



# **AMP-119A II .v21 Spark Diverter**

## **User Manual**

**Ampe Technology Co.,Ltd.**

[www.ampecn.com](http://www.ampecn.com)

## Preface

Thanks for using AMPE's high-performances spark diverter AMP series. The AMP series is manufactured with high-quality components and materials and incorporates the latest microprocessor technology available. Jiangsu AMPEON continuously practices the design and innovation of the product and provides excellent products with professional attitude. Furthermore, it responds to the customers with professional service and benefits each other with the customers.

The manual is to be used for the installing, parameter setting, troubleshooting and daily maintenance of spark diverter. In order to assure the proper installing and usage of the product, please read this manual in detail before installing. Please keep this user manual at hand and distribute to all users for reference.

Welcome to visit the website [www.ampecn.com](http://www.ampecn.com).

### **ATTENTION!**

1. First please carry out the delivery inspection and check whether there is damage caused by transportation process.
2. After unpacking, please compare with the packing list and check the type, specification and components of the product. If it does not conform to your order documents or if you have any questions regarding the product, you can contact to the dealer or the service office of our company.
3. Jiangsu Ampeon provides services of the three guarantee period 18 months from the delivery date.
4. Troubles due to lightening strike, water invasion and obvious artificial miss or damage etc. are not in the range of repair guarantee.
5. Metal & spark diverter series products are important products of the fore-spinning procedure in cotton spinning mill. But the users in cotton spinning mill should also take integrated measures in fire protection equipments, selection of material, management regulations etc. to assure the safety production.

### **CAUTION !**

1. The power supply must first be shut down before the electric wiring.
  2. Wiring, repairing & maintenance of the machine should be carried out by electric professionals.
  3. Do not carry out compression test toward the inner components because the semiconductor units are easy to be broken down by the high voltage and are easy to damage.
  4. The circuit board CMOS integrated circuit is apt to static electricity damage. So you should take the static electricity prevention measure before touching the circuit board with hand.
  5. As the machine is installed to the pipe in high place, installing personnel should take safety measures. Suspending or bracket should be solid to prevent the machine from dropping down.
  6. Select safety area to install the equipment, prevent the high temperature & direct shinning and avoid humidity and splashing of the water drops.
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## A. Overview

### 1. Use and structural characteristics

AMP-119A II spark diverter is mainly used for fireproofing of blowing -carding system in spinning mills. It is installed on the pipe of pneumatic transport systems for materials like fibers or tuft. When it detected the spark or burning debris in the pipeline, audible and visual alarm works and stop relevant equipment. At the same time, divert spark unit works and put the cotton mixed with spark into the fire extinguisher bag or fire extinguisher box. The professional design makes it possible to protect virtually any machine for production lines.

AMP-119A II spark diverter is used widely in the blowing-carding system. The machine is generally installed on the pipe from the cotton conveying fan to the carding and in front of the multi bin cotton mixer, etc., where fire prevention is required (Figure1)

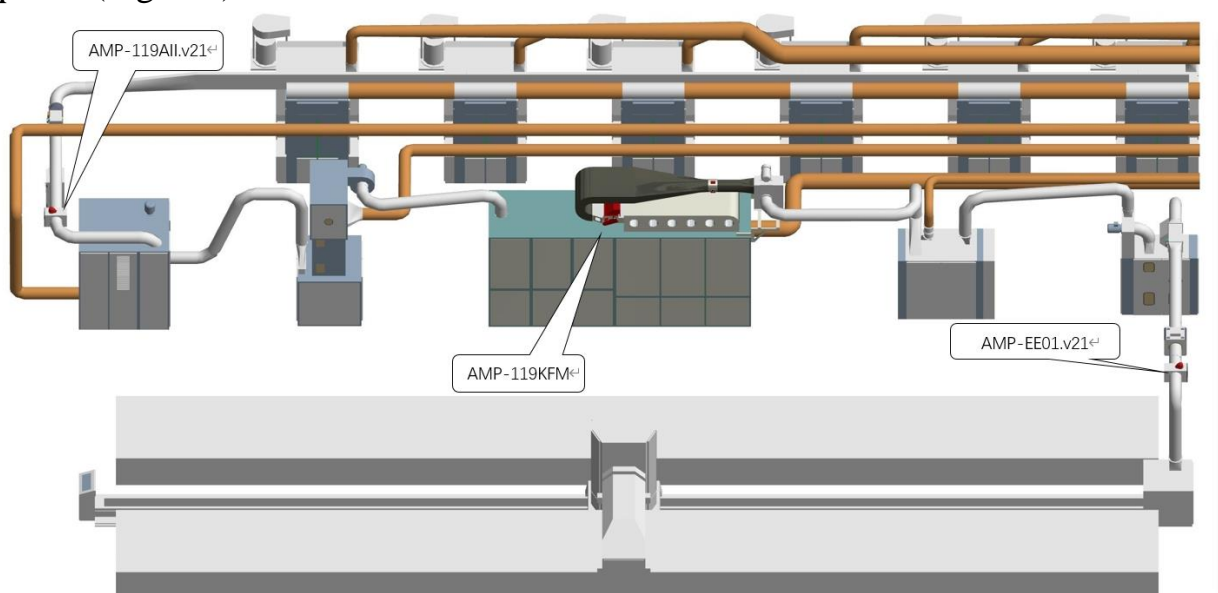


Figure1 The installation on blowing -carding system

### 2. Technical parameter

- a. Sensitivity: Spark detection: spark diameter more than  $\Phi 0.5\text{mm}$  spark (The angle of view is no less than 90 degrees)
- b. Response time:  $\leq 100\text{ms}$ .
- c. Power supply: 100-240V AC.
- d. Power:  $< 45\text{W}$ .
- e. Compressed air pressure range:  $600 \sim 800\text{Kpa}$
- f. Contact load of relay: AC220V/3A.
- g. Sound level of alarm:  $> 100\text{db}$
- h. Requirement of the environment: temperature  $-10^{\circ}\text{C} \sim 70^{\circ}\text{C}$ .

