JUF4802 型 PWM 直流风机串口调速器

JUF4802 Type 4-line PWM DC fan speed control terminal by RS485

用户手册 v4.0

User Manual v4.0

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版本信息/Version information：

版本号 Version number	主要变更内容 Main change content	日期 date
V1.00	初始版本 The initial version	2017-09
V2.01	细节描述优化 Details description optimization	2021-05
V3.00	增加风扇转速检测、PWM 频率调节相关描述 Add the fan speed detection and PWM frequency adjustment related description	2023-02
V4.00	风机故障代码支持 03 功能码查询、 说明书增加英文注释、其他优化 the fan fault code supports 03 function code Read, English annotations have been added to the manual, and other optimizations have been made	2023-06

1. 功能概述 Function overview

工业级技术方案，采用 ARM 内核的单片机作为主控芯片，支持 RS485 串口通信，通过串口协议控制 PWM 输出占空比，从而实现风机/电机的速度控制，串口指令遵循 modbus-rtu 协议，波特率 9600bps，风机转速 0-100%可调，支持读取风机转速，风机故障检测等功能，
适用于直流 12V/24V/48V 4 线风机/电机的转速控制及管理，也可以用作其他基于串口控制 PWM 输出的扩展应用。

The industrial level technical scheme adopts the SCM with ARM core as the main control chip, which supports RS485 serial port communication, controls the PWM output duty cycle through the serial port protocol, thus realizing the speed control of the fan/motor. The serial port command follows the modbus rtu protocol, the Baud is 9600bps, and the fan speed is 0-100% adjustable. It supports the functions of reading the fan speed, fan fault detection, etc,

2. 技术参数 Technical parameters

1.工业级方案，采用 ARM 系列单片机作为主控芯片，性能稳定
Industrial-level scheme, using ARM series single-chip microcomputer as the main control chip, with stable performance

2.宽电压设计，支持 12V/24V/48V 4 线 PWM 风机/电机直接接入，最大驱动电流 6A
Wide voltage design, support the direct access of 12V / 24V / 48V four-wire PWM fan / motor, and the maximum drive current of 6A

3.带 LED 指示，直观指示调速器的工作状态
With LED indication, visually indicate the working state of the governor

4.电源防反接保护设计，电源接反不会烧坏板子
Power supply anti-reverse protection design

5.标准 modbus-Rtu 协议，支持 RS485 串口设置各项参数、查询风机状态、控制风机转速
Standard modbus-Rtu protocol, support RS485 serial port to set various parameters, Read the fan status, and control the fan speed

6.RS485 串口 TVS 防浪涌设计,串口参数默认为 9600bps,8,N,1
RS485 serial port TVS surge prevention design,
the default serial port parameters are 9600bps, 8, N, 1

7.集成风机电源管理电路，100%关停所有的 4 线风机
100% shutdown all 4-line fans

8.PWM 输出幅度 5V，频率可调，PWM 输出电流 20mA
PWM frequency is adjustable, and the amplitude is 5V & 20mA

9.支持风机转速检测、风机故障检测
Support the fan rotation speed detection

10.工作温度范围：-30~80℃
Operating temperature range: -30~80℃

11.净重：≈60g
Net weight: ≈ 60g

3. 产品尺寸 Product size

主控板外形尺寸：70mm*46mm*25mm 安装孔尺寸：63mm*40mm

4.接口说明 interface specification

1 号端子：调速器供电电源+极接口 / No.1: power supply +,

2 号端子：调速器供电电源-极接口 / No.2: power supply -,

3 号端子：RS485 串口 A / D+ / No.3: RS485 serial port A / D +,

4 号端子：RS485 串口 B / D- / No.4: RS485 serial port B / D -,

5 号接风扇电源- / No.5 to fan power supply -,

6 号接风扇电源+ / No.6 to fan power supply +,

7 号接风扇转速信号 / No.7 to fan speed signal(FG),

8 号接风扇 PWM 控制线 / No.8 to fan PWM control line,

*5~8 号端子主要是为了方便没有插头的风扇接线，和 14 号接口的 4 位插针是直通的）

* Port 5-8 connects to port 14 directly

9 号端子：风机故障信号 OC 输出口（NPN 输出接口）

No.9: Fan fault signal OC output port (NPN output interface)

