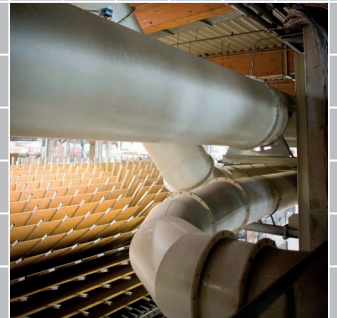


Spark extinguishing systems  
Fire protection for pneumatic conveying systems

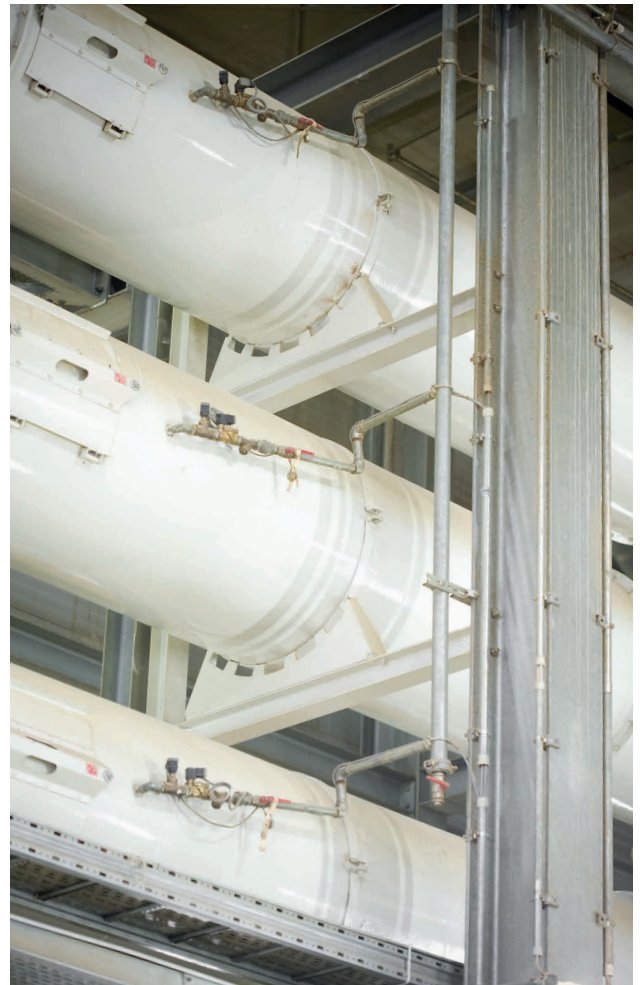


## Before the spark jumps across

If your company utilizes pneumatic conveying and air filtration systems in the manufacturing process, you are at risk from dust fires and explosions.

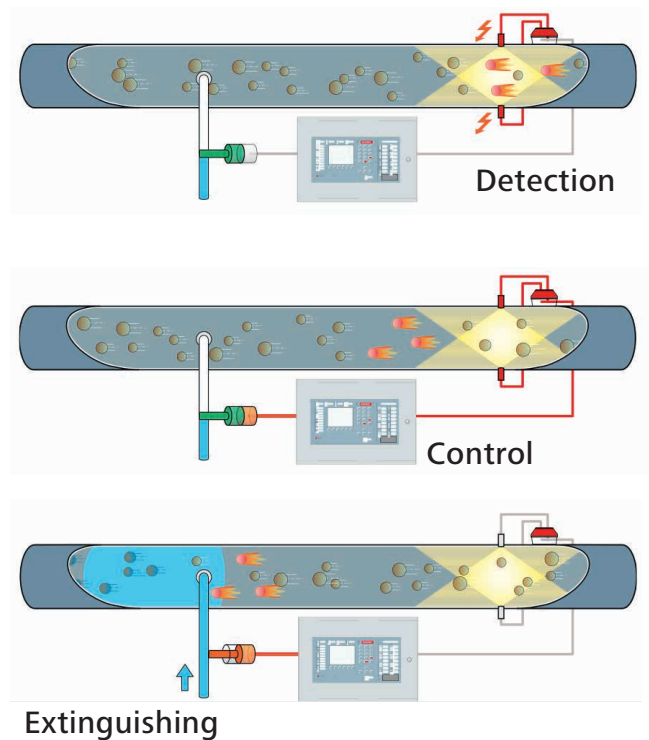
During the production sparks or glowing embers can easily be produced by the processing machines itself or from impurities in the conveyed material. These potential ignition sources are then picked up by the pneumatic system and transported along with highly combustible wood chips, dust or other finely divided particles. A single spark that enters filters, silos or the dust collector is sufficient to cause fires or dust explosions resulting in excessive damage of property and costly downtimes or even worse threatens life.

A potential disaster of this magnitude is best handled with preventative measures that are immediate, effective and dependable. With the Minimax system sparks can be detected and extinguished prior to reaching the filter or dust collector thereby protecting all company assets. Minimax is a pioneer in the development of spark extinguishing systems. Minimax offers spark suppression systems with VdS approval. Its protection strategy has been successfully tried and tested in thousands of applications worldwide.