## B. Structural features and installation

In order to meet the best performance of AMP-119AII spark diverter. Please be sure to read this “User manual” carefully before installation. And the installation environment and conditions for further correct measurement and evaluation.

### 1. Structural features

#### 1.1 spark detection unit

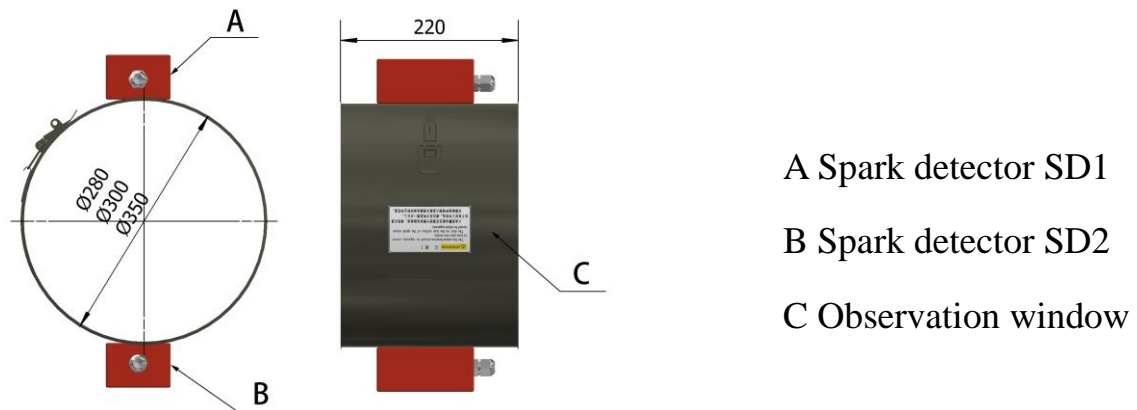


Figure2.a The sketch map of AMP-119AII spark diverter control box

The connecting pipe of the spark detectors can be installed to the pipeline directly, a side connected with the existing pipeline by flange, the other side connected with the glass steel pipe by a clamp.

#### 1.2 control box

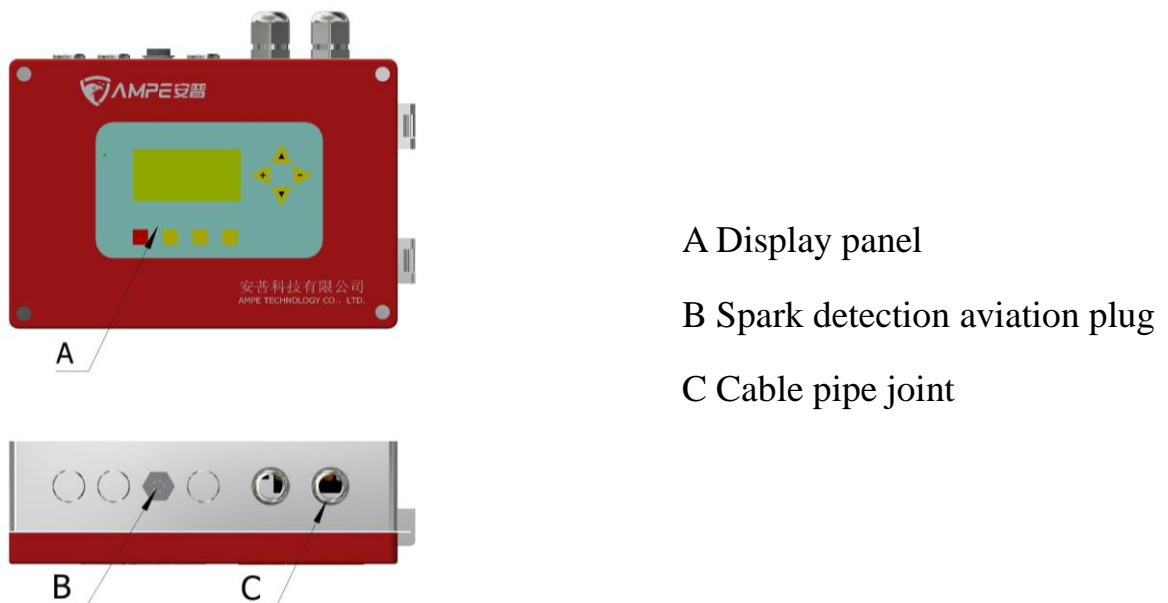


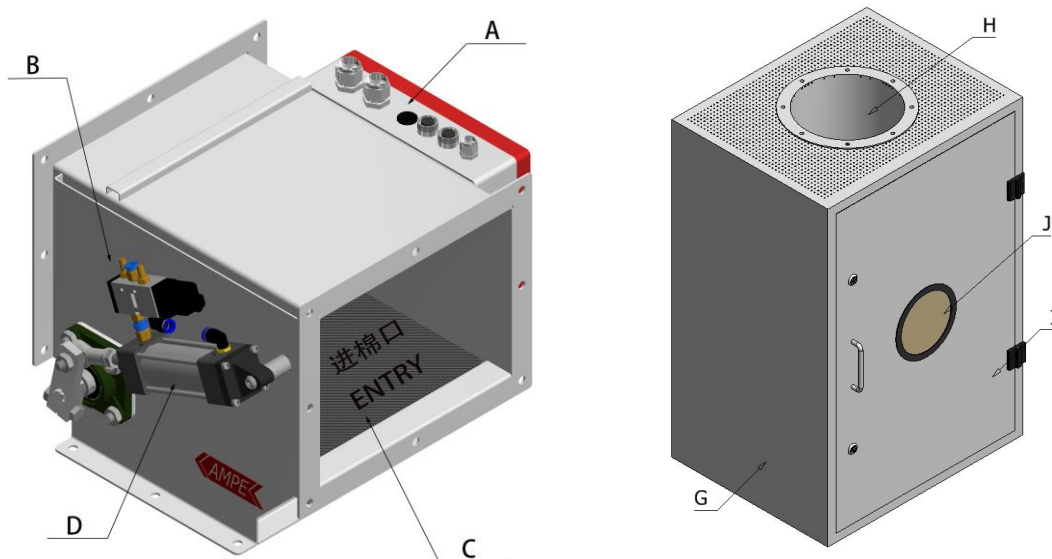
Figure2 The sketch map of AMP-119AII spark diverter control box

### 1.3 Automatic divert sparks unit

According to different fire collector of fire extinguisher, the divert spark unit has two units: A010(optional), A020(optional), A030(standard).