10 号端子：GND / No.10: GND

11 号接口：NC ， 12 号接口：NC

13 号位置：LED 指示灯，POW 为整机电源指示灯，PWM 为风机控制指示灯

Position 13: LED indicator light, POW is the overall power indicator light, PWM is the fan control indicator light

14~17 号接口：第 1~4 路风机接口，标准 KF2510-4P 座子，线序：fan-、fan+、FG、PWM

No.14~17 interface: the 1~4 road fan interface, standard KF2510-4P seat, line order: fan-, fan +, FG, PWM

4.1 全功能接线示意图 wiring diagram

(实际使用时，部分用不到的功能，直接忽略其接线即可)

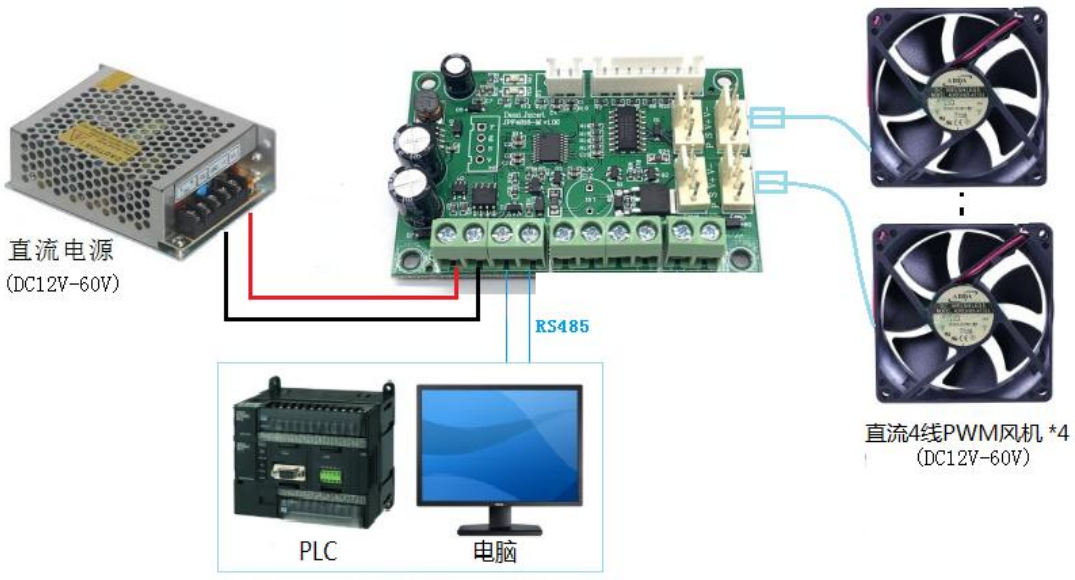
(in actual use, part of the unused functions, the wiring can be directly ignored)

*不能带电插拔风机，否则可能会损坏调速器

* Unable to plug and unplug the fan while working

*直流电源的电压必须和所接风扇的额定电压一致，且输出电流必须大于风扇电流的总和

* The voltage of the DC power supply must be the same with the rated voltage of the connected fan, and the output current must be greater than the sum of the fan current



5.风机故障信息输出 NPN（OC 口）使用说明 About Fan fault signal

此功能必须要配合“风机数量”参数以及风机必须按要求接线才能正常使用

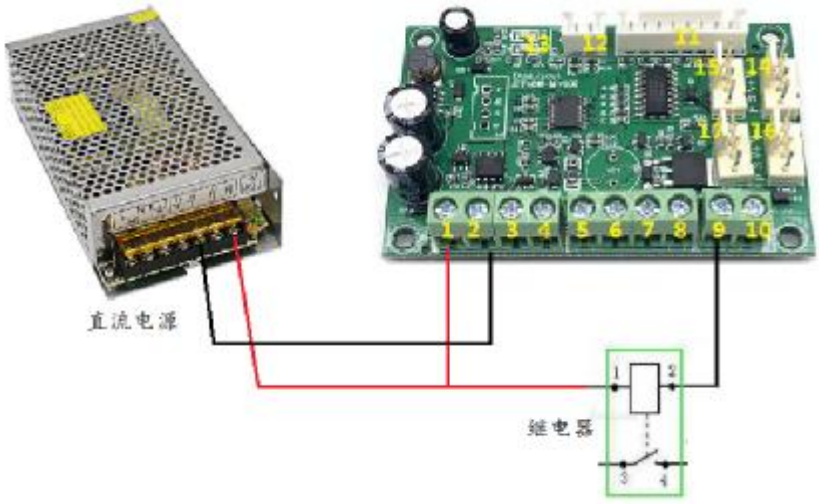
This function must be compatible with the "Number of Fans" parameter and the fans must be wired as required to function properly

