

深圳市玛威尔显控科技有限公司

Marvel Technology (China) Co.,Ltd

# MWESCM-S15**30**

## Specifications

单片机控制系统 **V3.0**

MCU control system **V3.0**



# MARVEL

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# Content :

## Chapter One

1.1 Product overview-----	3
1.2 Application-----	3
1.3 Features-----	3
1.4 Design Intention-----	5
1.5 CONFIGURATION & GENERALPRECAUTIONS-----	6

## Chapter Two

2.1 Appearance and Interface Description-----	8
2.2 Dimensions and Layout Sketch-----	12

## Chapter Three

3.1 Board Interface Pin Specification-----	13
3.2 Port Specification List and Functional-----	14
3.3 Terminal Interface-----	23

## Chapter Four

4.1 Precautions-----	26
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## Chapter One

### 1.1 Product overview

**MWESCM-S1530** 单片机控制电路板，采用 STC15 系列单片机为主控芯片，用有超高速双串口、高速 A/D、超强抗干扰、超低功耗等特点。支持 12\24\48V 输入电压，支持与 Android 或 Windows 系统搭配使用。支持检测温度、湿度、风速、烟雾、屏幕开关、电流、进水、倾斜、碰撞、门禁开关、滤网堵塞等，还可以控制加热器、风扇转速和屏幕背光等。

MWESCM-S1510 MCU control circuit board uses STC15 series MCU as the main control chip, with features such as ultra-high speed dual serial ports, high speed A / D, super anti-interference, ultra-low power and so on. Supporting 12\24\48V input voltage and Android or Windows system. Supporting detection of temperature, humidity, wind speed, smoke, screen switch, current, water intake, tilt, collision, access switch, filter blockage, etc. It can also control heater, fan speed and screen backlight.

### 1.2 Application

**MWESCM-S1530** 单片机控制电路板拥有稳定的运行结构，适用于大部分有温度、烟雾、湿度、倾斜、碰撞、进水、滤网堵塞、风扇转速、门禁等检测需要的设备，常用于：广告机、售卖机、智能数字广告牌、空调、电视机、和各种智能终端设备。

The MWESCM-S1510 MCU control circuit board has a stable operating

structure, which is suitable for most devices that require monitoring temperature, smoke, humidity, tilt, collision, water inlet, filter plugging, fan speed, and access control. Commonly used in: advertising machines, vending machines, smart digital billboards, air conditioners, televisions, and various smart terminal devices.

### 1.3 Features

- 具有超高速双串口、高速A/D、超强抗干扰、超低功耗等特点。
- 支持 12V、24V、48V 供电电压。
- 支持和Android、Windows 系统搭配使用。
- 支持 2 线/3 线/4 线PWM 风扇，支持 12V/24V/48V 等风扇。
- 支持烟雾、湿度、进水、电流、门开关状态、碰撞、倾斜、滤网堵塞等检测，还可以控制屏幕背光、加热器等。
- 支持串口读写指令控制，和支持互联网、物联网远程控制。
- 可以在机器现场终端 APP 查看检测到的数据，还可以在手机移动端用网页查看检测到的数据
- 支持现场USB-TTL 升级方式
- 可以现场设定超低温、低温、常温、高温、超高温 5 个温度边界值来自动控制屏幕、加热器、风扇、空调等。
- With ultra-high speed dual serial ports, high speed A/D,super anti-interference and ultra-low power features.
- Support 12V, 24V, 48V supply voltage.

- Support Android and Windows systems.
- Support 2-wire/3-wire/4-wire PWM fans and input voltage 12V/24V/48V fans.
- Support detection of smoke, humidity, water inlet, current, access switch status, collision, tilt, filter blockage, etc. It can also control screen backlights, heaters, etc.
- Support serial port read/write command control and Internet and IoT remote control.
- Support viewing the detected data in the machine on-site terminal APP, and on the mobile terminal of the mobile phone through web pages.
- Support on-site USB-TTL upgrade mode
- Support on-site setting five temperature boundary values of ultra-low temperature, low temperature, normal temperature, high temperature and ultra-high temperature to automatically control the screen, heater, fan, air conditioner and so on.

#### **1.4 Design Intention**

由于很多设备在设计之初就没有考虑过设备在不同的环境中会受到多大和哪些因素的影响，影响有好有坏，很多时候公司或者客户需要及时知道设备的状况，故设计了此检测控制系统。本产品的设计就是用于检测设备在使用过程中可能会发生的某些状况，以及时反馈给客户或者开发人员

Since many devices have not been considered how much they will be affected and what factors will affect them in different environments

when designed at the outset. The impact would be good or bad.