#### 1.3.1 A010 type automatic divert spark unit(figure3)

It consists of A010 type three way fire diverter and A010 type fire extinguisher box. Fire extinguisher valve can separate cotton mixed with fire from normal cotton rapidly, and put it to fire extinguisher box. It is easy to maintain.



A control box B solenoid valve C flap D cylinder G A010 fire extinguisher box  
H dropping cotton inlet I door J observation window

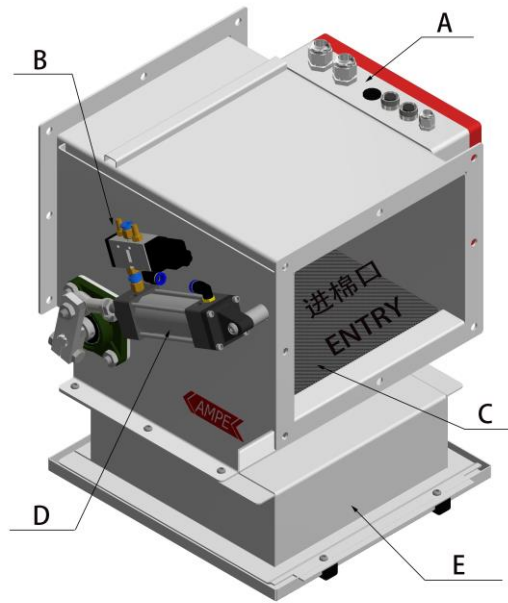
Figure3 A010 type automatic divert spark unit

#### 1.3.2 A020 type automatic divert spark unit(figure4)

The fire extinguisher bag is made up of flameresistant material, the integral divert spark unit consists of three way fire diverter and fire extinguisher. Fire diverter closes the cotton pipeline and open the door of fire extinguisher bag, put the cotton with fire into the bag when spark alarm happens.

#### ▲ATTENTION!

A020 type automatic divert spark unit uses the fire extinguisher bag instead of fire extinguisher box, it does not need to occupy floor space. It is suitable for multi bin cotton mixer or fire extinguisher box cannot be installed due to space limitation.

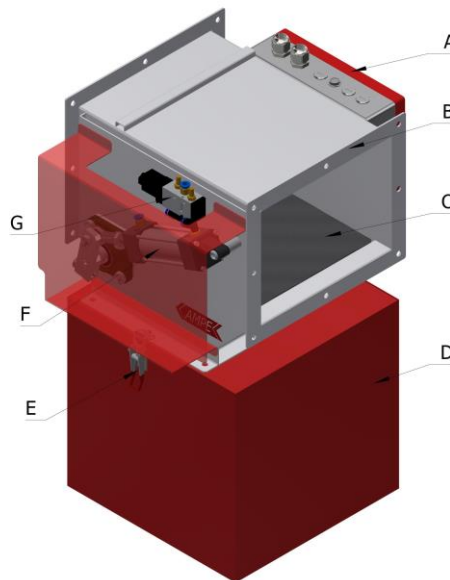


A control box    B solenoid valve    C flap    D cylinder    E fire extinguisher bag

Figure4 A020 type automatic divert spark unit

### 1.3.3 A030 type automatic divert spark unit (figure4)

The fire exhaust valve can quickly isolate the cotton conveying pipeline and discharge the fire cotton and burning debris into the fire box, with reliable structure and simple maintenance.



A Control box    B Automatic divert sparks unit    C Flap    D Collector box  
 E Buckle    F cylinder    G solenoid valve

Figure5 A030 type automatic divert spark unit

The fire discharge mechanism is connected to the cotton conveying pipe by square round pipe, and is installed by metal hanger, which should be installed in the direction of the arrow. Because of the quick reaction pneumatic mechanism, it is necessary to provide a stable clean gas source of 600-800kpa.

**▲ATTENTION!**

Do not touch or clean the flap when the equipment works, in order to avoid sudden action which cause danger!

## **1.4 Standard installation**

### **1.4.1 The requirements of installation**

a. You should read this “User manual” carefully before installation. The distance between the control box of spark detector and the automatic divert sparks unit can be calculated as ‘  $L(m) \geq 0.25 \times \text{transport velocity (m/s)}$  ’, and it’s more than 3m as usual. The customer should also pay special attention to the influence effected by the transport velocity to the diverter. The prefect distance should be determined after experiments.

b. There is a pipe with the observation window that installed beside the control box, for the use of periodic inspection to the spark detecting function and cleaning the dust on the spark detectors.

c. Avoid the daylight falling or reflecting on the detecting area, otherwise, it may trigger false alarms.

