

TL-P  
Pulse-Type Integrated Controller

User Manual

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## Chapter I Product Introduction

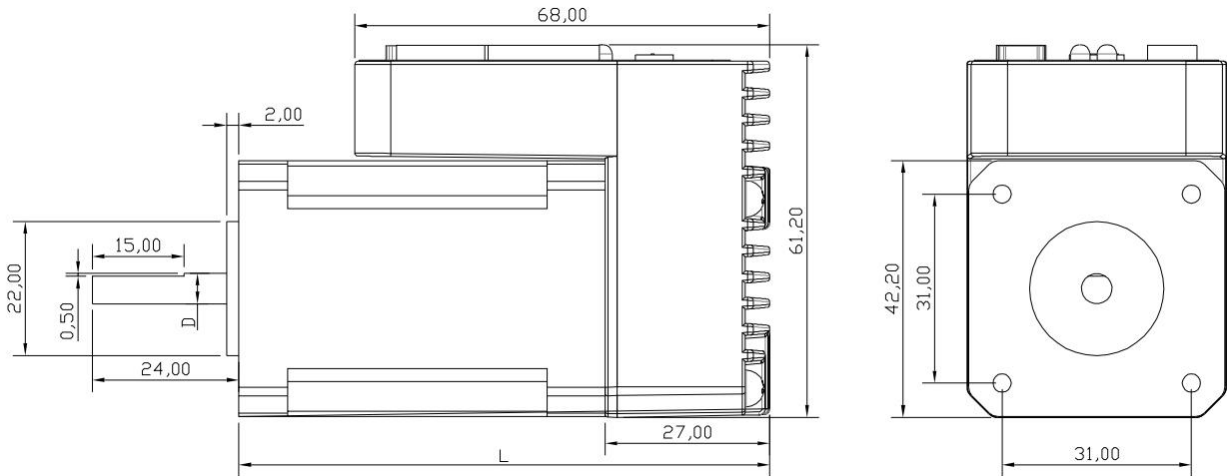
### 1.1 Product Overview

This series of stepper drive integrated controller adopts the latest 32-bit DSP technology, integrating separate driver control functions. It supports functions such as automatic current tuning, pulse + direction control, and dual-pulse control. These features not only enhance motor stability and reduce temperature rise without missing steps, but also improve the high-speed performance of the motor, reduce motor vibration, increase machining speed and accuracy, and lower machine power consumption.

