

# **SPARK DETECTORS**

## **technical description and application manual**



**CONTROL LOGIC**





# SPARK DETECTORS SUMMARY

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# **SPARK DETECTORS**

**technical description**

**ISO 9001**



**CONTROL LOGIC**



# SPARK DETECTORS

## technical description

### SUMMARY

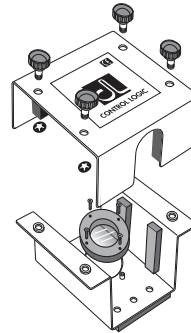
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**SPARK DETECTION AND EXTINGUISHING SYSTEMS COMPONENTS**



**RIV-601P/S  
 SPARK  
 DETECTOR**

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**SAM-871  
 MOUNTING FRAME  
 FOR RIV-601P/S**

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**PAN-701  
 SPARK ALARM PANEL**

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 (see FOE 38  
 electrical wiring)



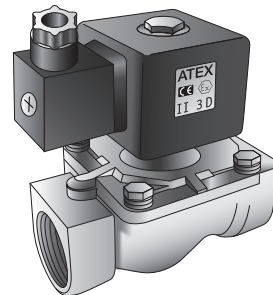
**PAN-705M  
 SPARK CONTROL  
 PANEL**

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**SNA-808L  
 ALARM SOUNDER  
 BEACON**

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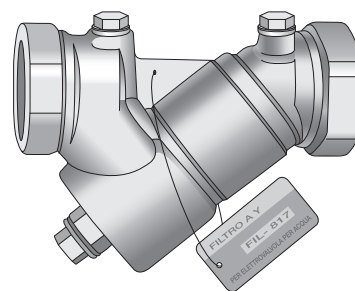
**EVS-811  
 WATER  
 SOLENOID VALVE**

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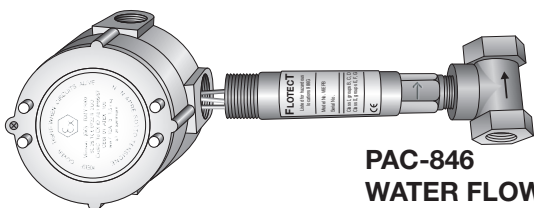
**LAC-843  
 ALARM  
 LAMP**

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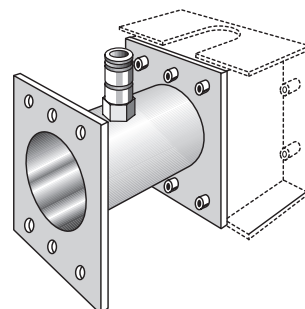
**FIL-817  
 STRAINER FOR  
 WATER SOLENOID  
 VALVE 3/4"**

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**PAC-846  
 WATER FLOW  
 SWITCH**

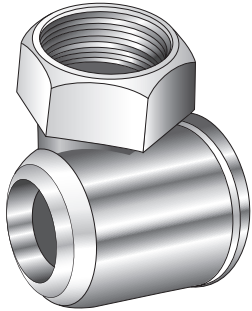
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**APU-874  
 AIR PURGING UNIT**

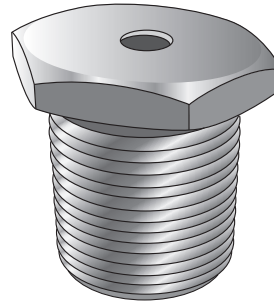
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## SPARK DETECTION AND EXTINGUISHING SYSTEMS COMPONENTS



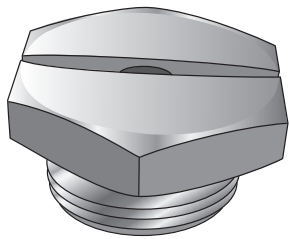
**UGN-820  
SPRAY  
NOZZLE**

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**UGN-820A  
AXIAL SPRAY  
NOZZLE**

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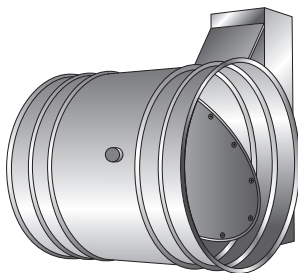
**UGN-820P  
FLAT JET SPRAY  
NOZZLE**

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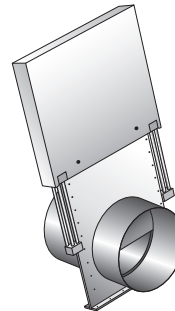
**LAM-612P  
EXTERNAL TEST  
LAMP**

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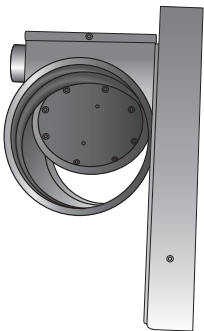
**SER-851  
BUTTERFLY TYPE  
DUCT VALVE**

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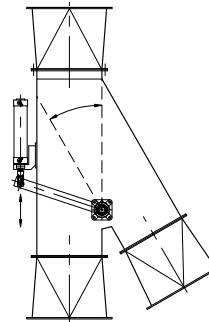
**SER-852  
GATE TYPE  
DUCT VALVE**

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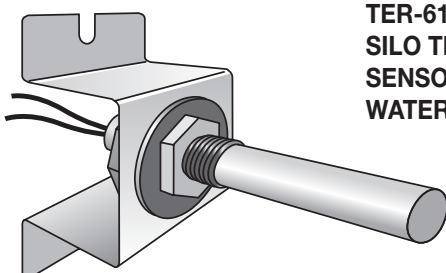
**SER-853  
ELECTRO-PNEUMATIC  
DUCT VALVE**

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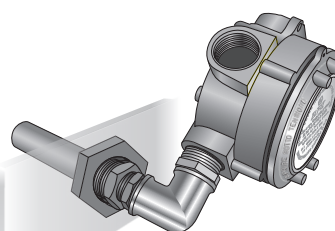
**SER-854  
FAST THREE-WAY  
FIRE DUCT VALVE**

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**TER-616/T  
SILO TEMPERATURE  
SENSOR  
WATERTIGHT IP65**

ref. FOE 21



**TER-616/TX  
SILO TEMPERATURE  
SENSOR FOR ATEX  
CLASSIFIED AREAS**

ref. FOE 36

## SPARK DETECTOR RIV-601P/S

CE Ex II 3D T85°C



### Description

Spark detector RIV-601P/S is an electronic fire alarm device, sensitive to sparks and incandescent bodies in movement.

Its use is particularly recommended on dust collection systems in factories where wood is processed, chipboard or furniture are manufactured, in sawmills and the like, where fires are both probable and frequent.

It is also recommended for the textile industry, especially in cotton mills, in cereal and animal feed mills and storage and in the treatment of hides and leather. And many many others where sparks are produced and they can start a fire.

Spark detector RIV-601P/S contains an element sensitive to the infrared (IR) radiation emitted by incandescent bodies, a series of amplifier and time circuits, and an output relay that provides a 1A 30Vdc changeover contact.

When a spark is detected the relay is operated for 3 seconds (time can be adjusted from 1 to 10 seconds). If the sparks are continuous the relay is operated till 3 seconds after last spark.

The spark detector is designed for installation over the ducts of the dust extraction systems or pneumatic chip conveyors, so that it can see inside the duct through a window. It can also be installed over screw and belt conveyors or other mechanical systems for conveying chips, sawdust, cereals or animal feed, but sun light or artificial light must not fall directly on the detection window as they might cause false alarms.

The detector is normally installed using the SAM-871 mounting frame, in which it is supported by rubber cushions and is protected from the environment and vibrations.

## SPARK DETECTOR RIV-601P/S

The simplest application of the detector is to activate a sound alarm and possibly automatic plant mechanisms (stop, reverse direction etc.). More usually, however, it is combined with an automatic extinguishing system, comprising a solenoid valve and one or more water spray nozzles to extinguish every spark that runs in front of the detector with a short spray of water.  
 In this case the spray nozzle is installed about 15 meters downstream from the detector in order to catch the sparks travelling at 30 m/s, since a delay of 0.2 sec is assumed, due to the water flow before and after the nozzle.

Another detector may be installed downstream from the nozzle to detect any spark remaining alive due to faults in the extinguishing system (lack of water, valve blocked etc.) or large size of the fire.

A flow switch may be fitted upstream of solenoid valve to monitor the water spray flow.

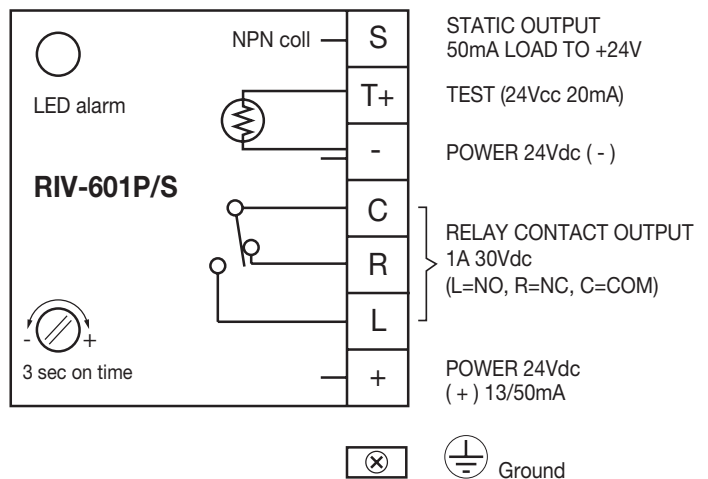
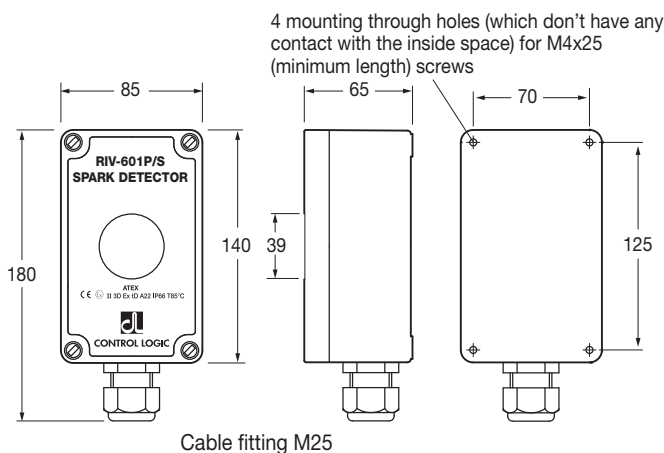
An interesting feature of the detector is its self test system. A special incandescent bulb is incorporated into the detector near the sensor. When this bulb is powered with a 24Vdc pulse it generates an infrared (IR) flash that is seen by the detector as a spark. This device allows a remote checking of the detector and the automatic extinguishing system.

## Specifications

Cast aluminium case IP66 protection (watertight NEMA 4).  
 Power supply 24Vdc (20-30V) filtered (ripple less than 5%).  
 Current consumption 13mA normal, 50mA in alarm. Test 20mA.  
 Spectral sensitivity infrared (IR) 1-3 micron.  
 Field of view 90° cone.  
 Typical sensitivity: 1mm spark at half a meter distance.  
 The minimum size detected increases or decreases linearly with distance (2mm spark at one meter, etc.).  
 Immediate response time (20-30ms).  
 Alarm time duration 3 sec (standard time). Internally adjustable from 1 to 10 sec.  
 Internal LED indicator showing relay alarm status.  
 Output changeover contact rated 1A 30Vdc. Relay is active when a spark is detected, and is held active for at least 3 sec.  
 "Teletest" feature for remote testing of the detector.  
 Requires a 24Vdc 20mA pulse to simulate a spark and cause the detector to operate.  
 Electrical wiring on 7 way terminal block, plug-in type, 10 pitch, wire size 2.5mm<sup>2</sup> max (a max 1.5mm<sup>2</sup> wire gauge is suggested to avoid a difficult wire entry into the screw terminal).  
 Cable entry fitting M25 internal diameter 13-18mm.  
 Operating temperature -20 +60°C.  
 Storage temperature -40 +85°C.  
 Relative humidity max 95% non condensing.  
 Dimensions 180x85xH65mm.  
 Weight 700g.

Model complying with 94/9 Atex directive suitable for application on zone 22

II 3D Ex tD A22 IP66 T85°C.



dimensions in mm

### Notes:

- It is highly recommended to connect the enclosure base to a good ground line using the **ground** terminal provided inside up on the left. Then, connect base and cover using the ground terminal provided inside the base lower on the right and the ground terminal provided inside the cover lower on the left.

All the ground terminals are signalled by ground label.

The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet.   
 The yellow-green ground conductor must be longer than the other conductors.

- In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided.  
 The suggested closing torque value is 1 ÷ 1.5Nm.



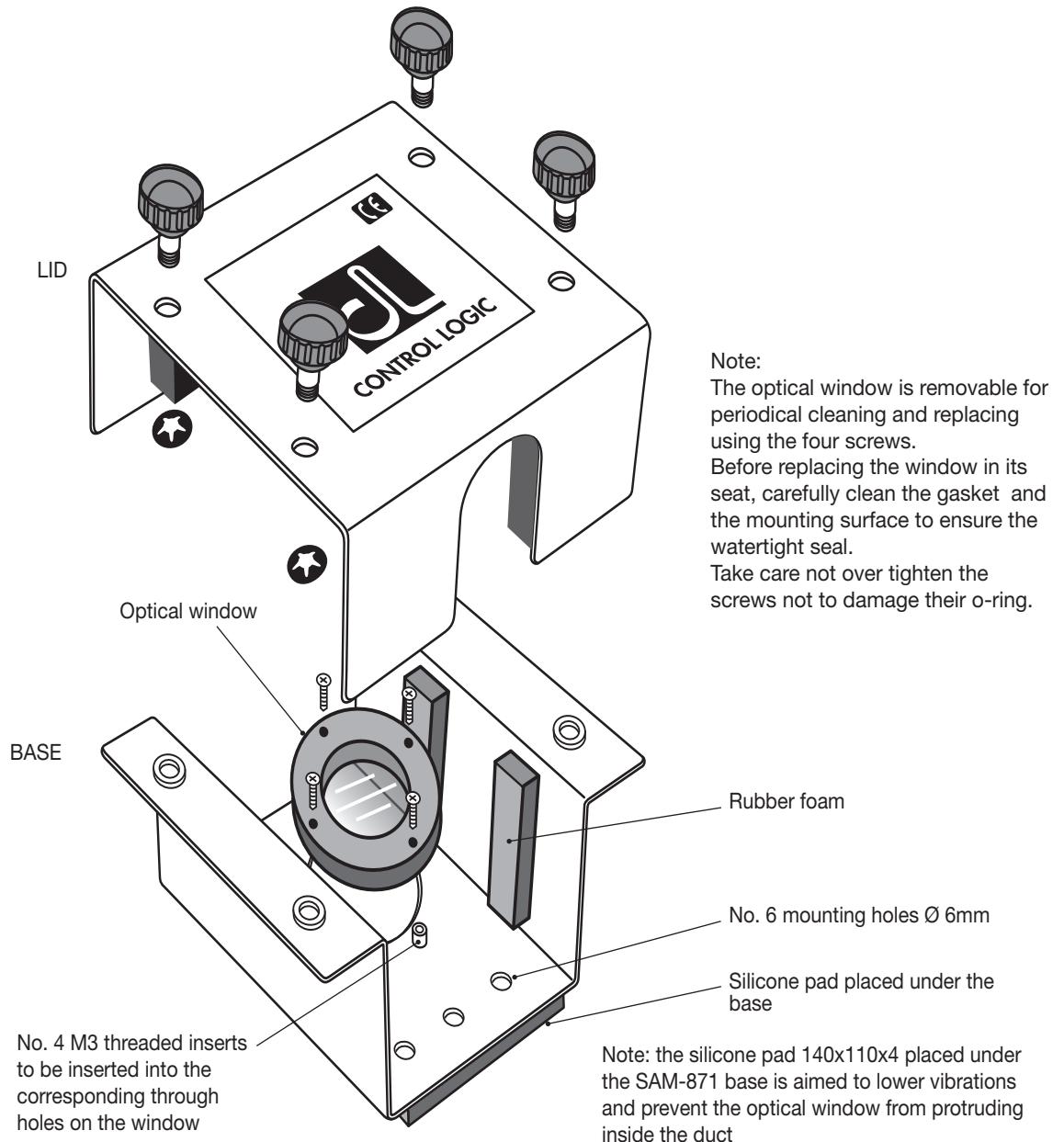
## MOUNTING FRAME SAM-871

### for spark detector RIV-601P/S

#### Specifications

Mounting frame SAM-871 is composed of two parts: the base to be fixed to the ducting by rivets or self-threading screws, the lid that closes the base by four captive knob screws. Aluminum optical window  $\varnothing 80 \times 18 \text{mm}$  with tempered glass window  $\varnothing 40 \times 6 \text{mm}$  and rubber foam ring. Silicone pad under the base.

The detector is placed inside among foam rubber walls.  
Material: 1mm thick stainless steel, painted yellow.  
Dimensions 170x165xH115mm (190x185x130mm package).  
Weight 1100g (1300g with package).

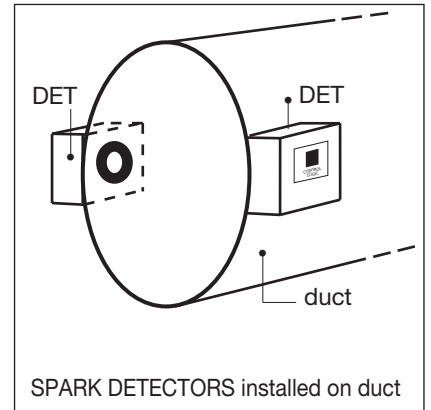
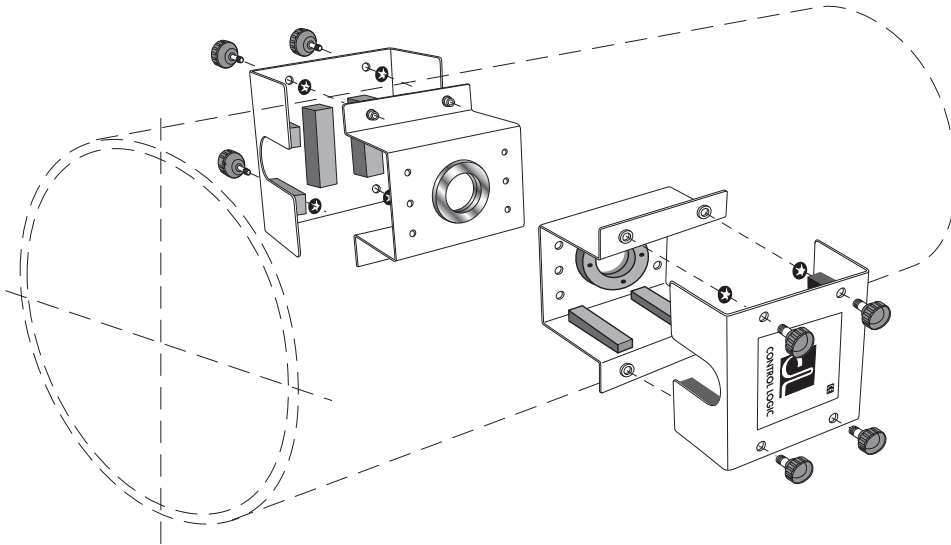


# MOUNTING FRAME SAM-871

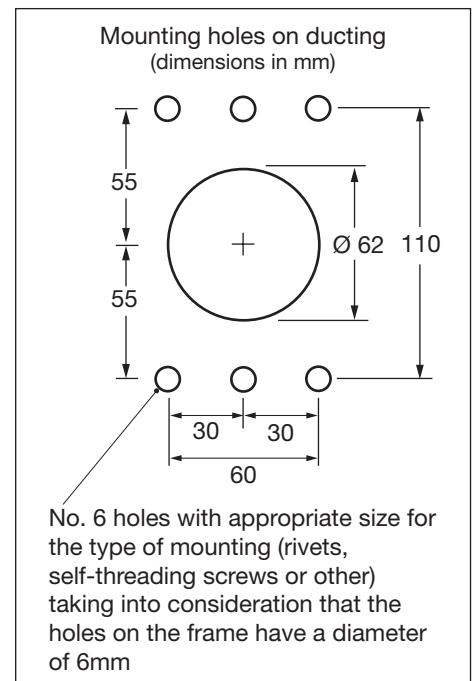
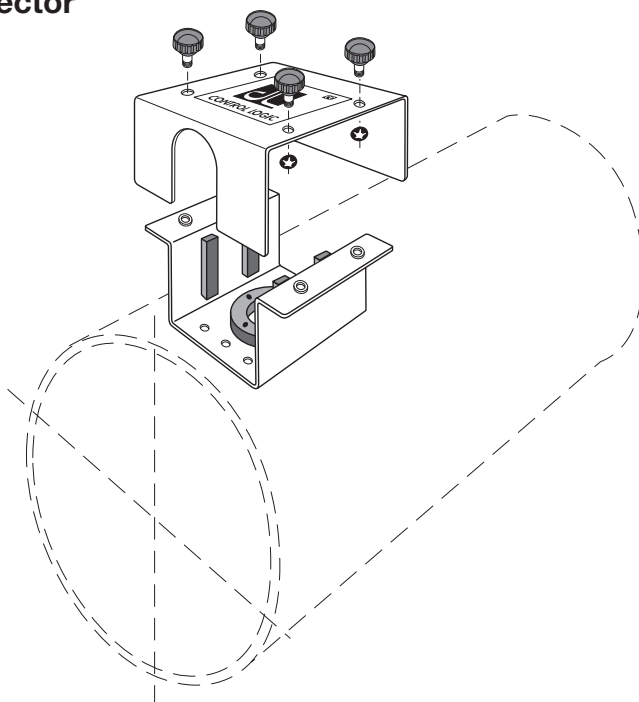
for spark detector RIV-601P/S

## duct mounting examples

### Double detector (pair)



### Single detector



## SPARK ALARM PANEL PAN-701

### for spark detector RIV-601P/S

It carries on the front panel a 24Vdc power indicator green LED, a reverse polarity indicator red LED, an overload/short circuit indicator yellow LED, 2 indicator red LEDs for the alarm of the Spark Detectors, 2 TEST buttons and 2 RESET buttons.

It must be powered by a 24Vdc power supply and it is protected against overload and short circuit by an internal fast press-to-reset thermal circuit breaker (1.5A – 36W).

The alarm panel PAN-701 allows to monitor two independent detection points (ALARM 1 and ALARM 2).

The alarm of the spark detector activates the STOP circuit (it turns on the alarm, stops the fan and closes the duct valve) which is held active until manual reset through the RESET button.

The TEST button is used to check the system. A short pulse causes a spark to be simulated inside the detectors that will go in alarm state, will light the ALARM LEDs and will activate alarm sounder and STOP circuit. Press the RESET button to return the system to normal operating conditions. The alarm panel PAN-701 is also suitable for our silo temperature alarm systems.

### Specifications

Wall mounting using mounting holes provided.

An external 24Vdc power supply is needed.

Output 24Vdc 36W for two RIV-601P/S spark detectors, two sound and light alarms, two STOP circuits.

Two TEST outputs 24Vdc pulse.

Internal power consumption 0,3W normal, 2W in alarm.

Max power consumption 36W – 1.5A

Operating temperature -20 +50°C.

Electrical wiring on 22 way terminal block, plug-in type, 5 pitch, wire size 2.5 mm<sup>2</sup> max.

Cable entries by 2 M25 cable fittings, internal diameter 13-18mm.

