



KALATEC

AUTOMAÇÃO

STR6-RS485

RS485 OPEN LOOP STEP MOTOR DRIVE User's Manual



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Foreword

Thank you for using our open step drive.

Before using this product, please read this manual carefully to understand the necessary safety information, precautions, and operation methods. Incorrect operation can have extremely serious consequences.

This product is designed and manufactured without the ability to protect personal safety from mechanical system threats. Users are advised to consider safety precautions during mechanical system design and manufacturing to prevent accidents caused by improper operation or product abnormalities.

Due to product improvements, the contents of this manual are subject to change without notice. Our company will not be responsible for any modification of the product by the user.

When reading, please pay attention to the following signs in the manual:



Note: To draw your attention to the main points in the text.



Caution: Indicates that improper operation can result in personal injury and damage to equipment.

This product has passed the national mandatory 3C certification, CE certification, ROHS certification



1 Overview

1.1 Product Introduction

RS485 Bus driver of Modle Bus Standard introduced by our company. It adopts the latest 32-bit DSP digital processing technology. The driver control algorithm adopts advanced variable current technology and advanced frequency conversion technology. The driver generates less heat and them or vibrates less, smooth operation. The user can set any IDaddress within 1-255 and any current value within the rated current, which can meet the needs of most applications. The bus driver can drive two-phase open-loop stepper motor, three-phase open-loop stepper motor, hybrid servo motor, brushless DC servo motor, etc... Due to the use of built-in micro-subdivision technology, even in the conditions of low subdivision, but also can achieve high subdivision effect, low, medium and high-speed operation is very smooth, ultra-low noise. The auto-tuning function is integrated in the driver, which can automatically generate the optimal operating parameters for different motors and maximize the performance of the motors.

1.2 Characteristics

- New 32-bit DSP technology
- 1 way 0-5V analog input
- Four-way optocoupler isolated OC output
- Automatic parameter power-on setting function
- Variable current control greatly reduces the heat generation of the motor.
- The current is automatically halved at rest
- Can drive a variety of loop stepper motor
- 5 photoelectricity isolation signal inputs, 2 of which are high-speed optocoupler isolation
- COMMUNICATION FREQUENCY UP TO 1MHZ (factory Default 9600HZ)
- Easy to set the current, can be in between

0.1-8.0 a arbitrary choice

- With over-voltage, under-voltage, over-current and other protection functions

1.3 Application areas

Suitable for all kinds of small and medium-sized automatic equipment and instruments, such as AGV, speed door, engraving machine, marking machine, cutting machine, laser phototypesetting, plotter, CNC machine tools, automatic assembly equipment, etc... It works especially well on devices that users expect to have low noise and high speed.

2 Performance Index

2.1 Electrical characteristics

Account for	RS0872			
	Minimum value	Typical value	Maximum value	Unit
Output Current (peak)	0.1	-	7.2	A
Input Power Supply Voltage (DC)	24	24/36/48	75	VDC
Control signal input current	6	10	16	mA
Control signal interface level	5	5	24	Vdc

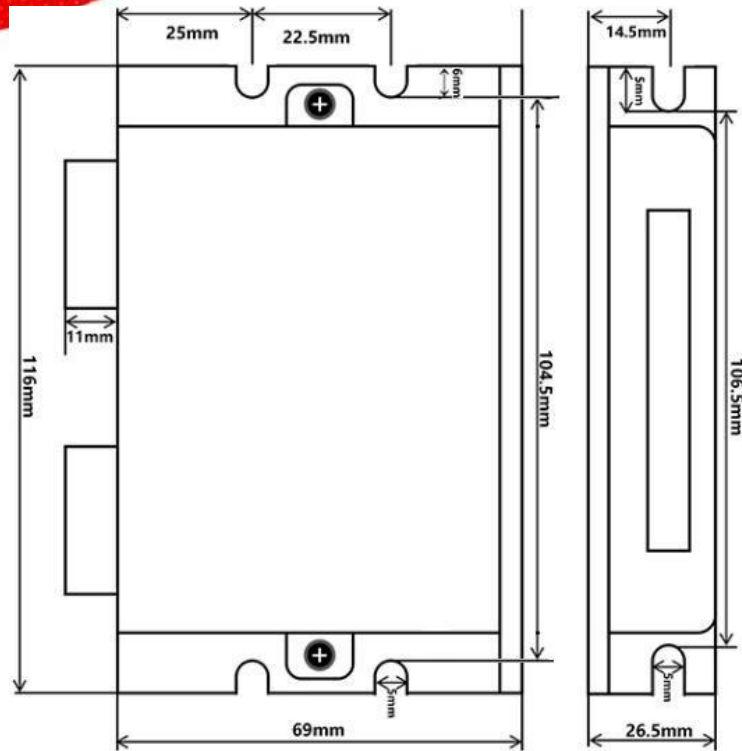
OC output pull-up voltage	5	-	24	Vdc
RS485 frequency	1		1000	KHz
Analog voltage input	0		5	Vdc
Insulation Resistance	100			MΩ

