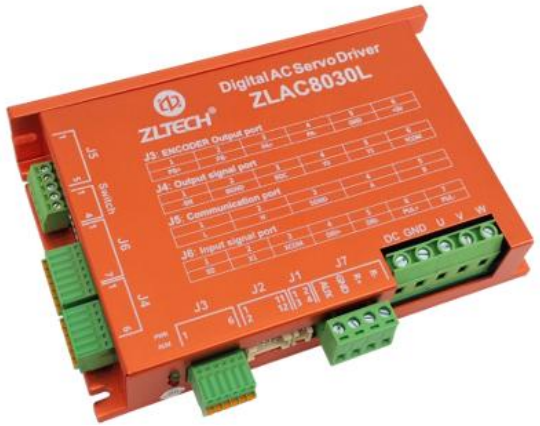
ZLAC8030L V2.0

Servo Driver Manual (Special for Hub Servo Motor)

【Please read the manual in detail before use, to avoid damage to the driver】



深圳中菱科技有限公司
Shen Zhen Zhong Lin Technology Co.,ltd

Shenzhen ZhongLing Technology Co.,Ltd.

Add: 303 Room, Building B, Country Garden Phoenix Wisdom Valley, Gongle Tiezai Rd., Xixiang St., Bao'an Dist, Shenzhen, China

Postcode: 518102

Tel: +86-0755-2979 9302

Fax: +86-0755-2912 4283

Email: sales@zlingkj.com

Web: www.zlingkj.com

CONTENTS

RELEASE NOTES

Version	Update Time	Update Content	Updater
V2.00	2022-1-14	First Edition	LHY
V2.01	2023-03-14	1. Update mechanical schematic diagram in section 2.3; 2. Revise the schematic diagram of communication terminals in section 3.1.7; 3. Revise the description of communication terminals in section 3.3 and 3.4.	CX,LHY
V2.02	2023-06-27	2.1 Correct insulation resistance 3.5 Modify fault alarms 4.3 Increase the bleed resistance	CX,LHY

PREFACE

Thanks for choosing ZLAC8030L, the servo driver for hub servo motor.

This manual describes the installation, debugging, maintenance, operation and other aspects of the servo driver ZLAC8030L. Please read this manual in detail before use, and be familiar with the safety precautions.

This manual may be revised timely when product is improved, specification and version are changed or for some other reasons, which will not be notified particularly.

Any questions when using our products, please read the relevant manual or call our technical service department, we will meet your requirements in the shortest possible time.

Marks and warning signal:

Danger: Indicates that this operation error may endanger personal safety!

Attention: Indicates that this operation error may result in equipment damage!

SAFETY PRECAUTIONS

Open Box and Check

Do not install integrated step-servo motor which is damaged or with missing parts.

Installation

Installed on a non-flammable metal frame, prevent the intrusion of dust, corrosive gases, conductive objects, liquids and flammable materials, and

maintain good heat dissipation conditions.

During installation, be sure to tighten the mounting screws of the integrated step-servo motor. It should be protected from vibration and shock.

Wiring

Please perform the wiring work by professional electrical engineer;

Before wiring, please confirm that the input power is off. Wiring and inspection must be performed after the power is turned off and the integrated step-servo motor indicator is off to prevent electric shock;

When plugging and unplugging the integrated step-servo motor terminals, make sure that its indicator is off before proceeding;

Please set the emergent stop circuit outside the controller;

Please tighten the output terminal with a suitable torque.

Electrify

Please confirm whether the main circuit input power is consistent with the rated working voltage of the integrated step-servo motor;

Do not test the integrated step-servo motor for high voltage and insulation resistance at will;

Do not connect the electromagnetic contactor or electromagnetic switch to the output circuit.

Operation

Do not directly touch the output terminals after the integrated step-servo motor is powered on;

When the system is running, the integrated step-servo motor may

have a high temperature rise, do not touch it;

Please confirm the input and output signals to ensure safe operation;

The alarm can be reset only after the operation signal is cut off. Alarm resetting in the running signal state will cause the integrated step-servo motor to restart suddenly;

Do not change the parameter settings of the integrated step-servo motor at will. The parameter modification needs to be performed under standby condition.

