Detecting Sparks, Extinguishing Sparks!

Avoid damage to property, loss of production and danger to human life!

Fire protection for pneumatic conveyor systems

Applications of Spark Extinguishing Systems

Insurance rebates up to 15% possible!

The up-to-date Manual of fire protection!

For free!

For free!
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Subject to change without notice!
Basic Function of T&B Spark Extinguishing Systems

Sparks in pneumatic and mechanic conveyor systems can lead to fires and filter explosions. Sparks are usually caused by processing machines. This can result in loss of production, serious damage to property and danger to human life. In order to eliminate such risks, pneumatic and mechanical conveyor systems have to be monitored for sparks, and protected by spark extinguishing systems.

Functional diagram of spark extinguishing system

With the following devices you can ensure complete protection of your operating equipment:
1. Spark detectors
2. Spark alarm unit
3. Spark extinguishing system

T&B electronic is a manufacturer of spark extinguishing systems recognised by the German Association of Property Insurer (VDS). T&B spark extinguishing systems are state of the art technology. The systems are equipped as standard with a test device (automatic test procedure from BM4/BM6 unit), extinguishing water control and detectors located after the fans.

T&B spark extinguishing systems represent leading technology.

Due to the enormous sensitivity of our spark detectors, spark propagation in the wavelength range of 700 nm to 1.3 µm (type FSK) can be reliably detected. The fact that infra-red radiation has great penetrating power also makes it possible to detect sparks reliably even if the spark detection optics are covered with dust.

Spark detectors monitor the pneumatic and mechanical conveyor systems continually, and send a signal to the spark alarm unit immediately any sparks are detected. Within milliseconds, the alarm unit then actuates the extinguishing system, the emergency shut-down or the CO2 extinguishing system. In the case of a water extinguishing system, high water pressure at P > 5 bar is used to create a finely atomised water spray in the suction pipe. The sparks must pass this curtain of water, where they are extinguished reliably and quickly.
The extinguishing system switches off automatically after the last spark detected has passed the extinguishing barrier. However, the system remains ready for operation, so that any new spark propagation can be extinguished immediately.

Single sparks are safely extinguished during the production process. The machinery can be switched off automatically by means of an adjustable spark threshold of from 1-999 sparks within a given unit of time. The number of sparks detected and the actuation threshold are displayed visually at the spark alarm unit.

The minimum distance between the spark detector and the extinguishing system or emergency shut-down in the suction unit depends on the air speed in the suction pipe. The minimum distance in metres is calculated from air speed in m/sec. multiplied by a safety factor. The safety factor is the time between spark detection and the actuation of the extinguishing system. Within this time, an effective water curtain has to be formed which will safely extinguish the flow of sparks.

Basically, therefore, the higher the air speed, the greater the distance between the spark detector and the extinguishing system has to be, so that the extinguishing process is always activated before the sparks arrive at the extinguishing point. More detailed information is available in the planning notes for the installation of T&B spark extinguishing systems.

If possible, spark detectors and extinguishing devices should always be installed after the suction fans (i.e. on pressure side). One reason for this is that the fan wheel itself can also produce sparks. If the extinguishing system is installed on the suction side, the sparks will of course be detected and extinguished, but if the cause of the spark is a metal part, it could produce more sparks as it passes through the fan. These sparks could then flow undetected into the following filter system, causing a fire or explosion.

If the distance between the fan and filter system is too short to install the spark detection and extinguishing system on pressure side, and they consequently have to be installed on the fan suction side, additional spark detectors must be installed after the fan, which will actuate the extinguishing system immediately in the event of spark detection and switch off the fan.

A flow pressure of at least P > 5 bar at the nozzle is required for the extinguishing system to create the necessary density of water spray in the suction pipe. If this pressure is not already available in the water supply system, a pressure booster system with membrane pressure tank and multi-stage vertical centrifugal pump must also be installed. For the biological separation from city water and extinguishing water if necessary also an water tank with a volume of 600 litres or more can be installed.