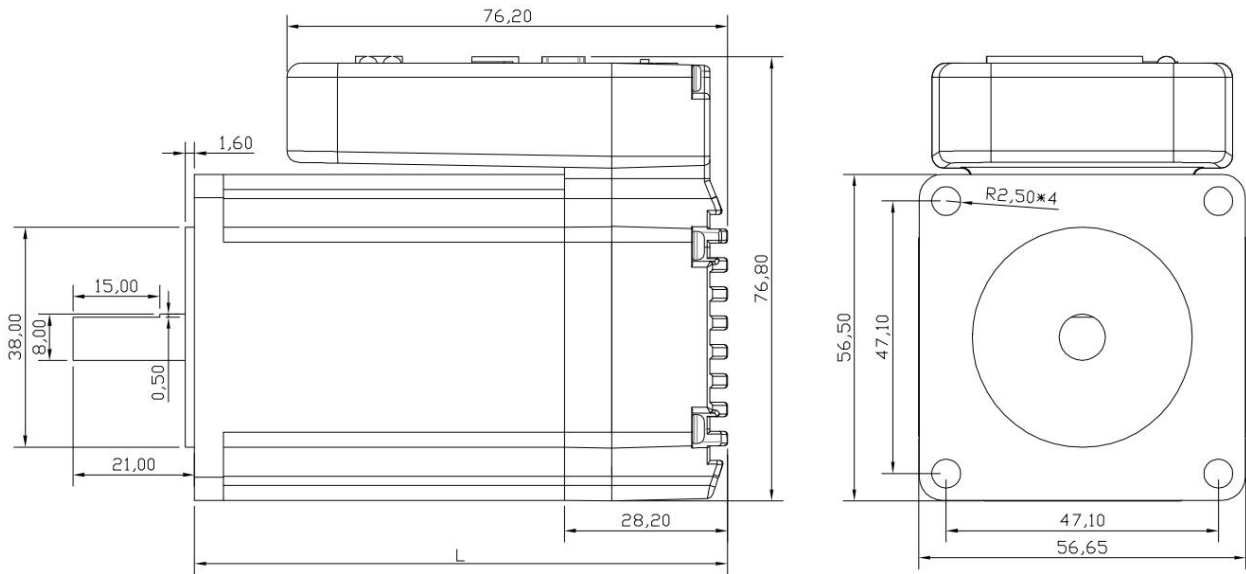
### 1.2 Product Specifications

Driver Models	TLC42-P	TLO42-P	TLC57-P	TLO57-P	TLC60-P	TLO60-P	TLC86-P	TLO86-P
Compatible Motor Sizes	42		57		60		86	
Power Supply Voltage	24~36V DC		24~50V DC		24~50V DC		24~70V DC	
Maximum Output Current	2.0A		4.0A		4.0A		6.0A	
Pulse Signal Voltage	5-24V							
Pulse Signal Frequency	0-200KHZ							
Encoder	1000 lines	None	1000 lines	None	1000 lines	None	1000 lines	None
Insulation Resistance	100MΩ							
Operating Environment	Temperature: 0°C ~ 45°C; Humidity: ≤90% RH, non-condensing Altitude: ≤1000m. Installation Conditions: Free from corrosive gases, flammable gases, oil mist, or dust. Vibration: Less than 0.5G (4.9m/s <sup>2</sup> ), 10–60 Hz (non-continuous operation).							
Storage Environment:	-20°C to 65°C (no frost), ≤90% RH, non-condensing							