Maintenance and Inspection

Do not touch the integrated step-servo motor terminals directly, and some have high voltage, very dangerous;

Before powering up, be sure to install the cover; when removing the cover, be sure to cut off the power supply first;

Before wiring, please confirm whether the input power is off;

After cutting off the main circuit input power and confirming the integrated step-servo motor indicator light has completely extinguished, it can be inspected and maintained;

Do the inspection and maintenance by professional electrical engineer;

Do not do wiring, disassembling or other operation on the terminals during power on.

There is an integrated circuit on the main control board of the servo driver. Please pay full attention when checking to avoid damage caused by static induction.

一、PRODUCT INTRODUCTION

1.1 OUTLINE

ZLAC8030L is a high-performance digital servo driver for hub servo motor. It has a simple structure and high integration, and adds RS485, CAN bus communication and single-axis controller function.

1.2 FEATURES

■ Adopt CAN bus communication, support CiA301 and CiA402 sub-protocol of CANopen protocol, could mount up to 127 devices. CAN bus communication baud rate range is 25-1000Kbps, and default value is 500Kbps.

■ Adopt RS485 bus communication, support modbus-RTU protocol, up to 16 devices; RS485 bus communication baud rate default 115200bps.

■ Support operation modes such as position control, velocity control and torque control.

■ User can control the start and stop of the motor through bus communication and query the real-time status of the motor.

■ Input voltage: 24V-48VDC.

■ 2 isolated signal input ports, programmable, implement the driver's functions such as enable, start stop, emergency stop and limit.

■ 2 isolated output ports, programmable, output driver‘s status and control signal.

■ 1 isolated brake control output port.

■ With protect function such as over-voltage, over-current.

1.3 APPLICATION

Suitable for AGV, delivery robot, service robot, automated handling machine, etc.

二、ELECTRICAL, ENVIRONMENTAL INDEX

2.1 ELECTRICIAL INDEX

Driver Parameter	Min value	Typical value	Max value	Unit
Input voltage	20 VDC	36VDC	48VDC	V
Output current(peak)	0	30	60	A
Control signal input current	7	10	16	mA
Over-voltage protection	-	75	-	VDC
Under-voltage protection	-	16	-	VDC
Input signal voltage	-	5	-	VDC
Insulation resistance	20			MΩ

2.2 ENVIROMENTAL INDEX

Cooling Type		Natural cooling or forced cooling
Working environment	Application occasion	Avoid dust, oil mist and corrosive gases
	Working temperature	0~50℃
	Max. ambient humidity	90% RH(no condensation)
	Storage temperature	-10~70℃
	Vibration	10~55Hz/0.15mm

2.3 INSTALLATION DIMENSION

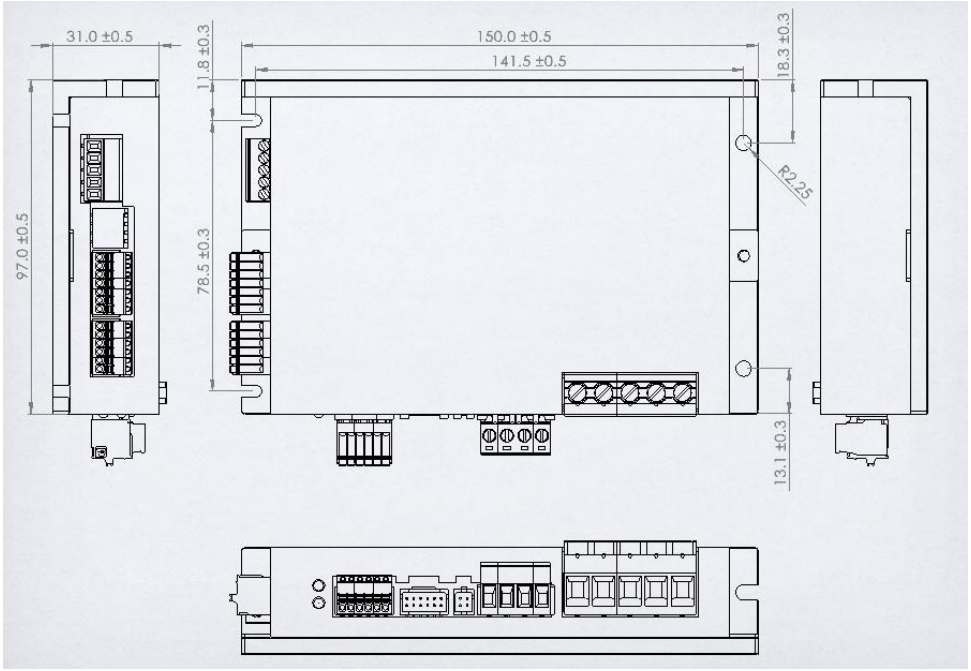


Fig.1 Installation dimension diagram (unit: mm)