Many times the company or the customer need to know the condition of the equipment, so the detection control system is designed. This product is designed to detect certain conditions that may occur during usage and provide feedback to the customer or developers timely.

### **1.5 CONFIGURATION & GENERALPRECAUTIONS**

Relative humidity:  $\leq 95\%$ .

相对湿度:  $\leq 97\%$ 。

Storage temperature:  $-30\sim 75^{\circ}\text{C}$ .

存储温度:  $-30\sim 100^{\circ}\text{C}$ 。

Operation temperature:  $-10\sim 60^{\circ}\text{C}$ .

使用温度:  $-25\sim 75^{\circ}\text{C}$ 。

Maximum current: no more than 10A

最大电流: 不超过10A

Maximum voltage: no more than 50V

最大电压: 不超过50V

Minimum power: 4W (no load)

最低功率: 4W (空载)

Rated voltage: 12V

额定电压: 12V

Rated current: 0.67a

额定电流: 0.67A

Rated power: 8W

额定功率：8W

Default high level of I / O port: 5V

I/O口默认高电平：5V

Protect the board from static electricity in case of damage to the IC.

请使板卡远离静电。

Keep the board away from conductor when it is working.

请确保板卡工作时远离导体。

Don't push or pull the connectors when the board is working.

板卡工作时请勿拆解。

Don't press, distort or disassemble the board.

勿受重压及弯折变形。

Clean the board with soft dry cloth when it's dirty.

如果板卡上有灰尘，请用干布擦拭。

## Chapter Two

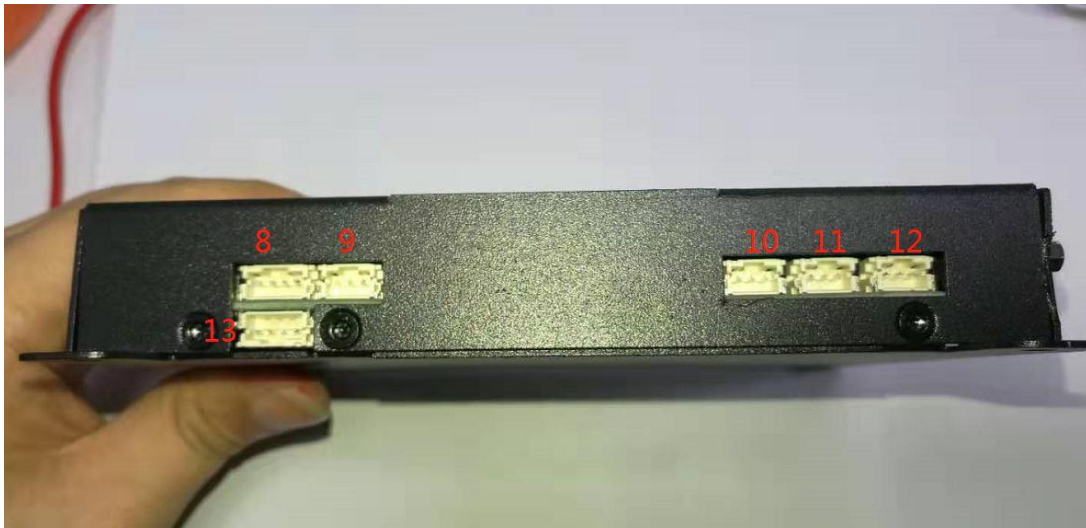
### 2.1 Appearance and Interface Description

