



DS_P-Pulse Type DC Servo Drive

User Manual

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Chapter I Product Introduction

1.1 Product Introduction

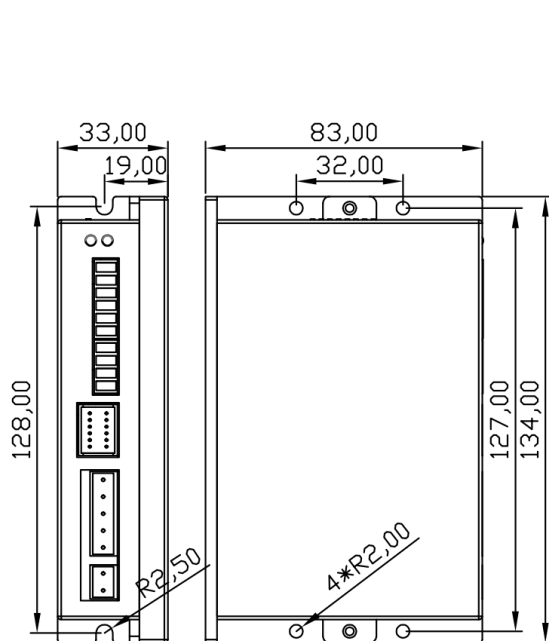
The low-voltage servo drives of DS series are low-voltage servo products developed based on the latest generation 32-bit DSP chips and combined with our company's years of experience in servo motion control, including pulse type, CANopen bus type and RS485 bus type products controlled with three kinds of modes, respectively. This manual mainly introduces pulse type drives.

This drive can support specs from 100W to 750W. The encoder is a 2500-line incremental low-voltage servo motor powered by a low-voltage DC supply. External braking resistors can be connected. It also supports pulse+direction and dual-pulse input control thanks to its high overload capacity, low noise and quick response, etc.

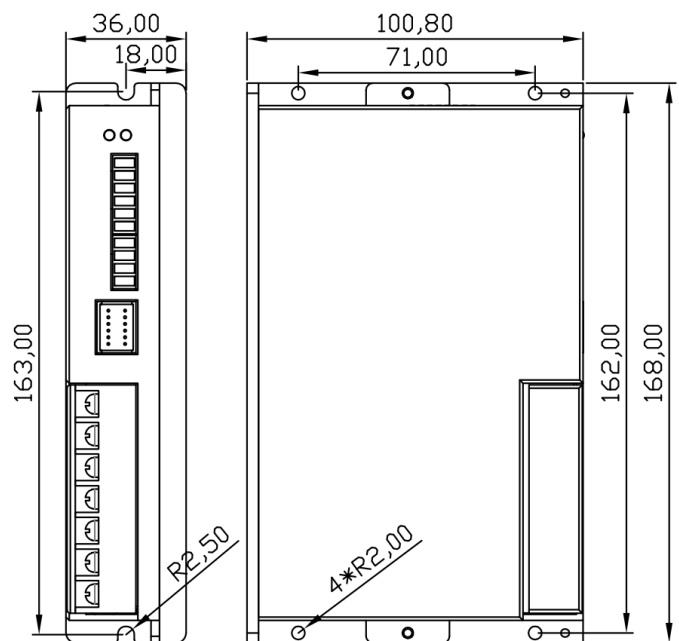
1.2 Product specification

Drive model		DS_P_100	DS_P_200	DS_P_400	DS_P_750
Parameter					
Matched motor		100W	200W	400W	750W
Encoder		2500-line incremental			
Supply voltage		24V-50V	24V-50V	24V-50V	24V-80V
Output current	Rated value	5A	7A	10A	20A
	Maximum	15A	21A	30A	57A
Drive size (mm) (L*H*W)		134 * 83 * 33			168 * 100 * 36
Drive weight (kg)		0.35			0.7

