

直线运动系统智造商
LINEAR MOTION SYSTEM INTELLIGENT PRODUCTS MANUFACTURER

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FUYU
福誉科技

FSC-2A

单轴运动控制器

使用指南手册版本: V 2.0

FUYU TECHNOLOGY CO.,LTD

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产品简介 Product brief introduction

FSC单轴运动控制器是本司最新推出的一款经济通用型的单轴运动控制器，采用ARM Cortex-M3内核的处理器，能够对步进电机、伺服电机的运动速度及运动距离进行有效精准的控制，且标准配置搭载了可显示运动参数的数码管及可调参数的按键。该控制器可升级为蓝牙的控制配置（需下载安装应用程序，目前仅支持安卓手机端），也可升级为遥控配置（可利用遥控器实现启停的控制），相对于市面上的绝大多单轴控制器，该控制器的调参及应用场景更为简易和灵活，是直线运动产品控制器的不二之选。

FSC single-axis motion controller is the latest economical single-axis motion controller produced by our company. Adopting ARM Cortex-M0 core processor, it can controll the moving speed and the travelling distance of step motor and servo motor more precisely, equally equipped with a digital tube which displays motion parameters and with adjusted-parameter-buttons. The bluetooth control is upgraded to be accessible (requiring downlodaing an application, only available on Android so far), remote control as well (using a remote to start and pause the device). Compared with the most of single-axis on the market, it is more user-friendly to modify the parameters and has more flexible application scenarios, which makes it the best choice among all

具备功能 Function

- 1.点动运动 inching movement
- 2.点位运动（按照坐标走/按照指定的距离走）
inching movement(following the coordinate or the fixed route)
- 3.往复运动 reciprocating movement
- 4.单程运动 single-way movement
- 5.实现到点延时 acheiving point-triggered delay
- 6.运动参数（速度、加速度与距离等）的显示与调节
motion parameters display and modifying (velocity, acceleration and distance etc.)
- 7.控制方式可升级为蓝牙或遥控 upgrading to access bluetooth or remote control

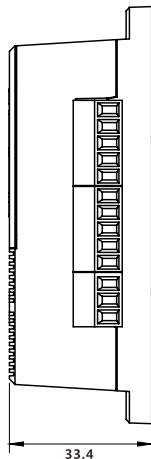
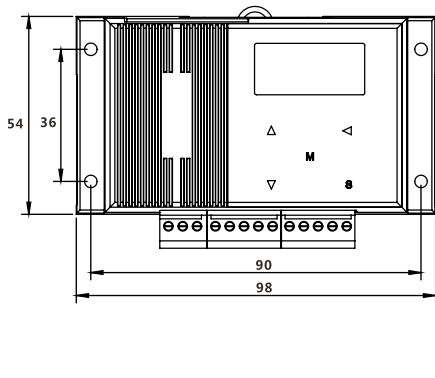
使用领域 Field

目前仅推荐搭配本公司的单根模组或者在数个电机的同步条件下使用。
It is only recommended to use matching with the single module of our company or under the conditon of multi-motor synchronization.

性能及规格 Specifications and Characteristics

型号Type	FSC-2A
供电方式 Power Supply Mode	DC24V供电(Supplied with DC24V)
功耗 Power Consumption	小于7.2W Lower than 7.2w
控制轴数 Number of Axes	单轴 Single-axis
编码器接口 Interface of Coders	无 None
可输出脉冲频率 Frequency of Pulse	50HZ~200kHZ
脉冲输出方式 Pulse Output Mode	脉冲+方向 Pulse+Dir
加速度模式 Acceleration Mode	梯形加减速 Trapezium AC/DE
总线拓展 Bus Extension	暂不支持 Not Supported Yet
软件操作系统 System	Android 9.0 内存2G以上 With More Than 2GB Storage
尺寸 Size	98*54*33.4