正面：

front

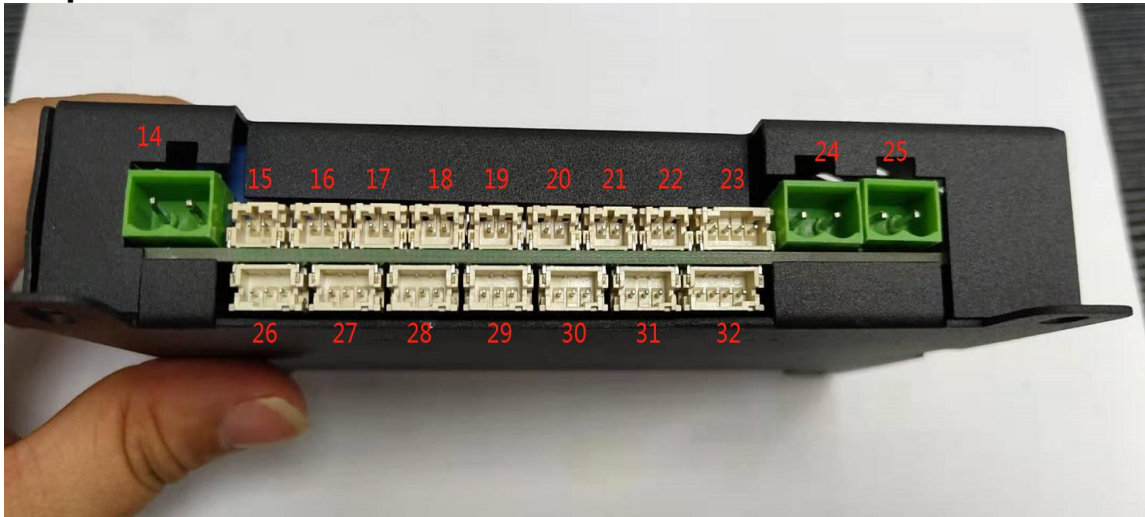


bottom

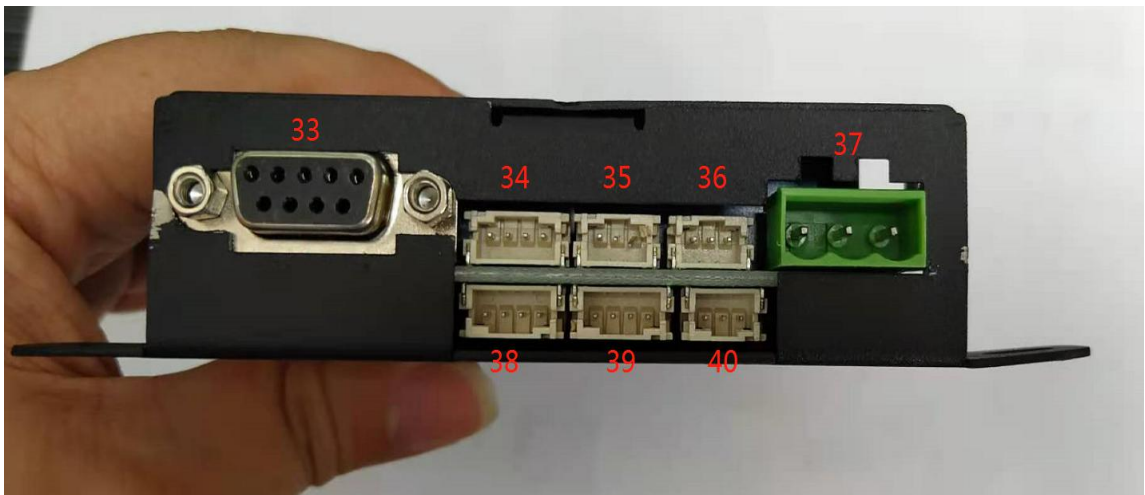




Top



Left



Right



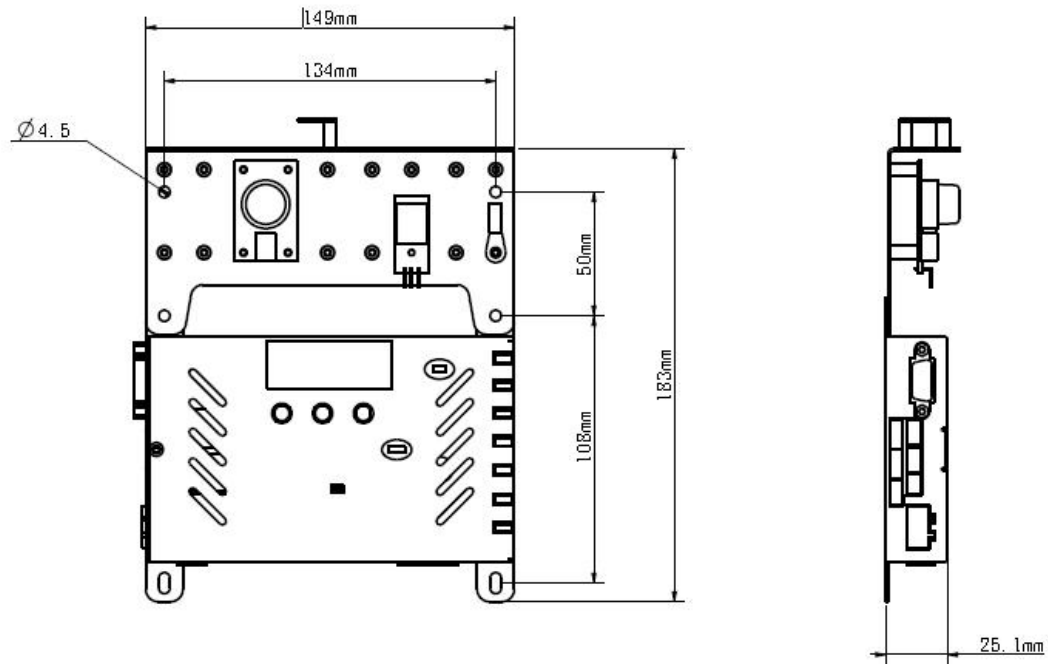
## 红色数字标记的接口：

### Red numbers marked interface

- 1: 数码管显示。
- 2~4: 独立按键。
- 5~6: 跳帽。
- 7: 工作指示灯。
- 8: 碰撞倾斜传感器接口。
- 9: 电流传感器接口。
- 10: 预留。
- 11: (RH) 湿度传感器接口。
- 12: (Smoke) 烟雾传感器接口。
- 13: 预留。
- 14: (PTC) 加热器接口。
- 15~16: (OLED) 屏幕背光控制接口。
- 17: (NTC-1) 温度1传感器接口 (数码管显示出温度值)。
- 18: (NTC-2) 温度2传感器接口 (数码管不显示温度值)。
- 19~20: (Water) 水位传感器接口。
- 21~22: (Door) 门开关传感器。
- 23: TTL协议通讯接口。
- 24: 此MWESCM-S1530主板供电端口 (建议接12V)。
- 25: 散热风扇的供电端口 (可接入12V\24V\48V)。
- 26~27: 预留。
- 28~29: PWM控制背光接口。
- 30~31: 预留。
- 32: 压差传感器接口。
- 33: 9针RS232串口接头 (母头)。
- 34: 4针RS232串口接口 (GND、RX、TX)。
- 35~36: 预留。
- 37: 继电器, 预留。
- 38: 预留。
- 39: 光感传感器接口。
- 40: 预留。
- 40~41: 2线风机接口(+、-)。
- 42~47: 4线风机接口(VCC、GND、PWM、FG)。

1: Digital tube display.  
2-4: Independent button key.  
5-6: Connector  
7: Work indicator  
8: Impact tilt sensor interface.  
9: Current sensor interface.  
10: Reservation  
11: (RH) humidity sensor interface.  
12: (smoke) smoke sensor interface.  
13: Reserved.  
14: (PTC) heater interface.  
15~16: (OLED) screen backlight control interface.  
17: (ntc-1) temperature 1 sensor interface (the digital tube shows the temperature value).  
18: (ntc-2) temperature 2 sensor interface (the digital tube does not display the temperature value).  
19 ~ 20: (water) water level sensor interface.  
21 ~ 22: (door1,door2) door opening sensor.  
23: TTL protocol communication interface.  
24: this MWESCM-S1530 main board power supply port (12V is recommended).  
25: power supply port of cooling fan (12V \ 24V \ 48V can be connected).  
26~27: reserved.  
28~29: PWM backlight control interface.  
30~31: reserved  
32: Filter sensor interface.  
33: 9-pin RS232 serial port connector (female).  
34: 4-pin RS232 serial interface (GND, Rx, TX).  
35-36: reserved.  
37: relay,reserved.  
38: reserved.  
39: light sensor interface.  
40: reserved.  
41 ~ 42: 2-wire fan interface (+, -).  
43-47: 4-wire fan interface (VCC, GND, PWM, FG).

