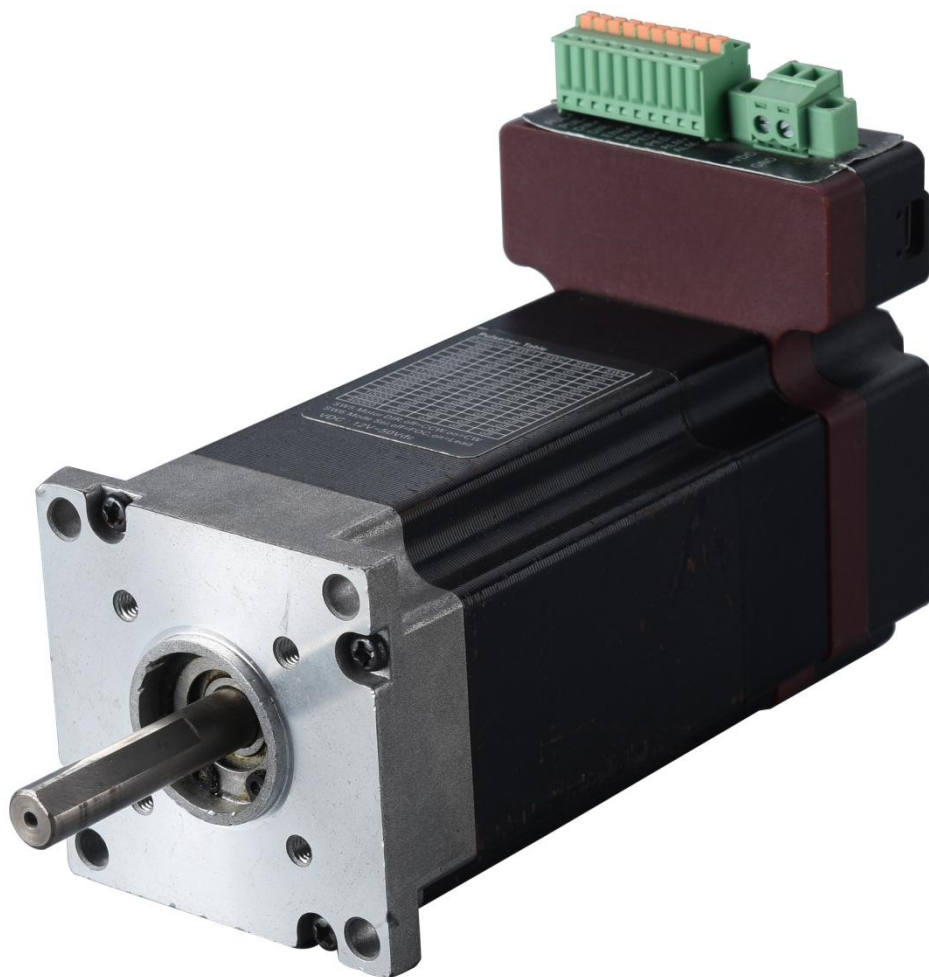


IV57

一体集成式脉冲无刷伺服驱动电机

Integrated Pulse brushless Servo Motor User's Manual



摩川技术(深圳) 有限公司

Moschon Technology (Shenzhen) Co. , Ltd.

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前言/Foreword

感谢您使用本公司开环步进驱动器。

Thank you for using our open step drive.

在使用本产品前，请务必仔细阅读本手册，了解必要的安全信息、注意事项以及操作方法等。错误的操作可能引发极其严重的后果。

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.

本产品的设计和制造不具备保护人身安全免受机械系统威胁的能力，请用户在机械系统设计和制造过程中考虑安全防护措施，防止因不当的操作或产品异常造成事故。

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.