2.2 Use environment

Cooling Mode		Natural Cooling or forced air cooling
Service Environment	Occasion	Cannot be placed next to other heating equipment, to avoid dust, oil mist, corrosive gases, humidity is too large and strong vibration sites, prohibited combustible gases and conductive dust.
	Temperature	-10°C ~ +50°C
	Humidity	40 ~ 90%RH
	Vibration	5.9m/s ² MAX
Storage temperature		-20°C ~ 60°C
Use Elevation		1000 米以下 Below 1000 meters
Weight		0.2KG

3 Installation

3.1 Mounting dimensions



3.2 Installation method

The reliable operating temperature of the driver is usually within 60, and the motor operating temperature is within 80°C.

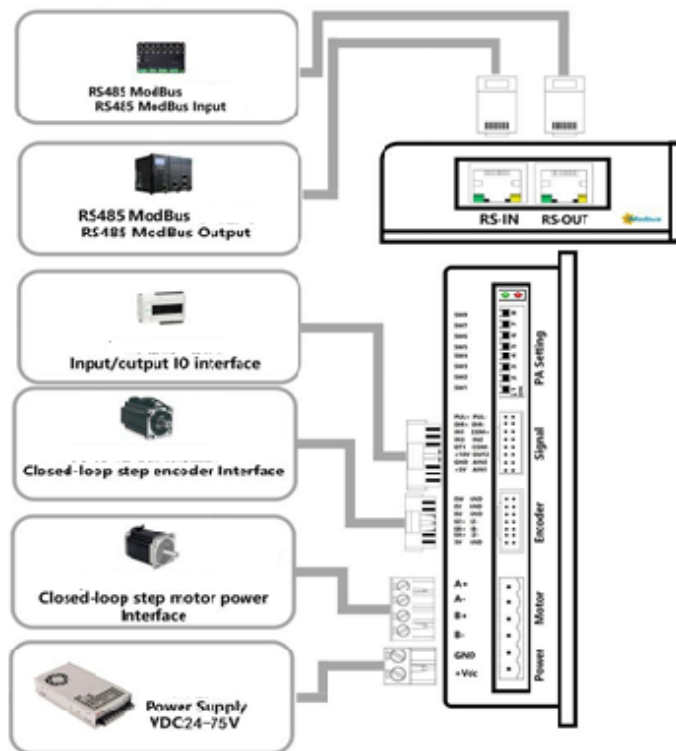
It is recommended to use the automatic semi-flow mode when using the motor. When the motor stops, the current is automatically reduced by half to reduce the heat of the motor and the drive.

Install the drive with vertical side mounting so that the heat dissipating teeth form a strong air convection.

Install a fan near the drive when necessary to force heat dissipation to ensure that the drive works within a reliable operating temperature range.

4 Driver ports and wiring

4.1 Schematic diagram of wiring




4.2 Port Definition

4.2.1 LED Lamp status indication

The blue LED on the left is the power indicator, which is always on when the driver is powered on, and goes out when the driver is cut off the power. The blue LED is the fault indicator, when there is a fault, the indicator lamp for 3 seconds cycle flashing; when the fault is cleared by the user, the blue LED often out. Red LED flashes in 3 seconds represent different failure information, as shown in the table below:

No.	The number of flashes	Red LED flashes waveform	Description of the problem
1	1		Overcurrent or interphase short circuit fault
2	2		Overvoltage fault
3	3		Under voltage fault

4	7		Over-tolerance alarm
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4.2.2 Control Signal Input Port