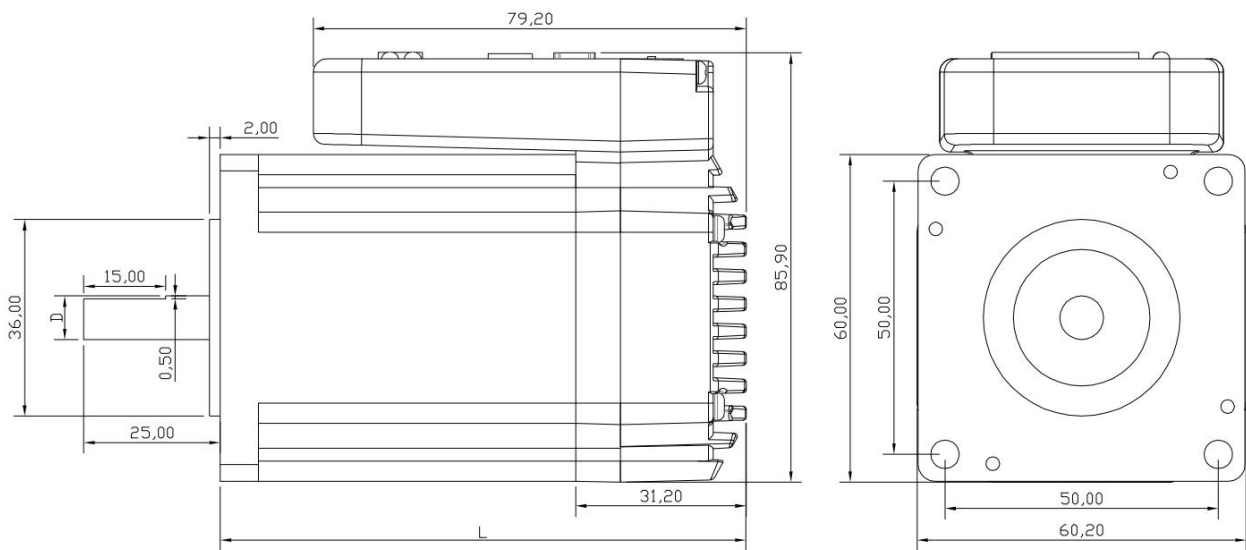
### 1.3 Installation Dimensions



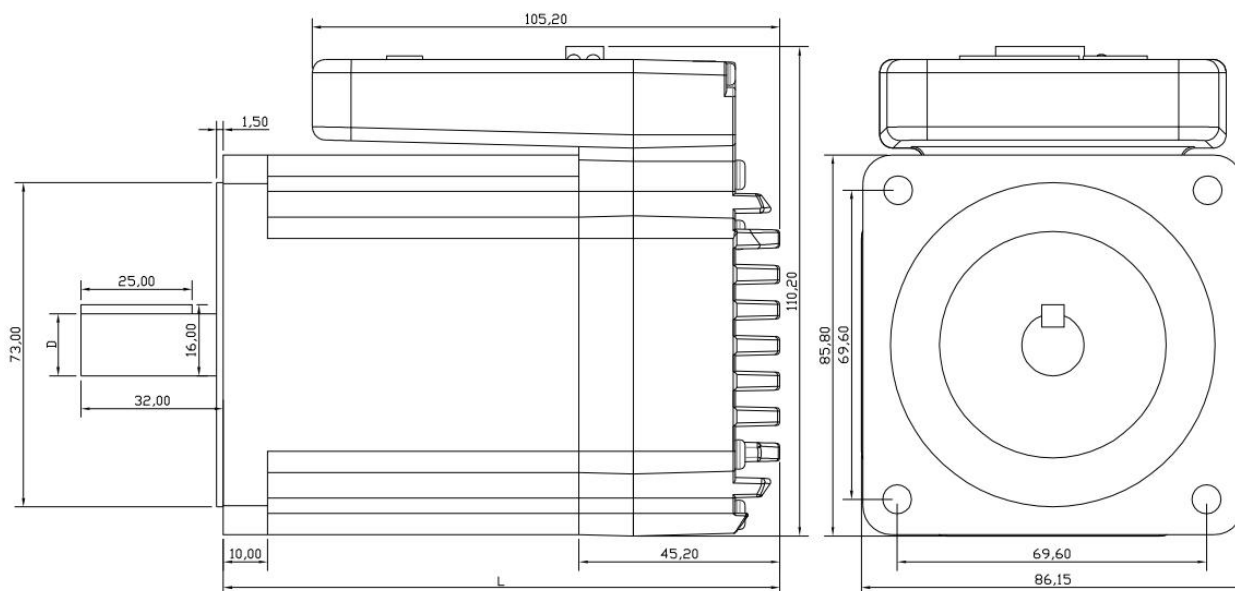
TLC42-P/TLO42-P



TLC57-P/TLO57-P



TLC60-P/TLO60-P



TLC86-P/TLO86-P

Model	D	Motor Length	Total Body Length (L)
TLC42-P, TLO42-P-04	φ5	48	75
TLC42-P, TLO42-P-08	φ5	60	87
TLC57-P, TLO57-P-1	φ6.35 or φ8	56	84.2
TLC57-P, TLO57-P-2	φ6.35 or φ8	82	110.2
TLC57-P, TLO57-P-3	φ6.35 or φ8	100	128.2
TLC60-P, TLO60-P-3	φ8	88	119.2
TLC60-P/ TLO60-P-3.5	φ8	100	131.2
TLC60-P, TLO60-P-4	φ8	112	143.2
TLC86-P/ TLO86-P-4.5	φ12.7 or φ14	80	125.2
TLC86-P/ TLO86-P-8.5	φ12.7 or φ14	114	159.2
TLC86-P, TLO86-P-10	φ12.7 or φ14	128	173.2
TLC86-P, TLO86-P-12	φ12.7 or φ14	150	195.2