由于产品的改进，手册内容可能变更，恕不另行通知。用户对产品的任何改装我公司将不承担任何责任。阅读时，请注意手册中的以下标示：

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:



注意：提醒您注意文字中的要点。



小心：表示错误的操作可能导致人身伤害和设备损坏。

本产品经过国家强制 3C 认证，CE 认证，ROHS 认证

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



1 概述/Overview

1.1 产品介绍/Product Introduction

IV57 是我公司基于多年低压交流伺服系统经验和集成一体化产品研制开发的一款新型交流伺服电机与驱动器集成一体化的低压交流伺服产品,本产品采用了最新 DSP 数字处理芯片和先进的控制算法技术,为设备制造商提供了一种高性价比的伺服驱动解决方案。IV57 结构紧凑,体积小巧,且由于驱动器与电机集成一体,节省了驱动器与电机间的连线,减低了线间的电磁干扰;采用了更优振动技术和低发热技术,有效的解决了发热、振动和噪声等问题。

IV57 is a new low-voltage AC servo product integrated with AC servo motor and driver, which is developed by our company based on many years' experience of low-voltage AC servo system and integrated product, this product uses the latest DSP digital processing chip and Advanced Control Algorithm Technology, for equipment manufacturers to provide a cost-effective solution to the servo drive. The IV57 is compact and compact in size, and because of the integration of the driver and the motor, the connection between the driver and the motor is saved and the electromagnetic interference between the wires is reduced, the invention effectively solves the problems of heating, vibration and noise.

1.2 特性/Characteristics

- 工作电压: 直流输入电压 15VDC~50VDC, 推荐工作电压 36V
Working Voltage: DC INPUT VOLTAGE 15VDC ~ 50VDC, recommended working voltage 36V
- 连续输出电流最大值 10A, 最大峰值电流 22A(3 倍的过载能力)
Maximum continuous output current 10A, maximum peak current 22A (3 times overload capacity)
- 可接受差分 and 单端式脉冲/方向指令, 具有位置/速度/力矩三种控制模式
Can accept differential and single-ended pulse/direction command, with position/speed/torque three control modes
- 采用 FOC 磁场定位控制技术和空间矢量脉宽调制 (SVPWM) 控制技术
FOC magnetic field positioning control technology and space vector pulse width modulation (SVPWM) control technology are adopted
- 每圈脉冲数可通过调试软件或拔码设定 (电子齿轮比)
The number of pulses per cycle can be set by debugging software or code (electronic gear ratio)
- 可以选 100W, 140W 和 200W 三款直流无刷伺服电机
Can Choose 100W, 140W and 200W three DC brushless servo motor
- 具有过压、欠压、过流和超差等保护功能
With over-voltage, under-voltage, over-current and over-differential protection functions
- 单/双脉冲模式、脉冲有效沿可选
Single/double pulse mode, pulse effective edge optional
- 控制指令最大脉冲频率为 500KHz (出厂默认为 200KHz)
The maximum pulse frequency of Control Instruction is 500 KHz (factory default is 200 KHz)
- 脉冲, 方向和使能信号输入接口电平为 5-24V 兼容
The pulse, direction and enable signal input interface levels are 5-24V compatible
- 具有串口 RS232 调试功能, 但需使用本公司专用的串口调试线缆
Have serial port RS232 debugging function, but need to use the company's dedicated serial port debugging cable
- 性能: 速度平稳, 超调小, 跟踪误差小, 电机和驱动器低发热
PERFORMANCE: stable speed, small overshoot, small tracking error, motor and driver low heating

1.3 应用领域/Application areas

适合各种中小型自动化设备和仪器，例如：喷绘机、中小型雕刻机、电子加工设备、自动抓取设备、专用数控机床、包装设备和机器人等。在用户期望低噪声、高速度的设备中应用效果尤佳。

Suitable for all kinds of small and medium-sized automatic equipment and instruments, such as: inkjet Printer, small and medium-sized engraving machine, electronic processing equipment, automatic grab equipment, special CNC machine tools, packaging equipment and robots. It works especially well on devices that users expect to have low noise and high speed.

2 性能指标/Performance Index

2.1 电气特性/Electrical characteristics

说明 Explanation	IV57			
	最小值 Minimum Value	典型值 Typical Value	最大值 Maximal Value	单位 Unit
连续输出电流 Continuous output current	0	-	10	A
电源电压（直流） Power Supply Voltage (DC)	15	36	50	Vdc
逻辑输入电流 Logic input current	6	10	16	mA
逻辑输入电压 Logic input voltage	5	5	24	Vdc
脉冲频率 Pulse frequency	0	200	500	kHz
脉冲高电平宽度 Pulse high-level width	1.5	-	-	uS
位置误差控制精度 Accuracy of position error control	-	±1	-	Pulse
速度控制精度 Speed control accuracy	-	±2	-	rpm
最高加速度（空载） Maximum acceleration (no load)	-	100	-	rpm /ms
电机高速 Motor speed	3500	-	-	RPM
绝缘电阻 Insulation Resistance	100	-	-	MΩ

