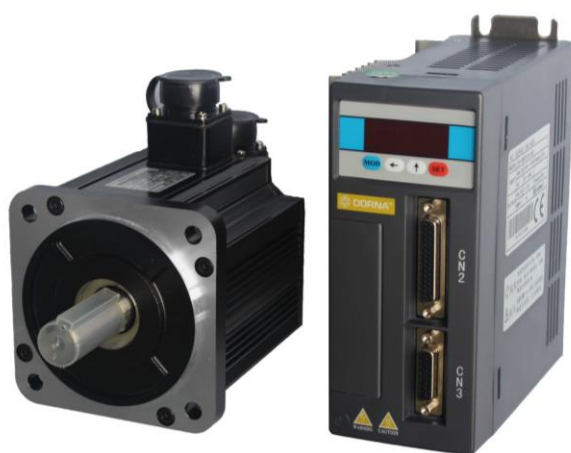


AC Servo Systems

EPS-EB Series

User Manual

(V1.00)



<http://www.cn-dorna.com>

Safety Notice

Dangers

- **Input power**
Input power of this driver is AC220V.
- **When it is installed to a machine and begins running, the motor shall be placed under the state for emergency stop at any moment.**
Otherwise, there may be personnel injuries and mechanical failure.
- **When the power is on, the housing of power supply's terminal block must be fixed.**
Otherwise, there may be electric shocks.
- **After the power is turned off or after the voltage withstand test, when the indication light of charge (CHARGE) is on, do not touch the power supply terminal.**
Otherwise, there may be electric shocks caused by residual voltage.
- **Please conduct trial run according to the procedures and instructions in the product user manual.**
When the servo motor is installed to the machine, operation mistakes may not only cause mechanical failures, but also cause personal injuries.
- **Do not make any changes to this product. No persons except the designated ones can set, dismantle or repair this product.**
Otherwise, there may be personnel injuries, mechanical failure or fire.
- **Please set a stop device on the machine side to ensure the safety.**
The holding brake of the servo motor equipped with a brake is not a stop device used to ensure safety.
Otherwise, there may be injuries.
- **Please ensure to connect the earth terminal of servo driver with the earth electrode (the earth resistance of servo driver for power input is below 100Ω) .**
Otherwise, there may be electric shocks or fire.

Notices

- This manual is an accompanying manual of EPS-EB Servo Driver, for detailed information, please refer to the Technical Manual of EPS-EB Servo Driver.
- Before installation, wiring and operation, please read thoroughly the Technical Manual of EPS-B1 Servo Driver to understand relevant matters needing attention, so as to prevent loss or danger caused by operational error.
- During the commissioning and use of driver, please set the relevant safety protection device. Our company will not bear any liability for the special losses, indirect losses and other relevant losses caused by our products.
- Information in this manual is general descriptions or characteristic introduction which may not always be the case in practical use, or may not be completely applicable when the products are further improved.

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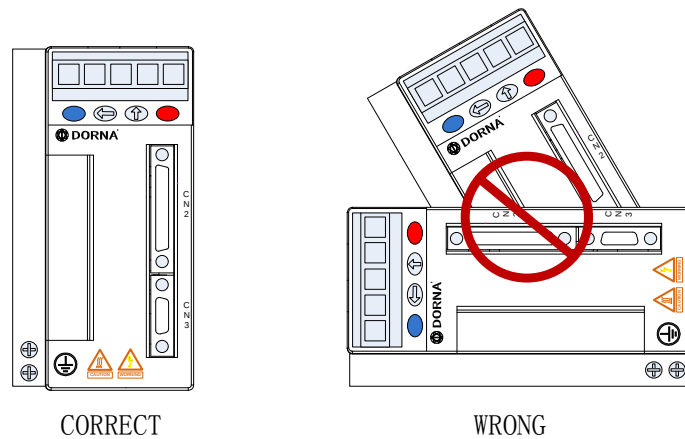
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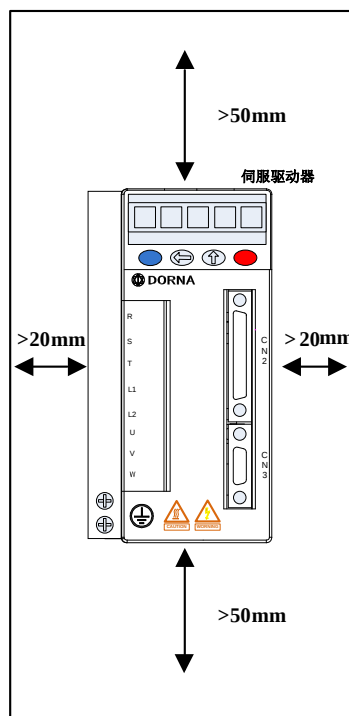
6.1.9 RS485 communication parameters.....34

1.1 Installation direction and space

The installation direction must be appropriate; otherwise, it may cause troubles. In order to ensure the fine cooling cycle effects, when the AC servo driver is installed, it must keep adequate distance from the articles and boards (walls) in its four directions and near it; otherwise, it may cause troubles. The air inlet and outlet shall not be blocked or placed inversely when the AC servo driver is installed; otherwise, it may cause fault.

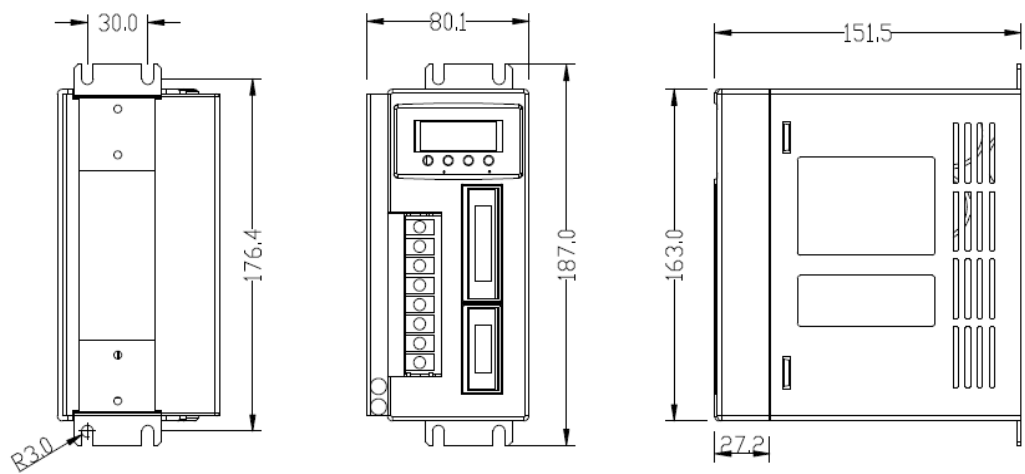


In order to lower the wind resistance to the radiator fan and let heat dissipation effectively, users shall follow the recommended installation spacing distance of one or several AC servo drivers (see the figure below) .