An electronic monitoring device, installed as standard in all alarm units, continually monitors the proper operation of the extinguishing process. The unit displays if water is flowing without any alarm having been given (leakage message), or if no water flows when an alarm is given, or if an alarm message is given when the machinery is not in operation.

In order to prevent filter fires, bypass smoke detectors have to be installed in the return airducts. Additionally by the insurance a thermal monitoring of the filter system is required.

The whole spark extinguishing system is designed in an intrinsically safe way. Spark detectors and extinguishing systems are monitored electronically for continual operational readiness. In the event of a power cut, the system switches automatically to emergency power for up to 4 hrs. The extinguishing system continues to operate in this emergency mode.

The spark detectors are equipped with built-in test equipment. Each spark detector can also be checked for operational readiness from the central alarm unit.

The spark detectors are designed only for installation in suction pipes where it is completely dark. No outside light should be able to enter the pipe, since all light contains a proportion of infrared radiation, which would immediately activate the alarm. If there is any possibility of outside light striking the detector, special spark detectors must be used that are able to filter out normal daylight. Existing spark detectors may detect heat radiation from 300°C and within a period of milli-seconds. These detectors can also detect concealed heat sources.

The number of spark detectors to be installed depends on the diameter of the suction pipe and the flow of material. In standard applications up to a nominal diameter of 800 mm, 2 detectors are always installed. More detailed information is available in the planning notes for the installation of T&B spark extinguishing systems.

Spark detectors can as a rule be used at ambient temperatures from -20°C bis +60°C. For higher temperatures up to 300°C, a lighting conductor must be used, which with a high-temperature adapter can also be used at temperatures up to 600°C.

The spark detectors have an angle of detection of 120°. Due to their high sensitivity, differing maintenance intervals may be required, depending on the type and volume of material being transported through the pipe. A certain amount of dirt can be tolerated without adversely affecting the sensitivity of the spark detector. The maintenance intervals should be established jointly between the manufacturer and system operator. Furthermore, the spark detectors are designed so that it is almost impossible for dust to be deposited on the detector optics due to the self-cleaning effect caused by the air current in the pipe.

The number of extinguishing nozzles to be installed also depends on the diameter of the pipe and the material flow. More detailed information is available in the planning notes for the installation of T&B spark extinguishing systems.

At a flow pressure of P > 5 bar, and depending on the number of extinguishing nozzles in relation to the pipe cross-section, a volume of water of 1.2-2.8 litres/sec. will be sprayed into the suction pipe. Experience shows that the filter systems are not adversely affected by this relatively small volume of water, since the water evaporates rapidly in the suction pipe.

The standard extinguishing process lasts 5 sec., although this time is automatically extended in the event of longer spark propagation. If the flow of sparks lasts longer than 5 sec. without the counter threshold being activated, the machinery will be switched off automatically after a total time of 15 sec.

If extinguishing systems are installed in outside areas where they will be exposed to frost, they must be equipped with additional, self-regulating heating. The heating system and extinguishing water pipe must also be insulated. The operation of the heating is controlled via an outdoor thermostat. This function is also monitored by the extinguishing water monitoring device of the spark alarm unit.

The spark alarm units BM4, BM5 and BM6 are fitted with a microprocessor control. The microprocessor can store up to 1,000 events (for BM4/BM5) and 2,500 events (for BM6). All messages are shown as plain text on a 2-line LCD-display. The unit records and displays the number of sparks detected, the extinguishing times and whether any machinery has been switched off.

Events can be transmitted and data exchanged with other systems via the standard built-in RS-232 interface (BM4/BM5), respectively an OPC-interface (BM6).

Summary of functions:
A. Spark extinguishing systems are always ready for operation, even immediately after a previous extinguishing procedure.
B. There is no stoppage of production after an extinguishing procedure.
C. The volume of extinguishing water is accurately controlled so as to cause no consequential damage.

