

Sense-WARE presents:

# SenseTronic Spark Detectors

## IR-800/1 Infrared Spark Detector (IR-800/1A with Airshield)

Specification  
Installation  
Operation  
Maintenance

[www.Flame-Detection.net](http://www.Flame-Detection.net)

Check the website for the latest information and latest version of this manual.

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## 1.1 General Description

The Infrared Spark Detector IR-800/1 detects small glowing sparks (embers) in air ducts or other closed conveyer systems. The detector operates at 800 nm (700–1000 nm) which is the Near Infrared and very close to the visible light range. Sparks or Embers hotter than 800<sup>0</sup> C (1472<sup>0</sup> F) can be detected within 1 msec.

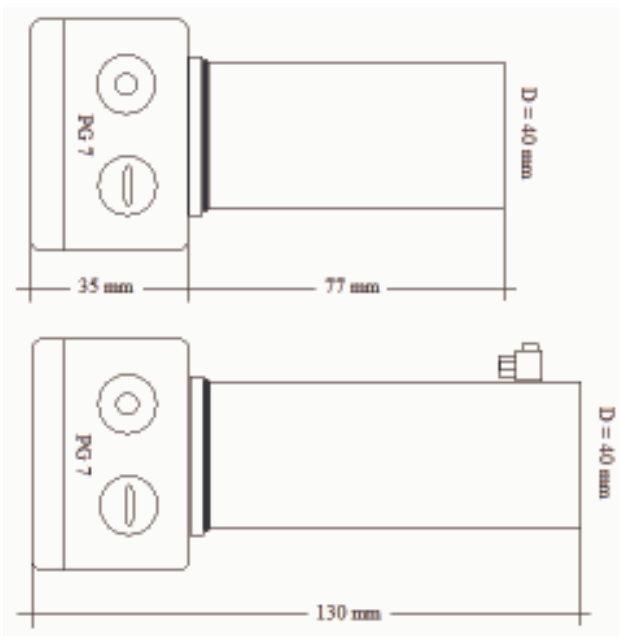
The IR-800/1 should be installed in dark applications in order to see the spark or ember. Just like the human eye the unit needs to have a contrast between the object and the background. In daylight or under artificial light conditions the detector can't operate.

Typical installation requires two spark detectors mounted in a duct pointing at each other covering the cross section of the duct.

The IR-800/1A has an Airshield that prevents contamination of the lens by dust too quickly. The Airshield limits the Cone of Vision of the detector to under 35<sup>0</sup> and is therefore less suitable for detection of sparks in ducts.

## 1.2 Specification

Power	: 12 - 24 Vdc (12-30)	Housing	: Aluminum
Current	: normal 100 $\mu$ A	Protection	: IP65
	In alarm at 12 Vdc, apr. 22 mA	Temperature	: -20 <sup>0</sup> C to +70 <sup>0</sup> C
	In alarm at 24 Vdc, apr. 45 mA		(-4 <sup>0</sup> F to +158 <sup>0</sup> F)
Alarm output	: One (2 wire) 560 Ohms output with a 4.7K Ohms EOL resistor .	Dimensions	: 76 x 40 mm
			(3 x 1.6 inch)
Output -		Dimensions	: 94 x 40 mm
activation time	: non latching for 0.3 seconds (single spark)	with Airshield	(3.7 x 1.6 inch)
Power up delay	: 5-10 seconds	Terminal box	: 65 x 50 x 35 mm
Response time	: < 1 msec		(5.6 x 2 x 1.4 inch)
Sensor/filter	: 800 nm peak (700-1000 nm)	Weight	: 180 gram (0.39 lbs)
Sensitivity	: selectable 100%, 20%, 50% and 1%	with Airshield	: 210 gram (0.46 lbs)
Cone of vision	: < 110 <sup>0</sup> (with Airshield: < 35 <sup>0</sup> )	Gland	: PG 7



### *Applications:*

- Processing installations for Chemicals, Food, Textile, Wood etc.
- Production machines such as machines, dryers, mills, sanders, buffers, silo's, furnaces etc.



