



AMP-119A3
SPARK DIVERTER
(Version 2.**)

USER MANUAL

AMPE TECHNOLOGY CO.,LTD

www.ampecn.com

P r e f a c e

Thanks for choosing AMPE's high-performances metal and spark diverter AMP series. The AMP series are manufactured with high-quality components and materials and incorporates the latest microprocessor technology available. AMPE TECHNOLOGY 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.

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, specifications and components of the product. If it does not conform to your order documents or you have any questions regarding the product, please contact to the dealer or the service office of our company.
3. Amp Technology Co., Ltd. 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 equipment, selection of material, management regulations etc. to assure the safety production.

CAUTION !

1. The power supply must be shut off 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 damaged by the high voltage.
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. Usage and structure characteristic

AMP-119A3 type spark diverter is installed on the pipe of pneumatic transport systems for materials like fibers or tuft. It can detect material mixed with tiny spark, divert the material into collect box and spray it. So that ensure the safety of blowing-carding production line in spinning mills or other fiber processing production lines.

Product function feature

- 1) The control box be installed on the pipe directly which has 3 high sensitivity infrared spark sensor with different wavelength;
- 2) Multi sensors ensure there is no spark detection blind area in dark pipe within 360 degree;
- 3) High performance sensor with infrared narrow band filter ensure there is no wrong spark detection;
- 4) When spark be detected, the fired cotton will be seperated into collector box and extinguished. Double screen ensures the airflow through partition so as to ensure the fired cotton totally into collect box. Meanwhile the screen can prevent the spark entering next procedure;
- 5) Automatic recording the real time when the fire alarm happens;
- 6) Automatic simulation and testing of spark detection system, the spark sensor is tested at the set time. When there is a fault in spark sensor, the horn-strobe alarms immediately;
- 7)Self-monitoring of flap position, self-monitoring of compressed air;
- 8) RS-485 Serial interface, communicate on Modbus networks; it can be connected into AMPE IOT so that realize the remote control function of APP and Wechat.

2. Technical parameter

- 1) sensitivity: detect no less than $\Phi 0.5\text{mm}$ spark;
- 2) Response time: $\leq 100\text{ms}$;
- 3) Power supply: 100-240VAC;
- 4) Pneumatic pressure range: 600~800KPa;
- 5) Alarm sound level: $>90\text{db}$;
- 6) Power dissipation: $<100\text{VA}$;
- 7) Requirement of the environment:
temperature -10°C — 70°C , relative humidity (20-75) %RH

B. ELECTRICAL WIRING AND INSTALLATION

In order to reach the best performance of AMP-119A3 spark diverter, proper electric wiring and installing is the most important approach. Please be sure to read this “User manual” carefully before installation. And the installation environment and conditions for further correct measurement and evaluation.

