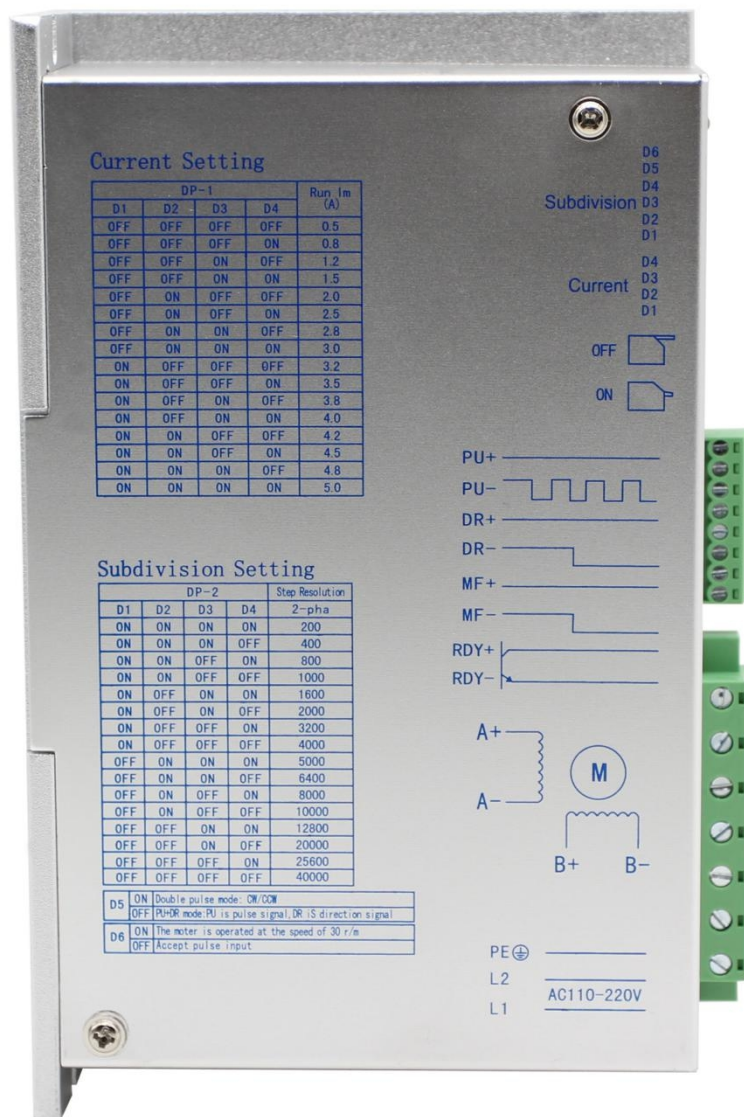


S02207A

开环步进驱动器使用手册

OPEN-LOOP STEP MOTOR DRIVE 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

在 86, 110 和 130 混合式步进电机的应用中(主要需求点为 900RPM 以内, 高转矩、高响应、高性价比的定位控制, 或者变频调速控制), 三相混合式步进电机应用最为广泛。但在某些国家(例如印度、土耳其、阿根廷等国), 以及某些行业中(例如大中型木工雕机、单头绣花机、花样机等), 由于使用习惯及发展历史等原因, 依然采用两相步进电机及高压型两相步进电机驱动器。传统模拟式两相步进电机驱动器由于控制算法、发热等方面的原因普遍使用交流 110V 供电, 交流 220V 供电会导致电机发热非常厉害而无法使用; 新型数字式两相步进电机驱动器在算法方面做了较大提升, 即使工作在交流 220V 时, 依然能够在发热、平稳性、稳定性等方面做到较好的平衡。该驱动器使用最为典型的行业为单头绣花机、大幅面花样机、定长送料机、中大型木工雕刻机等。

