	Modbus address	3686,3687	CANopen address	0x2D2B,0x00
PtP2.45	Data size	32bit	Data format	DEC
	Modbus address	3690,3691	CANopen address	0x2D2D,0x00
PtP2.47	Data size	32bit	Data format	DEC
	Modbus address	3694,3695	CANopen address	0x2D2F,0x00
PtP2.49	Data size	32bit	Data format	DEC
	Modbus address	3698,3699	CANopen address	0x2D31,0x00
PtP2.51	Data size	32bit	Data format	DEC
	Modbus address	3702,3703	CANopen address	0x2D33,0x00
PtP2.53	Data size	32bit	Data format	DEC
	Modbus address	3706,3707	CANopen address	0x2D35,0x00
PtP2.55	Data size	32bit	Data format	DEC
	Modbus address	3710,3711	CANopen address	0x2D37,0x00

6.9 State monitoring

6.9.1 User monitoring parameters (R0 group)

R0.00	Motor speed	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Display 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 address	4000,4001	CANopen address	0x3000,0x00

R0.01	Speed command	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Display the current speed command of the servo motor. **Note:** If the ACC/DEC time is enabled, the speed command is processed by the ACC/DEC time.				
R0.01	Data size	32bit	Data format	DEC
	Modbus address	4002,4003	CANopen address	0x3001,0x00

R0.02	Feedback pulse accumulation	Display range	Precision	Unit
		$-(2^{63}-1)$~$(2^{63}-1)$	1	reference unit
Accumulate and display the feedback accumulation pulse of the servo motor encoder. With sign and the unit is the user unit.				
R0.02	Data size	64bit	Data format	DEC
	Modbus address	4004,4005, 4006,4007	CANopen address	0x3002,0x00 0x3002,0x01

R0.03	Command pulse accumulation	Display range	Precision	Unit
		$-(2^{63}-1)\sim(2^{63}-1)$	1	reference unit
Accumulate and display the command pulse accumulation. With sign and the unit is the user unit.				
R0.03	Data size	64bit	Data format	DEC
	Modbus address	4008,4009, 4010,4011	CANopen address	0x3003,0x00 0x3003,0x01

R0.04	Retention pulse	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	reference unit
Display the number of retention pulses of the position deviation counter. The unit is the user unit.				
R0.04	Data size	32bit	Data format	DEC
	Modbus address	4012,4013	CANopen address	0x3004,0x00

R0.05	Hybrid control deviation	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	reference unit
This parameter is used to display the tolerance between the encoder feedback position and the grating feedback position in fully-closed up mode. With sign, and the unit is the user unit.				
R0.05	Data size	32bit	Data format	DEC
	Modbus address	4014,4015	CANopen address	0x3005,0x00

R0.06	Current torque	Display range	Precision	Unit
		-500.0~500.0	0.1	%
Display the actual torque at present. If the rated torque of servo motor is 100.0%, the actual value will be converted to percentage value to be displayed.				
R0.06	Data size	16bit	Data format	DEC
	Modbus address	4016,4017	CANopen address	0x3006,0x00

R0.07	DC voltage of main circuit	Display range	Precision	Unit
		0.0~1000.0	0.1	V
Display the DC voltage of main circuit.				
R0.07	Data size	16bit	Data format	DEC
	Modbus address	4018,4019	CANopen address	0x3007,0x00

R0.08	Voltage of control power	Display range	Precision	Unit
		0.0~1000.0	0.1	V
Display the DC voltage of control power.				
R0.08	Data size	16bit	Data format	DEC
	Modbus address	4020,4021	CANopen address	0x3008,0x00

R0.09	Output voltage	Display range	Precision	Unit
		0.0~1000.0	0.1	Vrms
Display the valid value of the current output voltage.				

R0.09	Data size	16bit	Data format	DEC
	Modbus address	4022,4023	CANopen address	0x3009,0x00

R0.10	Output current	Display range	Precision	Unit
		0.00~1000.00	0.01	Arms
Display the valid value of the output current.				
R0.10	Data size	16bit	Data format	DEC
	Modbus address	4024,4025	CANopen address	0x300A,0x00

R0.11	Drive temperature	Display range	Precision	Unit
		-55.0~180.0	0.1	℃
Display the current temperature of the IGBT module.				
R0.11	Data size	16bit	Data format	DEC
	Modbus address	4026,4027	CANopen address	0x300B,0x00

R0.12	Torque limit	Display range	Precision	Unit
		-500.0~500.0	0.1	%
Display the actual torque limit at present. If the rated torque is 100.0%, the actual value will be converted to percentage value to be displayed.				
R0.12	Data size	16bit	Data format	DEC
	Modbus address	4028,4029	CANopen address	0x300C,0x00

R0.13	Encoder feedback value	Display range	Precision	Unit
		0~(2^{20}-1)	1	pulse
Display the current encoder feedback value.				
R0.13	Data size	32bit	Data format	DEC
	Modbus address	4030,4031	CANopen address	0x300D,0x00

R0.14	Rotor relative to Z pulse position	Display range	Precision	Unit
		0~(2^{20}-1)	1	pulse
Display the mechanical absolute position of the motor in one encoder cycle. The unit is encoder resolution.				
R0.14	Data size	32bit	Data format	DEC
	Modbus address	4032,4033	CANopen address	0x300E,0x00

R0.15	Inertia ratio of load	Display range	Precision	Unit
		0~10000	1	%
Display the predicted value of the ratio of rotational inertia of the servo motor to that of the load converted onto the servo motor's shaft.				
R0.15	Data size	16bit	Data format	DEC
	Modbus address	4034,4035	CANopen address	0x300F,0x00

R0.16	Output power	Display range	Precision	Unit
		-500.0~500.0	0.1	%
Display the output mechanical power of the drive. If the rated power of servo motor is 100.0%, the actual value will be converted to the percentage value to be displayed. **Note:** The negative value means the motor is in power generation state.				
R0.16	Data size	16bit	Data format	DEC
	Modbus address	4036,4037	CANopen address	0x3010,0x00

R0.17	Motor load ratio	Display range	Precision	Unit
		0.0~500.0	0.1	%
Display the actual motor load ratio. If the rated power is 100.0%, the actual value will be converted to the percentage value to be displayed.				
R0.17	Data size	16bit	Data format	DEC
	Modbus address	4038,4039	CANopen address	0x3011,0x00

R0.18	Molecule of actual electric gear ratio	Display range	Precision	Unit
		0~(2^{31}-1)	1	-
Display the molecule coefficient of actual electric gear ratio				
R0.18	Data size	32bit	Data format	DEC
	Modbus address	4040,4041	CANopen address	0x3012,0x00

R0.19	Denominator of actual electric gear ratio	Display range	Precision	Unit
		1~(2^{31}-1)	1	-
Display the denominator coefficient of actual electric gear ratio				
R0.19	Data size	32bit	Data format	DEC
	Modbus address	4042,4043	CANopen address	0x3013,0x00

R0.20	Position command speed	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Display the speed value corresponds to the position command.				
R0.20	Data size	32bit	Data format	DEC
	Modbus address	4044,4045	CANopen address	0x3014,0x00

R0.21	Motor speed (filtering)	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Display the speed of the servo motor after filtering process.				
R0.21	Data size	32bit	Data format	DEC
	Modbus address	4046,4047	CANopen address	0x3015,0x00

R0.22	PTP state	Display range	Precision	Unit
		-1~4223	1	-

Display the execution state of PTP control: -1: no PTP control executed; 0-127: PTP number under executing; adding 4096 to the PTP number means the PTP execution is finished.

R0.22	Data size	16bit	Data format	DEC
	Modbus address	4048,4049	CANopen address	0x3016,0x00

R0.23	Feedback of encoder absolute position	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	pulse

Display the feedback value of encoder absolute position, this value will change to 0 after zero-clearing operation.

R0.23	Data size	32bit	Data format	DEC
	Modbus address	4050,4051	CANopen address	0x3017,0x00

R0.24	Encoder EEPROM data state	Display range	Precision	Unit
		0~3	-	-

Display the EEPROM state when EEPROM has no motor data or the data is not normal, the system will use the internal motor parameters.

Setting value	State
[0]	No EEPROM
1	EEPROM no data
2	EEPROM data error
3	EEPROM data normal

R0.24	Data size	16bit	Data format	DEC
	Modbus address	4052,4053	CANopen address	0x3018,0x00

R0.25	Circles of multi-turn encoder	Display range	Precision	Unit
		-32768~32767	0	-

Display the circles of multi-turn encoder.

R0.25	Data size	16bit	Data format	DEC
	Modbus address	4054, 4055	CANopen address	0x3019, 0x00

R0.26	Available encoder type	Display range	Precision	Unit
		0~6	-	-

It means the encoder type supported by hardware circuit.

Setting value	State
[3]	Optical encoder
5	Rotary transformer
Other values	(Reserved)

R0.26	Data size	16bit	Data format	DEC
	Modbus address	4056, 4057	CANopen address	0x301A, 0x00

R0.27	EtherCAT clock synchronous correction state	Display range	Precision	Unit
		0~1	-	-

Display whether the internal clock of drive is synchronized with DC Sync0 when EtherCAT communication synchronization mode adopts DC mode.

Setting value	State
[0]	Unsynchronized
1	Synchronized

R0.27	Data size	16bit	Data format	DEC
	Modbus address	4058, 4059	CANopen address	0x301B, 0x00

R0.28	State of CANopen state machine	Display range	Precision	Unit
		0~18	-	-

The current state of CANopen state machine in CAN communication and the state of CoE(CANopen over EtherCAT) state machine in EtherCAT communication

Setting value	Communication mode	State
[0]	-	Invalid
1	CAN	Init
2		Pre-Op
5		Stop
8		Op(Operational)
11	EtherCAT	Init
12		Pre-Op
14		Safe-Op
18		Op(Operational)

R0.28	Data size	16bit	Data format	DEC
	Modbus address	4060, 4061	CANopen address	0x301C, 0x00

R0.29	Node of PROFIBUS-DP slave station	Display range	Precision	Unit
		0~99	-	-

Display the received node of PROFIBUS-DP slave station and correspond to the position of rotary switch.

R0.29	Data size	16bit	Data format	DEC
	Modbus address	4062,4063	CANopen address	0x301D,0x00

R0.30	System state	Display range	Precision	Unit
		0~6	-	-

Display the system state.

Setting value	State
[0]	Initialization
1	The high voltage
2	Ready
3	Operation
4	Forced to stop
5	Fault
6	STO-In

R0.30	Data size	16bit	Data format	DEC
	Modbus address	4064,4065	CANopen address	0x301E,0x00

R0.31	IGBT state	Display range	Precision	Unit
		0~1	-	-

Display the IGBT state.

Setting value	State
[0]	Off
1	On

R0.31	Data size	16bit	Data format	DEC
	Modbus address	4066,4067	CANopen address	0x301F,0x00

R0.32	Current mode	Display range	Precision	Unit
		0~2	-	-

Display the current control mode.

Setting value	State
[0]	Position mode
1	Speed mode
2	Torque mode

R0.32	Data size	16bit	Data format	DEC
	Modbus address	4068,4069	CANopen address	0x3020,0x00

R0.33	Power on time	Display range	Precision	Unit
		0~(2^{31}-1)	1	s

Display the total power on time of the drive.

R0.33	Data size	32bit	Data format	DEC
	Modbus address	4070,4071	CANopen address	0x3021,0x00

R0.34	Operation time	Display range	Precision	Unit
		0~(2^{31}-1)	1	s

Display the total servo enabling operation time of the drive.				
R0.34	Data size	32bit	Data format	DEC
	Modbus address	4072,4073	CANopen address	0x3022,0x00

R0.35	DSP software version	Display range	Precision	Unit
		0.00~10.00	0.01	-
Display the DSP software version.				
R0.35	Data size	16bit	Data format	DEC
	Modbus address	4074,4075	CANopen address	0x3023,0x00

R0.36	FPGA software version	Display range	Precision	Unit
		0.00~10.00	0.01	-
Display the FPGA software version.				
R0.36	Data size	16bit	Data format	DEC
	Modbus address	4076,4077	CANopen address	0x3024,0x00

R0.37	Communication card software version	Display range	Precision	Unit
		0.00~10.00	0.01	-
Display the communication card software version.				
R0.37	Data size	16bit	Data format	DEC
	Modbus address	4078,4079	CANopen address	0x3025,0x00

R0.38	Drive serial No.1	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.1				
R0.38	Data size	16bit	Data format	DEC
	Modbus address	4080,4081	CANopen address	0x3026,0x00

R0.39	Drive serial No.2	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.2				
R0.39	Data size	16bit	Data format	DEC
	Modbus address	4082,4083	CANopen address	0x3027,0x00

R0.40	Drive serial No.3	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.3				
R0.40	Data size	16bit	Data format	DEC
	Modbus address	4084,4085	CANopen address	0x3028,0x00

R0.41	Drive serial No.4	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.4				
R0.41	Data size	16bit	Data format	DEC
	Modbus address	4086,4087	CANopen address	0x3029,0x00

R0.42	Drive serial No.5	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.5				
R0.42	Data size	16bit	Data format	DEC
	Modbus address	4088,4089	CANopen address	0x302A,0x00

R0.43	Drive serial No.6	Display range	Precision	Unit
		0~65535	1	-
Display the drive serial No.6				
R0.43	Data size	16bit	Data format	DEC
	Modbus address	4090,4091	CANopen address	0x302B,0x00

R0.44	Absolute position of linear encoder (2^{nd} encoder) in single circle	Display range	Precision	Unit
		$0~2^{23}$	1	pulse
Display the feedback value of absolute position of linear encoder (2^{nd} encoder) in single circle.				
R0.44	Data size	32bit	Data format	DEC
	Modbus address	4092, 4093	CANopen address	0x302C, 0x00

R0.45	Speed feedback of 2^{nd} encoder	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Display the actual speed of the servo motor.				
R0.45	Data size	32bit	Data format	DEC
	Modbus address	4094,4095	CANopen address	0x302D,0x00

R0.46	Observing speed of speed observer	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Detecting speed of speed observer.				
R0.46	Data size	32bit	Data format	DEC
	Modbus address	4096,4097	CANopen address	0x302E,0x00

R0.47	Feedback speed of speed observer	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Feedback speed of speed observer				
R0.47	Data size	32bit	Data format	DEC
	Modbus address	4098,4099	CANopen address	0x302F,0x00

R0.48	Observing disturbance torque via disturbance observer	Display range	Precision	Unit
		-1000.0~1000.0	0.1	%
Compensation torque of disturbance observer				
R0.48	Data size	32bit	Data format	DEC
	Modbus address	4100,4101	CANopen address	0x3030,0x00

R0.49	Compensation value of fully-closed-loop vibration suppressor	Display range	Precision	Unit
		-9999.9~9999.9	0.1	r/min
Compensation value of fully-closed-loop vibration suppressor				
R0.49	Data size	32bit	Data format	DEC
	Modbus address	4102,4103	CANopen address	0x3031,0x00

R0.51	Observe load inertia ratio in real time	Display range	Precision	Unit
		0~10000	1	%
Display load inertia ratio observed in real time.				
R0.51	Data size	16bit	Data format	DEC
	Modbus address	4106,4107	CANopen address	0x3033,0x00

R0.52	Linear encoder (2^{nd} encoder) position feedback accumulation (32-bit number)	Display range	Precision	Unit
		$-(2^{31}-1)$~$(2^{31}-1)$	1	pulse
Linear encoder (2^{nd} encoder) position feedback accumulation, 32-bit number, fast reading speed. If the data range exceeds 32-bit, use R0.57.				
R0.52	Data size	32bit	Data format	DEC
	Modbus address	4108,4109	CANopen address	0x3034,0x00

R0.53	Gantry synchronization position deviation	Display range	Precision	Unit
		$-(2^{31}-1)$~$(2^{31}-1)$	1	reference unit
Gantry synchronization position deviation.				
R0.53	Data size	32bit	Data format	DEC
	Modbus address	4110,4111	CANopen address	0x3035,0x00

R0.54	Linear encoder (2^{nd} encoder)position feedback value	Display range	Precision	Unit
		0~2^{23}	1	pulse
Display the feedback position of linear encoder (2^{nd} encoder).				
R0.54	Data size	32bit	Data format	DEC
	Modbus address	4112,4113	CANopen address	0x3036,0x00

R0.55	Encoder circle number offset after clearing multi-turn position	Display range	Precision	Unit
		$-(2^{31}-1)$~$(2^{31}-1)$	1	-
Display the offset of encoder circles after zero clearing of multi-turn position.				