Control Signal interface

Name	Function
PL+	HIGH-SPEED SIGNAL: Pulse rising edge is effective, PL highlevel 5 ~ 24 VDC, Low Level 0 ~ 0.5 v. In order to respond reliably to the pulse signal, the pulse width should be greater than 1.5 s.
PL-	
DR+	HIGH-SPEED SIGNAL: Pulse rising edge is effective, PL highlevel 5 ~ 24 VDC, Low Level 0 ~ 0.5 v. In order to respond reliably to the pulse signal, the pulse width should be greater than 1.5 s.
DR-	
IN+	Low speed signal: IN1, IN2, IN3 common anode input, level 5-24V compatible
IN1	Negative input of low speed signal IN1
IN2	Negative input of low speed signal IN2
IN3	Negative input of low speed signal IN3
OT-	Common Cathode OC emitter output, OT1, OT2 emitter OC output common terminal
OT1	OT1 emitter output, maximum pull-up voltage 24VDC, pull-up resistance 2K, maximum output current 100mA
OT2	OT2 emitter output, maximum pull-up voltage 24VDC, pull-up resistance 2K, maximum output current 100mA
10V	Reserve
AIN2	Reserve

GND	Reserve
AIN	Reserve
5V	Reserve

4.2.3 Encoder signal and Houle signal interface

Name	Function
EA+	Closed-loop step-by-step encoder reservation
EA-	
EB+	Closed-loop step-by-step encoder reservation
EB-	
EZ+	Closed-loop step-by-step encoder reservation
EZ-	
EU+	Brushless reserve
EU-	
EV+	Brushless reserve
EV-	
EW+	Brushless reserve
EW-	
5V	It supplies the motor's encoder and Houle element with a DC voltage of 5V and a current of 100mA.
GND	5V Reference Terminal Negative

4.2.4 Output ports of power supply and motor

Power supply and motor power interface.

Name	Function
GND	DC power source

+VDC	DC Power Supply Positive Pole, supply voltage range: DC 24 ~ 75VDC, recommended 24VDC or 36VDC work.
A+	A phase winding interface for stepper motor, Open-loop stepping and closed-loop stepping are used, DC servo is not used for this interface
A-	A-phase winding interface of stepper motor
B+	B phase winding interface for stepper motor
B-	B-phase winding interface of stepper motor

The power supply voltage can work normally between the specified ranges. The driver is preferably powered by a non-regulated DC power supply, or a transformer buck+bridge rectifier + capacitor filter. Note, however, that the peak voltage ripple after rectification should not exceed its specified maximum voltage. It is recommended that the user supply power with a DC voltage lower than the maximum voltage to prevent the grid from fluctuating beyond the operating range of the driver voltage.

If using a regulated switching power supply, be aware that the output current range of the switching power supply must be set to maximum.

Please note:

When wiring, pay attention to the positive and negative poles of the power supply, do not reverse connection;

It is better to use an unstable power supply;

The output capacity of the power supply current should be greater than 60% of the set current of the driver when an unstable power supply is used;

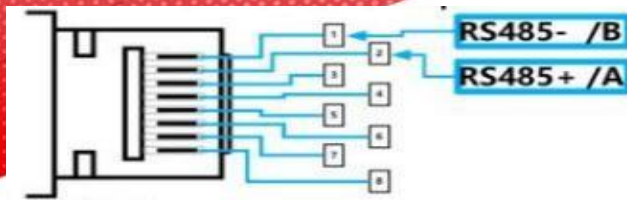
When a regulated switching power supply is adopted, the output current of the power supply shall be greater than or equal to the working current of the driver;

To reduce costs, two or three drives can share a power supply, but the power supply should be large enough.

4.2.5 RS485 bus communication interface

The RS485 port is a duplex with shielded RJ45 terminals (16 pins near the driver terminal side)

Pin Number	Signal	Function description
1	RS485-	RS485-SIGNAL, or B
2	RS485+	RS485 signal, or A
3	NC	No, hold
4	EGNG	Signal ground
5	EGNG	Signal ground
6	NC	No, hold
7	EGNG	Signal hot ground shielding technology, used in strong interference
8	EGNG	Signal ground
9	RS485-	RS485-SIGNAL, or B
10	RS485+	RS485 signal, or A
11	RS232-RXD	RS232 serial port, TTL-3.3 V level, serial debugging settings
12	EGNG	Signal ground
13	EGNG	Signal ground
14	RS232-TX	RS232 serial port, TTL-3.3 V level, serial debugging settings
15	EGNG	Signal hot ground shielding technology, used in strong interference
16	NC	No, hold



Note: the above diagram is the definition diagram of network communication signal pin, the input/output is the same

5 Instructions for setting the dial switch

RS0872 bus-type drive motor adopts 8-bit dial switch to set RS485 address, Baud rate and terminal matching resistance selection function, as follows:

Note: Low 5-bit RS485 address is set by dialing, high 2-bit RS485 address is set by host computer.