## Chapter 2: Drive Ports and Wiring

### 2.1 Drive Port Definitions

#### 2.1.1 RS232 Debug Port

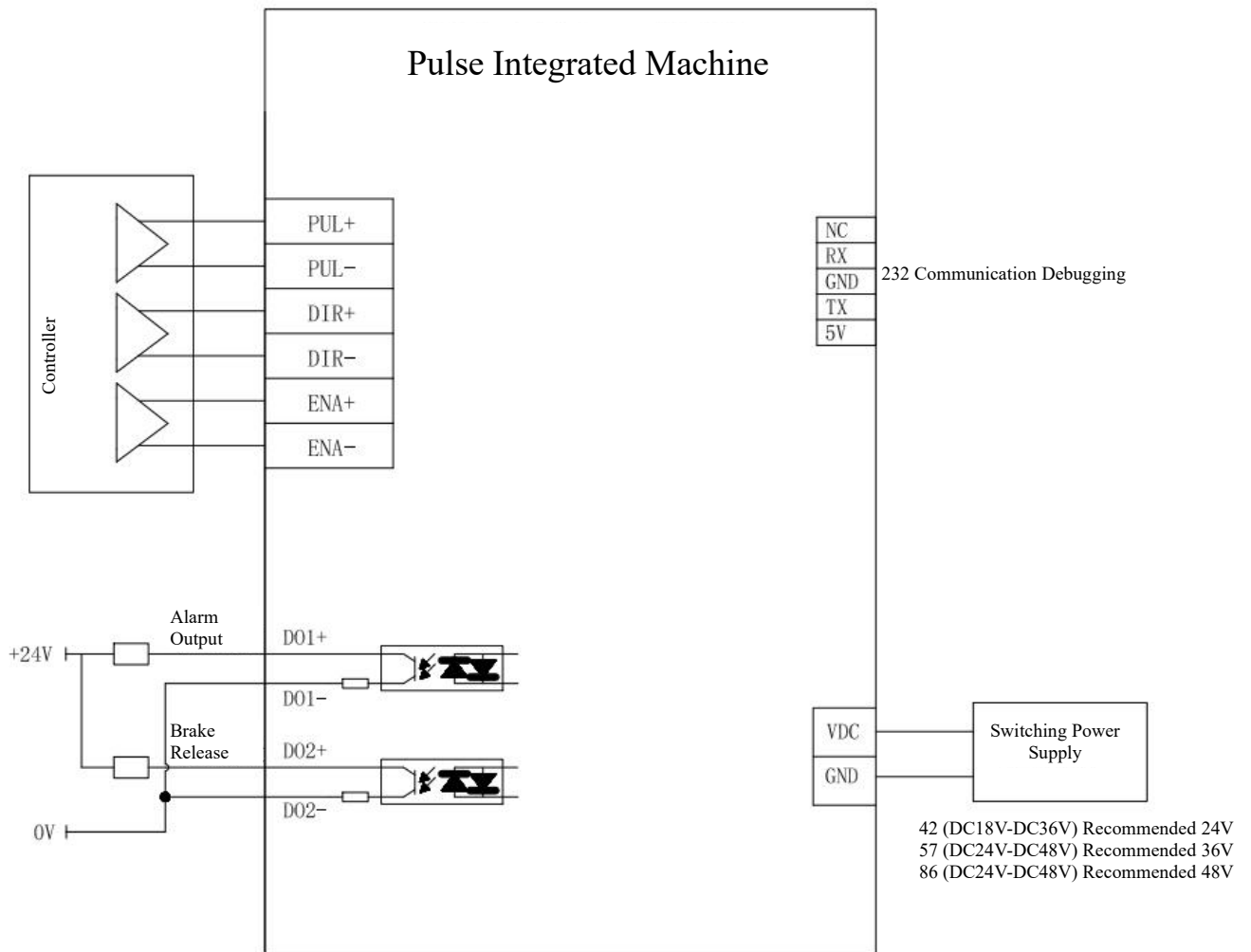
Pin	Signal Definition
1	NC
2	RX
3	GND
4	TX
5	5V

2.1.2 DI/DO Port

Pin	Definitions	Description
1	PUL+	Pulse signal input, supports signal voltage from 5V to 24V. Pulse input mode: pulse + direction (as pulse input) or dual pulse (as CCW input). High/low level signal. To ensure reliable motor commutation, the direction signal should be established at least 5μs before the pulse signal.
2	PUL-	
3	DIR+	Direction signal input, supports signal voltage from 5V to 24V. Direction input mode: pulse + direction (as direction input), dual pulse (as CCW input). High/low level signal. To ensure reliable motor commutation, the direction signal should be established at least 5μs before the pulse signal.
4	DIR-	
5	ENA+	Enable control signal. This input signal is used to enable or disable the output of the driver's axis 1 and axis 2. When ENA is connected to a low level (or the internal optocoupler is conducting), the driver will cut off the current to each phase of the motor, putting the motor in a free state and not responding to step pulses. If this function is not needed, leave the enable signal terminal unconnected. (Supports signal voltage from 5V to 24V)
6	ENA-	
7	ALM+	Alarm output
8	ALM-	
9	PEND+	Position output
10	PEND-	