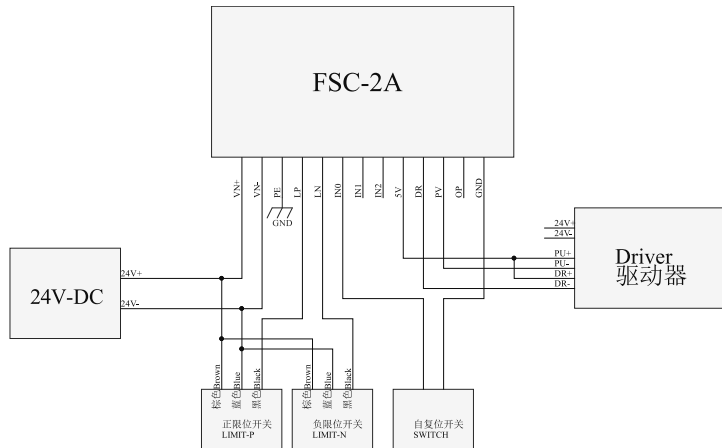
尺寸规格 Size



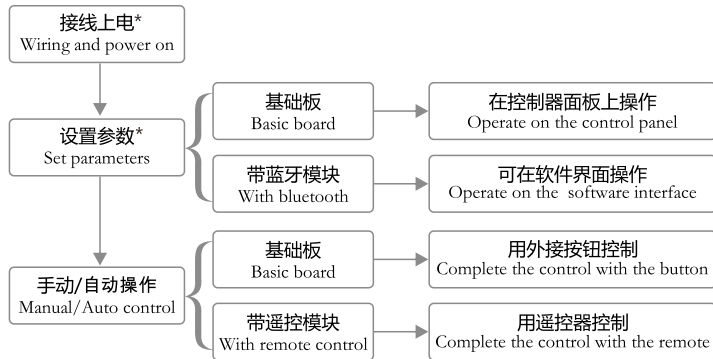
接口定义 Definition of Interfaces

标记符号 Symbol	功能 Function	说明 Brief Instruction
VN+	电源正极输入 Input of positive power supply	支持24V直流电源输入 24v DC power supply available
GND	电源负极 Power negative	直流电源负极 negative DC power supply
PE	控制器接地 Earth Ground	控制器接地 Earth Ground
PULSE	步进脉冲信号 Pulse signal	输出高电平4.625-5.5V, 低电平0-0.6V High level output 4.625-5.5V, low level output 0-0.6V
DIR	方向控制信号 Direction control signal	输出高电平4.625-5.5V, 低电平0-0.5V High level output 4.625-5.5V, low level output 0-0.5V
5V	隔离电源输出5V Isolated power output 5V	采用共阳极接法 Adopting common-anode wiring
OP	输出口 Output of Common-anode	输出口 Output
LP	正限位信号端 Positive limit signal port	正向限位开关信号接口 Interface of positive limit switch signal
LN	负限位信号端 Negative limit signal port	反向限位开关信号接口 Interface of positive limit switch signal
In0	输入信号端1 Stop signal port	外部停止按键接口 Interface of external stop button
In1	输入信号端2 Start signal port	外部开始按键接口 Interface of external stop button
In2	输入信号端3 Start signal port	可重复定义使用 Multi Function Input
GND	公共地端 Public ground port	使用内部电源时, 限位开关与开始停止开关需接此端口 On using internal power supply, limit switch and START and STOP need to connect with this port

接线示意图 The diagram of wiring



使用步骤 Operation steps



补充说明 Additional information

1. 接线上电 Wiring and power on

请参见接线示意图 Please check out the diagram of wiring.

2. 控制器面板介绍 Introduction of control panel

名称 Name	功能 Function
显示器 monitor	四组八段显示器用于显示监视值、参数值及设定值 Four-digit eight-segment displays are used to show monitoring values, parameters and setting values
Shift 键 Shift button	变更数值位数（在手动JOG模式下作为正转使用） Change the number of digits (used as forward rotation in manual JOG mode)
Set 键 Set button	进入选中的模式或者参数确定（在手动JOG模式下作为反转使用） Enter the chosen mode or fix the parameters (used as backward rotation in manual JOG mode)
Mode 键 Mode button	菜单显示界面翻页（手动JOG/参数设置/自动控制） Turn the page of display (manual JOG mode/parameters setting/automatic control)
Up 键 Up button	栏目内参数切换/增大数值/运动过程切换监视值 Switch the parameters in the section/increase the figure/ switch the monitor value while working
Down 键 Down button	栏目内参数切换/减小数值/运动过程切换监视值 Switch the parameters in the section/decrease the figure/ switch the monitor value while working

3. 参数设置说明 Instruction of parameters setting

上电开机默认进入手动JOG模式，数码管显示为：J__，按Mode键即可切换至参数设置菜单，在参数设置模式下，数码管显示为：P__。此模式下共有8个参数，各个参数通过Up和Down键切换。Set按键进入相应的设置界面，Shift按键移动需要设置的位，当需要更改的位被选中时，该位下的小数点会被点亮。

Manual JOG mode is by default with power on, the digital tube displaying: J___. Press Mode to enter the parameters setting mode. In this mode, which has 8 parameters ,being able to modify pressing Up and Down buttons, digital tube displays: P___. Press Set button to enter the setting page, to press shift to change the digit of the figure. When the digit is selected, the dot beneath it will be illuminated.