S02207A 以各行业客户对高压型 2 相步进电机驱动器的需求为目标, 以行业应用经验为基础, 以为客户提供高性价比、高稳定性的产品为宗旨。整套控制方案在充分吸收和掌握国外先进技术的基础上进行深入优化和提炼而成。硬件设计上充分考虑强弱电隔离、输入信号兼容、关键物料选用国际知名厂家经典、成熟的元器件; 软件上采用自创的两相步进电机驱动器矢量控制技术及其快速算法, 并具备自测试运行、单双脉冲模式设置、多重保护等功能。

In the hybrid application 86 and the stepping motor 110, 130 (mainly point demand within 900RPM, high torque, high response, high-cost positioning control or frequency control), three-phase hybrid stepper motor applications the most widely used. However, in some countries (such as India, Turkey, Argentina and other countries), as well as some industries (such as medium-sized woodworking engraving machine, single head embroidery machine, patterns, etc.), due to the usage and development of historical and other reasons, Still using the two-phase stepper motor and a high-pressure type two-phase stepping motor drive. Traditional analog two-phase stepping motor driver as the control causes of algorithms, fever and other commonly used AC 110V power supply, AC 220V power supply can cause the motor to heat a very powerful and can not be used; new digital two-phase stepper motor drive made in the algorithm a larger increase, even when working at AC 220V, still able to heat, stability, Stability and so do a better balance. The drive uses the industry as the most typical single-head embroidery machines, large format pattern machine, a feeder length, medium and large wood engraving machines.

S02207A to various industries, the demand for high-pressure type 2-phase stepper motor driver is targeted to industry application experience, to provide customers with cost-effective, high stability of the product for the purpose. The entire control scheme in-depth optimization and extracted from the full absorption of foreign advanced technology and grasp on. Give full consideration to the hardware design of the strength of electrical isolation, input signal compatibility, the key material selection of internationally renowned manufacturers of classic, sophisticated components; software

1.2 特性/Characteristics

●单电源输入，电压范围：交流 AC110-220V，相比传统 110V 供电的驱动器，可以省掉一个变压器，相同转速下输出力矩更大

Single power supply input, voltage range: AC 110-220V, compared with the traditional 110V power supply driver, can save a transformer, the output torque at the same speed is greater

●功率变换电路与控制电路采用隔离电流采样方案，采用 IPM 模块设计，可靠性高

The power conversion circuit and the control circuit use the isolation current sampling plan, uses the IPM module design, the reliability is high

●驱动电流从有效值 0.5A/相到 5.0A/相（电流为有效值电流，峰值电流为 0.7-7A）分 16 档可调

The driving current is adjustable from RMS 0.5A/phase to RMS 5.0A/phase (the current is RMS current and the peak current is 0.7-7A) in 16 stages

●16 档细分配置，最高分辨率 40000 步/转；细分配置小于等于 2000 步/转时采用微细分控制方式

Sixteen-step subdivision configuration with maximum resolution of 40000 steps/turn; When the subdivision configuration is less than or equal to 2000 steps/revolutions, the micro-subdivision control mode is adopted

●最高响应频率可达 200KHz

The highest response frequency can reach 200 KHz

●相位记忆功能：断电时能自动记忆电机转子位置

Phase memory function: It can automatically memorize the rotor position of the motor when the power is off

●保护功能：过热保护/过流保护、相间短路保护、断线保护、过压保护

Protection functions: over-heat protection/over-current protection, inter-phase short-circuit protection, line-breaking protection, over-voltage protection

●自动半流：输入脉冲停止超过 100ms 时，电流自动减半，减少电机发热

AUTOMATIC SEMI-CURRENT: When the input pulse is stopped for more than 100 ms, the current is automatically halved to reduce the heat generated by the motor

●全隔离：信号输入输出隔离；强弱电隔离（pwm 控制信号及电流采样均隔离）

Full isolation: signal input and output isolation; Strong and weak current isolation (PWM control signal and current sampling are isolated)

●5V/24V 信号输入兼容设计

5V/24V signal input compatible design

●控制模式可选：脉冲/方向模式；或者双脉冲输入模式

Control mode optional: pulse/directional mode; Or double-pulse input mode

●自测试功能：无需外界脉冲信号即可驱动电机以 30 转/分钟的速度转动

Self-test function: drive the motor to rotate at the speed of 30 rpm without external pulse signal