IR-800/1A (with Airshield)

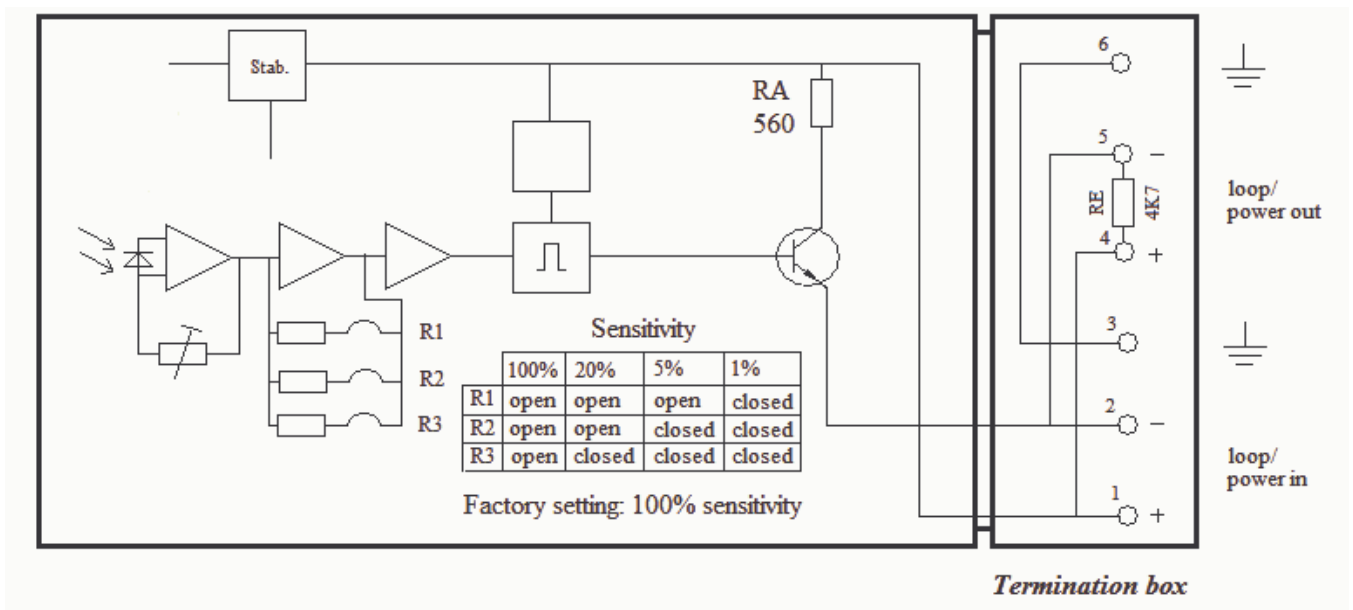
## 1.3 Airshield

The optional Airshield (factory option only) prevents contamination of the detector lens by dust too quickly. A flow of clean air keeps (most) dust particles away. The connector allows you to use a tube with an outer diameter of 4.5 mm (0.18 inch) and an inner diameter of 3 mm (0.12 inch). The air pressure should be 350 to 1000 mBar (5 to 15 psi) with a flow of 80 to 160 ltr/min (2.8 to 5.5 scfm).

The Airshield narrows the Cone of Vision of the detector to less than 35°.

## 1.4 Settings

Positions for wire bridges are provided to set the detector's sensitivity. The settings comply with the bridge "R" settings on the schematic layout:



The factory setting for the detector is:

Sensitivity:	100%	R1 open	R2 open	R3 open
Sensitivity:	20%	R1 open	R2 open	R3 closed
Sensitivity:	5%	R1 open	R2 closed	R3 closed
Sensitivity:	1%	R1 closed	R2 closed	R3 closed

We advise you to change the factory setting only when the setting is too sensitive. When small sparks should be ignored we advise to change the sensitivity to 20% or 5%. Make sure that the detector is able to alarm to the spark size you want.

To change the setting a qualified technician has to solder a wire bridge on the circuit board of the detector:

- Open the housing by taking the cylinder shaped aluminum part in your hand and turn it counter clockwise. (The foil is part of the EMC protection of the electronics.)
- Fold back the protecting foil carefully.
- Solder the required wire bridges on the marked spots.
- Wrap the foil back over the electronics.
- Close the housing.