A fully automatic spark extinguishing system (figure) consists of spark detectors, control panel and an automatic extinguishing unit. Sparks travelling through the duct of the conveying system are instantly identified by the infrared spark detectors mounted flush to the wall of the duct.

The spark detector sends a signal to the control panel which then triggers the solenoid valve of the automatic extinguishing unit, while simultaneously activating an audible alarm. The extinguishing water is released after milliseconds and injected into the duct via the strategically placed and patented flat spray nozzles creating a wall of water covering the entire cross section. The glowing particles are conveyed into the water spray curtain. Immediately afterwards the solenoid valve closes automatically. The complete detection and extinguishing process normally operates during production in order to eliminate expensive downtimes. Depending on the amount of potential ignition sources it is also possible to have the conveying machine automatically shut down.



## Structure and function

A fully automatic spark extinguishing system consists of spark detectors, control panel and an automatic extinguishing unit.

### Detection

The highly advanced Minimax infrared detectors UniVario YMX5000 are engineered for the immediate identification of sparks in industrial environments. The detector continuously checks the correct function of its electronics. An additional spark test detector system or special detectors are available to even monitor the visibility. Any faults identified are automatically relayed to the control panel notifying plant personnel. In areas where high ambient temperatures are expected, flexible temperature resistant fibre optic cables are used to thermally separate the electronic components of the spark detector from these hot areas.

### Controlling

The FMZ 5000 spark detector control panel includes a battery backup supply plus a power status indicator and supervises all of the spark detectors, including their function monitoring systems, flow switches, closing devices, pressure booster systems, trace heating, extinguishing valves and spark detector test equipment.

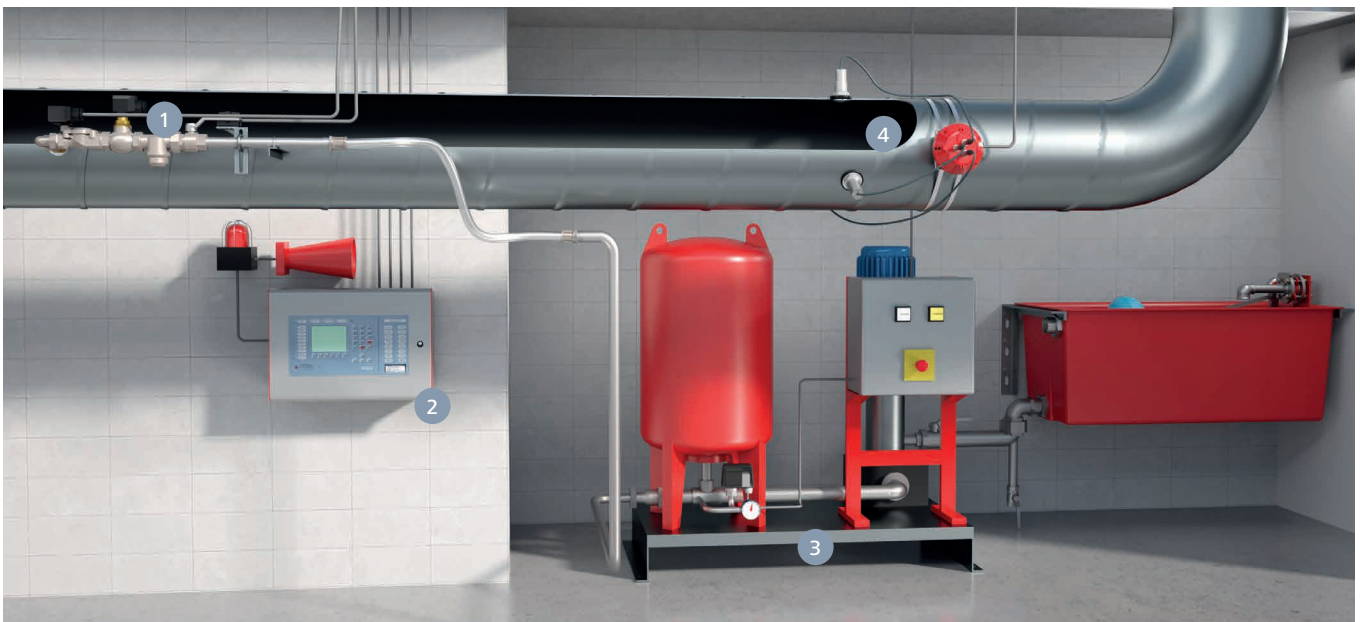


As long as sparks are identified, the extinguishment stays activated to prevent a fire damage. One of the three spark counter types, that are available per each spark detector line, offers an averaging over a free-definable period of time. With the help of the spark counters further, stepped measures can be taken in the event of increased or continuous flow of sparks and thus can be used to provide a statistical evaluation of the appearance of sparks in specific areas. The time of every spark detection plus the start and stop of the extinguishing processes, is logged to the millisecond in a storage memory for more than 50,000 entries. The control panel can check the correct functioning of the spark detector and extinguishing components at pre-defined times.