2.2 适配标准电机/Suitable for standard motor

该一体化驱动器能适配各大电机厂商不同规格的 57 低压无刷伺服驱动电机，驱动器可以单独对外销售。如果需要采购我司驱动器和电机整套产品，我司一般推荐如下三种标准规格型号，其它规格型号的低压无刷伺服电机可以根据客户需求定制。

The integrated drive can be used for 57 low voltage brushless Servo drive motors with different specifications from major motor manufacturers. The drive can be sold separately. If you need to purchase our driver and motor complete set of products, we generally recommend the following three standard specifications, other specifications of low-voltage brushless servo motor can be customized according to customer needs.

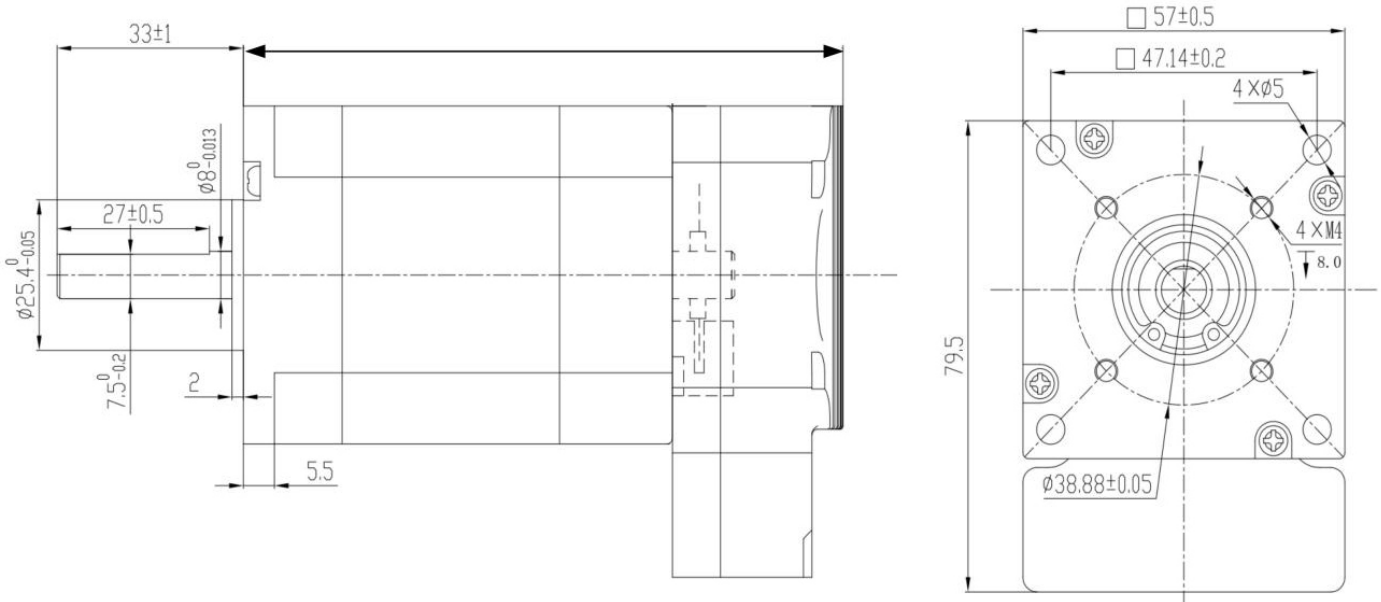
型号 (Model No.)	额定功率 Rated power	驱动器+编码器+电机机身长度 Length	重量 Weight
	W	mm	kg
IV57-09	100W	107±1	0.9
IV57-13	140W	127±1	1.0
IV57-18	200W	147±1	1.2

2.3 使用环境/Use environment

冷却方式 Cooling Mode		自然冷却或强制风冷 Natural Cooling or forced air cooling
使用环境 Service Environment	场合 Occasion	不能放在其它发热的设备旁，要避免粉尘、油雾、腐蚀性气体，湿度太大及强振动场所，禁止有可燃气体和导电灰尘。 Can not 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.
	温度 Temperature	-10℃ ~ +50℃
	湿度 Humidity	40 ~ 90RH
	振动 Vibration	5.9m/s ² MAX
保存温度 Storage temperature		-20℃~60℃
使用海拔 Use Elevation		1000 米以下 Below 1000 meters
重量 Weight		1.4KG

3 安装/Installation

3.1 安装尺寸/Mounting dimensions



3.2 安装方法/Installation method

驱动器的可靠工作温度通常在 60°C 以内，电机工作温度为 80°C 以内。

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

建议使用时选择自动半流方式，马达停止时电流自动减一半，以减少电机和驱动器的发热。

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.