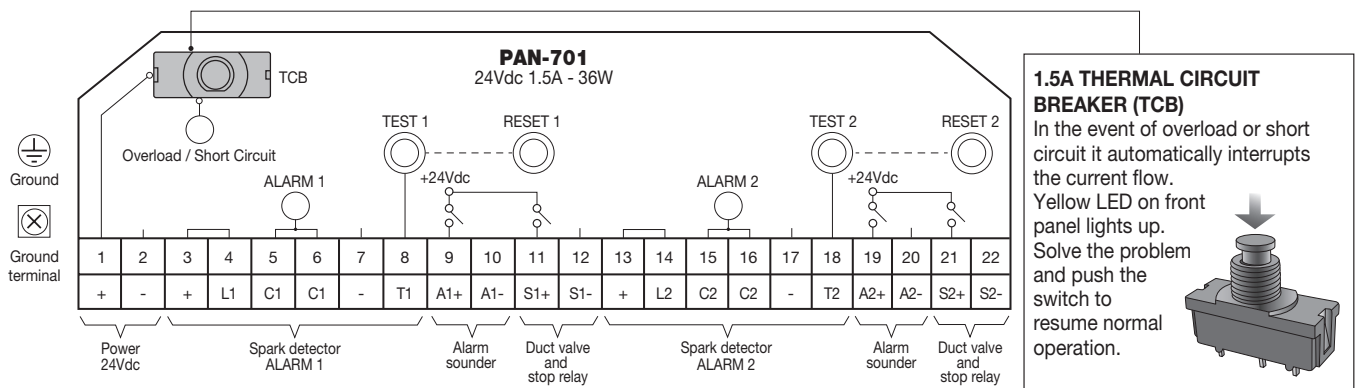
Cast aluminium case IP66 protection (watertight NEMA 4).

Dimensions 180x140xH65mm.

Packaging 240x180xH130mm.

Weight 1kg.

### Electrical diagram



For each line (ALARM 1 and ALARM 2) an additional "C" terminal is available to add another spark detector.

Input and output voltage 24Vdc.

All wiring and grounding must be done in accordance with local and national rules and regulations.

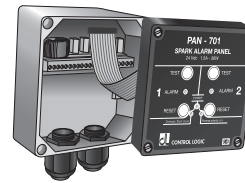
#### Notes:

- It is highly recommended to connect the enclosure base to a good ground line using the ground terminal provided inside lower on the right. Then, connect base and cover using the ground terminal provided inside the base lower on the left and the ground terminal provided inside the cover lower on the right.  
 All the ground terminals are signalled by ground label.   
 The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet.   
 The yellow-green conductor must be longer than the other conductors.

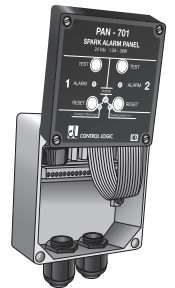
- In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is 1 ÷ 1.5 Nm.



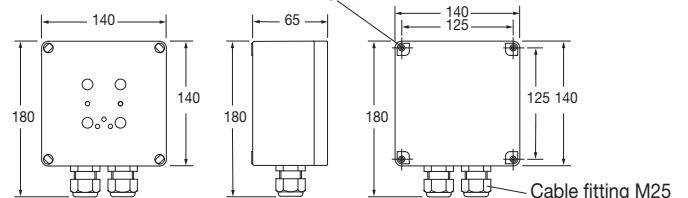
In the packaging are included no. 8 "not present" labels to put on the front panel to advise that one spark detector is missing.



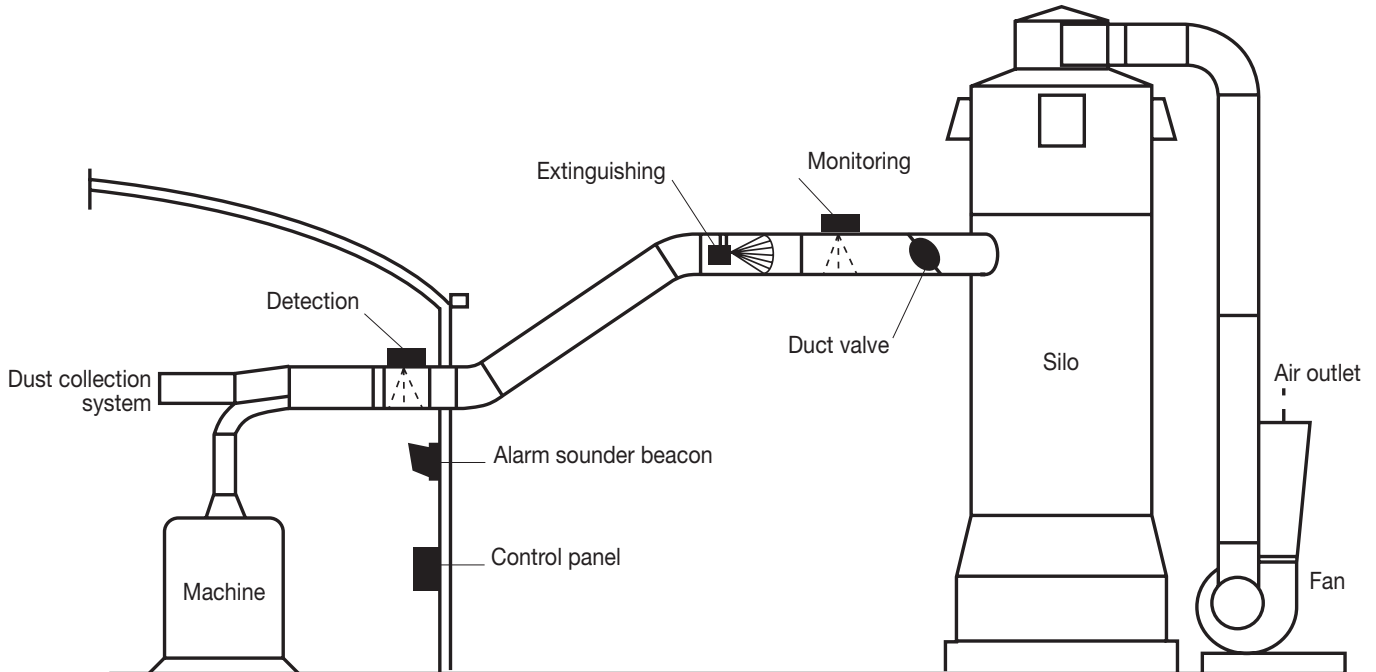
The front panel should not be hung by the internal electrical connections. When you open the control panel it is suggested to place the front panel as represented by the pictures on the sides.



4 mounting through holes (which don't have any contact with the inside space) for M4x25 (minimum length) screws



## SPARK DETECTOR SYSTEM APPLICATION EXAMPLE



## SPARK CONTROL PANEL PAN-705M

### for spark detector RIV-601P/S

The control panel PAN-705M is designed to operate and monitor all the functions of a complete spark detector system.

On front panel it displays the operating state of the spark detectors that control the extinguishing and the monitoring functions, the nozzle water flow switch, the STOP function and the power voltage.

**MEMORY function:** the alarm signaling LEDs of the detectors and of the flow switch "remember" the alarm occurred blinking until the manual reset (RESET). The MEMORY function can be deactivated / activated by single switches, one for each LED (5-way DIP switch on the front panel circuit).

Reverse polarity and overload/short circuit warning lights are also present.

In addition it carries the detector TEST pushbutton and the stop/memory RESET pushbutton (it turns off the alarm, switches off the signaling LEDs and restores the normal operating condition). It must be powered by a 24Vdc power supply.

It is protected against overload and short circuit by a fast press-to-reset thermal circuit breaker (1.5A – 36W).

It also contains the control relays for the alarm sounder, the solenoid valve, the STOP circuit (external relay to stop the fan and possible duct valve).

The solenoid valve is controlled by the extinguishing spark detectors.

The stopping of the fan and the closing of the duct valve are controlled by the monitoring spark detectors through the stop relay, which is held active until manually reset.

The alarm sounder is controlled by the extinguishing spark detectors, by the monitoring spark detectors and their stop function, and by the water flow switch.



### Specifications

Wall mounting using mounting holes provided.

Power line voltage 24Vdc

Internal power consumption 15mA normal, 100mA in alarm.

Max power consumption 36W – 1.5A

Press-to-reset protection against overload and short circuit.

Operating temperature -20 +50°C.

Electrical wiring on 22 way terminal block, plug-in type, 5 pitch, wire size 2.5mm<sup>2</sup> max.

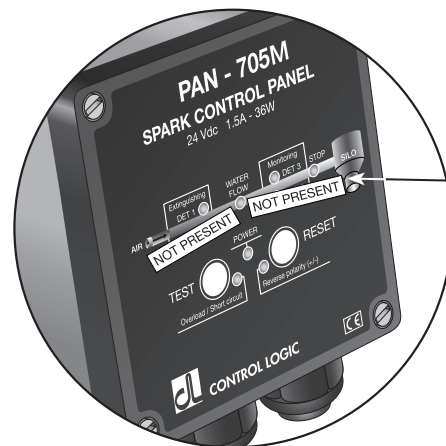
Cable entries by 2 M25 cable fittings, internal diameter 13-18mm.

Cast aluminium case IP66 protection (watertight NEMA 4).

Dimensions 180x140xH65 mm.

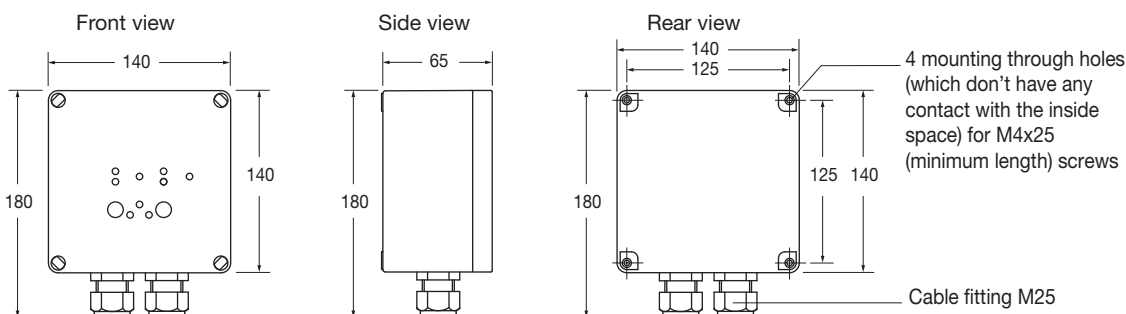
Packaging 240x180xH130 mm.

Weight 1kg.



In the packaging are included no 8. "NOT PRESENT" labels to put on the front panel to advise that one or more components are missing.

### Mechanical dimensions (mm)

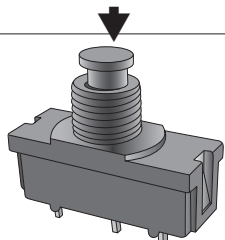


# SPARK CONTROL PANEL

## PAN-705M

### for spark detector RIV-601P/S

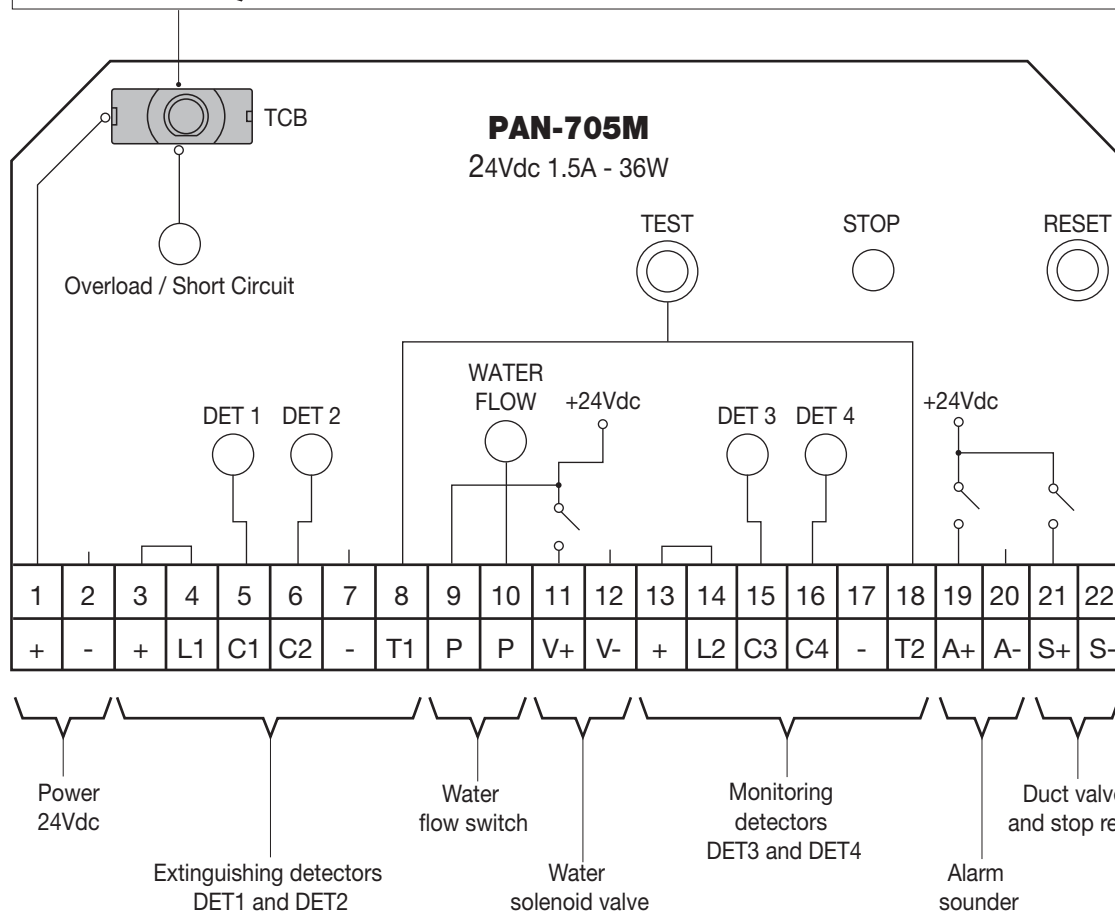
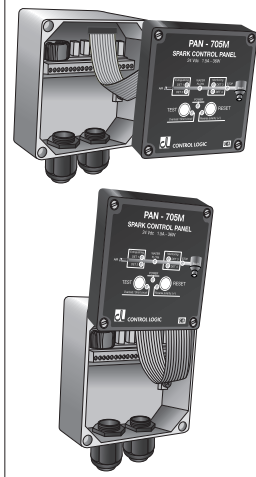
### Electrical diagram



#### 1.5A THERMAL CIRCUIT BREAKER (TCB)

In the event of overload or short circuit it automatically interrupts the current flow. Yellow LED on front panel lights up. Solve the problem and push the switch to resume normal operation.

The front panel should not be hung by the internal electrical connections. When you open the control panel it is suggested to place the front panel as represented by the pictures below.



Input and output voltage 24Vdc.  
 All wiring and grounding must be done in accordance with local and national rules and regulations.

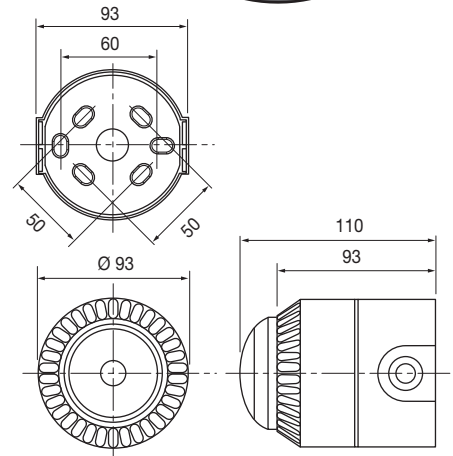
#### Notes:

- It is highly recommended to connect the enclosure base to a good ground line using the ground terminal provided inside lower on the right. Then, connect base and cover using the ground terminal provided inside the base lower on the left and the ground terminal provided inside the cover lower on the right. All the ground terminals are signalled by ground label. The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet. The yellow-green conductor must be longer than the other conductors.
- In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is  $1 \div 1.5\text{Nm}$ .

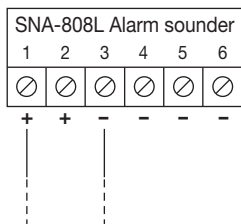
## ALARM SOUNDER BEACON SNA-808L

### Specifications

Audible visual alarm.  
Indoor and outdoor use.  
IP65 protection.  
Power voltage 24Vdc 16 mA 0,4W.  
Electrical wiring on screw terminals.  
Alternating sound 101dB(A), lamp flash 1Hz.  
Operating temperature -10 +55°C.  
Dimensions Ø 93xH110mm.  
Packaging 100x100x110mm.  
Weight 290g (320g with packaging).



### ELECTRICAL WIRING



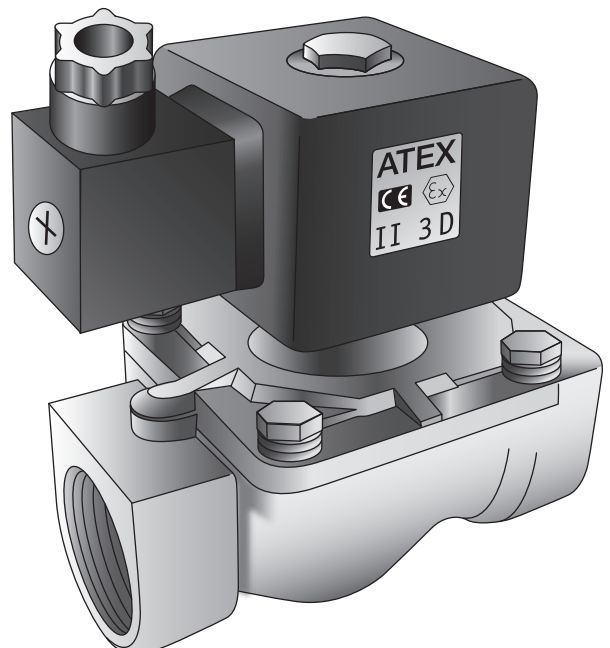
**Warning: take care not to change the plus (+) and minus (-) polarities.**

## WATER SOLENOID VALVE EVS-811

CE Ex II 3D T200°C

### Specifications

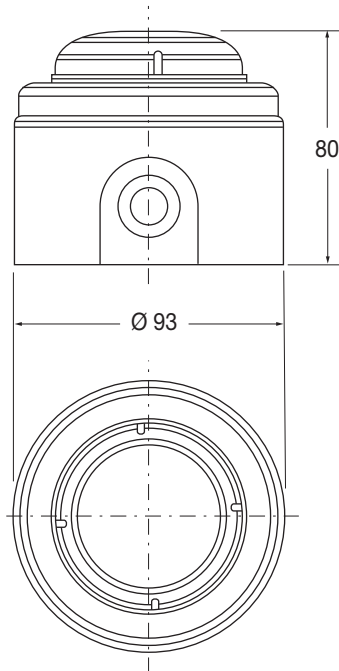
Two-way normally closed (NC) - Internal diameter 16 mm.  
Flow rate 30 lt/min (0,5 lt/sec) at 1 bar (1 lt/sec at 4 bar).  
Pressure range 0 to 10 bar.  
Coupling 3/4" gas female.  
Power voltage 24Vdc 11W.  
Weatherproof protection with IP65 connector (dust and water jet).  
Operating temperature -10 +60°C.  
Water temperature +5 +90°C.  
Dimensions 70x50x100mm.  
Packaging 125x90x55mm.  
Weight 700g (800 g with packaging).  
II 3D T200°C model (suitable for application on zone 22) complying with ATEX Directive II 3D Ex to IIIC T200°C  
Dc IP65 (Tamb: -20 ÷ +80°C).



## ALARM LAMP LAC-843

### Specifications

Lamp with built-in 1Hz flasher.  
Wall mounting.  
Power voltage 24Vdc 3-5mA.  
Electrical wiring on screw terminals.  
IP65 protection.  
Operating temperature -10 +60°C.  
Dimensions Ø 93 x h 80mm.  
Packaging 100x100x85mm.  
Weight 120g (160g with packaging).

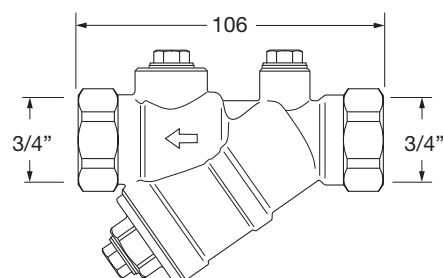
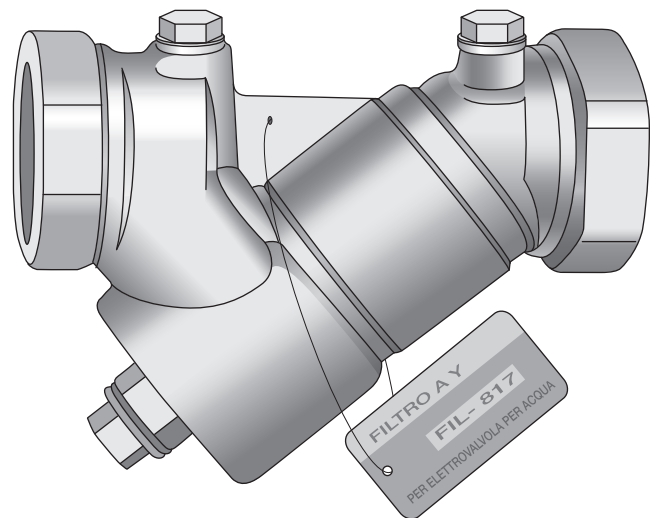


## STRAINER FOR WATER SOLENOID VALVE FIL-817

To be installed before EVS-811 water solenoid valve in order to stop any dirt flowing inside the main water line so as to avoid jamming and/or damaging the solenoid valve rubber diaphragm.

### Specifications

Typical flow rate 120 lt/min at 1 bar.  
Differential pressure at 50 lt/min flow rate (2 UGN-820 nozzles) 0.20 bar.  
Max pressure 25 bar.  
Brass type body, stainless steel removable filter cartridge.  
Acceptable fluid water.  
Coupling 3/4" F-F (female-female).  
Filter mesh 0.73 ÷ 0.87mm.  
Operating temperature -20 +120°C.  
Water temperature +5 +90°C.  
Dimensions 106x80x38mm.  
Packaging 110x80x45mm.  
Weight 550 g.





## WATER FLOW SWITCH PAC-846

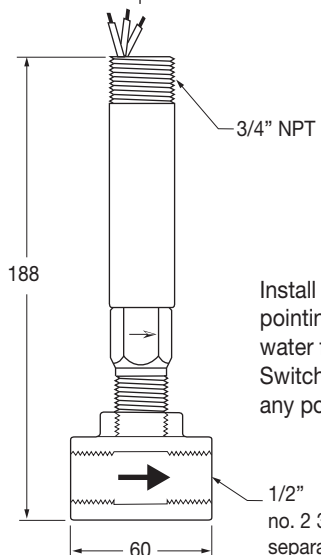
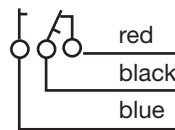
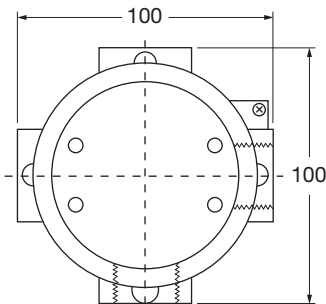
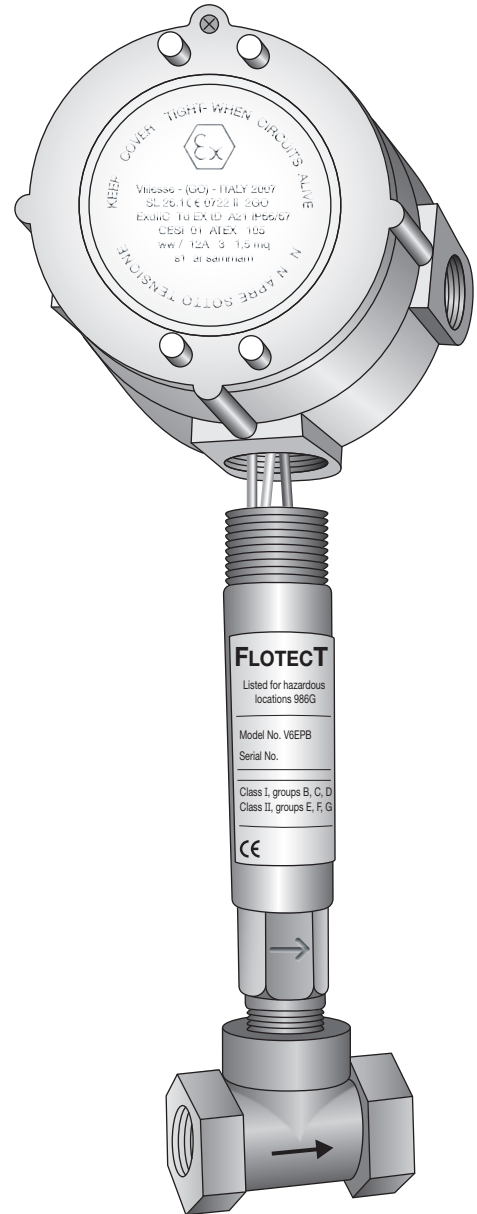
CE II 3D T135°C

Designed to monitor the spray water flow in the UGN-820 (or other type) nozzle during the extinguishing operation.  
 Installed upstream of the EVS-811 solenoid valve.  
 When a water flow is detected then a contact is closed on the BLUE and BLACK leads.