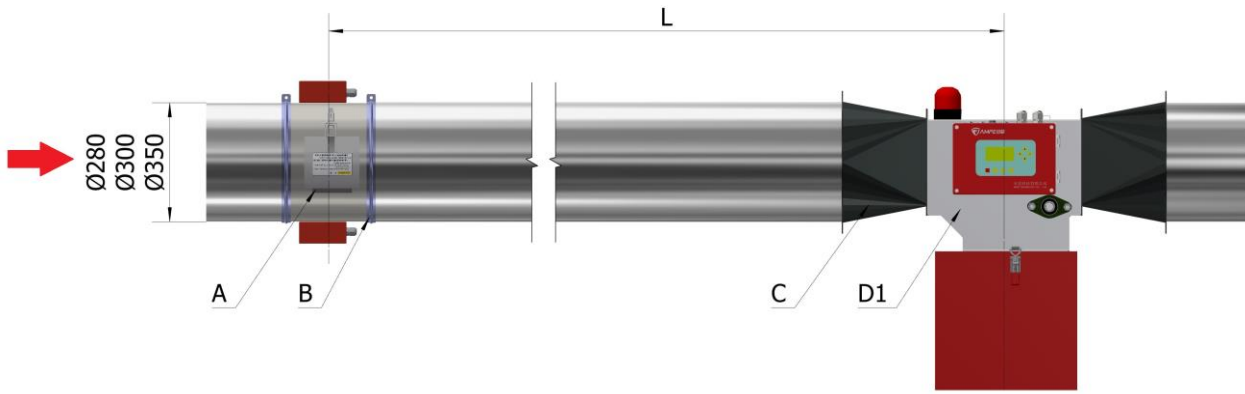
### **1.4.2 The installation of automatic divert sparks unit**

Usually, the automatic divert sparks unit is installed after the fan to ensure all the ember contaminated material drop into the collect box correctly. It is installed on the pipe by square to circular pipe.

#### **AMP-119AII type spark diverter equipped with A030 type automatic divert spark unit**

A030 type automatic divert spark unit is installed on the pipe by square to circular directly, pay attention to inlet and outlet of cotton direction.



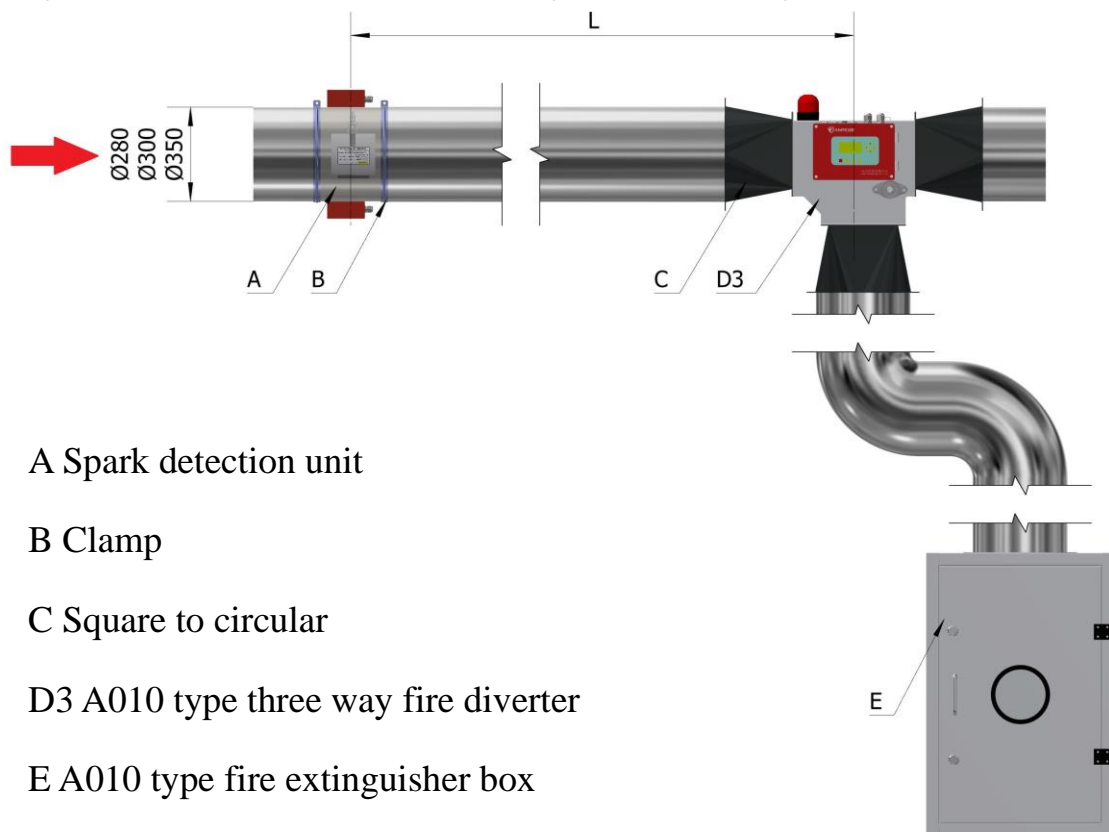


A Spark detection unit B clamp C Square to circular D1 A030 type fire diverter

Figure6 AMP-119AII equipped with A030 type automatic divert spark unit

**AMP-119AII type spark diverter equipped with A010 type automatic divert spark unit**

A010 type three way fire diverter is installed on the pipe directly, pay attention to the direction of installation so as to avoid the direction error. The bottom of three way fire diverter is connected to fire extinguisher box on the floor. The A010 type three way fire diverter is installed vertically or horizontally.