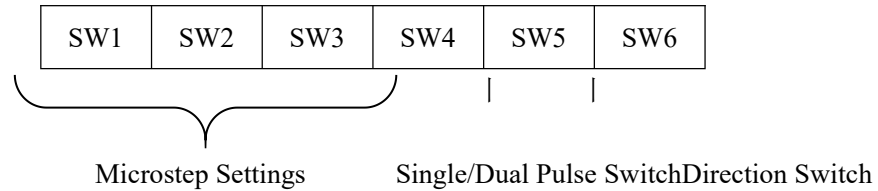
2.2 Wiring

2.2.1 Drive Wiring Diagram



### 2.2.2 Dip Switch Settings

This series of pulse-type integrated controller has a 6-position DIP switch that can be used to set microsteps, direction, and pulse input mode. The allocation is as shown below:



Single/Dual Pulse Settings:

Pulse Mode	SW5
PUL+DIR	OFF
CW/CCW	ON

Direction Settings:

If the motor direction is opposite to the system direction, set SW6 to ON to reverse the motor direction.

Microstep Setting:

Microstep Setting	SW1	SW2	SW3	SW4
Custom	OFF	OFF	OFF	OFF
800	ON	OFF	OFF	OFF
1600	OFF	ON	OFF	OFF
3200	ON	ON	OFF	OFF
6400	OFF	OFF	ON	OFF
12800	ON	OFF	ON	OFF
25600	OFF	ON	ON	OFF
51200	ON	ON	ON	OFF
1000	OFF	OFF	OFF	ON
2000	ON	OFF	OFF	ON
4000	OFF	ON	OFF	ON
5000	ON	ON	OFF	ON
8000	OFF	OFF	ON	ON
10000	ON	OFF	ON	ON
20000	OFF	ON	ON	ON
40000	ON	ON	ON	ON

## Chapter 3: Parameter Descriptions

### 3.1 Detailed Parameter Description

#### 3.1.1 Monitoring Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Attributes	
PA_001	1	Software Version	Hardware Version	(RO)	
PA_002	2	Hardware Version	Software Version	(RO)	
PA_004	4	Operating Status	Code	Operating Status	(RO)
			Bit0	In position	
			Bit1	Homing Complete	
			Bit2	Motor Running	
			Bit3	Fault	
			Bit4	Motor Enabled	
PA_005	5	Current Alarm	Fault Code	Content	(RO)
			0x01	Overcurrent	
			0x02	Overvoltage	
			0x03	Undervoltage	
			0x05	Position Error	
PA_008	8	Current Position H	Open loop for command position, closed loop for feedback position;	(RO)	
PA_009	9	Current Position L			
PA_00A	10	Current Speed			Unit: r/min

#### 3.5.2 DI/DO Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range	
PA_010	16	Enable Terminal NO/NC Switch	0: Normally Open; 1: Normally Closed	0 ~ 127	
PA_01B	27	DO terminal normally open/closed switching	Code	Status	0~7
			Bit0	DO0	
			Bit1	DO1	
			0: Normally Open; 1: Normally Closed		

#### 3.5.3 Communication Control Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_023	35	Subdivision Setting	Effective when all SW are OFF	400~51200
PA_027	39	Control Mode	0: Teach Mode; 1: Pulse Mode	0~1
PA_030	48	JOG Operating Speed	Unit: r/min	-3000~3000
PA_031	49	JOG Acceleration Time	Unit: ms	0~2000
PA_032	50	JOG Deceleration Time	Unit: ms	0~2000
PA_033	51	Positioning Start Speed	Unit: r/min	0~3000