序号 Serial number	内容 content	默认值 Default value	说明 Instruction
P__1	导程 Lead	10mm	填丝杆导程或者皮带轮的周径 The lead of filling rod and perimeter of pulley
P__2	细分比值 Subdivision ratio	25	表示细分倍数，计算方法为当前驱动所设置细分除以200 It represents subdivision multiple. The calculation method is divided by 200 for the subdivision set by the current driver.
P__3	速度 Velocity	50mm/s	运动速度 Velocity of moving
P__4	加速度 Acceleration	200mm/s ²	运动加速度 Acceleration of moving
P__5	到点延时 Point-triggered delay	1000ms	只在自动控制模式二与自动控制模式三下生效 Only available under automatic control mode 2 and 3
P__6	行程 travel	50mm	产品最大运动行程（自动模式下） Max moving distance of products(Under the automatic modes)
P__7	开始方向 Initial direction	0	初始运动方向，0代表正向，1代表反向 Initial moving direction, 0 representing forward, 1 representing reverse.
P__8	控制模式 Control mode	1	0：遥控器控制 1：手机蓝牙软件控制。在更改后需重启控制器方可生效 0 means remote control, while 1 means bluetooth control. After changing the settings, rebooting needs to be done to activate it.

4.手动JOG操作 Manual JOG operation

上电开机默认进入手动JOG模式，数码管显示为：J__，或者按Mode键切换至手动JOG模式，在此模式下，可通过Shift键与Set键手动控制电机的正转反转，操作Up和Down按键可查看监视值即目前运行的速度（mm/s），加速度（mm/s²）。

Manual JOG mode is by default with power on, the digital tube displaying: J__, or press Mode button to enter manual JOG mode. In this mode, Shift and Set buttons are able to control the forward rotation and backward rotation of the motor. Up and Down buttons are able to monitor the status value, including velocity and acceleration.

5.自动控制模式 Automatic control mode

参数设置好然后JOG下产品运动一切正常后，可通过Mode键进入自动模式菜单，数码管显示为：A__，此模式下有三个子模式：A_1、A_2、A_3，子模式之间的切换通过UP、DOWN按键实现。

处于子模式时，按下SET按键会进入该子模式，再次按下SET按键或MODE模式切换键均会退出子模式。

自动控制模式一为单段运动，自动控制模式二为单次往返，自动控制模式三为无限往返运动。

A_1：在此子模式时，按下SET按键，会显示为0001，表示处于自动控制模式一。通过外接按键或遥控器可进行启动或停止。运动参数为预设好的值。

A_2：在此子模式时，按下SET按键，会显示为0002，表示处于自动控制模式二。通过外接按键或遥控器可进行启动或停止。运动参数为预设好的值。

A_3：在此子模式时，按下SET按键，会显示为0003，表示处于自动控制模式三。通过外接按键或遥控器可进行启动或停止。运动参数为预设好的值。

注意：当需要取消自动控制模式时，需要通过Mode按键切换到A__栏目，再通过Up和Down键切换到自动控制子模式，按下Set键后再通过外部的停止按键停止当前运动模式。

如果是手机APP控制，请参见FSC-APP软件操作指南。

After the parameters are set and the product runs well in the manual JOG mode, press Mode to enter automatic control mode, with digital tube displaying A__. There are three sub-modes in this mode: A__1, A__2, A__3. These sub-modes can be switched through Up and Down buttons.

After choosing the sub-mode, press the SET button to enter this sub-mode, and press the SET button or the MODE button again to exit the sub-mode.

Automatic control mode one is single fixed travel distance movement, automatic control mode two is single reciprocating motion, automatic control mode three is infinite reciprocating motion.

A__1: In this sub-mode, press the SET button, it will display as 0001, indicating that it is in automatic control mode one. It can be started or stopped by an external button or remote control. The motion parameters are preset values.