R0.55	Data size	32bit	Data format	DEC
	Modbus address	4114,4115	CANopen address	0x3037,0x00

R0.56	Encoder feedback value offset after clearing multi-turn position	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	pulse
Display the offset of encoder feedback value after zero clearing of multi-turn position.				
R0.56	Data size	32bit	Data format	DEC
	Modbus address	4116,4117	CANopen address	0x3038,0x00

R0.57	Linear encoder (2^{nd} encoder) position feedback accumulation (64-bit number)	Display range	Precision	Unit
		$-(2^{63}-1)\sim(2^{63}-1)$	1	pulse
Linear encoder (2^{nd} encoder) position feedback accumulation, 64-bit number				
R0.57	Data size	64bit	Data format	DEC
	Modbus address	4118,4119, 4120,4121	CANopen address	0x3039,0x00 0x3039,0x01

R0.99	Fault code	Display range	Precision	Unit
		-32768~32767	1	-
Display fault code, the thousands and hundreds are main fault codes, tens and ones are sub-fault codes.				
R0.99	Data size	16bit	Data format	DEC
	Modbus address	4198,4199	CANopen address	0x3063,0x00

6.9.2 IO monitoring parameters (R1)

R1.00	Digital input state	Display range	Precision	Unit
		0x000~0x3FF	-	-
R1.01	Digital output state	Display 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	HEX
	Modbus address	4200,4201	CANopen address	0x3100,0x00
R1.01	Data size	16bit	Data format	HEX
	Modbus address	4202,4203	CANopen address	0x3101,0x00

R1.02	Original voltage of analog input 1	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the original voltage value of analog input channel 1				
R1.02	Data size	32bit	Data format	DEC
	Modbus address	4204,4205	CANopen address	0x3102,0x00

R1.03	Original voltage of analog input 2	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the original voltage value of analog input channel 2				
R1.03	Data size	32bit	Data format	DEC
	Modbus address	4206,4207	CANopen address	0x3103,0x00

R1.04	Original voltage of analog input 3	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the original voltage value of analog input channel 3				
R1.04	Data size	32bit	Data format	DEC
	Modbus address	4208,4209	CANopen address	0x3104,0x00

R1.05	Voltage of analog input 1	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the calibrated voltage value of analog input channel 1.				
R1.05	Data size	32bit	Data format	DEC
	Modbus address	4210,4211	CANopen address	0x3105,0x00

R1.06	Voltage of analog input 2	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the calibrated voltage value of analog input channel 2				
R1.06	Data size	32bit	Data format	DEC
	Modbus address	4212,4213	CANopen address	0x3106,0x00

R1.07	Voltage of analog input 3	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the calibrated voltage value of analog input channel 3				
R1.07	Data size	32bit	Data format	DEC
	Modbus address	4214,4215	CANopen address	0x3107,0x00

R1.08	Voltage of analog output 1	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the output voltage value after offset treatment of analog output channel 1				
R1.08	Data size	32bit	Data format	DEC
	Modbus address	4216,4217	CANopen address	0x3108,0x00

R1.09	Voltage of analog output 2	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the output voltage value after offset treatment of analog output channel 2				
R1.09	Data size	32bit	Data format	DEC
	Modbus address	4218,4219	CANopen address	0x3109,0x00

R1.10	Voltage of analog output 3	Display range	Precision	Unit
		-10.000~10.000	0.001	V
Display the output voltage value after offset treatment of analog output channel 3				
R1.10	Data size	32bit	Data format	DEC
	Modbus address	4220,4221	CANopen address	0x310A,0x00

R1.11	Cumulative value of pulse input	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	reference unit
Accumulate and display the received pulse number from external pulse input.				
R1.11	Data size	32bit	Data format	DEC
	Modbus address	4222,4223	CANopen address	0x310B,0x00

R1.12	Pulse position command	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	reference unit
Display the position command value in each pulse input detection cycle (0.125ms by default).				
R1.12	Data size	32bit	Data format	DEC
	Modbus address	4224,4225	CANopen address	0x310C,0x00

R1.13	Pulse speed command	Display range	Precision	Unit
		-10000.0~10000.0	0.1	r/min
Pulse speed command is the speed command corresponds to pulse position command.				
R1.13	Data size	32bit	Data format	DEC
	Modbus address	4226,4227	CANopen address	0x310D,0x00

R1.14	Analog compensation speed	Display range	Precision	Unit
		-10000.0~10000.0	0.1	r/min
Display analog compensation speed.				
R1.14	Data size	32bit	Data format	DEC
	Modbus address	4228,4229	CANopen address	0x310E,0x00

R1.15	Analog compensation torque	Display range	Precision	Unit
		-1000.0~1000.0	0.1	%
Display analog compensation torque				
R1.15	Data size	32bit	Data format	DEC
	Modbus address	4230,4231	CANopen address	0x310F,0x00

R1.16	DI capture encoder value	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	pulse
Display the encoder value captured by DI input.				
R1.16	Data size	32bit	Data format	DEC
	Modbus address	4232,4233	CANopen address	0x3110,0x00

6.9.3 Fault record parameter (R3)

R3.00	Fault code record	Display range	Precision	Unit
		-	-	-
Display the fault code when fault occurs. The default is the latest 1 fault record.				

R3.01	Power on time when fault occurs	Display range	Precision	Unit
		$0\sim(2^{31}-1)$	1	s
Display the power on time when fault occurs.				

R3.02	Operation time when fault occurs	Display range	Precision	Unit
		$0\sim(2^{31}-1)$	1	s
Display the operation time when fault occurs.				

R3.03	Motor speed when fault occurs	Display range	Precision	Unit
		-20000~20000	1	r/min
Display the motor speed when fault occurs.				

R3.04	Speed command when fault occurs	Display range	Precision	Unit
		-20000~20000	1	r/min
Display the speed command when fault occurs.				

R3.05	Feedback pulse accumulation when fault occurs	Display range	Precision	Unit
		$-(2^{63}-1)\sim(2^{63}-1)$	1	reference unit
Display the feedback pulse accumulation when fault occurs.				

R3.06	Command pulse accumulation when fault occurs	Display range	Precision	Unit
		$-(2^{63}-1)\sim(2^{63}-1)$	1	reference unit
Display the command pulse accumulation when fault occurs.				

R3.07	Stranded pulse when fault occurs	Display range	Precision	Unit
		$-(2^{31}-1)\sim(2^{31}-1)$	1	reference unit
Display the stranded pulse when fault occurs.				

R3.08	Current torque when fault occurs	Display range	Precision	Unit
		-500.0~500.0	0.1	%
Display the current torque when fault occurs.				

R3.09	Main circuit DC voltage when fault occurs	Display range	Precision	Unit
		0.0~1000.0	0.1	V
Display the main circuit DC voltage when fault occurs.				

R3.10	Output voltage when fault occurs	Display range	Precision	Unit
		0.0~1000.0	0.1	Vrms
Display the valid value of the output voltage when fault occurs.				

R3.11	Output current when fault occurs	Display range	Precision	Unit
		0.00~1000.00	0.01	Arms
Display the valid value of the output current when fault occurs.				

R3.20	Latest fault record	Display range	Precision	Unit
		-	-	-
Displays the fault record of the previous fault.				

R3.21	Latest 2 fault record	Display range	Precision	Unit
		-	-	-
Display the fault record of the latest 2 fault.				

R3.22	Latest 3 fault record	Display range	Precision	Unit
		-	-	-
Display the fault record of the latest 3 fault.				

R3.23	Latest 4 fault record	Display range	Precision	Unit
		-	-	-
Display the fault record of the latest 4 fault.				

R3.24	Latest 5 fault record	Display range	Precision	Unit
		-	-	-
Display the fault record of the latest 5 fault.				

R3.25	Latest 6 fault record	Display range	Precision	Unit
		-	-	-

Display the fault record of the latest 6 fault.

		Display range	Precision	Unit
R3.26	Latest 7 fault record	-	-	-
Display the fault record of the latest 7 fault.				

		Display range	Precision	Unit
R3.27	Latest 8 fault record	-	-	-
Display the fault record of the latest 8 fault.				

		Display range	Precision	Unit
R3.28	Latest 9 fault record	-	-	-
Display the fault record of the latest 9 fault.				

		Display range	Precision	Unit
R3.29	Latest 10 fault record	-	-	-
Display the fault record of the latest 10 fault.				

Chapter 7 Commissioning

7.1 Operation instruction of inertia identification

Inertia identification is divided into online mode and offline mode.

1. Online inertia identification:

It is necessary to set following parameters when online inertia identification is selected:

1).P1.00; 2.P1.08. If P1.00 and P1.08 is larger than 0, the online mode is valid. If the inertia identification requirements are met, (1. the speed is larger than 150r/min;

2). the ACC time is longer than 20 ms;

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), the identification result will be updated to P1.01 and written into EEPROM in every 30 minutes automatically.

2. Offline inertia identification:

It is necessary to set following parameters when offline inertia identification is selected: 1.P1.05; 2.P1.06. 3. P1.07. The offline mode is available by the auxiliary function EF-JId of the panel operation. Refer to chapter 5.2.5.5 for the EF-JId procedure. The offline mode is not affected by P1.00 and P1.08.

Before executing the auxiliary function of EF-JId, set P1.05 according to the operation mode of the motor, set P1.06 according to the rotating cycle and set P1.07 according to the mechanical rigidity. The stronger the mechanical rigidity, the smaller the ACC/DEC time constant. Set P1.05 to 1 or 2. The smaller the value of P1.06 and P1.07 is, the more correct the identification result.

When executing the auxiliary function of EF-JId, please ensure P1.05 and P1.06 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 automatically. If there is fault, P1.01 will keep the result before identification. If it reports Er25-7, increase P1.06 or reduce P1.07.

The precision of the identification result will be affected if following occur: 1. Mechanical rigidity is low; 2. The load inertia change too fast; 3.There is a space; 4. The external disturbance changes too fast.

7.2 General method for parameters adjusting

There are two kinds of parameters adjustment:

1. Automatic adjustment setting of rigidity choice. The inertia ratio of the load can be counted manually. There are 32 rigidity sets for the gain setting of the loop.

- The adjustment needs to be carried out to the actual situation:

Mechanical structure	Rigidity set
Big handling, transmission equipment	0~13
Belt drive mechanism	5~16
Ball screw + Belt drive	5~16
Manipulator	15~22
Direct ball screw or rigid bodies	18~25

The bigger the set value, the faster the system response, however, noise and vibration may come along. Please make corresponding setting according to the action of mechanical device.

2. Manual adjustment. If the servo system has vibration or the control performance is not good, adjusting the parameters of speed loop and position loop to improve system performance or remove vibration.

Gain of the speed loop: mainly used to determine the response speed of the speed loop. Under the precondition the mechanical system does not vibrate, the larger the set value, the faster the response speed.

Speed loop integration time constant: the speed loop has an integrator which can reflect minor input. This integrator can delay the operation of the servo system. Therefore, when time constant increases, the response becomes slower, and the required positioning setting time is longer. When the load inertia is large or the mechanical system is likely to vibrate, the loop integration time parameter must be large enough to avoid the vibration of the mechanical system.

Torque command filter: in some cases the mechanical system may resonate, generating vibration noise in sharp tone. At this time filtering via notch filter must be performed to eliminate resonance.

Gain of the position loop: the response of the servo system is determined by the gain of the position loop. When the gain of the position loop is set to a high value, the response speed will increase and the time required for positioning will be shortened. If you want to set the gain of the position loop to a high value, the rigidity and natural frequency of the mechanical system must be very high.

Generally, the gain of the speed loop should be larger than the gain of the position loop whenever possible. When the position gain is much larger than the speed gain, the system may overshoot under the action of the step signal, which will seriously damage the system performance. Parameters of the system always mutually limit each other. If the gain of the position loop increases only, the command outputted by the position loop may become unstable. This may cause the reaction of the servo system to become unstable. In general cases, we can adjust the system by referring to the follow procedures:

1) First set the gain of the position loop to a low value, then, under the precondition that abnormal sound and vibration are not generated, gradually increase the gain of the speed loop to the maximum.

2) Gradually decrease the gain of the speed loop while increasing the gain of the position loop. Under the precondition that the whole response is free from overshoot and vibration, set the gain of the position loop to the maximum.

3) Speed loop integral time constant depends on the length of the positioning time. Please decrease this value as small as possible under the precondition that the mechanical system does not vibrate.

4) After that, finely adjust the gain of the position loop, speed loop and the integration time constant to find their 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):

- Parameters are appropriate

In this case the parameters are set relatively appropriate. The motor speed can closely follow the position command, the speed has basically no overshoot, and the positioning time is relatively short.

- Speed loop integral time constant is relatively small

The speed loop of the servo drive must have high reaction speed. When the speed fluctuates, it indicates that the stability of the speed loop is damaged due to the shorting integration time of the speed loop. This causes the servo motor to run unstably at fluctuating speed.

- Speed loop integration time constant is relatively large

In this case, there is no apparent difference with the case when the parameters are appropriate. The influence of the speed loop integration on the speed follow-up position command is not very high, but too large speed loop integration time will delay the reaction time of the speed loop.

- Gain of the speed loop is relatively high

In this case, the motor speed will fluctuate. The influence is the same as the case when the speed loop integration time is too short. Both of them must keep coordinated. While increasing the gain of the speed loop, the speed loop integration time must also be increased. Otherwise the servo system will oscillate.

- Gain of the speed loop is too low

Decreasing the gain of the speed loop will cause fluctuation of the motor speed to fluctuate. By comparing with the case when the speed gain is too high we can know that the fluctuation frequency of the motor speed is lower in this case which fully indicates that increasing the gain of the speed loop can heighten the operating frequency of the system, improve the quick response performance of the system, and effectively overcome the influence of the interference.

- Gain of the position loop is excessively low

In the servo system, the operating frequency of the position loop is much lower than the speed loop. When the gain of the position loop is too low, the system is difficult to eliminate the position deviation formed during speed response. This can cause prolongation of the time interval of the motor speed follow-up position command.

- Gain of the position loop is excessively high

In the position servo system, the gain of the position loop also affects the stability. At this time, as the gain of the position loop is excessively high, it makes the motor speed to fluctuate. Additionally, comparing with the case when the gain of the position loop is too low we can know that the pure time

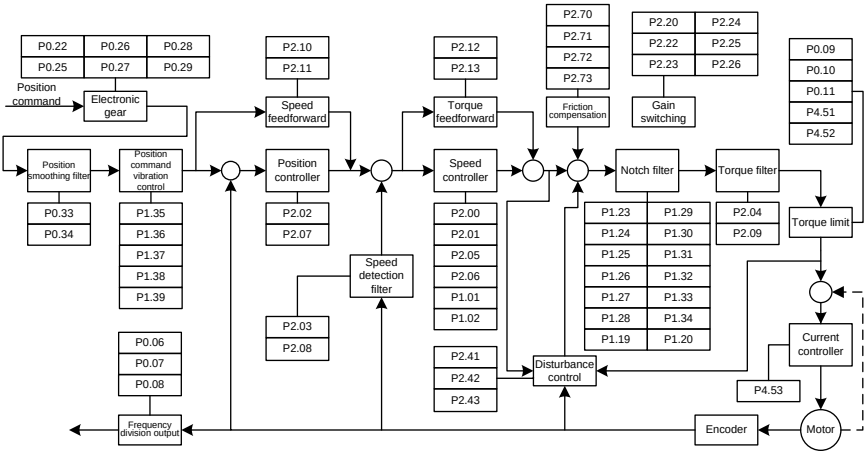
delay of the response to the position command of the motor speed is decreased.

- Gain of the position loop is too low

When we adjust the gain of the position loop to a low value, the motor speed follow-up position command represents obvious lag and the positioning time is prolonged largely. The high accuracy and high response performance of the positioning system are seriously affected.

7.2.1 Adjustment of the gain of the position loop

The position control block diagram of the SRV-63 series servo drive is shown in the figure below. The gain parameters that can be adjusted in the position mode are marked out on the block diagram.



The general procedures for parameter adjustment in the position mode are:

1) Initial setting of the parameters

The defaults of the parameters can be recovered by the default parameter recovering operation (see chapter 5.2.5.3 for details).

2) Adjustment of the gain of the position loop

When the servo motor is running with default parameters, if the system oscillation occurs with buzz, the position gain (P2.02, P2.07) should be adjusted smaller. If the system rigidity is relatively small, the position gain should be adjusted larger.

3) Adjustment of the position smoothing filter

During position control, if the position pulse commands input frequency varies largely, it may be caused by a larger impulse. At this time the position smoothing filters time constant(P0.33) or position command FIR filter (P0.34) should be adjusted to moderate the impulse.

4) Adjustment of the electronic gear

If the pulse transmission frequency of the pulse generator is restricted, or the transmission frequency does not meet the mechanical requirements, we can change the pulse input frequency by adjusting

the value of the electronic gear parameters (P0.25, P0.26, P0.27, P0.28 and P0.29) to meet the requirements for position control.

5) Adjustment of position feed-forward

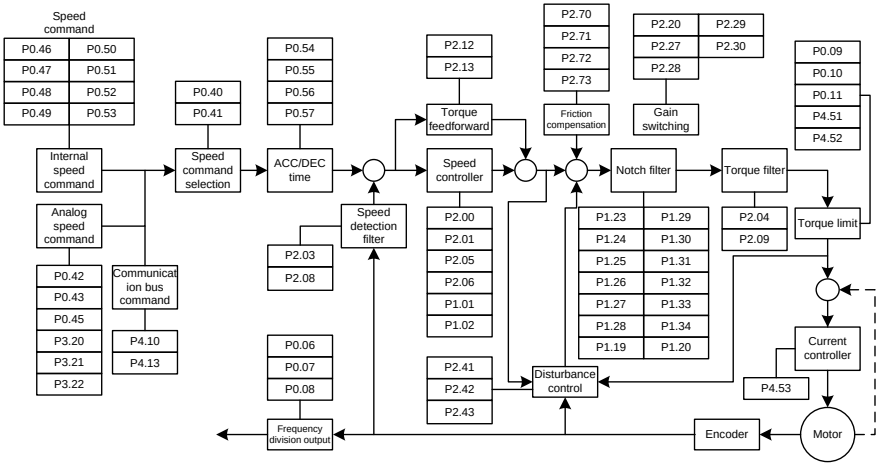
In the case the retention pulse is large or fault-free follow-up is required, we can improve the position follow-up performance by adjusting the speed feed-forward gain parameter (P2.10) and speed feed-forward gain filter parameter (P2.11). However, it should be noted that if the speed feed-forward gain is too large, it may cause system oscillation.

6) Frequency division of the feedback pulse output

If the feedback pulse needs to be outputted, the frequency division coefficient of pulse output (P0.06, P0.07) can be used to change the frequency of the output pulse.

7.2.2 Adjustment of the gain of the speed loop

The speed control block diagram of the SRV-63 series servo drive is shown in the figure below. The gain parameters that can be adjusted in the speed mode are marked on the block diagram.



The general procedures for parameter adjustment in the speed mode are:

1) Initial setting of the parameters

The defaults of the parameters can be recovered by the default parameter recovering operation (see chapter 5.2.5.3 for details).

2) Adjustment of the gain of the speed loop

When the servo motor is running with default parameters, if the system oscillation occurs with buzz, the speed gain (P2.00, P2.05) should be adjusted smaller. If the system rigidity is relatively small or the speed fluctuates largely, the speed gain should be adjusted larger.

3) Adjustment of the speed integration time constant

When the gain of the speed loop is increased, the speed integration time constant (P2.01, P2.06) should be increased at the same time. Similarly, when the gain of the speed loop is decreased, the speed integration time constant should be decreased at the same time.

4) Adjustment of the ACC/DEC time

If the speed varies violently during starting, it may cause large impulse or even overcurrent. At this time we adjust the ACC time (P0.54) to smoothen the speed rise. Similarly, we can adjust the DEC time (P0.55) to smoothen the speed fall during stopping.

5) S curve ACC/DEC adjustment

If the requirement for smooth variation of speed cannot be met by adjusting the ACC/DEC time, we can adjust the S curve ACC/DEC time (P0.56, P0.57) to make it change more smoothly.