●采用工业级芯片设计，运行环境温度：-25 °~+60 °C(0 °以下不结冰)

industrial grade chip design, operating temperature: + 60 ~ -25 ° C (0 C ° no icing or less)

●采用矢量控制及微细分控制技术，在运行平稳性、噪音、震动、发热等方面较传统驱动器均有较大的提升

vector control technology and control micro-segment, than conventional drives have greatly improved in terms of smooth running, noise, vibration, heat and the like

1.3 应用领域/Application areas

灌胶机 木雕机 激光切割机 数控机床 包装设备 单头绣花机 花样机 缝纫机 钻孔机

Plastic irrigation carving machines laser cutting machine CNC machine tools and packaging equipment single-head embroidery machine drilling machine sewing tricks

2 性能指标/Performance Index

2.1 电气特性/Electrical characteristics

说明 Explanation	S02207A			
	最小值 Minimum Value	典型值 Typical Value	最大值 Maximal Value	单位 Unit
连续输出电流 (峰值) Continuous output current	0.5	-	7.0	A
电源电压 (交流) Supply Voltage (AC)	110	110/220	220	Vac
逻辑输入电流 Logic input current	6	10	16	mA
逻辑输入电压 Logical 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 width	1.5	-	-	US
绝缘电阻 Insulation Resistance	100	-	-	MΩ

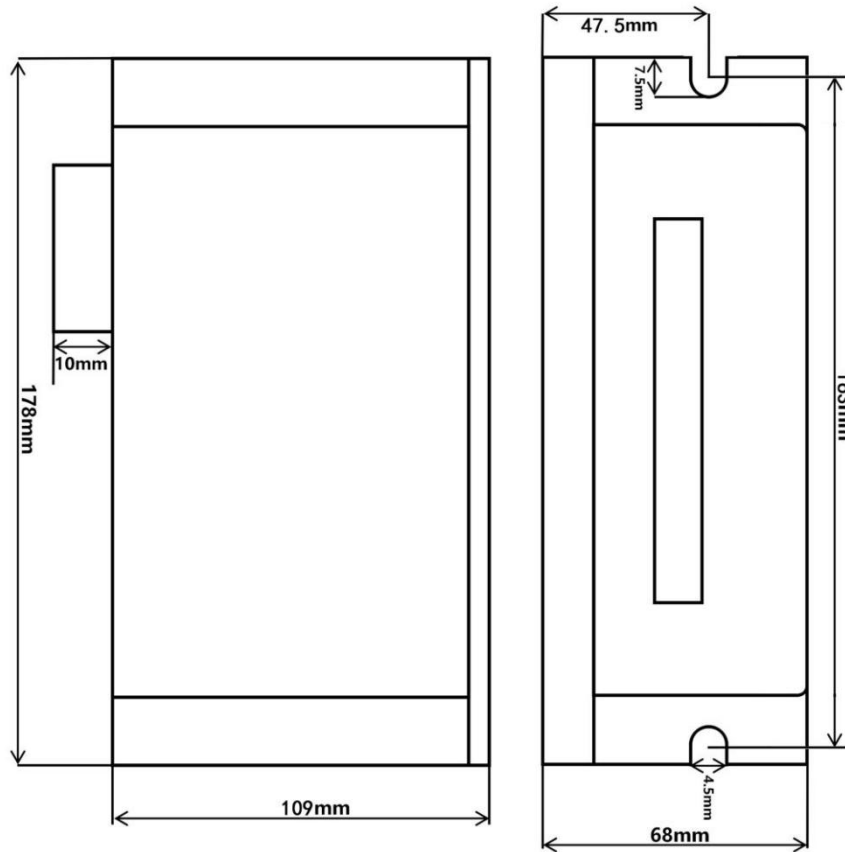
2.2 使用环境/Use environment

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°C ~ +50°C

	湿度 Humidity	40 ~ 90%RH
	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		1.7KG