2.4 INSTALLATION

User can use the wide or narrow side of the driver cooled radiator for installation. If installing with wide side, use M3 screws to install through the holes on four corners. If installing with narrow side, use M3 screws to install through the holes on both sides. In order to achieve good heat dissipation, it is recommended to use narrow-side installation.

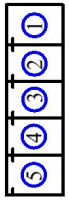
The power device of the driver will generate heat. If it works continuously under the condition of high input voltage and high power, the effective heat dissipation area

should be enlarged or forced cooling. Do not use it in a place where there is no air circulation or where the ambient temperature exceeds 60 ° C. Do not install the driver in a humid or metal debris place.

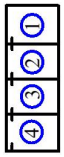
三、DRIVER INTERFACE AND WIRING

3.1 INTERFACE DEFINITION

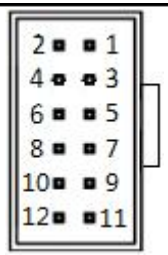
3.1.1 Power supply and motor power cable input port

Port	Pin	Mark	Name	Function
	1	DC	Power supply port	Power supply 24V-48V
	2	GND		
	3	U	Motor power cable	Connect to motor power cable
	4	V		
	5	W		

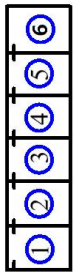
3.1.2 Auxiliary power supply and bleeding resistor input port (J7)

Port	Pin	Mark	Name	Function
	1	AUX	Auxiliary power supply	Power supply 24V-48V
	2	GND		
	3	R+	Bleeding resistor	Recommended resistance 5-10 Ω, power 100-200W
	4	R-		

3.1.3 Encoder and Hall port J2

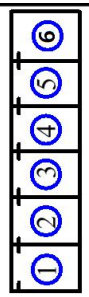
Port	Pin	Mark	Name	Function
	1	iA+		
	2	iA-		
	3	iB+	Encoder	
	4	iB-		
	5	RTC+	temperature sensor	
	6	RTC-		
	7	V	Hall sensor	
	8	W		
	9	U		
	10	GND	Power ground	
	11	VCC	Power positive	Output to encoder and HALL
	12	GND	Power ground	

3.1.4 Motor control signal port J3

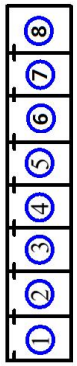
Port	Pin	Mark	Name	Function
	1	PB+	Motor encoder B+	Encoder output signal
	2	PB-	Motor encoder B-	
	3	PA+	Motor encoder A+	
	4	PA-	Motor encoder A-	
	5	GND	Encoder +5V power supply -	External power output
	6	+5V	Encoder +5V power supply+, <100mA	

3.1.5 Motor control signal port J4

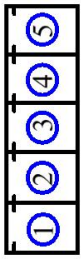
Port	Pin	Mark	Name	Function
	1	BR-	Brake-	Brake control
	2	BGND	Brake power supply-	
	3	BDC	Brake+, External power positive	

	4	Y0	Internal pull-up 5V output	Output signal
	5	Y1		
	6	YCOM	Output negative common terminal	

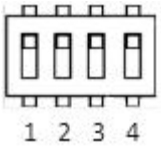
3.1.6 Motor control signal port J6

Port	Pin	Mark	Name	Function
	1	X0	Input signal, internal limit 5V input	Could be edited via CANOPEN or 485
	2	X1		
	3	XCOM	Input negative common terminal	
	4	DIR+	DIR input differential signal+	
	5	DIR-	DIR input differential signal-	
	6	PUL+	PUL input differential signal+	
	7	PUL -	PUL input differential signal-	

3.1.7 Communication port

Port	Pin	Mark	Name	Function
	1	CANL	CAN	CAN/RS485 belongs to isolated output. It is recommended to connect the common ground during stage.
	2	CANH		
	3	SGND	Communication common GND	
	4	A	RS485	
	5	B		

3.1.8 DIP switch

Port	Pin	Mark	Name	Function
	1	SW1	DIP switch	CANOPEN termination resistance selection
	2	SW2		RS485 termination resistance selection
	3	SW3		CAN/RS485 address selection is 1-3. When it is 0, it can be set to 4-127 by software.
	4	SW4		

3.2 CONTROL SIGNAL WIRING

ZLAC8030L series driver provides 4 photoelectric isolation programmable input interfaces, compatible with NPN wiring and PNP wiring.