All cable connections are monitored separately for wire breaks and short-circuits. The FMZ 5000 meets the requirements of both: EN 54 Part 2 and 4 for fire detection control panels and EN 12094 Part 1 for the control of gas-based suppression systems. It has been approved by VdS and FM for simultaneous use as a flame detection, fire detection and control panel for all types of extinguishing systems. As a result of this, all fire protection tasks can be carried out with just one control panel.

The Minimax reflex module for the FMZ 5000 offers a combined fire detection and spark suppression function both for pneumatic conveying systems and for suction systems. Spark detection and extinguishing process are reflex-like.





1 Automatic extinguishing unit

2 Fire detection system and suppression control

3 Pressure booster system

4 Spark detector



On receipt of a signal from the spark detector, the control panel activates the quick acting solenoid valve of the automatic extinguishing unit releasing a minimized quantity of extinguishing water. Minimax waterflow detectors for function monitoring are not installed in the water supply, but are integrated into the automatic extinguishing system. This means that each extinguishing point can be individually monitored for water flow and faults can be displayed.

## Structure and function

# Extinguishing – fast and safe with the Minimax flat spray nozzle

### Extinguishing

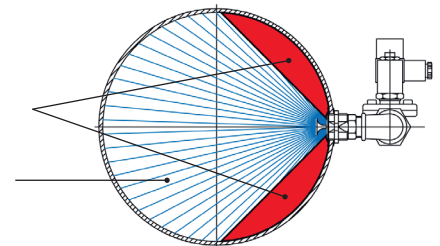
The water is injected by means of the unique flat spray nozzle engineered especially for the conditions in conveying systems. It creates a water spray which covers the entire cross section of the duct. Conventional nozzles, though, can only fill the cross section completely with the help of turbulences in the duct. This requires a certain length of duct. In the installation this means longer necessary distances between the position of nozzles and downstream equipment to be protected. Distances, which are not available very often. In ducts without power venting only gravity is the driving force and, consequently, no turbulences occur. In such chutes, the spray pattern of conventional nozzles will completely fill the section of the duct only if more than one nozzle is installed, whereas with the Minimax flat spray pattern nozzle one nozzle will be sufficient in most of the cases. In Minimax systems, the flow detector is not installed on the



### Conventional plate nozzle

Unprotected area

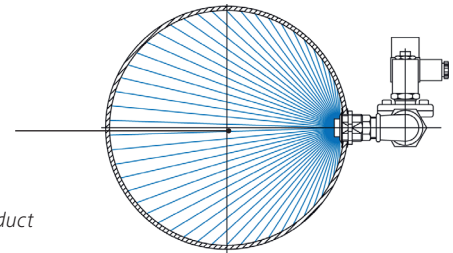
Protected area



### Minimax flat spray nozzle

Protected area

Section view of the duct at nozzle position



water supply, but rather at the automatic extinguishing unit. This allows plant personnel to identify problem zones easily. The stainless steel material and the flush construction of the Minimax flat spray nozzle increase its durability against plugging and abrasion even in the most severe environments. The ball valve as part of the valve unit can also be monitored electronically to ensure that it is always in the correct operating position.

## Pressure booster system – always enough line pressure

### Water supply

The Minimax pressure booster system, consisting of a centrifugal pump and a diaphragm pressure vessel, is the most cost effective and efficient means of increasing the water supply pressure if the minimum pressure required cannot be provided by an existing sprinkler system or a service water supply. The diaphragm pressure vessel supplies water with sufficient pressure immediately upon activation of the automatic extinguishing unit.

The centrifugal pump automatically supplies the pressure vessel if the water pressure drops below a specified value. Even in the unlikely event of pump failure, several extinguishing impulses from the diaphragm pressure vessel are possible. Optionally a monitoring device is available to detect a broken membrane inside the diaphragm pressure vessel.



## Advantages at a glance

- **Response time**  
There are just milliseconds between spark detection and establishment of a complete water screen in the transport pipe. The response time is significantly reduced compared to conventional spark suppression systems.
- **Distance between spark detector and extinguishing unit**  
Thanks to the rapid response time, the distance required between spark detector and extinguishing unit is significantly shortened. Therefore plant areas with short conveyor distances can also be protected with Minimax spark suppression systems.
- **Visibility monitoring**  
This enables a targeted maintenance of the sensors. By identifying the level of pollution, the risk in the relevant pipe can be detected in good time.
- **Installation time**  
In order to minimize installation times, rapid assembly kits are used for the detectors and extinguishing nozzles.
- **VdS- and FM-approved system**  
Minimax offers spark suppression systems with VdS approval and also with FM system approval.