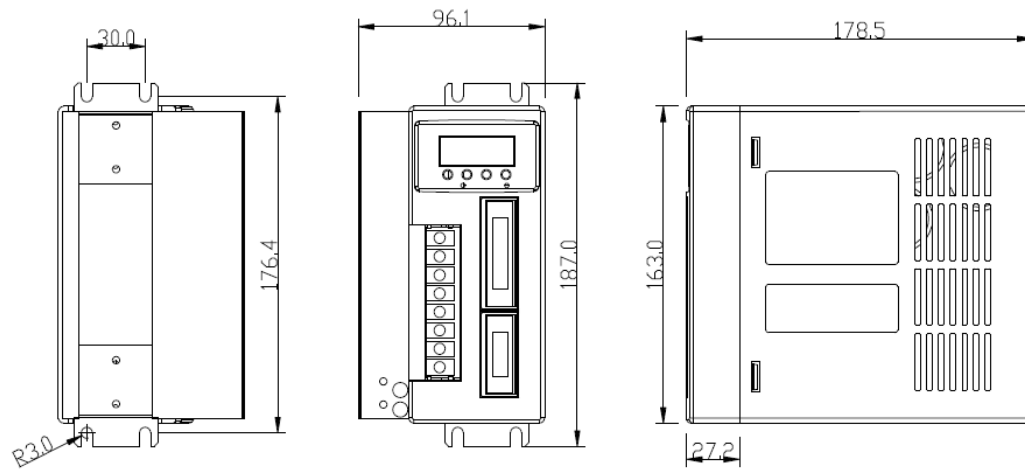


1.2 Dimensions of servo drivers

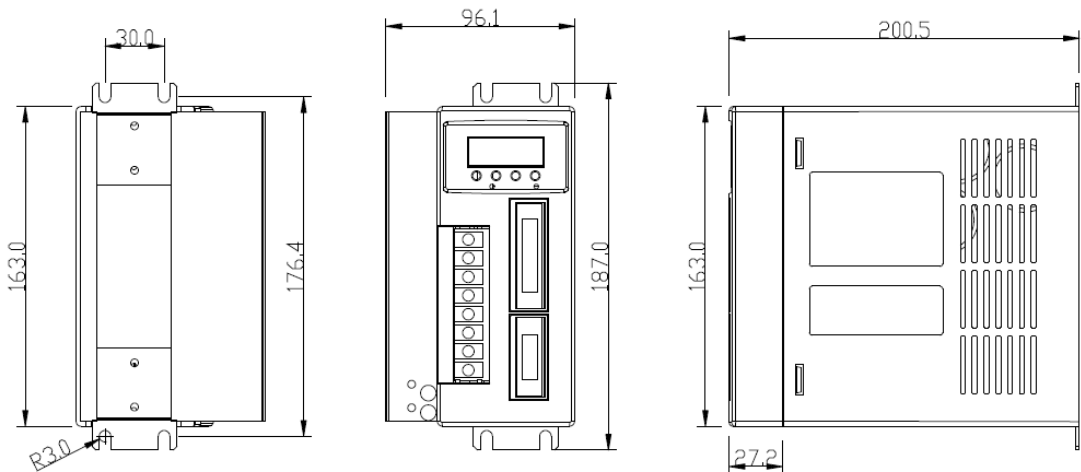
EPS-EB Series AC Servo Driver dimensions (unit: mm)



100W~750W



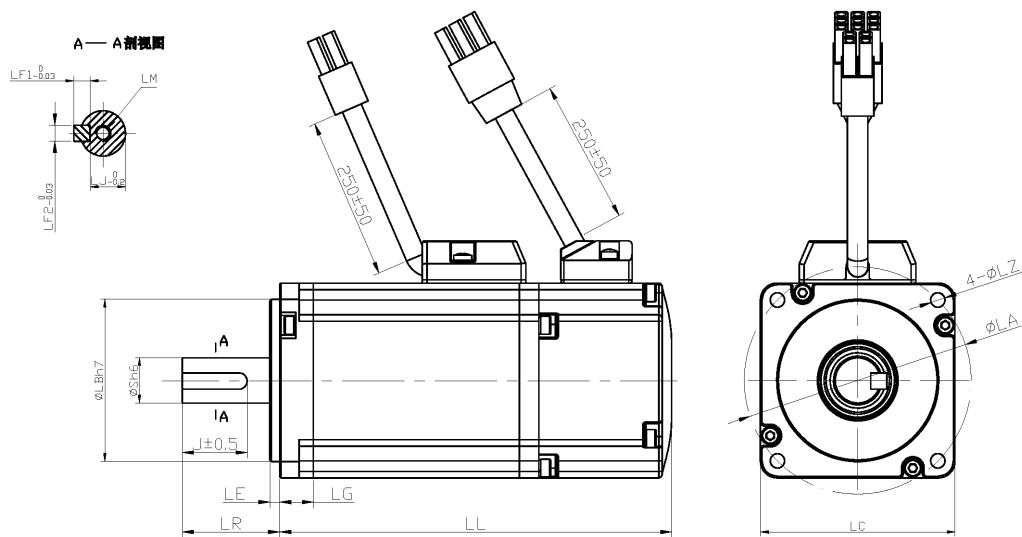
1KW~1.5KW



1.8KW~3.0KW

1.3 Dimensions of servo motors

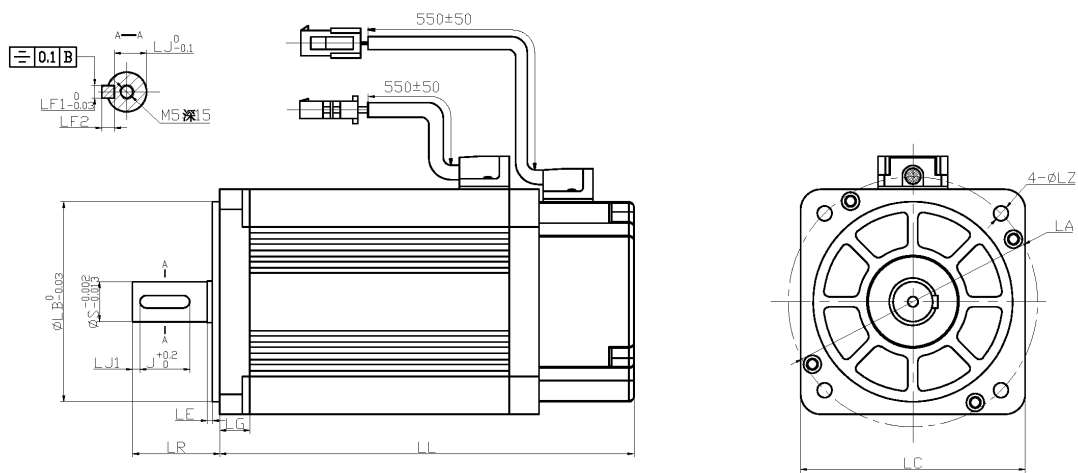
1.3.1 60/80 series servo motors



60/80 series servo motors installation dimensions (unit: mm)

Model	Flange face dimensions				Shaft end dimensions					LL	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LF2				
60DNMA1-0D20D	60	70	50	5.5	14	11	20	5	5	103	30	3	8
60DNMA1-0D40D	60	70	50	5.5	14	11	20	5	5	123	30	3	8
80DNMA1-0D75D	80	90	70	6.5	19	15.5	25	6	6	129.7	35	3	9.8

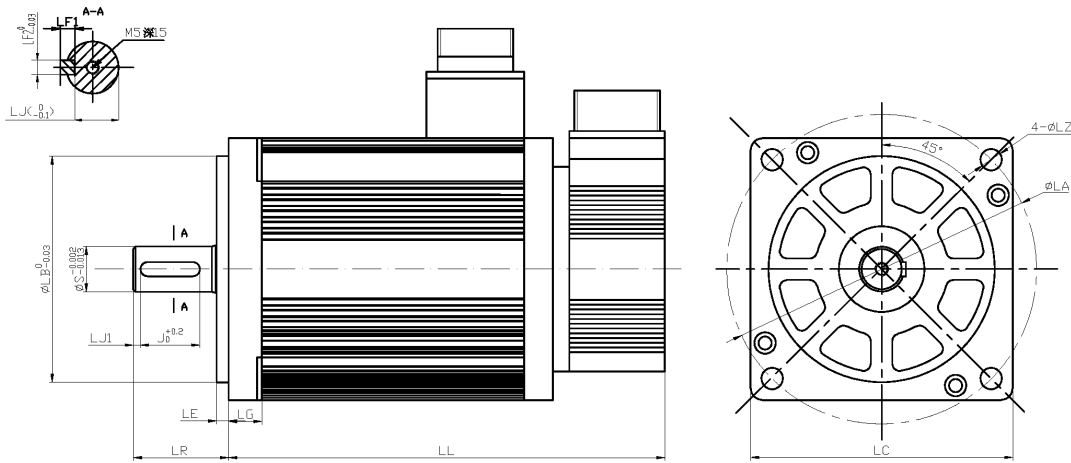
1.3.2 90 series servo motors



90 series servo motors installation dimensions (unit: mm)

Model	Flange face dimensions				Shaft end dimensions					LL	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LF2				
90DNA-08D	90	100	80	6	16	13	20	5	5	152	35	3	12
90DNA-10D	90	100	80	6	16	13	20	5	5	162	35	3	12

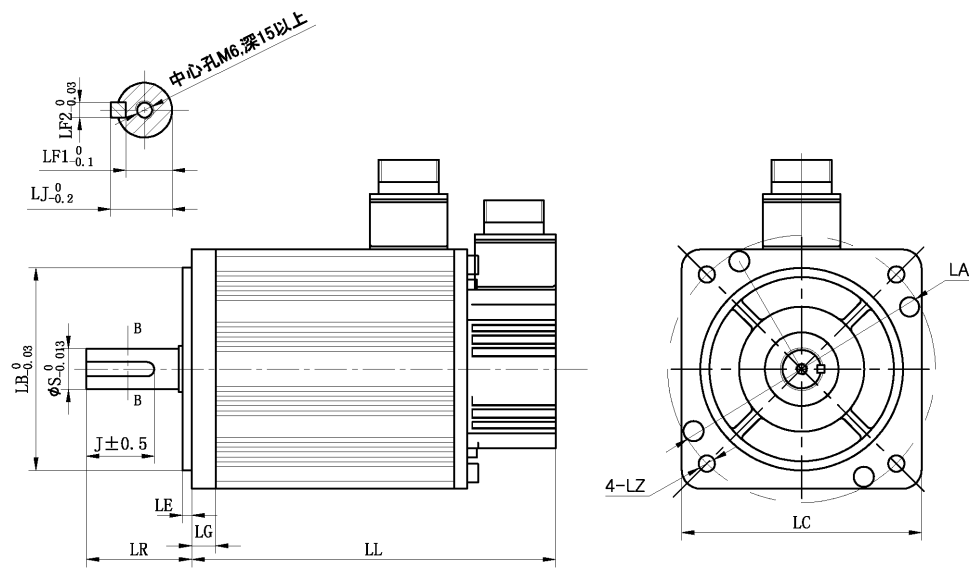
1.3.3 110 series servo motors



110 series servo motors installation dimensions (unit: mm)