We always have the right solution for your fire protection problems.
Benefits of T&B Spark Extinguishing Systems

- Up to 4 spark detectors can be connected to a line. That means cost reduction in case of large pipe diameters and subsequent detection. Additional line cards are not necessary.

- Test device on the line card and at the spark detector are fitted as standard. Each spark detector can be monitored via the spark alarm unit for proper function. The number of spark detectors ready for operation is displayed digitally.
  No extra cost for test card.

- Spark detectors installed after fans (recommended by the Association of Property Insures in case the distance between spark detection and spark extinguishing device is too short) are included on the line card.
  No additional electronic plug-in cards are necessary, thus saving further costs.

- Spark detectors installed after fans can be also be checked for proper operation via the test device fitted as standard.
  Please compare your quotations. T&B offers this benefit as a standard feature.

- Electronic monitoring of the extinguishing water is also fitted as standard in the alarm units (BM4/BM5&B6). All extinguishing procedures, possible leakages and operation of the heating band are monitored and displayed both visually and acoustically.
  Fitted as standard T&B spark extinguishing systems.

- The high sensitivity of T&B spark detectors is unmatched anywhere else. Even so, our spark detectors are still largely insensitive to environmental influences and other interference.
  As result, maintenance intervals can be extended.

- Spark detectors, extinguishing device and accessories are delivered with the same mounting holder. All that is needed for the installation of all components is a 40 mm diameter hole in the pipe.
  This saves on installation costs as only one tool is required. Furthermore, spark detectors and extinguishing devices can be removed and replaced in seconds for maintenance. For example, no inspection plates are needed.

- The whole spark extinguishing system can be extended quickly and easily with plug-in components.
  This means low spare parts requirements thanks to standardisation.

- Built-in spark counting device fitted as standard, with adjustable threshold of 1 - 999 sparks for each pre-set time period. On reaching the pre-set spark threshold, a relay with floating contacts is actuated immediately. This can be used to switch off the machine (suction fan).
  All this without any additional cost.
Applications of T&B Spark Extinguishing Systems

More than 25,000 systems have been fitted with T&B spark extinguishing units throughout the world since 1984. Fires and explosions are possible wherever flammable materials are transported pneumatically or mechanically. In all such situations, automatic electronic spark extinguishing systems represent a worthwhile investment.

Examples of applications where these systems can be used:

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<td>Building component manufacture</td>
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<td>Carpentry works</td>
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<td>Cellulose industry</td>
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<tr>
<td>Coal dust extraction</td>
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<td>Coffee roasting plants</td>
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<td>Cotton industry</td>
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<tr>
<td>Firing Systems</td>
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<td>Food industry</td>
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<td>Furniture industry</td>
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<td>Glass industry</td>
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<td>Refuse incineration</td>
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<td>Rubber industry</td>
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<td>Sawdust industry</td>
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<td>Sawmills</td>
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<td>Shipyards</td>
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<td>Sugar industry</td>
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<td>Textile industry</td>
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<td>Timber processing works</td>
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<td>Tobacco industry</td>
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<td>Tyre industry</td>
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<td>Window manufacture</td>
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We have the right solutions for all applications!
Spark Extinguishing Systems

Planning Notes
Installation Diagram for Spark Extinguishing System

Spark alarm unit

Fan

Spark detector

HBW Heating tape monitor

TH1 Exterior thermostat

GBW Heating monitor

Connection box

Connection boxes for AG1 Heating band

Extinguishing device

VB1 Water tank

WDS Pressure booster system

Membrane pressure vessel

DFW Flow switch

P = 5.5 kW

Membrane pressure vessel

Galvanised water pipe

DIN 2440
DIN 2950
Copper pipe
DIN 1786

Fan switch out

NYM 4 x 1.5

LIYCY 7 x 0.5 screened

Connection box

Connection box

NYM 3 x 1.5

NYM 3 x 1.5

NYM 3 x 1.5

NYM 3 x 1.5

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NYM 3 x 1.5
Explanation of Diagram:
Installation Instructions BM4/BM5/BM6
Spark Extinguishing Systems

The diagram shown is a standard installation for a spark extinguishing system monitoring a suction pipe.