安装驱动器时请采用竖着侧面安装，使散热齿形成较强的空气对流。

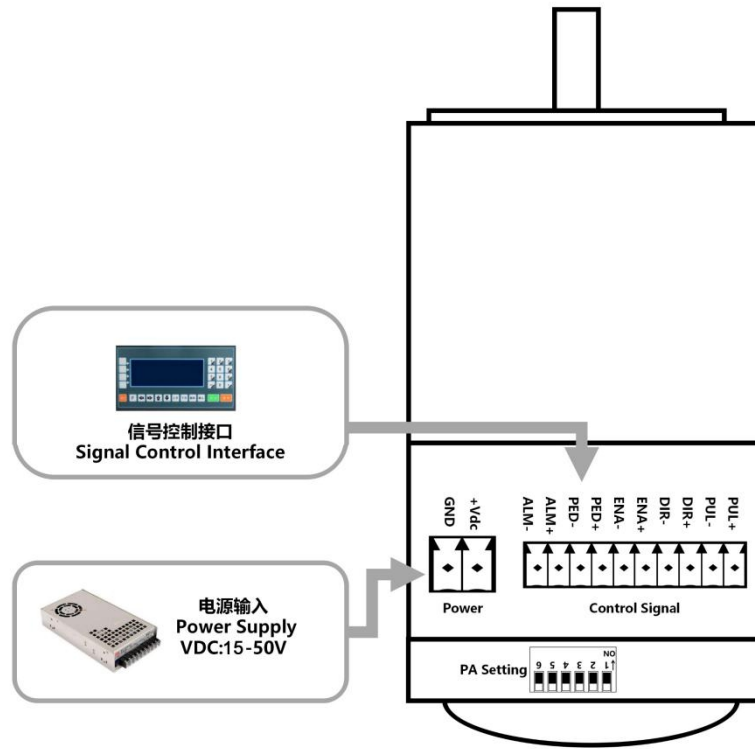
Install the drive with vertical side mounting so that the heat dissipating teeth form a strong air convection.

必要时机内靠近驱动器处安装风扇，强制散热，保证驱动器在可靠工作温度范围内工作。

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 驱动器端口与接线/Driver ports and wiring

4.1 接线示意图/Schematic diagram of wiring




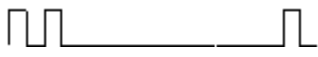

4.2 端口定义/Port Definition

4.2.1 LED 灯状态指示/Lamp status indication

绿色 LED 为电源指示灯，当驱动器接通电源时，该 LED 常亮；当驱动器切断电源时，该 LED 熄灭。红色 LED 为故障指示灯，当出现故障时，该指示灯以 5 秒钟为周期循环闪烁；当故障被用户清除时，红色 LED 常灭。红色 LED 闪烁频率为 2Hz，其中 LED 亮 200ms，灭 300ms。红色 LED 在 5 秒钟内闪烁次数代表不同的故障信息，具体关系如下表所示：

The green LED is the power indicator, which is always on when the driver is connected to the power; when the driver cuts off the power, the LED goes out. Red Led is the failure indicator, when there is a failure, the indicator lamp to 5 seconds cycle flashing; when the failure is cleared by the user, red LED often out. The red LED flashes at a frequency of 2 Hz, in which the LED is 200 ms bright and 300 ms out. Red Led flashes in 5 seconds represent different failure information, as shown in the table below:

序号 Serial number	闪烁次数 SCINTILLATION number	红色 LED 闪烁波形 Red Led flashing waveform	故障说明 Failure description
1	1		过流故障 (I 峰值 $\geq 25A$) Overcurrent fault (I peak value $\geq 25A$)