Model	Flange face dimensions				Shaft end dimensions					LL	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LF2				
110DNA-04C	110	130	95	9	19	15.5	25	6	6	164	40	5	14
110DNA-09C	110	130	95	9	19	15.5	25	6	6	184	40	5	14
110DNA-12D	110	130	95	9	19	15.5	25	6	6	184	40	5	14
110DNA-12C	110	130	95	9	19	15.5	25	6	6	204	40	5	14
110DNA-15D	110	130	95	9	19	15.5	25	6	6	204	40	5	14
110DNA-18D	110	130	95	9	19	15.5	25	6	6	204	40	5	14

1.3.4 130 series servo motors



130 series servo motors installation dimensions (unit: mm)

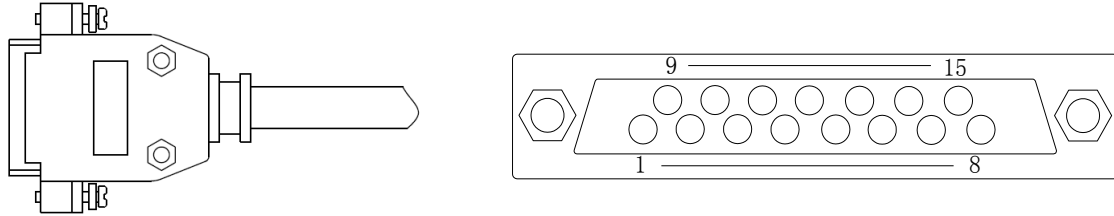
Model	Flange face dimensions				Shaft end dimensions					LL	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LF2				
130DNMA1-0D85C	130	145	110	9	22	18.5	36	6	6	163	57	5	13
130DNMA1-0001C	130	145	110	9	22	18.5	36	6	6	172	57	5	13
130DNMA1-01D2C	130	145	110	9	22	18.5	36	6	6	181	57	5	13
130DNMA1-01D5C	130	145	110	9	22	18.5	36	6	6	197	57	5	13

2.1 Connector and terminal of servo driver

EPS-EB series servo driver connectors and terminals

Terminal mark	Name	Description
R, S, T	Main loop power input terminal	Connect with three-phase AC supply.
L1, L2	Control loop power input terminal	Connect with single-phase AC supply.
U, V, W	Servo motor connecting terminal	Connected with the servo motor
	Earth terminal	It is connected with power earth terminal and motor earth terminal for grounding.
CN2	I/O connector	Connected with upper controller or RS485
CN3	Encoder connector	Connected with the motor encoder

2.1.1 Appearance and signal of CN3 terminal

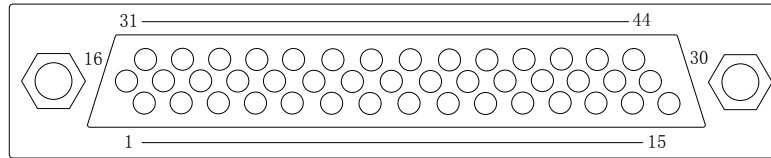


Appearance of CN3 terminal

Signal of CN3 terminal

Terminal mark	Name	Function	Terminal mark	Name	Function
9	A+	PG input A+ phase	6	U+	PG input U+ phase
1	A-	PG input A- phase	14	U-	PG input U- phase
2	B+	PG input B+ phase	5	V+	PG input V+ phase
10	B-	PG input B- phase	13	V-	PG input V- phase
3	Z+	PG input Z+ phase	12	W+	PG input W+ phase
11	Z-	PG input Z- phase	4	W-	PG input W- phase
7	+5V	PG supply +5V			
8	GND	PG supply 0V	15	PE	Shielding

2.1.2 Appearance and signal of CN2 terminal



Appearance of CN2 terminal

Arrangement of CN2 terminal

1	CLE	16	RS+	31	
2	INH	17	RS-	32	AGND
3	COIN	18		33	S_REF
4	S_RDY	19	CCWL	34	T_REF
5	ALM	20	CWL	35	DAOUT
6		21	A_CLR	36	AGND
7	BRK_OFF	22	COM+	37	
8	ZO	23	ZEROSPD	38	PULS24+
9	PULS+	24	S_ON	39	SIGN24+
10	PULS-	25	COM-	40	COM-
11	SIGN+	26	C_MODE	41	
12	SIGN-	27	TLC	42	
13	OZ+	28	ZSP	43	
14	OB-	29	OZ-	44	OA+
15	OB+	30	OA-		

Notes:

- (1) Please do not use unoccupied terminal.
- (2) Please connect the shielding layer of input-output signal cable to the enclosure of connector. Conduct frame grounding (FG) through the connector at servo driver side.
- (3) Above are default signal arrangements. Except ZO signal, all I/O signals can alter distributions through parameter settings.

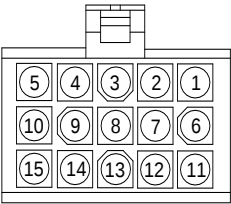
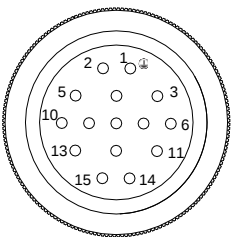
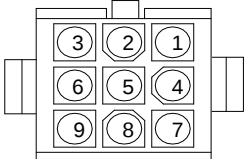
Signal of CN2 terminal

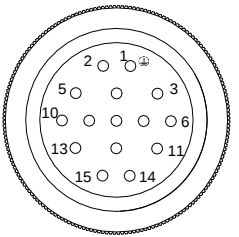
Mode	Signal	Pin No.	Functions	
Universal Input Signals	S-ON	24	Servo ON: The motor is powered on.	
	A-CLR	21	Alarm clear: release servo alarms.	
	CCWL	19	CCW prohibited	Over-travel prohibited: Stop operation of servo motor when it is on.
	CWL	20	CW prohibited	
	CLE	1	Position deviation clearance input during position control.	
	INH	2	Pulse inhibition input	
	ZEROSPD	23	Zero-speed signal input	
	C-MODE	26	Control mode switch: Switch of two control modes.	
	COM+	22	I/O signal electric power supply; user needs to provide 24VDC power supply.	
Universal Output Signals	ALM	5	Servo alarm: OFF when abnormal state is detected.	
	S_RDY	4	Servo ready: ON before S-ON if there is no alarm.	
	BRK_OFF	7	Release holding brake output.	
	ZO	8	Z phase signal open collector output.	
	COIN	3	Positioning reached (in position control mode) ; speed reached (in speed control mode) .	
	TLC	27	Target torque reached.	
	ZSP	28	Zero speed output.	
	COM-	25, 40	Output signal common grounding terminal.	
Position Control	PULS+	9	Pulse command input channel: Pulse command can have three different input forms and can be selected using PA28. 0: Sign + pulse train 1: CCW+CW pulse train 2: A + B pulse train For 24VDC, use PULS24+ & PULS-, SIGN24+ & SIGN-.	
	PULS-	10		
	SIGN+	11		
	SIGN-	12		
	PULS24+	38		
	SIGN24+	39		
Position Feedback	OA+	44	A phase signal	Encoder feedback pulse signal (A phase, B phase) and divided by the driver for output. Dividing parameter is PA25.
	OA-	30		
	OB+	15	B phase signal	
	OB-	14		
	OZ+	13	Z phase signal	Origin pulse (Z phase) signal, pulse width can be widened using PA30.
	OZ-	29		
Speed/Torque Control	S-REF	33	Speed command voltage input (±10VDC)	
	T_REF	34	Torque command voltage input (±10VDC)	
	AGND	32, 36	Analog ground signal.	
Analog Output	DAOUT	35	Analog signal output signal (0~10VDC)	
RS485 Communication	RS+	16	RS485 communication terminal.	
	RS-	17		

Notes: for I/O signals of unassigned pins, please refer to 3.2 CONTROL SIGNALS.