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℃ 以内，电机工作温度为 80℃ 以内。

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

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。

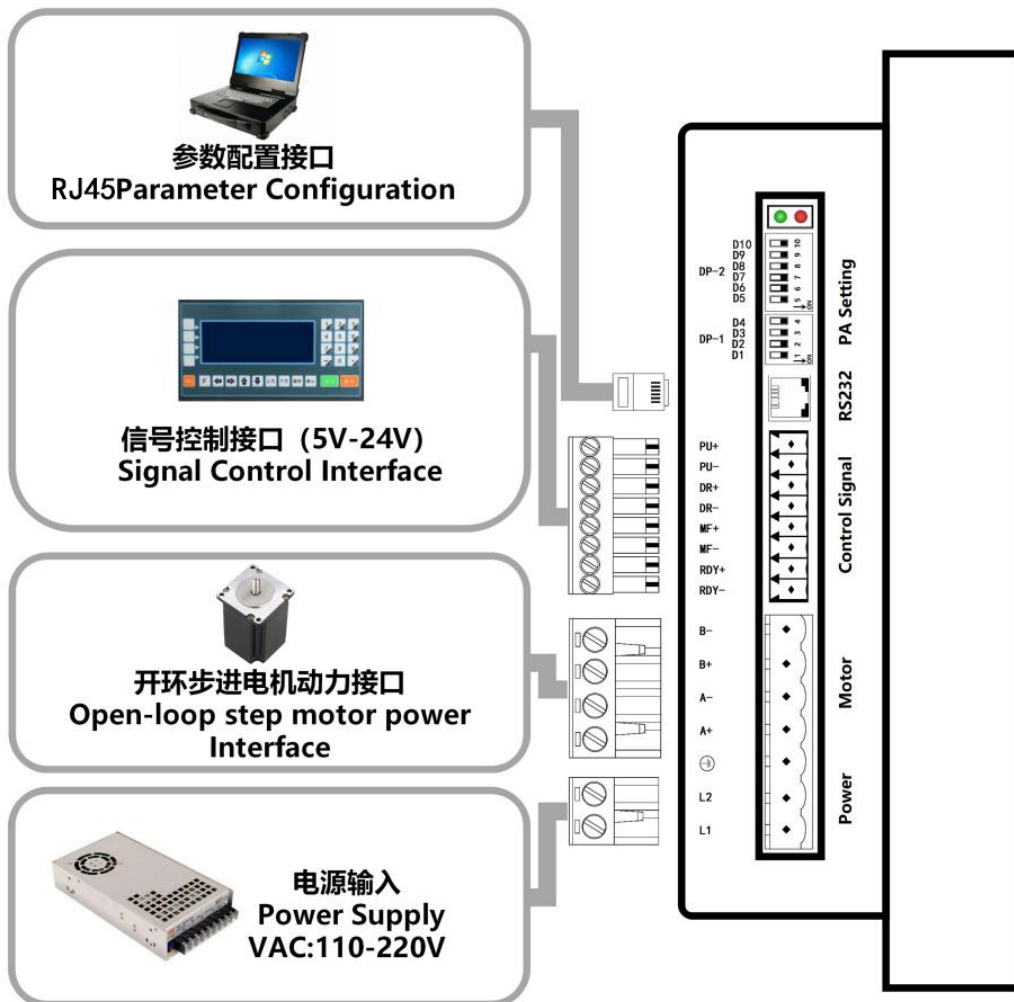
Install the drive with vertical side mounting so that the heat dissipating teeth form a strong air convection.

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/Wiring Diagram



4.2 端口定义/Port Definition

4.2.1 LED 灯状态指示/Lamp status indication

PWR: 绿灯, 电源指示灯。指示驱动器工作电源正常。如果驱动器电源异常, 此灯可能闪烁或者不亮。

PWR: Green Light, power indicator. Indicates that the drive is working and the power supply is normal. If the drive power supply is abnormal, the light may flicker or not come on.