### Specifications

- Minimum water flow 6 lt/min (fixed preset).
- Max water pressure 17 bar.
- Brass tee coupling 1/2" female (3/4" adapters separately supplied).
- Changeover contact rated 1A 30Vdc.
- Electrical connections on terminal block inside the explosion-proof IP66 junction box separately supplied.
- Ground screws supplied on junction box both internally and externally.
- Operating temperature -20 +75°C (non condensing).
- Flow switch dimensions 188x60x35mm.
- Junction box dimensions 100x100x67mm.
- Packaging 280x150x130mm.
- Weight 1.5kg.

II 3D T135°C model (suitable for application on zone 22) complying with 94/9 Atex directive only if electrical connections are made inside the explosion-proof junction box separately supplied duty sealed so as to assure IP66 protection grade.



Install in piping with arrow pointing in direction of water flow.  
 Switch can be installed in any position.

## AIR PURGING UNIT APU-874

### Description

The air purging unit model APU-874 is a mechanical unit designed to be applied in front of the spark detector RIV-601P/S mounting unit SAM-871 for application on ducts and conveyors in order to perform two important functions:

- Prevent by means of an air jet a dust build-up over the optical window of the mounting unit SAM-871, that could decrease or even blind the detector sensitivity.
- Prevent by means of an air cooling the detector heating when the duct temperature is over 60°C. A thermal insulation is provided to avoid the direct contact between APU-874 and duct.

The APU-874 is composed of a cylindrical part 80mm in diameter and 150 mm in length, with the inside surface polished as a mirror, and two flat bases for the mounting purpose on one side to the mounting unit SAM-871 and on the other to the duct.

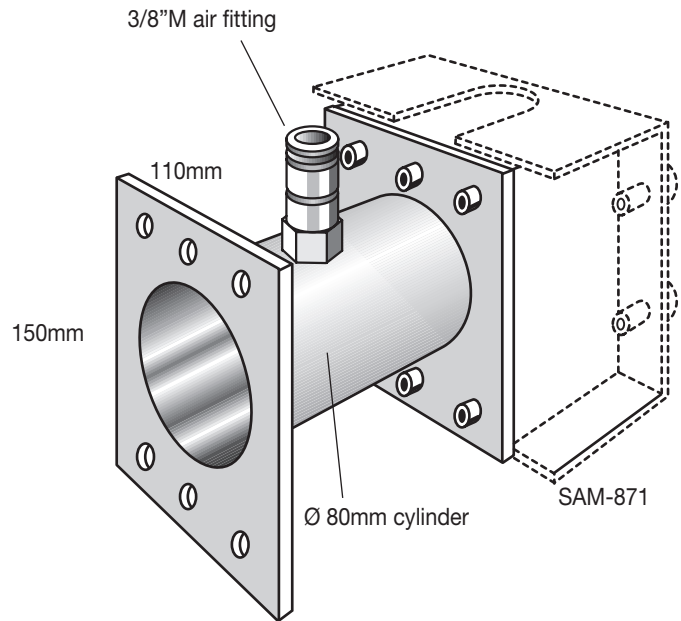
Six M6x20mm stainless screws are provided for fixing to the mounting unit SAM-871.

A thermal insulation plate, of rubber or other material, is also provided to be applied between the APU-874 and the duct.

On the centre of the cylinder length an 3/8" universal air fitting is mounted for the air supply (female socket and male moving plug for 10 mm pipe).

The spark detector RIV-601P/S can see through the APU-874 a **direct field of view of 25°**.

It can also see indirectly, due to the internal reflection, a larger **indirect field of view of 90°**, but with the sensitivity reduced by a 30%.



### Specifications

Material 3 mm stainless steel painted yellow, with the internal surface polished as a mirror.

Dimensions: 150mm high, 110mm wide, 150mm long.

Central tube 80mm in diameter and 150mm long.

Direct field of view 25°.

Indirect field of view 90°. Sensitivity reduced by 30%.

A thermal insulating plate, 150x110x5mm, is provided.

Six M6x20mm stainless steel screws provided for application to the mounting unit SAM-871.

Brass universal 3/8" universal air fitting, Parker (female socket and male moving plug for 10mm pipe).

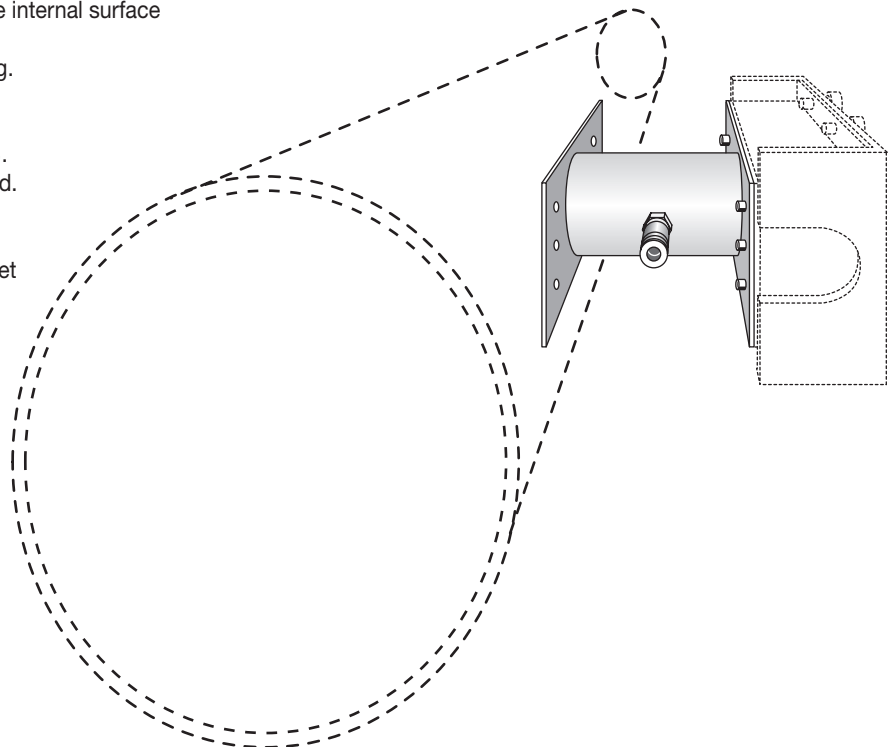
Suggested air pressure 3÷6 bar.

Air flow rate 1000 lt/min.

Operating temperature -20 +60°C.

Max duct temperature +120°C.

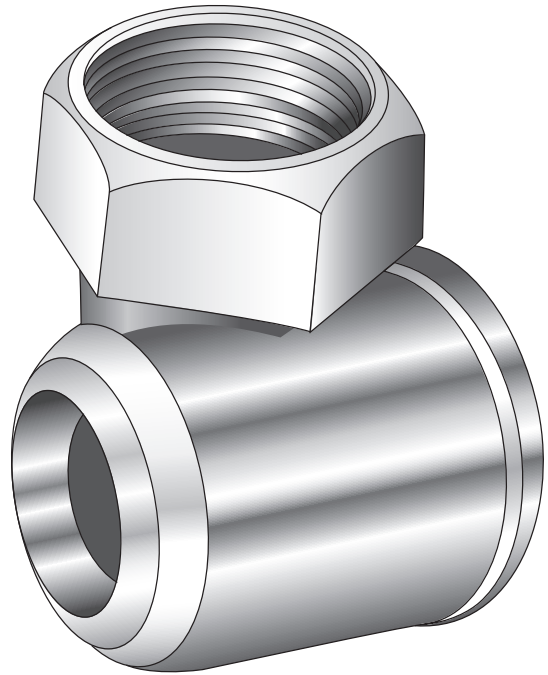
Weight 1.6kg.



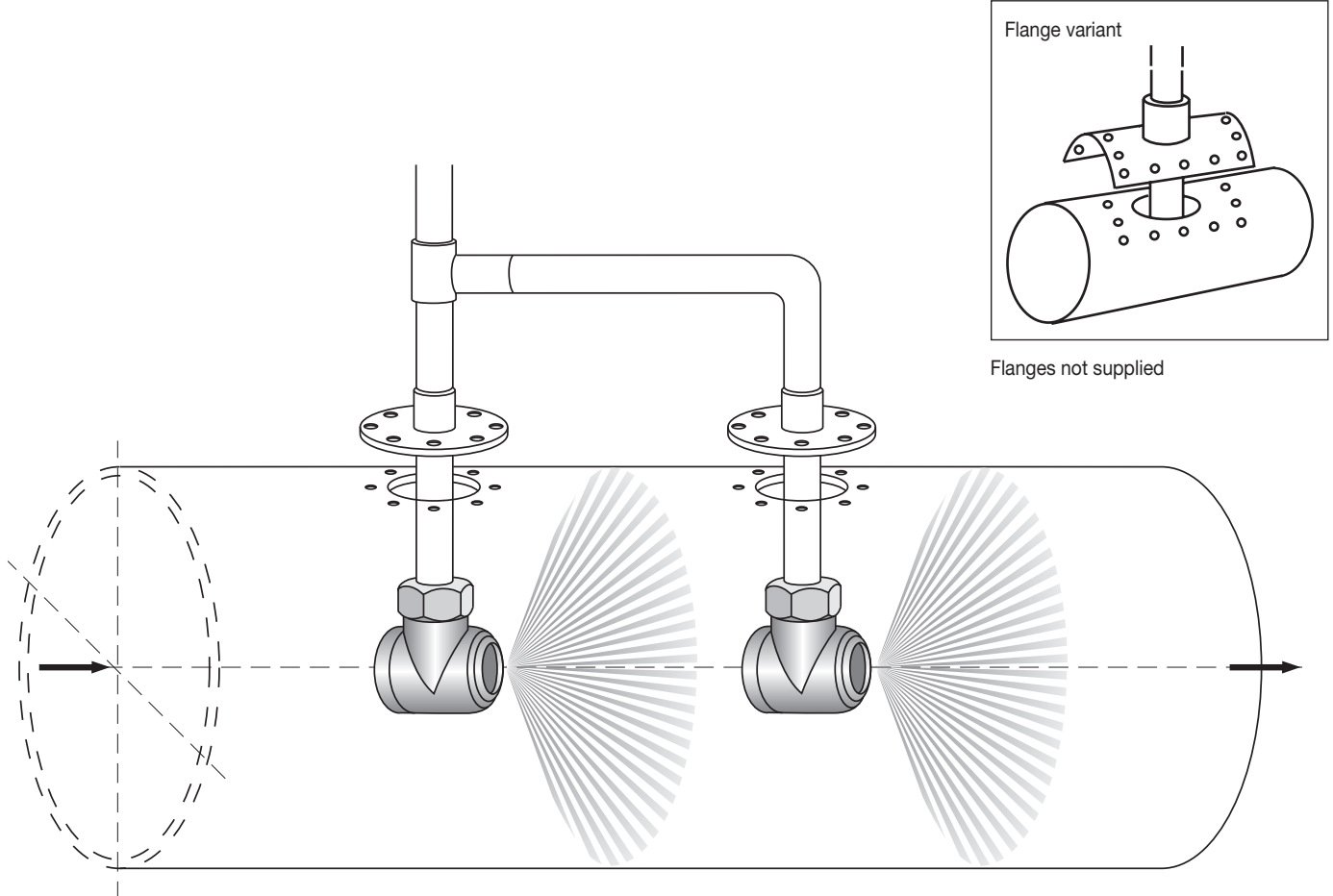
## STANDARD SPRAY NOZZLE UGN-820

### Specifications

Jam-proof design, vortex type.  
120° hollow cone jet. Spray at right-angle from water entry.  
Flow rate 13 lt/min (0.2 lt/sec) at 1 bar, 26 lt/min (0,4 lt/sec) at 4 bar.  
Coupling 3/4" gas female. Case material brass.  
To be mounted at right-angle to spray, on center of ductwork.  
Dimensions 39x32x58mm.  
Weight 400g.



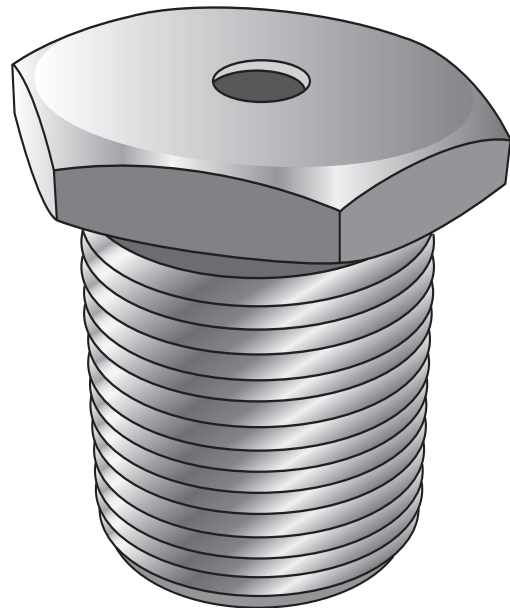
### mounting details



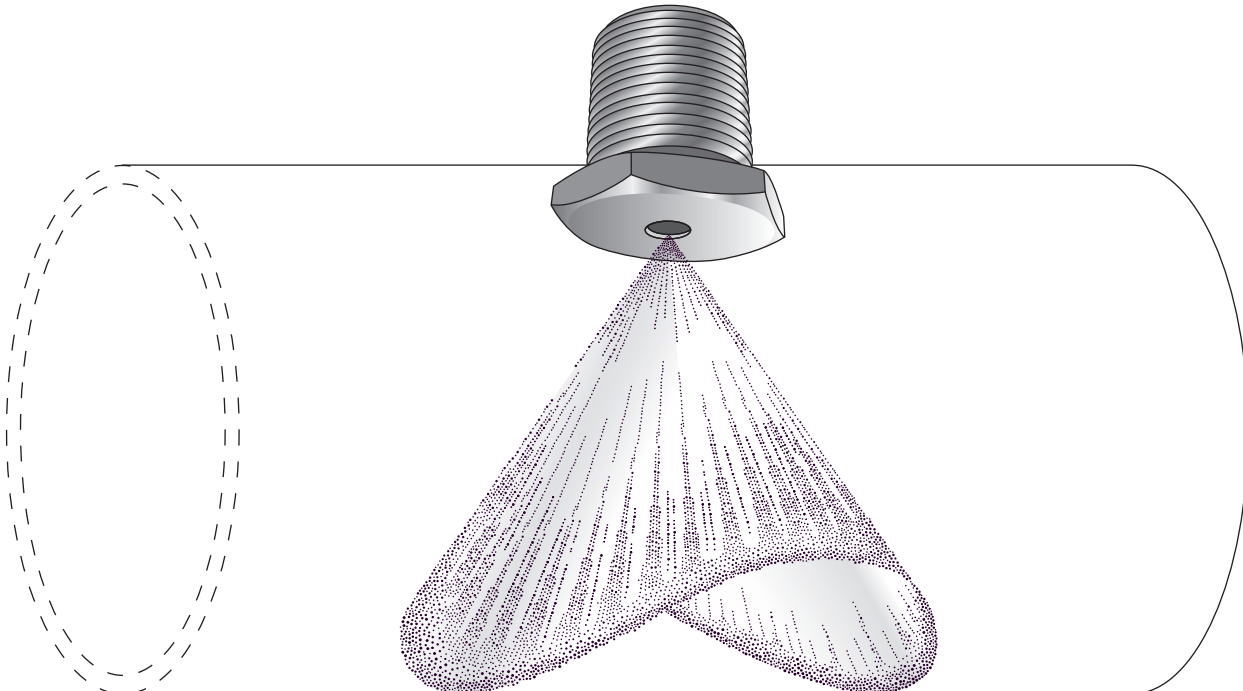
## AXIAL SPRAY NOZZLE UGN-820A

### Specifications

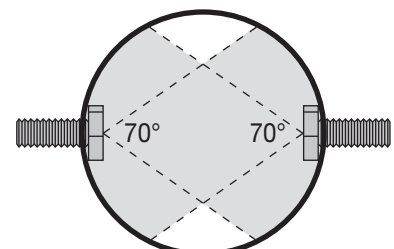
To be mounted on surface of ductwork.  
It is used in applications where it is necessary to avoid bulky in the duct because of the type and the quantity of transported material (eg fibers, paper, leather).  
70° hollow cone jet.  
Spray jet in line with water entry.  
Flow rate 11 lt/min (0.2 lt/sec) at 1 bar, 25 lt/min (0,4 lt/sec) at 4 bar.  
Coupling 3/4" gas male. Case material brass.  
Dimensions Ø40xH35mm.  
Weight 130g.



### mounting details



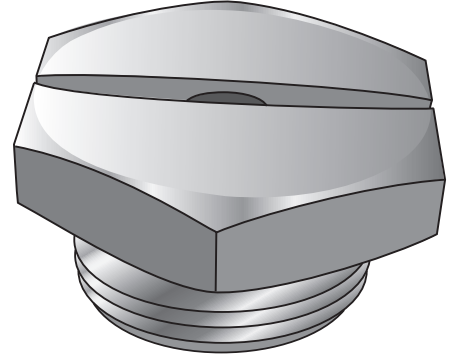
Note: install a pair of nozzles to achieve an effective extinguishing barrier. The two nozzles of the pair are mounted on the sides, horizontally opposite each other.



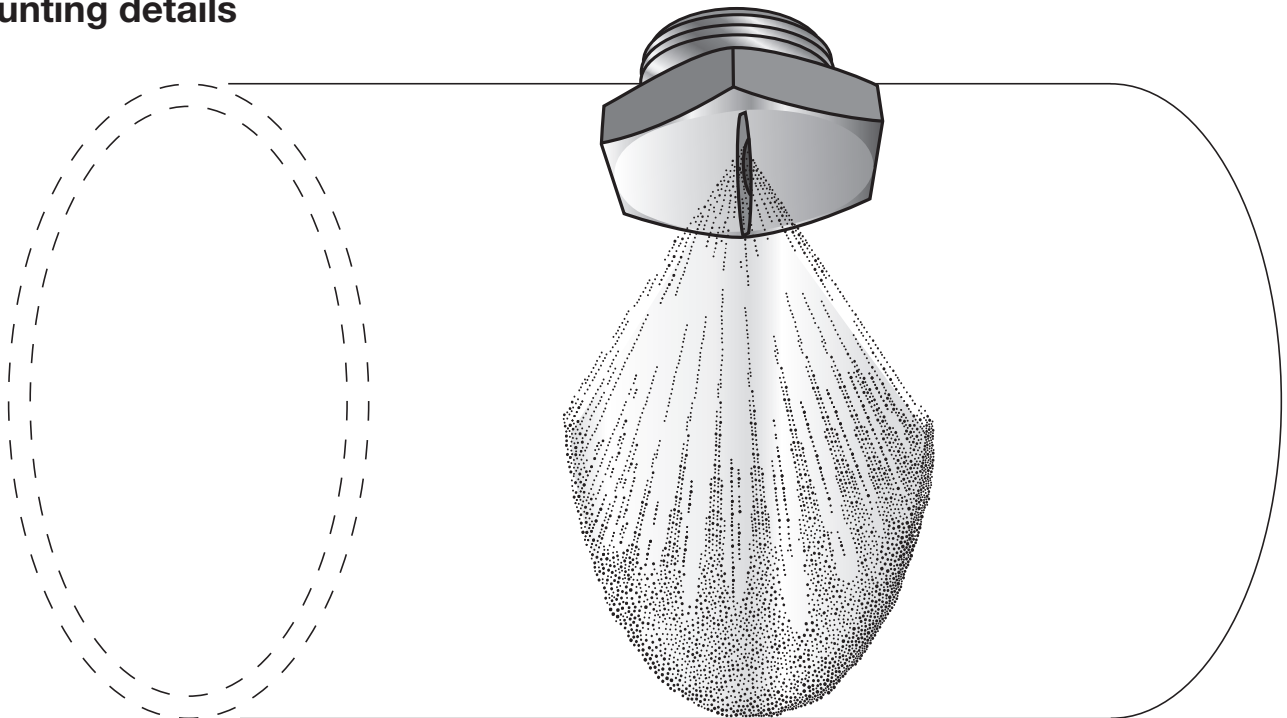
## FLAT JET SPRAY NOZZLE UGN-820P

### Specifications

To be mounted on surface of ductwork.  
Used for special applications.  
90° flat jet.  
Spray jet in line with water entry.  
Flow rate 14 lt/min (0.2 lt/sec) at 1 bar, 28 lt/min (0,4 lt/sec) at 4 bar.  
Coupling 3/4" gas male.  
Case material brass.  
Dimensions Ø40xH15mm.  
Weight 70g.

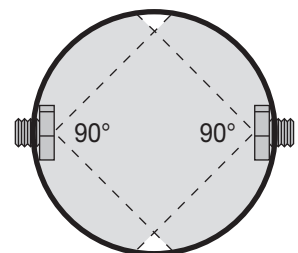


### mounting details



**CAUTION:**  
during installation of the nozzle,  
ensure that it is in such a way  
that the direction of the jet is  
perpendicular to the duct.

Note: install a pair of nozzles to  
achieve an effective extinguishing  
barrier. The two nozzles of the pair  
are mounted on the sides,  
horizontally opposite each other.

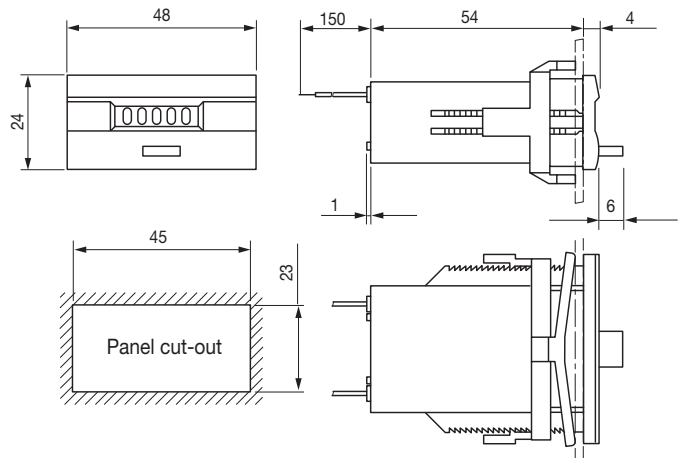
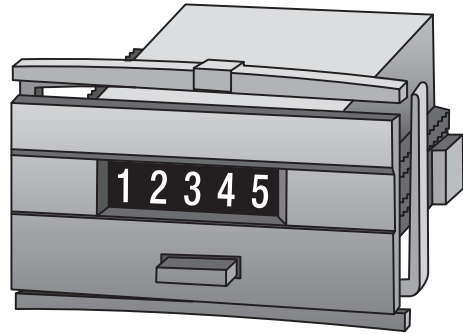


# PULSE COUNTER CON-844

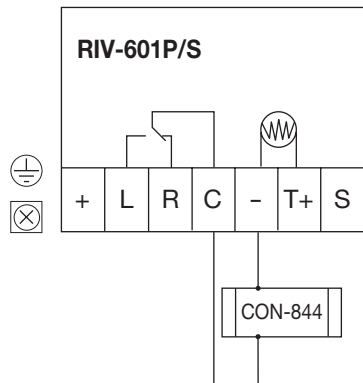
Counts the number of alarms and extinguishing operations.