2	2		过压故障 ($V_{dc} \geq 66V$) Overvoltage fault ($V_{DC} \geq 66V$)
3	5		跟踪误差超差故障 Tracking error overshoot fault

4.2.2 控制信号输入端口/Control Signal Input Port

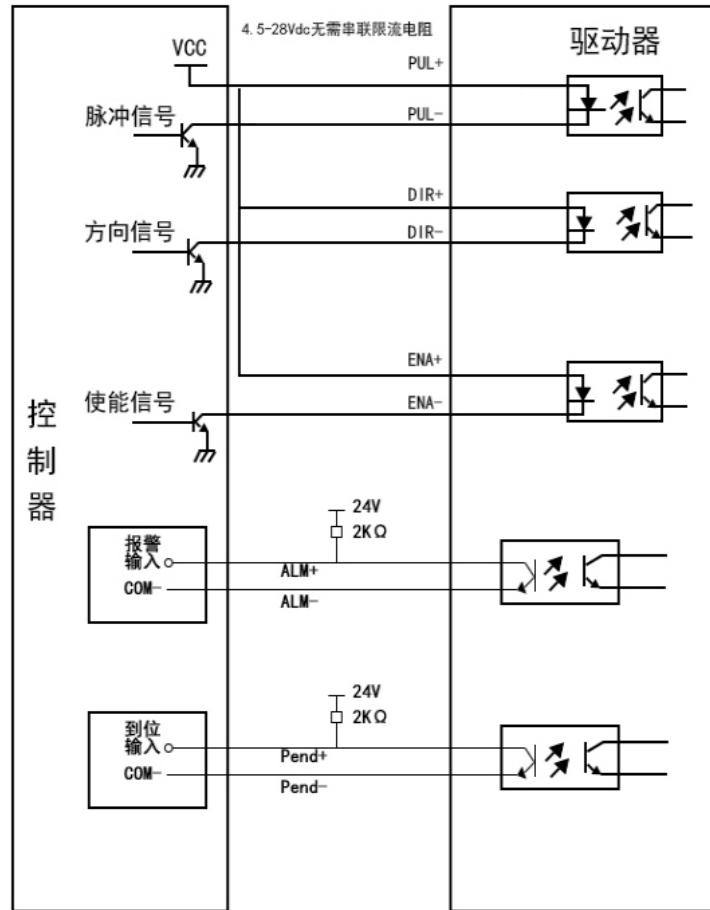
采用绿色 10Pin 的 2.5mm 间隔端子

2.5 mm space terminal with green 10Pin

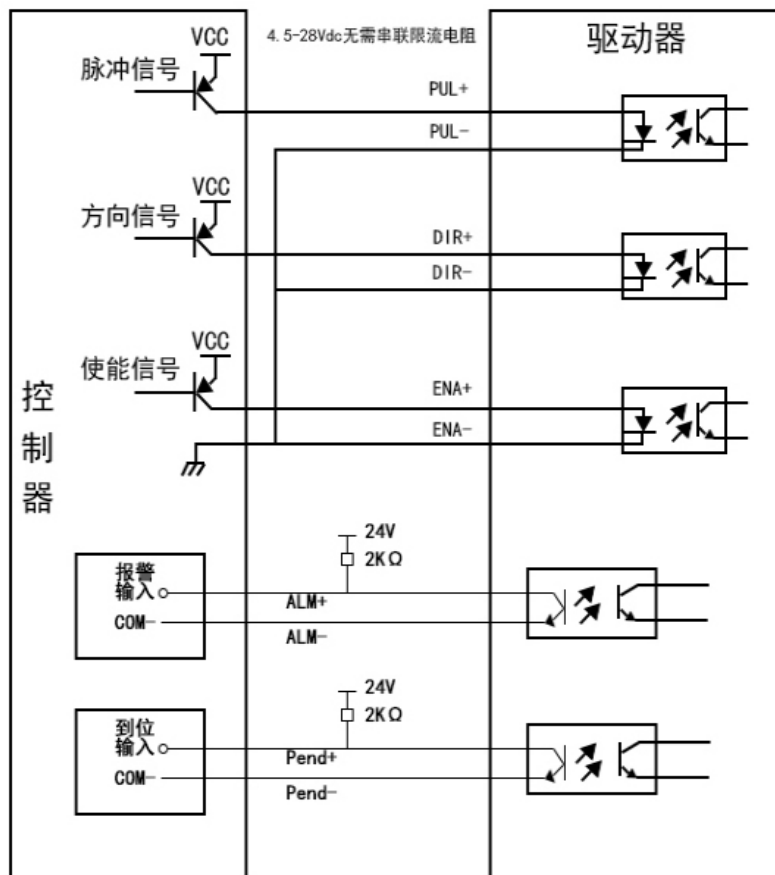
引脚号 Pin Number	信号 Signal	功能 Function	说明 Account for
1	PUL+	脉冲正输入端 Pulse positive input	兼容 5V-24V 电平信号 Compatible with 5 -24V level signal
2	PUL-	脉冲负输入端 Pulse negative input	
3	DIR+	方向正输入端 Directional positive input	
4	DIR-	方向负输入端 Directional negative input	
5	ENA+	使能正输入端 Enable positive input	
6	ENA-	使能负输入端 Enable negative input	
7	PED+	到位信号正输出端 In position signal positive output	集电极开路 OC 输出, 最大上拉电平 24V, 最大输出电流 100mA Open collector output, maximum pull up level 24V, maximum output current 100mA
8	PED-	到位信号负输出端 Negative out terminal of arrival signal	
9	ALM+	报警信号正输出端 Positive output of alarm signal	集电极开路 OC 输出, 最大上拉电平 24V, 最大输出电流 100mA Open collector output, maximum pull up level 24V, maximum output current 100mA
10	ALM-	报警信号负输出端 Negative output of alarm signal	