ALM: 驱动器准备好指示灯(或故障指示灯), 驱动器上电时, 自检程序会将 ALM 灯点亮 0.5 秒左右, 说明 ALM 灯正常。正常工作时该灯不会点亮。如果驱动器内部发生异常(如发生过流/过压保护、短路保护、断线保护、功率模块故障等)时会将该灯点亮, 以示发生异常。

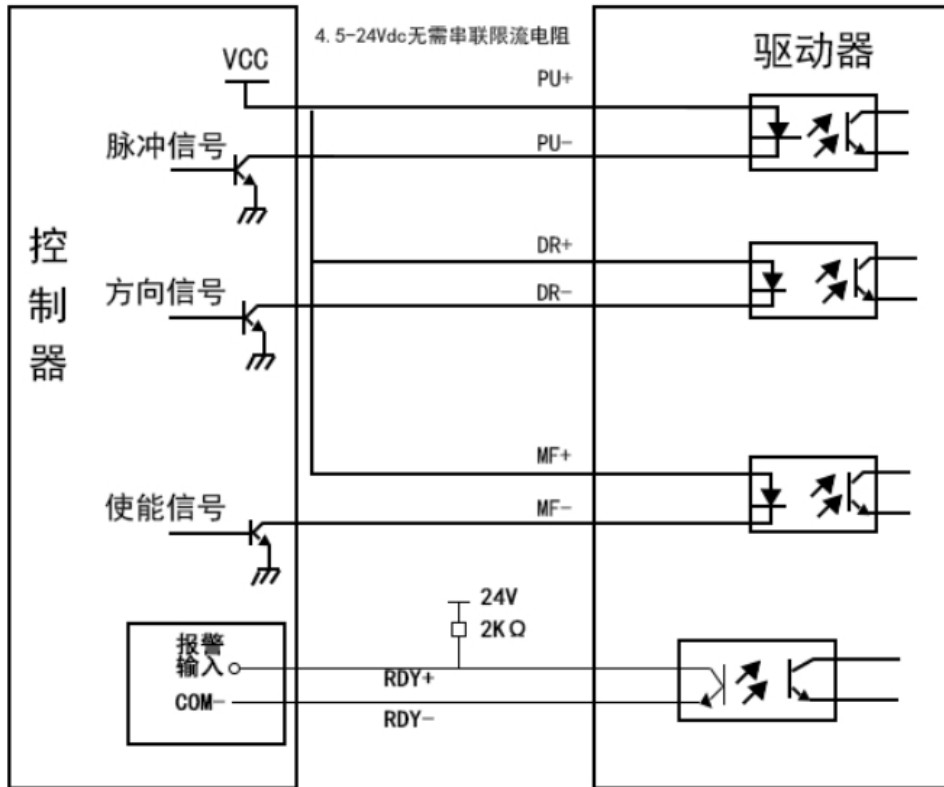
Alm: The ALM light is ready when the drive is powered on, and the self-checking program turns on the ALM light for about 0.5 seconds to indicate that the ALM light is working. It's not supposed to turn on when it's working. If an exception occurs inside the drive (e. g. overcurrent/overvoltage protection, short circuit protection, break protection, power module failure, etc.), the light will be turned on to indicate an exception has occurred.