2.2 Wiring at motor side

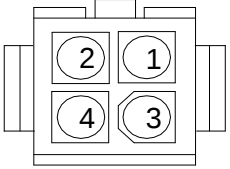
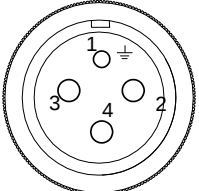
2.2.1 Motor Encoder Terminal appearance and signal

Encoder type	Terminal mark	Name	Function	Appearance
Non line-saving encoder: B	2	5V	PG power supply +5V	 Compatible encoder line: BD-002
	3	0V	PG power supply +0V	
	4	A+	PG input A+ phase	
	14	A-	PG input A- phase	
	9	B+	PG input B+ phase	
	13	B-	PG input B- phase	
	7	Z+	PG input Z+ phase	
	5	Z-	PG input Z- phase	
	6	U+	PG input U+ phase	
	8	U-	PG input U- phase	
	11	V+	PG input V+ phase	
	15	V-	PG input V- phase	
	10	W+	PG input W+ phase	
	12	W-	PG input W- phase	
Non line-saving encoder: B	1	PE	Shielding	 Compatible encoder line: BC-002
	2	5V	PG power supply +5V	
	3	0V	PG power supply +0V	
	4	A+	PG input A+ phase	
	7	A-	PG input A- phase	
	5	B+	PG input B+ phase	
	8	B-	PG input B- phase	
	6	Z+	PG input Z+ phase	
	9	Z-	PG input Z- phase	
	10	U+	PG input U+ phase	
	13	U-	PG input U- phase	
	11	V+	PG input V+ phase	
	14	V-	PG input V- phase	
	12	W+	PG input W+ phase	
	15	W-	PG input W- phase	
Line-saving encoder: H, E, K	1	+5V	PG power supply +5V	 Compatible encoder line: BA-017
	2	0V	PG power supply +0V	
	3	A+	PG input A+ phase	
	4	A-	PG input A- phase	
	5	B+	PG input B+ phase	
	6	B-	PG input B- phase	
	7	Z+	PG input Z+ phase	

Line-saving encoder: H, K	8	Z-	PG input Z- phase	 Compatible encoder line: BD-017
	9	PE	Shielding	
	2	5V	PG power supply +5V	
	3	0V	PG power supply +0V	
	4	A+	PG input A+ phase	
	7	A-	PG input A- phase	
	5	B+	PG input B+ phase	
	8	B-	PG input B- phase	
	6	Z+	PG input Z+ phase	
	9	Z-	PG input Z- phase	
	1	PE	Shielding	

Encoder types: B non line-saving 2500 line, H line-saving 1024 line, E line-saving 2500 line, K line-saving 5000 line.

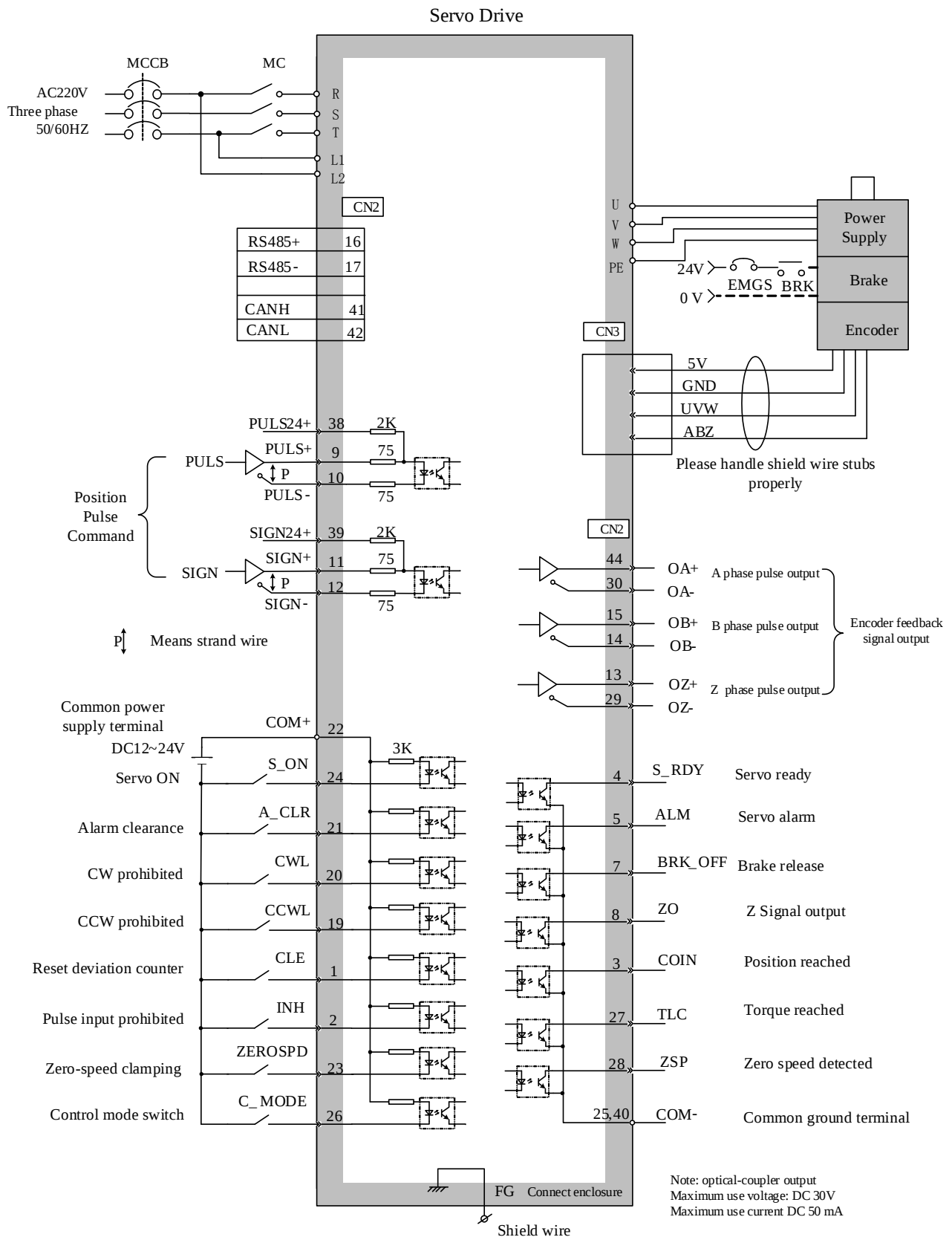
2.2.2 Motor Power Terminal appearance and signal

Motor Flange	Terminal Mark	Name	Function	Appearance
60/80/90	1	U	Motor U phase power	 Compatible power line: DA-002
	2	V	Motor V phase power	
	3	W	Motor W phase power	
	4	PE	Casing	
110/130	3	U	Motor U phase power	 Compatible power line: DB-002, DC-002
	2	V	Motor V phase power	
	4	W	Motor W phase power	
	1	PE	Casing	

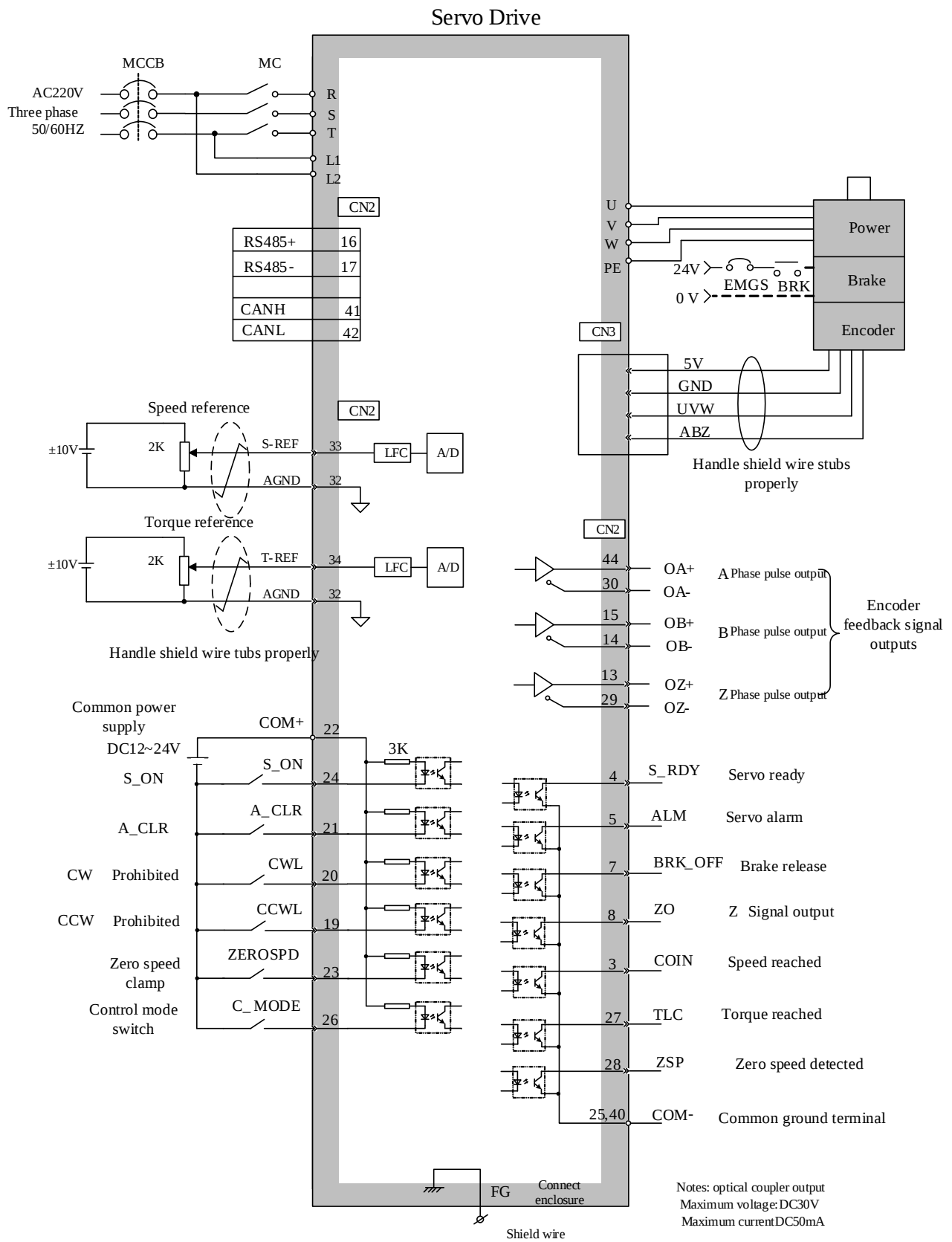
Notes: The above table is based on the terminal at motor side, so please pay attention to it when connecting wire.