The bridges for sensitivity setting relate to the basic sensitivity of the IR sensor in the detector housing and it's sensitivity is set with a Pot in the factory. DO NOT change the Pot setting. The detector IR-800/1 should not be used when the distance between the sensor and the opposite duct wall or corner is more than 50 cm (20 inch) even

when a second detector is installed on the opposite side of the duct. Larger ducts can be protected but the detector might not be sensitive enough to detect sparks but spark clusters or flames will most likely be detected.

In case of a smaller duct, e.g. 30 cm (1 ft), the sensitivity is higher compared to large duct due to the distance of the sensor to a possible spark in the duct.

**Warning:**

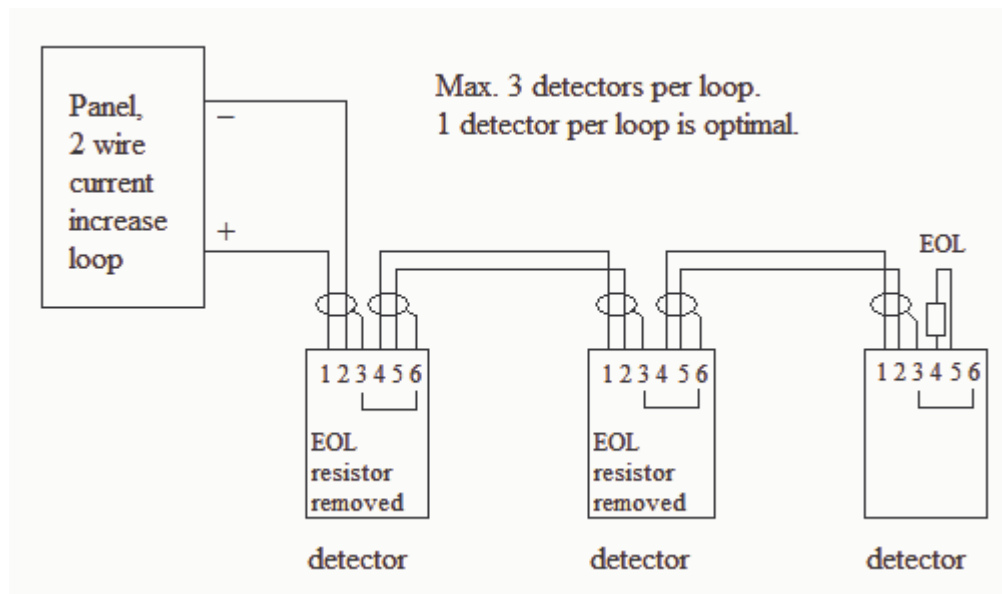
Smoke absorbs flame/spark radiation. This could effect the sensitivity of the detector.

**Warning:**

DO NOT change the Pot setting since this is used for calibrating the basic sensitivity of the unit.

## 1.5 Alarm outputs

The Detector consumes in normal situation apr. 100  $\mu$ A when power is applied to terminal 1 and 2. An end-of-line resistor of 4.7K is mounted on terminal 4 and 5. In alarm condition the alarm resistor RA (560 Ohms) is switched to terminal 1 and 2 (and 4 and 5) by the Open Collector of the Alarm transistor. The factory is able to supply units with various RA values.



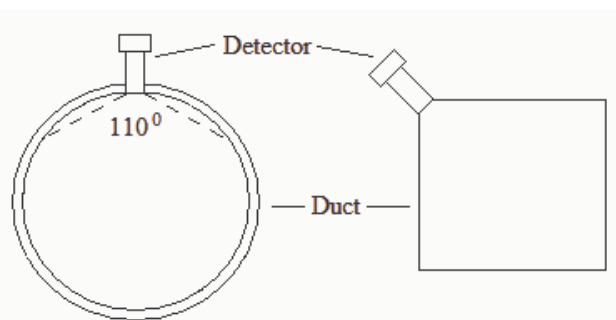
## 1 Installation

### 2.1 Mounting

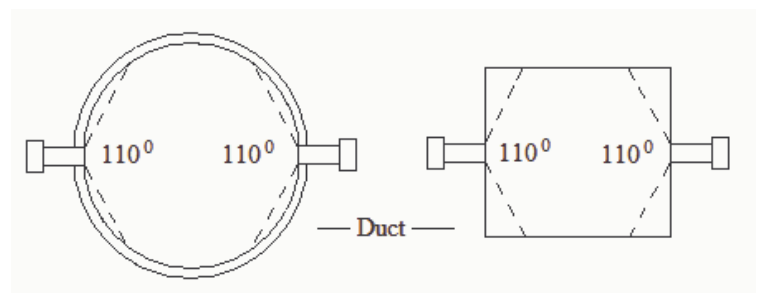
**Warning:**

IR spark detectors have strengths and weaknesses. Consider these before installation.