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

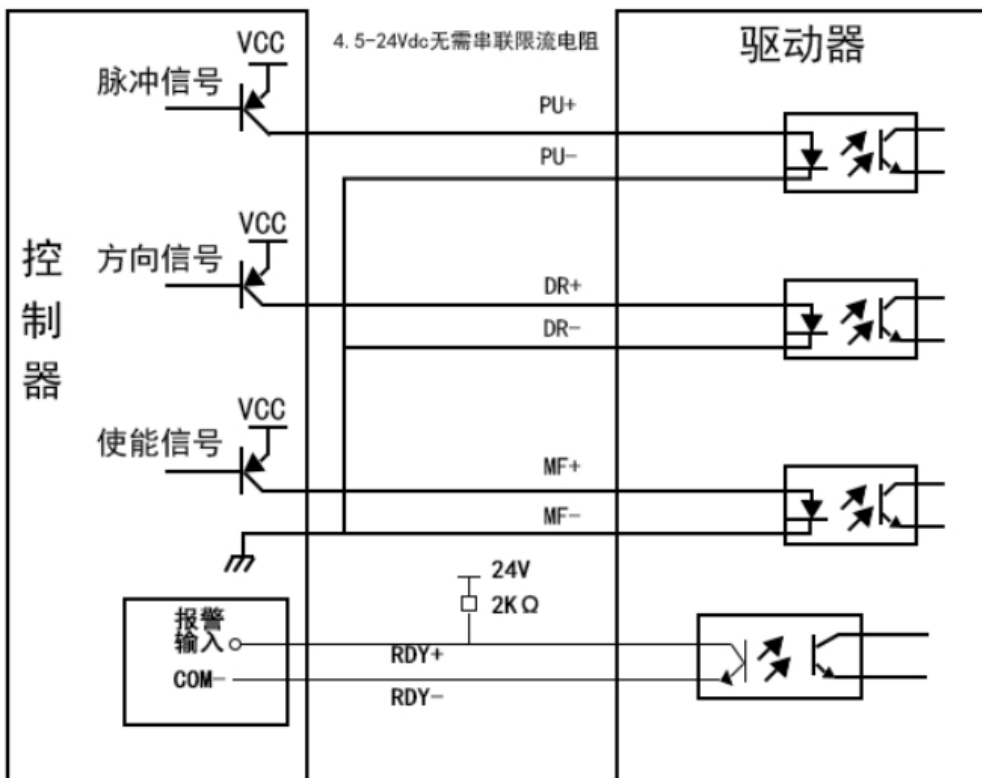
接口名称 Interface name	功能 Features	说明 Explanation
PU+	脉冲正输入端 Pulse Positive Input	兼容 5V-24V 电平信号 Compatible 5V - 24V level signal
PU-	脉冲负输入端 Pulse negative input	
DR+	方向正输入端 Directional Positive Input	
DR-	方向负输入端 Directional negative input	
MF+	使能正输入端 Enable Positive Input	
MF-	使能负输入端 Enable negative input	
RDY+	报警信号正输出端 Positive output of alarm signal	
RDY-	报警信号负输出端 Negative output of alarm signal	