6) Adjustment of the speed smoothing filter

In the case where the analog speed command is inputted, we can adjust the analog speed command filter (P3.21) to make the speed change smoothly.

7) Adjustment of torque feed-forward

If the speed follow-up performance is still poor after above parameter adjustment, we can adjust the torque feed-forward gain (P2.12) and torque forward feedback filter time (P2.13) to improve the speed follow-up performance. It should be noted however that too large torque feed-forward gain may affect the stability of the system.

8) Adjustment of speed filter

The performance of the speed loop can be improved by adjusting P2.04/P2.09 and P2.03/P2.08.

9) Adjustment of notch filtering

Refer to chapter 7.3.

10) Frequency division of the feedback pulse output

If the feedback pulse of the encoder needs to be outputted, the frequency division output coefficient (P0.06, P0.07) can be used to change the frequency of the output pulse.

11) Interference control adjustment

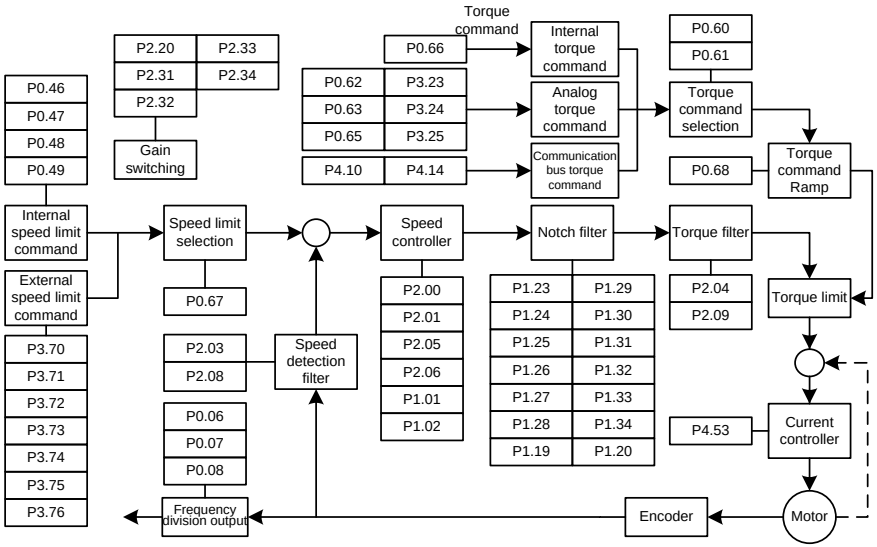
If the gain is small, the load changes or there is sudden external interference torque, users can adjust P2.42 and P2.43 of the disturbance observer to reduce the interference and improve the speed loop performance.

12) Friction compensation adjustment

If the following performance of the motor is bad during the direction changing of forward and reverse rotation, it can adjust P2.71 and P2.72 to improve the speed loop performance during commutation.

7.2.3 Adjustment of the gain of the torque loop

The torque control block diagram of the SRV-63 series servo drive is shown in the figure below. The gain parameters that can be adjusted in the torque mode are marked out on the block diagram.



The general procedures for parameter adjustment in the torque mode are:

1) Initial setting of the parameters

The defaults of the parameters can be recovered by the default parameter recovering operation (see chapter 5.2.5.3 for details).

2) Adjustment of the torque smoothing filter

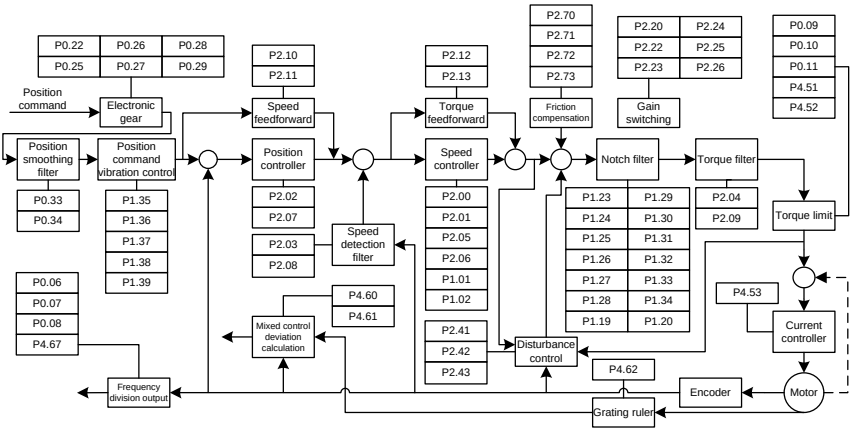
In the case the analog torque command is inputted, we can adjust the torque smoothing filter time constant to make the torque change smoothly.

3) Frequency division of the feedback pulse output

If the feedback pulse of the encoder needs to be outputted, the frequency division coefficient of pulse output can be used to change the frequency of the output pulse.

7.2.4 Fully-closed loop gain adjustment

The gain parameters which can be adjusted are listed as the figure below:



Refer to the adjustment steps of position mode in chapter 7.2.1.

7.3 Suppression of mechanical resonance

The mechanical system has a certain resonant frequency. If the response speed of the servo is improved, the system may resonate (oscillation and abnormal noise) near the mechanical resonant frequency. The resonance of the mechanical system can be effectively suppressed by setting the parameters of the notch filters.

The notch filters achieve the goal of suppressing mechanical resonance by decreasing the gain of certain frequency. We can set the frequency to be suppressed as well as the suppression extent with relevant parameters.

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 the figure in chapter 7.2.2. The setup of notch filter is shown in the diagram below.

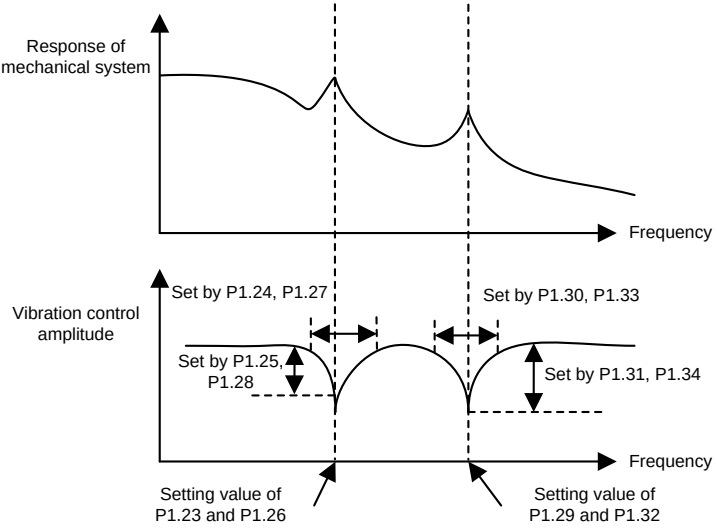
Note:

The notch filter is the lag factor for the servo system, so, if the center frequency of control width is large, the vibration may be strengthened. It is recommended to increase the width unit it meets the requirements.

The relationship between the Q value, width and depth is as below:

- Q value of the notch filter=Center frequency of the notch wave /Width of the notch wave;
- If the width of the notch is 0, the width of the filter is the deviation between two frequencies when the power of the center frequency drops to -3dB;
- The depth of the filter means the ratio of input and output, and its power spectrum strength

attenuates by 20log (P1.25%, P1.28%, P1.31%, P1.34%) dB.



7.4 Gain switching function

Gain switching operation is performed through internal data or external signal:

1) Can switch to lower gain to suppress vibration in the state when the motor is stopped;

2) Can switch to higher gain to shorten the positioning time in the state the motor is stop;

3) Can switch to high gain to obtain better command follow-up performance in the state when the motor is running.

4) Can switch between different gain settings through external signal according to the conditions of load, equipment and so on.

●Position control and fully-closed loop control (●: valid, —: invalid)

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 P2.23	Level P2.24	Lag*2 P2.25
0	Fixed on 1st gain		-	-	-
1	Fixed on 2nd gain		-	-	-
2	Gain switch input		-	-	-
3	Torque command	1	●	●(0.1%)	●(0.1%)
4	Speed command	3	●	●(r/min)	●(r/min)
5	Position deviation	4	●	●*3(reference unit)	●*3(reference unit)

6	With position command	5	●	-	-
7	Position not finished	6	●	-	-
8	Actual speed	3	●	●(r/min)	●(r/min)
9	With position command +speed command	7	●	●(r/min)*5	●(r/min)*5

●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	Fixed on 1st gain		-	-	-
1	Fixed on 2nd gain		-	-	-
2	Gain switch input		-	-	-
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)

●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	Fixed on 1st gain		-	-	-
1	Fixed on 2nd gain		-	-	-
2	Gain switch input		-	-	-
3	Torque command	1	●	●(0.1%)	●(0.1%)

*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).

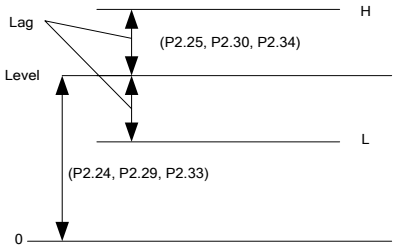


Figure 1

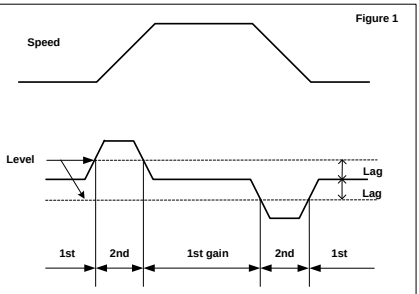


Figure 2

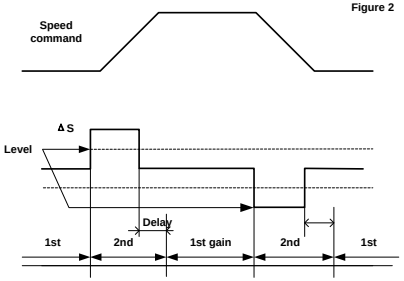


Figure 3

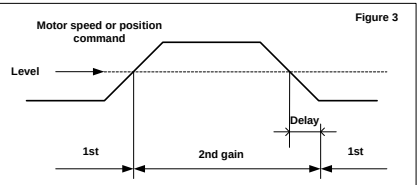


Figure 4

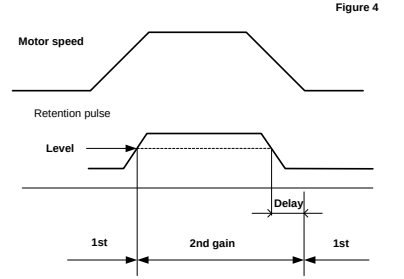


Figure 5

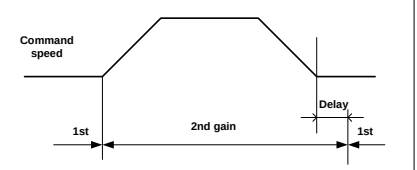


Figure 6

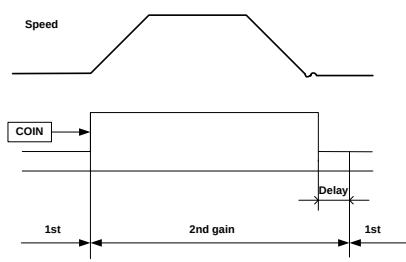
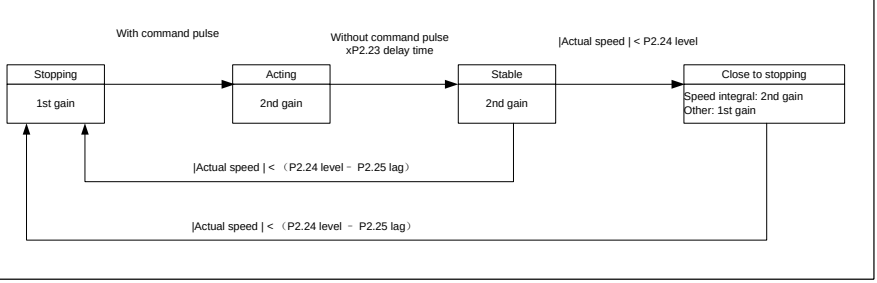


Figure 7



Chapter 8 Communication

8.1 Overview

SRV-63 servo drives provide RS485, CANopen and PROFIBUS-DP communication interface. Asynchronous serial half-duplex communication between 31 servo drives and NC or PLC is available through the RS485 interface; asynchronous serial half-duplex communication between 127 servo drives and NC or PLC is available through the CAN interface; asynchronous serial half-duplex communication between 100 servo drives and NC or PLC is available through the PROFIBUS-DP interface.

- Read/write the function parameters of the servo drives
- Monitor the operating state of the servo drives
- Form a multi-axis control system

There are three kinds of communication interface USB, CANopen and Ethernet between the servo drive and PC. And the PC has functions of parameter calibration, condition monitoring and data access to the drive. External communication card is needed for Ethernet communication.

8.2 RS485 communication protocol

The SRV-63 provide RS485 communication interface. It adopts international standard ModBus communication protocol to perform master-slave communication. The user can realize centralized control through PC/PLC, upper control PC, etc. (set the control command, running frequency of the inverter, modify relevant function codes, monitor and control the operating state and fault information of the inverter and so on) to adapt specific application requirements.

8.2.1 Protocol content

The Modbus serial communication protocol defines the frame content and usage format in asynchronous transmission which includes: master polling, and the format of the broadcast frame and the slave answering frame. The frame of the master includes: the slave address (or the broadcast frame), commands, digit and error checkout. The slave answering also applies the same structure: action confirmation, digit returning and error checkout. If there is a mistake during the frame receiving of the slave or the slave cannot finish the action which the master requires, it will respond an error frame to the master as a response.

8.2.2 Protocol instructions

The communication protocol of the SRV-63 series servo drives is an asynchronous serial Master-Slave communication protocol. The master is the only device in the network to build up the protocol (named as inquiry/command), while the other devices (the slaves) can respond to or do action to the inquiry/command of the master through providing digits. The master in this manual means PC, industrial control devices and PLC. The slaves mean the servo drives and other control devices with the same communication protocol. The master can communicate with a certain salve, as well as, send broadcast message to all slaves. For the separately-visiting inquiry/command of the master, the slave should return a message as the response. While for the broadcast message, the

salve needs not to do so.

8.2.3 Communication frame structure

Modbus protocol supports RTU mode only. The user can set serial communication parameters, such as, the baud rate and the checkout means.

8.2.3.1 RTU mode

Each 8bit bytes in the message frame contains two 4bit hex characters.

Table 8-1: The message frame in RTU mode

The start bit	Device address	Command code	Data	LRC checkout	The tailed
T1-T2-T3-T4	8Bit	8Bit	n 8Bit(s)	16Bit	T1-T2-T3-T4

The Modbus minimum idle time between frames should be no less than 3.5 bytes. The network device is detecting, even during the interval time, the network bus. When the first field (the address field) is received, the corresponding device decodes next transmitting character. When the interval time is at least 3.5 byte, the message ends.

The whole message frame in RTU mode is a continuous transmitting flow. If there is an interval time (more than 1.5 bytes) before the completion of the frame, the receiving device will renew the uncompleted message and suppose the next byte as the address field of the new message. As such, if the new message follows the previous one within the interval time of 3.5 bytes, the receiving device will deal with it as the same with the previous message. If these two phenomena all happen during the transmission, the CRC will generate a fault message to respond to the sending devices.

8.2.4 Command code and the communication data instructions

8.2.4.1 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 8-2 The master device request command

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
High bit of start address	03H
Low bit of start address	F2H
High bit of data number	00H
Low bit of data number	02H
Low bit of CRC CHK	65H
High bit of CRC CHK	BCH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

Table 8-3 The slave device reply

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	03H
Byte number	04H
Higher bit of 03F2H	00H
Low bit of 03F2H	C8H
High bit of 03F3H	00H
Low bit of 03F3H	00H
Low bit of CRC CHK	7BH
High bit of CRC CHK	CDH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

8.2.4.2 Command code: 10H

Function: write N words (N≥2)

For example, write 300(0000012CH) into address 03F2H, slave device address 01H. And then the structure of the frame is:

Table 8-4 The master device request command

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	10H
High bit of data address	03H
Low bit of data address	F2H
High bit of data number	00H
Low bit of data number	02H
Byte number	04H
High bit of 1st word of data content	01H
Low bit of 1st word of data content	2CH
High bit of 2nd word of data content	00H
Low bit of 2nd word of data content	00H
Low bit of CRC CHK	A9H
High bit of CRC CHK	F7H
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

Table 8-5 The slave device reply command

START	T1-T2-T3-T4 (transmission time of 3.5 bytes)
ADDR	01H
CMD	10H
High bit of start address	03H
Low bit of start address	F2H
High bit of data number	00H
Low bit of data number	02H
Low bit of CRC CHK	E0H
High bit of CRC CHK	7FH
END	T1-T2-T3-T4 (transmission time of 3.5 bytes)

8.2.5 Error checkout of the communication frame

The error checkout of the frame can be divided into two parts: the bit checkout of the byte and the whole data checkout of the frame (CRC check or LRC check).

8.2.5.1 Bit checkout of the byte

The user can select different bit checkouts or non-checkout, which impacts the check bit setting of each byte.

The definition of even checkout: add an even check bit before the data transmission to illustrate the number of “1” in the data transmission is odd number or even number. When it is even, the check byte is “0”, otherwise, the check byte is”1”. This method is used to stabilize the parity of the data.

The definition of odd checkout: add an odd check bit before the data transmission to illustrate the number of “1” in the data transmission is odd number or even number. When it is odd, the check byte is “0”, otherwise, the check byte is”1”. This method is used to stabilize the parity of the data.

For example, when transmitting “11001110”, there are five “1” in the data. If the even checkout is applied, the even check bit is “1”; if the odd checkout is applied; the odd check bit is “0”. The even and odd check bit is calculated on the check bit position of the frame. And the receiving devices also carry out even and odd checkout. If the parity of the receiving data is different from the setting value, there is an error in the communication.

8.2.5.2 CRC check

The checkout uses RTU frame format. The frame includes the frame error detection field which is based on the CRC calculation method. The CRC field is two bytes, including 16-bit binary values. It is added into the frame after calculated by transmitting device. The receiving device recalculates the CRC of the received frame and compares them with the value in the received CRC field. If the two CRC values are different, there is an error in the communication.

During CRC, 0*FFFF will be stored. And then, deal with the continuous 6-above bytes in the frame and the value in the register. Only the 8Bit data in every character is effective to CRC, while the start bit, the tailed and the odd and even check bit is ineffective.