RS485 ID Table

ID	S1	S2	S3	S4	S5
Reserved	On	On	On	On	On
1	Off	On	On	On	On
2	On	Off	On	On	On
3	Off	Off	On	On	On
4	On	On	Off	On	On
5	Off	On	Off	On	On
.....
30	On	Off	Off	Off	Off
31	Off	Off	Off	Off	Off

Note: The formula for calculating the value of the RS485 ID table is: $ID = 1 * S_1 + 2 * S_2 + 4 * S_3 + 8 * S_4 + 16 * S_5$. The Default ID value is 0, 0 is the broadcast address, and other higher addresses can be set through the host computer.

RS485 Baud Rate Table

Baud Rate	SW6	SW7
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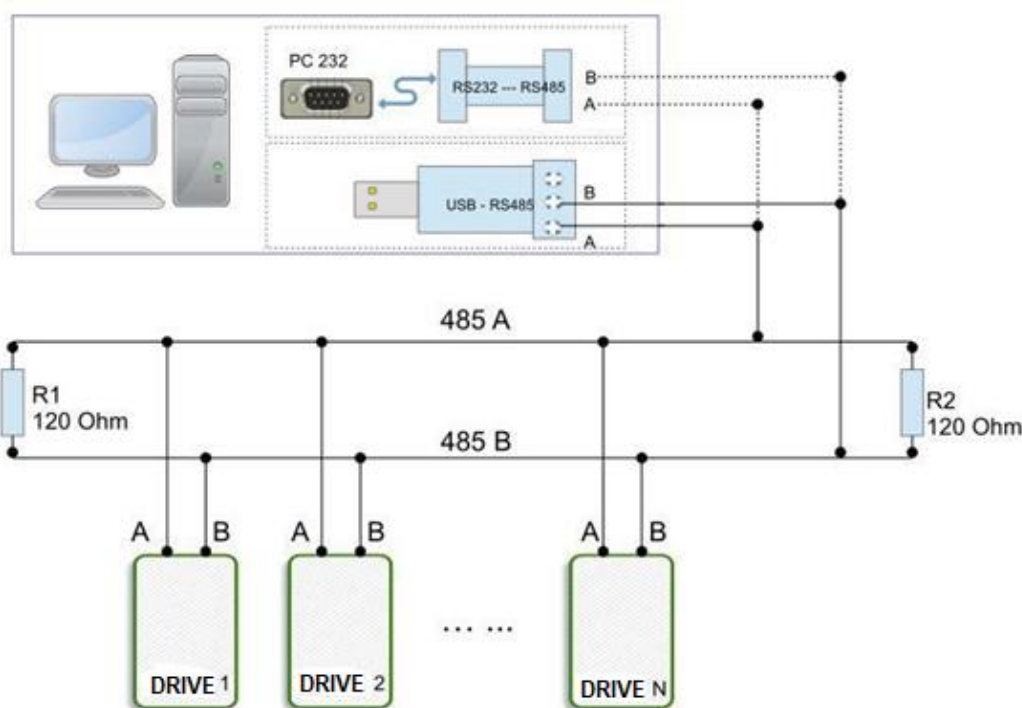
Default (9600HZ, set by PC)	On	On
19200Hz	Off	On
38400Hz	On	Off
57600 Hz	Off	Off

SW8: off=RS485 R off, (Default to)off; on= RS485 R on

Note: The drive at the end of the network requires SW8 = on.

6 Communication and communication protocol description

6.1 Network layout



Built-in trapezoidal acceleration and deceleration curve generator, can trapezoidal acceleration and deceleration, through communication commands to achieve fixed-length operation, continuous operation, deceleration stop, immediately stop. Internal operation supports absolute position mode and relative position mode control, built-in common return to zero function, simplify the development. The internal pulse generator uses 32-bit speed, acceleration, and stroke to achieve wide range of trajectory generation.