1.3 Mounting dimensions



Dimensions of DS_P_100/200/400 drive



Dimensions of DS_P_750 drive

Chapter II Wiring and Setting

2.1 Description of terminal function

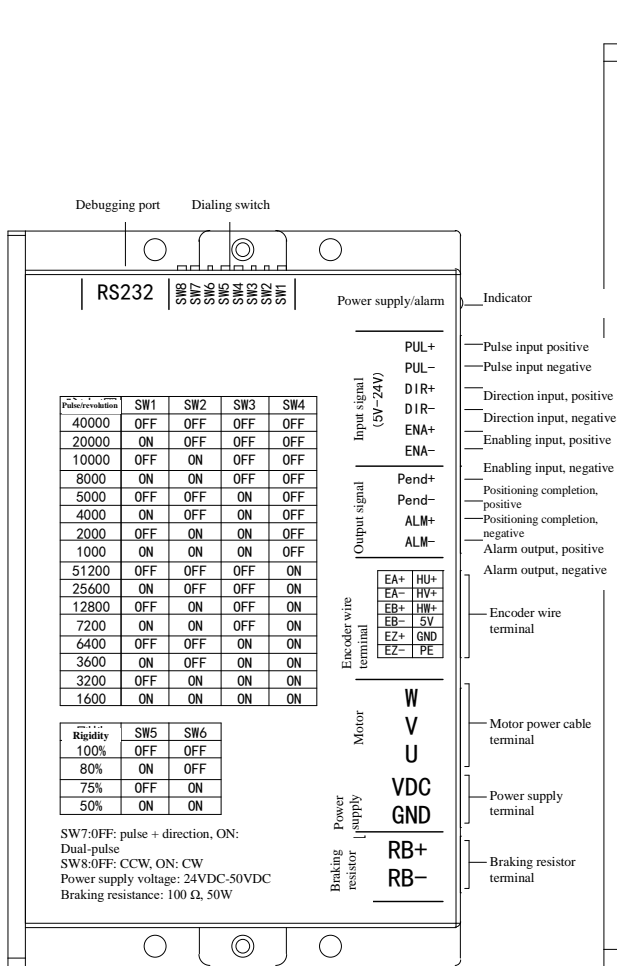


Fig. 1: 100W~400W driver terminals

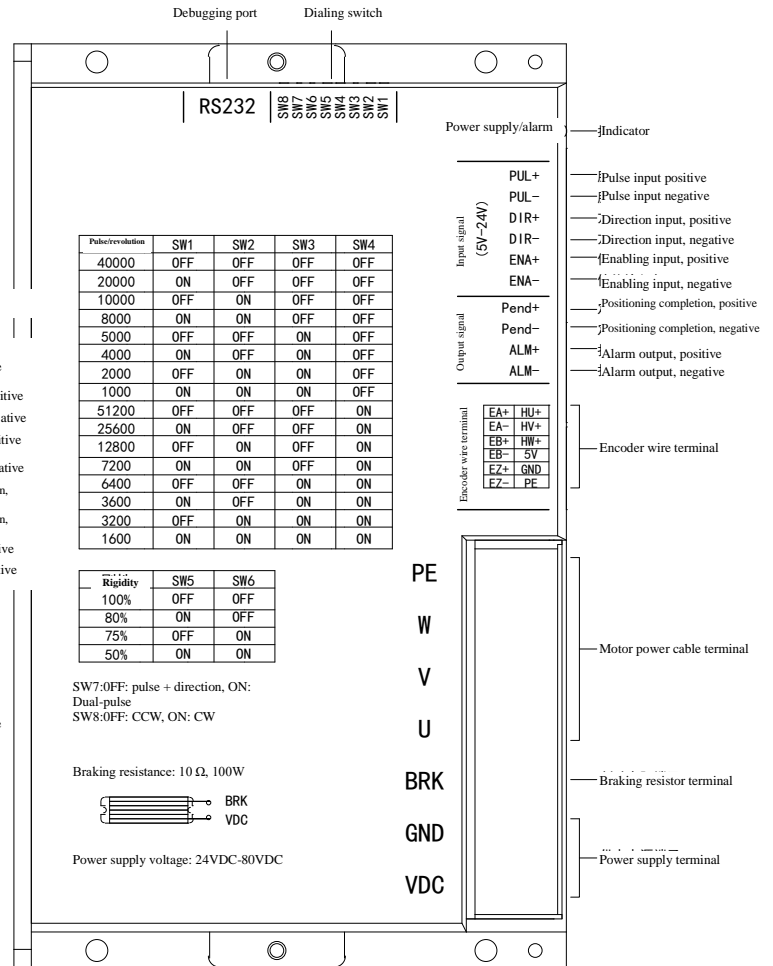


Fig. 2: 750W driver terminals

2.1.1 Power supply terminal

Drive model	DS_P_100	DS_P_200	DS_P_400	DS_P_750
Terminal name				
VDC (DC power supply, positive)	DC voltage: 24V~50V	DC voltage: 24V~50V	DC voltage: 24V~50V	DC voltage: 24V~80V
GND (DC power supply, negative)	Recommended power supply: ≥24V, 5A	Recommended power supply: ≥36V, 9A	Recommended power supply: 48V, 10A	Recommended power supply: ≥48V, 20A

2.1.2 Motor winding terminal

Terminal name	Description
PE	Motor ground wire
W	Motor three-phase winding Opposing winding sequence is not allowed, otherwise fault or runaway will be caused!
V	
U	