控制信号接口电路

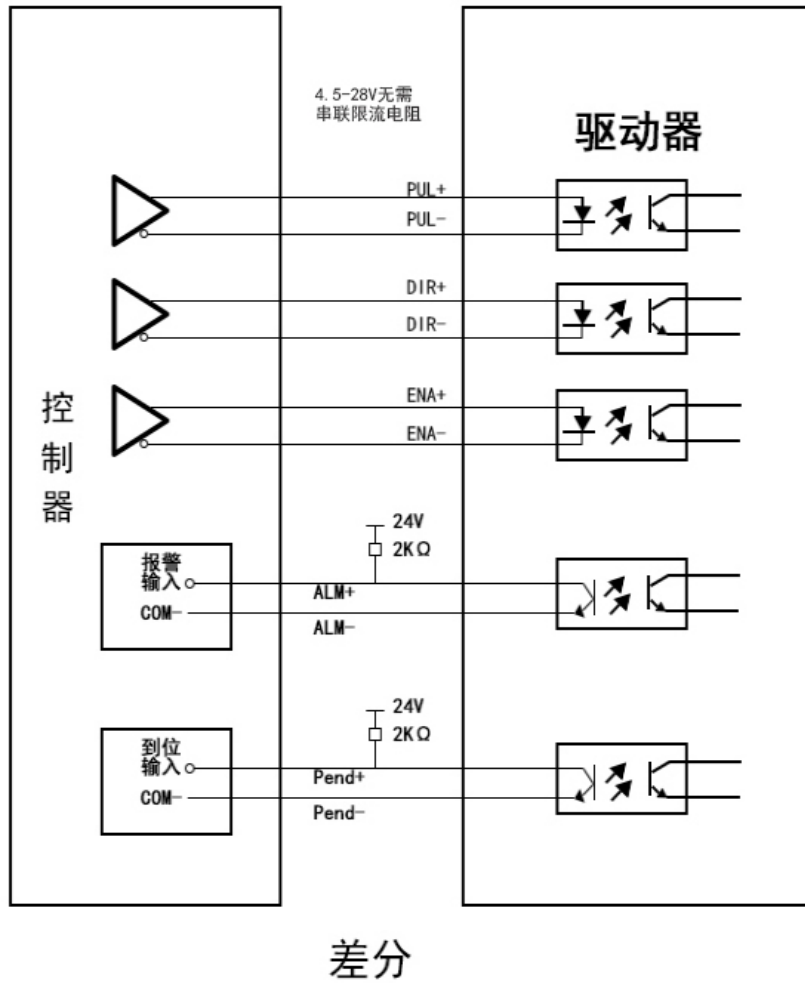
A control signal interface circuit



共阳极接法



共阴极接法

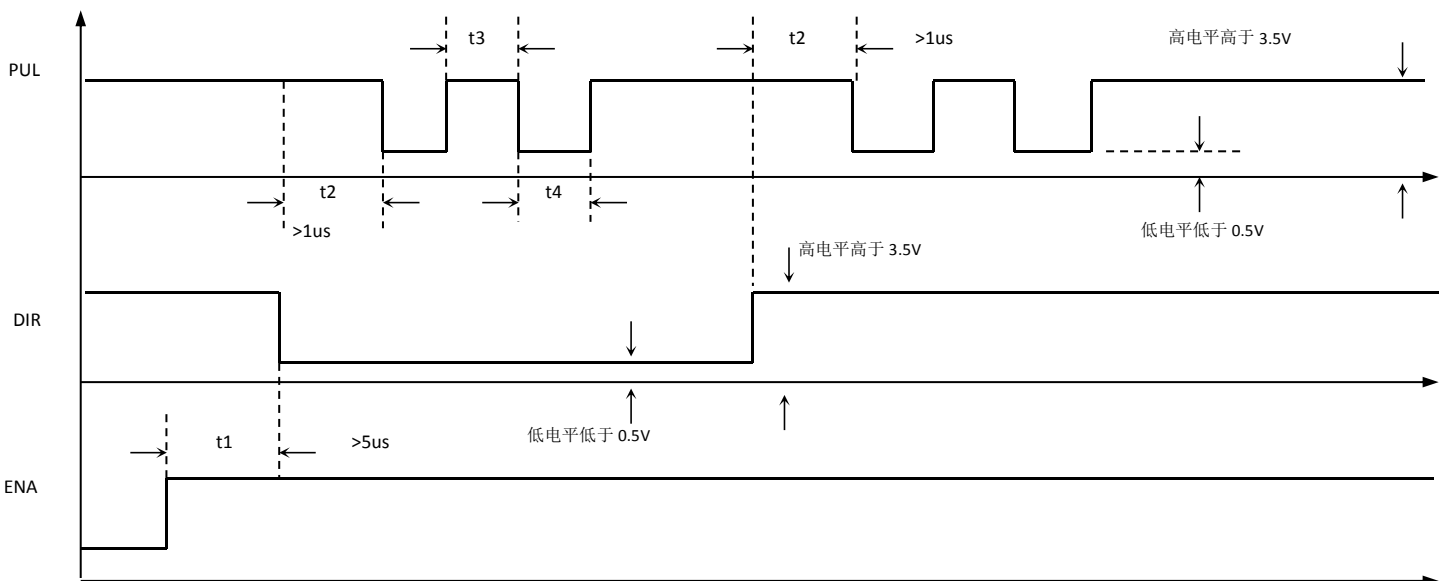


控制信号时序图

A control signal timing in FIG.

为了避免一些误动作和偏差, PUL-、DIR-和 ENA-应满足一定要求, 如下图所示:

In order to avoid malfunctions and deviations, PUL-, DIR- ENA- should meet certain requirements, and, as shown below:



注释/Comment:

t1: ENA (使能信号) 应提前 DIR 至少 $5\mu s$, 确定为高。一般情况下建议悬空即可;

t1: ENA (enable signal) DIR should advance at least $5\mu s$, determined to be high. In general recommendations can be suspended;

t2: DIR 至少提前 PUL 下降沿 $1\mu s$ 确定其状态高或低;

t2: DIR PUL falling $1\mu s$ determined in advance of at least a high or low state;

t3: 脉冲宽度至少不小于 $1.5\mu s$;

t3: at least a pulse width of not less than $1.5\mu s$;

t4: 低电平宽度不小于 $1.5\mu s$ 。

t4: low level width not less than 1.

4.2.3 电源端口/Power Port

采用绿色 2Pin 的 3.81 间隔带螺钉端子 (注意电源正负极, 勿正负极接反!!!)

Use Green 2Pin 3.81 spacer with screw terminal (note the power supply positive and negative pole, not positive and negative pole connected back!!!)