Dual-channel (J6) programmable input signals are isolated from the external control interface by optocoupler. The driver is compatible with common cathode internally, as shown in the figure below. In order to ensure the reliable conduction of the optocoupler inside the driver, the driving current provided by the controller is required to be at least 10mA.

The level pulse width of X0-X1 input needs to be bigger than 10ms, otherwise the driver may not respond normally. The X0-X1 sequence diagram is shown in Figure 2.

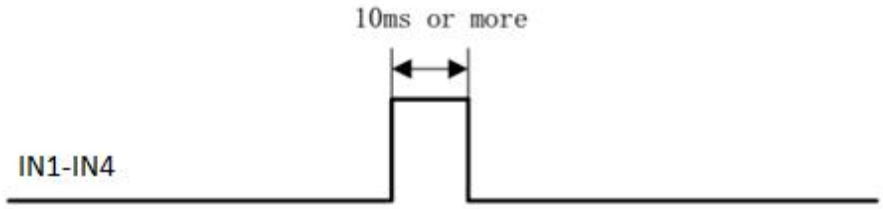


Fig.2 Control signal interface wiring diagram

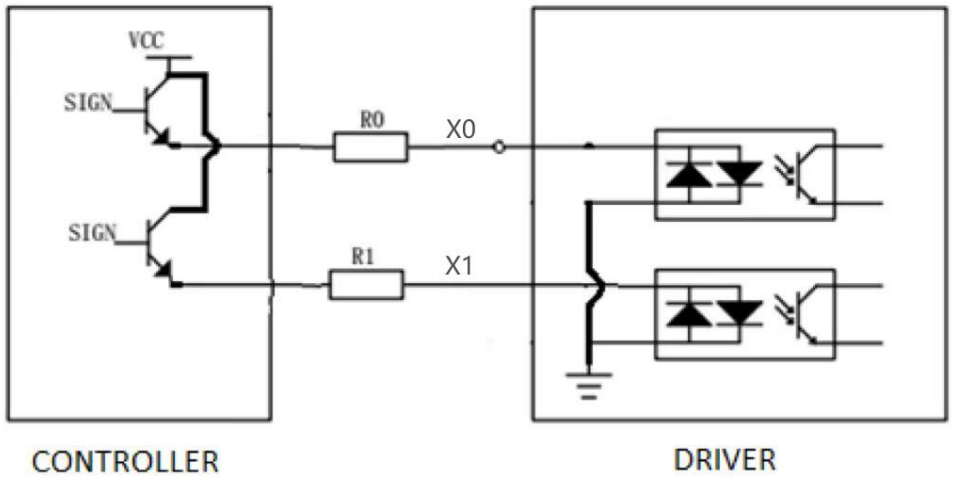


Fig.3 Input interface circuit

Note: The default input voltage of the control signal is 5V. For other voltages, current limiting resistors must be added, for example: 12V, external 1K 1/2W resistor; 24V, external 2K 1/2W resistor.

After the driver is powered on, X0-X1 defaults to the unspecified state. At this time, the input signal is invalid. User could configure X0-X1 input functions through bus communication.

Signal output wiring, such as alarm, in place, etc., customer could internally pull up 5V resistance to output, or externally pull up 3.3-24V resistance to output.