2.1.3 Braking resistor terminals

1. DS_P_100/200/400 drive terminals

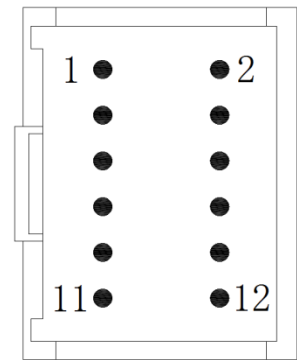
Terminal name	Description
RB+	Connecting the external braking resistor between RB+ and RB - A 10R 50W aluminum case resistor is recommended
RB-	

2. 750W drive terminals

Terminal name	Description
BRK	Connecting the external braking resistor between BRK and VDC A 10R 100W aluminum case resistor is recommended

2.1.4 Definition of drive encoder wire terminal

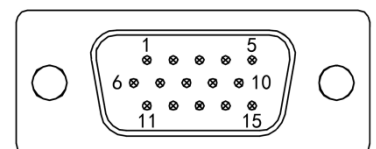
Pin No.	Signal	Color	Pin No.	Signal	Color
1	EA+	Yellow	2	HU+	Grey
3	EA-	Yellow/black	4	HV+	Orange
5	EB+	Green	6	HW+	White
7	EB-	Green/black	8	5V	Red
9	EZ+	Brown	10	GND	Black
11	EZ-	Brown/black	12	PE	Yes



Pins for terminal block

2.1.5 Definition of motor terminal

Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	0V	6	Z+	11	V-
2	5V	7	B+	12	U-
3	W+	8	A+	13	Z-
4	V+	9	Not connected	14	B-
5	U+	10	W-	15	A-