示意图如下/The schematic diagram is as follows：

用法 1：OC 口驱动继电器 / Usage 1: OC port drive relay

调速器的 OC 端口可以直接驱动继电器，接线如下图，通过控制继电器，可以实现风机故障时，去控制报警装置或开启其他大功率散热设备

The OC port of the governor can directly drive the relay, as shown in the following diagram. By controlling the relay, it is possible to control the alarm device or turn on other high-power heat dissipation devices in case of fan failure



用法 2：驱动指示灯 / Usage 2: Drive indicator light

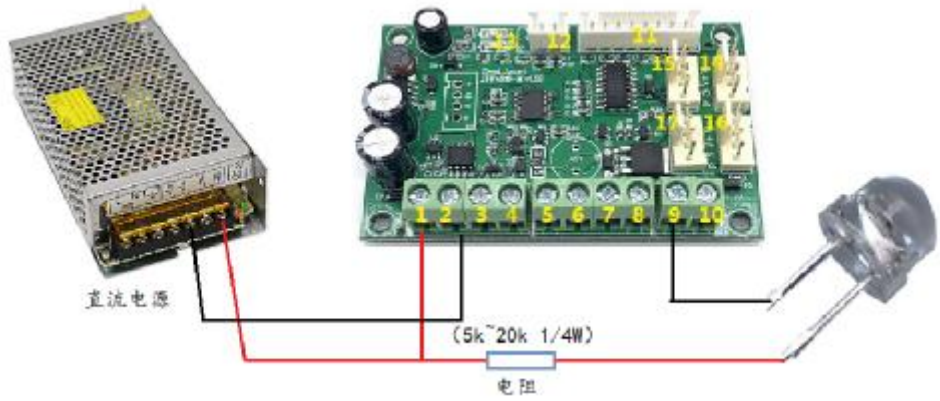
如下图所示，OC 端口来驱动一个小的指示灯，当风机出现故障时，指示灯会亮起，

As shown in the following figure, the OC port drives a small indicator light, which will light up when the fan malfunctions,

驱动指示灯时，需注意以下事项：

the following precautions should be taken：

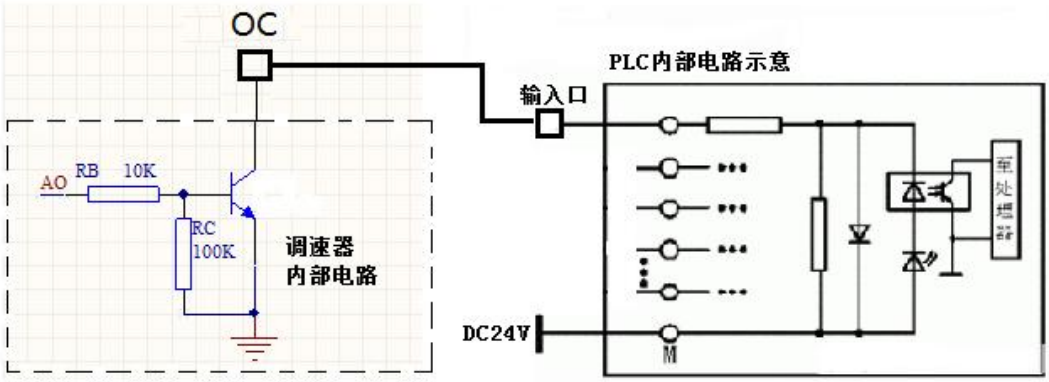
1. 指示灯的最大电流不能超过 100mA /
   The maximum current cannot exceed 100mA
2. 如果是普通的 LED 灯珠，必须在灯的回路上加限流电阻
   If it is a regular LED bead, a current limiting resistor must be added to the circuit of the lamp
3. 如果是成品的指示灯，灯的内部可能已集成了限流电阻，则不需再加限流电阻
   If it is a finished indicator light, the internal part of the light may have integrated a current limiting resistor, so there is no need to add a current limiting resistor