## Specifications

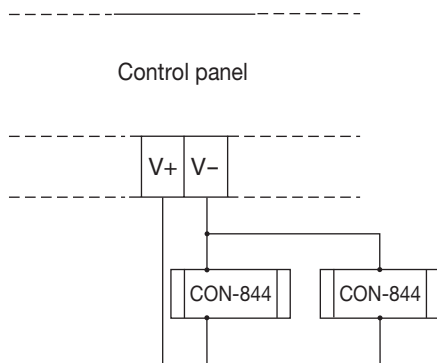
- 5 digits. Manual reset.
- Panel mount with mounting clip.
- Power voltage 24Vdc 0.55W.
- Electrical wiring on free leads.
- Dimensions 48x64xH24mm.
- Weight 130g.



## ELECTRICAL WIRING



To count all the spark detector alarms



To count all the extinguishing operations

## EXTERNAL TEST LAMP UNIT LAM-612P

CE II 3D T85°C

### Description

Designed to test the RIV-601P/S spark detector window integrity against dust and dirt build-up.

Its use is recommended when internal test cannot be reliable because of window being covered or darkened.

Its mounted like a spark detector, using the same SAM-871 mounting unit, over the duct in the opposite position, so as it will be in front of the spark detector.

The LAM-612P unit includes an incandescent bulb whose light is made pulsing by a modulator circuit at a particular frequency which is recognised by the spark detector.

On the LAM-612P terminal block wiring is on the same - and T+ terminals (5-6) as on RIV-601P/S spark detector.



### Specifications

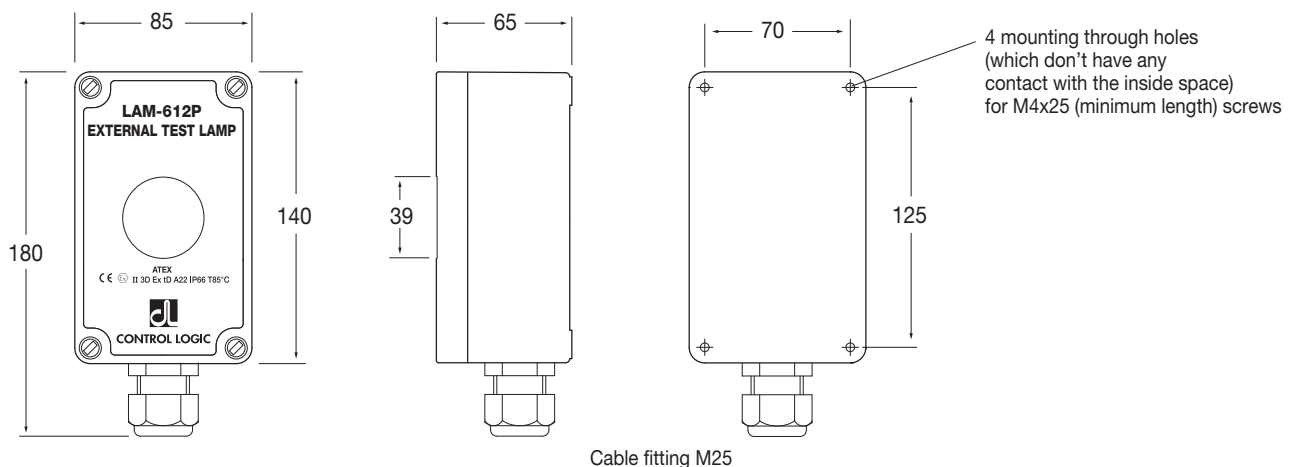
Cast aluminium case with IP66 protection (dust and water spray). Power voltage 24Vdc  $\pm$  15% 50mA (TEST pulse: a short pulse simulates a spark).

Electrical wiring on terminal block. Only - and T+ terminals are used (positions 5-6).

Weight 700g.

Model complying with 94/9 Atex directive suitable for application on zone 22

CE II 3D Ex tD A22 IP66 T85°C.



Notes: In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is  $1 \div 1.5\text{Nm}$ .

## EXTERNAL TEST LAMP UNIT LAM-612P

### OPERATING INSTRUCTIONS

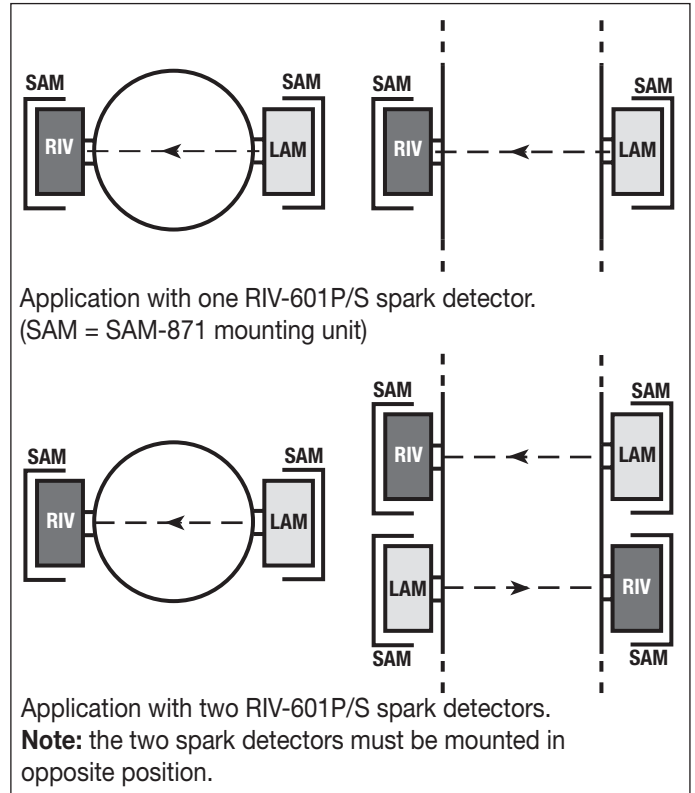
The LAM-612P unit is operated when the Test key on the control panel is depressed.

The control panel must be independent from the spark detector system control panel.

This is very important in order that both the external and the normal internal test can be performed.

In fact, if the external test gets no response by spark detector, the internal test allows to verify if the detector is healthy, and then the optical window is dirty, or if it is faulty, and a check is needed.

When in operation, the LAM-612P unit delivers a 90° wide and modulated light beam, which can excite a RIV-601P/S spark detector at a 2m distance (provided all windows are clean).



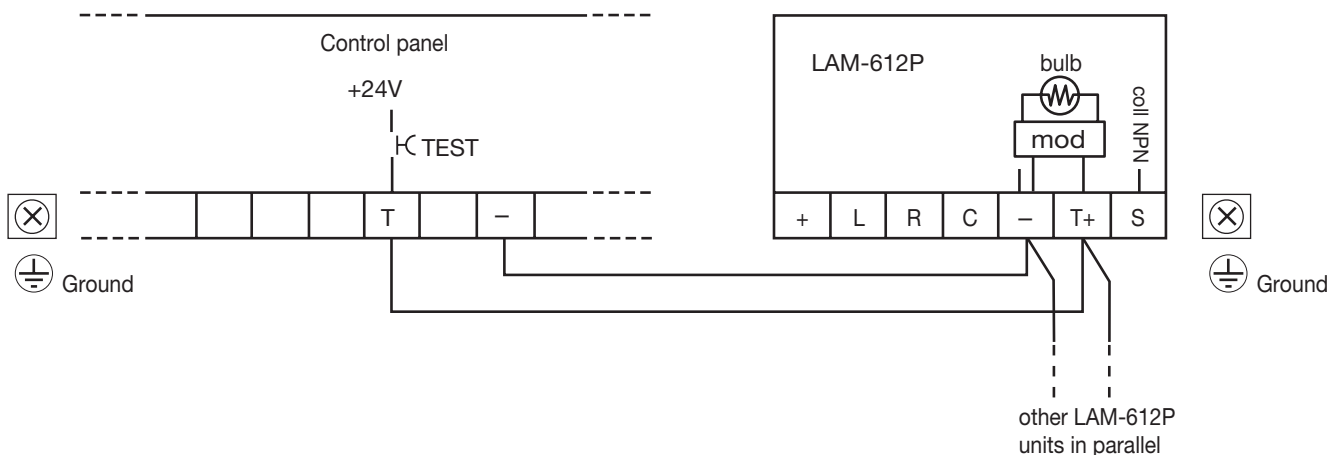
### ELECTRICAL WIRING

It is highly recommended to connect the enclosure base to a good ground line using the **ground** terminal provided inside up on the left. Then, connect base and cover using the ground terminal provided inside the base lower on the right and the ground terminal provided inside the cover lower on the left.

All the ground terminals are signalled by ground label. ⊕

The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet.

The yellow-green ground conductor must be longer than the other conductors.



The “S” terminal must be left open

Note:

The LAM-612P unit can be also used to test the **IR flame detector RIV-601P/F**.

For **manual** test application the **S** terminal must be left open.

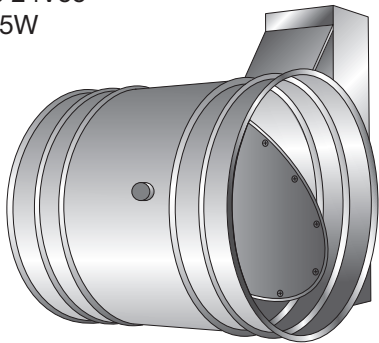
For **automatic** test application, the **T+** terminal must be connected to +24V and the **S** terminal must be connected to the S terminal of flame detector RIV-601P/F (in this case also the (-) terminal of LAM-612P must be connected to the (-) terminal of RIV-601P/F).

With this connection the flame detector will react by generating a short 0.5 sec. pulse every 4 sec. and will allow the alarm panel to recognise the stand by state (short pulses) from the fire alarm state (permanent on).



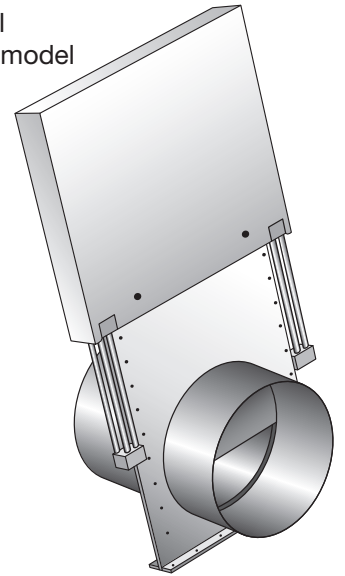
## ELECTRO-PNEUMATIC DUCT VALVE SER-851 butterfly type

Diameters from 100 to 1000mm  
 Galvanized or stainless steel  
 Standard or ATEX (zone 22) model  
 Normal air pressure 6 bar  
 Solenoid voltage 24Vcc  
 Solenoid power 5W



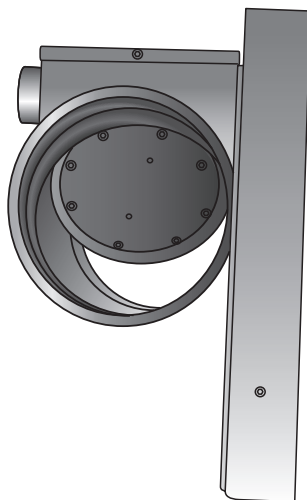
## ELECTRO-PNEUMATIC DUCT VALVE SER-852 slide type (or sash type)

Diameters from 100 to 800mm  
 Galvanized or stainless steel  
 Standard or ATEX (zone 22) model  
 Normal air pressure 6 bar  
 Solenoid voltage 24Vcc  
 Solenoid power 5W



## ELECTRO-PNEUMATIC DUCT VALVE SER-853 flapper type (fold-away type)

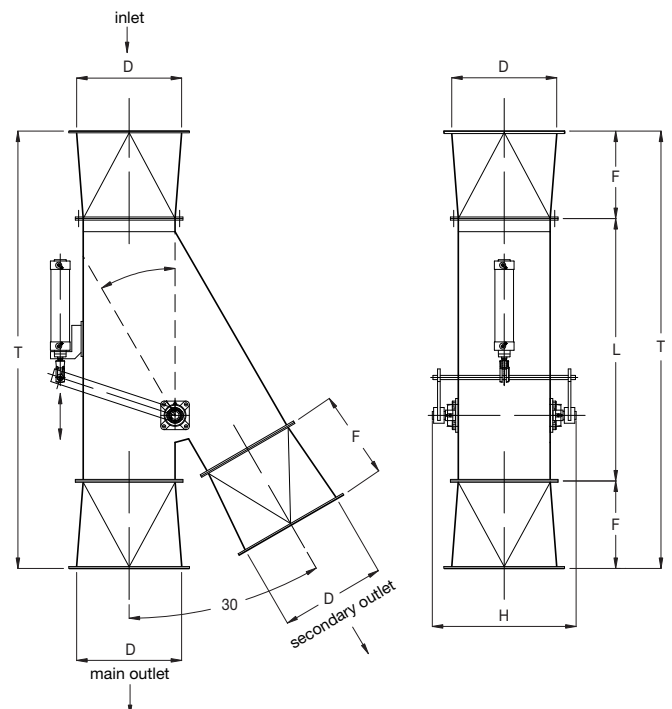
Diameters from 150 to 600mm  
 Galvanized or stainless steel  
 Standard or ATEX (zone 22) model  
 Normal air pressure 6 bar  
 Solenoid voltage 24Vcc  
 Solenoid power 5W



## FAST THREE-WAY FIRE DUCT VALVE SER-854

Diameters on demand  
 Galvanized steel  
 ATEX model not available  
 Normal air pressure 6 bar  
 Solenoid voltage 24Vcc  
 Solenoid power 5W

D = duct diameter  
 L = valve length  
 H = lateral dimensions  
 F = flange length  
 T = total length



# **SPARK DETECTORS**

**application manual**



**CONTROL LOGIC**



# SPARK DETECTORS

## application manual

### SUMMARY

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• Mechanical installation of the spark detector system.....	8 MASP
• Mounting of the spark detector RIV-601P/S with SAM-871 frame .....	9 MASP
• Installation of spray nozzle UGN-820.....	11 MASP
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• Preventive maintenance .....	16 MASP
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## THE CONTROL LOGIC SPARK DETECTOR SYSTEM

The spark detector is used for surveillance of the dust extraction ductwork connected to the silo and to neutralize every spark before it can ignite the silo. The spark detection system then comprises one or more detectors, an automatic extinguishing group and possibly a monitoring station.

When a burning particle passes in front of the detector, the built-in relay is operated for 3sec, a sound light alarm is turned on, the solenoid valve of the extinguishing group turns open and the nozzle sprays water for 3sec, usually long enough to extinguish the burning particle. The monitoring station, if present, comprises other spark detectors located downstream from the extinguishing group, and triggers an alarm if a spark is not extinguished in order to stop the fan and/or shut off the duct valve.

The spark detector is mounted on the external surface of the duct, using the mounting frame, which consists of a metal shell in two pieces, carrying inside an anti-vibration rubber cushion. In the base to be fixed to the duct is a tempered glass window through which the spark detector will see inside the duct. The lid closes with four handle screws and allows quick opening for inspecting and testing.

The spray nozzle of the extinguishing group is installed inside the duct and positioned in the center so as to spray in the same direction as the air flow towards the silo.

The solenoid valve that controls the water flow to the spray nozzle, is installed outside the duct, as near to the nozzle as possible.

A flow switch can be mounted upstream of solenoid valve, to monitor the water flow to the nozzle and give an alarm in case of leak of water due to a fault inside the valve.

It is very important that the spray nozzle should be placed at right distance from the extinguishing spark detector, to allow for the time taken by the water to reach the inside duct. While electronic circuit delay time is negligible, water takes at least 0.2 sec to form the spray, and this time varies with the pressure. If we consider an air speed of 15-30m/s inside the duct, and water pressure of 3-4 bar, a distance of 15m between detector and nozzle is advised, though the minimum distance may be less, down to 6m.

The graph on page MASP 13 shows the minimum distance for various air velocities.

When duct is short and just allows for the minimum distance we recommend to increase water pressure to 5-6 bar.

In addition to the extinguishing operation, it may be advisable to close the duct by an electro-pneumatic fire damper valve, mounted downstream from the nozzle and the monitoring detectors, and controlled by either the extinguishing or the monitoring detectors.

The delay time of the duct valve should also be considered and then be placed at a sufficient distance. The closing time depends on the size, but we suggest to consider a time of 0.5-1 sec. The distance from the spark detectors should therefore be 15-30m.

It may also be advisable to stop the fan of the dust extraction system, under control of the extinguishing or the monitoring spark detectors.

The control panel supplies the stop command to close the duct valve and stop the fan.

The monitoring function performed by the spark detectors downstream from the nozzles, along with the flow switch that monitors the water flow to the nozzles, is very important because it provides a higher level of safety and signals when a spark is not extinguished.

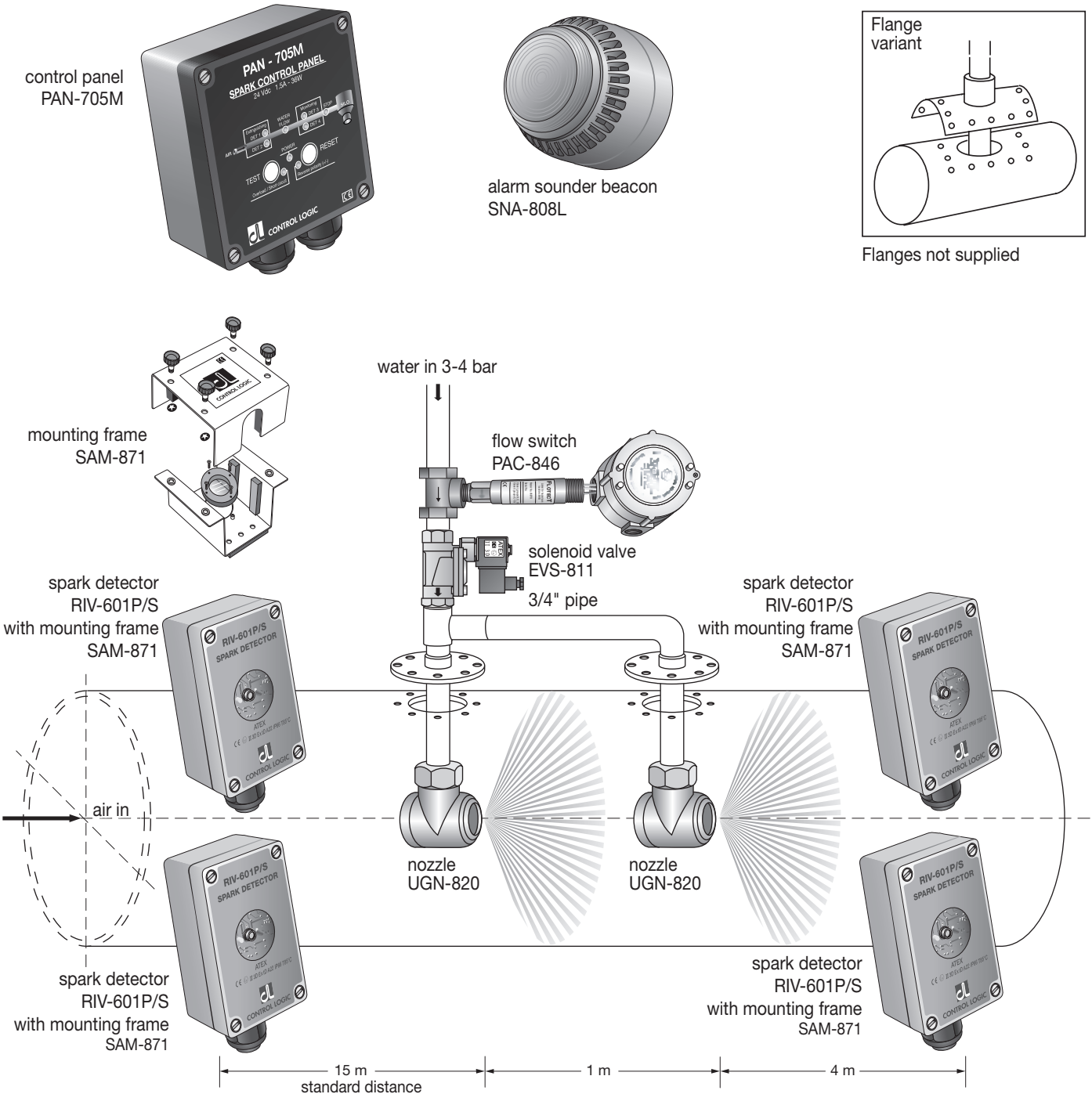
Reasons are many: faulty detectors, wiring problems, faulty solenoid valve, dirt blocking valve membrane, water pressure too low (1 bar or less), burning particle too large or big fire, etc. In these cases the system stops the fan, closes the duct valve, if any, and requires action by the operator for manual reset.

Remote testing is provided. When the TEST button on the control panel is pressed, a filament bulb lights inside each spark detector and is interpreted by the sensor as a spark. Therefore the whole system comes into operation: the solenoid valve turns open and the water nozzle sprays for 3 sec. The stop command is also activated and the sound alarm sounds until the operator presses the RESET button. The TEST function makes initial start-up operations easy and allows the system to be checked at any time.

The control panel, that must be powered by an external 24Vdc power supply, supplies the 24Vdc power to the detectors, signals the operation of the spark detectors, the water flowing through the nozzles, and the alarm for unextinguished spark. The control panel houses the relays that control the extinguishing operation, the sound light alarm, the duct valve closure and the fan stop. It also contains the remote test button and the manual reset.

# SPARK DETECTOR SYSTEM

## system diagram



### DETECTION

See page MASP 13  
 for minimum distance between  
 detection and extinguishing

### EXTINGUISHING

### MONITORING

### Note:

After the monitoring station an electro-pneumatic duct valve can be mounted to shut off the duct.

## DIMENSIONING OF SPARK DETECTOR SYSTEM

The elements to be considered for dimensioning the system are the following:

- Ducting: diameter, length and air speed.
- Safety level required: with or without monitoring station.
- Water: pressure.

The duct diameter determines the choice between single detector and pair.

Up to 500mm diameter, the duct is considered small and a single detector is sufficient (small systems type "A" and "E1"). Over 500mm diameter the duct is considered large and a pair of detectors is required (large systems type "B" and "E").

The safety level required determines the choice between systems that perform only detection and extinguishing operations (simple systems type "A" and "B") and those that also provide monitoring (complete systems type "E1" and "E").

Four systems are then available:

- **SYS-A**  
Small simple system. Extinguishing only. Single detector.
- **SYS-B**  
Large simple system. Extinguishing only. Double detector.
- **SYS-E1**  
Small complete system. Extinguishing and monitoring. Single detector.
- **SYS-E**  
Large complete system. Extinguishing and monitoring. Double detector.