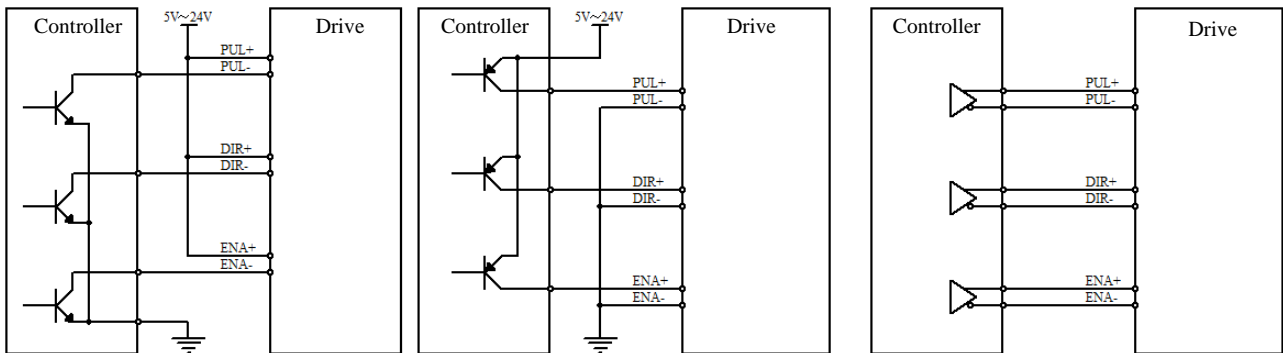


DB15 male pin surface

2.1.6 Control signal connection terminal

Terminal name	Description	Terminal name	Description
PUL+	Pulse signal input terminal (5-24V)	PEND+	Positioning completion signal output terminal (normally closed)
PUL-		PEND-	
DIR+	Direction signal input terminal (5-24V)	ALM+	Alarm signal output terminal (normally closed)
DIR-		ALM-	
ENA+	Enabling signal input terminal (5-24V)		
ENA-			

1. Input signal wiring diagram

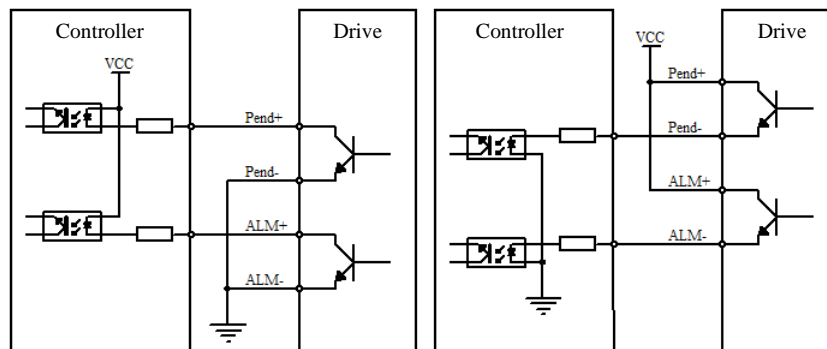


Common anode connection

Common cathode connection

Differential signal connection

2. Output signal wiring diagram

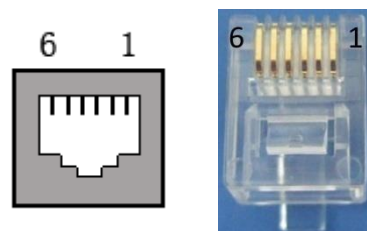


NPN connection

PNP connection

2.1.7 Definition of communication port pins

Pin	Symbol	RMK
2	GND	Signal ground
3	TXD	RS232 sending port
4	RXD	RS232 receiving port
5	GND	Signal ground



Communication cable connection method

Computer terminal (9-pin female)		Drive terminal (6-pin RJ)
3 TXD	-----	4 RXD
2 RXD	-----	3 TXD
5 GND	-----	5/2 GND

2.2 Dial function description

2.2.1 Electronic gear setting

SW4	SW3	SW2	SW1	Electronic gear ratio numerator	Electronic gear ratio denominator
OFF	OFF	OFF	OFF	10000	40000
OFF	OFF	OFF	ON	10000	20000
OFF	OFF	ON	OFF	10000	10000
OFF	OFF	ON	ON	10000	8000
OFF	ON	OFF	OFF	10000	5000
OFF	ON	OFF	ON	10000	4000
OFF	ON	ON	OFF	10000	2000
OFF	ON	ON	ON	10000	1000
ON	OFF	OFF	OFF	10000	51200
ON	OFF	OFF	ON	10000	25600
ON	OFF	ON	OFF	10000	12800
ON	OFF	ON	ON	10000	7200
ON	ON	OFF	OFF	10000	6400
ON	ON	OFF	ON	10000	3600
ON	ON	ON	OFF	10000	3200
ON	ON	ON	ON	10000 (PA_67 setting)	1600 (PA_68 setting)