During the generating CRC, each 8-bit is XOR with the register content, the result shifts toward the min. effective bit while the max. effective bit is filled with 0. LSB is extracted for detection. If LSB is 1, the register is XOR with the preset value independently, if LSB is 0, no action. The whole process will be repeated 8 times. After the last bit (8^{th} bit) completes, the next 8-bit byte will be XOR with the current value of register independently. Finally, the value in the register is the CRC value after all bytes in the frame are executed.

The calculation of CRC applies the international standard CRC checkout principles. When the user is editing CRC calculation, he can refer to the relative standard CRC calculation to write the required CRC calculation program.

8.2.6 Fault Responses

The slave uses functional code fields and fault addresses to indicate it is a normal response or some error occurs (named as objection response). For normal responses, the slave shows corresponding function codes, digital address or sub-function codes as the response. For objection responses, the slave returns a code which equals the normal code, but the first byte is logic 1.

Example: When the master sends a message to the slave, requiring it to read a group of address data of servo device function codes, there will be following function codes:

0 0 0 0 0 0 1 1 (Hex 03H)

For normal responses, the slave responds the same codes, while for objection responses, it will return:

1 0 0 0 0 0 1 1 (Hex 83H)

Besides the function codes modification for the objection fault, the slave will respond a byte of abnormal code which defines the error reason.

When the master receives the response for the objection, in a typical processing, it will send the message again or modify the corresponding order.

Table 8-6 Meaning of error code

Modbus abnormal code		
Code	**Name**	**Meaning**
01H	Illegal function	Receiving function codes from the upper devices is not allowable. This may because these function codes can only be applied to new devices or the slave device is dealing with this requirement in a wrong situation.
02H	Illegal data address	For servo drives, the required data address is not allowed; especially the mix of the register address and transmitting byte numbers is invalid.
03H	Illegal 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 devices, if the CRC check bit of RTU format or the LRC check bit of ASCII format is different from the check number calculated by below devise, check error will be reported.

8.3 CANopen communication protocol

8.3.1 CANopen instructions

CANopen is the high level communication protocol on the control area network, includes the applications communication agreement and equipment sub-agreement in embedded system. The basic CANopen devices and sub communication protocols are in CAN in Automation (CiA) draft standard 301. And there are some expansion for some sub-agreement based on CiA 301, for example, CiA 402 for dynamic control.

8.3.2 CANopen hardware configuration

Refer to chapter 3.6 for the definitions and functions of pins of CAN communication terminals (CN3). See the table below:

Baud rate	Communication length
1Mbit/s	25m
500kbit/s(default)	100m
250kbit/s	250m
125kbit/s	500m
50kbit/s	1000m
20kbit/s	2500m

Note:

1. All CANL and CANH pins of the slave station can be connected directly with series connection other than y connection.
2. The resistance of 120 ohms is needed between the master station end and the last node.
3. In order to avoid interference, CAN cable is shielded twisted-pair cable.
4. The longer connection needs higher drive ability of the CAN chip.

8.3.3 CANopen software configuration

Configure following three parameters before the application of CANopen:

1. Set P0.03 through LED panel or Astraada CFG SRV software to 7 [CANopen mode];
2. Set P4.02 through LED panel or Astraada CFG SRV software (0:1Mbps; 1:500kbps; 2:250kbps; 3:125kbps; 4:50kbps; 5:20kbps);
3. Set P4.05 through LED panel or Astraada CFG SRV software(range:1~127).

Note:

1. Above three parameters are valid after restarting, so it is necessary to repower again or reset the drive;
2.The node number of salve station cannot be the same as the node number of master station and other slave station (CNC or PLC);
3. Synchronous signal is generated by the master station or be configured by the slave station. The unit of synchronous communication cycle is 1us and the minimum unit of SRV-63 is 1000 us (1ms);
4. 0x1017 parameters is needed to be configured when the main station needs the slave station to send a heartbeat message, the Unit is 1ms;
5. The drive will shut down automatically to ensure safety when CANopen state machine exits from OP state.

8.3.4 CANopen functions

SRV-63 servo drive is the standard slave station of CANopen and support some parameters of 301 standard protocol and 402 dynamic control protocol.

The basic protocol supporting CANopen: NMT, SYNC, SDO, PDO, EMCY.

The pre-definition collection includes 4 receiving PDO (Receive-PDO), 4 sending PDO(Transmit-PDO), 1 SDO(occupying 2 CAN-ID), 1 emergency target and 1 node error control (Node-Error-Control)ID, and it also supports NMT-Module-Control service and SYNC signal.

Table 8-7 Specifications of CiA 402 protocol

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
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	Interpolation 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 8-8 CANopen fault code

Display	Fault name	32-bit fault code(16-bit Error Code+16-bit additional message)
Er01-0	IGBT fault	FF01-0101h
Er02-0	Encoder fault–The encoder wire break	7300-0200h
Er02-1	Encoder fault–Encoder feedback error is too large	7300-0201h
Er02-2	Encoder fault–Parity error	7300-0202h
Er02-3	Encoder fault–CRC 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 overtime	7300-0206h
Er02-7	Encoder fault–FPGA overtime	7300-0207h
Er02-8	Encoder fault–Low voltage alarm of the encoder	7300-0208h
Er02-9	Encoder fault–Undervoltage alarm of the encoder	7300-0209h

Display	Fault name	32-bit fault code(16-bit Error Code+16-bit additional message)
Er02-a	Encoder fault–Encoder over-temperature	7300-020Ah
Er02-b	Encoder fault–EEPROM write error	7300-020Bh
Er02-c	Encoder fault–EEPROM no data	7300-020Ch
Er02-d	Encoder fault–EEPROM data check error	7300-020Dh
Er03-0	Current sensor fault–U phase IGBT fault	7300-0300h
Er03-1	Current sensor fault–V phase IGBT fault	7300-0301h
Er03-2	Current sensor fault–W phase IGBT fault	7300-0302h
Er04-0	System initialization fault	FF01-0400h
Er05-1	Setting fault–Motor model error	FF01-0501h
Er05-2	Setting fault–Motor and drive model error	FF01-0502h
Er05-3	Setting fault–Software limit setting error	FF01-0503h
Er05-4	Setting fault–Homing mode setting fault	FF01-0504h
Er05-5	Setting fault–Position control overflow fault	FF01-0505h
Er07-0	Regeneration discharge overload fault	7100-0700h
Er08-0	Analog input overvoltage fault–Analog input 2	5441-0800h
Er08-1	Analog input overvoltage fault–Analog input 3	5442-0801h
Er08-2	Analog input overvoltage fault–Analog input 3	5443-0802h
Er09-0	EEPROM fault–Read-write fault	5530-0900h
Er09-1	EEPROM fault–data check fault	5530-0901h
Er10-0	Hardware fault–FPGA fault	5544-0A00h
Er10-1	Hardware fault–Communication card fault	5544-0A01h
Er10-2	Hardware fault–Grounding short circuit fault	5544-0A02h
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–Reentrant cycle mission	6100-0B01h
Er11-2	Software fault–Illegal operation	6100-0B02h
Er12-0	IO fault–Repeat digital input distribution	FF01-0C00h
Er12-1	IO fault-Repetitive analog input distribution	FF01-0C01h
Er12-2	IO fault–Pulse input frequency is too high	FF01-0C02h
Er13-0	Main circuit overvoltage fault	3110-0D00h
Er13-1	Main circuit undervoltage fault	3120-0D01h
Er14-0	Undervoltage control power fault	5200-0E00h
Er17-0	Drive overload fault	FF01-1100h
Er18-0	Motor overload fault	2310-1200h
Er18-1	Motor overtemp fault	2310-1201h
Er19-0	Speed fault–Overspeed fault	7180-1300h

Display	Fault name	32-bit fault code(16-bit Error Code+16-bit additional message)
Er19-1	Speed fault-FWD overspeed fault	7180-1301h
Er19-2	Speed fault-REV overspeed fault	7180-1302h
Er19-3	Speed fault- Overspeed parameter setup error	7180-1303h
Er20-0	Speed deviation fault	8400-1400h
Er21-0	Position overtravel - FWD overtravel	8500-1600h
Er21-1	Position overtravel - REV overtravel	FF01-1601h
Er22-0	Hybrid control deviation is too large	8500-1600h
Er22-1	Position increment overflow fault	FF01-1601h
Er22-2	Position increment overflow fault	FF01-1602h
Er22-3	CANopen fault–Sync signal timeout	FF01-1603h
Er22-4	CANopen fault-position command buffer full	FF01-1604h
Er23-0	Drive over-temperature fault	4210-1700h
Er24-0	PROFIBUS-DP fault–PWK parameters ID error	8100-1800h
Er24-1	PROFIBUS-DP fault–PWK Parameters beyond the range	8100-1801h
Er24-2	PROFIBUS-DP fault–PWK Parameters are read-only	8100-1802h
Er24-3	PROFIBUS-DP fault–PZD Configuration parameter does not exist	8100-1803h
Er24-4	PROFIBUS-DP fault–PZD Configuration parameter attributes do not match	8100-1804h
Er25-4	Application fault–Encoder offset angle test overtime	FF01-1904h
Er25-5	Application fault–Encoder offset angle test failure	FF01-1905h
Er25-6	Application fault–Offside of homing	FF01-1906h
Er25-7	Application fault–Inertia identification failure	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
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

Display	Fault name	32-bit fault code(16-bit Error Code+16-bit additional message)
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 rate is too high	FF01-1A0Eh
Er26-f	CANopen fault–Parameter modification state error	FF01-1A0Fh

8.4 PROFIBUS-DP communication protocol

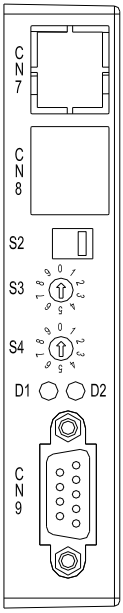
8.4.1 Brief introduction to PROFIBUS-DP protocol

PROFIBUS is a fieldbus standard used in automation technology and promoted in 1987 by Germany's Siemens and other 14 companies and five research institutions. PROFIBUS is short for PROcess FIeld BUS.

PROFIBUS DP is used in factory automation application, it can control many sensors and actuators by a central controller and master the state of each module by the standard or diagnostic function.

8.4.2 PROFIBUS-DP hardware configuration

The front side of PROFIBUS-DP communication card is as the figure below:



Name	Meaning
S2	PROFIBUS-DP communication terminal resistance selection switch: Press down: terminal resistance valid Hold on: terminal resistance invalid
S3	PROFIBUS-DP station address setting button: ten
S4	PROFIBUS-DP station address setting button: one
D1	PROFIBUS-DP diagnostic lights (red): Keep on: PRODIBUS-DP communication offline: Flicker (frequency 1Hz): configuration failure Flicker (frequency 2Hz): parameters configuration failure Flicker (frequency 4Hz): ASIC initialization failure; Off: PRODIBUS-DP communication online and trouble-free.
D2	PROFIBUS-DP communication On-Line status indicators (green): On: online Off: offline
CN7, CN8	Reserved
CN9	PROFIBUS-DP communication interface

Scope of PROFIBUS-DP communication rate is from 9.6Kbps to 1.5Mbps, which corresponds to the transmission distance range from 1200m to 200m, the corresponding relation is shown below:

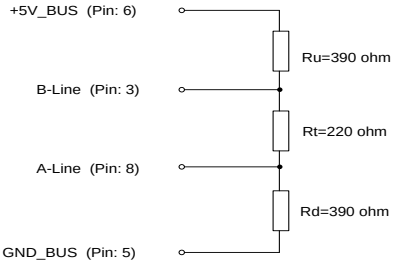
Baud rate	Communication length
1.5Mbit/s (default)	200m
500kbit/s	400m
187.5kbit/s	1000m
93.75kbit/s	1200m
19.2kbit/s	1200m
9.6kbit/s	1200m

Note:

1. PROFIBUS-DP communication card provides two rotary switches (S3, S4) to set the communication address on PROFIBUS-DP network. These two rotary switches of binary are used to set the ones and tens of the communication address. The valid range of the communication address is 0~99. The address modification will be effective immediately, it is recommended to set PROFIBUS-DP address during power-off to prevent accidents.

2. It is necessary to use 150Ω twisted pair cables according to the electric transmission mode of EIA-485 standards.

3. It is necessary to add the terminal resistor to the start terminal and end terminal in the same one PROFIBUS-DP network, the connection mode of the terminal resistor is shown below:



4. The bus transmission baud rate can be identified automatically after the power on of PROFIBUS-DP communication card.

8.4.3 PROFIBUS-DP software configuration

"Master-slave" mode is available between the data transmission between the main control module and slave control module and SRV-63 servo drive is always the slave. In real-time control, the cycle data is used for the command setting and state monitoring and the non-cycle communication function is used for the diagnosis and troubleshooting of the data transmission.

The drive control needs parameter and process data. The non-cycle data is used to control commands and drives. The process data is cycle data for servo drive control. SRV-63 only supports PROFIBUS-DP V0 protocol version (support PKW+PZD mode) and PPO type 5. DP-V0 is the basic communication protocol version and only supports cycle data exchange (MS0 communication). It has the basic configuration for parameters definition and diagnose.

PROFIBUS cycle transmission message applies 32 Byte transmission modes and the data format is as below:

0~7 (Byte)	8~31 (Byte)
PKW	PZD

Of which, PKW is used for the transmission of non-cycle data for the configuration of drive parameters and for the read-write operation. PZD is used in the transmission of cycle data, such as control word, speed command, position command, torque command or state word, speed response, position response, torque response; PZD data can be used for the data of transmission configuration parameters.

PKW message format:

PKW								
PKW number(Byte)	1	2	3	4	5	6	7	8
	PKE		IND*1		PWE			

*1 IND is the communication ID (the same as Modbus address), PWE is the parameter value.

Format of PKE message:

PKE															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	AK (task or response identification ID)				SPM (reserved as 0)	Reserved										

AK task ID:

Master station——> slave station		Slave station——> Master station	
Task ID	**Function**	**Positive response ID**	**Negative response ID**
0	No task	0	0
1	Read parameters	1, 2	7
2	Write parameters(single word)	1	7
3	Write parameters(double word)	2	7
13	Write parameters(single word) save EE	1	7
14	Write parameters(double word) save EE	2	7

PZD message format:

PZD												
WORD*1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Down	CW	Speed command	Position command*2		Torque command	Reserved	Configuration setting Parameter 1		Configuration setting Parameter 2		Configuration setting Parameter 3	
Up	SW	Speed feedback	Position feedback		Torque feedback	Reserved	Configuration feedback Parameter 1		Configuration setting Parameter 2		Configuration setting Parameter 3	

*1 the length of WORD is 16bit.

*2 the fixed content of PZD is: the position command is P4.12; the speed command is P4.13; the

torque command is P4.14, the speed feedback is R0.21, the position feedback is R0.02 and the torque feedback is R0.06.

The meaning of each bit in CW (control word) is listed below:

Bit	Function	Abbreviation in English
0	Control mode switching	MODE_SWITCH
1	Gain switching	GAIN_SWITCH
2	Inertia ratio switching	JRATIO_SWITCH
3	Torque limit switching	TRQLIMIT_SWITCH
4	Zero speed clamp	ZCLAMP
5	Retention pulse clearing	POSERR_CLEAR
6	Vibration control switching input	VIB_SUB
7	Reserved	RESERVED
8	Digital input block (0: CN1 digital input is valid; CN1 digital input is invalid, CW valid)	SERVO_DI_INH
9	Servo enable	SERVO_ON
10	Fault clearing	FAULT_CLEAR
11	Emergency stop	EMEGENCY
12	Positive direction drive disabled	POT(POSITIVE_LIMIT)
13	Negative direction drive disabled	NOT(NAGETIVE_LIMIT)
14	HOME switch signal	HOME_SINGAL
15	HOME trigger	HOME_TRIGGER

*1 When Bit8 is set to 0, the internal software of the drive will use digital input as the source of the corresponding function; when it is 1, the digital input is shielded and the corresponding control bit is used as the function source.

The meaning of each bit in SW (state word) is listed as below:

Bit	Function	Abbreviation in English
0	Speed matching	SPD_COIN
1	Speed reaching	SPD_AT
2	Speed limiting	SPD_LIMITING
3	Speed command	SPD_CMD_VALID
4	Speed zero output	SPD_ZERO
5	Torque limiting	TRQ_LIMITING
6	Zeroing finished	HOME_END
7	PZD in control	PZD_CONTROLING
8	Servo ready output *1	READY
9	Servo running output	RUN
10	Fault output	FAULT
11	Alarm output	ALARM
12	External brake release	BREAK_OFF
13	Position command	POS_CMD_VALID
14	Positioning finished	POS_COIN
15	Control mode switching state	MODE_CHANGE_STATUS

Note:

1. All used words and double-words are transmitted by the format of **Big-Endian**, which means the high byte or high word will be transmitted and then the low byte or low word.
2. PZD configuration parameters include setting parameters and feedback parameters for the designated parameter content. The corresponding parameters can be designated by P4.80, P4.81, P4.82, P4.83, P4.84 and P4.85.
3. GSD is a word file for the identification of PROFIBUS-DP device. GSD file includes the data information of a DP salve on the standard DP master station. GSD file has vendor information, supports communication transmission ratio, time information, characters, optional parts and I/O information as the base of master station parameters. The user can download GSD file on the company website for networking.

8.5 Upper PC software

8.5.1 Astraada CFG SRV upper pc software

Astraada CFG SRV V4.0 is the PC monitoring and commissioning software of SRV-63 servo drive with following functions:

1. Real-time monitoring to the state parameters
2. Online modification of the parameters setting
3. To support USB, 4-channel waveform monitoring, the minimum resolution is 0.125ms
4. Bulk parameters saved to folders and downloaded to servo drives
5. Fault display and fault record reading
6. Multiple independent functional application interfaces (for example: frequency feature test, inertia identification, program JOG, ECAM, etc.)