The duct length must be sufficient to allow positioning of the spray nozzles, and of monitoring detectors if required. Normally 15m are required for the nozzles plus another 4m for the monitoring detectors. In all, 15 or 20m are required. If the required length is not available, consult page MASP 13, which shows the minimum distance for the spray nozzle as a function of air speed.

The air speed is an important factor for the duct length required. The usual air speed in wood-processing factories is 20-30m/s. In textile and other factories air speed is lower, 15 to 20m/s.

The system must be powered by an external 24Vdc power supply.

The water pressure is very important to a proper functioning of the extinguishing system. At least 1 bar must reach the nozzle for a continuous hollow cone jet. Account must be taken of the pressure drop in the solenoid valve ( $1/2$  to 1 bar), and of pressure drop due to the elevation of the nozzles (1 bar every 10 m of elevation).

In general a pressure of 3-4 bar on the nozzle is recommended. When the water pressure is not sufficient or unstable, it is recommended to mount a small (10-20 liter) pressurized storage tank. Water consumption is moderate.

A nozzle sprays about 1-2 liters of water in each 3 sec spray, the flow rate through the nozzles is about 30 liters per minute at 4 bar.

Naturally, account must also be taken of the water piping length before the solenoid valve. 50 meters of 3/4" pipe with a flow rate of 60 liters per minute (2 nozzles) create a pressure drop of 4 bar, whereas for a 1 1/2" pipe with the same flow rate the pressure drop would only be 1/4 bar.

To compensate for the pressure drop it is advisable to mount a 10-20 liter pressurized tank with a non-return valve.

It is also advisable to mount a manometer before the solenoid valve and beyond the tank.

A strainer and a manual shutoff valve are accessories that a good plumber will fit on his own initiative.

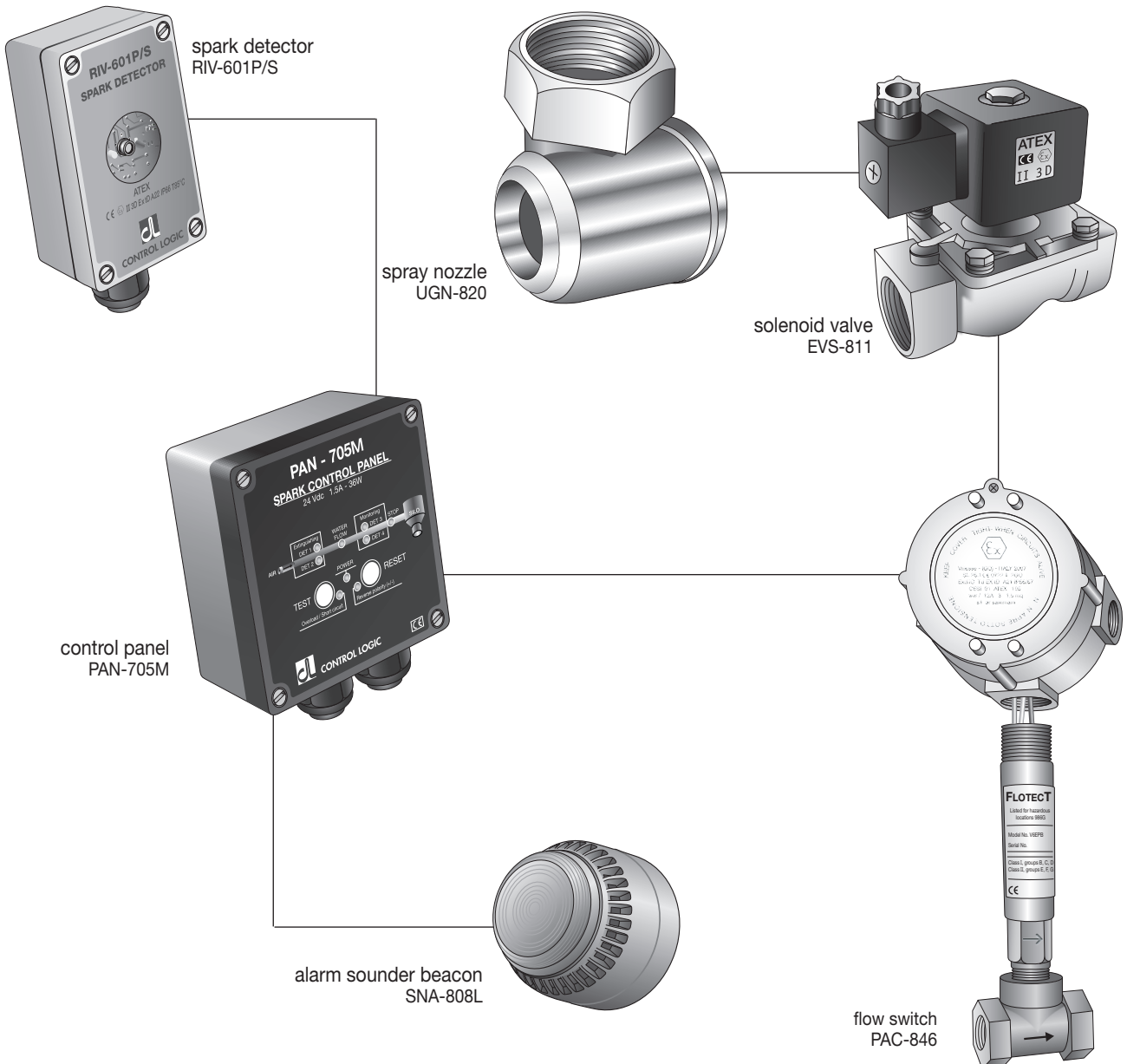
## MECHANICAL INSTALLATION OF THE SPARK DETECTOR SYSTEM

The problems of mechanical installation are mainly those of the spark detector RIV-601P/S and the spray nozzle UGN-820. The other components are installed according to general electrical and mechanical rules.

The control panel should be installed in a position convenient for the operator.  
The distance from the detectors does not matter.

Solenoid valve EVS-811 must be near the nozzle, to minimize the time required by water flowing from valve to nozzle.

The alarm light sounder SNA-808L can be mounted in the best position to attract the operator's attention, at the installer's choice.



## MOUNTING OF SPARK DETECTOR RIV-601P/S WITH SAM-871 MOUNTING FRAME

The spark detector RIV-601P/S is mounted using the SAM-871 mounting frame, which consists of a metal case in two parts: the base to be fixed to the duct, and the lid, which is closed manually by four captive knob screws. Inside both parts, rubber walls are fitted to protect detector from vibrations.

A tempered glass window with aluminum ring is provided on the center base. It is removable using the 4 screws to ease the maintenance operations.

Before replacing the window in its seat, carefully clean the gasket and the mounting surface to ensure the watertight seal. Take care not to tighten too much the screws not to damage their o-ring.

On the duct are to be made a 62mm diameter hole and six holes with appropriate size for the type of mounting (rivets, self-threaded screws or other) taking into consideration that the holes on the frame have a diameter of 6mm (see SAM-871 leaflet).

The first hole is for the detector window. The others are for fixing the base by rivets or self-threaded screws or other, avoiding as much as possible metallic parts protruding inside the duct which can pick up and accumulate long fibres.

Avoid mounting on or just after bends where the particles may be moving tangentially on one side of the ductwork.

In placing the base over the duct, make sure that the window aluminum ring enters the duct.

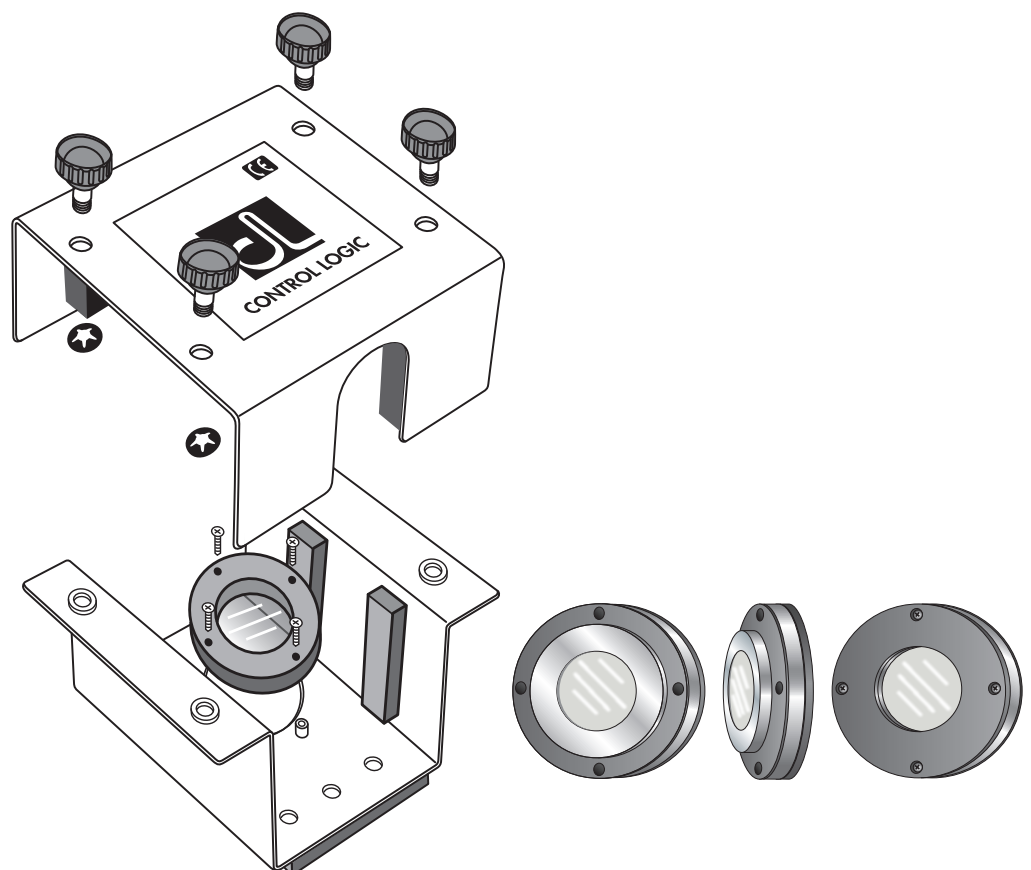
The curved surface, if important, has to be flattened or compensated by a proper adaptor.

Spark detector RIV-601P/S is simply inserted into the base, where, the rubber cushion will protect it from the duct vibration.

Naturally, the detector will first have been wired and tested, following the internal LED signal that lights up at every spark detected. Testing could be made by pressing the TEST button on the control panel or power unit, or by moving a cigarette lighter in front of the window. When inserting the detector into the base make sure it is flush with the base and central to the window, so that it can truly "see" the inside of the duct. The lid is then placed over the detector, exerting a light pressure through the foam rubber walls. The four captive knob screws are then tightened manually. Do not tighten too much.

On "small" ducts (less than 500mm diameter), where one detector is sufficient, the spark detector is mounted on the top of the duct to look downwards.

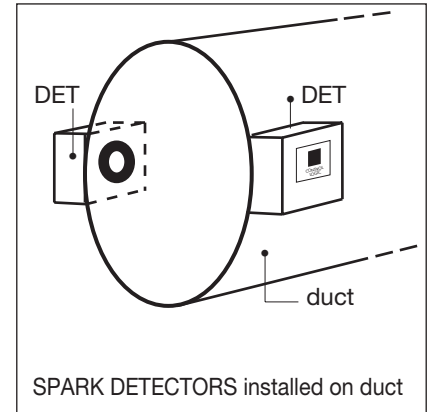
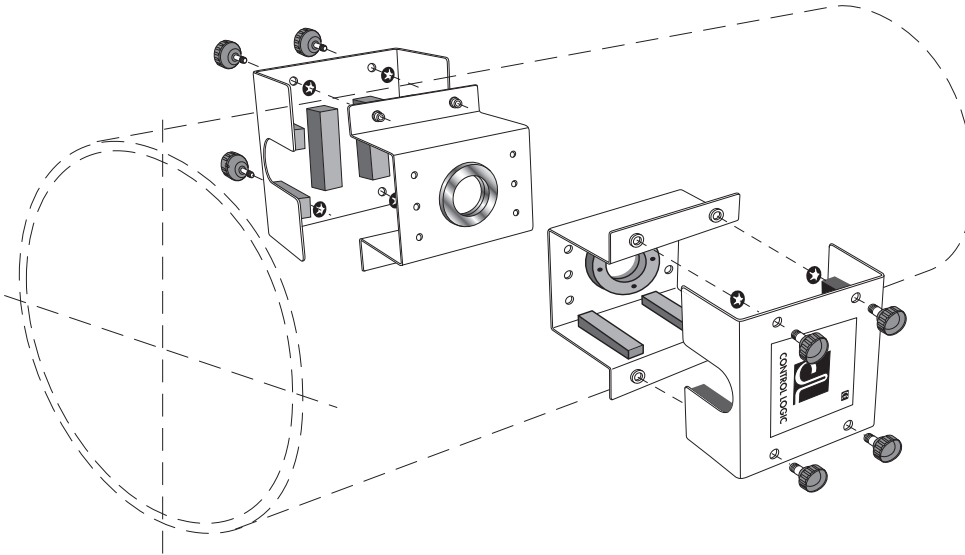
On "large" ducts (over 500mm diameter) the two detectors of the pair are mounted on the sides, horizontally opposite each other.





## MOUNTING OF SPARK DETECTOR RIV-601P/S WITH SAM-871 MOUNTING FRAME

### Double detector (pair)



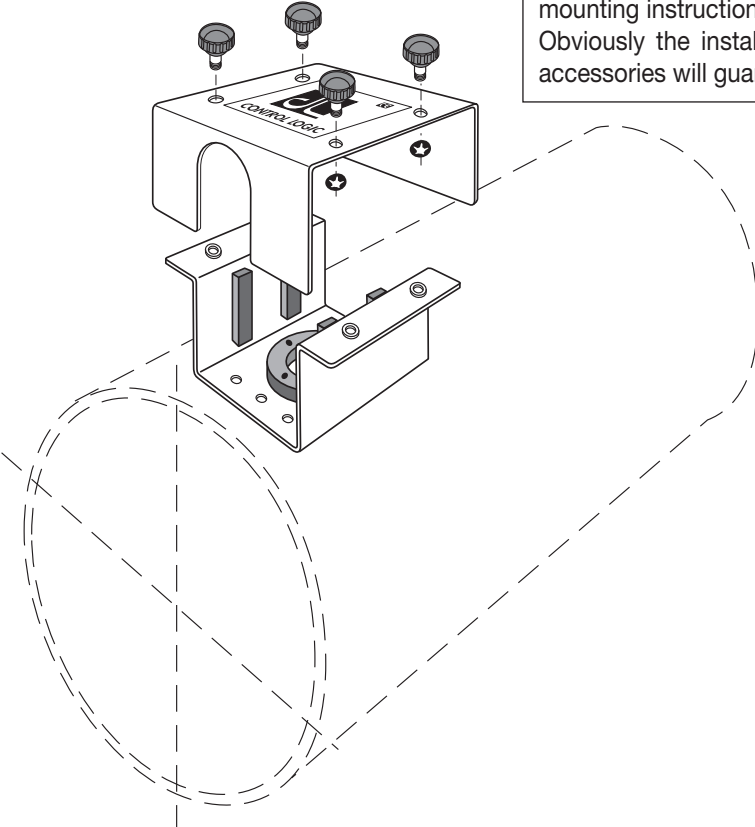
Spark detector is not installed directly over the duct but through the SAM-871 mounting frame which **isolates it** from the duct itself.

Spark detector is put inside the SAM-871 mounting frame and it sees the duct internal through two optical windows. Whatever situation will happen inside the duct does not go externally.

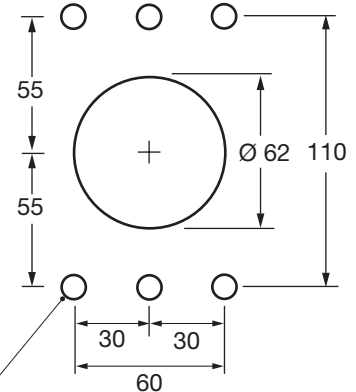
In order to assure the isolation, we strongly recommend the installer to follow the mounting instructions on pages MASP 9-10 of the application manual.

Obviously the installer must take care that mounting operations and related accessories will guarantee the perfect isolation.

### Single detector



Mounting holes on ducting  
 (dimensions in mm)



No. 6 holes with appropriate size for the type of mounting (rivets, self-threading screws or other) taking into consideration that the holes on the frame have a diameter of 6mm

## INSTALLATION OF SPRAY NOZZLE UGN-820

Spray nozzle UGN-820 is a jam-proof vortex type nozzle, with a large outlet hole (19mm diameter). It generates a 130° hollow cone jet.

Water exits at right-angle to the inlet coupling. So the nozzle must be mounted in the center of the duct in order to spray in the same direction as the air flow, towards the silo.

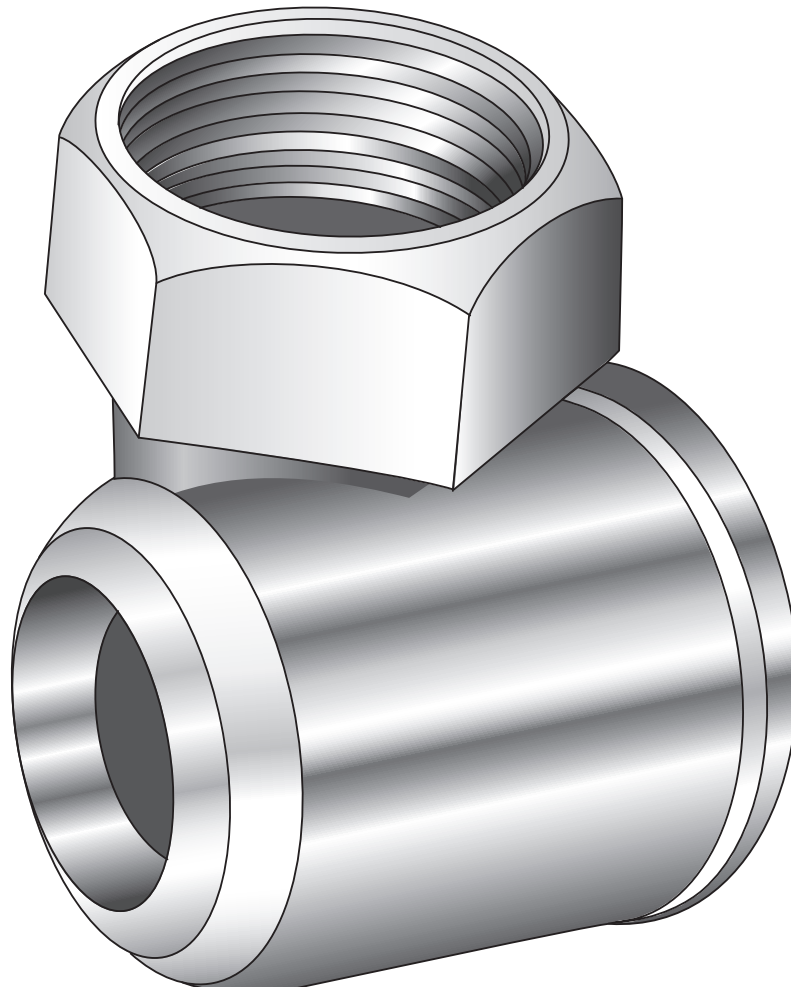
Usually it is sufficient to mount the nozzle to a small length of 3/4" piping which is fixed to the topside of the duct, where it exits and connects to the solenoid valve (and to the second nozzle piping in large systems).

Avoid mounting on the bottom side of the horizontal duct, particularly if the flow switch PAC-846 is present ("complete" systems).

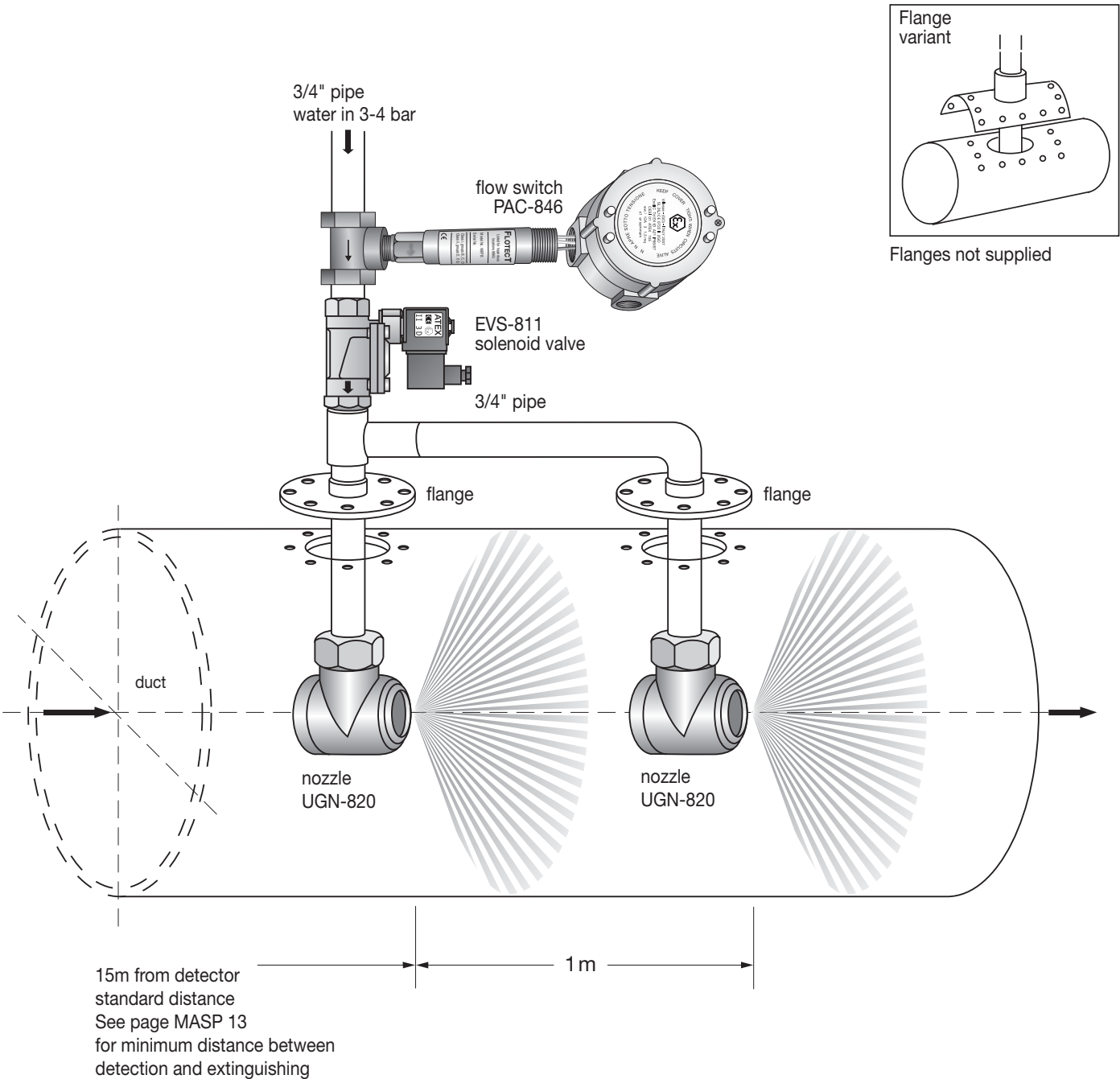
In "small" ducts (less than 500mm diameter) usually only one spray nozzle is mounted.

In "large" ducts (over 500mm diameter) two spray nozzles are parallel mounted, connected to the same flow switch and solenoid valve.

We recommend to install the nozzle at the distance specified on page MASP 13 downstream from the spark detectors that control the extinguishing operation.