控制信号接口电路

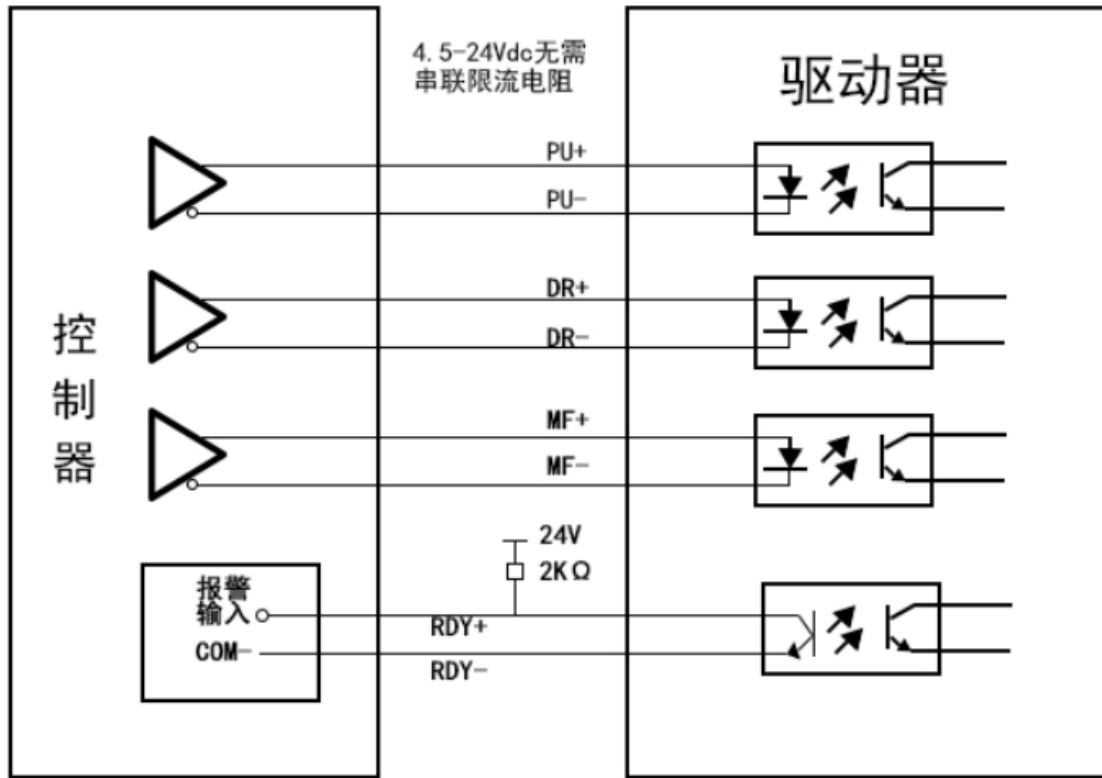
A control signal interface circuit



共阳极接法



共阴极接法



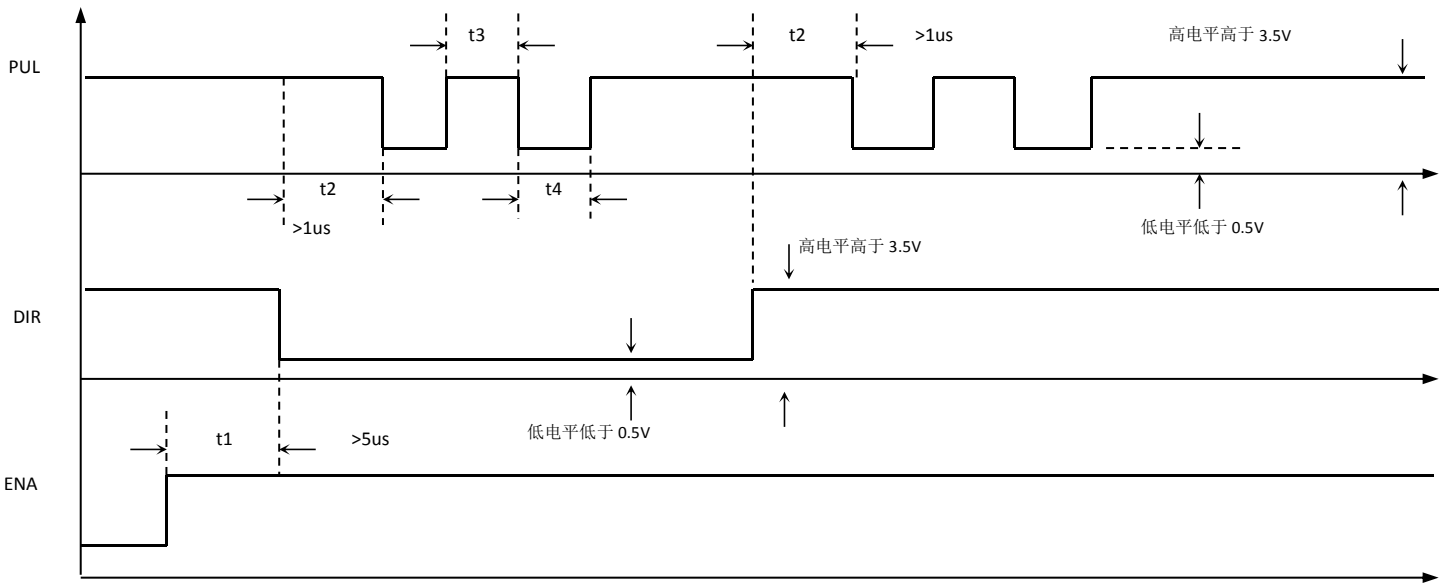
差分方式控制信号接口接线图

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，PU-、DR-和MF-应满足一定要求，如下图所示：

In order to avoid malfunctions and deviations, PU-, DR- MF- should meet certain requirements, and, as shown below:



注释/Comment:

t1: MF (使能信号) 应提前 DR 至少 5 μs, 确定为高。一般情况下建议悬空即可;

t1: MF (enable signal) DR should advance at least 5 μs, determined to be high. In general recommendations can be suspended;

t2: DR 至少提前 PU 下降沿 1 μs 确定其状态高或低;

t2: DR PU falling 1 μs 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 $1.5 \mu s$.