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PA_034	52	Positioning Acceleration Time	Unit: ms		0~2000	
PA_035	53	Positioning Deceleration Time	Unit: ms		0~2000	
PA_036	54	Positioning Speed	Unit: r/min		0~3000	
PA_037	55	Positioning Target H	Unit: pulse		-2147483648 ~ 2147483647	
PA_038	56	Positioning Target L				
PA_04E	78	Control Word	Bit	Function	Description	0 ~ 127
			Bit0	Positioning Control	0: Disabled; 1: Enabled;	
			Bit1	Positioning Mode	0: Relative; 1: Absolute;	
			Bit2	Switch Mode	0: Ignore new command if a positioning motion is in progress 1: Interrupt current positioning motion to execute new command;	
			Bit3	JOG Control	0: Disabled; 1: Enabled;	
			Bit4	Homing Control	0: Disabled; 1: Enabled;	
			Bit5	Stop Control	0: Disabled; 1: Enabled;	
			Bit6	Emergency Stop Control	0: Disabled; 1: Enabled;	
PA_04F	79	Auxiliary Control	Code	Function		
			0x0000	N/A		
			0x0100	Restore Factory Parameters		
			0x0200	Save Current Parameters		
			0x0300	Clear Current Alarm		
			0x0400	Clear Current Position		
			0x0500	Motor Enabled		
			0x0600	Motor Release		

### 3.5.4 Manufacturer Parameters

Parameter No.	Register Address (Decimal)	Item	Description	Setting Range
PA_100	256	Operating Mode (Effective after restart)	1: Open-loop; 2: Closed-loop;	1~2
PA_101	257	Encoder Resolution	Encoder Resolution	
PA_102	258	Maximum Effective Current	Maximum current output by the driver, unit: mA;	

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PA_103	259	Closed loop maximum current ratio	Closed loop maximum current ratio	
PA_104	260	Base current ratio	Base current ratio	
PA_105	261	Open loop maximum current ratio	Open loop maximum current ratio	
PA_106	262	Lock current ratio	Lock current ratio	
PA_107	263	Lock Motor Time	Lock Motor Time	
PA_109	265	Low-pass filter coefficient	Low-pass filter coefficient	
PA_10A	266	Position error threshold	Position error threshold	
PA_10B	267	Positioning accuracy threshold	Positioning accuracy threshold	
PA_10C	268	Positioning completion time	Positioning completion time	
PA_10D	269	Average filter coefficient	Average filter coefficient	
PA_10E	270	Current loop gain adjustment ratio	Current loop gain adjustment ratio	
PA_10F	271	Current Loop Kp	Current Loop Kp	
PA_110	272	Current Loop Ki	Current Loop Ki	
PA_111	273	Current Loop Kc	Current Loop Kc	
PA_112	274	LA Speed Kp1	LA Speed Kp1	
PA_113	275	LA Speed Kv1	LA Speed Kv1	
PA_114	276	Speed node 1	Speed node 1	
PA_115	277	LA Speed Kp2	LA Speed Kp2	
PA_116	278	LA Speed Kv2	LA Speed Kv2	
PA_117	279	Speed node 2	Speed node 1	
PA_118	280	Speed feedforward	Speed feedforward	
PA_119	281	Position integration	Position integration	

### 3.6 Alarm Handling

The alarm information for this series of drivers can be identified by the number of times the indicator light blinks. The specific alarm information is as follows:

Indicator Light Blinking Frequency	Alarm Description	Troubleshooting	Reset
Blinks once every 5 seconds	Overcurrent Alarm	<ol style="list-style-type: none"> <li>1. Motor wiring short circuit, check motor wiring;</li> <li>2. Motor damage, measure the resistance of the motor's A-phase and B-phase windings;</li> <li>3. Driver damage, replace the driver.</li> </ol>	Restart to reset
Blinks twice every 2 seconds	Overvoltage Alarm	<ol style="list-style-type: none"> <li>1. Power supply voltage is too high, measure the power supply voltage or replace the power supply;</li> <li>2. Driver damage, replace the driver.</li> </ol>	Restart to reset
Blinks three times every 5 seconds	Undervoltage Alarm	<ol style="list-style-type: none"> <li>1. Power supply voltage is too low, measure the power supply voltage or replace the power supply;</li> <li>2. Driver damage, replace the driver.</li> </ol>	Restart to reset
Blinks 4 times every 5 seconds	Memory Read/Write Error	Driver damage, please replace the driver.	Can be reset
Blinks five times every 5 seconds	Position Error Alarm	<ol style="list-style-type: none"> <li>1. Motor power line phase sequence error, check wiring sequence;</li> <li>2. Motor line phase loss, check if the wire is broken or has poor contact;</li> <li>3. Encoder line disconnection;</li> <li>4. Load jam;</li> <li>5. Speed too fast.</li> </ol>	Can be reset