## 2.2 Dimensions and Layout Sketch



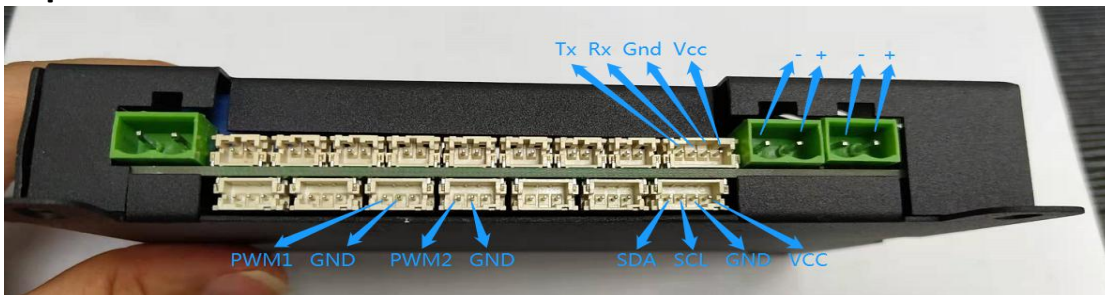
## Chapter Three

### 3.1 Board Interface Pin Specification

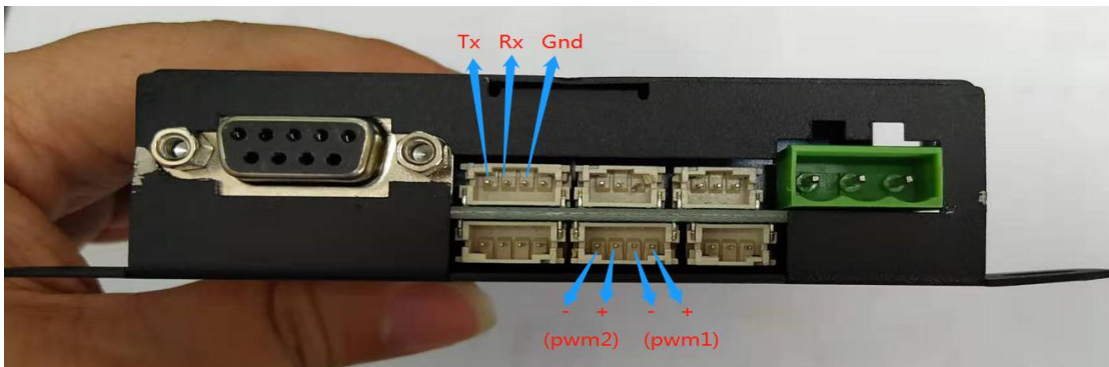
Button interface connection:



Top interface connection:



Left interface connection:



Right interface connection:



### 3.2 Port Specification List and Functional

#### TTL Port :

主要使用USB-TTL 线连接主板，MWESCM-S1530 电路板中所有的功能的数据都经过这个端口传输给主板。

Mainly using USB-TTL cable to connect the mainboard. All the data of functions of the MWESCM-S1510 board are transmitted to the mainboard through this port.

Serial Numbers	Definition	Attribute	Description
1	Tx	Send data	Send data to mainboard
2	Rx	Receive data	Receive instructions
3	GND	Ground	
4	VCC	Power supply	

## 数码管：

主要用于显示即时温度。

## 独立按键：

用于设置温度边界值，在数码管中会显示边界值。不同的边界值决定了不同的温度区间，不同的温度区间风扇转速、加热器会有不同的设定。

1. 按左边的按键，进入功能设置
2. 按1次左键，首字母显示“C”，进入模拟温度值设置。中间按键和右键可以调节此数值，继续按左键退出，此功能自作测试用。
3. 按2次左键，首字母显示“L”，进入设置超低温临界值。中间按键和右键可以调节此数值。
4. 按3次左键，首字母显示“A”，进入设置低温临界值。中间按键和右键可以调节此数值。
5. 按4次左键，首字母显示“E”，进入设置常温临界值。中间按键和右键可以调节此数值。
6. 按5次左键，首字母显示“F”，进入设置高温临界值。中间按键和右键可以调节此数值。
7. 按6次左键，首字母显示“H”，进入设置超高温临界值。中间按键和右键可以调节此数值。
8. 按7次左键，首字母显示“P”，进入风机风速模式选择。中

间按键和右键可以调节此数值。风速模式，从1到5模式，  
风机风速的曲线率越大，随温度升高风速会加速的更快。

温度临界值说明：

—L: 风机断电、加热器启动

L—A: 风机断电（如果加热器启动，温度会升到A临界值时，停止加热器加热）

A—E: 风机保持低速转动

E—F: 风机转速随温度上升而加快

F—H: 风机最大转速运行

H—: 风机最大转速运行，关闭屏幕背光。（温度下降到F才会再次开启背光）

**PTC 接口：**

它是继电器的常开端，在超低温L时会闭合，即打开加热器。

允许最大电流：10A。

允许最大电压：300V。

**Nixietube:**

Mainly used to display the instantaneous temperature.