4.2.3 电源及电机输出端口/Output ports of power supply and motor

供电与电机动力接口

Power supply and motor power interfac

接口名称 Interface name	功能 Features
L1	交流电源, 供电电压范围: 交流 110-220Vac AC power supply, voltage range: AC 110-220Vac
L2	交流电源, 供电电压范围: 交流 110-220Vac AC power supply, voltage range: AC 110-220Vac
A+	步进电机 A+相绕组接口 Stepping motor A + phase winding interface
A-	步进电机 A-相绕组接口 Stepping motor A-phase winding interface
B+	步进电机 B+相绕组接口 Stepping motor B + phase winding interface
B-	步进电机 B-相绕组接口 Stepping motor B-phase winding interface

电源电压在规定范围之内都可以正常工作, 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

5.1 电流设定/The current setting 【峰值电流 (Peak) =有效值电流 (RMS) *1.4】

Peak	RMS	DP-1			
		D1	D2	D3	D4
0.70A	0.5A	off	off	off	off
1.12A	0.8A	off	off	off	on
1.68A	1.2A	off	off	on	off
2.10A	1.5A	off	off	on	on
2.80A	2.0A	off	on	off	off
3.50A	2.5A	off	on	off	on
3.92A	2.8A	off	on	on	off
4.20A	3.0A	off	on	on	on
4.48A	3.2A	on	off	off	off
4.90A	3.5A	on	off	off	on
5.32A	3.8A	on	off	on	off
5.60A	4.0A	on	off	on	on
5.88A	4.2A	on	on	off	off
6.30A	4.5A	on	on	off	on
6.72A	4.8A	on	on	on	off
7.00A	5.0A	on	on	on	on

注：如上电流为标准产品 S02207A 电流，其它电流可以根据客户需求派生，能设定的峰值电流范围为 0.7-7.0A 之间的任意值【峰值电流 (Peak) =有效值电流 (RMS) *1.4】。

Note: If the current is standard product S02207A current, other peak current can be derived according to customer demand, can set the current range between 0.7-7.0 a arbitrary value.

5.2 细分设定/Subdivision setting

Step Resolution	DP-2			
	D1	D2	D3	D4
2-pha				
200	on	on	on	on
400	on	on	on	off

800	on	on	off	on
1000	on	on	off	off
1600	on	off	on	on
2000	on	off	on	off
3200	on	off	off	on
4000	on	off	off	off
5000	off	on	on	on
6400	off	on	on	off
8000	off	on	off	on
10000	off	on	off	off
12800	off	off	on	on
20000	off	off	on	off
25600	off	off	off	on
40000	off	off	off	off

注：如上细分为标准产品 S02207A 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 S02207A subdivides, other subdivides may according to the customer demand derivation, can set subdivides the scope between 200-51200 any value.

Function

5.3 功能设置/Function setting

脉冲模式设置/Pulse mode setting

脉冲/Pulse	D5	Remark
Single	off	PU 为步进脉冲信号，DR 为方向控制信号 Pu is the step pulse signal and Dr is the direction control signal
Double	on	PU 为正向步进脉冲信号，DR 为反向步进脉冲信号 Pu is the forward step pulse signal, Dr is the reverse step pulse signal

自动检测开关/Automatic detection switch

D6	Remark
off	接收外部脉冲 Receiving external pulse
on	驱动器内部以 30 转/分的速度运行 Drive internal running at a speed of 30 r/min

5.4 参数自整定功能/Parameter self-tuning function

驱动器为开环步进驱动时，驱动器能上电自动匹配电机参数。注意此时不能输入脉冲，方向信号也不应变化，使能信号不能接入。

When the driver is open-loop step-by-step drive, the driver can power up to match the motor parameters automatically. Note that at this time can not input pulse, direction signal should not change, so that the signal can not access.

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.

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