6.2 Communication protocol

The communication adopts the standard Modbus protocol, which supports 0x03 (read register), 0x06 (write single register), 0x10 (write multiple registers). Serial communication format: baud rate 9600 ~ 115200, 8 data bits, no parity check, 1 stop bit.

6.2.1 MODBUS Register address definition

	The parameter	attri	The	The range	Register description
site	name	bute	defaul t value	of values	
0	Peak current	R/W/S	5000	1~6000	Unit: Ma
1	The fine fraction	R/W/S	6000	200~51200	The number of pulses required to run a motor in one turn.
2	Standby time	R/W/S	300	100~10000	The time the drive is on standby, unit: ms
3	Percentage of standby current	R/W/S	50	0~100	Unit: %
4	Dial the code state	R			
10	Filtering time	R/W/S	4000	50~25600	Set the filtering time of the filter:us
15	Current Kp loop	R/W/S	1000	100~32767	When self-setting is enabled, the item read-only;The user can

					rewrite when it is not enabled.
16	Current loopKi	R/W/S	200	0~32767	When self-setting enabled, the item is read-only;The user can rewrite when it is not enabled.
18	Baud rate selection	R/W/S	96	96~1152	96 said 9600
22	Effective current value	R/W/S	3500	1~4200	Unit: Ma
31	Device ID no.	R			
39		R			

	Total number of pulses L				16bit The number of external pulsesreceivedis16bit lower
40	Total number of pulses H	R/W			16bit The number of external pulsesreceivedis16bit higher Write: Write 1 to clear the counter
48	Bus voltage	R			Return bus voltage unit 0.1V

51	Motor running direction	R/W/S	1	0/1	0: The running direction of the motor remains unchanged 1: the motor running direction is reversed
60	Back to zero velocity	R/W/S	200	0~65535	pulse/s
62	Acceleration reduction is lower 16bit	R/W/S	3200	0~65535	pulse/s ²
63	Deceleration height 16bit	R/W/S	0	0~65535	pulse/s ²
64	16bit Low speed	R/W/S	1600	0~65535	pulse/s
65	16bit High speed	R/W/S	0	0~65535	pulse/s
66	16bit Low acceleration	R/W/S	3200	0~65535	pulse/s ²
67	16bit High acceleration	R/W/S	0	0~65535	pulse/s ²
68	Low 16 bit	R/W/S	1600	0~65535	pulse
69	High 16 bit	R/W/S	0	0~65535	pulse
70	Sports	R/W	0	0~5	

	instruction				<p>Trigger the corresponding motion, and then the address changes to 6</p> <p>0-- Slow down to a stop</p> <p>1-- Forward constant length motion</p> <p>2-- Reverse fixed length movement</p> <p>3-- Forward continuous motion</p> <p>4-- Continuous reverse motion</p> <p>5-- Stop immediately</p> <p>6-- Default value, meaningless</p>
71	Back to the zero	R/W	0	0~2	<p>0-- Exit back to zero</p> <p>1-- Zero to zero with the forward limit signal</p> <p>2-- Zero to zero with negative limit signal</p>
72	Fixed length movement working mode	R/W	0	0/1	<p>0: Incremental mode</p> <p>1: Absolute mode</p>

73	device control register	R/W/S			See 2.2.1 for the specific bit definition
74		R/W/S	10	0~65535	1 said 50 us

	Return to zero limit filtering time				
75	device status register	R			See 2.2.2 for the specific bit definition
90	Save the parameters	R/W	0	0/1	Read the address: Return 0: Save incomplete Return 1: The save is complete
91	Restore factory default parameters	R/W	0	0/1	Write 1 to start the cleanup; Read the address: Return 0: Clear unfinished Return 1: The cleanup is complete
92~150	reserved	R			reserved

A definition	Name & Description	The default value	description
7~15	reserved	0	No
6	IO triggers motion enablement (In1 is the default trigger port)	0	0 -- The trigger port is inactive 1 -- The trigger port can trigger the motion
2~5	Reserved	0	No
1	Negativelimitsignal level (default IN3 is negative)	1	Negative limit occurs when 0 -- optocoupler is turned off 1 -- Negative limit occurs when the optocoupler is on
0	Positivelimitsignal level (In2 is a positive limit by default)	1	Positive limit occurs when 0 -- optocoupler is turned off 1 -- Positive limit occurs when the optocoupler is on