**Independent button:**

Used to set the temperature boundary value and display it in the digital tube. Different boundary values determine different temperature ranges,



for which fan speeds and heaters will have different settings.

#### **PTC interface:**

Used to install the heater. The heater will automatically be set by different temperature boundary values and can be controlled manually in the background terminal.

#### **风扇接口：**

**MWESCM-S1530** 支持 12V\24V\48V 等多种 PWM 控制风扇接入，端口中可以使用 2 线、3 线、4 线等的不同类型风扇。风扇转速会随温度线性变化，用于冷却设备温度过高。

风机供电在**MWESCM-S1530**板左侧的电源端子，风扇的总功率不得超过**500W**。

#### **Fan interface:**

MWESCM-S1510 supports a variety of PWM controlled fans such as 12V\24V\48V. Different types of fans such as 2-wire, 3-wire and 4-wire can be used in the port. The fan speed varies linearly with temperature

Serial Numbers	Definition	Attribute	Description
1	VCC	Power supply	Power supply for fans
2	PWM	Pulse width modulated signal	Control the speed of fans
3	FG	Fan speed signal	Return to speed signal of fans

4	GND	Ground	
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and is used to cool the equipment whose temperature is too high.

### 烟雾传感器接口：

用于安装烟雾传感器，当检测到烟雾时会有报警提醒，在后台终端会有及时反映，以防止设备出现火警故障时造成严重后果。

Smoke sensor interface:

Used to install the smoke sensor. When the smoke is detected, there will be an alarm reminder, which will be reflected in the background terminal in time to prevent serious consequences when the equipment has a fire

Serial Numbers	Definition	Attribute	Description
1	VCC	Power supply	Power supply for the sensor
2	AO	Data transmission port	Data transmission
3	GND	Ground	Return to the speed signal of fans

alarm error.

### 湿度传感器接口：

用于安装湿度传感器，湿度传感器用于检测机器内部的湿度，某些元器件在湿度过高时会有短路的风险。此功能就是让客户能提早发现问题。

#### Humidity sensor interface:

Used to install a humidity sensor. The humidity sensor is used to detect the humidity inside the machine. Some components may have a short circuit risk when the humidity is too high. This feature is to allow customers to find this problem early.

Serial Numbers	Definition	Attribute	Description
1	VCC	Power supply	Power supply for the sensor
2	DATA	Data transmission port	Data transmission
3	GND	Ground	Return to the speed signal of fans

### **门开关传感器接口：**

用于安装门的开关传感器，能使客户知道设备是否被打开和是否被关闭。

Door sensor interface:

The switch sensor used to install the door enables the customer to know whether the device is open or closed.

### **进水传感器接口：**

用于安装进水传感器。很多设备都安装在户外，而有些可能被安装到地势比较低的位置，这些设备在下雨天可能会有进水的风险，所以需要这样的传感器及时感应到水淹状况，可以及时给设备自动断电处理，不至于发生漏电，造成行人安全隐患。

Ponding sensor interface:

Used to install the water inlet sensor. Many equipment are installed outdoors, and some may be installed in low-lying places. These equipment may have the risk of water inflow in rainy days, so it is necessary to use such a sensor to sense the flooded condition in time, which can automatically cut off the power supply of the equipment in time, so as not to cause leakage, causing potential safety hazards for pedestrians.

### **撞击传感器接口：**

撞击传感器可以检测到设备是否遭受到硬物撞击，还可以检测到设备是否发生倾斜，避免人物损坏。当设备被硬物撞击或发生倾斜时，设备会自动拍照周围环境，并发出语音警告，后台终端也会有及时提醒。

### **Access switch sensor interface:**

Used to install an access switch sensor to enable the customer to know whether the device is turned on or turned off.

### **Water inlet sensor interface:**

Used to install the water inlet sensor. Many devices are installed outdoors and some may be installed in lower-lying locations, which may have a risk of water inlet on rainy days. Therefore, such sensors are needed to sense the water situation in time and the device can be automatically disconnected in time, which will not cause power leakage, resulting in pedestrian safety risks.

### **Collision sensor interface:**

The collision sensor can detect whether the device is hit by a hard object, and can also detect whether the device is tilted to avoid damage to people or devices. When the device is hit by a hard object or tilted, the device will automatically take a picture of the surrounding environment and issue a voice warning, and the background terminal will also issue a reminder in time.