1. Electrical cable to spark alarm unit, 230 V/50 Hz, 6 A fused. The circuit must be permanently live, and there must be no other consumers connected to the circuit. The fuse in the main distributor must be marked "red" and labelled.
   Cable type and cross-section: NYM 3 x 1.5 mm²

2. Electrical cable to WDS pressure booster system, 3 x 400 V/50 Hz, 25 A fused. There should be no other consumers connected to the circuit. The fuse in the main distributor should be marked "red" and labelled.
   Cable type and cross-section: NYM 5 x 4.0 mm²

3. Electrical cable to the spark detectors. The spark detectors are fitted with a plug plugged into the connection box. A connection box can be used for up to 6 spark detectors:
   max. 2 detectors KK3: only BM6.....
   max. 2 detectors KK2: only BM4....., BM5.....
   The connection to the spark alarm unit is made using a multi-core, screened cable. The connection box is to be installed easily accessible, and protected from damp.
   Cable type and cross-section: LIYCY 7 x 0.5 mm² for up to 2 spark detectors
   If secondary spark detection is installed, an extra wire must be installed per each spark detector. The cable leads should be properly sealed.

4. Electrical cable to the extinguishing system. The solenoid valve of the extinguishing system is fitted with a plug and a built-in diode. The connection should be made using a flexible cable, since there is little room in the interior of the cable connector.
   Cable type and cross-section: HO5 WF 3 x 1.5 mm²
   The extinguisher solenoid valve must always be installed horizontally.

5. Electrical bond between spark alarm unit and WDS Pressure booster system.
   Cable type and cross-section: NYM 4 x 1.5 mm²

6. Electrical lead to H3 horn (24 V DC).
   Cable type and cross-section: NYM 3 x 1.5 mm²

7. Electrical cable to B3 strobe light (24 V DC).
   Cable type and cross-section: NYM 3 x 1.5 mm²

8. Electrical cable to HBW heating band monitor, 3 x 400 V/50 Hz, 16 A fused. There should be no other consumers connected to the circuit. The fuse in the main distributor must be marked "red" and labelled.
   Cable type and cross-section: NYM 5 x 2.5 mm²

9. Electrical bond between spark alarm unit and HBW heating band monitor.
   Cable type and cross-section: NYM 4 x 1.5 mm²

10. Electrical lead to TH1 exterior thermostat. The thermostat should be installed in an easily accessible place and protected from the wind.
    Cable type and cross-section: NYM 3 x 1.5 mm²

11. Electrical cable to self-regulating HB1 heating band.
    Cable type and cross-section: NYM 3 x 1.5 mm²
    The connection is made via the AG1 connection box.

12. Electrical cable for return signal of self-regulating HB1 heating band.
    Cable type and cross-section: NYM 3 x 1.5 mm²
    The connection is made via the AG1 connection box.

13. Electrical cable to DFW flow switch. If no pressure booster system is being used, a cable must be installed to spark alarm unit.
    Cable type and cross-section: NYM 3 x 1.5 mm²
    With the pressure booster system, the flow switch is wired as standard in the switch-box of the WDS.
    The flow switch must always be installed horizontally.

14. Before the automatic extinguishings a slide valve R=1" is installed which has to be secured against unintentional closing.

15. Electrical lead between spark alarm unit and fans or other external equipment to be switched off.
    Cable type and cross-section: NYM 3 x 1.5 mm² for all units monitored

16. Electrical lead to pipe thermostat.
    Cable type and cross-section: NYM 3 x 1.5 mm²

17. Water tank for pressure booster system. The feed pipe should have a diameter of at least R=1/2". The water level in the water tank is controlled by means of a built-in float switch. At the same time the water tank serves for the biological separation from extinguishing water and city water.