2.2.2 Rigidity setting

SW6	SW5	Rigidity
OFF	OFF	100%
OFF	ON	80%
ON	OFF	75%
ON	ON	50%

2.2.3 Pulse mode switching

SW7	Control mode
OFF	PU+DIR
ON	CW+CCW

2.2.4 Default direction switching

SW8	Default direction
OFF	Counterclockwise
ON	Clockwise

Chapter III Parameter Description

3.1 Monitoring parameters

No.	Meaning	Description	Property	Range	
PA_00	Device information	Device information	RO	-	
PA_01	Software version	Software version	RO	-	
PA_02	Motor model	1: 100W-2500 motors; 2: 200W-2500 motors; 3: 400W-2500 motors; 4: 750W-2500 motors;	RW	1	
PA_03	System status	Code	Operation status	RO	-
		Bit0	Out-of-tolerance		
		Bit1	Undervoltage		
		Bit2	Overvoltage		
		Bit3	Overcurrent		
		Bit4	Encoder fault		
		Bit5	Overload		
		Bit6	Error bit		
		Bit7	Motor enabling		
		Bit8	In place		
		Bit9	Effective for positive software limit		
		Bit10	Effective for negative software limit		
Bit11	Homing completed				
PA_05	Bus voltage	Unit: 0.01V	RO	-	
PA_08	Drive error code	1000: Overcurrent; 1001: Overvoltage; 1002: Undervoltage; 1003: Encoder HALL signal error; 1004: U-phase overcurrent; 1005: V-phase overcurrent; 1006: W-phase overcurrent; 1007: Overload; 1008: Position out-of-tolerance; 1009: U-phase current calibration error; 1010: V-phase current calibration error; 1011: Bus voltage calibration error; 1012: EEPROM read error; 1013: EEPROM writing error;	RO	-	
PA_09	Incorrect Cache 1	See the description of 0x0008	RO	-	
PA_0A	Incorrect Cache 2	See the description of 0x0008	RO	-	
PA_0B	Incorrect Cache 3	See the description of 0x0008	RO	-	

No.	Meaning	Description	Property	Range
PA_0C	Incorrect Cache 4	See the description of 0x0008	RO	-
PA_0D	Incorrect Cache 5	See the description of 0x0008	RO	-
PA_0E	Incorrect Cache 6	See the description of 0x0008	RO	-
PA_0F	Incorrect Cache 7	See the description of 0x0008	RO	-
PA_10	Incorrect Cache 8	See the description of 0x0008	RO	-
PA_11	Given velocity	Unit: rpm;	RO	-
PA_12	Feedback velocity	Unit: rpm;	RO	-
PA_13	Position error	Unit: pulse;	RO	-
PA_14	Given pulse H	Unit: Encoder dimension;	RO	-
PA_15	Given pulse L	Unit: Encoder dimension;	RO	-
PA_16	Feedback pulse H	Unit: Encoder dimension;	RO	-
PA_17	Feedback pulse L	Unit: Encoder dimension;	RO	-

3.2 Motor parameters

No.	Meaning	Description	Property	Range
PA_18	Rated power	Unit: W;	RW is effective after power-on	-
PA_19	Rated voltage	Unit: 0.001V	RW is effective after power-on	-
PA_1A	Rated current	Unit: 0.001A	RW is effective after power-on	-
PA_1B	Rotating velocity	Unit: rpm	RW is effective after power-on	-
PA_1C	Rated torque	Unit: 0.001Nm	RW is effective after power-on	-
PA_1D	Peak torque	Unit: 0.001Nm	RW is effective after power-on	-
PA_1E	Line inductance	Unit: 0.001mH	RW is effective after power-on	-
PA_1F	Line resistance	Unit: 0.001 Ω	RW is effective after power-on	-
PA_20	Rotational inertia	Unit: Kg.m ² ×10e-7	RW is effective after power-on	-
PA_21	Torque coefficient	Unit: mN.m/Arms	RW is effective after power-on	-
PA_22	Back EMF coefficient	Unit: V/rpm	RW is effective after power-on	-
PA_24	Number of pole pairs	Default 5-pole-pair motor	RW is effective after power-on	-
PA_25	Number of encoder lines	Default 2500-line motor	RW is effective after power-on	-