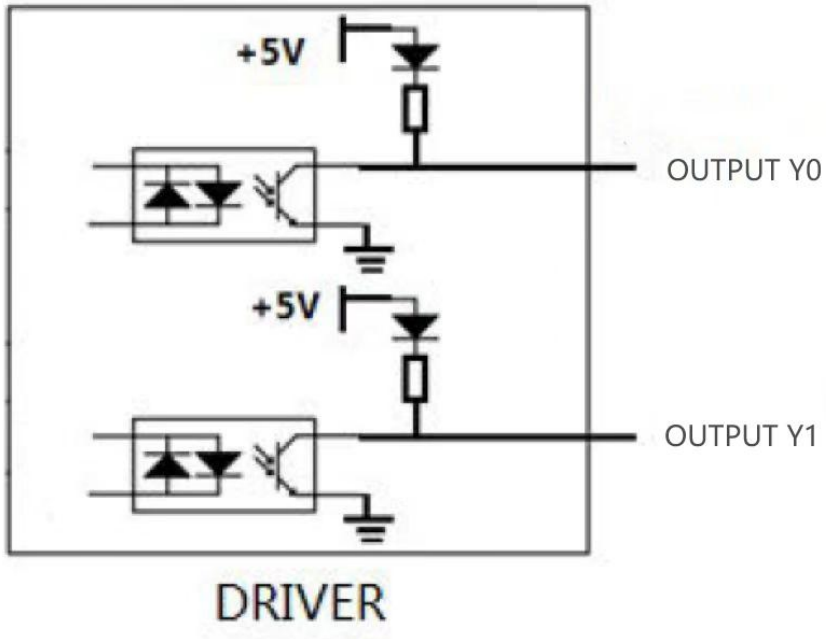


Fig.4 Output interface circuit

There is 1 brake circuit, the schematic diagram is shown in Figure 5.

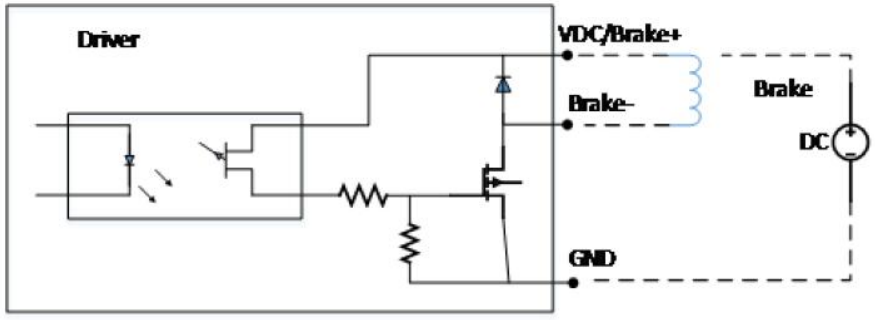
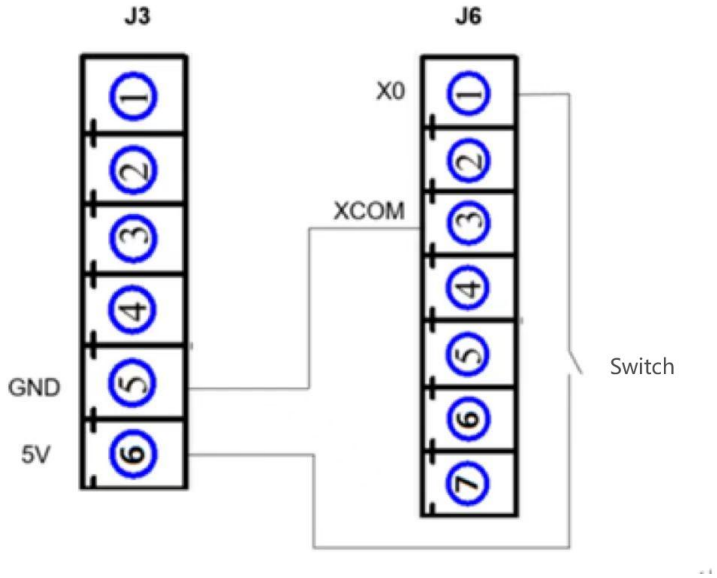


Fig.5 Output interface circuit

External scram wiring diagram



Input interface circuit Figure 6

3.3. CANOPEN COMMUNICATION PORT DESCRIPTION

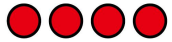
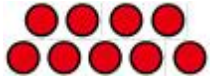
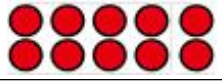
ZLAC8030L series driver provides a 5PIN communication port, please refer to 3.1.7 communication Port for pin definition. Please note that the communication cable should be shielded twisted pair, and SGND (coomunication common GND) must to controller’s communication GND, to ensure stable communication.