18. Dry-running protection for pressure booster system.
    Cable type and cross-section: NYM 3 x 1.5 mm²

19. Overflow pipe for supply container. A waste pipe should be available for piping to the supply container overflow.
Protection Systems

Applications:
Laser cutting, welding, grinding

Spark alarm unit
Horn/strobe light
Flame detector
Smoke detector
Manual actuation
CO₂ extinguishing system

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Spark Extinguishing Systems

Applications
Example 1
Frequently silo fires result from the fact that glowing particles (A) from the combustion plant arrive into the silo. It can take some days, until it comes then to a fire.
Reasons:
1. Leakages of the star-wheel feeder before the furnace
2. No constant filling of the material supply to the furnace
3. Only partly filled splinter silo - by it chimney draw effect - the glow is pulled from the furnace
4. Hot gases, which lead in the silo to the self inflammation
By the installation of a spark detection (B) with spark extinguishing (C) these fire risks can be fought effectively. Furthermore all suction lines and return air lines on flying sparks should be monitored.

Example 2
All suction pipes (D) leading to wood-chip or sawdust silos should be protected by a spark extinguishing system. Spark propagation will thus be detected immediately and extinguished within milli-seconds, without interrupting production. However, if a large number of sparks are detected within a certain time (e.g. 10 sparks within a second), they will be extinguished and the fan will be switched off. The return airduct is monitored by a bypass smoke detector (E).
Spark Extinguishing Systems for Protection of Hose Filter System

Hose filter systems need to be safely protected against dust fires and explosions caused by spark propagation. Optimal protection can only be offered by a spark extinguishing system. All suction pipes leading to the filter system are monitored by spark detectors (2) and protected by spark extinguishers (3). If a filter pipe starts smouldering, the alarm is actuated immediately by by-pass smoke sensors (1) in the clean air ducts. Fires due to self-ignition in the filter system are detected by thermal detectors (4) and the alarm given immediately, so that the filter extinguishing system (5) is also activated.
The suction fan of a suction system must always be incorporated in the safety concept. Sparks may also be created by the fan (bearing damage), which without a secondary detection system can penetrate undetected into the filter system. Spark detection and extinguishing take place before the fan, and additional spark detectors are installed after the fan, which also actuate the extinguishing system if sparks are detected, and switch off the machinery.

If the filter system uses a return air vent, a by-pass smoke detector is also installed in the return air pipe. This will immediately detect a fire in the filter pipes, allowing the system to be switched off.
Protection by using Pneumatic Emergency Shut-off Barrier

Application areas:
- Textile industry
- Foodstuffs industry
- Paper industry
- Chemical industry
- Animal feed industry
- etc.

Minimum distance between spark detectors and shut-off barrier in m = air speed in m/sec. x safety factor 0.3
Example: 25 m/sec x 0.3 = 7.5 m minimum separation

In Operation 000 000 000 16:19:39 16.12.09

Spark alarm unit
Fan shut-off in the event of spark propagation
Alarm Horn Strobe light
Connection box
Spark detector

Pneumatic Emergency shut-off barrier

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Protection by using Spark Extraction System

Spark alarm unit

Fan shut-off in the event of spark propagation

Connection box

Alarm

Horn

Strobe light

Spark detector

Pneumatic Spark extraction system
Spark Extinguishing Systems for Protection of Sugar-Beet Processing

- To pellet silo
- To bunker
- Pellet press
- Magnetic separator
- Cooling conveyor
- Dust separator
- Dryer
- FSK Spark detector

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Spark Extinguishing Systems for Protection of Sludge-Drying Process
Spark Extinguishing Systems for Protection of Chipboard Industry
In order to prevent a PVC fire in equipment in the battery industry, the individual banks are monitored by spark detectors. In the event of spark propagation, the spark alarm unit switches off the charging current.