1. Installation

1.1 The installation of control box

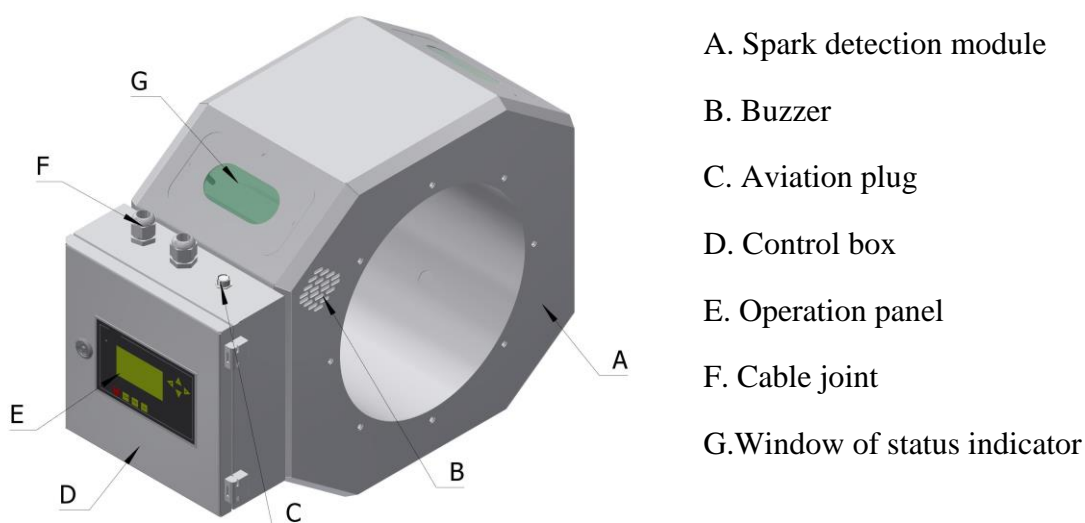


Figure1.a AMP-119A3 spark diverter component

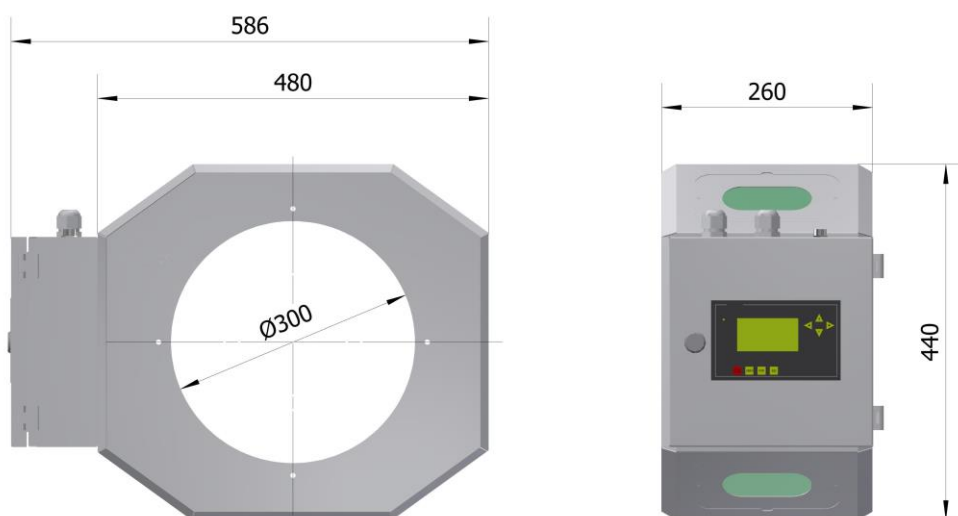
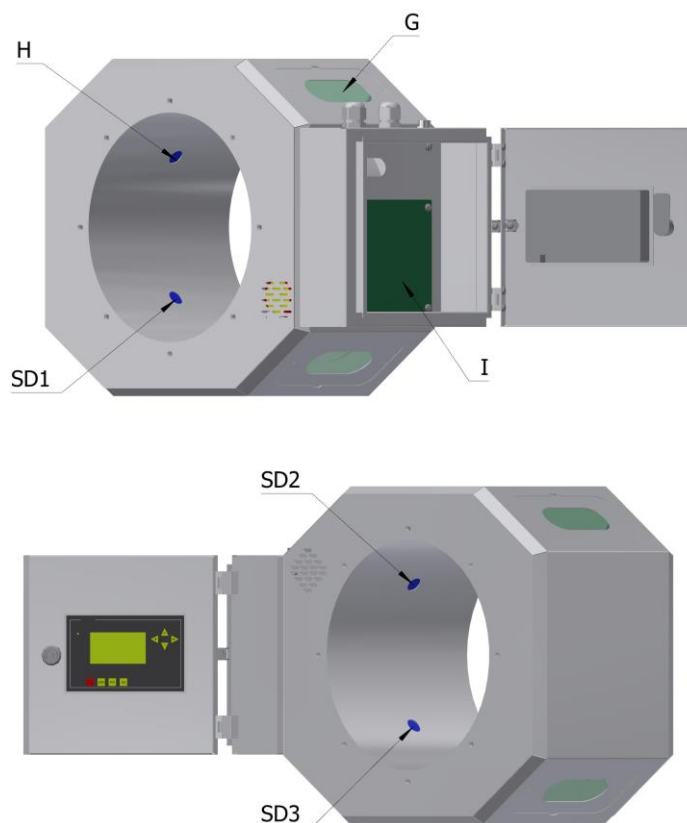


Figure1.b The Dimension of 119A3 spark diverter control box



- G. Window of status indicator H. Spark sensor test light
 I. Main control board SD1. No.1 spark sensor SD2. No.2 spark sensor
 SD3. No.3 spark sensor

Figure1.c Internal component of control box

AMP-119A3 type control box has 3 spark sensors and a self-test sensor. It is installed on the pipe line by flange. The window of status indicator(as shown in figure1.c) shows working status of control box. Green light means that the working status of control box is normal, red light means that there is fire alarm, yellow light means there is fault, white light means that self-test function is running.

1.2 The installation of fire-extinguisher actuator unit

Fire-extinguisher unit consists of fire-extinguisher actuator (as shown in figure3) and collector box(as shown in figure4). Collector box is installed on bottom side of actuator, should ensure there is enough place to open and close the door of collector.