2.3 Standard wirings

2.3.1 Position control wiring diagrams



3.2.2 Speed/torque control wiring diagrams



Chapter III Control & Operation

3.1 Control mode selection

EPS-EB series servo drive control modes

Parameter setting		Control modes
PA04=0	PA110=0	External position control & internal speed control (JOG) switch: External position control: use position command pulse train to control servo motor positions. Position is set by the number of pulses; speed is set by the frequency of pulses. This is used in applications where positioning are needed. Internal speed control: use JOG1 and JOG2 to realize motor JOG forward & backward movements. (Motor speed is set by PA131)
	PA110=2	Internal position control & internal speed control (JOG) switch: Internal speed control: used without upper controllers. Use PTRG to activate internal position control. Position is set by PA83, PA84 and so on.
	PA110=3	External position control & external speed control switch: Use C_MODE to switch between position command pulse train inputs and external analog speed command inputs.
	PA110=4	External position control & internal torque control switch: Use C_MODE to switch between position command pulse train inputs and external analog torque command inputs. Internal torque control: keep constant motor torque output. Torque output is set by PA128; speed limit is set by PA45; TRQ_INV is torque command negation signal.
PA04=1	PA110=0	External speed control: Use analog voltage input to control speed of servo motor. Used in the following applications: 1) speed control; 2) Create a position loop between servo drive encoder pulse output & upper controller; 3) Use SPD1 & SPD2 to realize real time switch between analog signal & internal THREE-level speed.
	PA110=1	Torque control & speed control switch: Use C_MODE to realize torque control & speed control switch. This is used in applications when push & press or stretch is needed. Torque control: use TRQ1 & TRQ2 to choose torque control mode (Analog voltage command, PA128, PA129 or PA130). Speed control: use SPD1 & SPD2 to choose speed control mode (Analog voltage command, PA131, PA132 or PA133).

PA04=7	—	Internal speed control: Internal EIGHT-level speed: use SPD1, SPD2, SPD3 to select the pre-set speeds (set by PA131~PA138) for speed control.
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3.2 Control signals

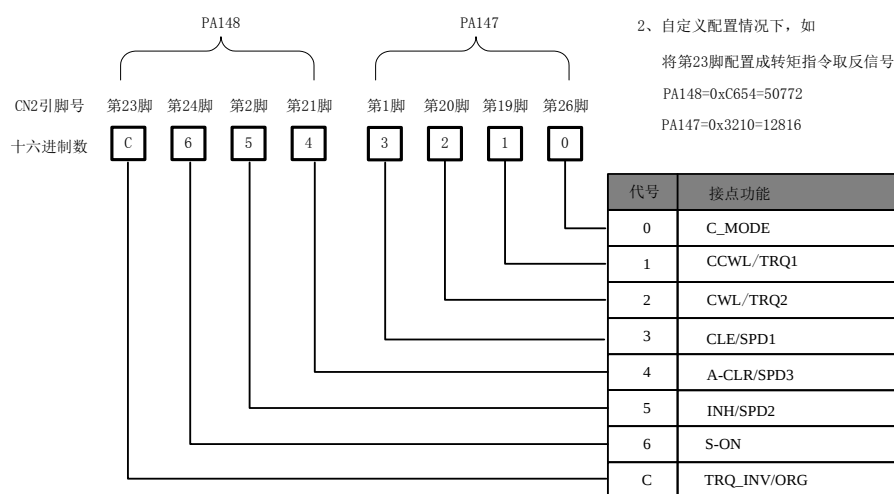
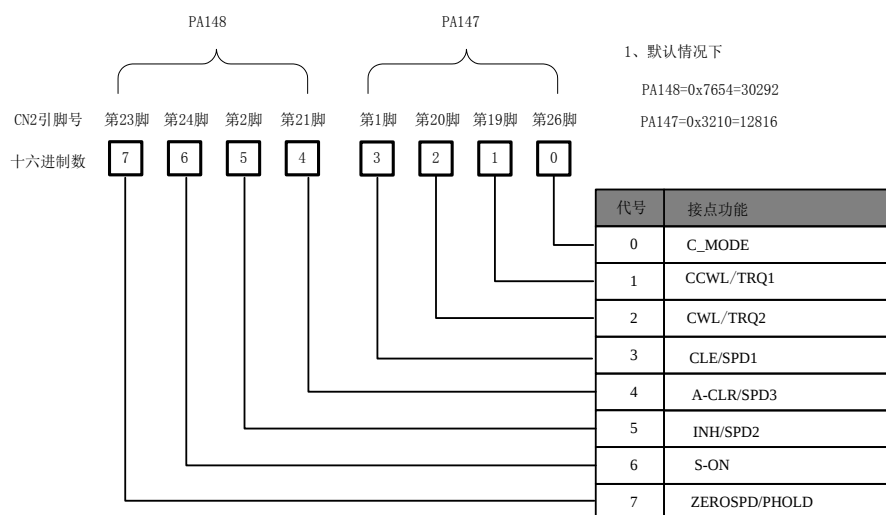
3.2.1 Input signals

(1) Input signal configurations

Factory default input signal configurations can be modified by PA147~PA148.

Parameter number	Name		Set range	Default value	Effective time
PA147~PA148	Control terminal input signal selections		0~65535	PA147 =12816 (0x3210) PA148 =30292 (0x7654)	Immediately
	Code	Input signal functions			
	0	Control mode switch (C-MODE)			
	1	CCW prohibited (CCWL) /Torque command select 1 (TRQ1)			
	2	CW prohibited (CWL) /Torque command select 2 (TRQ2)			
	3	Reset deviation counter (CLE) /Speed command select 1 (SPD1)			
	4	Release alarms (A-CLR) /Speed command select 3 (SPD3)			
	5	Pulse Input prohibited (INH) /Speed command select 2 (SPD2)			
	6	Servo enabled (S-ON)			
	7	Zero speed clamp (ZEROSPD) /Internal position pause (PHOLD)			
	8	JOG forward (JOG1) /Speed command negation (SPD_INV)			
	9	JOG backward (JOG2) /Internal position select 1 (POS1)			
	A	Internal position trigger (PTRG)			
	B	Homing trigger (HOME)			
	C	External origin reference (ORG) /Torque command negation (TRQ_INV)			
	D	Internal position select 2 (POS2)			
	E	Electronic gear ratio switch (G-SEL) /Internal Position command negation (POS_INV)			
	F	Internal position select 3 (POS3)			

PA147~PA148 correspond to 4 input signal pin respectively, as shown below:



(2) Input signal status selections

parameter number	Name	Set range	Default value	Effective time
PA64	Input signal status selection	0~65535	0	Immediately
	PA64 第15位 第14位 第13位 第12位 第3位 第2位 第1位 第0位 二进制数 0 0 0 0 0 0 0 0 说明 输入信号0形态选择 (0:L电平有效 1:H电平有效) 输入信号1形态选择 (0:L电平有效 1:H电平有效) 输入信号2形态选择 (0:L电平有效 1:H电平有效) 输入信号3形态选择 (0:L电平有效 1:H电平有效) 输入信号C形态选择 (0:L电平有效 1:H电平有效) 输入信号D形态选择 (0:L电平有效 1:H电平有效) 输入信号E形态选择 (0:L电平有效 1:H电平有效) 输入信号F形态选择 (0:L电平有效 1:H电平有效)			
例：在需要内部实现伺服使能时，输入信号6（S_ON）置1，PA64=0100 0000 = 64。				