**Example: closed formation**

Fan shut-off in case of spark propagation

**Example: opened formation**

**Spark detector**

The electronics of the FSK-S Spark detector correspond to those of the FSK Spark detector, with the following exceptions: acid-resistant plastic housing, fully resistant to sulphuric acid. The spark detector is designed for installation in machinery in the battery and chemical industry. Detection range up to approx. 25 m.
Protection concept
for Battery Industry

The problem:
In recent years PVC fires have often occurred on the production lines of battery manufacturers. Since the whole suction system has to be resistant to sulphuric acid, PVC is the only material that can be used for the suction pipes. There have been several different reasons for the fires. In some cases the cause was too high a charging current (up to several hundred amperes) for the batteries. Fires in suction pipes have also occurred due to badly soldered connections between the tanks, resulting in increased generation of heat. In other cases, power supply cables have heated up to such an extent that the insulation has melted and the individual wires of the flexible cabling have become red-hot, and have been sucked in by the air current of the suction system. These hot parts then remained in the suction system, where they began to smoulder, soon causing a fire.

The solution:
In order to be able to use spark detectors in such a system, they must be completely resistant to sulphuric acid. Since beams of light may be expected to enter the piping trough the lateral suction channels, it is essential to use spark detectors which are insensitive to outside light. Such production lines usually have a length of between 7 and 20 metres. Any possible spark propagation or rapid build-up of heat must be safely monitored and detected throughout this whole length without excessive outlay. For this application, spark detectors with a PVC casing were used, with electronics integrally cast. A slotted blind was fitted over the detection optics to filter out the outside light. Since static build-up, which always produces light in the blue range of the spectrum but never causes fires, often occurs in such production lines, the detectors were also fitted with a UV filter removing all light radiation in the range below 700 nm. Spark detectors were also installed at the end of each suction channel to monitor the whole cross-section of the pipe.
If any sparks are detected, an alarm is actuated and displayed visually at the spark alarm unit. If the built-in spark counter registers more than four sparks within one time unit, the charging current is switched off automatically. After this second alarm level, the alarm is also given to operating personnel to carry out a visual check of the system.
Spark Extinguishing Systems for Textile Industry

1. Fan
2. Drum filter
3. Preliminary filter
4. Briquette press
5. Baling press
6. Material transport
7. Textile machinery

Spark detector
Extinguishing device
Emergency shut-off
Spark Extinguishing Systems for Textile Industry
Example: Material transport of cotton

1. To drum filter
2. To briquette press
3. Bale transporter
4. Spark detector
5. Extinguishing device
6. Emergency shut-off
Spark Extinguishing Systems for Spray Drying System

Example:
Milk-powder production

Installation plan for protection of a spray drying system
Fire Protection of Cartridge Filter System

Applications:
Animal feed industry, food industry, grinding and polishing, laser welding and laser cutting

Cartridge filter protected by a T&B Spark extinguishing system with Nitrogen/CO₂ or Argon
Due to their extremely fast closure times, T&B emergency shut-off barriers (1) provide reliable protection against fires and explosions. The barrier is built into the pneumatic conveyor systems used for the transport of fine particles. Sparks are detected by the spark detector (2) built into the conveyor pipe, and the emergency shut-off barrier (1) is actuated within a split second by the spark alarm unit (3). The various parts of the system are thus isolated immediately, preventing a possible catastrophe.

T&B emergency shut-off barriers (1) are operated by compressed air, and work at an operating pressure of 6 - 8 bar. They can easily and quickly be checked for operational readiness from the spark alarm unit (3). After actuation they are ready for further operation immediately. T&B emergency shut-off barriers have been in use for years in many branches of industry (e.g. mills).
If sparks are detected (1), drive to the rotary barrier valve (2) is shut off immediately, preventing any further transport of the warm particles. Rapid shut-off is ensured by the use of brake motors. The final rotational speed of the valve is limited to 50 rpm. Depending on the product concerned and local conditions, additional extinguishing systems (3) can be installed.
Spark Extinguishing Systems for Asphalt Industry
Spark Extinguishing Systems for Food Industry