8.5.2 Hardware

CPU	Above Pentium 4
Internal storage	More than 1G
Hard disk	More than 512M
Screen resolution	More than 1024*768
Communication interface	USB1.1

8.5.3 Software

Operation system	Windows XP,Vista,Windows7
.NET version	.NET Framework 4.0
Excel software	Excel2007, 2010 or above

8.5.4 Communication connection

The drive has USB interfaces through which the drive and the computer can be connected. The communication connection is as the figure below:

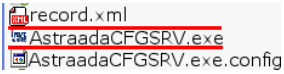
Connection	Operation	Instruction
Micro USB wire	Standard Micro-USB wire 	After power on, the USB wire can connect with the computer and to install the designated drive program

8.5.5 Software installation and operation

(The software installation program Astraada CFG SRV V4.0 can be downloaded from the website of our company: http://www.astor.com.pl) During installation, automatically detect whether the user computer needs necessary plug-ins and pop up corresponding prompt messages. Ensure the software and hardware configuration of the computer meets the requirements in 8.5.2 and 8.5.3 before using.

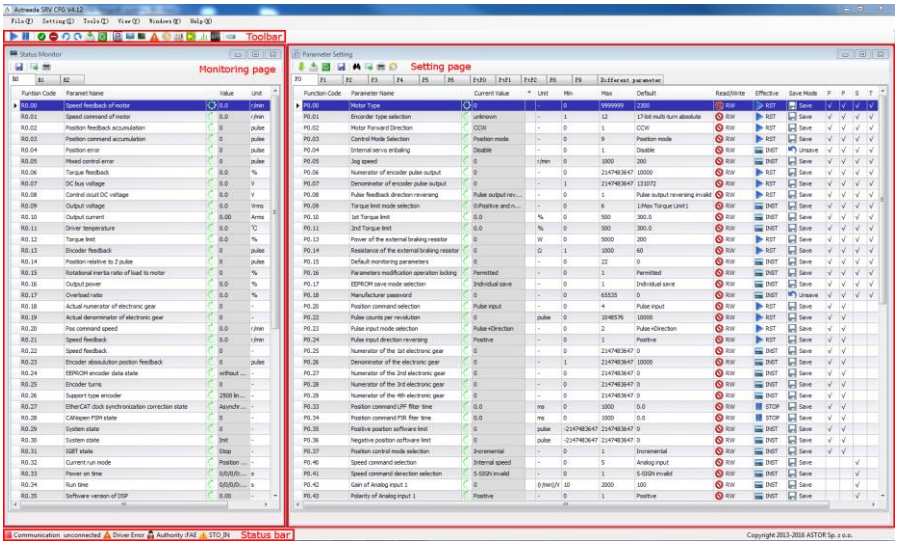
The USB device drive program of the drive is in the drive folder in the directory of software installation (path: ..\AstraadaCFGSRV\Drive\USB drive\). If necessary, the operation procedures for installing drive program in manual are as follows: My computer → Hardware device manager → Update drive program → Open the folder where drive program is → Select the folder labeled in the red box below

When starting Astraada CFG SRV software, double click AstraadaCFGSRV.exe in the directory of software installation as follows:



After starting the program, pop up a start-up interface and then the main interface of the software.

8.5.6 Program interface



The main interface includes four parts:

1. Menu bar and Tool strip, all kinds of interface and function of the entrance

2. Condition monitoring page on the left of main interface is used to monitor real-time feedback of status parameters

3. The parameter settings page on the right of main interface is used to modify the setting parameters

4. Display the current communication mode, communication condition, fault status and the information such as user permissions

8.5.7 Parameter setting

1. Find the line to the parameters to be modified in the parameter setting interface
2. Click the current value twice, if the permission is allowed, the corresponding bar will appear and then input right value
3. Send the modified parameters to the drive by two methods

a. Press carriage return at the edition window

b. Click the sending button [ ]

8.5.8 Help file

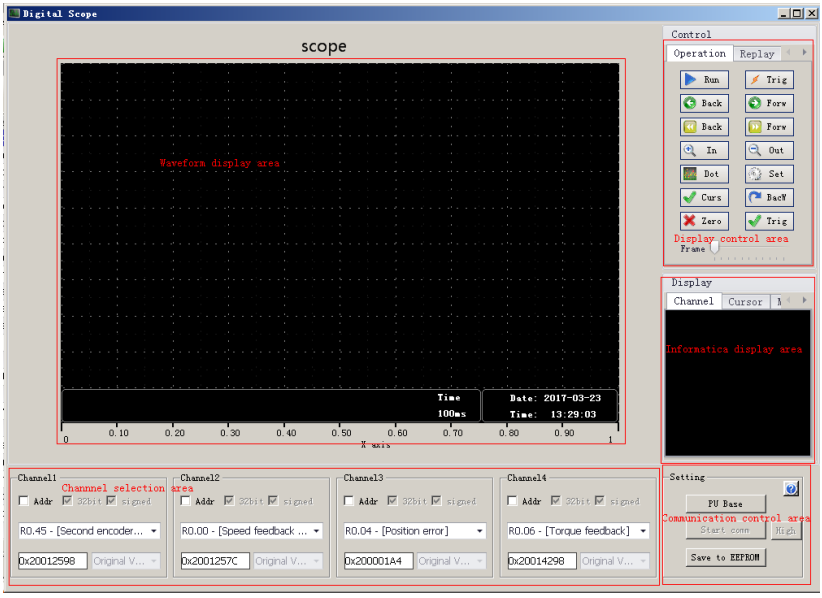
The software has the help file of chm format, including the operation instruction and detailed parameter information for the corresponding help.

The main window has the access to general documentation and the help button of each window can lead the user to relative chapter.

8.5.9 Oscilloscope

The oscilloscope function can be started by the oscilloscope button or the route of menu bar → tool → oscilloscope.

User interface



There are five areas:

1. Waveform display area: Draw waveform and auxiliary display elements, such as the cursor, gain, etc.

2. Channel selection area: Choose the display content of the channel monitoring, support parameter selection and two modes of the internal variable function codes

3. Display control area:

a. Operating interface: Control the starting, stopping, moving and magnifying of the oscilloscope waveform and the displaying of the cursor, zero and trigger threshold;

b. Page replay interface: Be used in the USB trigger mode and waveform file restoring mode, including the function of starting, stopping, and moving and position selection;

c. File operations interface: Saving and restoring of csv waveform file and the figures;

4. Communication control area: Control the starting and stopping of the oscilloscope communication, saving of the channel data, switching of the high-speed and low-speed oscilloscope (valid in the USB mode), setting in the trigger mode and help.

5. Information display area: Display the name of the current monitored content, display or hide the result and so on.

Chapter 9 Faults and solutions

9.1 Meanings of the fault alarm code and countermeasures

Code	Name	Causes	Countermeasures
Er01-0	IGBT fault	The actual output current exceeds the specified value 1.Drive fault (drive circuit, IGBT fault); 2.Short circuit of motor cable U,V,W, or the motor cable is grounded or connected improperly; 3. Motor Burndown; 4. Reverse sequence of U, V, W phase; 5. Parameters are inappropriate and cause system divergence. 6. ACC/DEC of start/stop process is too short; 7. Instantaneous load is too large.	1. Remove the motor cables and enable the drive, if the fault persists, replace the drive; 2.Check the motor cables and wiring 3.Reduce the value of P0.10 and P0.11; 4.Comission the loop parameters to stabilize the system and reduce the value of P0.12; 5.Increase the ACC/DEC time; 6.Replace with the drive with larger power; 7. Replace the motor.
Er02-0	Encoder fault– The encoder cable broken	1. The encoder is not connected; 2. The encoder connector becomes loose; 3.One of U, V, W, A, B Z phase cables is broken; 4. Reversed A/B phase of the encoder; 5. Communication break or abnormal data caused by noise; 6.Normal encoder communication but abnormal communication data; 7. FPGA communication overtime 8. The drive does not support the encoder type.	1. Check the encoder connector or replace the encoder cable if the cable is disconnected; 2. Detect whether encoder power voltage is normal; 3. Reduce the interference of the encoder, route the encoder and motor independently and connect the shielded cables of the encoder to FG; 4. If reporting encoder disconnection fault when power on, check whether the available drive encoder type is consistent with the available motor encoder type according to P0.01.
Er02-1	Encoder fault–Encoder feedback error is too large		
Er02-2	Encoder fault– Parity 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 overtime		
Er02-7	Encoder fault –FPGA overtime		
Er02-8	Encoder fault –Low voltage alarm of the encoder	If multi-turn encoder is used, the battery voltage of the external encoder is between 3.0V~3.2V	1. Check the battery connection in encoder cable; 2. Check whether the external

Code	Name	Causes	Countermeasures
			battery voltage of encoder is below 3.2V, if yes, change the battery; 3. Change the battery when the drive is power on; otherwise the encoder data will be lost.
Er02-9	Encoder fault –Undervoltage alarm of the encoder battery	If multi-turn encoder is used, the battery voltage of the external encoder is between 2.5V~3.0V.	1. Check the battery connection in the encoder cable; 2. Check whether the voltage is below 3.0V, if yes, change the battery; 3. Change the battery when the drive is power on; otherwise the encoder data will be lost.
Er02-a	Encoder fault –Encoder over-temperature	The feedback encoder temperature is higher than the set over-temperature value	1. Check the setting value of the over-temperature protection value; 2. Stop the motor and reduce the encoder temperature.
Er02-b	Encoder fault– EEPROM write-in error	If the motor is used with communication encoder, and when the drive updates the data to encoder EEPROM, there is communication transmission error or data check error.	1.Check the encoder connection and reduce the interference to encoder communication; 2.Write in for several times or change the motor.
Er02-c	Encoder fault– EEPROM no data	If the motor is used with communication encoder, and when read encoder EEPROM during power on, there is no data.	1.Select the current motor model through P0.00 and then carry out the encoder EEPROM writing through P4.97; 2.Block the fault by P4.98, and then carry out corresponding initialization with the motor parameters in EEPROM.
Er02-d	Encoder fault– EEPROM data check error	If the motor is used with communication encoder, and when read encoder EEPROM during power on, there is data check error.	1.Check the encoder connection and reduce the encoder interference; 2. Select the current motor model through P0.00 and then carry out the encoder EEPROM writing through P4.97; 3. Shield the fault by P4.98, and then carry out corresponding initialization to the motor parameters.

Code	Name	Causes	Countermeasures
Er03-0	Current sensor fault–U phase current sensor fault	1. Current sensor or abnormal detection circuit; 2. Power on when the motor shaft is in a state of non-stationary.	Repower on when the motor is in static state or change the drive
Er03-1	Current sensor fault–V phase current sensor fault		
Er03-2	Current sensor fault–W phase current sensor fault		
Er04-0	System initialization fault	The self-inspection is not passed after initialization.	1. Repower on; 2. If the fault occurs for several times, change the drive.
Er05-1	Setting fault– Motor model does not exist	Wrong P0.00 setting	1. Ensure the motor model is set correctly; 2. Ensure the motor parameter model matches with the power class of the drive.
Er05-2	Setting fault–Motor and drive model does not match		
Er05-3	Setting fault– Software limit setting error	Software limit values setting is improper. The setting value of P0.35 is less than or equal to the setting value of P0.36.	Reset P0.35 and P0.36.
Er05-4	Setting fault–return to homing mode setting fault	Mode of P5.10 is set incorrectly.	Set P5.10 according to the instructions.
Er05-5	Setting fault– Point control travel overflow fault	The signal increment of idle travel of the bit exceeds 2^{31}-1.	The single travel cannot exceed 2^{31}-1 in the absolute position mode
Er07-0	Regeneration of discharge overload fault	1. The power of the built-in braking resistor is relatively low; 2.The motor speed is too high or the deceleration is too fast; 3. The action limit of the external braking resistor is restricted to 10% of the duty ratio.	1. Replace with an external braking resistor and increase the power; 2.Modify the deceleration time and reduce regeneration discharge action rate; 3. Reduce the motor speed; 4. Improve the capacity of the motor and drive.
Er08-0	Analog input overvoltage fault– Analog input 1	The voltage inputted to analog input 1 port exceeds the setting value of P3.22.	1. Set P3.22,P3.25,P3.75 correctly; 2. Check the terminals wiring; 3.Set P3.22,P3.25,P3.75 to 0 to disable the protection function.
Er08-1	Analog input overvoltage	The voltage inputted to analog	

Code	Name	Causes	Countermeasures
	fault– Analog input 2	input 2 port exceeds the setting value of P3.25	
Er08-2	Analog input overvoltage fault– Analog input 3	The voltage inputted to analog input 3 port exceeds the setting value of P3.75	
Er09-0	EEPROM fault– Read-write fault	The data stored in data storage area is damaged when reading data from EEPROM There is interference to EEPROM write operation	1.Try again after repower on; 2. If the problem reoccurs for many times, change the drive.
Er09-1	EEPROM fault– data check fault	1. The data read from EEPROM when power on is different from that during writing; 2. The drive DSP software version updates.	1. Reset all parameters; 2. If the problem reoccurs for many times, change the drive.
Er10-0	Hardware fault– FPGA fault	FPGA chip fault	1. Repower on; 2. If the problem reoccurs for many times, change the drive.
Er10-1	Hardware fault– Communication card fault	External communication card fault	1. Repower on 2. If the problem reoccurs for many times, change the communication card
Er10-2	Hardware fault– Ground short circuit fault	During the earth test after power on, one of motor cables V,W is short-circuited to the ground	1. Check the connection of the motor cables; 2. Change the motor cable or test whether the motor insulation aging or not.
Er10-3	Hardware fault– External input fault	This fault occurs when the digital terminal configured as external fault input function acts.	1. Clear the external fault input and enable fault clearance; 2. Repower on the drive
Er10-4	Hardware fault–Emergency stop fault	This fault occurs when the digital terminal configured as emergency stop button acts.	1. Clear the emergency stop input and enable fault clearance; 2. Repower on the drive
Er10-5	Hardware fault– 485 communication fault	Strong EMI of 485 communication circuit causes drive serial communication alarms	1. Use twisted shielded pairs for 485 communication; 2.Wiring communication cables and motor power cables separately.
Er11-0	Software fault– Reentry of motor control mission	1. CPU loading ratio is too high 2.DSP software fault	1. Reduce the software function; 2. Contact the customers service and change the DSP software.
Er11-1	Software fault– Reentry		

Code	Name	Causes	Countermeasures
	of cycle mission		
Er11-2	Software fault - Illegal operation		
Er12-0	IO fault– Digital input distribution repeated	Two or more digital inputs are configured to the same functions	Reset P3.00~P3.09 and ensure there is no repeated setting.
Er12-1	IO fault–Analog input distribution repeated	If the drive is standard, the analog input 3 is speed command	Set P3.70 to other value.
Er12-2	IO fault–Pulse input frequency is too high	The pulse input frequency detected by the drive is higher than the designated value 1. External input pulse signal frequency is too high. 2. Damage of internal drive pulse frequency detection circuit	1. Reduce the external input pulse signal frequency; 2. Change the drive if fault occur when external input signal is normal.
Er13-0	Main circuit overvoltage fault	The DC voltage of the main circuit is higher than the designated value 1. The grid voltage is too high; 2. No braking resistor or pipe during braking or the braking resistor is damaged; 3.DEC time is too short during the stopping; 4. The internal DC voltage test circuit is damaged	1. Check whether the grid input voltage exceeds the allowed value; 2. Check whether the internal braking resistor is loose or damaged; check whether external braking resistor is damaged; 3.Enlarge the setting value of ACC/DEC time; 4. Monitor R0.07 when the drive is disabled, if it is abnormal and does not match with grid input voltage, change the drive.
Er13-1	Main circuit undervoltage fault	The DC voltage of the main circuit is less than the designated value 1. The grid voltage is too low; 2.The buffer relay is not switched on; 3. The drive output power is too large; 4. The internal DC voltage test circuit is damaged	1. Check whether the grid input voltage is lower than the allowed value; 2. Repower on, and check whether there is pull-in noise of the relay; 3. Monitor R0.07 when the drive is disabled, if it is abnormal and does not match with grid input voltage, change the drive.
Er14-0	Control circuit undervoltage fault	The DC voltage of the control power is less than the designated value 1. The grid voltage is too low; 2. The internal control power DC	1. Check whether the grid input voltage is lower than the allowed value; 2. Monitor R0.08 when the drive is disabled, If it is abnormal and does

Code	Name	Causes	Countermeasures
		voltage test circuit is damaged.	not match with grid input voltage, change the drive.
Er17-0	Drive overload fault	Short-time load of the drive is too heavy	1.The load is too heavy which causes drive overload; 2.Check whether phase dislocation or phase loss occurred to UVW wiring of the motor, and check whether encoder is correct; 3.Check whether the motor is compatible with the drive.
Er18-0	Motor overload fault	1. Long-term overload running; 2. The load is too heavy during short time.	1. Replace with the drive and motor with larger power.
Er18-1	Motor overtemp fault	Motor temp exceeds the protection value	1.Replace with the motor of larger power; 2.Check whether UVW phase sequence is correct.
Er19-0	Speed fault– Overspeed fault	The absolute value of the motor speed exceeds the setting value of P4.32 1. U, V, W phases of the motor are connected reversely; 2. Incorrect setting of the electronic gear ratio or motor speed loop control parameters; 3.The setting value of P4.32 is less than the setting value of P4.31 (max. speed limit); 4. Interference to the encoder feedback signal.	1. Check the electronic gear ratio; 2. Check the setting of speed loop control parameters; 3. Check that the phase sequence of the motor cable are connected correctly; 4. Check whether motor encoder connection is proper; 5. Replace with the motor with higher rotation speed.
Er19-1	Speed fault-FWD overspeed fault	Speed feedback exceeds the value of P4.40 by more than 20ms.	1.Check whether encoder is normal; 2.Check whether P4.40 parameter is set properly.
Er19-2	Speed fault-REV overspeed fault	Speed feedback exceeds the value of P4.41 by more than 20ms.	1.Check whether encoder is normal; 2.Check whether P4.41 is set properly.
Er19-3	Speed fault-Overspeed parameter setup is wrong	The value of P4.40 is less than 0 or P4.41 is larger than 0.	1.Check whether encoder is connected reliably; 2.Check whether P4.40 and P4.41 are set improperly.