用法 3：接入到 PLC 或工控机 / Connect to PLC or industrial computer

调速器的 OC 端口为 NPN 信号输出，可以接入到工控机或 PLC 的开关量采集口，用此可以检测风机是否出现故障

The OC port can be connected to industrial computer or PLC



6.RS485 串口通信协议说明 Communication protocol

6.1 本协议遵守 MODBUS-RTU 通信协议,参照 MODBUS 协议中的子集 RTU 方式.
调速器作为从机，只能被动接收主机的命令，不主动上报数据。
This protocol complies with the MODBUS-RTU communication protocol, referring to the subset RTU mode in the MODBUS protocol. As a slave, the governor can only passively receive commands from the host and does not actively report data.

协议格式如下（hex）:

*主机读取

MODBUS 地址	功能码	寄存器地址	寄存器数量	CRC16 校验
1byte	0x03	2byte	2byte	2byte

控制器应答读取

MODBUS 地址	功能码	数据值的字节数	数据值	CRC16 校验
1byte	0x03	1byte	nbyte	2byte

*主机写（配置参数），一次只可以写单个寄存器的数据

MODBUS 地址	功能码	寄存器地址	数据值	CRC16 校验
1byte	0x06	2byte	2byte	2byte

控制器应答写

MODBUS 地址	功能码	寄存器地址	数据值	CRC16 校验
1byte	0x06	2byte	2byte	2byte

6.2.**串口参数**/Serial port parameters
波特率 9600，无校验,8 位数据,1 位停止位
Porter rate 9600, no check, 8 bit data, 1 bit stop bit
***寄存器地址如下表** / Register address is listed below:

寄存器地址 Register address	**说明** explain	**允许操作** Allow operation	**功能码** Function code
0x0000	保留	/	0x03
0x0001	风机状态， 数据内容换算成 2 进制后，最低位代表 fan1，次低位代表 fan2……； 详见后页说明， Fan status, Convert data content to binary, the lowest level represents fan1, and the second low level represents fan2...; See the following page for details.	只读 read only	0x03/0x02
0x0002	MODBUS-485 地址， 取值范围：0x0001~0x00FE, MODBUS-485 Address, Value range: 0x0001~0x00FE, *Support for FFFF broadcast addresses.	读/写 Read/ write	0x03/0x06

0x0003	串口强制控制风机转速， 风机转速值(百分比)完全受控于串口，断电重启调速器会按设置的工作模式工作， 取值范围：0x0000~0x0064、0xFFFF， Serial port forced control of the fan speed, The fan speed value (percentage) is completely controlled by the serial port. When the power is off to restart or the governor will resume the data value to 0xFFFF, Value range: 0x0000~ 0x0064、0xFFFF.	读/写 Read/ write	0x03/0x06
0x0004	保留	/	/
0x0005	调速器上电启动后的工作模式， =0x0001：最小转速模式，PWM 输出为 20%； =0x0000：关停模式，PWM 输出为 0； Operating mode of the governor, 0x0001= fan minimum speed mode, 0x0000= fan off mode.	读/写 Read/ write	0x03/0x06
0x0006	风机数量，取值范围：0x0001~0x0004 Number of fans, the value range: 0x0001~0x0004.	读/写 Read/ write	0x03/0x06
0x0007~000A	4 个风机的实时转速（RPM）， Fan1 的转速对应 0x0007 的值…， *读取到的转速值（RPM）是由公式 60*N/2 计算而来：N 是风扇每秒钟产生的脉冲数量，/2 表示风扇转 1 圈会产生 2 个脉冲，此公式适合市面上绝大多数的风扇，极少部分特殊风扇的转速需要根据风扇资料/特性自行二次计算 speed of 4 fans (RPM), The speed of Fan1 corresponds to the value of 0x0007... * The speed value (RPM) is calculated from formula 60 * N / 2: N is the number of pulses generated by the fan per second, and /2 means that the fan turning 1 will produce 2 pulses. This formula is suitable for the vast majority of fans on the market, and the speed of a few special fans needs to be calculated twice according to the data / characteristics of the fan	只读 read only	0x03