3.3 Operating parameters

No.	Meaning	Description	Property	Default value
PA_2F	Max. bus voltage	Unit: 0.001V	RW Effective after release and writing	8000
PA_30	Min. bus voltage	Unit: 0.001V	RW Effective after release and writing	1800
PA_31	Max. phase current	Unit: 0.1% p.u.	RW Effective after release and writing	2500

PA_32	Max. continuous line current	Unit: 0.1% p.u.	RW Effective after release and writing	2500
No.	Meaning	Description	Property	Default value
PA_34	Position loop output limit	Unit: rpm	RW Effective after release and writing	4500
PA_35	Velocity loop output limit	Unit: 0.1% rated current	RW Effective after release and writing	2000
PA_36	d-axis current loop limit	Unit: 0.1% p.u. voltage	RW Effective after release and writing	500
PA_37	Voltage vector limit	Unit: 0.1% p.u. voltage	RW Effective after release and writing	900
PA_38	1st gain of position loop	1st proportional gain of position loop	RW Effective immediately	-
PA_39	2nd gain of position loop	2nd proportional gain of position loop	RW Effective immediately	-
PA_3B	Velocity feedforward coefficient of position loop	Velocity feedforward coefficient of position loop, unit: 0.1%	RW Effective immediately	-
PA_3C	Velocity feedforward low-pass filtering bandwidth	Velocity feedforward low-pass filtering, unit: Hz	RW Effective after release and writing	-
PA_3D	1st gain of velocity loop	1st gain of velocity loop	RW Effective immediately	-
PA_3E	2nd gain of velocity loop	2nd gain of velocity loop	RW Effective immediately	-
PA_3F	1st integral of velocity loop	1st integral of velocity loop	RW Effective immediately	-
PA_40	2nd integral of velocity loop	2nd integral of velocity loop	RW Effective immediately	-
PA_41	Interference resistance gain	This parameter can be increased gradually during positioning oscillation, and the default value is 0	RW Effective immediately	-
PA_42	Acceleration feedforward coefficient	Acceleration feedforward coefficient, unit: 0.1%	RW Effective immediately	-
PA_43	Acceleration feedforward low-pass filtering bandwidth	Acceleration feedforward low-pass filtering, unit: Hz	RW Effective after release and writing	-
PA_44	Current loop gain	Current loop gain	RW Effective immediately	-
PA_45	Current loop integral	Current loop integral	RW Effective immediately	-
PA_46	Gain setting	0: Effective 1st gain; 0: Effective 2nd gain;	RW Effective after release and writing	-
PA_48	Load inertia ratio	Load inertia ratio	RW Effective after release and writing	-
PA_4A	Rigidity coefficient	Rigidity coefficient, effective when SW5 and SW6 dialing are OFF; 0: 100%; 1: 80%; 2: 75%; 3: 50%;	RW Effective after release and writing	-