## INSTALLATION OF SPRAY NOZZLE UGN-820





## DISTANCE BETWEEN SPARK DETECTOR AND SPRAY NOZZLE

The minimum distance is based on 0.2 sec delay time due to the response delay time of the solenoid valve and water travelling time from solenoid valve to nozzle (with a 3-4 bar water pressure).

The maximum distance is based on 3 sec time the spark detector is held active for each spark detected (the nozzle sprays water for 3 sec).

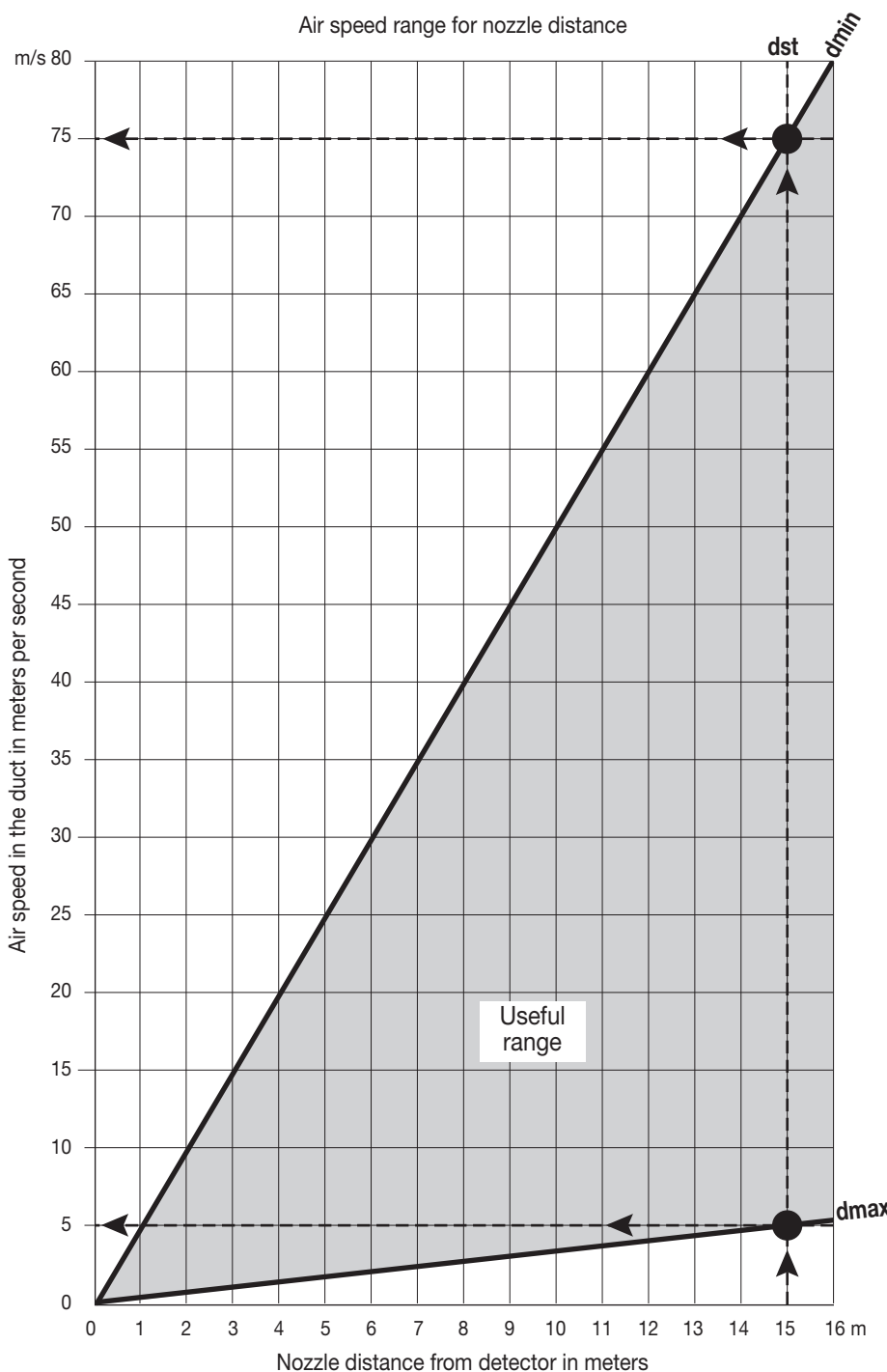
Air speed range is normally 20-30m/s for woodwork and 15-20m/s for textile or other industries.

When the available duct length is critical, a higher water pressure of 5-6 bar is suggested.

See graph and table below with details about air speed range covered by duct length available for extinguishing.

### Standard distance 15 meters

If duct length is enough, standard distance of 15 meters based on 0.2 sec delay time covers an air speed range from 5 meters per second to 75 meters per second, that is highly sufficient for most applications.



Available duct length m	Air speed range m/s (meters per second)	
	from	to
1	1	5
2	1	10
3	1	15
4	2	20
5	2	25
6	2	30
7	3	35
8	3	40
9	3	45
10	4	50
11	4	55
12	4	60
13	5	65
14	5	70
15	5	75
16	6	80
17	6	85
18	6	90
19	7	95
20	7	100

**dmin** = minimum distance line (the points are obtained by multiplying speed by 0,2)

**dmax** = maximum distance line (the points are obtained by multiplying speed by 3)

**dst** = standard distance (15meters)


Note:

if air speed is less than 5m/s, standard distance is higher than maximum distance;  
 if air speed is more than 75m/s, standard distance is less than minimum distance.



# SPARK DETECTION SYSTEM ELECTRICAL CONNECTIONS

## general guidelines

The electrical wiring must be made by qualified personnel, and in accordance with local and national rules. It is highly recommended to connect the metallic enclosure body of all the electrical equipment (RIV-601P/S, PAN-705M, PAC-846, EVS-811, etc.) to a good ground line using the ground terminals provided and signaled by ground label  .

The electrical connections for spark detector system do not present greater difficulties than are encountered in installing lights and switches.

The system must be powered by an external 24Vdc power supply.

Connections are made on terminal block, marked as per drawing.

Currents are fairly low, typically 0.1 to 0.4A. Cable size can therefore be from 0.5 to 1 mm<sup>2</sup>, chosen for mechanical strength more than for voltage loss. Better not greater than 1 mm<sup>2</sup> to avoid inserting problems at the terminal.

The electrical circuit is protected against overload and short circuit by a fast press-to-reset thermal circuit breaker (max 1.5A) housed inside the control panel.

It is also protected against reverse polarity.

See on page MASP 18 for systems type "A" and "B" electrical connections.

See on page MASP 21 for systems type "E1" and "E" electrical connections.

### Warning !!!

Fast impulsive electromagnetic noise in the factory can cause false alarms. To avoid them we suggest to take a few measures during wiring of spark detectors:

1. Good **ground** connection of metallic parts and of shields of shielded cables.
2. Keep **separate 24Vdc wiring** from higher voltage wiring (AC power line).  
If possible, run wiring through metallic tubing. Keep spark detectors wiring physically separate from other wiring (motor controls and other high power loads).

For further information see note on false alarms on pages MASP 26 and following.

## SPARK DETECTOR SYSTEM STARTUP OPERATIONS

### General considerations

After connections of all system components have been made, following the corresponding electric diagram (see page MASP 18 for systems type "A" and "B", page MASP 21 for systems type "E1" and "E"), some checking procedures must be undertaken in order to ensure a correct operation of the system.

It must be ensured that the extinguishing detectors and the monitoring detectors have been connected to the control panel each in the proper position.

For this purpose, the detector must be kept out of the mounting frame so as to cause the alarm by exposing it to the external light or by lighting a flame in front of the optical window.

This way you can check the answer of each detector and make sure its exact position by checking that the detector alarm will turn on its LED on the control panel.

Subsequently, after placing the detectors inside of the mounting frame, execute the TEST by briefly pressing the corresponding push button on the control panel.

The DET LEDs related to the detectors will turn on for 3 sec, the alarm sounder will sound for 3 sec and the nozzles will spray water for 3 sec.

Make sure the water actually flows by checking the pressure gauge or observing that the WATER FLOW LED on the control panel turns on for three seconds if the PAC-846 flow switch has been installed.

After 3 seconds, check the activation of the MEMORY function: both the DET LEDs corresponding to the detectors gone in alarm and the WATER FLOW LED (if the PAC-846 flow switch is present) blink signaling that there was an alarm.

The LEDs will continue to blink until the manual reset through the RESET pushbutton.

Remember that in complete systems "E1" and "E" the TEST sequence makes the sound alarm permanently on, and that a manual RESET is required to switch off the alarm and the fan STOP control.

The normal spray of about 2 liters of water per operation does not affect the silo, provided that it does not occur too frequently.

### **Our statistics shows that on average a spark passes every two hours.**

Obviously the spark frequency greatly depends on the type of process and the conditions of the machinery. The machines that most frequently produce sparks include sanders, multi-blade cutters and waste wood chippers.

### Alarm MEMORY function

The DET and WATER FLOW alarm signal LEDs remain lit for the duration of the alarm: DET steady red light for all the alarm time (standard 3 sec), WATER FLOW steady blue light for all the water flow time (standard 3 sec).

When the alarm ends, these LEDs maintain a blinking light signal.

In this way is always available the indication that one or more detectors (and which) went in alarm and that there was a flow of water.

This function does not preclude nor interfere with the operation of the system in each of its components.

If a detector (or the flow switch) goes in alarm while the relative LED is blinking for a previous alarm, the same will turn on with a steady light for the duration of the alarm to return to the blinking state at the end of the alarm.

To reset the memory and consequently bring the LED signals back to the stand-by state, press the RESET pushbutton.

The MEMORY function can be deactivated / activated through individual switches for each LED (5-way DIP switch on the front panel circuit).



## PREVENTIVE MAINTENANCE

Preventive maintenance of the spark detector system is generally not required for the following reasons:

- Detectors generally do not get dirty. It has been found that the air flow in the duct keeps the glass window of the detector mounting frame clean. It must be checked during the first days of operation and periodically.
- Detectors are little affected by dust, since the infrared (IR) thermal radiation emitted by incandescent bodies are much less attenuated than light.
- Spray nozzles are jam-free, since they are vortex type and have a large water outlet of 19 mm diameter.
- Periodic use of TEST operation and the control panel LED indicators allows any malfunctions to be discovered.
- Water leaks on the solenoid valve, due to electrical or mechanical malfunctions, if flow switch PAC-846 is provided, are signalled by the sound alarm and the WATER FLOW LED on the control panel.

In some special applications where dust is sticky and has tendency to adhere to the detector window, we suggest to install the APU-874 air purging unit and the LAM-612P external test lamp unit.

Dirt in water supply or piping threading waste can sometimes cause the solenoid valve diaphragm malfunction. We recommend the FIL-817 strainer, or other, to be mounted before the solenoid valve.

### Care must also be taken over frost.

Frost stops water flow and damages solenoid valve and flow switch. The following precautions are recommended:

- As far as possible, install the extinguishing group and its water piping inside the factory building.
- Outside, use insulated piping and create an insulating box around flow switch and solenoid valve.
- When the factory is closed down for night or holidays, shut off the water supply and keep the piping empty.
- If possible, use a Pyrotenax or other heating cable over piping for frost protection, with an outside temperature controller set to +5°C.
- Hot water from the heating system could also be used to heat the extinguishing group and prevent frost. Also a small pressurized reservoir containing anti-frost liquid mixed to water is a valuable solution.

### Excess water

The extinguishing water entering the duct could be too much so as to flooding the silo, or worse, to damage sensitive electrical equipment, such as fan motor, etc.

Therefore it is necessary to install on the duct one or more discharging valves which will carry the water in excess into the main waste water ducting.

# SPARK DETECTOR RIV-601P/S

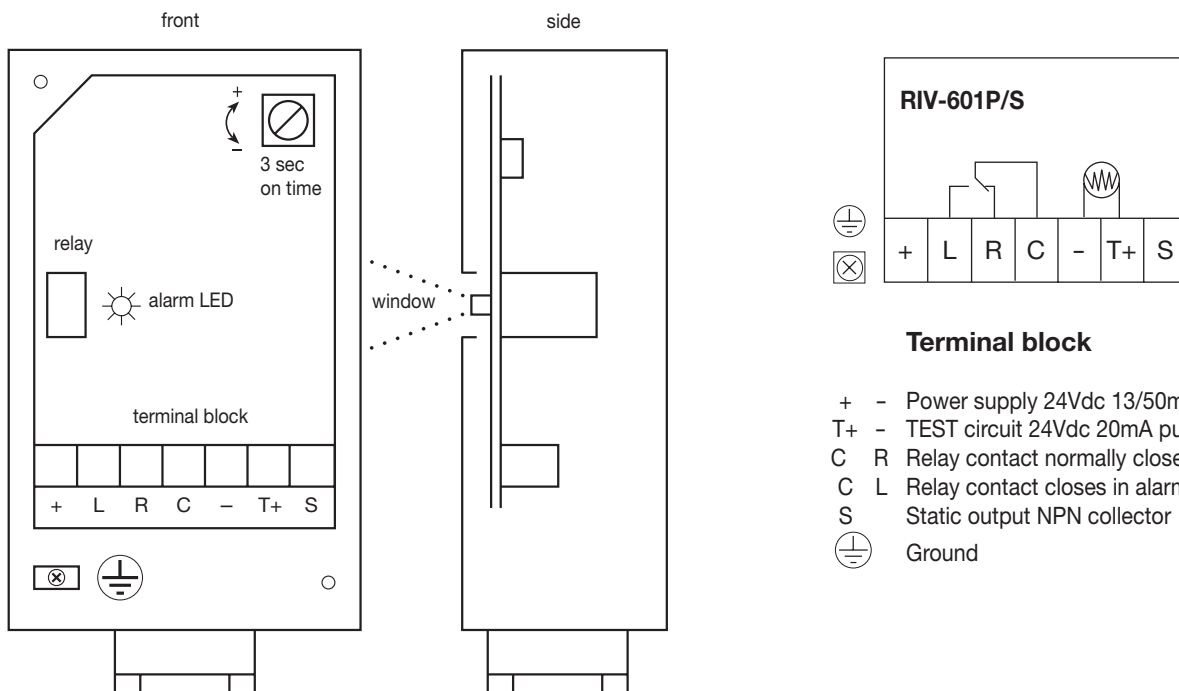
## electrical connections

The detector case lid is closed by four screws.  
 The electrical wiring on the terminal block is to be made following the terminals marking and the system diagram.  
 See page MASP 18 and MASP 21.

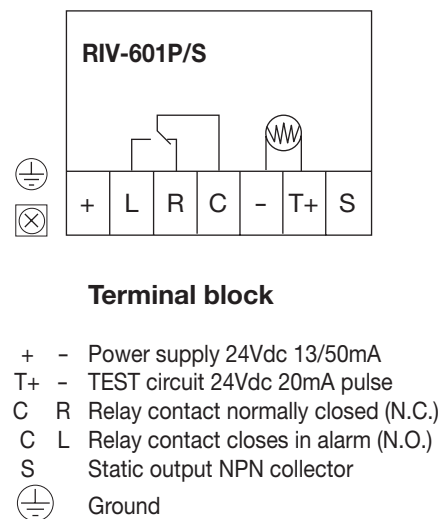
The alarm duration time setting should not be altered. The standard time is 3 sec. A different setting in the 1 to 10 sec range, if required, should be requested when ordering.

At each spark detected, the detector is held in alarm for 3 sec.  
 The internal LED lamp lights up, indicating the relay is energized.  
 A power-on delay is provided, which holds the detector inactive for about 3 sec when power voltage is applied.  
 The detector functioning could be checked by the TEST button on the control panel, or by a cigarette lighter in front of the detector window, or else by directing the detector towards the sun or incandescent lamp. A flash lamp could also be used.

### internal view



- + - Power supply 24Vdc 13/50mA
- T+ - TEST circuit 24Vdc 20mA pulse
- C R Relay contact normally closed (N.C.)
- C L Relay contact closes in alarm (N.O.)
- S Static output NPN collector
- ⊕ Ground



### Notes:

1. It is highly recommended to connect the enclosure base to a good ground line using the **ground** terminal provided inside up on the left. Then, connect base and cover using the ground terminal provided inside the base lower on the right and the ground terminal provided inside the cover lower on the left.  
 All the ground terminals are signalled by ground label. ⊕  
 The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet.   
 The yellow-green ground conductor must be longer than the other conductors.

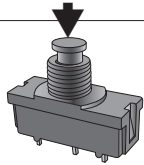
2. In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is 1 ÷ 1.5Nm.



## SYSTEMS TYPE "A" AND "B" electrical wiring

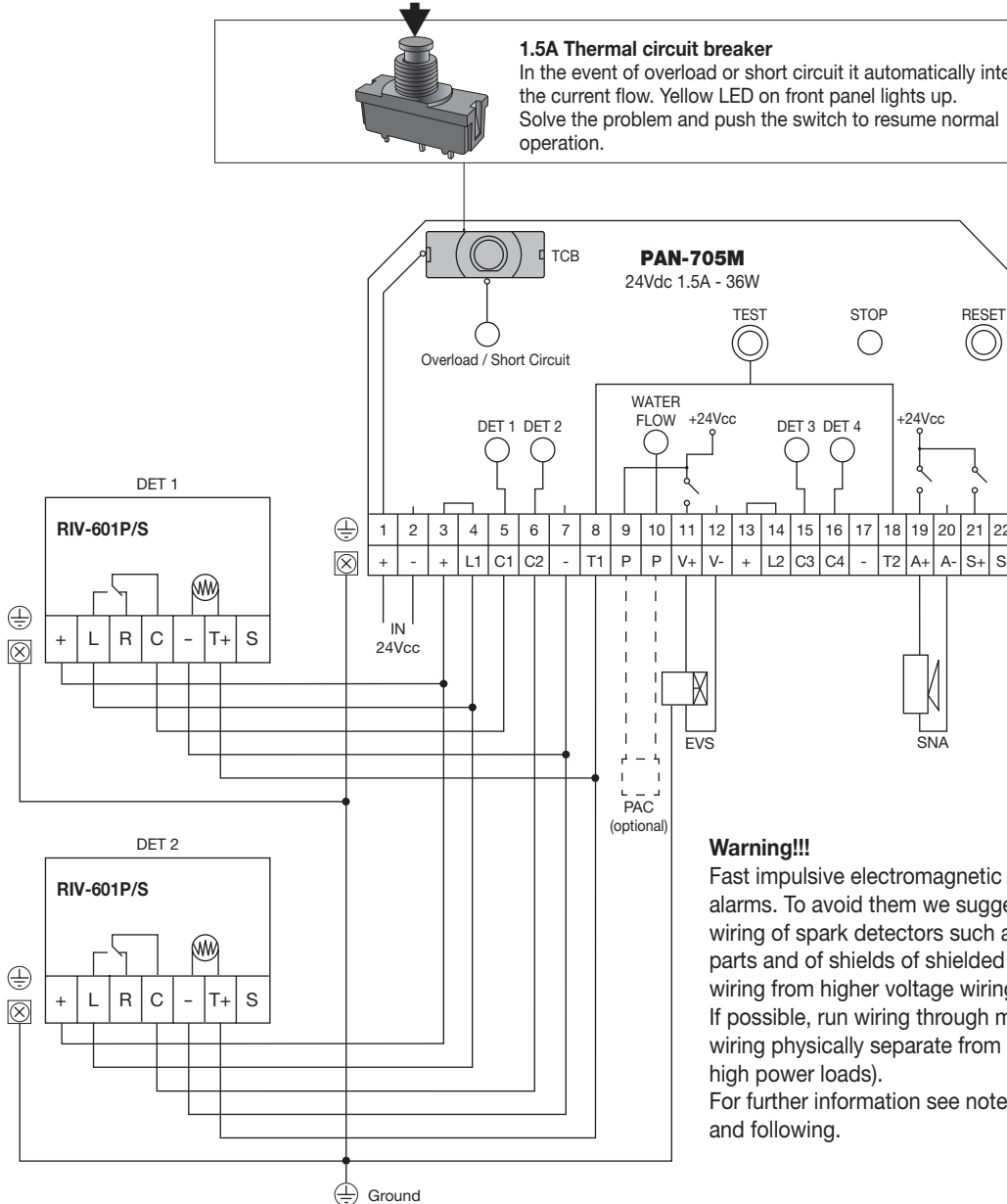
System type "A" comprises only one detector and one nozzle and it is used for "small" ducts up to 500mm diameter.  
 System type "B" comprises 2 spark detectors and two nozzles and it is used for "large" ducts over 500mm diameter.

The PAN-705M control panel allows the simple systems type "A" and "B" expanding, transforming them into complete systems type "E1" and "E".

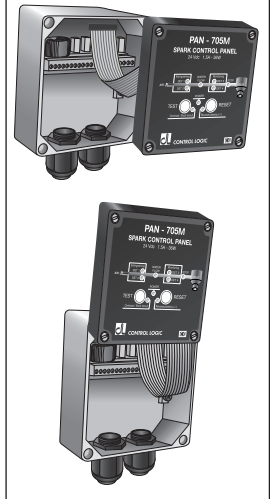


### 1.5A Thermal circuit breaker

In the event of overload or short circuit it automatically interrupts the current flow. Yellow LED on front panel lights up. Solve the problem and push the switch to resume normal operation.



The front panel should not be hung by the internal electrical connections. When you open the control panel it is suggested to place the front panel as represented by the pictures below.



### Warning!!!

Fast impulsive electromagnetic noise in the factory can cause false alarms. To avoid them we suggest to take a few measures during wiring of spark detectors such as good ground connection of metallic parts and of shields of shielded cables and to keep separate 24Vdc wiring from higher voltage wiring (A. C. power line). If possible, run wiring through metallic tubing. Keep spark detectors wiring physically separate from other wiring (motor controls and other high power loads). For further information see note on false alarms on pages MASP26 and following.

No connection on spark detectors terminal "S".

Voltage 24Vdc - max 1,5A output current.

All wiring and grounding must be done in accordance with local and national rules and regulations.

### Notes:

- It is highly recommended to connect the enclosure base to a good ground line using the ground terminal provided inside lower on the right. Then, connect base and cover using the ground terminal provided inside the base lower on the left and the ground terminal provided inside the cover lower on the right. All the ground terminals are signalled by ground label. The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet. The yellow-green conductor must be longer than the other conductors.
- In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is  $1 \div 1.5\text{Nm}$ .