Example:
Fluid bed reactor
Fires or explosions often occur in the shredders of waste incineration systems (A+B) during shredding operations. These dangers can be reliably averted by the installation of spark extinguishing and explosion suppression systems.
Small mobile suction systems, for example as used in the footwear industry, are often protected against spark propagation by means of a Type BM 1 spark extinguishing system. The spark detector detects even the smallest sparks (1) in the suction pipe, and immediately activates the extinguishing system. By means of a special extinguishing device, a fine water spray is sprayed over the material falling to the bottom of the container (2), and over the sparks, thus effectively preventing a fire. The extinguishing device can be operated with normal water pressure of 2-3 bar.
Spark Extinguishing Systems

Systems and Accessories
Spark Alarm Units

Spark alarm unit BM1
Spark alarm unit for one extinguishing area. Solid plastic case, protection class IP 54, with transparent front panel. Dimensions: 180 x 130 x 100 mm. Electrical power supply via normal power supply of 230 V/50 Hz +/-5%. Relay unit with floating contacts (each with one 230 V/1A change-over contact) for activating extinguishing device, with a fixed extinguishing time of 5 seconds. In the event of spark propagation the extinguishing time is increased automatically. Relay unit 2 is used to switch off the machinery or to actuate a horn or flashing lamp (one 230 V/1A contact). Up to 6 spark detectors can be connected. Functional check of spark detectors via test device from the spark alarm unit. Reset of the spark alarm unit is carried out via a built-in reset button. The terminal connectors are located at the bottom of the spark alarm unit.
Spark Alarm Units

Spark alarm units BM4-3/BM4-4

The basic BM4 microprocessor-controlled spark alarm unit consists of 3/4 control and extinguishing areas. The report memory can store up to 1,000 events. All messages are shown as plain text on a 2-line LCD-display (40 digits each line). The unit records and displays the number of sparks detected, the extinguishing times, and whether any machinery has been switched off. All messages can also be printed on the built-in printer (optional). Events can be transmitted and data exchanged with other systems via the standard built-in RS-232 interface. Up to 6 spark detectors can be connected to each line, with built-in individual evaluation devices. Each spark detector displays its own number of sparks detected digitally on the LCD-display. Example: D1 : 32   D2 : 44   D3 : 31   D4 : 0

Built-in automatic self-monitoring of all spark detection and extinguishing areas. Test procedures are also monitored and any faults displayed immediately (automatic extinguishing water monitoring). If one line is switched off, this is displayed visually and reported. Easy handling for system operators. The LCD plain text display shows which buttons have to be pressed during operation. All relay outputs (Fire 1+2, secondary detection, failures, etc.) are fully programmable. For each range there are two floating 230 V/1A outputs. Extinguishing times and spark thresholds are pre-programmed during commissioning of the system.

Visual display for possible extinguishing water heating.

Built-in emergency power supply for maximum 4 hours operation.

Case protection class: IP 54
Dimensions: 400 x 400 x 200 mm

Service-friendly overall design due to plug-in components and assemblies.
Spark alarm unit BM5

Microprocessor-controlled spark alarm unit for 3-15 monitored areas. The report memory can store up to 1,000 events. All messages are shown as plain text on a 2-line LCD-display (40 digits each line). The unit records and displays the number of sparks detected, the extinguishing times and whether any machinery has been switched off. All messages can also be printed on the built-in printer (optional). Events can be transmitted and data exchanged with other systems via the standard built-in RS-232 interface. Up to 6 spark detectors can be connected to each line, with built-in individual evaluation device. Each spark detector displays its own number of sparks detected digitally on the LCD-display. Example: D1 : 32   D2 : 44   D3 : 31   D4 : 0

Built-in automatic self-monitoring of all spark detection and extinguishing areas. Test procedures are also monitored and any faults displayed immediately (automatic extinguishing water monitoring). If one line is switched off, this is displayed visually and reported. Easy handling for system operators. The LCD plain text display shows, which buttons have to be pressed during operation. All relay outputs (Fire 1+2, secondary detection, failures etc.) are fully programmable. For each range there are two floating 230 V/1A outputs. Extinguishing times and spark thresholds are pre-programmed during commissioning of the system. Visual display for possible extinguishing water heating.