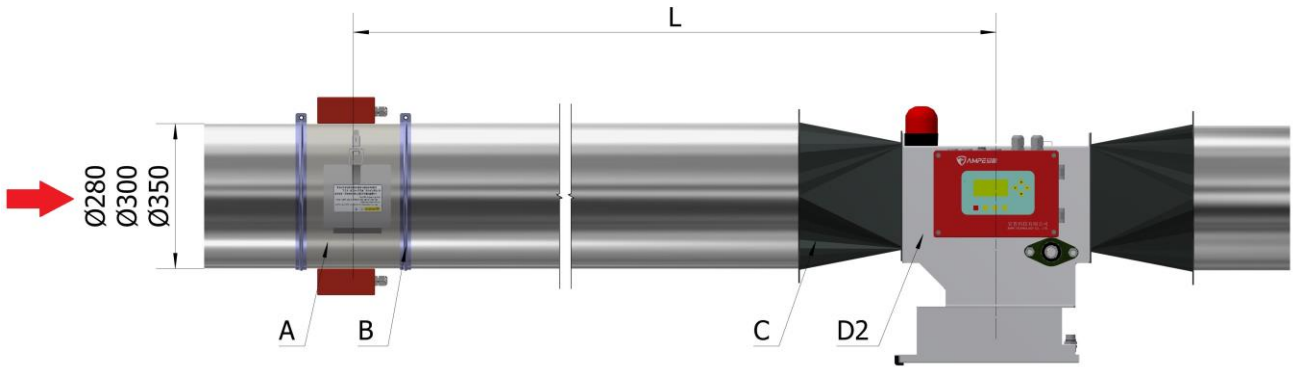


- A Spark detection unit
- B Clamp
- C Square to circular
- D3 A010 type three way fire diverter
- E A010 type fire extinguisher box

Figure7 AMP-119AII equipped with A010 type automatic divert spark unit

## AMP-119AII type spark diverter equipped with A020 type automatic divert spark unit

A020 type automatic divert spark unit is installed on the pipe by square to circular directly, pay attention to inlet and outlet of cotton direction.



A Spark detection unit B clamp C Square to circular D2 A020 type fire diverter

Figure8 AMP-119AII equipped with A020 type automatic divert spark unit

## 2. Electrical wiring

### 2.1 Explanation of main electrical wiring

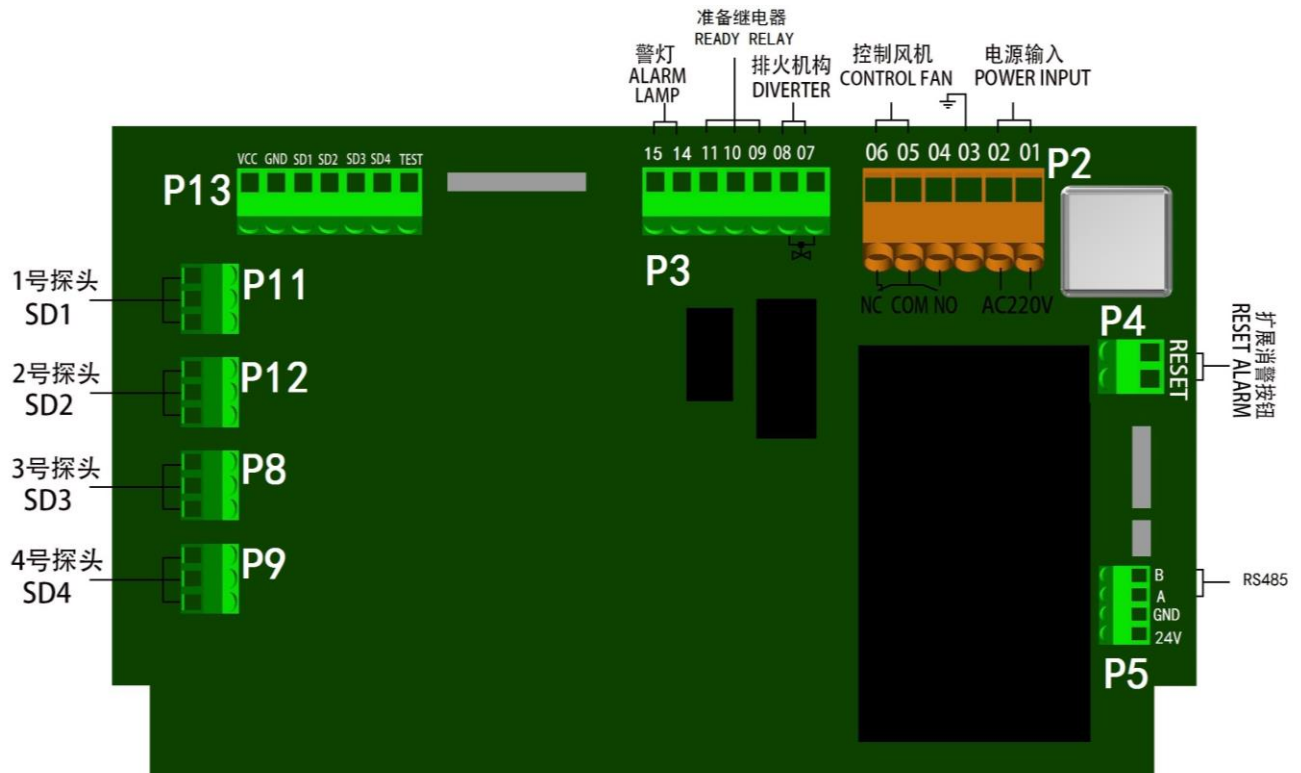


Figure9 Electrical wiring diagram

a. Terminal 01 and 02 are power input, terminal 3 is ground electrode

### ▲ATTENTION!

**We shall avoid the share of power supply with other equipments that may produce interference radiation. We shall pay special attention to avoiding the phenomenon that on the time of spark alarm stopping, the power supply of instrument itself can not be shut down for output of relay signal.**

b. Terminal 4 “NC”, 5 “COM” and 6 “NO” are a group of passive relay contact output. The relevant equipment can be shut off when spark alarm happens.

c. The terminal 7 and 8 are connected to solenoid valve coil of diverter. The specification of solenoid valve coil is DC20-24V.

d. The terminal SD<sub>1</sub>、SD<sub>2</sub>、SD<sub>3</sub>、SD<sub>4</sub> are used to connected four spark detectors. The detectors SD<sub>1</sub>,SD<sub>2</sub> are ready in the control box, but SD<sub>3</sub>,SD<sub>4</sub> detectors are used for extension (optional for the customer).

e. Terminal 09, 10 and 11 are passive relay contact output. It detects the performance of this equipment, the relay contact works if there is a fault.

f. Terminal 14 and 15 are connected to sound and light alarm signal, terminal 14 is connected to positive pole, terminal 15 is connected to negative pole.