Code	Name	Causes	Countermeasures
Er20-0	Speed deviation fault	In non-torque mode, the deviation between motor speed and speed command exceeds the set value of P4.39 1. U, V, W phases of the motor are connected reversely or motor cable is not connected. 2. The motor load is so heavy that it causes motor stall 3. Insufficient drive force that causes motor stall 4. Speed loop control parameters setting is improper 5. The set value of P4.39 is too small.	1. Check the phase sequence of motor cable and ensure right wiring; 2. Check whether the conveyer belt or chain or the workbench reaches the boundary or encounters obstacles; 3. Check whether the loop control parameters are set correctly or the drive is damaged or servo system model is proper; 4. Enlarge the setting value of P4.39 5. Set P4.39 to 0 to disable speed deviation fault detection.
Er21-0	Position overtravel-FWD overtravel	Under position mode or fully-closed loop mode, the FWD limit switch is touched or the accumulated feedback pulse exceeds P0.35.	1.Check whether FWD limit switch signal is correct; 2.Check whether P0.35 is set properly.
Er21-1	Position overtravel-REV overtravel	Under position mode or fully-closed loop mode, the FWD limit switch is touched or the accumulated feedback pulse exceeds P0.36.	1.Check whether REV limit switch signal is correct; 2.Check whether P0.36 is set properly.
Er22-0	Hybrid control deviation is too large	1. Server response time is too slow, causing retention pulse number to exceed the setting value of P4.33; 2. The motor load is too heavy to cause motor stall; 3.The pulse input frequency is too high and exceeds the max. speed of motor; 4. Position command input step change exceeds the setting value of P4.33.	1. Check whether the conveyer belt or chain or the workbench reaches the boundary or encounters obstacles; 2. Enlarge the position loop gain parameters or speed feedforward gain or P4.33; 3. Adjust the electronic gear ratio parameter; 4. Decrease the variation of position command input.
Er22-1	Position increment overflow fault	In fully-closed loop control, the deviation between the feedback position of linear encoder and that	1.Check the connection between the motor and load; 2. Check the connection between

Code	Name	Causes	Countermeasures
		of the encoder exceeds the setting value of P4.64	linear encoder and the drive; 3.Check the setting of P4.60, P4.61 and P4.62.
Er22-2	Position increment overflow fault	The position command of single variation after converting via electronic gear ratio exceeds (2^{31}-1).	1. Decrease the single variation quantity of position command; 2. Modify the gear ratio to a proper range.
Er23-0	Drive over-temperature fault	1.The ambient temperature of the drive exceeds the designated value; 2. Drive overload.	1.Reduce the ambient temperature and improve the ventilation environment; 2. Replace with a servo system with larger power; 3. Prolong the ACC/DEC time and reduce the load.
Er25-4	Application fault–Encoder offset angle test failed	Abnormity occurred during encoder offset angle test.	Check whether the motor shaft can rotate freely, then repower on and carry out.
Er25-5	Application fault–Encoder offset angle test failed	The current feedback wave fluctuate violently during encoder offset angle test	Reduce P4.53 parameter setting, then repower on and carry out.
Er25-6	Application fault–Offside of homing	Encounter the limit switch or software limit during homing	Modify the setting of P5.10, repower on and carry out.
Er25-7	Application fault–Inertia identification failed	1.Vibration in stopping exceeds 3.5s; 2. Too short ACC time; 3. The identification speed is below 150r/min.	1.Improve the mechanical rigidity properly; 2.Increase P1.07; 3.Increase P1.06.

9.2 CANopen communication fault code and countermeasures

Code	Name	Causes	Countermeasures
Er22-3	Sync signal overtime	Under interpolation position mode, the time interval between the two neighboring sync frame signals exceeds twice of the communication time cycle.	1.Check communication cable to improve communication reliability; 2.Check whether the generation interval of sync frame of sync signal generation source is correct.
Er22-4	Position command buffer is full	CANopen PTP position command buffer is full.	Prolong the time interval of PTP position command transmission
Er26-0	CANOpen disconnection	The master does not receive the heartbeat message from the	Check the communication wiring.

Code	Name	Causes	Countermeasures
		slave during a period of time	
Er26-1	SDO index does not exist	SDO read or write parameters, the corresponding index does not exist or is not supported	Check the index and modify EDS file
Er26-2	SDO sub index does not exist	SDO read or write parameters, the corresponding sub index does not exist or is not supported	Check the index and modify EDS file
Er26-3	SDO data length error	The length of SDO read or write command does not match with the data length in drive object dictionary.	Adjust the length of SDO R/W command according to the data length of drive object dictionary
Er26-4	SDO write data exceeds the range	The range of SDO write command exceeds the data range of drive object dictionary	Adjust written data of SDO according to the data range in object dictionary.
Er26-5	Read-only and non-modifiable	Modify the read-only parameters	Check whether the parameter to be written is read-only data.
Er26-6	PDO mapping length error	The mapping length of PDO data exceed 64 bit	Check the mapping length of PDO
Er26-7	PDO mapping data does not exist	PDO mapping data cannot be found in the object dictionary	Check PDO mapping data in the object dictionary
Er26-8	PDO not allowed to be changed in the operating	Modify the PDO mapping during operation	Switch CANOpen state to pre-workbench and then modify PDO mapping
Er26-9	PDO not allow the mapping	Map the parameters not allowed into PDO	Check whether there are read-only PDO parameters being mapped into RPDO.
Er26-a	Sync signal is too fast	The received frame exceeds the range allowed by baud rate	1.Modify the interval of data frame transmission via master station or the interval of synchronization frame; 2.Modify communication baud rate.
Er26-b	Receiving fault	CAN communication offline or the received error exceed 128	1.Check communication wiring; 2.Restart the servo drive.
Er26-c	Transmission fault	CAN communication offline or received error exceed 128	1.Check communication wiring; 2.Restart the servo drive.
Er26-d	Sync signal repeat	Receive the synchronization signal of external input when synchronization signal is from slave station	Modify the configuration and ensure only there is only one synchronization signal generation source in one communication network.

Code	Name	Causes	Countermeasures
Er26-e	Bus load rate is too high	In asynchronous work mode, the number of frames received by the slave exceeds the scope allowed by baud rate	1. Modify the interval of data frame transmission via master station; 2. Modify the transmission mode of slave station TPDO; 3. Modify communication baud rate.
Er26-f	Parameter modification state error	Modify the parameter in the state not allowed	Adjust the CANopen machine to Pre-OP or OP state, and then try to modify the parameters

9.3 PROFIBUS-DP communication fault code and countermeasures

Code	Name	Causes	Countermeasures
Er24-0	PWK ID error	PWK ID error	Read the manual , ensure the ID of PWK corresponds to the parameter ID
Er24-1	PWK exceed the range	The setting of PWK exceed the range allowed by the corresponding parameter	Read the manual , ensure the PWK setting of PWK is in the range allowed by the corresponding parameter
Er24-2	Read-only PWK parameter	PWK parameter performs write operation to read-only parameters.	Read the manual , ensure the parameter can be read and written
Er24-3	PZD configuration parameter does not exist	The selected ID is not right	Read the manual , ensure the ID corresponds to the corresponding parameter ID
Er24-4	PZD configuration parameter does not matching	The parameter is not valid instantly	Read the manual , ensure the parameter is valid instantly

9.4 EtherCAT communication fault code and countermeasures

Code	Name	Cause	Countermeasures
Er24-8	Initialization fault	Poor contact of EtherCAT chip	Replace the servo
Er24-9	EEPROM fault	EtherCAT EEPROM has no data or data reading failed.	Use TwinCAT tool to download xml file to EtherCAT EEPROM;
Er24-a	DC Sync0 signal abnormal	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 normally;
Er24-b	Disconnection fault	After the drive is enabled, the network cable is detected to be	Check whether network cable is connected properly, the connection

Code	Name	Cause	Countermeasures
		inserted improperly or EtherCAT master is running improperly.	mode of network cable is top-in and bottom-out; Check interferences; Check whether EtherCAT master can work properly.
Er24-c	PDO data loss fault	No PDO data is received after the drive is enabled for a period of time.	Check whether EtherCAT master works properly; Check whether interference causes data loss.

Chapter 10 Appendix

10.1 Setup parameter list

P – position mode; S – speed mode; T – torque mode; F –fully-closed loop mode

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.

Function code	Name	Unit	Range	Default	Available Mode
P0 Basic control					
P0.00[1]	Motor model	-	0~9999999	2300	PSTF
P0.01[1]	Encoder type	-	1~12	4	PSTF
P0.02[1]	Forward rotation of motor	-	0~1	0	PSTF
P0.03[1]	Control mode selection	-	0~9	0	PSTF
P0.04*	Internal enabling command	-	0~1	0	PSTF
P0.05	JOG speed	r/min	0~1000	200	PSTF
P0.06[1]	Numerator of frequency division output coefficient	-	0~(2^{31}-1)	10000	PSTF
P0.07[1]	Denominator of frequency division output coefficient	-	1~(2^{31}-1)	131072	PSTF
P0.08[1]	Reverse of frequency division output	-	0~1	0	PSTF
P0.09	Torque limit mode setting	-	0~6	1	PSF
P0.10	Max torque limit 1	%	0.0~500.0	300.0	PSTF
P0.11	Max torque limit 2	%	0.0~500.0	300.0	PSF
P0.13[1]	Power of the external braking resistor	W	0~5000	200	PSTF
P0.14[1]	Resistance of the external braking resistor	Ω	1~1000	60	PSTF
P0.15	Default monitoring parameters	-	0~22	0	PSTF
P0.16	Parameter modification operation locked	-	0~1	0	PSTF
P0.17	EEPROM write mode	-	0~1	0	PSTF
P0.18*	Factory password	-	0~65535	0	PSTF
P0.20[1]	Position command selection	-	0~4	0	PF

Function code	Name	Unit	Range	Default	Available Mode
P0.22[1]	Pulse number per motor resolution	reference unit	0~2^{23}	10000	PF
P0.23[1]	Pulse input form	-	0~2	0	PF
P0.24[1]	Reverse of pulse input direction	-	0~1	0	PF
P0.25	Numerator of 1st electronic gear ratio	-	0~(2^{31}-1)	0	PF
P0.26[2]	Denominator of the electronic gear ratio	-	1~(2^{31}-1)	10000	PF
P0.27	Numerator of 2nd electronic gear ratio	-	0~(2^{31}-1)	0	PF
P0.28	Numerator of 3rd electronic gear ratio	-	0~(2^{31}-1)	0	PF
P0.29	Numerator of 4th electronic gear ratio	-	0~(2^{31}-1)	0	PF
P0.33[2]	Smooth filtering of position command	ms	0.0~1000.0	0.0	PF
P0.34[2]	FIR filtering of position command	ms	0.0~1000.0	0.0	PF
P0.35	Software limit of forward position control	reference unit	-(2^{31}-1)~(2^{31}-1)	0	PF
P0.36	Software limit of reverse position control	reference unit	-(2^{31}-1)~(2^{31}-1)	0	PF
P0.37	Position command mode	-	0~1	0	PF
P0.40	Speed command selection	-	0~5	1	S
P0.41	Setting of speed command direction	-	0~1	0	S
P0.42	Analog input 1 gain	(r/min)/V	10~2000	100	S
P0.43	Analog input 1 reverse	-	0~1	0	S
P0.45	Dead zone of analog input 1	V	0.000~3.000	0.000	S
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

Function code	Name	Unit	Range	Default	Available Mode
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	ACC time of S curve	ms	0~1000	0	S
P0.57	DEC time of S curve	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
P0.62	Analog input 2 gain	0.1%/V	0~2000	100	PSTF
P0.63	Analog input 2 reverse	-	0~1	0	PSTF
P0.65	Dead zone of analog input 2	V	0.000~3.000	0.000	PSTF
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 of fast stop	ms	0~10000	500	PSTF
P0.70	Absolute encoder mode setting	-	0~1	0	PSTF
P0.71*	Absolute encoder multi-turn zeroing	-	0~1	0	PSTF
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	$-1\sim2^{23}$	-1	PST
P0.92	Position mode switching exit mode	-	0~1	0	PST
P1 Autotuning control					
P1.00	Inertia online automatic estimation	-	0~1	0	PSTF
P1.01	1^{st} inertia ratio	%	0~10000	250	PSTF
P1.02	2^{nd} inertia ratio	%	0~10000	250	PSTF
P1.03	Machine rigidity setting	-	0~31	13	PSTF
P1.04*	Inertia offline automatic estimation	-	0~1	0	PSTF
P1.05	Operation mode of inertia identification	-	0~3	0	PSTF

Function code	Name	Unit	Range	Default	Available Mode
P1.06	Movable range of inertia identification	r	0.2~20.0	2.0	PSTF
P1.07	ACC time constant of inertia identification	ms	2~1000	200	PSTF
P1.08	Speed level of inertia identification	-	0~3	1	PSTF
P1.19	Valid resonance detection bit	%	0.2~100.0	5.0	PSTF
P1.20	Resonance detection mode	-	0~7	0	PSTF
P1.21*	1st mechanical resonance frequency	Hz	0~5000	5000	PSTF
P1.22*	2nd mechanical resonance frequency	Hz	0~5000	5000	PSTF
P1.23	1st notch filter frequency	Hz	50~5000	5000	PSTF
P1.24	1st notch filter Q value	-	0.50~16.00	1.00	PSTF
P1.25	1st notch filter depth selection	%	0~100	0	PSTF
P1.26	2nd notch filter frequency	Hz	50~5000	5000	PSTF
P1.27	2nd notch filter Q value	-	0.50~16.00	1.00	PSTF
P1.28	2nd notch filter depth selection	%	0~100	0	PSTF
P1.29	3rd notch filter frequency	Hz	50~5000	5000	PSTF
P1.30	3rd notch filter Q value	-	0.50~16.00	1.00	PSTF
P1.31	3rd notch filter depth selection	%	0~100	0	PSTF
P1.32	4th notch filter frequency Q value	Hz	50~5000	5000	PSTF
P1.33	4th notch filter Q value	-	0.50~16.00	1.00	PSTF
P1.34	4th notch filter depth selection	%	0~100	0	PSTF
P1.35	Vibration control mode of position command	-	0~2	0	PF
P1.36	1st vibration control frequency	Hz	0.0~200.0	0.0	PF
P1.37	1st vibration control filter factor	-	0.00~1.00	1.00	PF
P1.38	2nd vibration control frequency	Hz	0.0~200.0	0.0	PF
P1.39	2nd vibration control filter factor	-	0.00~1.00	1.00	PF
P2 Motor control					
P2.00	1st speed gain	Hz	0.0~3276.7	27.0	PSTF
P2.01	1st speed integration time constant	ms	0.1~1000.0	21.0	PSTF
P2.02	1st position gain	1/s	0.0~3276.7	48.0	PF
P2.03	1st speed detection filter	Hz	100~5000	5000	PSTF
P2.04	1st torque filter	ms	0.00~25.00	0.84	PSTF
P2.05	2nd speed gain	Hz	0.0~3276.7	27.0	PSTF

Function code	Name	Unit	Range	Default	Available Mode
P2.06	2nd speed integration time constant	ms	0.1~1000.0	1000.0	PSTF
P2.07	2nd position gain	1/s	0.0~3276.7	57.0	PF
P2.08	2nd speed detection filter	Hz	100~5000	5000	PSTF
P2.09	2nd torque filter	ms	0.00~25.00	0.84	PSTF
P2.10	Speed feed-forward gain	%	0.0~100.0	0.0	PF
P2.11	Speed feed-forward filter time	ms	0.00~64.00	0.50	PF
P2.12	Torque feed-forward gain	%	0.0~100.0	0.0	PSF
P2.13	Torque feed-forward filter time	ms	0.00~64.00	0.00	PSF
P2.14	1st IPPI coefficient	%	0~1000	100	PSTF
P2.15	2nd IPPI coefficient	%	0~1000	100	PSTF
P2.20	2nd gain setting	-	0~1	1	PSTF
P2.22	Position control switching mode	-	0~9	0	PF
P2.23	Delay time of position control switching	ms	0~10000	0	PF
P2.24	Switching level of position control	-	0~20000	0	PF
P2.25	Switching delay of position control	-	0~20000	0	PF
P2.26	Switching time of position gain	ms	0~10000	0	PF
P2.27	Switching mode of speed control	-	0~5	0	S
P2.28	Delay time of speed control switching	ms	0~10000	0	S
P2.29	Switching level of speed control	-	0~20000	0	S
P2.30	Switching delay of speed control	-	0~20000	0	S
P2.31	Switching mode of torque control	-	0~3	0	T
P2.32	Delay time of torque control switching	ms	0~10000	0	T
P2.33	Switching level of torque control	-	0~20000	0	T
P2.34	Switching delay of torque control	-	0~20000	0	T
P2.41[2]	Disturbance observer valid	-	0~2	0	PSTF
P2.42	Disturbance observer compensation gain	%	0~100	0	PSF
P2.43	Disturbance observer cut-off frequency	ms	0.00~25.00	0.53	PSF
P2.44	Torque command offset	%	-500.0~500.0	0.0	PSTF
P2.50[2]	Fully-closed loop vibration suppressor valid	-	0~2	0	PSF

Function code	Name	Unit	Range	Default	Available Mode
P2.51	Fully-closed loop vibration suppressor cut-off frequency r	Hz	1.0~500.0	100.0	PSF
P2.52	Fully-closed loop vibration suppressor compensation gain	%	0~1000	0	PSF
P2.60[2]	Speed observer valid	-	0~2	0	PSTF
P2.61	Speed observer gain	Hz	1~500	100	PSTF
P2.70	Friction compensation max-speed	r/min	0~1000	20	PST
P2.71	Positive torque coefficient of friction compensation	%/(10r/min)	0.0~100.0	0.0	PST
P2.72	Negative torque coefficient of friction compensation	%/(10r/min)	-100.0~0.0	0.0	PST
P2.73	Friction compensation valid	-	0~1	0	PST
P3 I/O management					
P3.00[1]	Input configuration of digital 1	-	0x000~0x133	0x003	PSTF
P3.01[1]	Input configuration of digital 2	-	0x000~0x133	0x00D	PSTF
P3.02[1]	Input configuration of digital 3	-	0x000~0x133	0x004	PSTF
P3.03[1]	Input configuration of digital 4	-	0x000~0x133	0x016	PSTF
P3.04[1]	Input configuration of digital 5	-	0x000~0x133	0x019	PSTF
P3.05[1]	Input configuration of digital 6	-	0x000~0x133	0x01A	PSTF
P3.06[1]	Input configuration of digital 7	-	0x000~0x133	0x001	PSTF
P3.07[1]	Input configuration of digital 8	-	0x000~0x133	0x002	PSTF
P3.08[1]	Input configuration of digital 9	-	0x000~0x133	0x007	PSTF
P3.09[1]	Input configuration of digital 10	-	0x000~0x133	0x008	PSTF
P3.10[1]	Output configuration of digital 1	-	0x000~0x11F	0x001	PSTF
P3.11[1]	Output configuration of digital 2	-	0x000~0x11F	0x003	PSTF
P3.12[1]	Output configuration of digital 3	-	0x000~0x11F	0x007	PSTF
P3.13[1]	Output configuration of digital 4	-	0x000~0x11F	0x00D	PSTF
P3.14[1]	Output configuration of digital 5	-	0x000~0x11F	0x005	PSTF
P3.15[1]	Output configuration of digital 6	-	0x000~0x11F	0x00E	PSTF
P3.16	Function configuration of DI capture encoder	-	0~778	0	PSTF
P3.20	Offset of analog input 1	V	-10.000~10.000	0.000	S
P3.21	Filter of analog input 1	ms	0.0~1000.0	1.0	S
P3.22	Voltage protection of analog input 1	V	0.000~10.000	0.000	S
P3.23	Offset of analog input 2	V	-10.000~10.000	0.000	PSTF
P3.24	Filter of analog input 2	ms	0.0~1000.0	0.0	PSTF