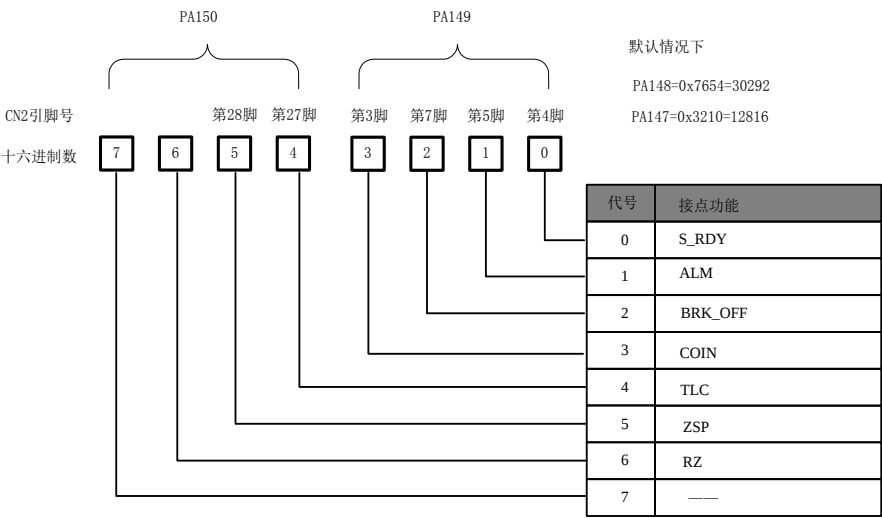
3.2.2 Output signals

(1) Output signal configurations

Factory default output signal configurations can be modified by PA149~PA150.

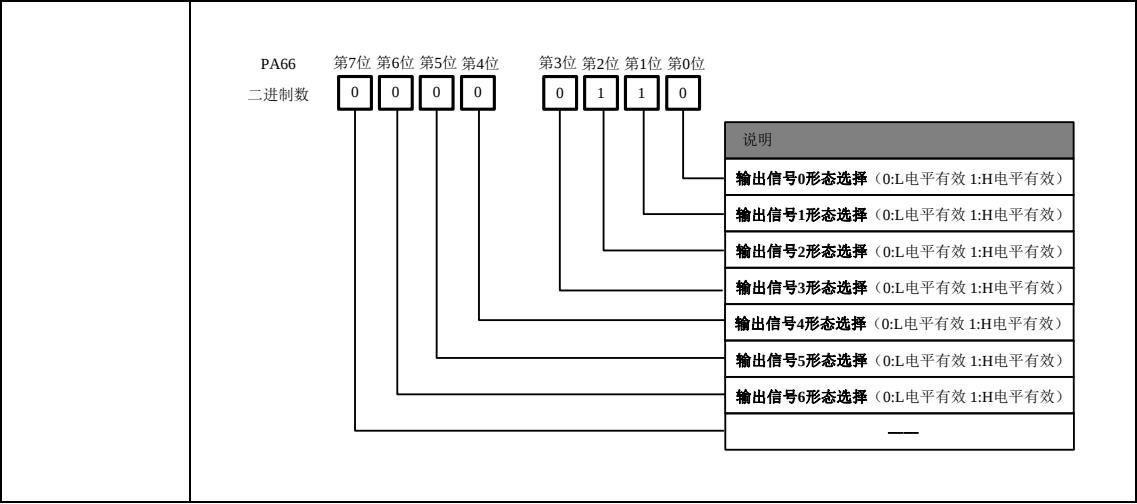
parameter number	Name		Set range	Default value	Effective time
PA149~PA150	Control terminal output signal selectection		0~65535	PA149 =12816 (0x3210) PA150 =30292 (0x7654)	Immediately
	Code	Output signal functions			
	0	Servo ready (S-RDY)			
	1	Servo alarm (ALM)			
	2	Brake release (BRK_OFF)			
	3	Position reached (COIN)			
	4	Torque reached (TLC)			
	5	Zero speed signal (ZSP)			
	6	Homing reached (RZ)			

PA149~PA150 can configure 6 output signal pins except ZO, as shown below:



(2) Output signal status selctions

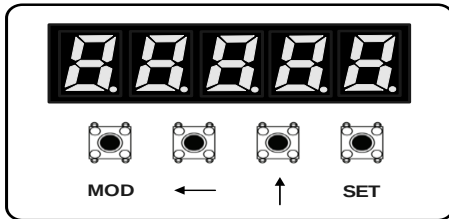
parameter number	Name	Set range	Default value	Effective time
PA66	Output signal status select	0~65535	6	Immediately



Chapter 4 Monitoring and Operations

4.1 Panel operator

Panel operator can be used to monitor servo drive's status and change parameters.

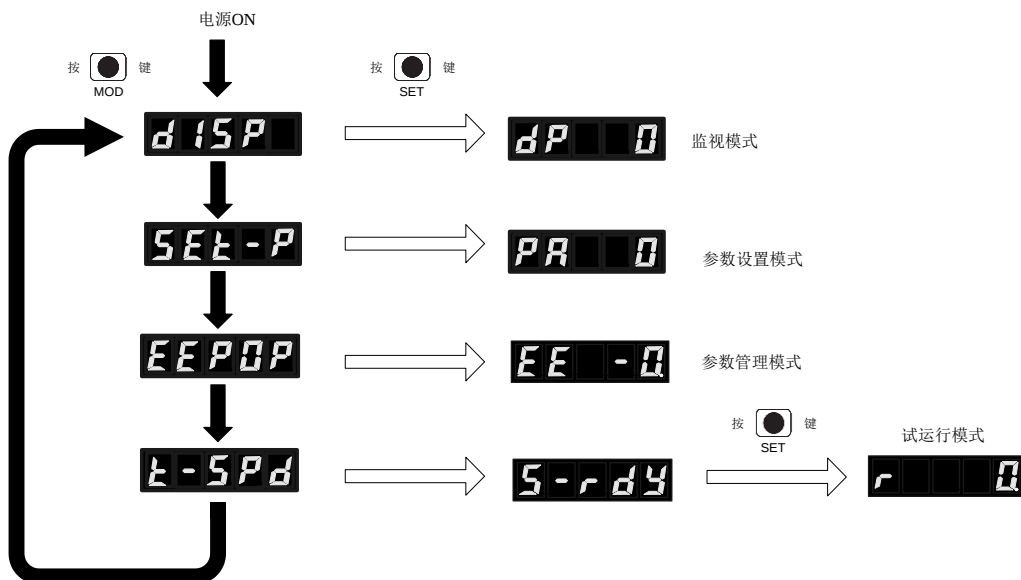


Explanations of keys are given below:

Mark	Key name	Functions
MOD	Mode/Escape	Switch between different modes or escape to last operation
←	Left	Move to digits leftwards in loops
↑	Increase	Increase value or switch between '+' & '-'
SET	Set/Confirm	Confirm operations or value changes

4.2 Mode switch

Press MODE & SET keys to switch between modes.



4.3 Monitoring functions

No.	Content	Unit
dP 00	Motor speed	【r/min】
dP 01	Motor pulse feedback quantity lower 4-place	【1encoder pulse】
dP 02	Motor pulse feedback quantity higher 5-place	【10000encoder pulse】
dP 03	Position command pulse quantity lower 4-place (before electronic gear)	【1 command pulse】
dP 04	Position command pulse quantity higher 5-place (before electronic gear)	【10000encoder pulse】
dP 05	Position deviation pulse quantity lower 4-place	【1encoder pulse】
dP 06	Position deviation pulse quantity higher 5-place	【10000encoder pulse】
dP 07	Speed command analog Input	【0.0025V】
dP 08	Speed command	【r/min】
dP 09	Torque command analog Input	【0.0025V】
dP 10	Torque command	【%】
dP 11	Internal Torque feedback	【%】
dP 12	Input signal monitor	---
dP 13	Output signal monitor	---
dP 14	command pulse frequency	【0.1KHz】
dP 15	Load current	【A】
dP 19	encoder number of revolutions	---
dP 20	encoder UVW signal	---
dP 25	Alarm log 1	---
dP 26	Alarm log 2	---
dP 27	Alarm log 3	---
dP 28	Alarm log 4	---
dP 34	encoder Z signal captured position	---
dP 35	encoder Z signal captured sum	---
dP 36	CPLD software version	---
dP 37	DSP software version	---