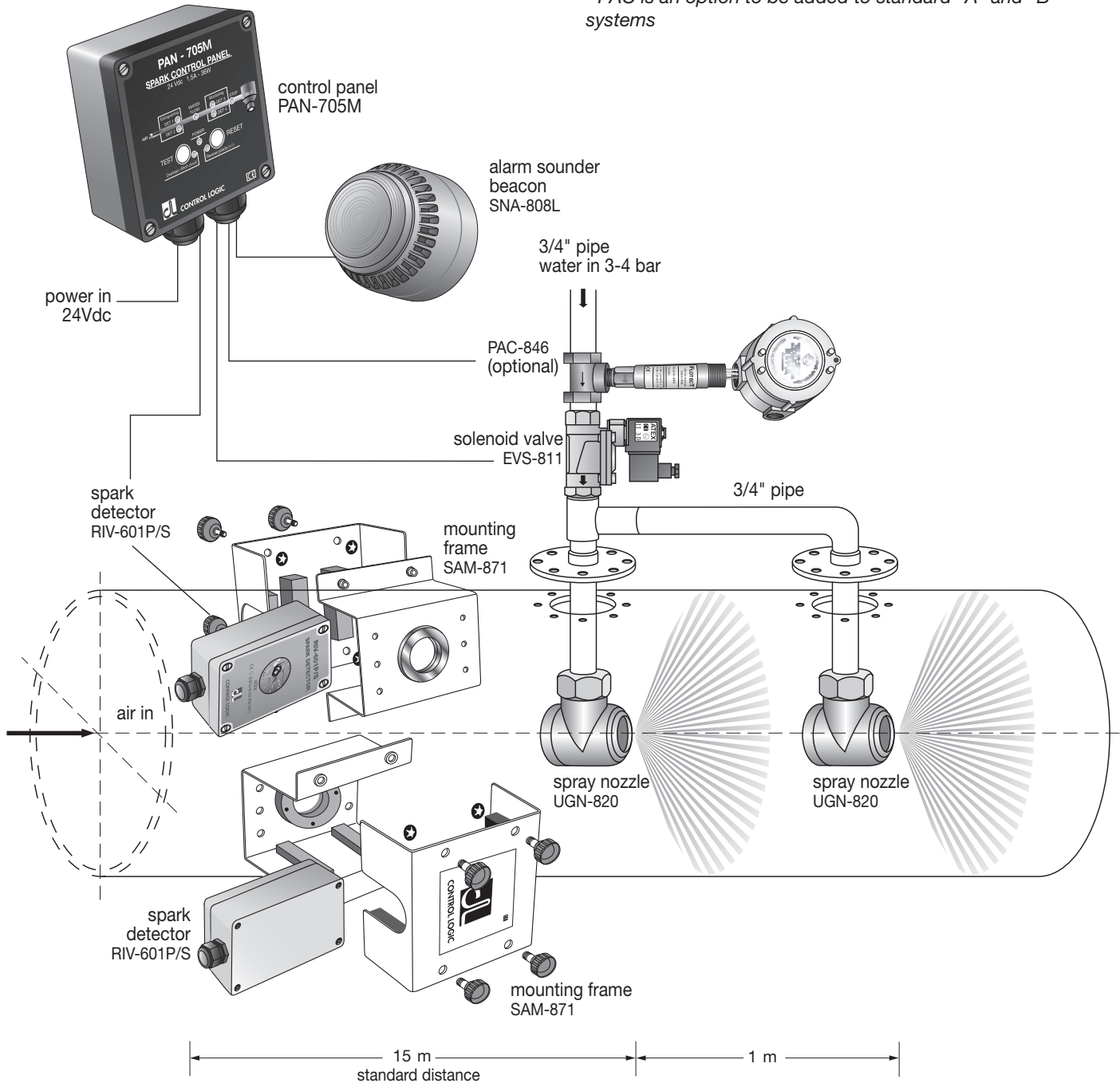
## SYSTEMS TYPE "A" AND "B" system diagram

System type "A" comprises only one spark detector and one nozzle, and is used for "small" ducts up to 500mm diameter. System type "B" comprises 2 spark detectors and 2 nozzles, and is used for "large" ducts over 500mm diameter.

### Component list:

Type "A"	Type "B"	Component
n. 1	n. 2	RIV - 601P/S Spark detector
n. 1	n. 2	SAM - 871 Mounting frame
n. 1	n. 1	PAN - 705M Control panel
n. 1	n. 1	SNA - 808L Alarm sounder beacon
n. 1	n. 1	EVS - 811 Solenoid valve
n. 1	n. 2	UGN - 820 Spray nozzle
n. 1	n. 1	PAC - 846 Flow switch*

\* PAC is an option to be added to standard "A" and "B" systems



### DETECTION

See page MASP 13  
for minimum distance between  
detection and extinguishing

### EXTINGUISHING



## SYSTEMS TYPE "A" AND "B" startup operations

It is advisable to put on the front panel of the PAN-705M Control Panel the "NOT PRESENT" labels positioned on the missed components, e.g. DET 2, DET 3, DET 4, etc. (see page DESP 13).

- 1) Check that electrical connections are correct.  
Do not open water
- 2) Apply voltage. The POWER LED will light on. All other LEDs should be off. The sound alarm should not sound and the solenoid valve should be de-energized and closed.
- 3) Execute the TEST operation. A pulse on the TEST button simulates a spark. The detectors turn active for 3 sec. The EXTINGUISHING DET LEDs light on for 3 sec, when alarm stops they blink.

The WATER FLOW LED stays off.

The sound alarm sounds for 3 sec.

The nozzle does not spray because the water supply is closed.

Remember that detectors are inactive for about 3 seconds after power voltage is applied (power-on delay).

- 4) Open the water supply. Check pressure: should be 3-4 bar at least.
- 5) Repeat the TEST sequence as per point (3). While the nozzle sprays, be sure that water really flows by observing the manometer or, if flow switch PAC-846 is provided, observing the WATER FLOW LED lighted for 3 sec. on the control panel. When alarm stops DET and WATER FLOW LEDs blink.
- 6) Press the RESET pushbutton to reset the alarm memory and bring the LED signals back to the stand-by state (LEDs turn off).

To check the sensitivity of detectors, remove them from the mounting frame and direct the front window to a light or a cigarette lighter. In this way each detector can be tested in turn, checking that the system is correctly installed.

### List of possible malfunctions

#### 1) The detector fails to operate with TEST.

Check the 24Vdc voltage on the +/- terminals of the detector and the 24Vdc voltage pulse on the "T+" and "-" terminals when pressing the TEST button.

If voltages are correct, the detector is faulty.

#### 2) The detector is permanently in alarm.

Check the 24Vdc voltage on the +/- terminals of the detector and power supply unit. If it is correct, and provided that no light falls on the detector window, the detector is faulty. If the voltage is incorrect or unstable, maybe the power supply unit is faulty. The detector circuits could generate alarm signals in response to intermittent power voltage, even if the power-on delay will eliminate most of this problem.

#### 3) The WATER FLOW LED (when flow switch PAC-846 is installed) is permanently on and the sound alarm sounds, while all other LEDs are off.

This signals a water leak in the solenoid valve due to rubber diaphragm being jammed by dirt or having a malfunction. Close the water supply and check. If necessary, open the solenoid valve body.

#### 4) One or more LEDs do not blink after an alarm.

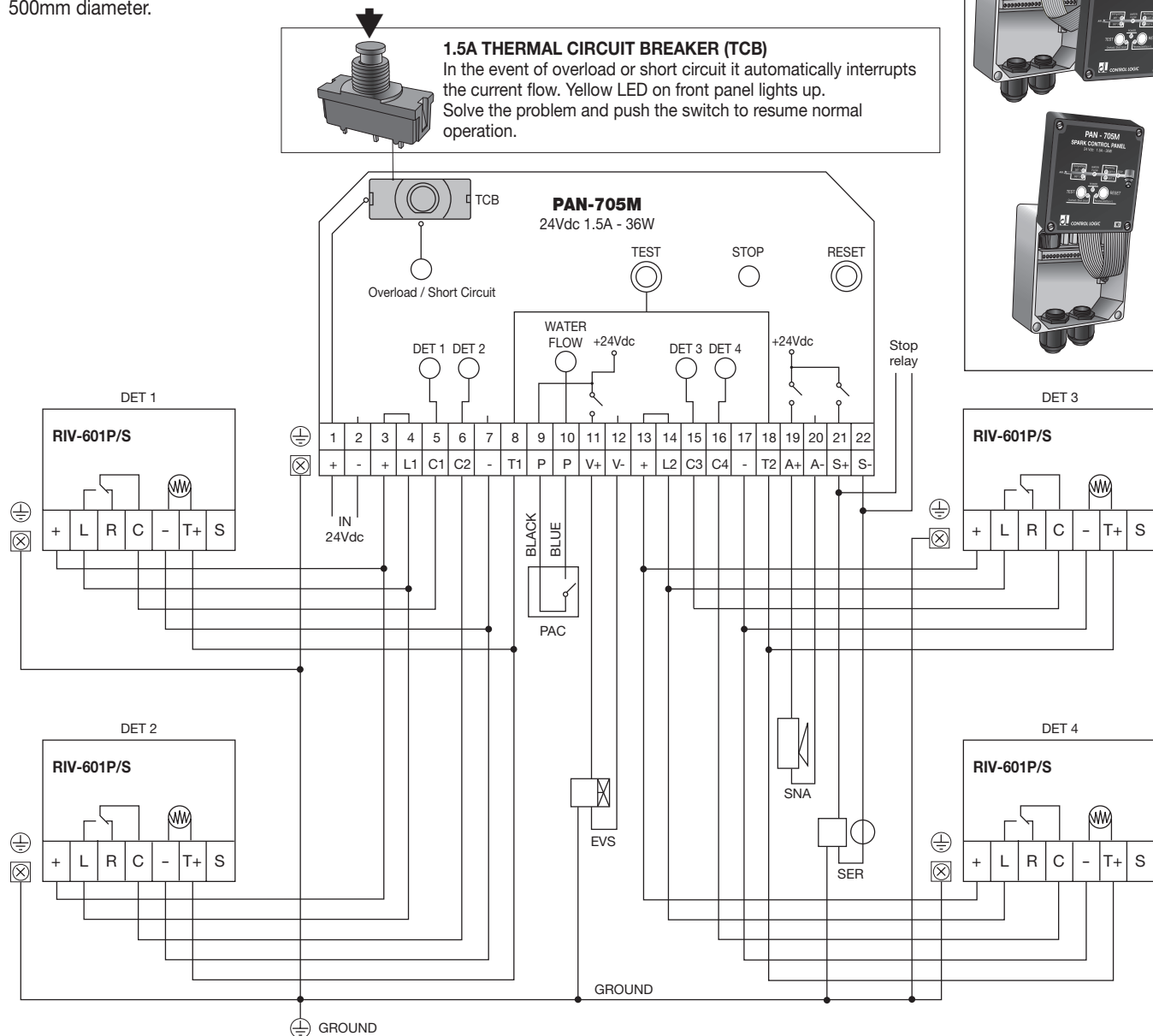
Check that the corresponding switches, positioned on the front panel circuit, are in "on" position (DIP switch 1-2-3-4 = DET 1-2-3-4, DIP switch 5 = WATER FLOW).

**Notice:** The detector is very sensitive. Movements of lights or sun light penetrating through openings in the duct may cause false alarms.

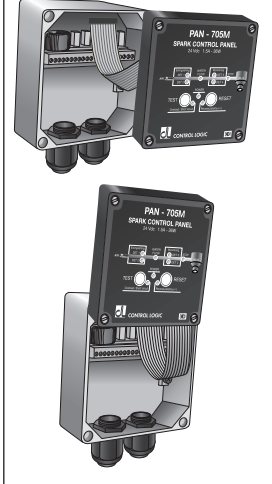
## SYSTEMS TYPE "E1" AND "E" electrical wiring

System type "E1" comprises only one extinguishing detector, one monitoring detector and one nozzle. It is used for "small" ducts up to 500mm diameter.

System type "E" comprises 2 extinguishing detectors, 2 monitoring detectors and 2 spray nozzles. It is used for "large" ducts with over 500mm diameter.



The front panel should not be hung by the internal electrical connections. When you open the control panel it is suggested to place the front panel as represented by the pictures below.



No connection on spark detectors terminal "S".  
 Voltage 24Vdc – max 1,5A output current.  
 All wiring and grounding must be done in accordance with local and national rules and regulations.

**Notes:**

- It is highly recommended to connect the enclosure base to a good ground line using the ground terminal provided inside lower on the right. Then, connect base and cover using the ground terminal provided inside the base lower on the left and the ground terminal provided inside the cover lower on the right. All the ground terminals are signalled by ground label. The ground connection must be done using a yellow-green conductor and a M4 double crimp eyelet. The yellow-green conductor must be longer than the other conductors.

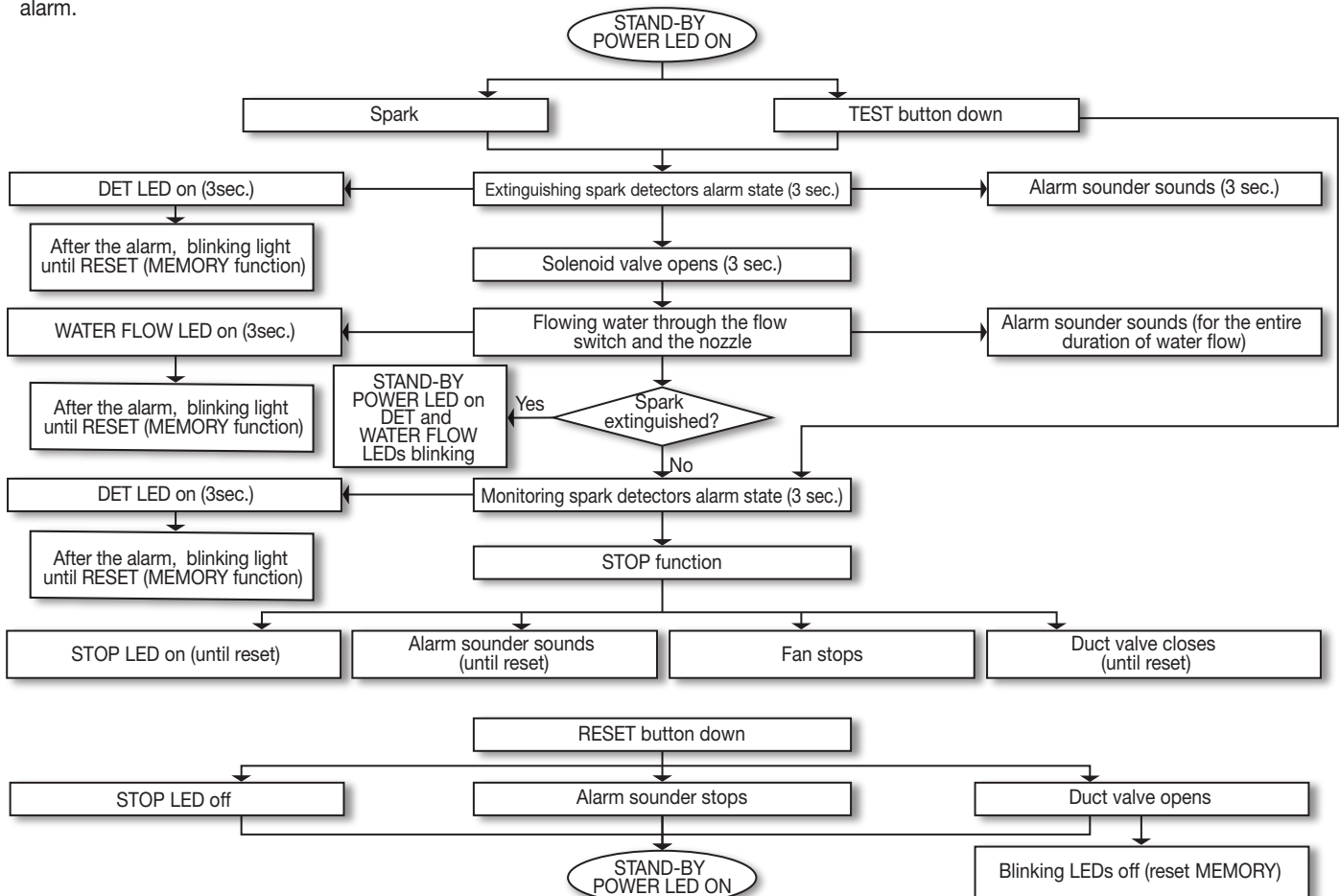
- In order to ensure an **IP66 protection grade** the cover must be tightly closed turning the four screws provided. The suggested closing torque value is 1 ÷ 1.5 Nm.



## SYSTEMS TYPE “E1” AND “E” general functions

- **OVERLOAD/SHORT CIRCUIT YELLOW LED**  
 Indicates overload or short circuit. Check electrical connections and push the white slide switch of the thermal circuit breaker (TCB) to resume normal operation.
- **REVERSE POLARITY RED LED**  
 Indicates reverse polarity. Disconnect and reverse power supply connections.
- **POWER GREEN LED**  
 Indicates the presence of the 24Vdc power voltage. Must always be on.
- **EXTINGUISHING DET 1 RED LED**  
 Steady light indicates that the extinguishing spark detector DET 1 is in alarm state (standard time 3 sec at each spark detected), blinking light (until manual RESET) indicates that there was an alarm.
- **EXTINGUISHING DET 2 RED LED**  
 Steady light indicates that the extinguishing spark detector DET 2 is in alarm state (standard time 3 sec at each spark detected), blinking light (until manual RESET) indicates that there was an alarm.
- **WATER FLOW BLUE LED**  
 Operated by the nozzle flow switch, indicates a water flow in the spray nozzle during an extinguishing operation, or else a water leakage through a defective solenoid valve. It lights up with a steady light during extinguishing and in case of water leakage due to valve defective, blinks until manual RESET to signal that there was an alarm.

- **MONITORING DET 3 RED LED**  
 Steady light indicates that the monitoring spark detector DET 3 is in alarm state (standard time 3 sec at each spark detected), blinking light (until manual RESET) indicates that there was an alarm.
- **MONITORING DET 4 RED LED**  
 Steady light indicates that the monitoring spark detector DET 4 is in alarm state (standard time 3 sec at each spark detected), blinking light (until manual RESET) indicates that there was an alarm.
- **STOP RED LED**  
 Indicates an alarm for un-extinguished spark and stop circuit activated. This LED lights together with MONITORING DET LED but it turns off only when the RESET button is pressed.
- **TEST BUTTON**  
 Used to check the system.  
 A short pulse causes a spark to be simulated inside the detectors, that will go in alarm state: they will activate the alarm sounder, will cause the EXTINGUISHING DET, MONITORING DET and STOP LEDs to light on and will stop the fan.  
 The WATER FLOW LED is controlled by the flow switch and will therefore light only if water flows through the nozzle. This LED doesn't turn on only in case of malfunction (jammed nozzles, solenoid valve closed).  
 If during the test do not turn on one or more DET LEDs, the related detectors are not connected or are faulty.
- **RESET BUTTON**  
 Resets the memory, switches off the STOP LED, turns off the sound alarm and opens the stop circuit.  
 The system returns to normal operating conditions.



### Warning!!!

Fast impulsive electromagnetic noise in the factory can cause false alarms. To avoid them we suggest to take a few measures during wiring of spark detectors such as good ground connection of metallic parts and of shields of shielded cables and to keep separate 24Vdc wiring from higher voltage wiring (A. C. power line). If possible, run wiring through metallic tubing. Keep spark detectors wiring physically separate from other wiring (motor controls and other high power loads). For further information see note on false alarms on pages MASP26 and following.



## SISTEMS TYPE "E1" AND "E" system diagram

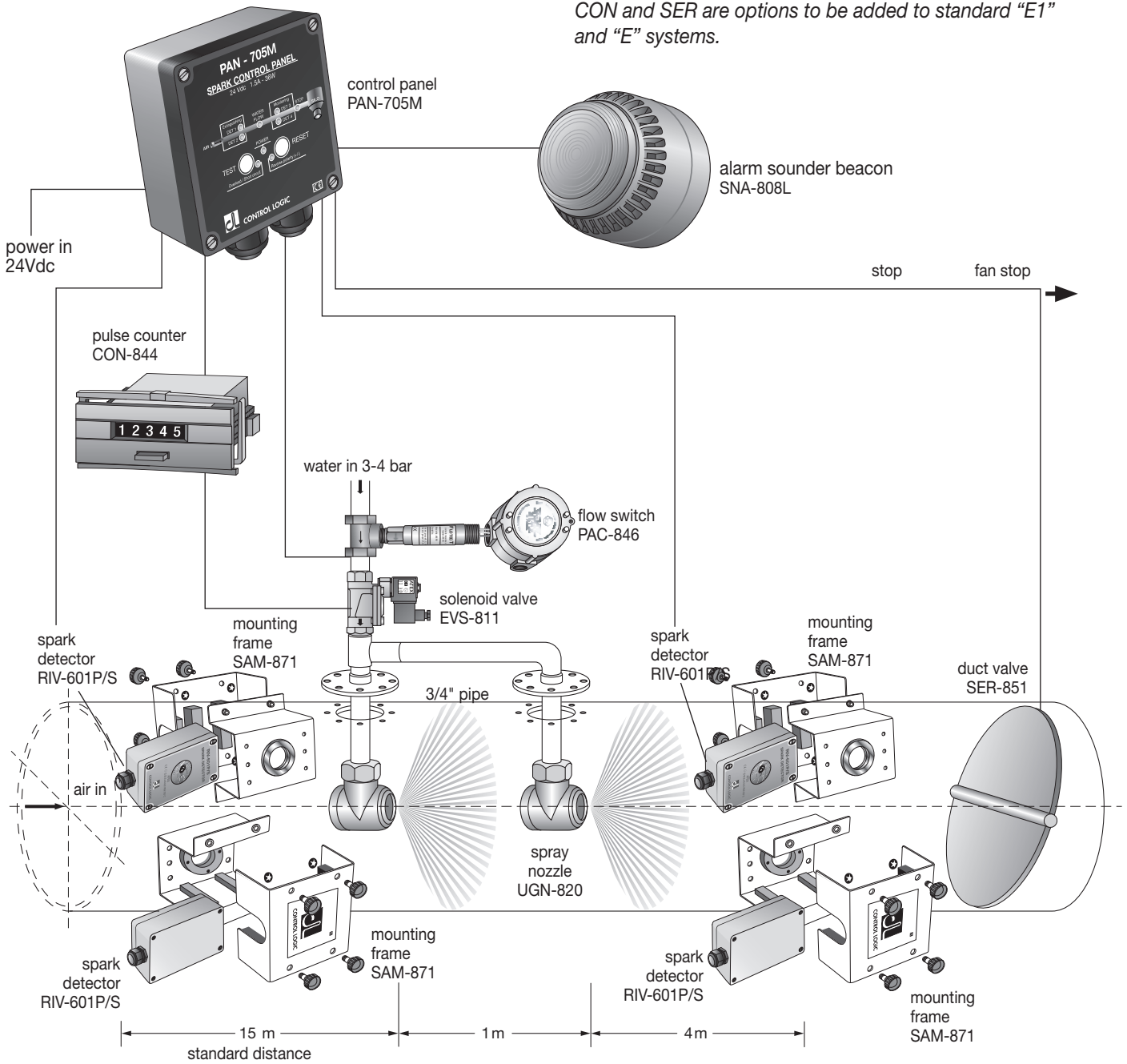
System type "E1" comprises only one extinguishing detector, one monitoring detector, and one nozzle. It is used for "small" ducts up to 500mm diameter.

System type "E" comprises 2 extinguishing detectors, 2 monitoring detectors and 2 spray nozzles. It is used for "large" ducts with over 500mm diameter.

### Component list:

Type "E1"	Type "E"	Component
n. 2	n. 4	RIV - 601P/S Spark detector
n. 2	n. 4	SAM - 871 Mounting frame
n. 1	n. 1	PAN - 705M Control panel
n. 1	n. 1	SNA - 808L Alarm sounder beacon
n. 1	n. 1	EVS - 811 Solenoid valve
n. 1	n. 1	PAC - 846 Flow switch
n. 1	n. 2	UGN - 820 Spray nozzle
n. 1	n. 1	CON - 844 Pulse counter
n. 1	n. 1	SER - 851 Duct valve

CON and SER are options to be added to standard "E1" and "E" systems.



**DETECTION**  
 See page MASP 13  
 for minimum distance between  
 detection and extinguishing

**EXTINGUISHING**

**MONITORING**



## SYSTEMS TYPE “E1” AND “E” startup operations

It is advisable to put on the front panel of the PAN-705M Control Panel the “NOT PRESENT” labels positioned on the missed components, e.g. DET 2 or DET 4, etc. (see page DESP 13).