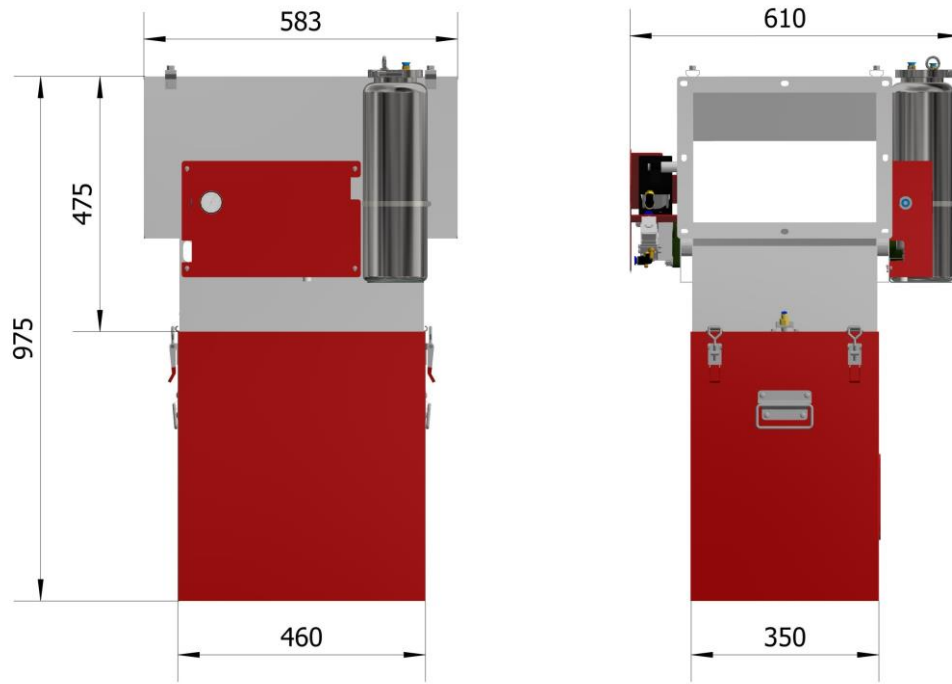
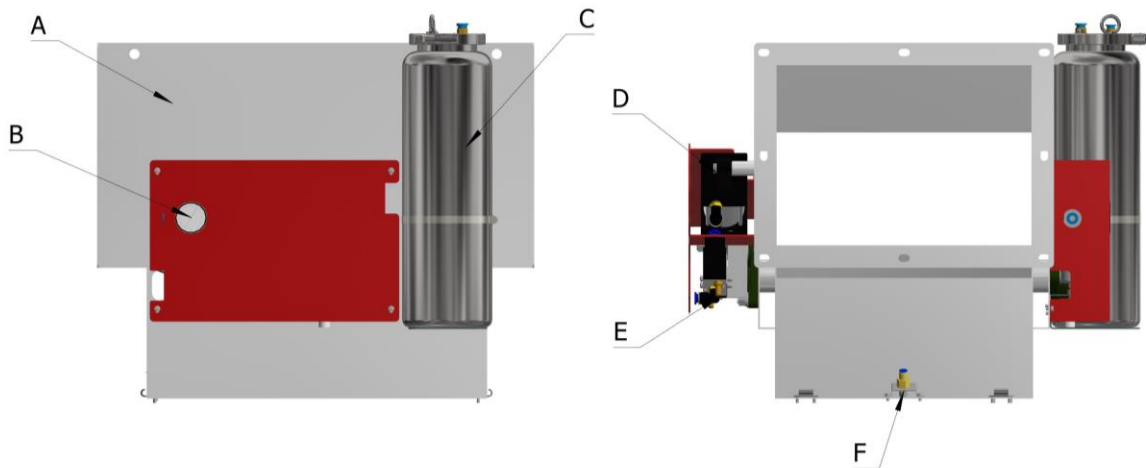
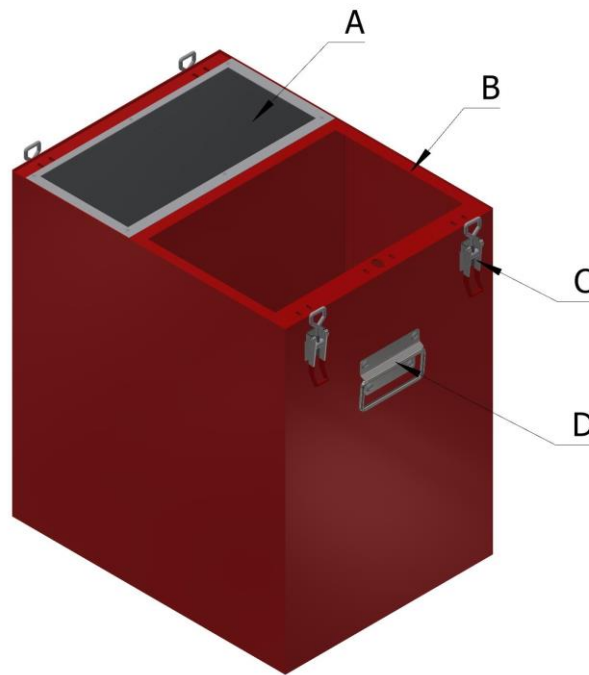


Figure2. Fire-extinguisher actuator dimension



- A. Fire-extinguisher actuator B. Oil water separator C. Water pitcher D. Cylinder
E. Solenoid valve F. Water jet nozzle G. Water spray solenoid valve

Figure3. Fire-extinguisher component



A. Strainer B. Noil barrel C. Buckle D. Handle

Figure4. Collector box component

Fire-extinguisher actuator is connected to cotton pipe by square-to-circle pipe, it is installed by using metal hanger. The installation direction refers to the direction of arrow. The fire-extinguisher actuator is fast reaction pneumatic mechanism so that stable and clean 600~800Kpa compressed air is needed.

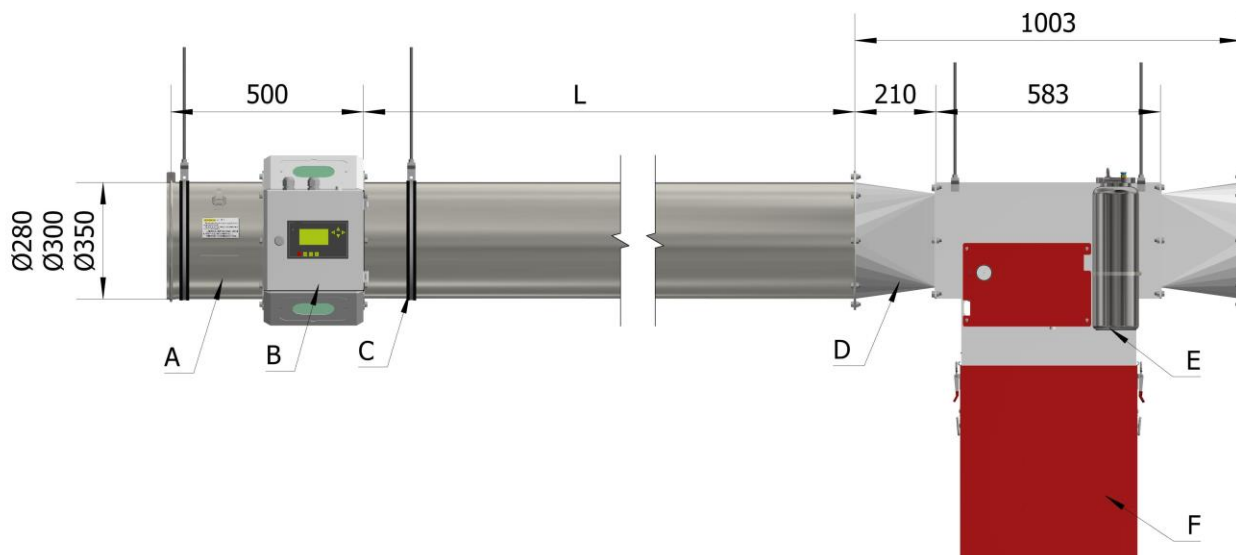


WARNING

When workers clean collector box, must pay attention to the danger of falling heavy material.

1.3 Standard installation

Please refer to figure.5 before installing the AMP-119A3. All required accessories are complete.



- A. Observation window B. Control box C. Clamp D. Square to circle
 E. Fire-extinguisher actuator E. Collector box

Figure5. The standard installation of AMP-119A3 spark diverter

ATTENTION

1. Please read the manual carefully before installing. The distance between spark detection control box and fire-extinguisher actuator is more than 2.5m. Wind velocity must be taken into consideration when there is a bend pipe in pipeline, or there is shorter installation distance. The best position should be determined by experiment. The detection area should avoid direct sunlight or reflection in case of wrong alarm.

2. When alarm happens, the power supply must not be cut off.

3. Use live and neutral from power distribution cabinet in the workshop, do not use AC 220V power from AC380V/AC220V control transformer in the electrical control cabinet.

2. Internal wiring of control box

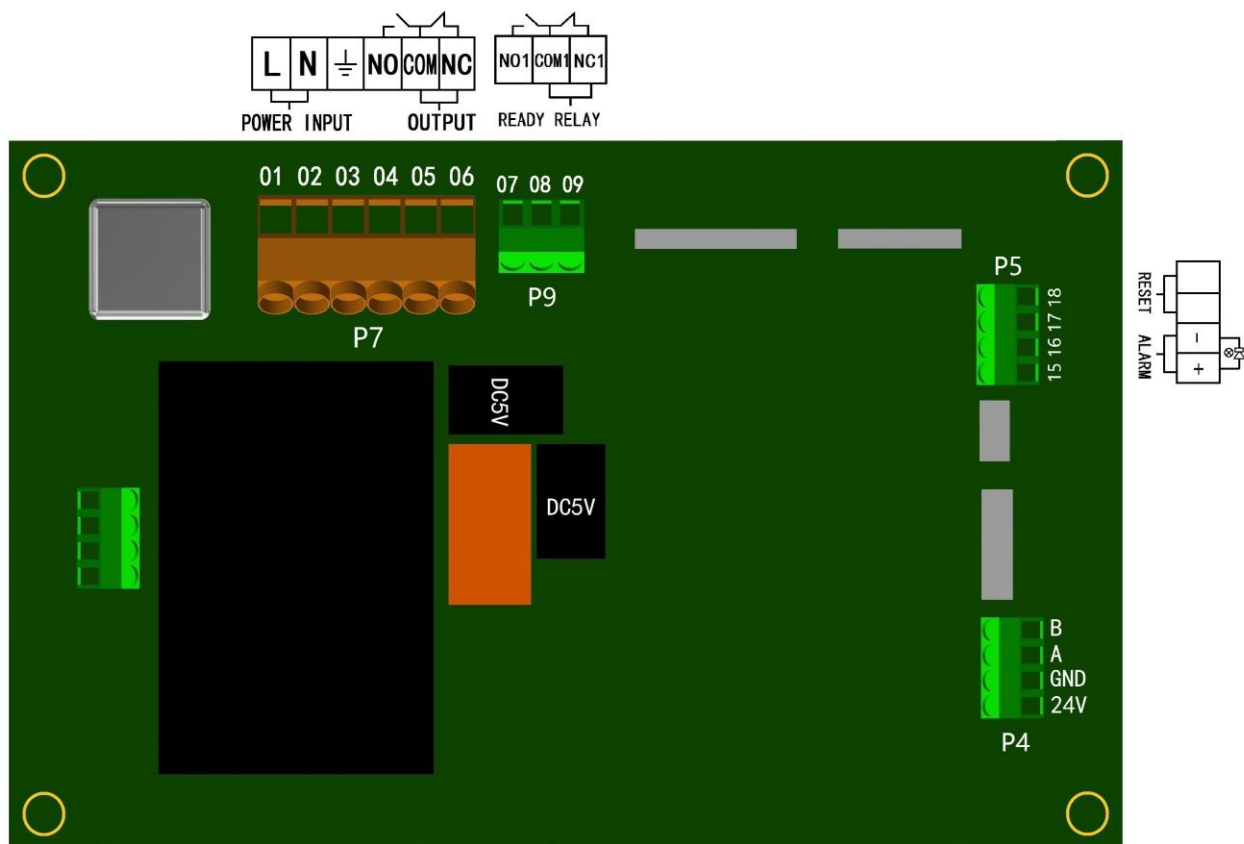


Figure6. Main connecting terminal

2.1 Control box power and interlock signal terminal P7

- a. Terminal 01 and 02 of P7 are power input, terminal 03 is ground electrode.

⚠ CAUTION

1. The power supply should be avoided being cut off when spark alarm stopping happens;
2. The power supply wiring should come from power distribution cabinet in the workshop, do not use AC 220V from control transformer of the electrical control cabinet. We shall avoid the share of power supply with other equipment that may produce interference radiation, such as high-power inverter and motor's frequent start-stop. Please provide separate power supply if possible.

- b. Terminal 04 “NO”, 05 “COM” and 06 “NC” are a group of passive relay contact output. The relevant equipment can be shut off when spark alarm happens.

2.2 Electrical wiring of P9 terminal

Terminal 07, 08 and 09 are passive relay contact output. It detects the performance of this equipment, the relay contact works if there is a fault.

2.3 Electrical wiring of P5 terminal

a. Terminal 15 and 16 are connected to sound alarm signal, terminal 15 is connected to positive pole, terminal 16 is connected to negative pole.

b. Terminal 17 and 18 are connected with external alarm elimination keys.

2.4 Electrical wiring of P4 terminal

P4 is the RS485 communication interface.

2.5 Grounding and safety

a. All the units must be grounded directly to a common ground terminal according to the safety standard of local government.

b. This equipment needs to be separately grounded and it is prohibited to be grounded together with others. It is suggested that the grounded wire be as short as possible.

c. While overhauling, please first shut down the power supply and interrupt the compressed air supply.

d. Ensure the safety of personnel when testing the turning action of the actuator.

C. DEBUGGING AND MAINTENANCE

1. Operation panel display and function description

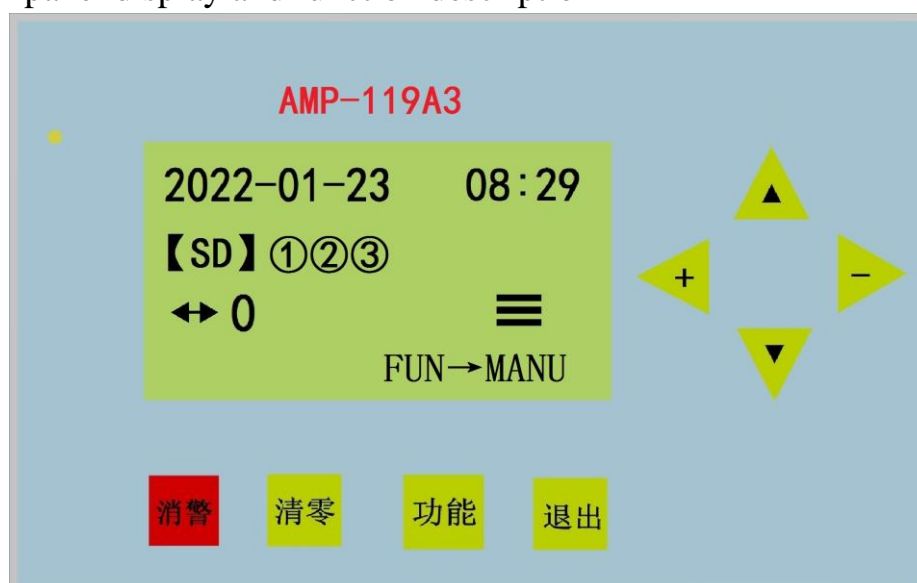


Figure7. Operation panel and main working page

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	Function or meaning
1	2022-01-23 08:29	08:29, January 23, 2022
2	≡	“≡” means the water spray function of fire-extinguisher actuator is off, “ ” means the water spray function of fire-extinguisher is on.
3	↔ 0	The alarm times is 0.
4	[SD] ①②③	The normal working status of spark sensor: “[SD] ①②③”
5	FUN→MENU	The main working page can be changed to parameter setting menu page by pressing “功能” key. The icon “FUN→MENU” turns to "locked" when the keyboard is locked.

Table1. Operation panel description

1.2 LCD displays content when spark alarm happens

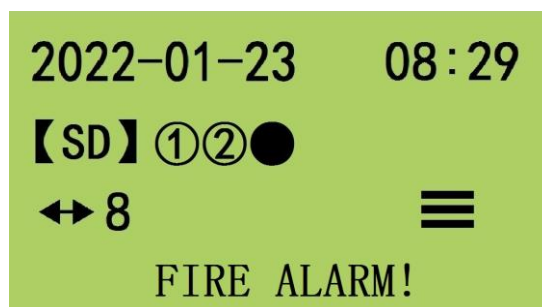


Figure8. LCD displays content when spark alarm happens

The alarm sounds intermittently, the indicator status light of control box turns to red. The alarm page is shown in figure8. 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.

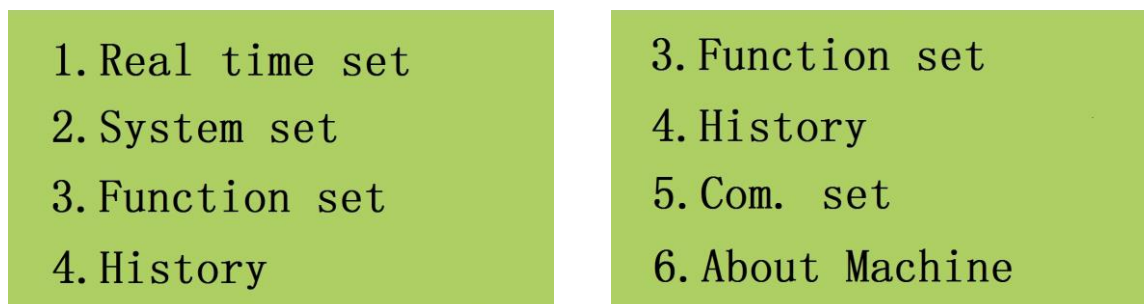


Figure9. Parameter setting page

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.

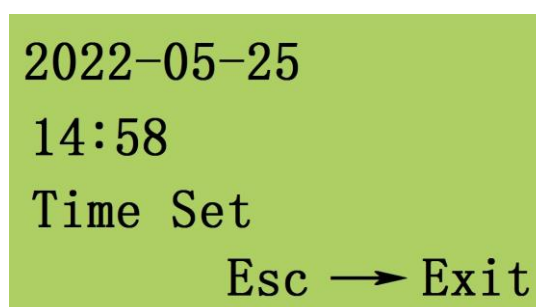


Figure10. Real time setting page

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.

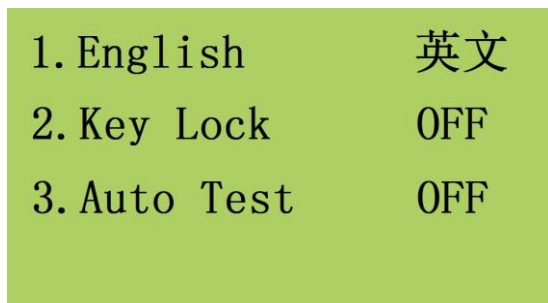


Figure11.a system parameter setting page

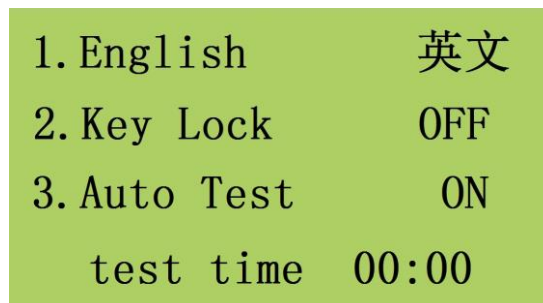


Figure11.b system parameter setting page

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.

3) 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.

2.3 Fuction setting page

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

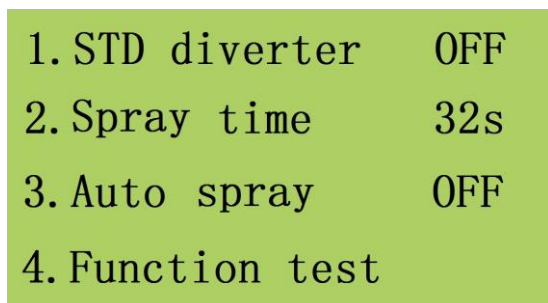


Figure12.a function parameter page

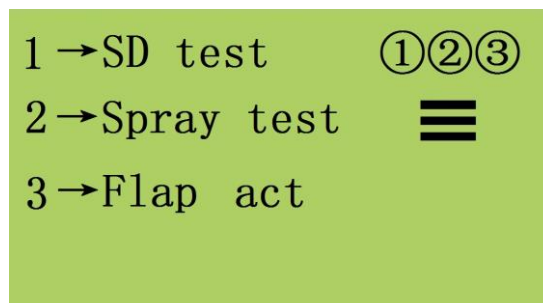


Figure12.b function parameter page

1) The cursor is flashing in the “1.STD diverter” item, shows that press the key “+, -” to select “ON” or “OFF” to turn the fault alarm function of auto fire-extinguisher actuator on or off.

2) The cursor is flashing in the “2.Spray time” item, set the spray time of fire-tinguisher actuator by pressing the key “+, -”. The range of spray time is from 10s to 90s.

3) The cursor is flashing in the “3.Auto spray” item, turn the function of spray on or off by pressing the key “+, -”.

4) The cursor is flashing in the “4.Function test” item, enter into function test page by pressing the key “功能”. Shift the location of cursor up and down by pressing the key “▲, ▼”, enter into test page by pressing the key “-”.

“SD test ①②③” means that test the self-test function of spark sensor, enter into spark sensor page by pressing the key “-”.

“Spray test” means that test the water spray function of fire-extinguisher actuator, inching water spray test is on by short pressing the key “-”, successive water spray test is on by long pressing the key “-”.

“Flap act” means that test the flap of fire-extinguisher actuator, when the function of “STD diverter” is ON, if the flap is test OK, it displays flap act time; if the flap is test exception, it display “Flap Fault”.

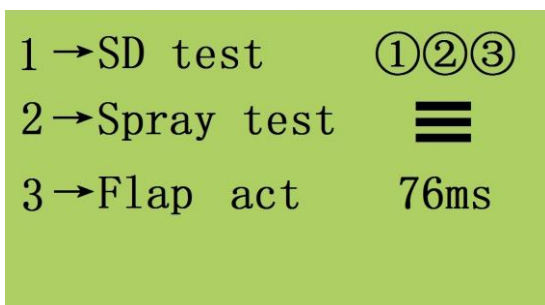


Figure13.a flap act normal page

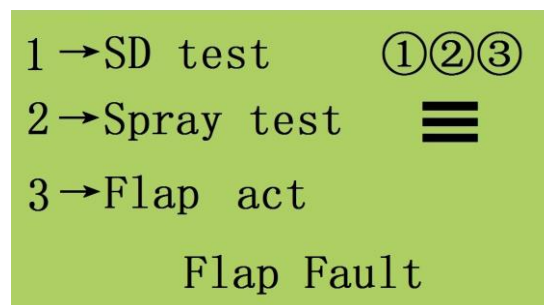


Figure13.b flap act fault page

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	→

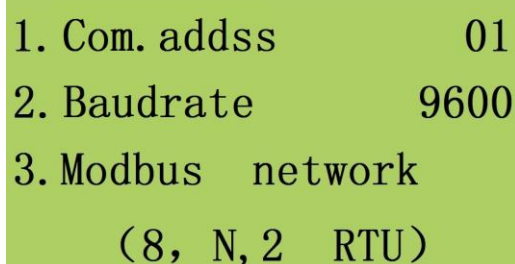
Figure14. history record

“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

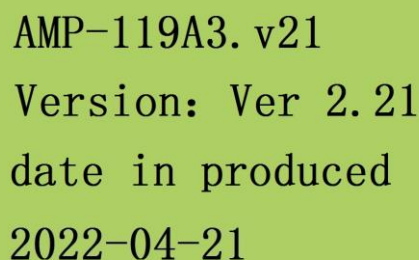
1) Press “+, -” can select the communication address which can be set from No1 to No.32.

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-119A3. v21
Version: Ver 2.21
date in produced
2022-04-21

```

Figure16. about machine page

3. Fire simulation experiment and 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. The working status indicator turns to white when under the condition of spark simulation test. If the result of spark sensor is good, the display page is shown in figure 17.a, otherwise the display page is shown in figure 17.b and working status indicator turns to yellow. Press the key “消警” to eliminate the faulty alarm.

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.

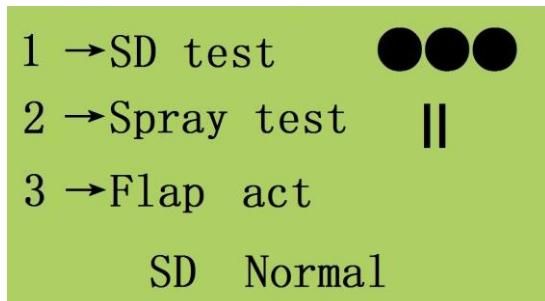


Figure 17.a normal page of testing spark sensor

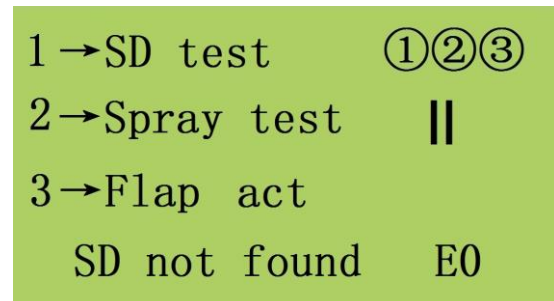


Figure 17.b fault page of testing spark sensor

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.

4. Fault display description

◆ E5

Flap fault: The flap is not at proper position when it's working.

Check whether the flap had been jammed in the abnormal position.

◆ E6

Pressure low: the pressure of compressed air is too low.

- 1) Check whether the compressed air was supplied normally, or in the demand range.
- 2) Check whether the pressure switch is working and if necessary check the wiring of the pressure switch.

◆ E7

Water lv low E7 : Water level monitoring

- 1) Check whether the water is shortage;
- 2) Check whether the water level sensor is broken

◆ E10

SD1 fault

- 1) SD1 is not installed
- 2) The sensitivity of SD1 is too low.

◆ E11

SD2 fault

- 1) SD2 is not installed
- 2) The sensitivity of SD2 is too low.

◆ E12

SD3 fault

- 1) SD3 is not installed
- 2) The sensitivity of SD3 is too low.

D. COMMUNICATION

1. Communication baud rate and address setting

parameter	setting range	default setting
baud rate	b1 (9600bit/s) b2 (19200 bit/s) b3 (38400 bit/s)	b1, 9600
communication address	d1~d32	d1

Table3. communication parameter setting

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

2. Communication protocol parameter

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	Working status
	0002H	Spark alarm counts
	0003H	Code of alarm spark sensor
	0004H	Water spraying time
	0005H	Communication address R/W

	0006H	Baud rate R/W
	0007H	Version
	0008H	Code of faulty spark sensor

b) function code 05

Coil data write (function code 05)	Bit1	——
	Bit2	——
	Bit3	——
	Bit4	——
	Bit9	Reset alarm
	Bit10	——
	Bit11	Spark 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: spark simulation test

E. TROUBLESHOOTING

The following table lists some common faults and troubleshooting methods during debugging or use. If you still can't solve the problem according to the table below, you can call amp services for technical support and service.

Trouble phenomenon	The cause of the trouble	Location to check	Troubleshooting and adjustment
LCD has no display	<ol style="list-style-type: none"> 1.Power circuit 2.Damage of the main-board 3.Plug behind the display panel loses. 	<ol style="list-style-type: none"> 1.The inner patch panel of the control box, the AC voltage connected from the power supply (2、3connectors) 2.Check if the plug connected to the display panel has become flexible 	<ol style="list-style-type: none"> 1.Reconnect the wire 2.Reinsert the plug 3.Repair or change the main-board
Frequent alarm, many times a day without finding the fire	<ol style="list-style-type: none"> 1. There is sunlight shinning or reflecting into the detecting area. 2.The spark detector may be damaged 3.The main control panel is damaged 	<ol style="list-style-type: none"> 1.Check whether there is sunshine to the detector 2.Check the spark detector inside the control box and find the detector with mistaken fire alarm 3.Check the damage of main control panel 	<ol style="list-style-type: none"> 1.Avoid the direct sunshine to the detector. 2.Change the damaged spark detector 3.Change the damaged main control panel.

There is drive output voltage when alarming, but the fire-extinguisher does not work	Check the pneumatic components and three-way flap mechanism of the fire-extinguisher actuator	<ol style="list-style-type: none"> 1. Check whether the compressed air pressure is normal 2. Check whether the cylinder and solenoid valve are normal 3. check whether the three-way flap mechanism is stuck 	<ol style="list-style-type: none"> 1. Compressed air pressure returns to normal 2. Replace pneumatic components 3. Clean and adjust the three-way flap mechanism
The spark simulation test does not work	<ol style="list-style-type: none"> 1. No spark sensor 2. Faulty spark sensor 3. Broken spark test light 4. Damage of the main-board 	<ol style="list-style-type: none"> 1. Check connection wire between spark sensor and main board 2. Check spark sensor 3. Check power of spark test light 4. Check DC 12V of main board 	<ol style="list-style-type: none"> 1. Install spark sensor 2. Replace spark sensor 3. Replace spark test light 4. Replace main board

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