Function code	Name	Unit	Range	Default	Available Mode
P3.25	Voltage protection of analog input 2	V	0.000~10.000	0.000	PSTF
P3.26	Function selection of analog input 1	-	0~7	0	PSTF
P3.27	Function selection of analog input 2	-	0~7	3	PSTF
P3.28	Analog speed compensation gain	%	0.0~100.0	0.0	PSTF
P3.29	Analog torque compensation gain	%	0.0~100.0	0.0	PSTF
P3.30[1]	Analog output 1 selection	-	0~19	0	PSTF
P3.31	Voltage gain of analog output 1	[P3.30 unit]/V	0~214748364	0	PSTF
P3.32[1]	Analog output 2 selection	-	0~19	0	PSTF
P3.33	Voltage gain of analog output 2	[P3.30 unit]/V	0~214748364	0	PSTF
P3.34	Offset voltage of analog output 1	V	-10.000~10.000	0.000	PSTF
P3.35	Offset voltage of analog output 2	V	-10.000~10.000	0.000	PSTF
P3.36[1]	Analog output monitor setting	-	0~2	0	PSTF
P3.40[1]	Travel limit switch shield	-	0~2	1	PSTF
P3.41[1]	Emergency stop switch shield	-	0~1	1	PSTF
P3.43[1]	Digital input filter	0.125ms	1~800	1	PSTF
P3.44	Command pulse input invalid setting disabled	-	0~1	0	PF
P3.45[1]	Clearing mode of retention pulse	-	0~1	1	PF
P3.50	Range of position arrival	reference unit	$0\sim2^{18}$	100	PF
P3.51	Output mode of position arrival	-	0~4	0	PF
P3.52	Hold time of position arrival output terminal	ms	0~30000	0	PF
P3.53	Speed matching range	r/min	10~20000	50	PSTF
P3.54	Speed reaching range	r/min	10~20000	1000	PSTF
P3.55	Zero speed range	r/min	10~20000	50	PSTF
P3.56	Locked time of servo after braking	ms	0~1000	50	PSTF
P3.57	Braking delay of electromagnetic brake	ms	0~30000	500	PSTF
P3.58[1]	Motor speed of brake release	r/min	0~1000	30	PSTF
P3.59	Torque reaching range	%	5.0~300.0	50.0	T
P3.70[1]	Function of analog input 3	-	0~7	4	PSTF
P3.71	Zero offset of analog input 3	V	-10.000~10.000	0.000	PSTF

Function code	Name	Unit	Range	Default	Available Mode
P3.72	Dead zone of analog input 3	V	0.000~3.000	0.000	PSTF
P3.73	Gain of analog input 3	-	0~2000	300	PSTF
P3.74	Analog input 3 reverse	-	0~1	0	PSTF
P3.75	Voltage protection of analog input 3	V	0.000~10.000	0.000	PSTF
P3.76	Analog input 3 filter	ms	0.0~1000.0	0.0	PSTF
P3.77	Deadzone mode of analog input	-	0~1	0	PSTF
P3.90	Pulse input filter	-	0~7	2	PSTF
P4 Extension and application					
P4.01[1]	485 local communication address	-	1~255	1	PSTF
P4.02[1]	CAN communication baud rate	-	0~5	1	PSTF
P4.03[1]	485 communication baud rate	-	0~3	1	PSTF
P4.04[1]	485 communication parity mode	-	0~5	0	PSTF
P4.05[1]	CAN communication node	-	1~127	1	PSTF
P4.06	485 communication fault clearing mode	-	0~1	1	PSTF
P4.07[1]	EtherCAT synchronous cycle	-	0~3	2	PSTF
P4.08[1]	EtherCAT synchronous type	-	0~2	0	PSTF
P4.09[1]	EtherCAT fault detection time	ms	0~1000	100	PSTF
P4.10[1]	Upper PC type	-	0~1	0	PSTF
P4.11*	Bus servo enabling	-	0~1	0	PSTF
P4.12*	Bus position command	reference unit	$-(2^{31}-1)$~$(2^{31}-1)$	0	PF
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*	Switching command of control mode	-	0~1	0	PSTF
P4.16*	Gain switching command	-	0~1	0	PSTF
P4.17*	Switching command of electronic gear ratio	-	0~3	0	PF
P4.18*	Inertia ratio switching command	-	0~1	0	PSTF
P4.19*	Zero speed clamp command	-	0~1	0	ST
P4.20*	Retention pulse clearing	-	0~1	0	PF
P4.21*	Torque limit switching command	-	0~1	0	PSTF
P4.22*	External fault command	-	0~1	0	PSTF
P4.23*	Emergency stop command	-	0~1	0	PSTF
P4.24*	Input command of vibration control switching	-	0~1	0	PF

Function code	Name	Unit	Range	Default	Available Mode
P4.30	Stop mode	-	0~3	0	PSTF
P4.31	Max speed limit	r/min	0~20000	5000	PSTF
P4.32	Overspeed level	r/min	0~20000	6000	PSTF
P4.33	Pulse range of position deviation	reference unit	$0\sim2^{27}$	100000	PF
P4.34[1]	Brake overload detection selection	-	0~2	0	PSTF
P4.36[1]	Undervoltage protection of main power supply	-	0~1	1	PSTF
P4.37	Undervoltage detection time of main power supply	ms	70~2000	70	PSTF
P4.39	Speed deviation setting	r/min	0~20000	0	PSF
P4.40	Forward speed limit	r/min	0~20000	20000	PSTF
P4.41	Reverse speed limit	r/min	-20000~0	-20000	PSTF
P4.42	Internal speed of high resolution	r/min	-20000.0~20000.0	0.0	PSTF
P4.50[1]	Offset of encoder Z phase	pulse	$0\sim(2^{20}-1)$	0	PSTF
P4.51	Switching time 1 of torque limit	ms/100%	0~4000	0	PSF
P4.52	Switching time 2 of torque limit	ms/100%	0~4000	0	PSF
P4.53	Current loop response adjustment	%	10.0~200.0	100.0	PSTF
P4.54[1]	Initialization time after power on	ms	0~200000	0	PSTF
P4.60[1]	Frequency division molecular of external linear encoder	-	$0\sim2^{23}$	0	F
P4.61[1]	Frequency division denominator of external linear encoder	-	$1\sim2^{23}$	10000	F
P4.62[1]	Direction reverse of external linear encoder	-	0~1	0	F
P4.64[1]	Large mixed deviation setting	reference unit	$0\sim2^{27}$	160000	F
P4.65[1]	Mixed deviation clearing	r	0~100	0	F
P4.67[1]	External linear encoder pulse output mode of AB phase	-	0~1	0	F
P4.68[1]	External linear encoder (2^{nd} encoder) resolution	pulse	$1\sim2^{23}$	10000	PF
P4.69[1]	Frequency division output source	-	0~3	0	PSTF
P4.70[1]	External linear encoder (2^{nd} encoder) Z signal type	-	0~3	0	PSTF
P4.78[1]	MotionNet node number	-	0~63	0	PSTF

Function code	Name	Unit	Range	Default	Available Mode
P4.79[1]	MotionNet baud rate	-	0~3	2	PSTF
P4.80	Configuration of PZD setting parameter 1	-	1000~3999	1998	PSTF
P4.81	Configuration of PZD setting parameter 2	-	1000~3999	1998	PSTF
P4.82	Configuration of PZD setting parameter 3	-	1000~3999	1998	PSTF
P4.83	Configuration of PZD feedback parameter 1	-	4000~5852	4012	PSTF
P4.84	Configuration of PZD feedback parameter 2	-	4000~5852	4018	PSTF
P4.85	Configuration of PZD feedback parameter 3	-	4000~5852	4032	PSTF
P4.86[1]	PPO type of DP communication	-	5	5	PSTF
P4.87	CANopen communication cycle	us	0~(2^{31}-1)	0	PSTF
P4.88	CANopen heartbeat cycle	ms	0~32767	1000	PSTF
P4.89	Automatic stop at CANopen disconnection	-	0~1	0	PSTF
P4.90*	Fault restore	-	0~1	0	PSTF
P4.91*	Parameters saving	-	0~1	0	PSTF
P4.92*	Restore to factory value	-	0~1	0	PSTF
P4.93*	Reading enable of fault record	-	0~1	0	PSTF
P4.94*	Clearing enable of fault record	-	0~1	0	PSTF
P4.95*	Group number of fault record	-	0~9	0	PSTF
P4.96*	Factory parameters	-	-	0	PSTF
P4.97*	EEPROM operation of communication encoder	-	0~1	0	PSTF
P4.98*	EEPROM data fault block of communication encoder	-	0~1	1	PSTF
P5 Program JOG, homing and PTP (point-to-point) control					
P5.00	JOG mode	-	0~6	0	P
P5.01	JOG movement amount	reference unit	1~2^{30}	50000	P
P5.02	JOG speed setting	r/min	1~5000	500	P
P5.03	JOG ACC/DEC time	ms	2~10000	100	P
P5.04	JOG waiting time	ms	0~10000	100	P
P5.05	JOG cycle times	-	0~10000	1	P
P5.10[2]	Homing mode	-	0~128	0	P
P5.11[1]	Automatic homing after power	-	0~1	0	P

Function code	Name	Unit	Range	Default	Available Mode
	on				
P5.12	1st speed setting of high speed homing	r/min	0~2000	100	P
P5.13	2nd speed setting of high speed homing	r/min	0~60	20	P
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	Correlated action of homing	-	0~3	0	P
P5.17	Speed to designated target after homing	-	1~5000	0	P
P5.18	ACC/DEC time to designated target after homing	r/min	0~32767	100	P
P5.19	Position to designated target after homing	reference unit	$-(2^{31}-1)$~$(2^{31}-1)$	300	P
P5.20*	PTP trigger command	-	-1~2048	-1	P
P5.21	00 target speed	r/min	0~6000	20	P
P5.22	01 target speed	r/min	0~6000	50	P
P5.23	02 target speed	r/min	0~6000	100	P
P5.24	03 target speed	r/min	0~6000	200	P
P5.25	04 target speed	r/min	0~6000	300	P
P5.26	05 target speed	r/min	0~6000	500	P
P5.27	06 target speed	r/min	0~6000	600	P
P5.28	07 target speed	r/min	0~6000	800	P
P5.29	08 target speed	r/min	0~6000	1000	P
P5.30	09 target speed	r/min	0~6000	1300	P
P5.31	10 target speed	r/min	0~6000	1500	P
P5.32	11 target speed	r/min	0~6000	1800	P
P5.33	12 target speed	r/min	0~6000	2000	P
P5.34	13 target speed	r/min	0~6000	2300	P
P5.35	14 target speed	r/min	0~6000	2500	P
P5.36	15 target speed	r/min	0~6000	3000	P
P5.37	00 ACC/DEC time	ms	0~32767	200	P
P5.38	01 ACC/DEC time	ms	0~32767	300	P
P5.39	02 ACC/DEC time	ms	0~32767	500	P
P5.40	03 ACC/DEC time	ms	0~32767	600	P
P5.41	04 ACC/DEC time	ms	0~32767	800	P
P5.42	05 ACC/DEC time	ms	0~32767	900	P
P5.43	06 ACC/DEC time	ms	0~32767	1000	P

Function code	Name	Unit	Range	Default	Available Mode
P5.44	07 ACC/DEC time	ms	0~32767	1200	P
P5.45	08 ACC/DEC time	ms	0~32767	1500	P
P5.46	09 ACC/DEC time	ms	0~32767	2000	P
P5.47	10 ACC/DEC time	ms	0~32767	2500	P
P5.48	11 ACC/DEC time	ms	0~32767	3000	P
P5.49	12 ACC/DEC time	ms	0~32767	5000	P
P5.50	13 ACC/DEC time	ms	0~32767	8000	P
P5.51	14 ACC/DEC time	ms	0~32767	50	P
P5.52	15 ACC/DEC time	ms	0~32767	30	P
P5.53	00 delay time	ms	0~32767	0	P
P5.54	01 delay time	ms	0~32767	100	P
P5.55	02 delay time	ms	0~32767	200	P
P5.56	03 delay time	ms	0~32767	400	P
P5.57	04 delay time	ms	0~32767	500	P
P5.58	05 delay time	ms	0~32767	800	P
P5.59	06 delay time	ms	0~32767	1000	P
P5.60	07 delay time	ms	0~32767	1500	P
P5.61	08 delay time	ms	0~32767	2000	P
P5.62	09 delay time	ms	0~32767	2500	P
P5.63	10 delay time	ms	0~32767	3000	P
P5.64	11 delay time	ms	0~32767	3500	P
P5.65	12 delay time	ms	0~32767	4000	P
P5.66	13 delay time	ms	0~32767	4500	P
P5.67	14 delay time	ms	0~32767	5000	P
P5.68	15 delay time	ms	0~32767	5500	P
P5.69	PTP trigger buffer switch	-	0~1	0	P
P5.70	Single-turn resolution of disk	pulse	$-(2^{31}-1)$~$(2^{31}-1)$	10000	P
P5.71	Zero-returning switch of disk	-	0~3	0	P
P5.72	Multi-turn mode	-	0~1	0	P
P5.73	Digital trigger mode of PTP	-	0~1	0	P
P5.74	Digital output mode of PTP	-	0~4	0	P
P6 Application function					
P6.00	Forward low JOG speed	r/min	0~6000	5	P
P6.01	Reverse low JOG speed	r/min	-6000~0	-5	P
P6.02	Position latch function switch	-	0~1	0	P
P6.03	Position latch save mode	-	0~1	0	P
P6.04	Forward high JOG speed	r/min	0~6000	60	P
P6.05	Reverse high JOG speed	r/min	-6000~0	-60	P

Function code	Name	Unit	Range	Default	Available Mode
P6.06	Terminal JOG valid	-	0~1	1	P
P6.20	Turret function switch	-	0~1	0	P
P6.21	Turret number	handful	1~128	16	P
P6.22	Turret pulse number per cycle	reference unit	2~(2^{31}-1)	10000	P
P6.23	Starting point of turret	reference unit	-(2^{31}-2)~(2^{31}-2)	0	P
P6.30	Gantry synchronization function switch	-	0~1	0	P
P6.31	Gantry synchronous speed control gain	Hz	0.0~3276.7	0	P
P6.32	Gantry synchronous speed control integral	ms	0.1~1000	1000	P
P6.33	Gantry synchronous position control gain	1/s	0.0~3276.7	1000	P
P6.34	Gantry synchronous compensation torque filter	ms	0.00~64.00	0.00	P
P6.35	Gantry synchronization compensation speed filter	ms	0.00~64.00	0.00	P
P6.36	Gantry synchronization control bandwidth ratio	%	0~1000	0	P
P6.37	Gantry synchronization master/slave selection	-	0~1	0	P
P6.38	Gantry synchronization alignment retreat distance	reference unit	-(2^{31}-2)~(2^{31}-2)	10000	P
P6.39	Gantry synchronization alignment retreat speed	r/min	1~200	60	P
P6.40	Gantry synchronization alignment approaching speed	r/min	1~60	5	P
P6.41	Gantry alignment direction	-	0~1	0	P
PtP0 PTP control					
PtP0.00	00^{th} control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.01	00^{th} position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP0.02	01^{st} control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.03	01^{st} position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP0.04	02^{nd} control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.05	02^{nd} position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP0.06	03^{rd} control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.07	03^{rd} position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP0.08	04^{th} control word	-	0~0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Available Mode
PtP0.09	04th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.10	05th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.11	05th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.12	06th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.13	06th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.14	07th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.15	07th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.16	08th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.17	08th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.18	09th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.19	09th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.20	10th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.21	10th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.22	11th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.23	11th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.24	12th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.25	12th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.26	13th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.27	13th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.28	14th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.29	14th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.30	15th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.31	15th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.32	16th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.33	16th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.34	17th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.35	17th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.36	18th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.37	18th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.38	19th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.39	19th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.40	20th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.41	20th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.42	21st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.43	21st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.44	22nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.45	22nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.46	23rd control word	-	0~0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Available Mode
PtP0.47	23rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.48	24th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.49	24th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.50	25th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.51	25th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.52	26th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.53	26th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.54	27th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.55	27th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.56	28th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.57	28th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.58	29th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.59	29th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.60	30th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.61	30th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.62	31st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.63	31st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.64	32nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.65	32nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.66	33rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.67	33rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.68	34th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.69	34th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.70	35th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.71	35th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.72	36th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.73	36th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.74	37th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.75	37th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.76	38th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.77	38th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.78	39th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.79	39th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.80	40th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.81	40th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.82	41st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.83	41st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.84	42nd control word	-	0~0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Available Mode
PtP0.85	42nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.86	43rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.87	43rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.88	44th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.89	44th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.90	45th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.91	45th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.92	46th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.93	46th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.94	47th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.95	47th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.96	48th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.97	48th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP0.98	49th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP0.99	49th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1 PTP control					
PtP1.00	50th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.01	50th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.02	51st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.03	51st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.04	52nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.05	52nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.06	53rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.07	53rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.08	54th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.09	54th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.10	55th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.11	55th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.12	56th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.13	56th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.14	57th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.15	57th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.16	58th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.17	58th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.18	59th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.19	59th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP1.20	60th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.21	60th position	reference unit	-(2^31-1)~(2^31-1)	0	P