## 2.2 Electrical wiring of control box

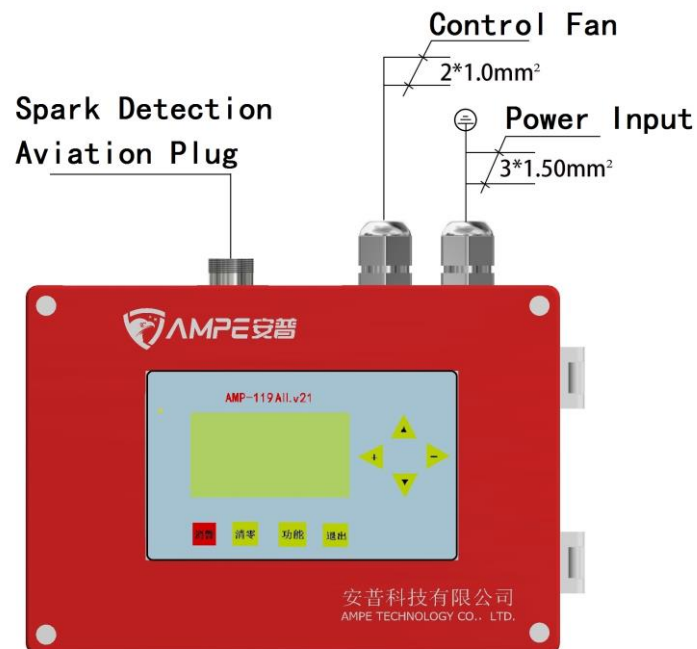


Figure10 Electrical wiring of control box

### 3. Grounded and safety

a. You should earth properly according to the safety standard of local government. This equipment needs to be separately earthed. It is suggested that the grounded wire be as short as possible and it is prohibited to earth it together with other equipments.

b. While overhauling, please first shut down the power supply and interrupt the compressed air supply. The temperature of the radiator is very high. So don't touch it to avoid burn.

c. After the fire alarm is activated, you should shut down the general power supply of the procedure and then put out the fire.

d. The function test or maintenance work that needs climbing should be carried out by more than two people.

## C. Debugging and usage maintenance

### 1. Operation panel display and function description



Figure 11 Operation panel and main working page

#### 1.1 LCD content description

##### Main working page

If the LED is always on, it means that the device has been powered on to the normal working state. If the LED flashes, it means that there is new alarm information. Press the "消警" key to restore the original state.

NO.	Display	Explanation
1	2022-01-23 08:29	08:29, January 23, 2022
2	↔ 0	The alarm times is 0.
3	[SD] ①②③	The normal working status of spark sensor: “[SD] ①②③”
4	FUN→MENU	The main working page can be changed to parametert setting menu page by pressing “功能” key. The icon “FUN→MENU” turns to "locked" when the keyboard is locked.

## 1.2 LCD displays content when spark alarm happens

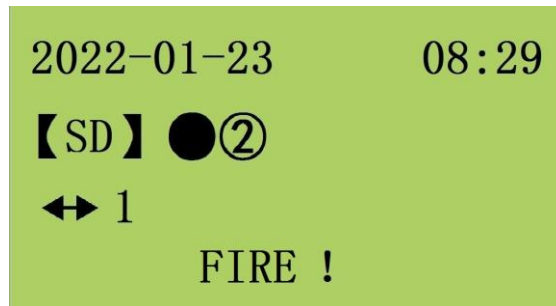


Figure12 LCD displays content when spark alarm happens

The alarm sounds intermittently. The alarm page is shown in figure12. Press the key “消警”, alarm page will turn to working page.

## 1.3 The description of key

Enter into parameter setting page by pressing “功能+▲” key.

The description of key

- 1) “消警” reset alarm key: it can reset the system alarm.
- 2) “功能”Function key. The key is used to switch the menu page. If the keyboard is locked, you can enter the menu page by pressing the “功能” and “▲” keys simultaneously.
- 3)“退出” Exit key. After pressing the key, you will return to the main page.
- 4) “▲” Up key , “▼” Down key , “+” Left key, “-” Right key , These keys have the functions of shifting parameter settings and changing the data.

## 2. Parameter setting page

After pressing the key “功能” on the main menu page , you will turn to the

menu page of Parameter setting page.

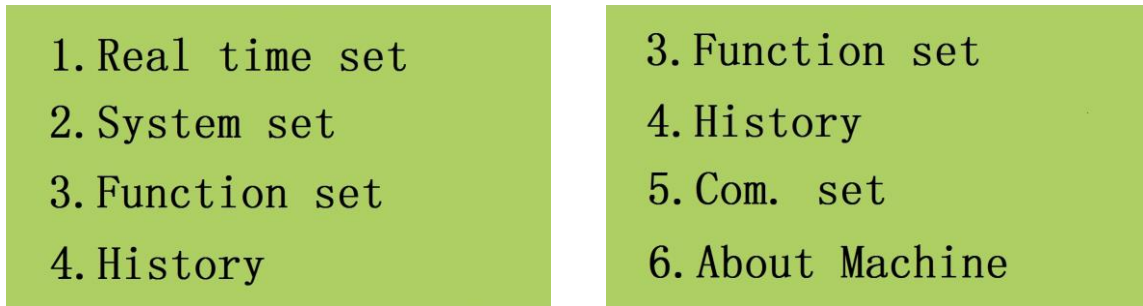


Figure13 Parameter setting page

When the cursor is flashing in the “1.Real time set” item, press the key “功能” to enter into time settings, use the key “▲, ▼” to switch positions of the cursor. Press the key “功能” entering into the page where the cursor stayed.