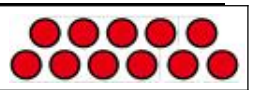
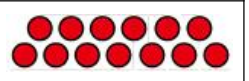
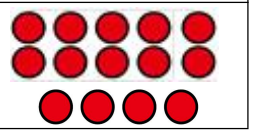
3.4 RS485 COMMUNICATION PORT DESCRIPTION

ZLAC8030L series driver provides a 5PIN communication port, please refer to 3.1.7 communication Port for pin definition. Please note that the communication cable should be shielded twisted pair and SGND (coomunication common GND) must to controller’s communication GND, to ensure stable communication.

3.5 STATUS INDICATOR LED

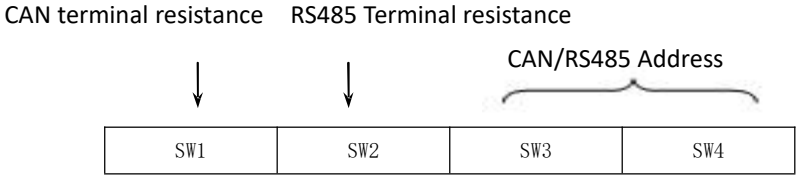
The green LED is the power indicator, which is solid when the drive is turned on; When the driver cuts off power, this LED turns off. The red LED is a fault indicator, and when a drive fails, the drive will shut down and prompt the corresponding fault code. (For example: overvoltage, flash a red light, pause, flash a red light again, and cycle to indicate that the driver enters an overvoltage alarm) The user needs software to clear the alarm, and the fault can be cleared.

Status	Situation	Status indicator LED description	
Over-Voltage	The power supply voltage exceeds the maximum rated voltage.	1 Red	
Under-Voltage	The power supply voltage is lower than the minimum working voltage.	2 Red	
Over-Current	Phase current through the motor exceeds short-circuit between phases	3 Red	
Over-Load	The phase current through the motor exceeds the set overload current	4 Red	
Current out-of-tolerance	Control current and output current are out of tolerance		Reserved
Position out-of-tolerance	The given position is out of tolerance with the output position	6 Red	
Speed out-of-tolerance	The given speed and output speed are out of tolerance		Reserved
Internal reference error	Internal fault of the driver	8 Red	
Parameter reading error	EEPROM parameters read error	9 Red	
HALL fault	The HALL cable is not plugged in or the signal is incorrect	10 Red	

High motor temperature	Motor temperature is too high	11 Red	
High driver temperature	Driver internal temperature too high	12 Red	
Encoder error	Motor encoder cable falls off or encoder signal is abnormal	13 Red	
Mixed error	There are at least 2 errors	14 Red	

四、DIP SWITCH SETTING

ZLAC8030L driver uses a 4-digit DIP switch to set the terminal resistance and driver address. The details are as follows:



4.1 STEP RESOLUTION SETTINGS

A. CAN/RS485 Address

SW3	SW4	Address
OFF	OFF	Custom
ON	OFF	1
OFF	ON	2
ON	ON	3

User could use CANOPEN/RS485 bus to control up to 127 ZLAC8030L series drivers at the same time. The driver communication address is set with a 4-digit DIP switch. The address setting range is 1-3(CAN/RS485 common), where address 0 needs to be set and saved by the driver software. SW3-SW4 switches must be all set to OFF.

4.2 TERMINAL RESISTANCE SETTING

User can select whether to incorporate a 120Ω-terminal resistor through this bit. According to the application, it is generally determined that only the master terminal and the last slave need to connect a 120Ω terminal resistor.

CAN:
SW1 = OFF, invalid;
SW1 = ON, effective.
RS485:
SW2 = OFF, invalid;
SW2 = ON, effective.

4.3 TERMINAL RESISTANCE SETTING

If motor's speed exceeds 100RPM, or emergency stop, fast stop, and other functions are requested, it is recommended to add a bleeder circuit to prevent damage to the driver or other equipments caused by the back electromotive force generated by excessive speed or emergency stop. (Recommended resistance parameter: 5Ω 200W. For different motors, bleeder resistors might be different. If any questions, please consult ZLTECH.) The connection method is shown in the following figure: