



AMP-3000V5 type
Metal & spark & heavy metal diverter

User manual

Jiangsu Ampeon Electronic Engineering Co., Ltd

<http://www.ampeon.cn>

Prelude

Thanks for using new models AMP series of high performance metal & spark diverter produced by Jiangsu Ampeon Electronic Engineering Co., Ltd. AMP series products are manufactured with high quality units, materials and with the utilization of latest microcomputer technology. Jiangsu Ampeon Electronic Engineering Co., Ltd. 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 provides cautions about the installing, parameter setting, troubleshooting and daily maintenance of metal & spark diverter to the user. In order to assure the proper installing and usage of the product, please read this manual in detail before installing. Please keep the manual well and give it to the operator of the machine.

Welcome to visit the website of Jiangsu Ampeon Electronic Engineering Co., Ltd. : www.ampeon.cn. The website provides the download of the operation instructions and technical BBS service.

The following are the cautions that need special attention:

▲Caution !

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, please contact to the dealer or the service office of our company.
3. Jiangsu Ampeon Electronic Engineering Co., Ltd. provides services of the three guarantee period 18 months from the delivery date.
4. Troubles due to lightning 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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Contents

A. Overview	1
1. Use and structural characteristics.....	1
2. Explanation of the principle.....	2
2.1 Spark diverter.....	2
2.2 Metal diverter.....	2
2.3 Diverter.....	2
3. External dimensions and names of the parts.....	2
4. Technical parameter.....	4
B. Electric wiring and installing	5
1. Electric wiring diagram.....	5
1.1 Explanation of main terminal-X1 electric wiring.....	5
1.2 The connection of metal diverter's signal cable.....	6
1.3 Earthing and safety.....	7
2. Installing.....	7
2.1 Install requirements.....	7
2.2 The installing of control box.....	9
2.3 The installing of metal detector.....	10
2.4 The installing of diverter.....	11
C. Debugging and usage maintenance	12
1. Indicative and adjustable parameter of the control panel.....	12
1.1 Spark inspection unit AMP-TIME SET.....	13
1.2 Metal diverting unit APU-02.....	15
2. Fire alarm simulation test.....	19
3. Metal diverting function test and adjustment.....	19
D.RS-232 communication	21
1. Function of RS-232 communication connector.....	21
2. Special APU-01 human-machine interface.....	21
E. Troubleshooting	22
F. Appendix	27
Appendix 1:Diagram showing wiring principle of AMP-3000V5 metal, spark & heavy matter diverter.....	27
Appendix 2:Diagram of AMP-3000V5 metal,spark & heavy matter diverter installing.....	28
Appendix 3:The practice of blowing and carding line fire alarm.....	29

A. Overview

1. Use and structural characteristics

AMP-3000V5 type spark & metal & heavy matter diverter using the computer technology control, can detect the metal within flow cotton automatic and act according to the metal size to control the action time of the diverter accurately. Because of using the infrared sensor, the diverter can detect the diameter above 1mm moving spark. Meanwhile running the acoustic-optics alarm, it can drive the diverter to eliminate the embers and stop the fan, and then restore the date and time of alarm. The diverter has the concave shape vane structure, when the flowing cotton with the heavy sundry matter via the scoop channel, it will fall into the trough under the action of gravity, thus enable a row of mixed organization to have the heavy sundry goods separation function.

AMP-3000V5 type metal & spark & heavy matter diverter can be directly installed on the conducting duct of blow room machinery and is an important and necessary machine for safety production. The loss of wind pressure of the cotton flow caused by this product is very less and it is suited to all kinds of positive pressure, negative and positive negative pressure.

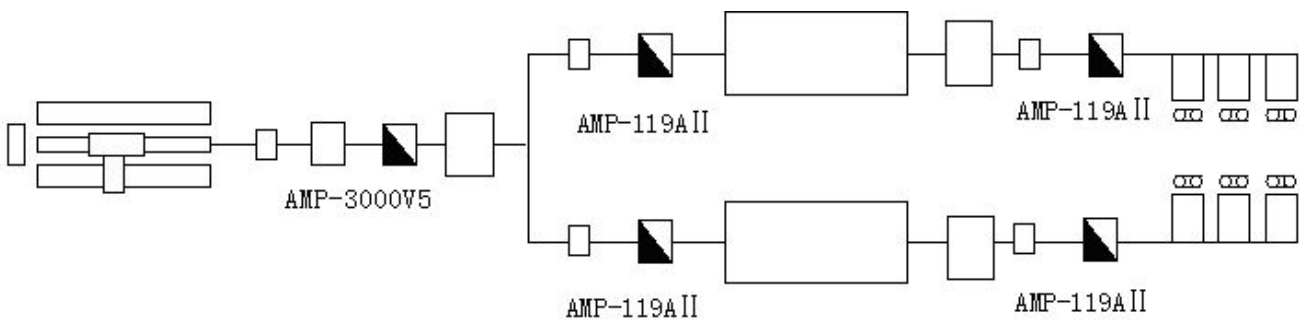


Figure1: Diagram of safety equipment layout in blowing-carding joint production line

2. Explanation of the principle

2.1 Spark diverter

When the beater of a bale plucker strikes metal material or the spindle end of the beater is tangled with fiber, spark may be caused, the spark can mix in the fiber and move in the conducting duct under the action of the wind. When the cotton fiber mixed with sparkle moves through the high sensitive infrared probe detecting area, the controlling program will immediately make the fire alarm with sound and light. Furthermore, while stopping the running of related equipments such as blower fan etc., the cotton flow with sparkle and combusting scraps are discharged into collect box to assure that the sparkle will not enter the next procedure and eliminate the hidden trouble of fire.

2.2 Metal diverter

In cotton wool, there are generally metal sundries such as iron wire scraps, screw, washer, metal reed etc. While mixing with fibers, they are transported through the detecting area of metal probe, the metal probe circuit will drive the diverter after distinguishing and discharge the cotton flow with sundries into the collect box to prevent the metal sundries from entering the blower equipments in the next procedure to cause the hidden trouble of fire and the damage of machinery such as carding cloth.

2.3 Diverter

Executing structure is composed of A301 type rapid diverter and collect box. A301diverter utilizes three-way air rocking plate type valve structure and has rapid response speed and small wind pressure loss. The diverter has the concave shape vane structure, when the flowing cotton with the heavy sundry matter via the scoop channel, it will fall into the trough under the action of gravity, thus enable a row of mixed organization to have the heavy sundry goods separation function. In the procedure of both positive and negative pressure, this diverter executive structure can work effectively and it is applicable in the parallel use of reciprocate bale plucker and disc bale plucker.

3. External dimensions and names of the parts

This equipment is mainly composed of three parts: spark detection control

box(figure2), metal detector(figure3) and diverter(figure4).

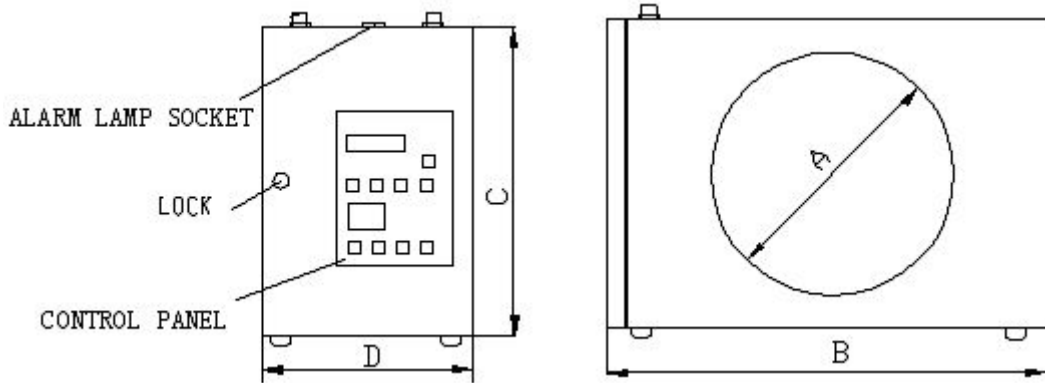


Figure 2:Diagram of the control box

Type	Remark	A (mm)	B (mm)	C (mm)	D (mm)	Weight (KG)
300	Applicable to ϕ 300mm pipe	300	560	380	260	19
350	Applicable to ϕ 350mm pipe	350	600	430	260	21

Table 1:Dimension table of control box

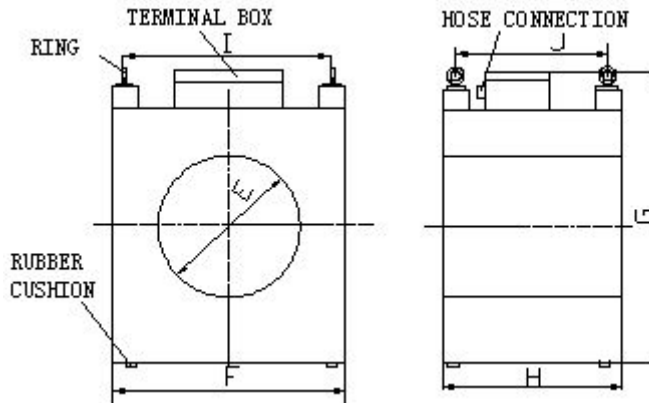


Figure 3:Diagram of the metal detector

Type	Remark	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	Weight (KG)
<u>300</u>	Applicable to ϕ 300mm pipe	325	540	620	415	310	355	45
<u>350</u>	Applicable to ϕ 350mm pipe	380	580	660	415	335	350	47

Table 2:Dimension table of detector

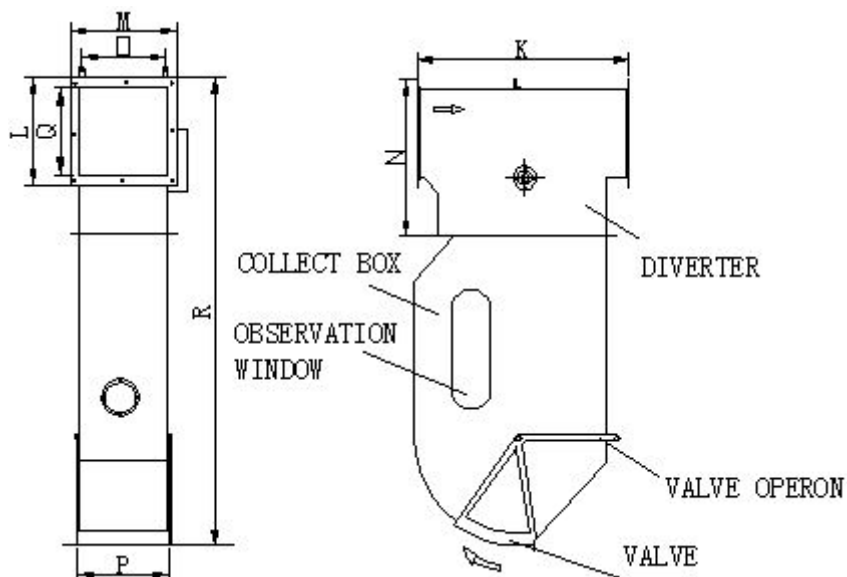


Figure 4:Diagram of the diverter

Type	Remark	K (mm)	L (mm)	M (mm)	N (mm)	Q (mm)	P (mm)	Q (mm)	R (mm)	Weight (KG)
<u>300</u>	Applicable to $\phi 300\text{mm}$ and $\phi 350\text{mm}$ pipe	605	355	355	555	295	295	290	1530	66
<u>350</u>										

Table 3: Dimension of diverter

4. Technical parameter

- a. Sensitivity Metal detection: can detect the steel ball not less than $\Phi 3\text{mm}$
Spark detection: not less than $\Phi 1\text{mm}$ spark (visual angle not less than 90 degree)
- b. Response time: $\leq 0.2\text{second}$
- c. Power supply: $\text{AC}220\text{V} \pm 10\%$,50Hz (Electromagnetic interference conforms to related standard of our country)
- d. pressure range: $6 \sim 8\text{kgf/cm}^2$
- e. Sound level of alar: $> 120\text{db}$
- f. Power: $< 100\text{VA}$
- g. Relay contact output: $10\text{A}/240\text{VAC}/28\text{VDC}$
- h. Requirement of the environment: temperature $-10\text{ }^\circ\text{C} \sim -40\text{ }^\circ\text{C}$,relative humidity $(20-75)\%RH$

B. Electric wiring and installing

In order to reach the best performance of AMP-3000V5 type metal & spark diverter, proper electric wiring and installing is the most important approach. Before the installing, please read the following carefully and make further measurement and evaluation properly with respect to installing environment and condition on the site.

1. Electric wiring diagram

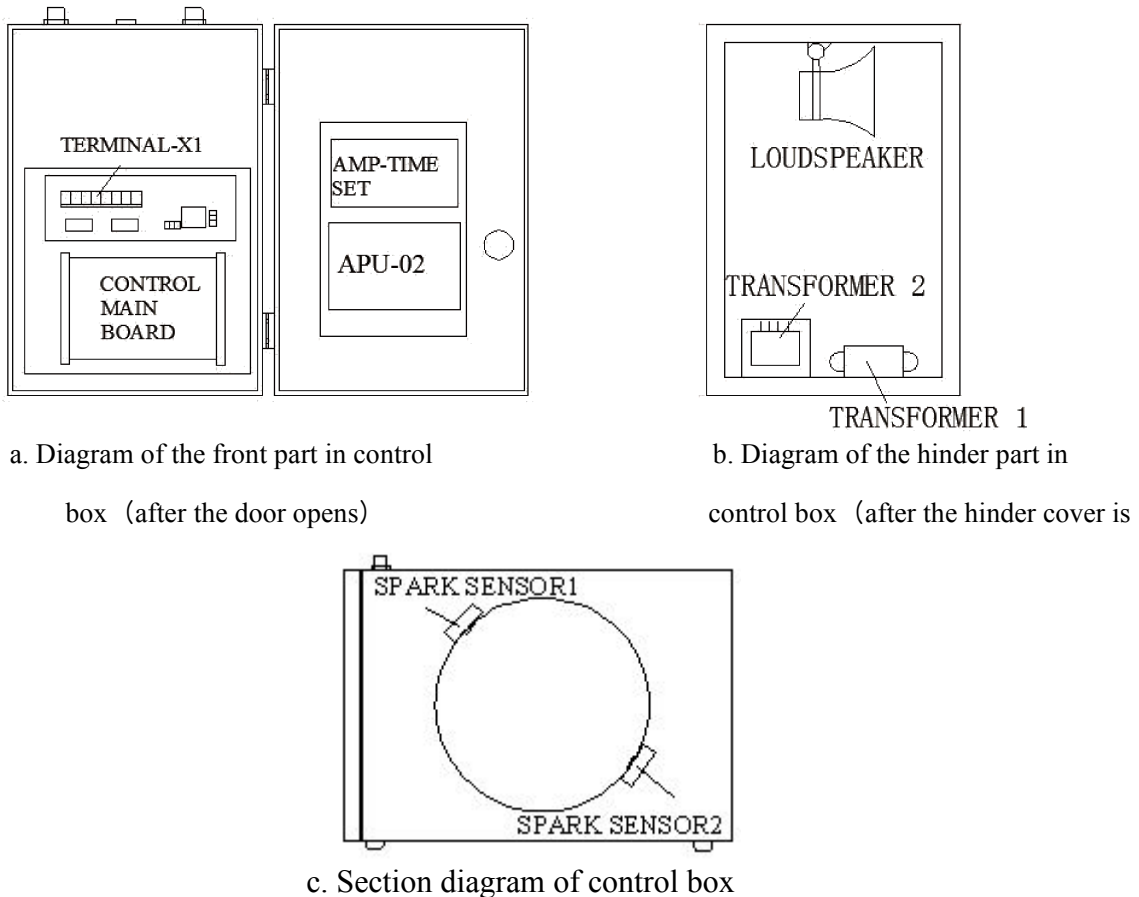


Figure 5:Diagram of the inner units in control box

1.1 Explanation of main terminal-X1 electric wiring

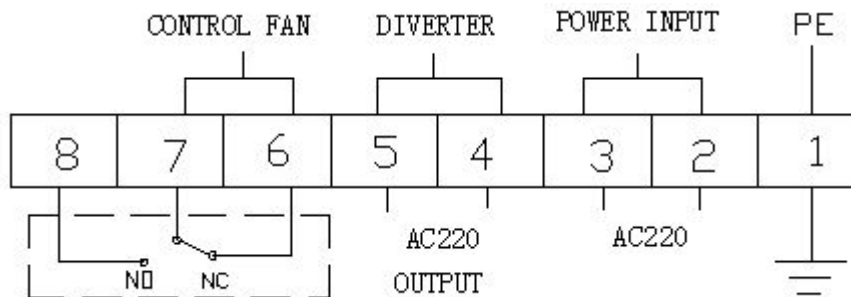


Figure 6:Diagram of the main terminal-X1 wiring

a. 2# and 3# connector are the incoming line of power supply AC220V. We should avoid the share of power supply with other equipment that may produce interference radiation. If it is possible, please supply the electricity separately. It is necessary to pay special attention to avoid the phenomenon that on the time of spark alarm stopping, the power supply of instrument itself cannot be shut down. As the equipment is installed to the metal pipe, it is recommended that you use the wire over RVV 1.0mm².

b. 4# and 5# connector can output AC220V power supply. It is connected to the solenoid valve coil of correlated diverter. As the equipment is installed to the metal pipe, it is recommended that you use the wire over RVV 1.0mm².

c. 6#,7# connector can provide passive normally closed relay contact and provide the input circuit to PLC in the control box of the control equipment. With this, the system can stop when the fire alarm happens. (If you use 6# and 7# connector's normally closed contacts to connect to related equipment AC circuit, the rapid stopping in case of fire alarm can also be realized.)

▲ Caution !

Through the use of 7# and 8# normally open contacts and with the transformation of intermediate relay, the blower fan contactor can be directly controlled and the rapid stopping in case of fire alarm can be realized(refer to figure 7). Thus But because the AC circuit may affect the normal working of the metal detector, it is not recommended.

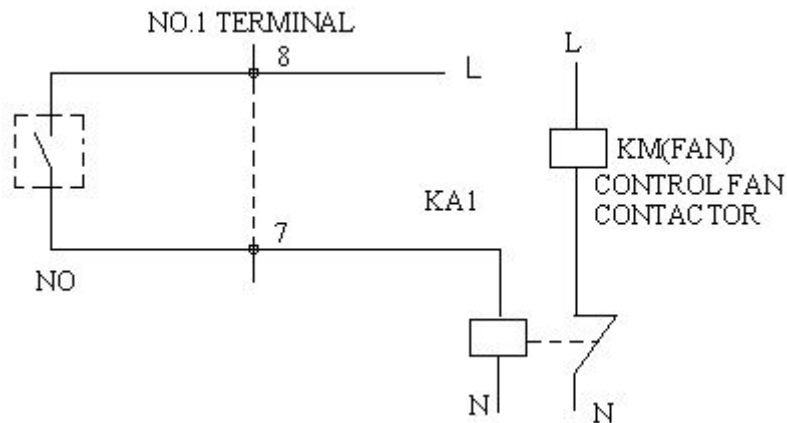


Figure 7:Control the blower fan through the conversion of relay KA1

1.2 The connection of metal diverter's signal cable

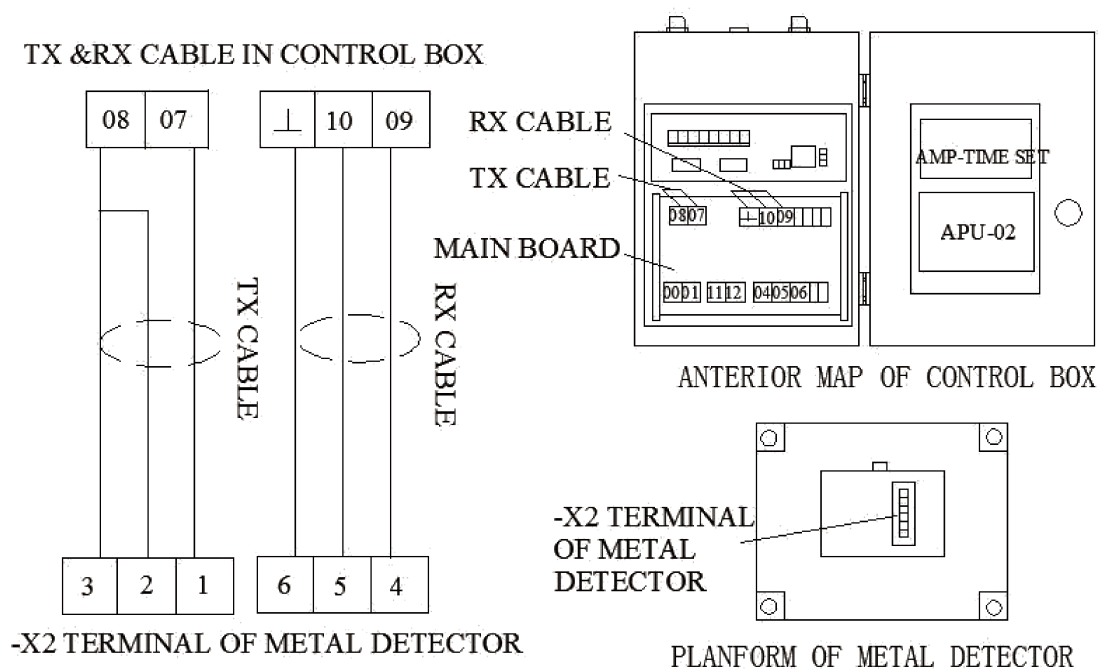


Figure 8: The connection diagram of metal signal cable

1.3 Earthing 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 earthing wire be as short as possible and it is prohibited to earth it together with other equipment.

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

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

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

2. Installing

2.1 Install requirements

The detailed requirements of installing are as follows:

a. Enough length of straight duct must be reserved within the installed route. In the ordinary course of events, if the length of the straight duct is over 4.5m, it can be installed according to figure 9. The metal detector and diverter must be installed to the straight duct (refer to figure 9.a).

b. The control box of AMP-3000V5 diverter should also be installed to the straight duct together with metal detector and diverter because it includes the spark detector. But the limitation of the straight duct's distance, for example straight duct is just about 3m, the control box can be installed to the other side of the bent duct of the wool inlet direction (figure 9.b).

c. If bent pipe is installed between the metal detector and diverter, the diverting rate will not reach the ideal effect (refer to figure 9c). So we don't recommend the installing method of figure 9c.

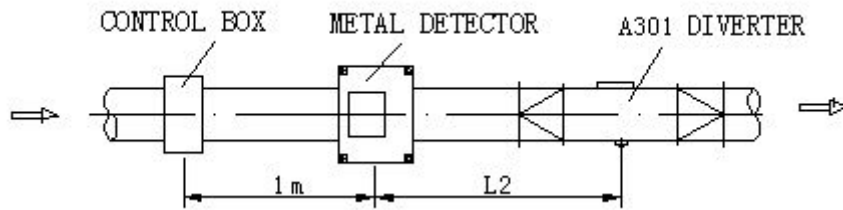


Figure 9.a

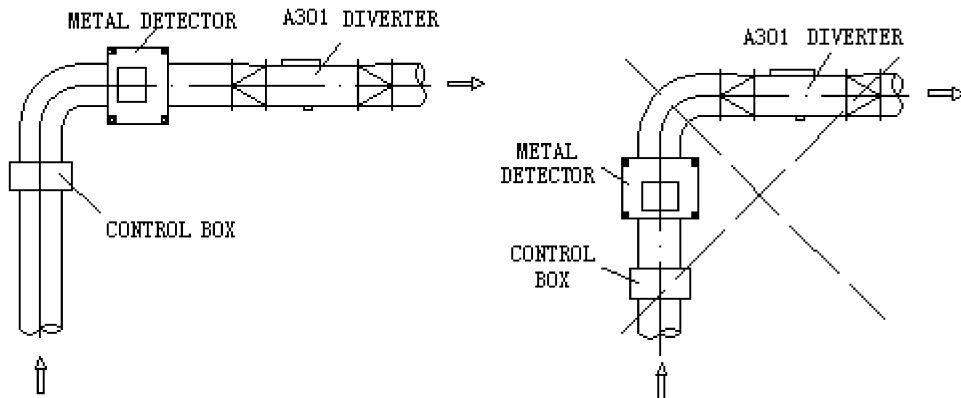


Figure 9.b

Figure 9.c

Figure 9: The diagram of several AMP-2000V5 regular pipes installing (platform)

d. The centre distance of metal detector to the diverter L_2 is the most important parameter that needs to be confirmed during the installing. The determination method in detail is as the following table (table 4). L_2 directly relates to the diverting rate.

e. Before the installing, it is necessary to prepare the metal slingers, metal bracket and wire & cable for the installing.

Air speed v (m/sec)	Install distance "L2" (m)
$v < 10$	3m
$10 < v < 20$	3 m~4.5 m
$v > 20$ (high wind speed)	$\geq 5m$ (Adjust according to the actual situation)

Table 4: The install distance from metal detector to the diverter (center distance)

▲ Caution!

a. During the installing, the center distance between the metal detector and diverter L2 is the most important parameter of the installing process. If the install distance L2 is too long, the metal diverter rate will obviously decrease. The most near distance that satisfies the simulation experiment L2 is most ideal.

b. After finishing the installing, if you can't get ideal diverting effect through the adjustment of parameters in the parameter unit, you must confirm through tests and adjust the L2 distance.

2.2 The installing of control box

a. The control box is directly connected to the pipe. It can be hung to the two sides of the metal pipe connected to it (figure 10.a) and it can also be directly hung to the installing screw in the two sides of the control box (figure 10.b). Or otherwise under the special condition that installed straight pipe distance is limited; the control box can also be horizontally installed to the vertical pipe (figure 10.c).

b. The connecting pipe with observing window is directly connected to the control box (figure 9). The connecting pipe with observing window is designed for the convenience of the test of spark inspection function.

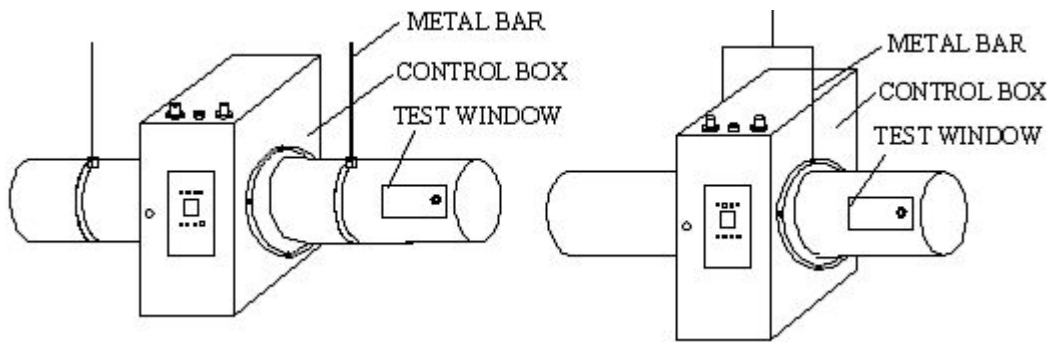


Figure 10.a

Figure 10.b

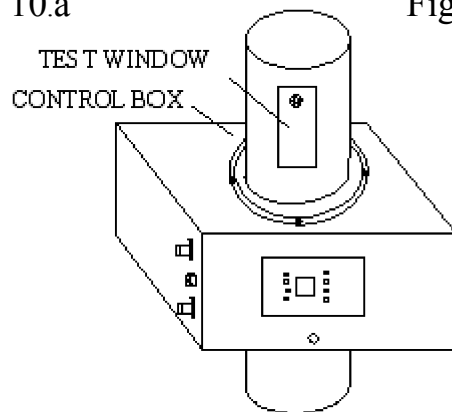


Figure 10.c

Figure 10: Diagram of control box installing

▲ Caution !

The control box installing control panel should face the direction that is easy to operate and control. The foreside and backside should not be close to the wall for the convenience of maintenance and repair. The observing window should also face the direction that is easy to inspect and observe.

2.3 The installing of metal detector

a. Metal detector can be hung by metal bar to get installed. Please refer to figure 11.b. If metal detector is near the wall, it can be installed with metal bracket to support and get installed. Please refer to figure 11.a.

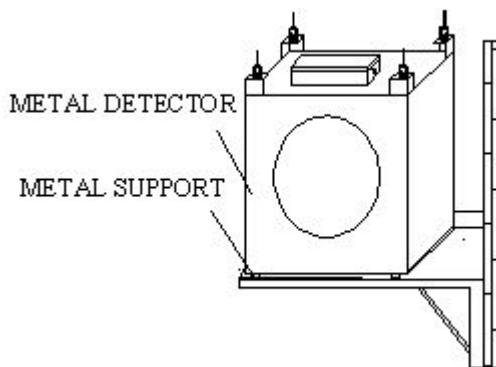


Figure 11.a

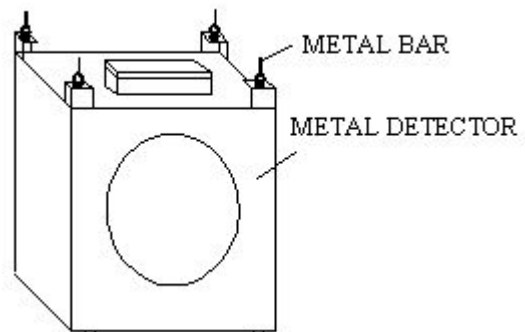


Figure 11.b

b. While installing, don't let metal substance like screw, spanner etc. remain inside the metal detector. These things should be hung or supported by bracket, they should keep an insulation distance to the detector with metal bracket or hanging tool.

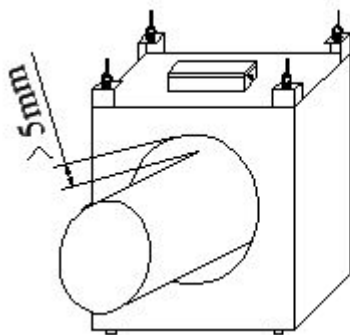


Figure 11.c

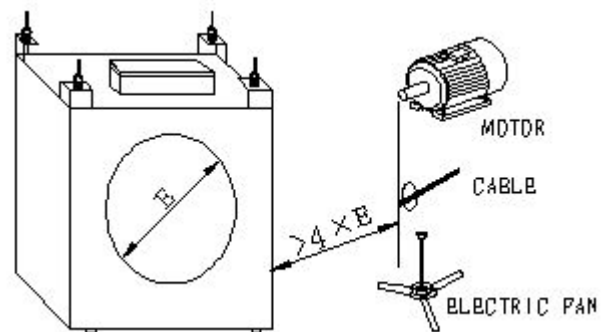


Figure 11.d

c. Metal detector should be firmly installed to avoid misacting when the detector vibrates during usage. The metal detector should be firmly installed to prevent the disoperation caused by the vibration of the detector. The non-metal duct dispatched on delivery go through to the inner cavity of the metal detector and should avoid the

collision, furthermore a distance of 5mm should be maintained with the inner cavity. Please see figure 11.c.

d. Metal detector should be far away from the things that generate the electromagnetic radiation such as electric motor, transformer and fluorescent lamp etc. Furthermore, it should be far away from moving or vibrating metal substance, for example, fan etc. The cables with big current shall also keep a distance from the detector. Please refer to figure 11.d.

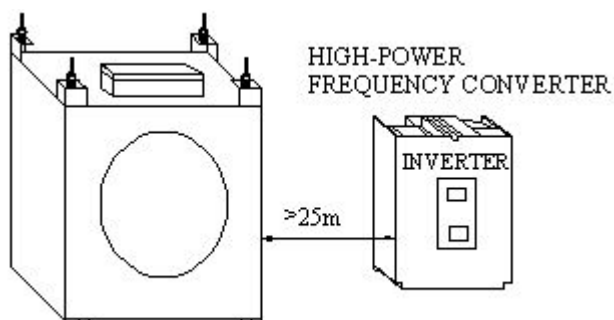


Figure 11.e

e. The location that the metal detector is installed is very sensitive to the electromagnetic interference. For example, in the workshop, there is air conditioner and a big power inverter is used (over 15KW) and it is within 25m. So it may cause the disoperation. So please install RFI filter to the main connecting wire. The nearer the install position to the AC motor driver the better it is. If you adjust the inverter's PWM wave carrying frequency, the interference will relatively decrease. Please see figure 11.e.

2.4 The installing of diverter

The executive structure is composed of two parts: diverter and collect box(refer to figure 12). The collect box is installed under the diverter and be careful not to reversely installed and assure that the collect valve can act flexibly.

The diverter is connected with square joint pipe to the conduct duct. The install method is the use of hanger. Please pay attention to the direction of cotton incoming and output. The diverter utilizes rapid response gas driving structure, so it is necessary to provide clean and stable 6-8kgf/cm² gas supply.

The collect box has wool dropping control valve, if the diverter is installed to the high place, you can tie ropes to the handle of the door. As for the install position, you

should avoid the problem that wool containing sundries dropped to the wool bag or other machines when the collect door opens.

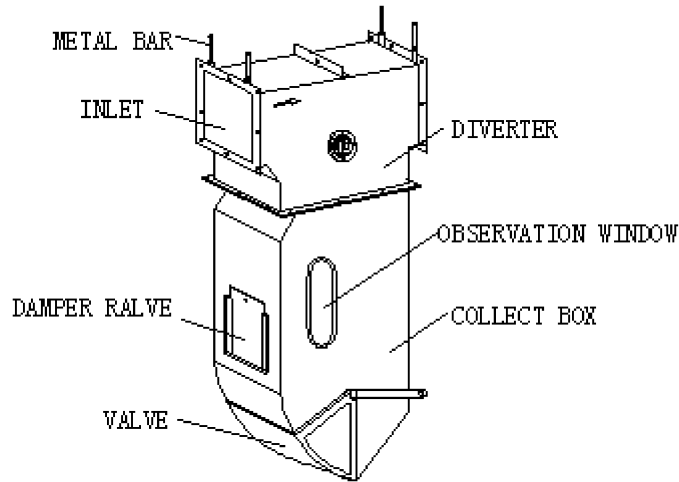


Figure 12: Diagram of diverter installing

C. Debugging and usage maintenance

1. Indicative and adjustable parameter of the control panel

After completing the installing, first carry out the energizing test. If the displayer shows normally after the energizing, the following procedure is the understanding and the setting of the parameters.

1.1 Spark inspection unit AMP-TIME SET

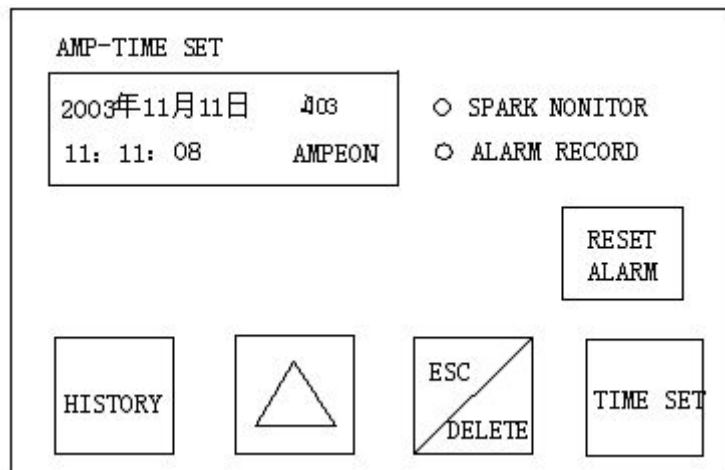


Figure 13: The diagram of parameter panel in spark inspection unit

a. The explanation of the messages in LCD

- 11:11:08 indicates 11hour 11minute 08second
- ♫03 indicates there are 3 alarm messages

AMPEON indicates Logo of Jiangsu Ampeon

The above is the main display information of the main page while working, red LED on indicates that AMP01 spark inspection control main-board works in normal state. Green LED twinkling indicates that there is new alarm information. After seeing the alarm records, it returns to the original state.

b. The search of alarm record

When you push the alarm record button, you can enter the page of the latest alarm. LCD displays the time of year, month, date, hour and minute.

Then you push **▲** key, you can turn to the previous alarm history. You can continuously turn to the front page. When “NO RECORD” is shown, it shows that there is no record and the system will automatically return to main page.

When we push **ESC/DELETE** key, it exits to the alarm history page. If there is no instruction in the alarm history page, it can also exit to the main page after 10 second.

▲ Caution!

This computer can store 20 alarm messages. If the number exceeds 20, the history record will be automatically cleared and displays "01". That is to say, it only stores the 21st message. The original 20 messages will be automatically deleted.

c. Operation in case of alarm

In case of alarm, the instrument sends the sound and light alarm signal and shuts down. The displaying clock in the LCD main page stops. In case of alarm, after pushing **RESET ALARM** key, the alarm status will be eliminated and the instrument returns to the normal working status. The main page of LCD returns to the normal time (While alarming, although the clock stops, the inner is still timing. After the elimination of alarm, it automatically returns to the correct time) and the message number of alarm will be increased by one.

d. The deletion of alarm record

On the main displaying page of LCD, when you push **ESC/DELETE** key, the latest alarm record will be deleted. The function is mainly used in the fire alarm inspection by maintenance personnel for deleting automatic alarm record while doing inspection test.

e. Time setting

The time has been set when delivered, in the ordinary course of event, it is not necessary to adjust.

If you need to calibrate the time, you can push **TIME SET** key to enter the time

setting page. Then push the key in turn to switch among the year, month, date, hour, minute. The adjusted data is in the twinkling status, through pushing the **▲** key, we can change the value of the data. After finishing the setting of the time, push **TIME SET** key to return to the main page and automatically save the time after the change.

In the time setting page, push **ESC/DELETE** key to return to the main page, but you can not save the change.

In the time setting page, if there is no new operation, it will return to main page and does not save the change.

▲ Caution!

While changing the time, you should operate patiently, after the change and save, please confirm carefully to prevent the error.

1.2 Metal diverting unit APU-02

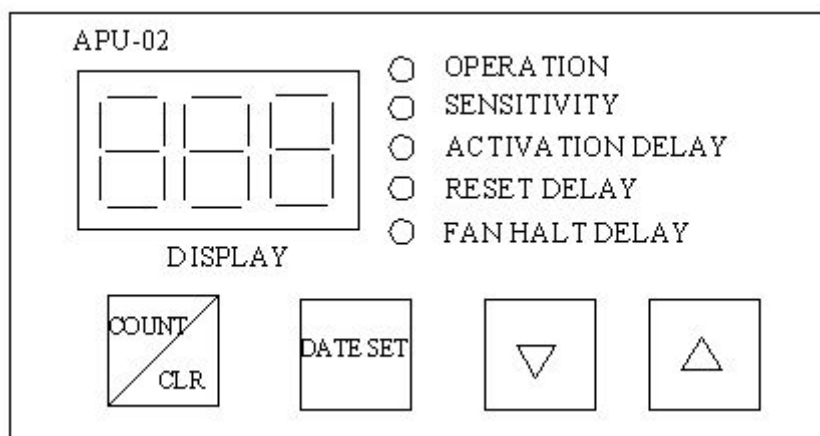


Figure 14: Diagram of APU-02 panel

a. Use of counting function

The data displayed in LED value displaying area is the times of the metal diverter's action. If you want to restart the counting, you can push **COUNT/CLR** key. After the count reaches 999, the counter will automatically reset and restart the counting.

Users can understand the times of metal detecting machine's action and judge the rate of metal inclusion in the raw material. And we can also compare it with the calculating value to check the dropped metal substances.

b. Parameter setting

b.1 **DATE SET** key is used to transform among the following 5 cycling mode: "working status" → "sensitivity setting" → "delayed action setting" → "delayed reset setting" → "delayed blower fan stopping". Each time you push **DATE SET** (parameter setting) key, it in turn changes to next mode. If it is within 30S, it can automatically

return to working status without any operation to the key.

b.2 ,  key can increase or decrease the value in parameter setting.

b.3 The 5 LED on the right of the nixie duct indicates the displayed content of the working nixie duct. They are in turn working indications (red), sensitivity (green), delayed action(green), delayed resetting (green), delayed stopping of the blower fan. After the finishing of parameter setting and resume of work status, the changed parameter is automatically written into the storage devise EEPROM.

c. Parameter setting range and explanation

Parameter	Range of setting	Setting value on delivery
Sensitivity SU	A0、 A1、 A2 Automatic level	A1
	1-99 Manual level	
Action delay T1	0.00S-3.00S	0.00S
Reset delay T2	1.00S-3.00S	1.50S
Fan halt delay T3	0.00S-3.00S	0.00S

Table 5 : Parameter setting table

c.1 Sensitivity SU

Automatic mode of sensitivity (3 levels): A2(automatic high sensitivity) , A1(automatic medium sensitivity), A0(automatic low sensitivity).

Manual mode of sensitivity,99 levels: parameter range 1~99,the lowest 1,the highest 99.

We recommend the A0,A1,A2 Automatic mode of sensitivity .A0 and A1 sensitivity levels can satisfy most of the users in spinning mills. In automatic mode, CPU can adapt itself to different working conditions and make the metal diverter maintain the best sensitivity status.

1~99 is the manual setting mode of sensitivity, users can set the sensitivity parameter according to the actual requirement. The values in the range 69-85 can satisfy most of the users in spinning mills.

▲ Caution!

Under the working condition that the magnetic interference is big, if you set the sensitivity parameter too high, the disoperation of diverter will happen. Under the condition of bad electromagnetic environment, we can decrease the use of sensitivity parameter.

c.2 Action delay T1

Action delay refers to the parameter of software delayed time from the time the

detector detects the metal to the time diverter acts. The action delay time parameter should be set according to the actual wind speed and the install distance from metal detector to diverter. The setting precision of the action delay parameter is 0.01S and the setting range is 0.00S-3.00S. As for the adjusting method in detail, refer to this section 3. ***Metal diverting function experiment and adjustment***. It is suggested that if the install distance is satisfactory, software delay is not used. The action delay parameter is set to 0.00S。

c.3 Reset delay T2

Reset delay refers to the time from the flap of the diverter opens to the time it resets. The parameter should be confirmed through the experiment. We must assure that wool including metal substances can drop to the collect box and in the meantime, we must assure that the dropping volume is the minimum and it has minimum influence to the gas flow of normal production. The reset delay parameter's setting precision is 0.01S. Adjust \triangle , ∇ and set the reset delay parameter in the range of 1.00S to 3.00S.

▲ Caution!

If the parameter T2 is set too low, this may cause the condition that material including the metal can not be discharged .If it is too big, the discharged material may become excessive. In general course of event, the value between 1.50S to 2.00S can satisfy the needs. When the instrument detects special big metal substance, reset delay T2 will automatically prolong and increase the dropping time of the wool.

c.4 Fan halt delay T3

Stop delay 0.00S refers to the condition of stopping immediately after the fire alarm happens. If it is set to 0.50S, then the blower fan or other machine will stop 0.50S after the fire alarm. Adjust \triangle , ∇ and **blower stop delay** parameter can be set in the range between 0.00S and 3.00S.

▲ Caution!

Blower stop delay parameter is used in the situation that after the fire alarm, the stop of running blower fan is delayed to assure that the material can dropped to the collect box and other situations that need to delay the stop. If the delay is not necessary, you can set the parameter to 0.00S.

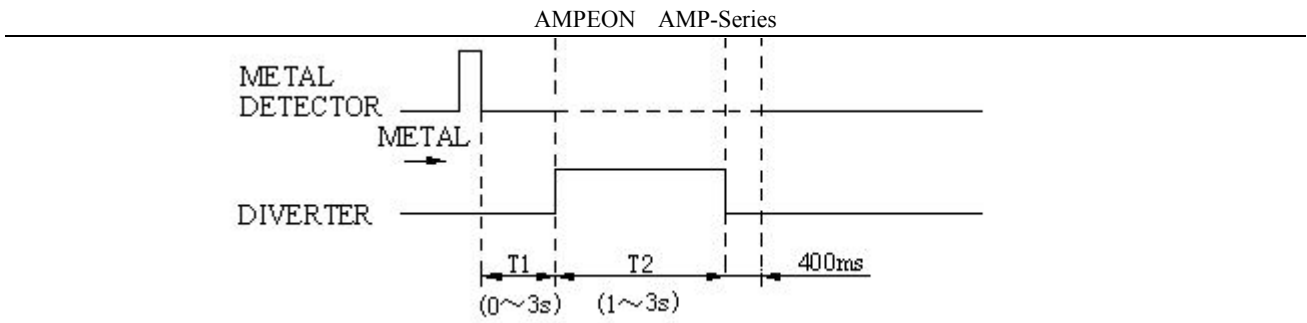


Figure 15.a: Diagram of metal detector's action status

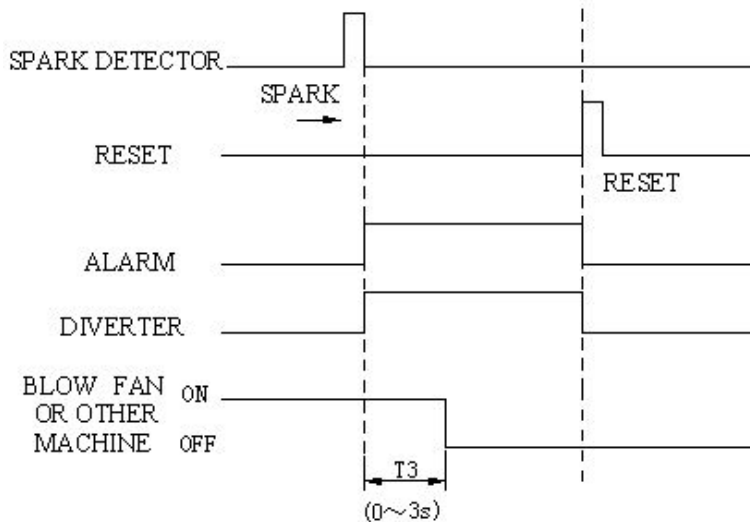


Figure 15.b Diagram of fire alarm status

Figure 15: Diagram of time delay T1, T2 and T3 parameters

d.The cautions in the use of APU-02 panel

d.1 After the displayer is energized, it indicates "APP". It is the status of delay and preparing to enter the work. "AP-" is the action delay time, "RE2" indicates the relay-operating time of the diverter, "AP-" is reset delay time. When the count value appears in the LED and the working indicating lamp is on, the metal diverter is in the working state.

d.2 After the initial setting of the parameter, we can wrap the metal with material and simulate the normal running of the material in the pipe. After revising the parameter repeatedly, we can detect properly and divert properly.

d.3 After the setting of the parameter, take the record to restore in case other personnel dissipates. The parameters must be set up by special personnel. The operator is prohibited to change the setting, or trouble may happen.

d.4 This machine has the function of automatic adjustment to the "reset delay" time,

that is to say ,the function of automatic adjustment of maintenance time after the action of diverter. In case of special big metal substance, the corresponding reset delay time will increase.

d.5 In case of the continuous action of metal detector and if it is necessary to change the setting of the sensitivity, please continuously push the 'parameter setting' button and transform the function to sensitivity adjustment mode and decrease the sensitivity parameter.

d.6 APU-02 is a computer unit, if strong magnetic interference or other factor happen and cause the parameter unit abnormal, please shut down the main power supply for one minute and then reenergize and recheck every parameter.

2. Fire alarm simulation test

a. There is an active window on the pipe beside the spark diverter. Shine the spark sensor through the small window and it will be OK if the controller can carry out normal action(The tungsten filament of the torch is a hot body and includes infrared ray).During action, it alarms with sound and light, so it is necessary to turn off the alarm manually.

b. During the normal use, if fire alarm happens, operation can not be started until the cause is found out. Occasionally although the spark is small and can be out by itself, we should also stop for not less than half an hour, and we can not start until it is inspected and the safety can be assured.

▲Caution!

a. The spark alarm function should be checked regularly with simulation test to assure that they are in the good working status. It is suggested that the test be carried out at least once every two weeks.

b. The dust and cloth waste on the surface of lens in spark detector must be regularly checked and cleaned.

3. Metal diverting function test and adjustment

In the meantime of metal diverting function test, it is necessary to do the setting of parameters such as sensitivity, action delay, reset delay.

a. The sensitivity setting on the control panel controls the sensitivity of detecting metal substance. The higher the sensitivity is , the stronger the ability of discharging the metal substance has. Users can set the sensitivity according to the actual needs. It

is suggested that the automatic sensitivity method be used. The diverter can maintain the best working status in this mode.

b. Action delay parameter can adjust the delay time from the time metal detector detects the metal to the time diverter acts. The parameter is thus adjusted to minimum 0.00S, and after many times of testing, it is proved to be able to discharge metal substance correctly. This status indicates that the distance from the metal detector to the diverter is the shortest and it is the most ideal.

▲Caution!

In the install mode that keeps the distance between the detector and diverter minimum, the detected metal substance can be quickly discharged and the minimum wool dropping volume can be assured. In the meantime, the influence to the normal carding is the minimum. As the install distance between the detector and the diverter is very short, the action delay is the minimum. Once the metal is detected, the diverter will act immediately. In this working mode, the various size of metal substance discharge rate will reach maximum because the distance they move along with the wool flow is small.

c. **Reset delay** refers to the delay time of resetting after the action of the diverter. The parameter can directly affect the wool dropping volume. It is best to assure that the metal scraps can be properly discharged but the wool dropping volume is the minimum.

▲Caution!

Action delay and **reset delay** parameter should conform to the actual wind speed and use condition. While debugging, users set it to the best position through the experiment.

d. While the user is carrying out the metal test, please be observant to avoid the metal from entering the blower in the next procedure. The user can use spreader tin foil not less than 100mm, otherwise 5mm or smaller screw washer with obvious identification. Then wrap it with cotton and let it be plucked by bale plucker or directly put it into the conduct duct. When the indicator of the control box lights and the diverter acts, that indicates that the metal detection function of this equipment is normal.

e. If the diverter has taken the actions, but you can't find the test metal in the collect box, you should carefully observe and repeatedly adjust closing delay parameter until

you can reliably discharge the test metal. In the meantime, you should assure the dropped volume is the minimum. After repeat test, if you still can't divert properly, it is necessary to reconsider the install distance from metal detector to diverter.

▲ Caution !

- a. The dropped wool in the collect box of diverter needs to be cleaned immediately, or it will damage the diverter.
- b. We also need to carry out regular simulation test and check to the metal diverter and trash separator to assure the good working state.

D.RS-232 communication

1. Function of RS-232 communication connector

RS-232 communication connector is installed in AMP-3000V5 metal & spark diverter (Figure 14). RS-232 communication connector is specially designed for user's computer management and various distance communications. It can adapt to the situation that workshop network management requires the end terminal computer displays the working status of the diverter and the parameters is revised online. Jiangsu Ampeon Electron Engineering Co., Ltd. provides open network communication protocol.

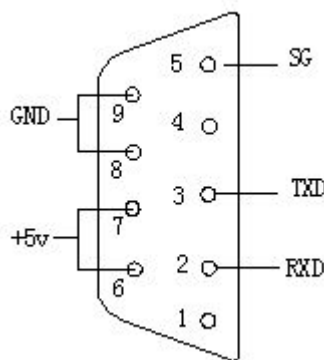


Figure 16: RS-232 communication connector

User may also purchase the APU-01 human-machine interface that is specially used in the communication with AMP-3000V5 metal and spark diverter's mainframe.

2. Special APU-01 human-machine interface

APU-01 human-machine interface is a special operation panel that is connected to AMP-3000V5 metal & spark diverter control box through RS-232 communication

cable AP-RS-3.5m.

This control panel mainly utilizes near distance communication method. Through this, you can realize the parameter setting function of AMP-3000V5 control box installed in the height with APU-01 human-machine interface. APU-01 human-machine interface can be installed in the position that operator can observe and operate easily (refer to the following figure).

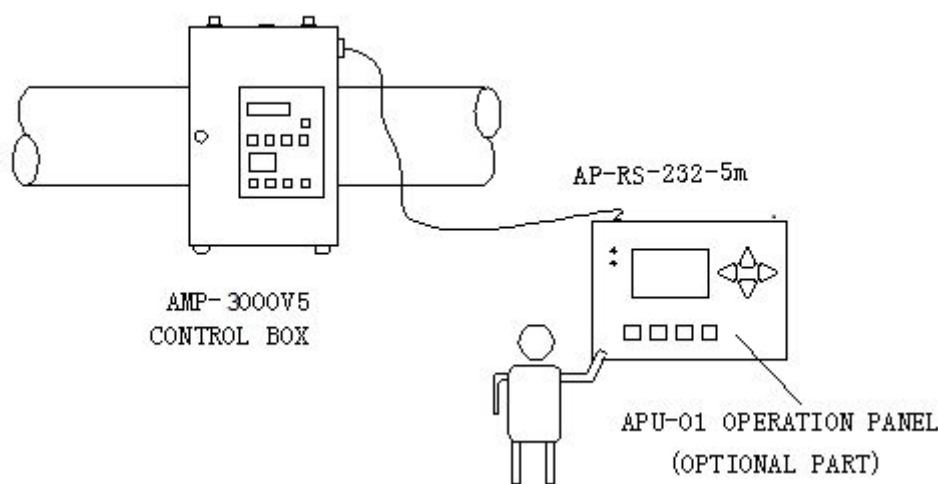


Figure 17: APU-01 human-machine interface

▲Caution !

APU-01 Operation panel is optional part. When necessary, user can purchase from Jiangsu Ampeon Electronic Engineering Co., Ltd. separately.

APU-01 human-machine interface utilizes LCD and touch type keyboard and has selectable Chinese and English control interface and separate real time clock (RTC) . Not only can it monitor the working status of AMP-3000V5 metal & spark diverter, but also can carry out online setting of basic functional parameter such as sensitivity, delay etc. APU-01 human-machine interface has functions such as independent spark alarm history record. As for detailed information, please refer to "Instructions of APU-01 operational panel" and you can download it from the website of Jiangsu Ampeon Electron Co., Ltd.: <http://www.ampeon.cn>.

E. Troubleshooting

In table 5, regular troubleshooting methods during debug or normal use are listed. If you still can't solve the trouble while comparing to the following table, you can telephone the after-service department of Jiangsu Ampeon Electronic Engineering Co.,

Ltd. or visit our website to get technical support and service.

Trouble phenomenon	The cause of the trouble	Location to check	Troubleshooting and adjustment
The spark inspection lamp lights, alarm record lamp does not light, no display in LCD, there is alarm in simulative detection	1.The adaptor plug may become flexible 2.The display control circuit board is damaged	1.Connect the hinder plug of display panel 1. Display control circuit board AMP-TIME SET	1.Insert the plug properly 2.Change the display control circuit board AMP-TIME SET * Does not affect the main function of spark alarm detection
Spark detection lamp is not on Alarm record lamp is not on LCD has no display	1.Power circuit 2.Damage of the main-board 3.Plug behind the display panel looses.	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	1.Reconnect the wire 2.Reinsert the plug 3.Repair or change the main-board
Spark detection lamp is on , LCD display is normal, but fire alarm is usually mistaken	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	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	1.Avoid the direct sunshine to the detector. 2.Change the damaged spark detector 3.Change the damaged main control panel.
The spark inspection lamp lights, the alarm record lamp twinkles, there is no display in LCD, there is alarm in simulative detection	LCD on display control panel is damaged	Check the LCD display control circuit board	Change the display control circuit board *Does not affect the main function of spark alarm detection
LCD has display, but the clock does not run	1.The crystal oscillation structure on display control panel is damaged 2.The program of time integrated circuit DS1302 goes wrong	Check the circuit of LCD display control panel	1.Change the crystal oscillation circuit board or LCD display control circuit board 2. Re-plug or change DS1302 clock single chip integrated circuit in the circuit board. *It will not affect the main function of the spark alarm detection.

Trouble phenomenon	The cause of the trouble	Location to check	Troubleshooting and adjustment
The clock is incorrect.	The battery is short of electric energy. Chargeable nickel-chromium battery can be used for several years.	LCD displaying	Change the battery on the circuit board, (Nickel-chrome chargeable battery 3.6V) *Does not affect the main function of spark alarm
LCD background light is not bright	1. There is a life span of background light. 2. There is problem with power supply circuit.	Check the displaying plate.	As the background light has its life span, LCD background light off does not affect the function and need not be repaired
In the fire alarm simulation test, the power supply of the control box went off as soon as the fire alarm happens	Cut off the working power supply in case of alarm	1.The incoming power supply part	1.Change the incoming part of the power supply and avoid the cutting off of the power supply when fire alarm acts
LED nixie duct does not light	1.Power supply circuit 2.Mainboard 1011 is damaged or control transformer is damaged 3.The adaptor plug on the main-board becomes flexible	1.The inner circuit board of the control box. The power supply incoming is on connector №2 and 3,measure AC220V voltage 2.The output voltage of the main-board 3.Adaptor plug	1.Rewire and energize again 2.Change the main-board 3.Re-insert the plug
In case of spark alarm, there is alarm elimination sound and the alarm lamp does not light	1. Plug of the alarm lamp is not firmly plugged 2. The light bulb inside the alarm lamp is damaged	1. Plug of alarm lamp 2. Inside of the alarm lamp	1. Re-insert the plug 2. Change the light bulb of the alarm lamp DC12V
There is no metal diverting function, the metal detector does not act, there is no indication of RE2, the diverter does not act	1.There is problem with the emission and receiving wire between the detector and control box 2.Control main-board 1011 is damaged 3.LED display panel APU-02 circuit board is damaged	1.Check if signal emission and receiving wires have been reliably connected 2.Check the control main-board 1011 3.Check LED display board	1.After measuring with multimeter, fix the connecting wire and assure the proper connection 2.Repair or change main-board 1011 3.Repair or change LED display board

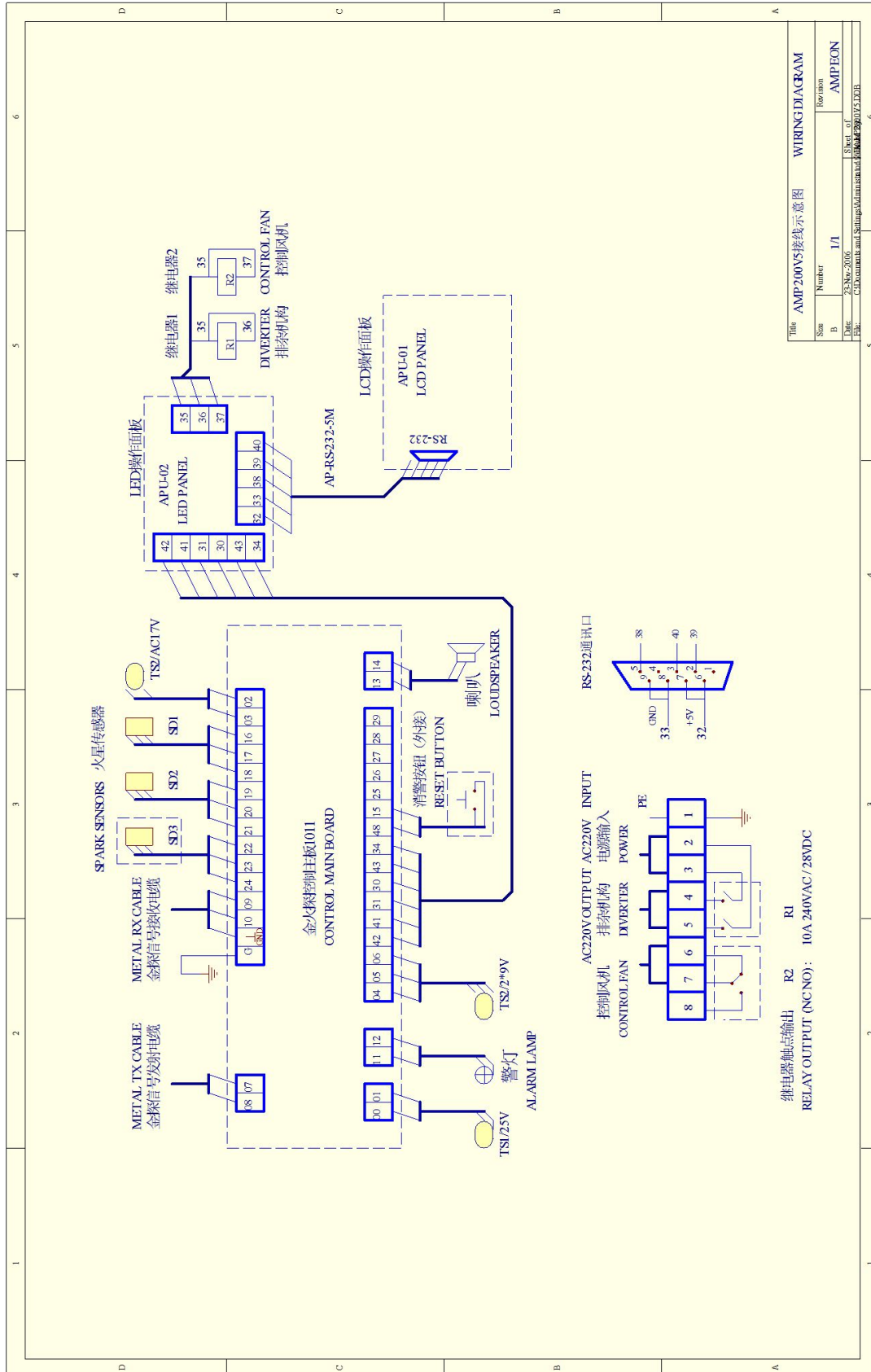
Trouble phenomenon	The cause of the trouble	Location to check	Troubleshooting and adjustment
The metal detector can act, there is output indication 'RE2', but the executive structure can not act	1.The pressure of the gas supply is low 2.The solenoid valve is damaged 3.The executive structure linking wire is broken or the relay is broken down	1.The pressure of the gas supply 2.The solenoid valve 3. The connecting wire output of the relay	1.Assure the stability of the gas supply pressure 2.Change the solenoid valve 3.Change the relay or reconnect the output wire
The flap of executive structure is not on the position	1. Flap of diverting structure is locked	1.The executive structure of diverting	1.Clean up the material remaining in the collect box of the executive structure. 2.Take down the diverter and adjust the gap between the flap and the side wall.
The metal detection is normal and the executive structure can act, but the metal scraps can not be discharged	1.The flap in executive structure is locked or can not act to proper position 2.Action delay and reset delay parameters are not properly set up 3.There is problem with the install distance.	1.Check the executive structure. 2.Check the action delay and reset delay parameters that have been set up	1.Clean up the sundries in the executive structure and repair the damaged parts 2.Reset the parameter 3.When the adjustment of the parameter does not work, the pipe install distance should be adjusted.
Misoperation happens frequently in metal diverting function	1. Interference of the power supply	1.The power supply circuit	1. Change the incoming circuit and avoid the mixing with relay, electric motor, inverter power supply or other strong interference load that is frequently on and off. It is best to select the live wire and zero wire at the position of main power supply incoming wire.
	2.The metal detector vibrates	2 .The solidness of the detector installing	2.Fix the detector and nonmetal pipes, eliminate the factors that cause the vibration of the detector
	3.The electromagnetic interference of the detector	3.The environment of the detector	3.Check and remove the daylight lamp or other electromagnetic interference source. If there is power supply cable over the detector, it is necessary to change the position.

Disoperation happens frequently in metal diverting function			
	4.The fibers rub with non-metal pipes rapidly and the static electricity happens	4.Observe whether there is electricity discharging between non-metal pipes and the detector	4.Change the non-metal pipes or improve the earthing
	5.The metal bar or bracket collides with the detector	5.Check the hanger or supporting parts of the detector	5.Separate the metal bracket and the detector with spacer to avoid the collision between the bracket and the detector
	6.The signal emitting and receiving wires are not properly connected or not firmly fixed	6.Signal emitting and receiving shielding cable	6. Fix the signal emitting and receiving shielding cable in the corresponding connectors
	7.The metal hose threaded with signal emitting cable is not fixed and vibrate during working	7.Signal emission and receiving cable	7. Fix the threaded(wired) metal hose
	8 There is metal scraps remaining in the inner cavity of the detector or the distance between the detector and vibrating metal piece is too near	8.Check the inner cavity and the surroundings of the detector	8.Remove the sundries inside the detector and keep a distance between metal and detector
	9. Sensitivity is set too high.	9. Check the sensitivity parameter of APU-02	9. Decrease the setting of the sensitivity
	10. Main control panel 1011 is damaged	10. Check the main control panel 1011	10. Repair or change the main control panel 1011

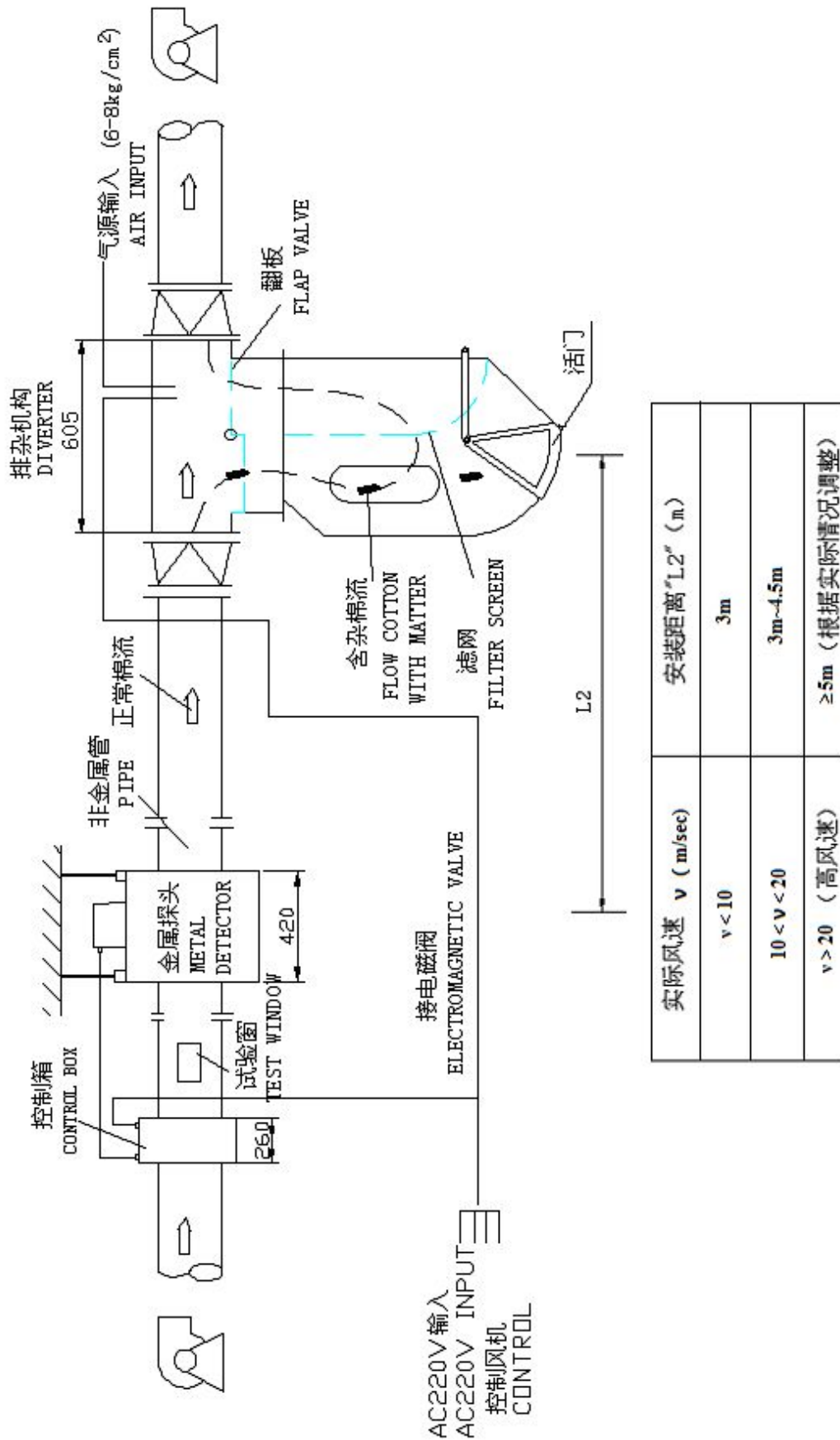
Table 6:The comparing tale between the troubleshooting of debug process and normal use

F. Appendix

Appendix 1: Diagram showing wiring principle of AMP-3000V5 metal, spark & heavy matter diverter



Appendix 2: Diagram of AMP-3000V5 metal, spark & heavy matter diverter installing



Appendix 3: The practice of blowing and carding line fire alarm

Most of the material in cotton spinning mill are combustible substances such as cotton, chemical fiber etc. The frequent happening of the fire alarm in scutching workshop is a problem that gives management personnel much trouble. Blowing and carding procedure utilizes reciprocate bale plucker to pluck the wool. Large quantity of wool bags stack in the workshop and large volume of combustible material is stored in multi-box mixing openers and blowing & carding boxes. Furthermore, through the whole procedure of the blowing and carding line, the pipes are sealed and large quantity of blower fans and dust filtering equipments are utilized. Because of the above situation, in case of fire alarm, large loss will happen. Not only will the material be lost, expensive machines will also be burned and damaged. The more important thing is that the production will be affected. In case that the blowing and carding line stops production because of fire alarm, it will affect the production operation of the whole spinning mill. As the blowing and carding line becomes popular and comes to our use, the prevention of fire alarm in the blowing and carding line becomes more important. In this text, we will discuss the prevention of the fire alarm in the blowing and carding line and the practice process after purchasing the product of Jiangsu Ampeon Electronic Engineering Co., Ltd.!

A. Discussion about the cause of the fire alarm.

1. The iron scraps directly mix into uniaxial, biaxial and other opening machine. So the beaters violently rub and strike with each other and that is the cause of fire alarm.
2. The iron scraps mix into the blower with the wool flow, the high speed flying blade of the blower fan strikes the iron scraps or iron scraps rub with turbo housing of the fan and then spark happens and finally fire alarm happens.
3. There are ropes, stones and rags etc. remained in the wool bag. When these sundries rub or strike with beater or fan blade, fire may also happen.
4. The problem of running such as the improper use of cotton waste. The wasted rags is not torn down and it includes spindle, wrap cloth, so may tangle with the beater and rub with the tangle, then fire may happen.
5. The install position of the spark diverting equipment is improper and the install position of the spark diverting head is not within the area that fire is easy to happen.

B. Through the installing of Ampeon series metal spark diverter, we can get the effect of ‘nip in the bud’ .

1. It is manifested by the practice that through the installing of AMP-2000 metal & spark diverter between the reciprocal bale plucker and other blower in the blowing and carding line pipes, the fire alarm that happens when beater of the bale plucker strikes and rubs can be prevented effectively. In the diverter of this product, the loss of the wool wind pressure is very small. So it applies to various situations such as positive, negative and positive & negative pressure. It is the first barrier in the safety production in blowing and carding production line. As an integrated measure, the installing of TF-27 bridge type iron in the blowing and carding line pipes can also strengthen the effect of removing iron scraps.

2. Within the procedure, as multi-bin mixer and carding collect box store large quantity of combustible material, they are the most important object of our fire prevention. AMP-119AII spark diverter must be installed in the wool inlet. When infrared detector detects that there is spark inside the wool fiber, it will make the fire alarm with sound and light immediately. Related equipments such as blower fan will be automatically stopped. In the meantime, Diverting executive structure will

act to discharge wool flow with fire and combustible scraps into the sundries box. Through this, we can assure that spark will not enter the next procedure. AMP119AII type is newly developed spark diverter produced by Jiangsu Ampeon Electron Co., Ltd. Through the usage of double detector, it can avoid the blind area. It is also equipped with clock function and it can record 20 alarm messages. Alarm content can include the year, month, date, hour and minute of the fire alarm.

3. Dust filtering system is also apt to fire alarm. AMP-119C type diverter utilizes the structure of main frame & detector separation. So the installing is simple, the disposition is flexible. Each mainframe may be equipped with 1-15 detectors according to the need. Through the installing of detector on the route of dust filtering system pipe, over the dust room and near the compactor, we can prevent the spark from expanding and causing fire effectively, so it can assure the safety production of the whole blowing and carding procedure.

C. The management assurance for prevention of blowing and carding line fire alarm.

The strengthening of management is the key factor of decreasing fire alarm, good running (operation) management and equipment management can completely avoid the happening of the fire alarm.

1. When the wool is packaged in bags, the operator should tidy up all the iron wire and wrap cloth and manage to be cut basically flat in height. Make the cloth waste and wasted rugs distribute evenly. While packaging, there should be personnel to supervise and check.

2. The wasted rugs must be torn and packaged before using, control the sundries such as cutters and pipes.

3. Ask the scotching operator to do the patrol well, immediately find and remove the sundries in the bag. Furthermore, immediately remove the sundries in the collect box of metal and spark diverter.

4. Inspect and test the sensitivity and other various functions of metal and spark diverter. Through this, we can keep the metal and spark diverter in good working status.

5. There should be counter plan regarding the fire alarm disposition. When fire alarm happens in the blowing and carding procedure, scotching operator should not be in a pucker. Furthermore, for the proper handling, training and guidance is needed. You should arrange corresponding staff to study various prevention and salvage knowledge and understand the basic function and alarm message of metal and spark diverter. Improper handling may cause the fire to expand. (transferred from the website of Jiangsu Ampeon: <http://www.ampeon.cn>)

JIANGSU AMPEON ELECTRONIC ENGINEERING CO.,LTD.PRC.

Service web: <http://www.ampeon.cn>

E-mail: ampeon@ampeon.cn

OFFICE: Rm.1801 Textile Mansion 482 Zhongshan Dong Road, Nanjing.P.R. of China

Phone: 86-25-84503825 4400099-21801

Post Code: 210002

FACTORY: JINTAN JIANGSU P.R.OF CHINA

Post Code: 213215

Phone: 0519-82612300 82616999 82616111

FAX: 86-519-82616555