6.2.2 Driver status register

A definition	Name & Description	The default value	explain
8~15	retain	0	retain

7	Movement to complete	1	1——内部脉冲发送完成 0——内部脉冲未完成 1 -- Internal pulse transmission completed 0 -- Internal pulse is incomplete
6	retain	0	0
5	Negative limit	0	0——No negative limit signal 1——a negative limit signal
4	positive limit	0	0 -- No positive limit signal 1 -- Positive limit
			signal
2~3	retain	0	
1	overpressure	0	0 - no overvoltage 1 -- Overpressure occurs
0	Over current	0	0 - no flow 1 -- Overflow occurred

6.3 Return to zero function

6.3.1 The forward limit signal is zero to zero

After writing "1" to register address 71 (return to zero command), the return to zero process is as follows:

Step 1: Run forward to the positive limit at the speed and acceleration set at register addresses from 62 to 67.

Step 2: Slow down and stop when positive limit signal is detected.

Step 3: Run to the limit signal in the negative direction of the speed set at register address 60 (return to zero speed).



6.3.2 The negative limit signal is zero to zero

After writing "2" to register address 71 (return to zero command), the return to zero process is as follows:

Step 1: Run negative to the negative limit with the speed and acceleration set at register addresses 62 ~ 67 addresses.

Step 2: Slow down and stop when negative limit signal is detected.

Step 3: Run in the positive direction of the speed set by register address 60 (return to zero speed) to the limit signal.



6.3.3 Exit back to zero:

After writing "0" to register address 71 (return to zero command), the driver exits the return to zero process and slows down to stop. After returning to zero, the client writes 1 at the register address 40 as needed (such as in absolute position mode) The pulse counter can be cleared.

6.4 MODBUS Common function codes

6.4.1 Read holding register command 0x03

Host → Slave Data

Device address	Function code	Register address		Number of registers read		CRC check	
01	03	00	00	00	01	85	0A

Slave → Host Data

Device address	Function code	Number of bytes returned	Register count		CRC check	
01	03	02	0A	8C	BF	41

The return current value of the slave (register address 00) is 2700mA.

6.4.2 Write single register command 0x06

Host → Slave Data

Device address	Function code	Register address		Write data		CRC check	
01	06	00	40	06	40	8A	4E

Slave → Host Data

Device address	Function code	Register address		Write data		CRC check	
01	06	00	40	06	40	8A	4E

Write 1600 pulse/s to the lower 16bit of the slave speed (register address 64).

6.4.3 Write multiple registers command 0x10

Host -> Slave Data

Device address	Function code	The starting address		Write the number		The number of bytes	Write content		Write content		CRC check	
		00	44	00	02		38	80	00	01	3B	24
01	10	00	44	00	02	04	38	80	00	01	3B	24

Slave -> Host Data

	Function code	The starting address		Write the number		CRC check	
		00	44	00	02	01	DD
01	10	00	44	00	02	01	DD

Write 14464 to the slave 16bit low (register address 64) and 16bit high (register address 65) Write 1, that is, the total number of trips is 80000pulse.

6.5 CRC Validation routines

The following routine calculates CRC using the C language.

```

Uint16 Funct_CRC16(unsigned char * puchMsg, Uint16 DataLen)
{
Uint16 i,j,tmp; Uint16
crcdata=0xFFFF;
for(i=0;i<DataLen;i++)
{
crcdata=(*puchMsg)^crcdata;
puchMsg++; for(j=0;j<8;j++)
{
tmp=crcdata&0x0001;
crcdata=crcdata>>1;
if(tmp){
crcdata=crcdata^0xA0
01;
}
} }
returncrcdata;
}

```

7 Warranty and after-sales service

Please keep the packing box for transportation, storage or need to return to the company for maintenance. One year warranty period:

From the use of this drive within one year because of the product itself caused by the damage, responsible for the warranty.

Not covered by warranty:

Damage caused by improper wiring, power supply voltage and user peripheral configuration.

Without the written authorization of the company, users make changes to the products without authorization. Use beyond electrical and environmental requirements.

The drive serial number has been torn off or is unreadable. The outer shell was visibly damaged.

An irresistible disaster.

6.2 Aftersales Service

Before you call, please record the following information:

Fault phenomenon

Product model and serial number Installation date or production date