- 1) Check that the electrical connections are correct.  
Do not open the water supply.
- 2) Apply voltage. The POWER LED will light on. All other LEDs should be off. The sound alarm should not sound and the solenoid valve should be de-energized and closed. The STOP circuit (duct valve and/or fan stop) should be off.
- 3) Execute the TEST operation. A pulse on the TEST button simulates a spark.  
The detectors turn active for 3 sec. The EXTINGUISHING DET and the MONITORING DET LEDs light on for 3 sec. When alarm stops DET LEDs blink.  
The STOP LED lights on permanently and will require the RESET button to turn off.  
The WATER FLOW LED stays off.  
The sound alarm sounds permanently and can only be stopped by the RESET button.  
The nozzle does not spray because the water supply is closed.  
The duct valve and/or fan stop relay (STOP circuit) are permanently activated and can only be reset by the RESET button.  
Press the RESET button to switch off all the LEDs and sound alarm, and to de-activate the STOP circuit.  
Remember that detectors are inactive for about 3 seconds after power voltage is applied (power-on delay).
- 4) Open the water supply. Check pressure: should be 3-4 bar at least.
- 5) Repeat the TEST sequence as per point (3). Check that the WATER FLOW lamp comes on for 3 sec while the nozzle sprays. When alarm stops DET and WATER FLOW LEDs blink, STOP LED is on permanently.
- 6) Press the RESET button to switch off all the LEDs and sound alarm, and to de-activate the STOP circuit.

To check the sensitivity of detectors, remove them from the mounting frame and direct the front window to a light or a cigarette lighter. In this way each detector can be tested in turn, checking that the system is correctly installed.

### List of possible malfunctions:

- 1) **The detector fails to operate with TEST.**  
Check the 24Vdc voltage on the + and - terminals of the detector and the 24Vdc voltage pulse on the T+ and - terminals when pressing the TEST button.  
If voltages are correct, the detector is faulty.
- 2) **The detector is permanently in alarm.**  
Check the 24Vdc voltage on the + and - terminals of the detector and control panel. If it is correct, and provided that no light falls on the detector window, the detector is faulty. If the voltage is incorrect or unstable, maybe the control panel is faulty. The detector circuits could generate alarm signals in response to intermittent power voltage, even if the power-on delay will eliminate most of this problem.
- 3) **The WATER FLOW LED is permanently on and the sound alarm sounds, while all other LEDs are off.**  
This signals a water leak in the solenoid valve due to rubber diaphragm being jammed by dirt or having a malfunction. Close the water supply and check. If necessary, open the solenoid valve body.
- 4) **One or more LEDs do not blink after an alarm.**  
Check that the corresponding switches, positioned on the front panel circuit, are in "on" position (DIP switch 1-2-3-4 = DET 1-2-3-4, DIP switch 5 = WATER FLOW).

### Notice

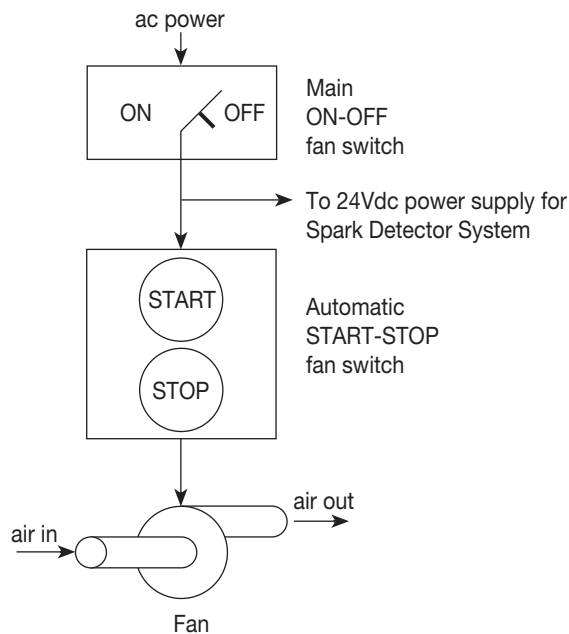
The detector is very sensitive. Movements of lights or sun light penetrating through openings in the duct may cause false alarms.

## IMPORTANT WARNING NOTICES

The Control Panel must be powered by an external power supply connected to the fan control panel downstream from the manual main on-off fan switch and upstream from the automatic start-stop fan switch, so that during work breaks and for night, week-end or holiday pauses the Spark Detector System is off, thus avoiding unsupervised operations due to false alarms or electrical circuit faults.

### Excess water

Excessive extinguishing water entering the duct could result in silo flooding, or worse, in damaging sensitive electrical equipment, such as fan motors, etc. Therefore it is necessary to install on the duct one or more discharging valves which will carry the excess water into the main waste water ducting.



The extinguishing water supply line must also be kept closed during the same periods of no work. The reason for these two warnings is to avoid false alarms, and false Spark Detector Systems operations during unsupervised periods, which may result in simple acoustic alarms or even in excessive water flows into dust extraction ducts.

### CAUTION !!!

Before installing the solenoid valve it is highly recommended to air blow cleaning all tubing, in order to eliminate waste and dirt from inside tubing, as these may cause the solenoid valve diaphragm to jam, thus impeding complete closure.

A strain filter should be mounted upstream from the solenoid valve to block waste.



## FALSE ALARMS FROM ELECTROMAGNETIC EMISSIONS

### 1.0 Introduction

Control Logic Spark Detectors are designed and certified for an electromagnetic immunity level greater than required by CE norms (EMC directive). If other electrical equipment present in the plant have an electromagnetic emission level lower than required by CE norms, false alarms are not expected.

### 2.0 Main causes of false alarms

The electromagnetic emissions can enter inside the spark detector electronic circuit in two ways: by radiation and by conduction.

#### 2.1 Electromagnetic radiation

The electromagnetic emissions are spread into space and enter inside spark detector both directly through metallic enclosure where openings are present, like optical windows and cable fittings, and indirectly through electrical cables. A metallic enclosure not well connected to the ground lets electromagnetic radiation pass through.

#### 2.2 Electromagnetic conduction

Electromagnetic emissions create an electromagnetic field which produces disturbing currents inside metallic conduits, metallic tubing and electrical cables. Also, electrical cables can operate like electrical transformers, so that electromagnetic currents can pass from one conductor to others and go through all cables which are running together.

Fig. 1 - Electrical arc between two electrical contacts while they are opening

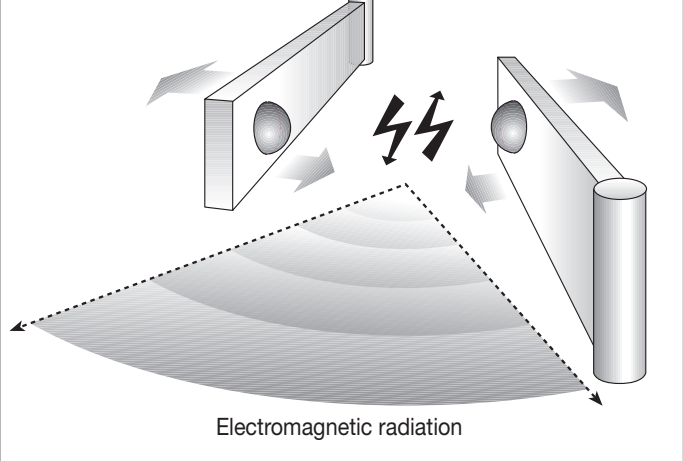


Fig. 2 - Current induced by electromagnetic radiation on sensor wiring

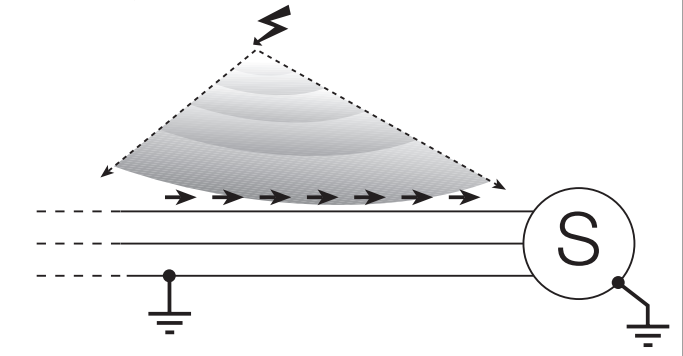
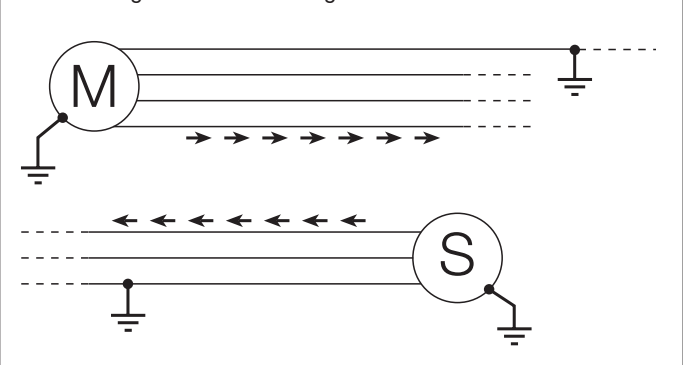


Fig. 3 - Noise current induced between motor wiring and sensor wiring which are close together



## FALSE ALARMS FROM ELECTROMAGNETIC EMISSIONS

### 3.0 Sources of electromagnetic emissions

There are lots of electrical equipment which can generate electromagnetic noise. Here is a short list of the main ones.

#### 3.1 Radio and television transmitters

Their electromagnetic field is modulated by sound and image.

#### 3.2 Radio-telephone transceivers

Their electromagnetic field is modulated by voice.

#### 3.3 Mobile phone transceivers

Their electromagnetic field is intermitted and modulated both by connection impulses which keep mobile phone under control and by voice.

#### 3.4 Frequency converters for variable speed electric motors

This electronic equipment control frequency and power by electrical pulse trains with variable time length and repetition frequency. The electrical pulses steep fronts generate electromagnetic noise.

#### 3.5 Uninterruptible power supplies

Uninterruptible power supplies are built with electronic 50-60Hz frequency generators and are supplied by DC power supplies. Frequency is generated by electrical pulse trains with variable time length and repetition frequency. The electrical pulses steep fronts generate electromagnetic noise.

#### 3.6 Switching power supplies

Switching power supplies are DC power supplies which control the level of voltage and current by electrical pulse trains with variable time length and repetition frequency. The electrical pulses steep fronts generate electromagnetic noise.

#### 3.7 Industrial computers for production processes

Their connection to equipment and other electrical devices is done by electrical pulse trains of high intensity running through long cables.

#### 3.8 High frequency generators for plastic welding machines

They behave like powerful radio transmitters built into industrial equipment, and are activated periodically for short periods during welding. The same high frequency generators are used in the woodworking industry to heat and bend the parts to be curved and shaped.

#### 3.9 On-off switches for electrical motors

At the starting and stopping of the motors the switch contacts generate strong electrical arcs caused by inrush currents and its contact behavior on opening and closing. The opening arc is particularly strong because of high induction values in the motor. The related electromagnetic pulsing field covers all the surrounding environment and runs through all the electrical cables nearby.

#### 3.10 Automatic electronic welding equipment for metallic parts

These generate frequent electrical arcs during operation, for example for point welding of metallic sheets. The electrical arcs are by nature unstable and intermitted, and they behave like high frequency generators, more or less the first generators used by Marconi in his first radio transmissions.

Fig. 4 - Electromagnetic noise generated by a motor current at the starting and stopping

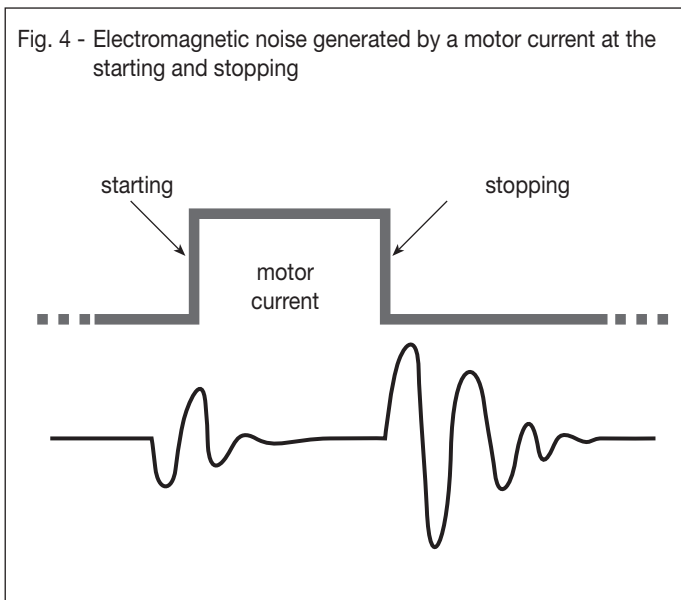
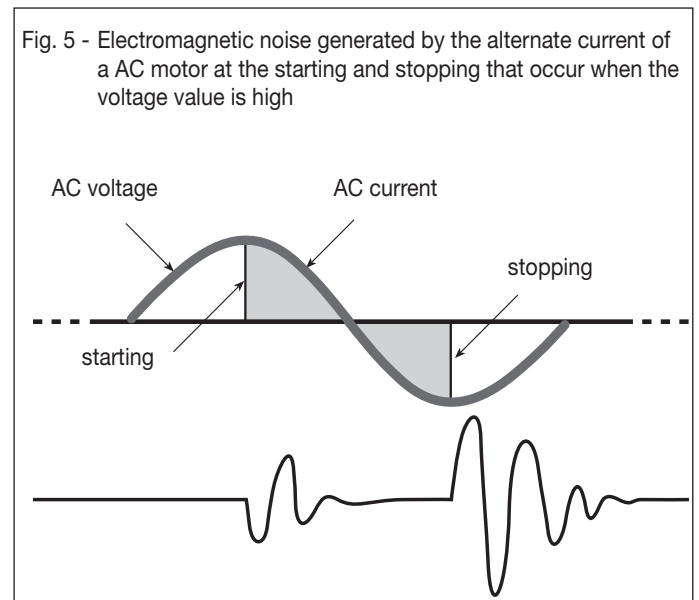


Fig. 5 - Electromagnetic noise generated by the alternate current of a AC motor at the starting and stopping that occur when the voltage value is high



## FALSE ALARMS FROM ELECTROMAGNETIC EMISSIONS

### 4.0 How to reduce the electromagnetic noise

In order to obtain good results and to eliminate or minimize the risk of false alarms, it is necessary to operate on two fronts: on the equipment that generate noise and on systems and wiring of spark detectors.

#### 4.1 Stopping electromagnetic emission on source equipment

- Ground connection, verifying it is a good ground. Connect to ground all metallic parts of the equipment, metallic conduits, metallic tubing for cables, shields of shielded cables, so as to discharge to the ground the electromagnetic fields present or running by.
- Use shielded wiring, and keep it physically separate from other wiring. If possible run it through metallic tubing. Remember that nearby cables are influenced by induction caused by current variations.
- Insert stop inductors on connections to common power electrical lines so as to prevent electromagnetic noise from running towards other equipment and systems.

#### 4.2 Stopping electromagnetic noise on spark detector systems

It is necessary to prevent noise from reaching the detector.

- Connect to ground all metallic parts of the system, the detector enclosure, the dust extraction conduits, metallic tubing for cables, shields for shielded cables. Verify that ground is good. Remember that a bad ground connection spreads the electromagnetic noise.
  - Use shielded wiring, and keep it physically separate from other wiring. If possible put it into a metallic tubing. Remember that nearby cables are influenced by induction caused by current variations.
- Keep separate 24Vdc wiring from higher voltage wiring (keeping in mind that 24Vdc wiring enters inside the detector electronic circuit).

### GROUND CONNECTION AND WIRING SEPARATION

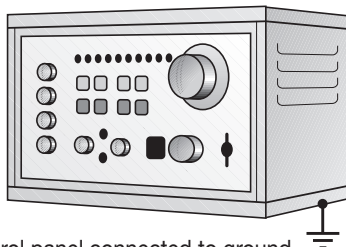


Fig. 6 - Control panel connected to ground

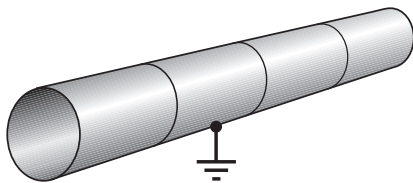


Fig. 8 - Dust extraction conduit connected to ground

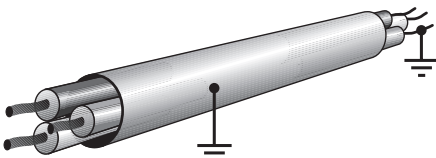


Fig. 9 - Metallic tubing for cables connected to ground

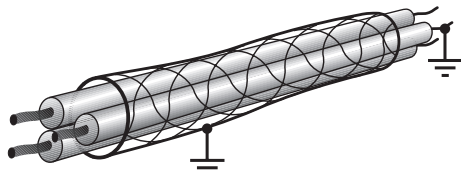


Fig. 10 - Shielded wiring connected to ground

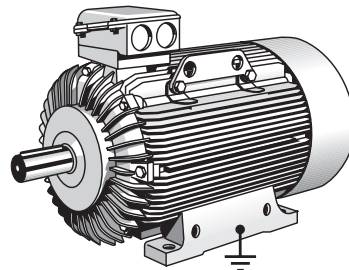


Fig. 7 - Electric motor connected to ground

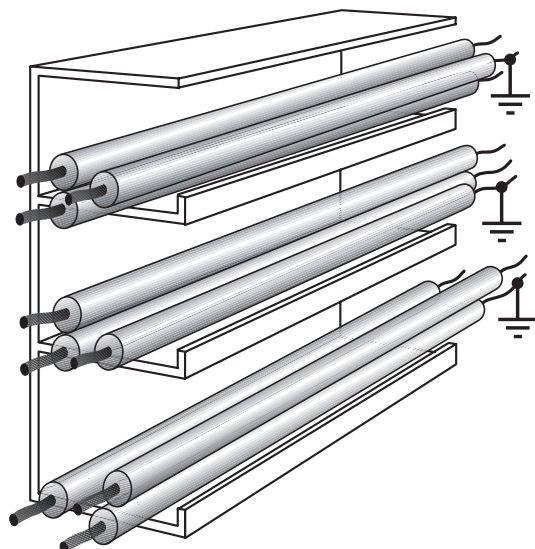


Fig. 11 - Plastic conduit with different levels to separate different cables (electronic signals, DC low power, AC power)



## FALSE ALARMS FROM ELECTROMAGNETIC EMISSIONS

### 5.0 Conclusions

Electromagnetic noise pulses, those that are only a fraction of a microsecond in length, are difficult to verify due to their fast, momentary and unpredictable nature. Yet they are the most treacherous ones since they are difficult to verify and can trigger spark detectors false alarms because detector response is very fast. Also, suitable instruments are not available, since those available can only measure average values and can not follow momentary pulses.

We then strongly suggest you to take every precaution, as detailed above, to minimize the probability of false alarms.

A simple instrument which can light a progressive series of LED signals and sound a progressive alarm BIP can be useful to detect electromagnetic noise even if impulsive and momentary.

Our technical staff is always available for any further information and suggestions.



## **EU DECLARATION OF CONFORMITY (DoC)**

This declaration of conformity is issued under the sole responsibility of the manufacturer and belongs to the following products:

**SYS-A – SYS-B – SYS-E1 – SYS-E**

Spark detection and extinguishing systems for dust collecting systems

**SYS-F1A – SYS-F1T – SYS-F1TX**

Silo temperature alarm systems for dust collecting systems

The object of the declaration described above is in conformity with the relevant union harmonisation legislation:

**Directive 2014/30/EU electromagnetic compatibility (EMC)**

Milano, 20 aprile 2016

Control Logic S.r.l.  
Paola Nosetti  
(General Manager)



## ORDINARY AND EXTRAORDINARY MAINTENANCE

The water pressure which supplies the extinguishing system, composed of flow switch, solenoid valve and nozzles, is suggested to be at least 3 bar, so as to keep uniform the water jet that flows from the nozzle. 1 bar pressure is anyway enough to form the water jet. A higher pressure, 5-6 bar, is useful for a more effective extinguishing and a greater water speed that improves the extinguishing action when the nozzle to detector distance is in the range of minimum value as specified in the table graph on page MASP 13 of the application manual.

### ORDINARY MAINTENANCE

The most critical element of the spark detection and extinguishing system is the water solenoid valve.

In fact, since it is composed of a pin pilot valve and a closing rubber elastic diaphragm on which a very small hole is drilled to perform the water opening and closing, it is easily jammed by dirt or foreign materials, or even calcareous layer, or worst, water frost that completely blocks the solenoid valve and deforms it in a permanent way.

We suggest to install a strainer before the solenoid valve in order to separate dirt. This strainer is a standard component well known to plumbers.

Periodically it must be opened and cleaned.

Inspection frequency is depending on the amount of dirt found. Also the solenoid valve must be periodically opened and cleaned, paying attention to the small hole of the diaphragm which, if jammed, prevents the solenoid valve from closing and creates a continuous water leak. The suggested inspection period is at least 6 months.

The non-closing solenoid valve leak problem is very common. In order to avoid bad consequences and damaging, we suggest, as a base prudence, to turn off the water tap at the end of every working cycle, morning and evening, night and before every stop period, holidays, and so on.

Water frost during winter must be avoided because it deforms and destroys the valve, causing a continuous water leak as soon as the ice will be melted.

We can suggest two ways to avoid the valve frost:

1. Insulating and heating the flow switch-valve system. For this purpose are well known heating cables used in mountain locations on roofs, gutters, car passing ways, pipes and water ducts.
2. Insulating and use of antifreeze liquid into the water supply booster.

Also the use of hot water is effective, provided the water is kept circulating around the flow switch-valve-nozzle system and water piping.

It is advisable to periodically check and eventually clean the optical window of the mounting frame. The frequency of this operation can be established based on the materials carried in the duct and to one's own experience.

All the spark detection and extinguishing system must be periodically verified in order to find faulty operations at least once a day.

For this purpose the TEST push button is available on the Control Panel.

#### I. Type "A" and "B" simple systems

By briefly depressing the TEST push button on the Control Panel all system is caused to operate:

- The Spark Detectors turn on for 3 seconds. The Extinguishing DET LEDs on the Control Panel turn on for 3 seconds.
- The Alarm Sounder sounds for 3 seconds.
- The Solenoid Valve opens for 3 seconds and the Nozzle sprays water for 3 seconds.
- If the Flow Switch is provided, the WATER FLOW LED on the Control Panel turns on for 3 seconds.  
When alarm stops DET and WATER FLOW LEDs blink. Press the RESET pushbutton to reset the alarm memory and bring the LED signals back to the stand-by state (LEDs turn off).

#### II. Type "E1" and "E" complete systems

By briefly depressing the TEST push button on the Control Panel all system is caused to operate:

- The Spark Detectors, both for extinguishing and for monitoring, turn on for 3 seconds. Their LEDs on the Control Panel turn on for 3 seconds.
- The Alarm Sounder sounds for 3 seconds.
- Water is opened for 3 seconds by the Solenoid Valve, the Nozzle sprays water for 3 seconds and the WATER FLOW LED on the Control Panel turns on for 3 seconds.
- The STOP LED turns on in a permanent way and signals that the STOP output is energized to close the duct valve if present, and to stop the dust collection system fan.
- When alarm stops DET and WATER FLOW LEDs blink, STOP LED is on permanently.
- To turn off all the LEDs, to open the duct valve and to turn on the dust collection system fan, the RESET push button must be briefly depressed.

The periodical TEST operation doesn't disturb the dust collection system if it is performed during the day on more favorable moments, as for instance at the beginning of the morning and afternoon shifts just after the main fan switch is turned on. In this case the fan stop doesn't disturb the dust collection system and it can be turned on again without any problem.

### EXTRAORDINARY MAINTENANCE

Since the ordinary maintenance is performed frequently, we can consider that the extraordinary maintenance is the operation of uninstalling all the sensitive parts such as Spark Detectors, Solenoid Valve and Flow Switch and sending them to Control Logic Srl - Milan for a full check.

The advised frequency is 5 years, unless particular conditions of heavy work or ordinary maintenance results suggest to anticipate it.

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**CONTROL LOGIC** S.r.l.