引脚号 Pin Number	信号名称 Signal name	功能说明 Function description
1	+VDC	电源输入正端, 输入电压为 $15\sim 50Vdc$ Power input terminal, INPUT VOLTAGE $15 \sim 50VDC$
2	GND	电源输入负端 Power input negative terminal

4.2.4 串口 RS232 通讯接口/serial RS232 communication interface

可以通过串口转接装置 (串口转接装置另配) 和专用串口电缆线连接 PC 机 (禁止带电插拔)。通过 PC 机软件可以对驱动器进行功能和参数设置, 如客户所需要的细分和电流值、有效沿等, 还可以进行共振点的消除调节。

The PC can be connected through the serial port transfer device (the serial port transfer device is equipped separately) and the special serial port cable (no live plug). The driver can be set up by PC software, such as subdivision, current value, effective edge, etc., and the resonance point can be adjusted.

端子号 Terminal number	符号 Symbols	名称 Name	说明 Account for
1	+5V	5V 电源正端 5V Power Terminal	仅供外部 STU Outside STU only
2	TXD	RS232 发送端 RS232 transmitter	
3	RXD	RS232 接收端 RS232 receiver	
4	GND	5V 电源地 5V ground	0V

电源电压在规定范围之间都可以正常工作，驱动器最好采用非稳压型直流电源供电，也可以采用变压器降压+桥式整流+电容滤波。但注意应使整流后电压纹波峰值不超过其规定的最大电压。建议用户使用低于最大电压的直流电压供电，避免电网波动超过驱动器电压工作范围。

The power supply voltage can work normally between the specified ranges. The driver is preferably powered by an unregulated 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.

如果使用稳压型开关电源供电，应注意开关电源的输出电流范围需设成最大。

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

请注意：

Please note:

接线时要注意电源正负极切勿反接；

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

最好用非稳压型电源；

It is better to use an unstable power supply;

采用非稳压电源时，电源电流输出能力应大于驱动器设定电流的 60%即可；

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;

采用稳压开关电源时，电源的输出电流应大于或等于驱动器的工作电流；

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;

为降低成本，两三个驱动器可共用一个电源，但应保证电源功率足够大。

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

5 拨码定义/Dial definition

IV57 数字式一体混合伺服驱动器采用 6 位拨码开关设定细分精度（电子齿轮比）、电机旋转初始方向和功能模式选择。详细描述如下：

IV57 digital integrated hybrid servo driver adopts 6-bit dial switch to set subdivision precision (electronic gear ratio), motor rotation initial direction and function mode selection. The details are as follows:

细分精度（电子齿轮比）

Subdivision accuracy (electronic gear ratio)

方向和功能模式设定

Direction and function mode setting



5.1 细分设定/Subdivision setting

Pulse/rew	S1	S2	S3	S4
Default	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

注：如上细分为标准产品 IV57 细分，其它细分可以根据客户需求派生，能设定的细分范围为 200~51200 之间的任意值。

Note: The above subdivides into the standard product IV57 subdivides, other subdivides may according to the customer demand derivation, can set subdivides the scope between 200-51200any value.

5.2 电机初始方向设置/Initial orientation of motor

Direction	SW5	Remark
CCW	off	Counterclockwise
CW	on	Clockwise

5.3 驱动控制模式设定/Drive control mode setting

Drivecontrolmode	SW6	Remark
FOC	off	Apply to screw
PM	on	Apply to belt

6 保修及售后服务 /Warranty and after-sales service

请保留好包装箱以便运输、储存或需要退回本公司维修时使用。一年保修期：

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

来自本驱动器使用一年内因为产品自身的原因造成的损坏，负责保修。

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

不在保修之列：/Not covered by warranty:

不恰当的接线、电源电压和用户外围配置造成的损坏。/Damage caused by improper wiring, power supply voltage and user peripheral configuration.

无本公司书面授权条件下，用户擅自对产品进行更改。/Without the written authorization of the company, users make changes to the products without authorization.

超出电气和环境的要求使用。/Use beyond electrical and environmental requirements.

驱动器序列编号被撕下或无法辨认。/The drive serial number has been torn off or is unreadable.

外壳被明显破坏。/The outer shell was visibly damaged.

不可抗拒的灾害。/An irresistible disaster.

6.2 售后服务 /Aftersales Service
添加微信或者拨打电话



(+86) 18926788846

Email: Tech@TQKTEC.COM

您拨打电话之前，请先记录以下信息：

Before you call, please record the following information:

故障现象/Fault phenomenon

产品型号和序列号/Product model and serial number

安装日期或者生产日期/Installation date or production date