The detector can be mounted using a duct fitting of your choice. A fitting is NOT supplied with the detector since every duct and duct-surface is different in shape and size. It is preferred that the cable gland is pointing down. Leave a loop of spare cable with a diameter of apr. 10 cm (4 inch). The advised maximum duct diameter that can be detected is 0.5 meter (20 inch). When the sensor is mounted as if it is part of the duct then the product and air in the duct will keep the lens clean much longer. To keep the sensor(s) clean longer one should also avoid that the sensor(s) point upwards. The installer should make a fitting with a 40 mm (1.6 inch) hole that holds the sensor in place. The inside of the duct where the sensor is mounted should be smooth to avoid dirt build up.



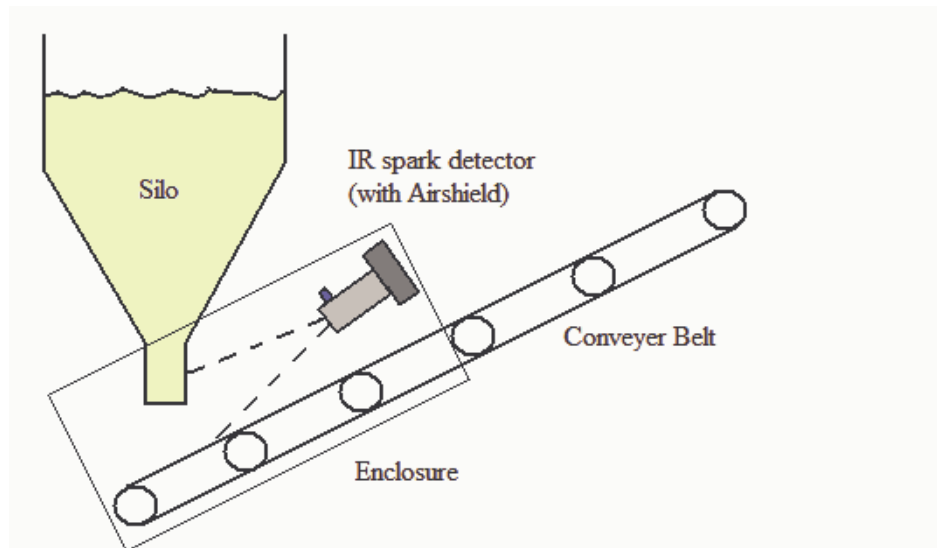
Single IR-800/1 (without Airshield)



Double IR-800/1 (without Airshield)

## 2.2 Detector alignment and Field of View

A single IR-800/1 will not cover the complete cross section of a circular duct since it has a cone of vision of  $>110^{\circ}$ . A second spark detector on the opposite side of the duct (both mounted horizontally) will cover the dead areas of the cone of vision. It also enhances the relative sensitivity of the detection system. When a single IR-800/1 is used in a rectangular duct the detector should be mounted in one of the corners so that it covers the cross section of the duct.



The IR-800/1A (with Airshield) has a Cone of Vision of  $\pm 35^{\circ}$ .

When mounted in a situation where a lot of dust might contaminate the lens of the detector, it is advised to order a version with Airshield (IR-800/1A). This detector has a total Cone of Vision of  $\pm 35^{\circ}$ . E.g. point the detector to the area where the product from the Silo falls on the conveyor belt. Make sure the detector operates in the dark at a distance of no more than 0.5 meter (20 inch).

## 2.3 Cabling

A minimum of a two twisted cores cable is needed to wire the detector correctly. The diameter of the cores must be 0.6 to 1.5 mm (24 to 16 AWG). The cores must be shielded and have a shield core for use with grounding terminals. The isolation resistance to ground must be at least 500K Ohm. The length and diameter of the cable should be selected so that the detector will still have enough power under all detector conditions (normal and alarm).