Chapter 5 Troubleshooting

5.1 Errors

Err No.	Error Name	Cause	Solutions
Err.02	Main circuit under-voltage	Main power supply under-voltage or over-fluctuate	Check R, S, T input power
Err.03	Main circuit over-voltage	Main power voltage over-voltage or over-fluctuate	Check R, S, T input power
		Brake resistor broken	Check Brake resistor
		Brake resistor insufficient power	Re-confirm load status or replace a brake resistor with higher rated power
		Servo drive malfunction	Replace Servo drive
Err.04	Control circuit under-voltage	Control circuit power voltage too low	Check L1, L2 input power voltage, or check cable terminal contact status
		Control circuit power voltage over-fluctuate	Increase PA153, PA154 value
Err.01	Motor overload	Motor model parameter (PA9) not match	Contact DORNA directly
		encoder line malfunction	Check encoder line wiring, model and check cable terminal contact status
		motor power line malfunction	Check motor power line wiring, phase sequence and check cable terminal contact status
		Motor encoder malfunction	Replace servo motor
		Motor stall or overload; Motor torque is more than rated torque	Re-confirm load status or replace a bigger servo
			Increase torque limit (PA48)
			Increase overload curve (PA81, PA82)
			Increase servo acceleration/deceleration time constant (PA39, PA40)
		Servo drive malfunction	Replace Servo drive
Err.06	Motor overload	Same as above	Increase overload curve (PA120, PA121)
Err.07	Motor overload	Same as above	Increase overload curve (PA122, PA123)
Err.05	Motor over-speed	Motor model parameter (PA9) not match	Contact DORNA
		encoder line malfunction	Check encoder line wiring, model and check cable terminal contact status
		motor power line malfunction	Check motor power line wiring, phase sequence and check cable terminal contact status

		Wrong speed loop gain	Adjust speed loop gain
Err.08	Motor stall	Same as above.	Same as above.
Err.09	Position over-proof (out of tolerance)	Input pulse frequency too high or accelerate/decelerate too fast	——
		Relevant parameter setting not appropriate	Motor model parameter (PA9) not match Increase position loop gain and speed loop gain (PA11, PA14), or increase position over-proof threshold (PA53)
		encoder line , motor power line malfunction	Check encoder line , motor power line
		Load inertia too high	Re-confirm load status, increase motor torque output (PA48) , or replace a bigger servo
		(If can be ignored)	Set PA54=1 can ignore this error
Err.10	Current deviation	Motor model parameter (PA9) not match	Contact DORNA
		Relevant parameter setting not appropriate	Adjust current loop PID parameter, to achieve faster current loop responsiveness
		(If can be ignored)	PA113=8192 to ignore
Err.16	parameter mistake	Cannot read correct value from EEPROM	Reset to factory default (EE-1)
Err.20	Power module (IGBT) alarm	encoder line, motor power line malfunction	Check encoder line , motor power line
		Motor model parameter (PA9) not match	Contact DORNA
		parameter setting not appropriate	Adjust position loop gain and speed loop gain (PA11, PA14)
		Load inertia too high	Re-confirm load status, or replace a bigger servo
		Servo drive malfunction	Replace Servo drive
Err.21	Current-sensing channel 1 malfunction	Internal Current-sensing circuit broken	If error persists after rebooting servo, replace Servo drive
Err.22	Current-sensing channel 2 malfunction		
Err.26	encoder AB pulse lost	encoder line malfunction	Confirm encoder line model , Check encoder wiring
		encoder signal interference too high	Conduct appropriate encoder line cable management and correct servo grounding
		Motor model parameter (PA9) not match	Contact DORNA
		Internal encoder signal processing circuit broken	Replace Servo drive
		Motor encoder malfunction	Replace servo Motor

Err.27	encoder UVW error	Same as above.	Same as above., also can use dP20 to monitor UVW signal
Err.28	encoder UVW disconnection	encoder line malfunction	Check encoder wiring
Err.29	encoder ABZ disconnection	encoder line malfunction	Check encoder wiring
Err.30	encoder Z pulse lost	encoder line malfunction	Check encoder wiring
		Motor encoder malfunction	Replace servo motor
		(If can be ignored)	Set PA113=8 to ignore
Err.31	Magnetic encoder initialization status error	Motor encoder error	Check motor nameplate to confirm whether the encoder is magnetic encoder
		encoder line malfunction	Check encoder wiring
Err.32	Electronic gear ratio protection	Electronic gear ratio value overflow	Adjust electronic gear ratio (PA31 , PA32)
Err.33	Input signal configuration error	Input signal pin configuration duplicates or un-defined	Confirm Input pin configuration parameter (PA147, PA148)
Err.34	Output signal configuration error	Output signal pin configuration duplicates or un-defined	Confirm Output pin configuration parameter (PA149, PA150)

Chapter 6 Parameters

6.1 Parameters

6.1.1 Basic parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA000	password	0~9000		58	
PA001	Carrier frequency	5~10	KHz	8	re-power on
PA003	Initial display status To select display status when power on.	0~40		0	re-power on
PA004	Control mode selection Refer to 3.1	0~7		0	re-power on
PA110	Function selection parameter Refer to 3.1	0~10		0	
PA009	Motor model select	0~280		—	re-power on

6.1.2 Function selection parameter

parameter code	parameter Name & functions		Set range	unit	Default value	Effective
PA006	Function selection parameter		0~65535		0	re-power on
	Place	Definition	Status setting			
			0	1		
	bit0	CWL & CCWL control signal	signal valid	signal invalid		
	bit1	Input direction signal (SIGN) negation	invalid operation	valid operation		
	bit2	Input pulse signal (PULSE) negation	invalid operation	valid operation		
	bit3	Save 2 parameters to EEPROM when power off	invalid operation	valid operation		
	bit4	Save motor turns when power off	invalid operation	valid operation		
	bit5	Speed display DP[0] negation	invalid operation	valid operation		
	bit6	ZEROSPD control signal	signal valid	signal invalid		

parameter code	parameter Name & functions		Set range	unit	Default value	Effective
	bit7	INH control signal	signal valid	signal invalid		
	bit8	Z pulse signal logic negation	invalid operation	valid operation		
	bit9	Zero speed clamp at speed control mode	Speed clamp	Position clamp		
PA019	Function selection parameter		0~65535		0	
	Place	Definition	Status setting			
			0	1		
	bit0	Torque analog Input selection	Input valid	Input invalid		
	bit1	Speed analog Input selection	Input valid	Input invalid		
	bit2	Electronic gear ratio switch signal	Input valid	Input invalid		
PA029	Input trigger mode selection bit0: CLE signal Input selection 0: electrical level trigger mode 1: edge trigger mode		0~65535		0	

6.1.3 Gain & filter parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA011	Position loop gain It decides the responsiveness characteristics of position control system. Positioning time can be shorted, if larger position loop gain value is set. However, vibration may be caused, if the set value is too large, so please pay attention to this problem in modification.	100~9000		2000	
PA012	Speed feedforward gain In the speed control instruction calculated based on internal position instruction, add the value got by multiplying this parameter ratio into the speed instruction from position control processing	0~100	%	0	
PA013	Speed feedforward filter Set the time constant of first-order lag filter required for speed feed-forward input.	0~8150	0.1ms	6000	
PA014	Speed loop gain It decides the responsiveness characteristics of speed loop. In order to increase position ring gain and improve servo system's total responsiveness, the speed	400~8000		1000	

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
	ring gain setting should be increased. However, vibration may be caused, if the set value is too large, so please pay attention to this problem in modification.				
PA015	First speed loop integral time constant Time constant is used to set speed loop integral time constant. The smaller the set value, the greater the integral's function, and the stronger the anti-disturbance capability, but too large setting may cause vibration.	0~2000	0.1 ms	200	
PA023	Second speed loop integral time constant	0~1000	0.1 ms	10	
PA016	Speed detection filter time constant After speed detection, time constant of low-pass filter can be set. The greater the set value, the larger the time constant, but the responsiveness will decrease, despite the reduced motor noise.	0~9000		0	
PA022	Pulse input filter time constant	1~127		5	re-power on
	The larger this parameter, the more obvious filter effect for commands, however the lower cut-off frequency.				
	parameter set value	Cut-off frequency (KHz)	parameter set value	Cut-off frequency (KHz)	
	20	200	80	50	
	40	100	100	40	
	60	67	120	33	
PA079	Speed analog input filter parameter The larger this value, the more obvious filter effects however over-large value will cause slow speed response.	1~32		10	
PA080	Torque analog input filter parameter The larger this value, the more obvious filter effects however over-large value will cause slow torque response.	1~32		10	
PA035	Pulse Input filter parameter The larger this value, the more obvious filter effects	1~1000		1	
PA017	Speed Input filter time constant The larger this value, the more smooth speed changes however can also result in worse responsiveness.	0~8150		0	
PA018	Torque Input filter time constant The larger this value, the more smooth torque changes however can also result in worse responsiveness.	0~8150		0	
PA020	Speed filter mode selection 0: Linear acceleration/deceleration 1: S-curve	0~1		0	
PA021	S-curve coefficient The larger this value, the faster	1~100		1	

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
	acceleration/deceleration for S-curves.				