### 2.1 Real time setting page

After you enter into the time setting menu page, press “▲, ▼” turning to switch among the month, date, year, hour, minute. Through pressing the key “+, -”, we can change the value of the data.

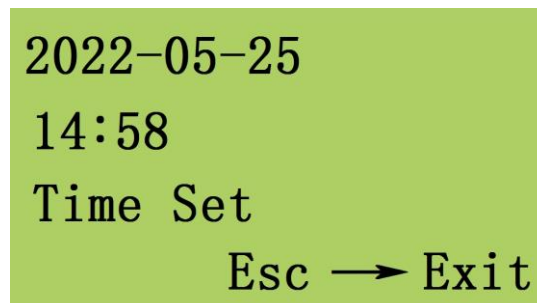


Figure14 Real time setting page

### 2.2 System setting page

After you enter into the system setting menu page, press the two keys “▲, ▼” can change for the up and down item shifting.

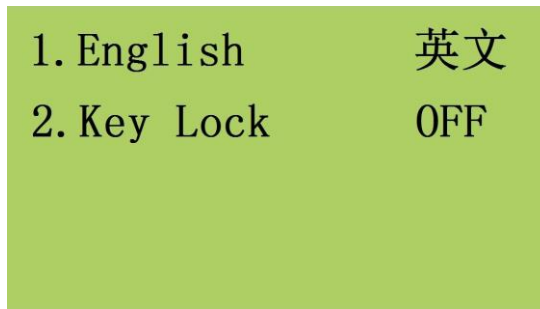


Figure15 system parameter setting page

1) The cursor is flashing in the “1. CHINESE 中文” item, shows that we can choose according to the language, press “+, -”, then we can select the system's language between Chinese and English.

2) The cursor is flashing in the “2.key lock” item, shows that we can lock the keyboard now, pressing the key “+, -” to select “ON” or “OFF”. “ON” means the keyboard is locked.

### 2.3 Function setting page

After entering function setting menu, press “▲, ▼” can change for the up and down item shifting.

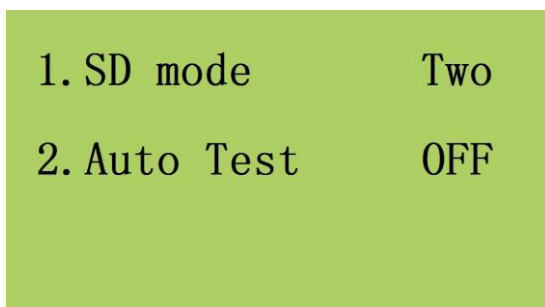


Figure16a function parameter page

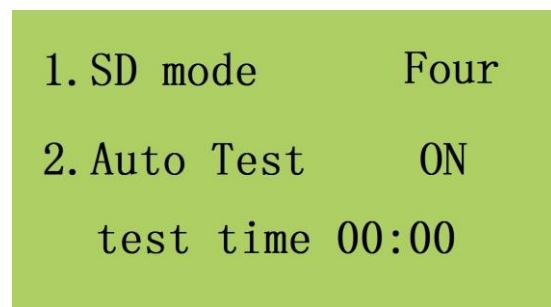


Figure16b function parameter page

1) The cursor flashes in the “1. SD mode” line, indicating that you can press “◀, ▶” The key switches the detection mode of the spark detector. The device supports the two spark detector and four spark detector detection modes. In four probe mode, SD3 and SD4 do not have spark simulation test.

2) When the cursor is flashing in the “3.Auto Test” item, shows that we can press the key “+, -” to enable or disable the “Auto Test”. When the “Auto Test” shows “ON” (refer to Figure 11b) , there will be an order as “Test Time 00:00” appeared at the bottom of the page .You can use the key “▲, ▼” to shift the flashing items. Press “+,-” in a 24-hour time automatically test time settings. If the auto test function is enable, the spark sensor will be tested at the specified time everyday.



## 2.4 History page

In the parameter setting page, when the cursor flashes at “4. History” item, you can press the key “功能”, then enter into the History inquiring page. Search the fire alarm record by pressing the key “+, -”.

Date	Time
22-04-09	15:14
Count Alarm:	05
SD: 1	→

Figure14. history record

“22 -04 -09 15: 14”: records the time of the fire alarm , “Count Alarm:05” means there is fire alarm in No.5, “SD:1” means the No.1 spark sensor alarm. Press the key “-”, you can turn to the previous fire alarm history.

## 2.5 Communication setting page

There is a RS-485 communication interface on the control board.(as shown in figure6.)

When the cursor flashes in NO.5 “5.com set” item in parameter setting menu, you can enter into to the Communication setting page by press “功能”.

1. Com. addss	01
2. Baudrate	9600
3. Modbus network	
	(8, N, 2 RTU)

Figure15. communication setting page

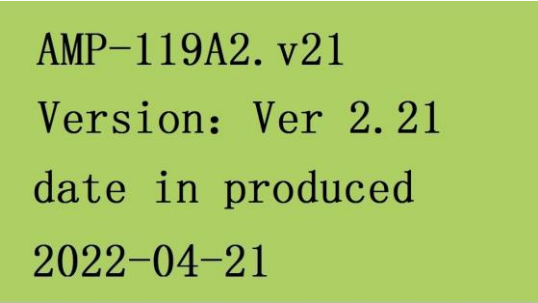
1) Press “+, -” can select the communication address which can be set from No1 to No.32. The default communication address is 1.

2) RS-485 can be set up to communicate on Modbus networks,the baud rate can be selected between 9600bit/s, 19200bit/s, and 38400bit/s. The initial setting is 9600bit/s. The communication protocol uses Modbus RTU mode, protocol <8, N, 2 , RTU>.