A__2: In this sub-mode, press the SET button, it will display as 0002, indicating that it is in automatic control mode two. It can be started or stopped by an external button or remote control. The motion parameters are preset values.

A__3: In this sub-mode, press the SET button, it will display as 0003, indicating that it is in automatic control mode three. It can be started or stopped by an external button or remote control. The motion parameters are preset values.

Notice: When the automatic control mode requires stopping, current sub-mode should be selected through Mode and Up and Down buttons, showing A__X(X could be 1, 2 or 3) on the screen, which matches the sub-mode, then press Set button and external pause button to stop the working pattern, which means that the current sub-code needs to be called out, before making it stop.

For mobile APP control, please refer to the FSC-APP guidance.

拓展模块介绍 Introduction of expanding module

A、遥控模块 Remote module

遥控模块是在原有的基础运动功能上加入遥控功能，使得能用遥控器代替原有的外接按键达到无线远程控制的目的，且遥控距离可达30米，启停操作便捷灵活。（但使用需注意）。

使用注意：

1. 穿透能力和抗干扰能力一般，需要减少阻隔和干扰。

2. 如需更换遥控器，则需要重新与遥控器进行对码，对码操作即在模块正确安装并通电的情况下，按住模块上的白色按键两秒，接着模块红灯会闪烁一次，此时按下遥控器的任意按键，便完成了对码操作。

The remote control module is an additional function besides the original basic motion function, which enables a remote in place of external buttons, achieving the goal of long-distance wireless control(within 30 meters) and the flexibility of start and stop operation.

Notice:

1. Penetrating ability and anti-interference ability are average, so the barrier and disturbance needs to be reduced.
2. If a remote wants to be changed, then another remote needs to be re-coded with. When the module is correctly installed and powered on, press the white button on the module for two seconds, then the red light will flash once, then press any key of the remote will accomplish the process.

B、蓝牙模块 Bluetooth module

增加蓝牙模块使得控制卡具有蓝牙功能，可配合我们自主开发的应用程序（目前仅支持安卓手机端），将控制器和手机通过蓝牙进行连接，实现在软件界面上修改运动参数，选择控制模式，最终远程实施运动功能等。且蓝牙的遥控距离可达10m且抗干扰强，因此无论是在参数的设置上还是运动的启停上，都能满足客户对便捷灵活应用场景的要求。

Bluetooth control function bases on the bluetooth module, which connects the controller and mobile phone through the app we developed (now only available on Android). To modify the parameters, to choose the working pattern and to operate start or stop on the app is now all possible. The control distance reaches 10 meters and it has strong anti-interference ability. Whether on the settings of parameters or the start and stop of the motion, the flexibility is being impressively increased.

用户须知 Customer Guidance

使用环境 Using environment	使用场合 Occasion	避免粉尘及腐蚀性气体 Trying to avoid dust and corrosive gas
	工作温度 Working Temperature	-20°C~60°C
	湿度 Humidity	<75%RH 无凝溶 No condensate
	保存温度 Preservation Temperature	-20°C~70°C
	抗扰度 Immunity	静电放电抗扰度（ESD）：空气±15KV接触±4KV（air ±15KV contact ±4KV） （GB/T 17626.2-2018/IEC 61000-4-2：2008 所有接口all the interfaces） 浪涌（冲击）抗扰度（surge）：Line-line ±2KV （GB/T 17626.5-2019/IEC 61000-4-5：2014 电源接口 power interface）

注意事项 Notes	1.修改参数时，应注意避免控制卡断电，一旦发生断电，所设置的导程、细分、速度等参数会丢失并在下次开机后恢复默认，且可能导致控制卡芯片损坏。 2.在控制电机运行过程中无法完成控制卡参数修改，需待电机停止运动后方可。 3.在自动模式运行中无法使用点动功能，需待电机停止运动后切换到对应的自动控制模式下方即可。 1. While modifying the parameters, try to avoid the power failiure of the control card. Once power is cut off, all the settings of leed, subdivisons and velocity will be lost and will return to default after rebooting, which also might cause damage to the chip. 2. It is not feasible to modify the parameters of the control card, when the motor is under working conditons, unless it stops. 3. With automatic mode on, the inching function will be shut down. To acativate it, the motor requires to be stopped working and the mode needs to be switched into automatic control mode.
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