6.1.4 Position control parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA025	Encoder pulse output frequency division coefficient	1~255		1	re-power on
PA026	Encoder pulse output logic negation	0~1		0	re-power on
PA027	command pulse Input logic negation	0~1		0	
PA028	command pulse Input mode selection 0: pulse /direction 1: CW/CCW pulse 2: A/B pulse	0~2		0	re-power on
PA031	First Electronic gear ratio numerator	1~65535		1	
PA032	First Electronic gear ratio denominator Electronic gear ratio Set range: 1/200 ~ 200	1~65535		1	
PA141	Second Electronic gear ratio numerator	1~65535		1	
PA142	Second Electronic gear ratio denominator	1~65535		1	
PA083	Internal position0 first place	-9999~9999	r	0	
PA084	Internal position0 second place	-9999~9999	pulse	0	
PA085	Internal position1 first place	-9999~9999	r	0	
PA086	Internal position1 second place	-9999~9999	pulse	0	
PA087	Internal position2 first place	-9999~9999	r	0	
PA088	Internal position2 second place	-9999~9999	pulse	0	
PA089	Internal position3 first place	-9999~9999	r	0	
PA090	Internal position3 second place	-9999~9999	pulse	0	
PA091	Internal position4 first place	-9999~9999	r	0	
PA092	Internal position4 second place	-9999~9999	pulse	0	
PA093	Internal position5 first place	-9999~9999	r	0	
PA094	Internal position5 second place	-9999~9999	pulse	0	
PA095	Internal position6 first place	-9999~9999	r	0	
PA096	Internal position6 second place	-9999~9999	pulse	0	
PA097	Internal position7 first place	-9999~9999	r	0	
PA098	Internal position7 second place	-9999~9999	pulse	0	
PA099	Internal position sections to execute	1~8		1	
PA102	Internal position Speed 0	0~5000	rpm	120	
PA103	Internal position Speed 1	0~5000	rpm	130	
PA104	Internal position Speed 2	0~5000	rpm	140	
PA105	Internal position Speed 3	0~5000	rpm	150	
PA106	Internal position Speed 4	0~5000	rpm	160	

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA107	Internal position Speed 5	0~5000	rpm	170	
PA108	Internal position Speed 6	0~5000	rpm	180	
PA109	Internal position Speed 7	0~5000	rpm	190	
PA160	Internal position0 stop time	1~9000	0.1ms	100	
PA161	Internal position1 stop time	1~9000	0.1ms	100	
PA162	Internal position2 stop time	1~9000	0.1ms	100	
PA163	Internal position3 stop time	1~9000	0.1ms	100	
PA164	Internal position4 stop time	1~9000	0.1ms	100	
PA165	Internal position5 stop time	1~9000	0.1ms	100	
PA166	Internal position6 stop time	1~9000	0.1ms	100	
PA167	Internal position7 stop time	1~9000	0.1ms	100	

6.1.5 Speed control parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA039	Acceleration time constant	1~9999	ms	200	
PA040	Deceleration time constant	1~9999	ms	200	
PA042	Speed command Input zero speed clamp place threshold	1~300	0.1rpm	0	
PA043	Speed command Input gain	10~1000		200	
PA044	Speed command Input logic negation	0~1		0	
PA045	Speed command Input offset compensation	-9000~9000	0.1rpm	0	
PA118	Maximum speed multiplier Percentage of motor maximum speed to rated speed.	50~300	%	150	
PA131	Internal Speed 0	-5000~5000	rpm	500	
PA132	Internal Speed 1	-5000~5000	rpm	500	
PA133	Internal Speed 2	-5000~5000	rpm	500	
PA134	Internal Speed 3	-5000~5000	rpm	500	
PA135	Internal Speed 4	-5000~5000	rpm	500	
PA136	Internal Speed 5	-5000~5000	rpm	500	
PA137	Internal Speed 6	-5000~5000	rpm	500	
PA138	Internal Speed 7	-5000~5000	rpm	500	

6.1.6 Torque control parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA046	Torque command Input gain	10~1000		100	
PA047	Torque command Input logic negation	0~1		0	

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA048	Torque restraint constant Used to limit output torque. Default is 200, i.e. within 200% of rated torque.	0~300	%	200	
PA049	Torque command Input offset compensation	-9000~9000		0	
PA128	Internal Torque 0	0~300	%	0	
PA129	Internal Torque 1	0~300	%	0	
PA130	Internal Torque 2	0~300	%	0	

6.1.7 I/O parameters

param eter code	parameter Name & functions	Set range	unit	Default value	Effective																
PA064	Input signal logic electrical level select	0~65535		0																	
PA066	Output signal logic electrical level select	0~65535		6																	
PA147	Terminal Input signal select1	0~65535		12816																	
PA148	Terminal Input signal select2	0~65535		30292																	
PA149	Terminal Output signal select1	0~65535		12816																	
PA150	Terminal Output signal select2	0~65535		30292																	
PA030	Z pulse Output width	1~6500		4000	re-power on																
	The larger, the wider Z pulse. <table><tr><td>parameter set value</td><td>Z pulse width (ms)</td><td>parameter set value</td><td>Z pulse width (ms)</td></tr><tr><td>500</td><td>4</td><td>4000</td><td>32</td></tr><tr><td>1000</td><td>8</td><td>6000</td><td>48</td></tr><tr><td>2000</td><td>16</td><td></td><td></td></tr></table>					parameter set value	Z pulse width (ms)	parameter set value	Z pulse width (ms)	500	4	4000	32	1000	8	6000	48	2000	16		
parameter set value	Z pulse width (ms)	parameter set value	Z pulse width (ms)																		
500	4	4000	32																		
1000	8	6000	48																		
2000	16																				
PA050	Position reached signal Output threshold Position control mode, position deviation is less than this value, COIN valid.	0~9000	pulse	50																	
PA078	Speed reached signal Output threshold Speed control mode, speed deviation is less than this value, COIN valid.	1~3000	rpm	50																	
PA051	ZSP signal set value When motor speed is less than this set value, ZSP signal valid.	0~3000	rpm	50																	
PA052	ZSP signal time set value	0~9000	0.1ms	50																	
PA055	Torque reached output signal threshold When motor torque is larger than this value, TLC signal valid.	0~300	%	100																	
PA056	Torque reached output time set value	0~9000	ms	100																	
PA065	Brake release output signal time set value Delay of BRK_OFF output signal after servo on.	0~9000	ms	150																	

6.1.8 Other function parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA063	Stop mode after servo OFF 0: Motor decelerates to speed of PA61, then power off after delay PA60; 1: Motor coast to stop.	0~1		1	
PA061	Motor speed at mechanical brake When motor speed is lower than this set value, BRK_OFF signal invalid.	0~100	rpm	10	
PA060	Power off delay time after servo Off After S_ON signal is invalid, motor power will be off after delay of PA060	0~9000	ms	150	
PA053	Position deviation over-large alarm threshold To set motor position deviation over-large detection level, unit is 0.01r. Relevant pulse number is related to encoder resolution.	0~500	0.01 r	300	
PA054	Position deviation over-large alarm invalid	0~1		0	
PA111	Stall alarm threshold	0~9000	0.1rpm	3000	
PA112	Stall alarm time	0~9000	0.1ms	30	
PA119	Over-speed alarm threshold	50~300	%	150	
PA081	Over-load alarm threshold 1	0~300	%	130	
PA082	Over-load alarm time 1	0~9000	ms	3000	
PA120	Over-load alarm threshold 2	0~300	%	150	
PA121	Over-load alarm time 2	0~9000	ms	1000	
PA122	Over-load alarm threshold 3	0~300	%	180	
PA123	Over-load alarm time 3	0~9000	ms	500	
PA151	Brake loop release duty cycle	0~80	%	10	
PA153	Control loop under-voltage alarm delay time	1~2000	ms	40	
PA154	Control loop under-voltage alarm delay time threshold	0~2000	0.5ms	75	
PA139	Power off save parameter 1	0~249		0	
PA140	Power off save parameter 2	0~249		1	
PA005	Analog output signal deviation When Output is speed, unit is rpm; When output is torque, unit is percentage.	0~9000		0	
PA007	Analog Output monitor selection 0: Motor speed 1: Motor Torque	0~1		0	
PA008	Analog Output signal proportion coefficient	1~300		100	

6.1.9 RS485 communication parameters

parameter code	parameter Name & functions	Set range	unit	Default value	Effective
PA070	RS485 communication mode 0: RTU 1: ASCII	0~1		0	
PA072	RS485 communication address	1~127		1	
PA073	RS485 bit rate 0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps 5: 57600bps 6: 115200bps	0~6		2	
PA074	RS485 protocol (Modbus protocol) setting 0: 7, N, 2 1: 7, E, 1 2: 7, O, 1 3: 8, N, 2 4: 8, E, 1 5: 8, O, 1 6: 8, N, 1 N: No verification, E: Even verification, O: Odd verification	0~6		3	