Function code	Name	Unit	Range	Default	Available Mode
PtP1.22	61st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.23	61st position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.24	62nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.25	62nd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.26	63rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.27	63rd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.28	64th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.29	64th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.30	65th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.31	65th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.32	66th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.33	66th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.34	67th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.35	67th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.36	68th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.37	68th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.38	69th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.39	69th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.40	70th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.41	70th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.42	71st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.43	71st position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.44	72nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.45	72nd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.46	73rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.47	73rd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.48	74th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.49	74th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.50	75th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.51	75th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.52	76th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.53	76th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.54	77th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.55	77th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.56	78th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.57	78th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.58	79th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.59	79th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P

Function code	Name	Unit	Range	Default	Available Mode
PtP1.60	80th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.61	80th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.62	81st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.63	81st position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.64	82nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.65	82nd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.66	83rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.67	83rd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.68	84th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.69	84th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.70	85th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.71	85th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.72	86th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.73	86th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.74	87th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.75	87th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.76	88th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.77	88th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.78	89th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.79	89th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.80	90th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.81	90th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.82	91st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.83	91st position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.84	92nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.85	92nd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.86	93rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.87	93rd position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.88	94th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.89	94th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.90	95th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.91	95th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.92	96th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.93	96th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.94	97th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.95	97th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P
PtP1.96	98th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.97	98th position	reference unit	-(2^{31}-1)~(2^{31}-1)	0	P

Function code	Name	Unit	Range	Default	Available Mode
PtP1.98	99th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP1.99	99th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2 PTP control					
PtP2.00	100th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.01	100th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.02	101st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.03	101st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.04	102nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.05	102nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.06	103rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.07	103rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.08	104th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.09	104th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.10	105th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.11	105th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.12	106th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.13	106th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.14	107th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.15	107th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.16	108th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.17	108th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.18	109th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.19	109th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.20	110th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.21	110th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.22	111th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.23	111th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.24	112th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.25	112th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.26	113th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.27	113th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.28	114th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.29	114th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.30	115th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.31	115th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.32	116th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.33	116th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.34	117th control word	-	0~0x7FFFFFFF	0x00000000	P

Function code	Name	Unit	Range	Default	Available Mode
PtP2.35	117th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.36	118th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.37	118th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.38	119th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.39	119th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.40	120th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.41	120th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.42	121st control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.43	121st position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.44	122nd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.45	122nd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.46	123rd control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.47	123rd position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.48	124th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.49	124th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.50	125th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.51	125th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.52	126th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.53	126th position	reference unit	-(2^31-1)~(2^31-1)	0	P
PtP2.54	127th control word	-	0~0x7FFFFFFF	0x00000000	P
PtP2.55	127th position	reference unit	-(2^31-1)~(2^31-1)	0	P

10.2 Monitoring parameter table

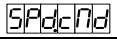
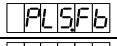
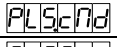
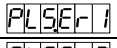
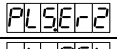
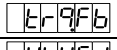
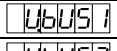
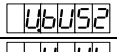
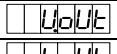
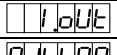
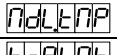
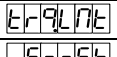
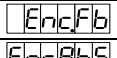
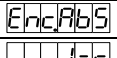
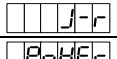
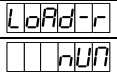
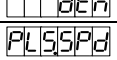
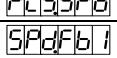
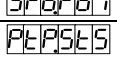
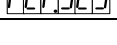
The state monitoring parameter of the servo drive is shown below:

Function code	Name	Unit	Range	Available Mode
R0 System monitoring parameter				
R0.00	Motor speed	r/min	-9999.9~9999.9	PSTF
R0.01	Speed command	r/min	-9999.9~9999.9	PSTF
R0.02	Feedback pulse accumulation	reference unit	$-(2^{63}-1)$~$(2^{63}-1)$	PF
R0.03	Command pulse accumulation	reference unit	$-(2^{63}-1)$~$(2^{63}-1)$	PF
R0.04	Retention pulse	reference unit	$-(2^{63}-1)$~$(2^{31}-1)$	PF
R0.05	Hybrid control deviation	reference unit	$-(2^{63}-1)$~$(2^{31}-1)$	F
R0.06	Current torque	%	-500.0~500.0	PSTF
R0.07	DC voltage of main circuit	V	0.0~1000.0	PSTF
R0.08	Voltage of control power	V	0.0~1000.0	PSTF
R0.09	Output voltage	Vrms	0.0~1000.0	PSTF
R0.10	Output current	Arms	0.0~1000.0	PSTF
R0.11	Drive temperature	℃	-55.0~180.0	PSTF
R0.12	Torque limit	%	-500.0~500.0	PSTF
R0.13	Encoder feedback value	pulse	0~$(2^{20}-1)$	PSTF
R0.14	Rotor relative to Z pulse position	pulse	0~$(2^{20}-1)$	PSTF
R0.15	Inertia ratio of load	%	0~10000	PSTF
R0.16	Output power	%	-500.0~500.0	PSTF
R0.17	Motor load ratio	%	0~500	PSTF
R0.18	Molecule of actual electric gear ratio	-	0~$(2^{31}-1)$	PF
R0.19	Denominator of actual electric gear ratio	-	1~$(2^{31}-1)$	PF
R0.20	Position command speed	r/min	-9999.9~9999.9	PF
R0.21	Motor speed (filtering)	r/min	-9999.9~9999.9	PSTF
R0.22	PTP state	-	-1~4223	P
R0.23	Feedback of encoder absolute position	pulse	$-(2^{31}-1)$~$(2^{31}-1)$	PSTF
R0.24	Encoder EEPROM data state	-	0~3	PSTF
R0.25	Circles of multi-circle encoder	-	-32768~32767	PSTF
R0.26	Available encoder type	-	0~6	PSTF
R0.27	EtherCAT clock synchronous correction state	-	0~1	PSTF
R0.28	State of CANopen state machine	-	0~18	PSTF
R0.29	Node of PROFIBUS-DP slave station	-	0~99	PSTF
R0.30	System state	-	0~5	PSTF
R0.31	IGBT state	-	0~1	PSTF
R0.32	Current mode	-	0~2	PSTF
R0.33	Power on time	s	0~$(2^{31}-1)$	PSTF
R0.34	Operation time	s	0~$(2^{31}-1)$	PSTF

Function code	Name	Unit	Range	Available Mode
R0.35	DSP software version	-	0.00~10.00	PSTF
R0.36	FPGA software version	-	0.00~10.00	PSTF
R0.37	Communication card software version	-	0.00~10.00	PSTF
R0.38	Drive serial No.1	-	0~65535	PSTF
R0.39	Drive serial No.2	-	0~65535	PSTF
R0.40	Drive serial No.3	-	0~65535	PSTF
R0.41	Drive serial No.4	-	0~65535	PSTF
R0.42	Drive serial No.5	-	0~65535	PSTF
R0.43	Drive serial No.6	-	0~65535	PSTF
R0.44	Absolute position of linear encoder (2^{nd} encoder) in single circle	pulse	$0\sim2^{23}$	PSTF
R0.45	Speed feedback of 2^{nd} encoder	r/min	-9999.9~9999.9	PSTF
R0.46	Observing speed of speed observer	r/min	-9999.9~9999.9	PSTF
R0.47	Feedback speed of speed observer	r/min	-9999.9~9999.9	PSTF
R0.48	Observing disturbance torque via disturbance observer	%	-1000.0~1000.0	PSTF
R0.49	Compensation value of fully-closed vibration suppressor	r/min	-9999.9~9999.9	PSTF
R0.51	Observe load inertia ratio in real time	%	0~10000	PSTF
R0.52	Linear encoder (2^{nd} encoder) position feedback accumulation (32-bit number)	pulse	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R0.53	Gantry synchronization position deviation	reference unit	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R0.54	Linear encoder (2^{nd} encoder) position feedback value	Pulse	$0\sim2^{23}$	PSTF
R0.55	Encoder circle number offset after clearing multi-turn position	-	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R0.56	Encoder feedback value offset after clearing multi-turn position	Pulse	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R0.57	Linear encoder (2^{nd} encoder) position feedback accumulation (64-bit number)	pulse	$-(2^{63}-1)\sim(2^{63}-1)$	PSTF
R0.99	Fault code	-	-32768~32767	PSTF
R1 IO monitoring parameter				
R1.00	Digital input state	-	0x000~0x3FF	PSTF
R1.01	Digital output state	-	0x00~0x3F	PSTF
R1.02	Original voltage of analog input 1	-	-10.000~10.000	PSTF
R1.03	Original voltage of analog input 2	-	-10.000~10.000	PSTF
R1.04	Original voltage of analog input 3	-	-10.000~10.000	PSTF
R1.05	Voltage of analog input 1	V	-10.000~10.000	PSTF
R1.06	Voltage of analog input 2	V	-10.000~10.000	PSTF
R1.07	Voltage of analog input 3	V	-10.000~10.000	PSTF
R1.08	Voltage of analog output 1	V	-10.000~10.000	PSTF

Function code	Name	Unit	Range	Available Mode
R1.09	Voltage of analog output 2	V	-10.000~10.000	PSTF
R1.10	Voltage of analog output 3	V	-10.000~10.000	PSTF
R1.11	Cumulative value of pulse input	reference unit	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R1.12	Pulse position command	reference unit	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R1.13	Pulse speed command	r/min	-10000.0~10000.0	PSTF
R1.14	Analog compensation speed	r/min	-10000.0~10000.0	PSTF
R1.15	Analog compensation torque	%	-1000.0~1000.0	PSTF
R1.16	DI capture encoder value	pulse	$-(2^{31}-1)\sim(2^{31}-1)$	PSTF
R2 Factory monitoring parameter				
-	-	-	-	-
R3 Fault record parameter				
R3.00	Fault code record	-	-	PSTF
R3.01	Power on time when fault occurs	s	$0\sim(2^{31}-1)$	PSTF
R3.02	Operation time when fault occurs	s	$0\sim(2^{31}-1)$	PSTF
R3.03	Motor speed when fault occurs	r/min	-20000~20000	PSTF
R3.04	Speed command when fault occurs	r/min	-20000~20000	PSTF
R3.05	Feedback pulse accumulation when fault occurs	reference unit	$-(2^{63}-1)\sim(2^{63}-1)$	PF
R3.06	Command pulse accumulation when fault occurs	reference unit	$-(2^{63}-1)\sim(2^{63}-1)$	PF
R3.07	Stranded pulse when fault occurs	reference unit	$-(2^{31}-1)\sim(2^{31}-1)$	PF
R3.08	Current torque when fault occurs	%	-500.0~500.0	PSTF
R3.09	Main circuit DC voltage when fault occurs	V	0.0~1000.0	PSTF
R3.10	Output voltage when fault occurs	Vrms	0.0~1000.0	PSTF
R3.11	Output current when fault occurs	Arms	0.00~1000.00	PSTF
R3.20	Latest fault record	-	-	PSTF
R3.21	Latest 2 fault record	-	-	PSTF
R3.22	Latest 3 fault record	-	-	PSTF
R3.23	Latest 4 fault record	-	-	PSTF
R3.24	Latest 5 fault record	-	-	PSTF
R3.25	Latest 6 fault record	-	-	PSTF
R3.26	Latest 7 fault record	-	-	PSTF
R3.27	Latest 8 fault record	-	-	PSTF
R3.28	Latest 9 fault record	-	-	PSTF
R3.29	Latest 10 fault record	-	-	PSTF

10.3 General monitoring parameters

Setting value of P0.15	Meaning	Sign	Unit	Corresponding parameter
[0]	Motor rotation speed		r/min	R0.00
1	Speed command		r/min	R0.01
2	Pulse feedback accumulation		reference unit	R0.02
3	Pulse command accumulation		reference unit	R0.03
4	Retention pulse		reference unit	R0.04
5	Hybrid control deviation		reference unit	R0.05
6	Current torque		%	R0.06
7	Main circuit DC voltage		V	R0.07
8	Voltage of control power		V	R0.08
9	Output voltage		Vrms	R0.09
10	Output current		Arms	R0.10
11	Drive temperature		℃	R0.11
12	Torque limit		%	R0.12
13	Encoder feedback value		pulse	R0.13
14	Rotor position relative to Z pulse		pulse	R0.14
15	Load inertia ratio		%	R0.15
16	Output power		%	R0.16
17	Motor load rate		%	R0.17
18	Molecule of actual electronic gear		-	R0.18
19	Denominator of actual electronic gear		-	R0.19
20	Pulse speed command		r/min	R0.20
21	Instant speed		r/min	R0.21
22	PTP state		-	R0.22

10.4 Fault code

The format of fault code is ErXX-X, of which, XX is the master code and X is the sub code.

Example:  , the master code is 01, the sub code is 0. Other codes are displayed in the similar way.

Fault code	Name	Feature		
		History record	Can be cleared	Disable
Er01-0	IGBT fault	●		●
Er02-0	Encoder fault–The encoder wire break	●		●
Er02-1	Encoder fault–Encoder feedback error is too large	●		●
Er02-2	Encoder fault–Parity error	●		●
Er02-3	Encoder fault–CRC error	●		●
Er02-4	Encoder fault–Frame error	●		●
Er02-5	Encoder fault–A short frame error	●		●
Er02-6	Encoder fault–Encoder overtime	●		●
Er02-7	Encoder fault–FPGA overtime	●		●
Er02-8	Encoder fault–Low voltage alarm of the encoder	●		●
Er02-9	Encoder fault–Undervoltage alarm of the encoder	●		●
Er02-a	Encoder fault–Encoder over-temperature	●		●
Er02-b	Encoder fault–EEPROM write error	●		●
Er02-c	Encoder fault–EEPROM no data			●
Er02-d	Encoder fault–EEPROM data check error			●
Er03-0	Current sensor fault–U phase current sensor fault	●		●
Er03-1	Current sensor fault–V phase current sensor fault	●		●
Er03-2	Current sensor fault–W phase current sensor fault	●		●
Er04-0	System initialization fault	●		●
Er05-1	Setting fault–Motor model does not exist	●		●
Er05-2	Setting fault–Motor and drive model does not match	●		●
Er05-3	Setting fault–Software limit setting error	●	●	●
Er05-4	Setting fault–Homing mode setting fault	●	●	●
Er05-5	Setting fault–Bit control travel overflow fault	●	●	●
Er07-0	Regeneration discharge overload fault	●	●	●
Er08-0	Analog input overvoltage fault–Analog input 1	●	●	●
Er08-1	Analog input overvoltage fault–Analog input 2	●	●	●
Er08-2	Analog input overvoltage fault–Analog input 3	●	●	●
Er09-0	EEPROM fault–Read-write fault			●

Fault code	Name	Feature		
		History record	Can be cleared	Disable
Er09-1	EEPROM fault–data check fault			●
Er10-0	Hardware fault–FPGA fault	●		●
Er10-1	Hardware fault–Communication card fault	●	●	●
Er10-2	Hardware fault–Grounding short circuit fault	●		●
Er10-3	Hardware fault–External input fault	●	●	●
Er10-4	Hardware fault–Emergency stop fault	●	●	●
Er10-5	Hardware fault–485 communication fault	●	●	●
Er11-0	Software fault-Motor control task re-entry	●		●
Er11-1	Software fault–Reentrant cycle mission	●		●
Er11-2	Software fault–Illegal operation	●		●
Er12-0	IO fault–Digital input distribution repeated	●	●	●
Er12-1	IO fault-Repetitive analog input distribution	●	●	●
Er12-2	IO fault–Pulse input frequency is too high	●	●	●
Er13-0	Main circuit overvoltage fault	●	●	●
Er13-1	Main circuit undervoltage fault		●	●
Er14-0	Undervoltage fault of control power		●	●
Er17-0	Drive overload fault	●		●
Er18-0	Motor overload fault	●	●	●
Er18-1	Motor overtemp fault	●	●	●
Er19-0	Speed fault–Overspeed fault	●	●	●
Er19-1	Speed fault-FWD overspeed fault	●	●	●
Er19-2	Speed fault-REV overspeed fault	●	●	●
Er19-3	Speed fault- Overspeed parameter setup error	●	●	●
Er20-0	Speed deviation fault	●	●	●
Er21-0	Position overtravel - FWD overtravel	●	●	●
Er21-1	Position overtravel - REV overtravel	●	●	●
Er22-0	Position deviation fault	●	●	●
Er22-1	Hybrid control deviation is too large	●	●	●
Er22-2	Position increment overflow fault	●	●	●
Er22-3	CANopen fault–Sync signal timeout	●	●	●
Er22-4	CANopen fault-position command buffer full	●	●	●
Er23-0	Drive overtemp fault	●	●	●
Er24-0	PROFIBUS-DP fault–PWK parameters ID error		●	

Fault code	Name	Feature		
		History record	Can be cleared	Disable
Er24-1	PROFIBUS-DP fault–PWK Parameters exceeds the range		●	
Er24-2	PROFIBUS-DP fault–PWK Parameters are read-only		●	
Er24-3	PROFIBUS-DP fault–PZD Configuration parameter does not exist		●	
Er24-4	PROFIBUS-DP fault–PZD Configuration parameter properties do not match		●	
Er24-8	EtherCAT fault–initialization fault	●		●
Er24-9	EtherCAT fault–EEPROM fault	●		●
Er24-a	EtherCAT fault–DC Sync0 signal is abnormal	●	●	●
Er24-b	EtherCAT fault–Disconnection fault	●	●	●
Er24-c	EtherCAT fault–PDO data loss fault	●	●	●
Er25-4	Application fault–Encoder offset angle test overtime	●	●	●
Er25-5	Application fault–Encoder offset angle test failure	●	●	●
Er25-6	Application fault–Offside of homing	●	●	●
Er25-7	Application fault–Inertia identification failure	●	●	●
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 W data exceeds the scope		●	
Er26-5	CANopen fault–Read-only cannot be modified		●	
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 modified during operating		●	
Er26-9	CANopen fault–PDO mapping is not allowed		●	
Er26-a	CANopen fault–Sync signal is too fast		●	
Er26-b	CANopen fault–Receive fault		●	
Er26-c	CANopen fault–Send failure		●	
Er26-d	CANopen fault–Sync signal repeat		●	
Er26-e	CANopen fault–The bus load rate is too high		●	
Er26-f	CANopen fault–Parameter modification state error		●	

10.5 Record table of parameter setting

Parameter	Default	Drive 1	Drive 2	Drive 3	Modified by	Date	Remark

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ASTRAADA

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