## 2.4 Local grounding

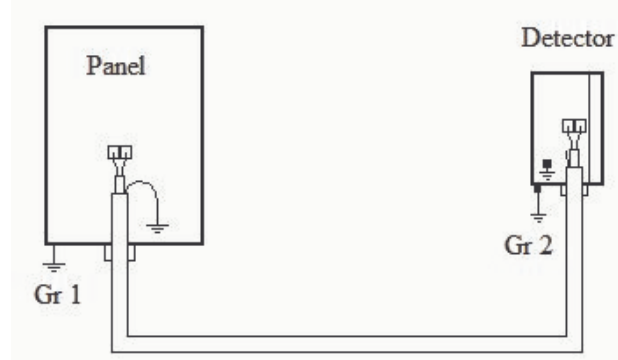
Ducts convey products and air which may cause static electricity. The ducts are usually grounded for this reason. When possible ground the detector by making sure the sensor housing has a galvanic connection with the duct.

### **Panel:**

Leave the cores protected by the shield as much as possible. Isolate the shield wire if necessary and connect it to the ground lug or screw.

### **Detector:**

Leave the cores protected by the shield as much as possible. Isolate the shield wire and connect it to terminal 3. Ground the housing of the detector locally by making sure the sensor housing has a galvanic connection with the duct.



## 3 Operation

### 3.1 Commissioning

Before the detector is put in operation the following should be checked:

- Clean the detector lens
- Position and alignment check
- False alarm sources in the Field of View
- Wiring at the detector and the panel
- Cable Shielding
- Grounding of the detector and panel
- Ingress Protection at gland
- Tighten the mounting screws
- Tighten the wiring gland
- Test alarm
- Close the detector housing

Before final commissioning the detector should run without alarm actions during a period that represents the normal operation conditions.

When faults occur during the test run the installation should be checked and adjusted until the detector works without failures. After a final test alarm the installation can be switched on permanently.

#### Warning:

If the customer specifies a performance requirement and that performance requirement is confirmed by fire/spark tests or other means, the final installation must be tested using the applicable fuel and conditions specified. Take every precaution to protect the workers, property, and environment from harm while testing.

### 3.2 Faults

Spurious alarms can be caused by:

- The detector is activated by a known or unknown IR source in the Field of View.
- The detector is activated by an electromagnetic interference on the wiring and/or electronics.
- The detector is activated by wrong or faulty wiring.
- The detector's electronics are damaged.

To determine the cause of spurious alarms you need an accurate record of the alarms and conditions. The time, date, weather and lighting conditions, and any other operating parameter that could affect detector performance.

To determine if the spurious alarm is caused by an event in the Field of View or the wiring and electronics the sensors can be blinded by a cover. Make sure no light or other radiation can reach the sensor. If the detector still alarms it is likely that the spurious alarm is caused by the wiring and/or electronics. Make sure that the cover is removed after testing.

First check the power supply for correct voltage and current, ripple etc. Then check all items mentioned under Operation. Replace the detector if a spare is available.

#### Warning:

Commissioning and tests must be performed by knowledgeable technicians. All local regulations for installation and cabling apply including regulations for activation of alarm systems, extinguishing systems and other activations.

## 4 Maintenance

### 4.1 Testing

The detector is factory tested. However, on a regular basis the detector must be tested to ensure normal operation and fire condition. The detector lens needs to be clean in order to be able to detect a fire. Build up of contamination will effect the sensitivity of the detector.

If the customer specified a performance requirement and that performance requirement was confirmed by fire tests or other means, the installation must be tested using the applicable fuel and conditions specified. Take every precaution to protect the workers, property, and environment from harm while testing.

### 4.2 Routine check

Besides cleaning the detector needs no specific maintenance. Inspection of the following items is necessary:

- Position and alignment check
- Check for possible spurious alarm sources in the Field of View
- Check for un-obstructed view
- Clean the detector lens
- Has the application changed
- Wiring at the detector and the panel
- Cable Shielding
- Grounding of the detector and panel
- Ingress Protection at gland
- Tighten the mounting screws
- Tighten the wiring gland
- Test alarm
- Close the detector housing

The end user is responsible for optimal operation conditions. The detector(s) were installed according to a fire protection plan/layout. If there are changes that influence the original plan/layout, please make sure a knowledgeable technician takes all necessary actions.