## 2.6 About machine page

When the cursor flashes in NO.6 “6. About Machine” item in parameter setting menu, you can enter into to the About machine page by press “功能” get the equipment model, production date and version information.



```

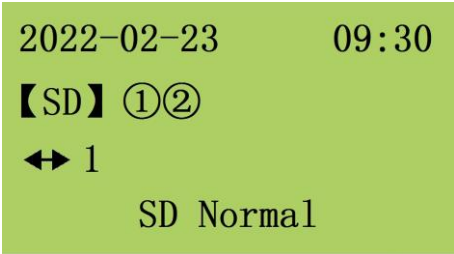
AMP-119A2. v21
Version: Ver 2.21
date in produced
2022-04-21
  
```

Figure16. about machine page

## 3. The fire alarm simulation test and usage maintenance

a. The reason of fire alarm must be found and then reuse the relevant equipment when the fire alarm happens. The relevant equipment still must stop for half an hour when come into spark that emerge of itself and perish of itself, make sure there is no hazard then start production line.

b. AMP-119A3 has the function of spark simulation test, press the “Function test” and enter into spark simulation test (as shown in chapter 3 2.3). Users also can press “清零” button for 3 seconds and the spark simulation test will be on automatically. If the result of spark sensor is good, the display page is shown in figure17.a, otherwise the display page is shown in figure17.b. Press the key “消警” to eliminate the faulty alarm.



```

2022-02-23      09:30
【SD】 ①②
↔ 1
SD Normal
  
```

Figure17 normal page of testing spark sensor

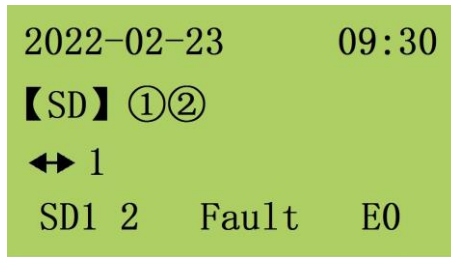


Figure17.b fault page of testing spark sensor

c. A movable window is opened on the pipe beside the spark sensor. Flash the spark sensor through the small window with a flashlight, and the equipment can generate normal action (because the tungsten wire in the small flashlight bead is a heating element and contains infrared ray). In case of audible and visual alarm during action, it is necessary to manually press the alarm button to clear the alarm.

d. We suggest that users need to conduct manual inspection at least once every two weeks, including the function inspection of spark sensors and the inspection of actuator action time.

e. The dust and fibres on the surface of lens in spark detectors must be regularly checked and cleaned.

f. The hanging flowers between the flap and the cavity wall must be cleaned regularly to prevent the fire exhaust mechanism flap from acting untimely. It is recommended to clean it once a month.

## D. Communication

### 1. Communication baud rate and address setting

Parameter	Setting range	Default value
Baud rate	b1 (9600bit/s) b2 (19200 bit/s) b3 (38400 bit/s)	b1, 9600
Communication address	d1~d32	d1

Table2. communication parameter setting

**Note: The default baudrate is 9600, communication address is 1.**

## 2. Communication protocol

### 2.1 Communication format

11-bit character frame ( 8,N,2 for RTU )

Start bit	0	1	2	3	4	5	6	7	Stop bit	Stop bit
-----------	---	---	---	---	---	---	---	---	----------	----------

### 2.2 Communication protocol RTU mode

START	Keep no input signal greater than or equal to 10ms
address	Communication address
Function	Function code
DATA ( n-1 )	Contents of data : n×8-bit data
.....	
DATA 0	
CRC CHK Low	CRC check sum 16-bit CRC check code consists of two 8-bit combinations
CRC CHK High	
END	Keep no input signal greater than or equal to 10ms

### 2.3 Local communication protocol parameters address definition

a) function code 03, 06

Register data read write (function code 03, 06)	0001H	Status register
	0002H	Fault spark detector No
	0003H	Alarm spark detector No
	0004H	---
	0005H	Communication address R/W
	0006H	Baud rate R/W
	0007H	Hardware version

b) function code 05

Coil data write (function code 05)	Bit1	---
	Bit2	---
	Bit3	---
	Bit4	---
	Bit9	Fire alarm
	Bit10	---
	Bit11	Spark detector test

Force coil bit 9 to ON state

Function: Reset fire alarm/ Reset part of the fault alarm content

Force coil bit 11 to ON state

Function: The function of spark detector simulation test

## E. Troubleshooting

In the below table, common faults and elimination methods during debugging or normal operation are listed. If faults still fail to be eliminated after referring to the below table, please contact after-sale service department of Jiangsu Ampe or visit our website to acquire relevant technical support and services.

Incident	Cause	Location to Check	Troubleshooting
*Red led is not on *Green led is not on *LCD has no displays	*Power circuit. *Plug behind the display panel loses. *Damage of the main board	*The AC220V of power supply is normal or not. *The plug connected to the display panel was going flexible or not *Check the main board	*Ensure reliable AC220V power supply *Reinsert the plug *Replace the main board
The fire alarm sounded frequently without any fire. False Alarm?	* The sunlight reflected to the detecting area *one of the detectors is damaged	*Check the detecting area *spark detectors	*Avoid the sunlight reflected to the detecting area *Replace the damaged spark detector
There is output voltage but the diverting valve didn't act	Check pneumatic parts and the flap of the automatic divert sparks unit is OK	*Check the pressure of pressurized air for normal. *The electromagnetic valve and the cylinder acts for normally *Check the movable flap of the actuator for stuck	*Return the pressure of pressurized air to normal *Change the pneumatic parts *Clean and adjust the pneumatic three-way diverting valve
Spark detector test does not work	*There is no spark detector *There is a fault with spark detector	*Check cable between SD and control board *Check the spark detector	*Install the spark detector *Replace the spark detector



**安普科技有限公司**  
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