Serial Numbers	Definition	Attribute	Description
1	VCC	Power supply	Power supply for the sensor
2	SCL	Clock signal	Clock signal
3	SDA	Data signal	Data signal
4	GND	Ground	

### 滤网堵塞传感器：

滤网检测的传感器安装比较特殊，不单单是传感器本身而已，还包括特殊的安装设置，这是本公司自行研发的方案，申请专利的。设备在使用久了之后，会发生滤网堵塞，使设备内部风扇不能正常对设备冷却，设备发生故障的概率就会上升。这个传感器就是解决这个问题而存在的，当滤网堵塞率达到一定程度时会给客户提示该更换滤网了。

### Filter jam sensor:

The installation of the filter sensor is quite special, not only the sensor itself, but also special installation settings, which is our company's own developed solution, having applied patent. After the device is used for a long time, the filter will be blocked, making the internal fan of the device can not cool the device normally, and the probability of device failure will increase. This sensor exists to solve this problem. When the filter clogging rate reaches a certain level, the customer will be prompted to

replace the filter.

Serial Numbers	Definition	Attribute	Description
1	VCC	Power supply	Power supply for the sensor
2	SCL	Clock signal	Clock signal
3	SDA	Data signal	Data signal
4	GND	Ground	

## 电流传感器接口

电流传感器用于检测屏幕电流，当屏幕关闭或者出现异常时，会获取到相应的信息。当然用户如果有必要，可以用到不同的地方检测其他的电流。

### Screen backlight current sensor interface:

**The screen backlight current sensor is used to detect the screen backlight current. When the screen is closed or abnormal, the corresponding information will be obtained.**

Serial Number	Definition	Attribute	Description
1	VCC	Power Supply	Power supply for the sensor
2	GND	Ground	
3	OUT	AQW	Get the current signal



### 3.3 Terminal Interface

串口信息	
风机3转速	0
风机4转速	0
风机5转速	0
温度	28
门1	关
加热管	关
湿度	0
烟雾	无

串口信息：Serial port information

风 机 3 转 速 ： Fan 3

speed 风 机 4 转 速 ： Fan 4

speed 风 机 5 转 速 ： Fan 5

speed 温 度 ： temperature

门 1 ： door 1

加 热 管 ： heater

湿 度 ： humidity

烟 雾 ： smoke

## 设备终端界面

### Device terminal interface



设备监控 (九方户外): Device monitoring (Jiufang outdoor)

数据更新时间: Data update time

温度: temperature

风速: fan speed

屏幕 (开): screen (on)

湿度: humidity

积水: water

烟雾: smoke

碰撞: collision

倾斜: tilt

门禁: Door Access

滤网: filter

加热器: heater

## 手机及客户端界面

### Mobile phone and client interface



设备监控: Device monitoring  
当前设备: Current device  
在线状态: Online state  
背光电源: Backlight power  
当前温度: Current Temperature  
当前风速: Current fan speed  
当前湿度: Current humidity  
工作电流: Working current

## Chapter Four

### 4.1 Precautions

⊙ 电路板安装时候要轻拿轻放，由于电路板上有些元器件是贴片元件，撞摔会使这些贴片元器件脱落。安装时要检查一下，如果有元器件掉落的不可安装，以免发生更严重的事故。

⊙ 传感器安装时，建议先安装温度传感器，温度传感器正确安装数码管才能正常显示，有很多功能都基于温度传感器，比如风扇，如果没有装温度传感器，或安装不正确，风扇是不会启动的。

⊙ 电源仅支持 12V，24V，48V 电压，电源输入电压和风扇输出电压是一致的，切不可使用超出 48V 的高电压，以免造成事故。

⊙ When the board is installed, it should be handled gently. Since some components on the board are chip components, which will fall off through collision. Checking it before installation. If it is found that some components are dropped, it can not be installed, to avoid more serious accidents.

⊙ When installing the sensor, it is recommended to install the temperature sensor first. The nixietube can work normally after the temperature sensor is correctly installed. Many functions are based on

temperature sensors, such as fans. If the temperature sensor is not installed, or the installation is not correct, the fan will not start.

⊙The power supply only supports 12V, 24V, 48V input voltage. The power input voltage and the fan output voltage are consistent. Do not use a voltage exceeding 48V to avoid accidents.