No.	Meaning	Description	Property	Default value
PA_4B	Filter On configuration	Bit definition, 0: Disable; 1: Enable; Bit0: Given velocity filtering; Bit1: Velocity feedback filtering; Bit2: Given current filtering; Bit3: Current feedback filtering; Bit4: Torque filter, second-order notch filter;	RW Effective after release and writing	7
PA_4C	Given velocity filtering bandwidth	Given velocity filtering bandwidth, unit: Hz	RW Effective after release and writing	-
PA_4D	Velocity feedback filtering bandwidth	Velocity feedback filtering bandwidth, unit: Hz	RW Effective after release and writing	-
PA_4E	Given current filtering bandwidth	Given current filtering bandwidth, unit: Hz	RW Effective after release and writing	-
PA_4F	Current feedback filtering bandwidth	Current feedback filtering bandwidth, unit: Hz	RW Effective after release and writing	-
PA_50	Torque notch filter frequency	Torque notch filter frequency, unit: Hz	RW Effective after release and writing	-
PA_51	Torque notch filter width	Torque notch filter width, unit: Hz	RW Effective after release and writing	-
PA_52	Torque notch filter depth	Torque notch filter depth, unit: dB	RW Effective after release and writing	-
PA_53	Filter parameter calculation	0: N/A; 1: Calculate filter parameters	RW Effective after release and writing	-
PA_54	Jerk smoothing factor	0: N/A; Level 1~7 smoothing ;	RW Effective after release and writing	-
PA_67	Electronic gear numerator	Electronic gear numerator, effective when SW1~SW4 are ON	RW Effective after power-on	-
PA_68	Electronic gear denominator	Electronic gear denominator, effective when SW1~SW4 are ON	RW Effective after power-on	-
PA_6C	Relief opening threshold	Relief opening threshold, unit: 0.001V	RW Effective after power-on	-
PA_6D	Relief closing threshold	Relief closing threshold, unit: 0.001V	RW Effective after power-on	-
PA_70	In-place error	Unit: pulse	RW Effective after release and writing	-
PA_71	In-place time	Unit: ms	RW Effective after release and writing	-
PA_76	Out-of-tolerance threshold	Unit: pulse	RW Effective after release and writing	-
PA_79	Output terminal polarity setting	Bit0: MF signal polarity setting; Bit1: PEND signal polarity setting; Bit2: ALM signal polarity setting;	RW Effective after release and writing	-
PA_85	Velocity limit under torque mode	Unit: rpm	RW Effective after release and writing	-

Chapter IV Troubleshooting

4.1 Description and handling method of alarm indicator

Number of flashes	Description	Troubleshooting
1	Overcurrent	1. Motor line power line short circuit or motor fault; 2. Incorrect phase sequence of motor power line, check the phase sequence; 3. Incorrect set motor model. Check the motor model; 4. Too heavy load, first check the no-load operation for being normal; 5. Too high set gain parameter, reduce the gain parameter. 6. Internal failure of drive, send it back to the factory for maintenance.
2	Overvoltage	1. Check for too high power supply voltage, reduce the voltage or replace the power supply if necessary; 2. Internal fault of drive, sent it back to the factory for maintenance.
3	Undervoltage	1. Check the power supply voltage for being low, reduce the voltage or replace the power supply; 2. Internal fault of drive, sent it back to the factory for maintenance.
4	Encoder disconnection error	1. Check the encoder for being disconnected and the plug for loose insertion; 2. Replace the motor and check the motor encoder for malfunction; 3. Bad drive encoder, send it back to the factory for maintenance.
5	Phase current error	1. Motor phase sequence error. Check the motor power line for incorrect connection; 2. Internal fault of drive, sent it back to the factory for maintenance.
6	I2T error	Initialize the parameters and restart the device to check for alarms. If the alarms still occur, send it back to the factory for maintenance.
7	Position out-of-tolerance	1. Check the power line for phase loss; 2. Check for too high load; 3. Check for too high velocity, and reduce the velocity if necessary; 4. Too low set position out-of-tolerance threshold, increase this parameter PA_76;

 Appendix: Motor parameters

	100W	200W	400W	750W
Rated power				
Rated voltage				
Rated current				
Rated velocity				
Rated torque				
Peak torque				
Back EMF				
Torque coefficient				
Rotor inertia				
Line resistance				
Line inductance				
Electrical time constant				
Number of pole pairs				
Weight				



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