0x000B	PWM 输出频率选择， 取值范围：0x0000~0x0005,默认为 0005， 如非必要，此参数应保持默认，不要修改， 0=500Hz,1=1KHz,2=2K,3=5K,4=10K,5=25K. The PWM frequency selection， Value range: 0x0000~0x0005, 0=500Hz,1=1KHz,2=2K,3=5K,4=10K,5=25K, *Default to 0005 If not necessary, not be modified.	读/写 Read/ write	0x03/0x06
0x000C	保留	/	/
0x000D	保留	/	/
0x000E	风机故障代码， 数据内容换算成 2 进制后，最低位代表 fan1， 次低位代表 fan2……， 详见后页说明. Fan fault codes, After converting the data content to binary, the lowest bit represents fan1, and the second lowest bit represents fan2, Please refer to the Commands on the following page for details.	只读 read only	0x03
0x0020	复位重启控制， 取值范围：0x00AA, *向 0020 寄存器写 00AA 可使调速器复位重启， Restart control, Value range: 0x00AA, Writing 00AA to the 0x0020 register can reset the governor.	只写 write only	0x06

7.RS485 串口协议使用实例 Use example（Hex）

7.1 查询当前风机状态（03 功能码，寄存器地址 0001）

Read the current fan status (03 function code, register address 0001)

指令格式：调速器地址 03 00 01 00 01 CRC16

Command format: governor address 03 00 01 00 01 CRC16,

调速器返回：调速器地址 03 02 00 0x CRC16

Governor return: governor address 03 02 00 0x CRC16

000x 为数据内容，HEX 格式，需要换算成二进制，低 4 位就对应 4 个风扇，从右往左，最右位对应 1 号风扇，第 4 位对应 4 号风扇；0 表示风扇停止，1 表示风扇运转

000x is the data content, HEX format, which needs to be converted to binary, low 4 bits correspond to 4 fans, from right to left, the most right bit corresponds to fan 1 fan, position 4 corresponds to fan 4; 0 means the fan stops and 1 means the fan runs

以 modbus 地址 01、1 号风机运转，234 号风机停转

Run with modbus address 01, no. 1 fan, no. 234 fan stop turn

主机发送：01 03 00 01 00 01 D5 CA

调速器应答：01 03 02 00 01 79 84 (00 换成 2 进制=0000 0001),

Host Send: 01 03 00 01 00 01 D5 CA

Governor response: 01 03 02 00 01 79 84 (00 changed to 2 rrr =0000 0001)

7.2 设置风机数量（06 功能码，寄存器地址 0006）

Set the number of fans (06 function code, register address 0006)

指令格式：调速器地址 06 00 06 00 xx CRC16

Command format: governor address 06 00 06 00 xx CRC16

调速器返回：调速器地址 06 00 06 00 xx CRC16

Governor return: governor address 06 00 06 00 xx CRC16

*XX 换成十进制就是接入风机的个数，取值范围 00-04

* XX to decimal is the number of access fans, take the value range of 00-04

7.3 查询风机故障信息(03 功能码，寄存器地址 000E)

Read the fan fault information (03 function code, register address 000E)

指令格式：调速器地址 03 00 0E 00 01 CRC16

Command format: Governor address 03 00 0E 00 01 CRC16

调速器返回：调速器地址 03 02 00 XX CRC16

Governor return: governor address 02 00 XX CRC16

XX 换算成二进制码,低 4 位就对应 4 个风扇，

从右往左，最右位对应 1 号风扇，第 4 位对应 4 号风扇，

0 表示风扇故障，1 表示风扇正常，

XX is converted into binary code, and the lower 4 bits correspond to 4 fans, From right to left, the rightmost position corresponds to fan 1, and the fourth position corresponds to fan 4;
0 indicates the fan fault, and 1 means that the fan is normal

以 modbus 地址 01，风机数量为 4；3 号风机故障、124 号风机正常运转 为例，
With modbus address 01, the number of fans is 4， Taking the malfunction of fan No.3 and the normal operation of fan 1 2 4 as an example,

主机发送：01 03 00 0E 00 01 E5 C9
Host Send:01 03 00 0E 00 01 E5 C9
调速器应答：01 03 02 00 FB F9 C7 (0B=11111011，也就对应出 3 号风机处于故障状态)
Governor return:01 03 02 00 FB F9 C7(0B=11111011,means that fan No.3 is fault)

*此功能码查询出的信息为调速器根据相关配置实际判断出的风机故障状态，
*此功能必须要配合“风机数量”参数及按要求接入风机才能正常使用
* This function must be combined with the "fan number" parameter and the required
* The information of this function code is the fan fault state determined by the governor according to the relevant configuration,

7.4 串口强制控制 PWM 输出占空比 (06 功能码，寄存器地址 0003)
Serial port force control governor output duty cycle
(06 function code, register address 0003)
指令格式：调速器地址 06 00 03 00 xx CRC16
Command format: governor address 06 00 03 00 xx CRC16
调速器返回：调速器地址 06 00 03 00 xx CRC16
Governor return: governor address 06 00 03 00 xx CRC16
*XX 换成十进制就是风机转速百分比，取值范围 0x00-0x64
*XX to decimal system is the fan speed percentage, the value range is 0x00-0x64
*此控制仅实时生效，设备复位重启后将按设置的工作模式工作（风机关停或维持最小转速）

7.5 查询 2 号风机转速（03 功能码，寄存器地址 0008）
Read NO.2 fan speed (03 function code, register address 0008)
指令格式：调速器地址 03 00 08 00 01 CRC16
Command format: governor address 03 00 08 00 01 CRC16
调速器返回：调速器地址 03 02 xx xx CRC16
Governor return: governor address 03 02 xx xx CRC16
*xxxx 换算成十进制就是 2 号风机的实际转速，单位 RPM(转/分钟)
* xxxx Conversion to decimal is the actual speed of no. 2 fan, unit RPM (rpm / min)

7.6 **修改调速器** modbus **地址** (06 **功能码，寄存器地址** 0002)

指令格式：调速器地址 06 00 02 xx xx CRC16

Command format: governor address 06 00 02 00 xx CRC16

调速器返回：调速器新地址 06 00 02 xx xx CRC16

Governor return: governor new address 06 00 02 00 xx CRC16

*xxxx 换算成十进制就是需要修改的调速器地址，取值范围 0x0001-0x00fe

*如果不确定调速器当前的地址，指令第一个字节可以用 FF 广播地址代替

*When xxxx is converted to Decimal, it is the address of the governor to be modified. The value range is 0x0001-0x700fe

*If the current address of the governor is uncertain, the first byte of the instruction can be replaced by an FF broadcast address

7.7 **读取全部参数** (03 **功能码，寄存器地址** 0000~000E)

Read all parameters (03 function code, register address 0000~000E)

指令格式：01 03 00 00 00 0F 05 CE

Command format: 01 03 00 00 00 0F 05 CE

(0000：寄存器起始地址，000F：读取 15 个寄存器)

(0000: Register starting address, 000F: Read 15 registers)

调速器返回：01 03 1E 00 32 00 01 00 01 00 14 46 5A 00 01 00 04 02 76 00 00 00 00 00 00 00 05 00 46 00 5A 00 FF ED 1E

Governor return:01 03 1E 00 32 00 01 00 01 00 14 46 5A 00 01 00 04 02 76 00 00 00 00 00 00 00 05 00 46 00 5A 00 FF ED 1E

1E：返回数据长度，共 30 个字节(15 个寄存器，每个寄存器的数据占 2 个字节)

1E: Return data length, 30 bytes (15 registers, each for 2 bytes)

0032 对应寄存器 0000 的值，0001 对应寄存器 0001 的值，依次对应，以此类推…

0032 corresponds to value of register 0000,0001 corresponds to value of register 0001, and so on...

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Our company can provide supporting debugging software for free, the interface is as follows, users can visit our official website to download or contact customer service to provide

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