Built in emergency power supply for maximum 4 hours operation.

Case protection class: IP 54
Dimensions: 600 x 600 x 300 mm
Service-friendly overall design due to plug-in components and assemblies.
Spark alarm unit BM6

Microprocessor-controlled spark alarm unit for 2 to max. 36 monitored areas. Modular structure in different versions: **BM6-2**: Equipped for 2 lines, **BM6-4**: Equipped for 4 lines, **BM6-16** and **BM6-36**: Basic version equipped for 4 lines, by additional components a later extension up to 16 or 36 lines is possible. 4 languages installed, maybe switched at any time. The report memory can store up to 2,500 events. All messages are shown as plain text on a LCD-display. The unit records and displays the number of sparks detected, the extinguishing times and whether any machinery has been switched off. Events can be transmitted and data exchanged with other systems via optional OPC- or USB-interface.

Up to 4 spark detectors can be connected to each line, with built-in individual evaluation device. Built-in automatic self-monitoring of all spark detection and extinguishing areas. Test procedures are also monitored and any faults displayed immediately (automatic extinguishing water monitoring). If a line is switched off, this is displayed visually and reported.

Easy handling for system operators. The LCD plain text display shows, which buttons have to be pressed during operation. All relay outputs (Fire 1+2, secondary detection, failures etc.) are fully programmable. For each range there are two floating 230 V/1A outputs. Extinguishing times and spark thresholds are pre-programmed during commissioning of the system.

Visual display for possible extinguishing water heating.

Built in emergency power supply for maximum 4 hours operation.

Case protection class: IP 55

Service-friendly overall design due to plug-in components and assemblies.

Remote control function gives access to the Spark Detection Unit via Internet.

In case of a disturbance a T&B service technician may help online, if a modem is installed.
By-pass Smoke Detector BRM1 and Thermal Detector THM1

By-pass smoke detector BRM1
By-pass smoke detectors are installed in exhaust air ducts and on the cleaned gas side of filter housings in order to prevent filter fires. Air is extracted continually from the system being monitored by a series of pipes, and fed to an optical smoke detector. In the event of an alarm, the filter system can be switched off or an extinguishing device activated.

Thermal detector THM1
Overheating of material, which could lead to a fire, or temperature increases during the production process, are monitored by thermal detectors. In the event of an alarm, the filter system can be switched off or an extinguishing device activated.
Spark Detectors

Spark detector FSK-1/FSK-2/FSK-3
The FSK-1 (FSK-2, FSK-3) spark detector is an opto-electronic monitoring system and has been developed to detect sparks in the near infrared range. The spark detector is suitable for installation in closed piping systems where no outside light can enter the pipe. The spark detector can be installed easily in pipes of different nominal diameters (100-2000 mm) without any modification of the existing suction system thanks to its special housing. Inspection flaps for maintenance work are not required. Installation diameter is 40 mm and is quickly cut with a special hole-cutter. The housing of the spark detector is made of chromed brass and has a fine thread of M 30 x 1.5 m. Rapid installation in the pipe is carried out using an M 42 retaining nut. The spark detector is supplied as standard with a 2 metres plugin connection cable. Up to 6 spark detectors can be operated at one line. The spark detectors can detect sparks within an angular field of about 120°. The infrared radiation emitted by a spark is detected by a highly sensitive photo-diode in the detector. This signal is then evaluated by a pre-set electronic amplifier and transmitted to the line card of the spark alarm unit, where the extinguishing process is initiated. Due to the high sensitivity of spark detectors, maintenance is carried out at different intervals, depending on the materials being transported. The spark detector can tolerate a certain degree of dirt without losing its sensitivity. Maintenance intervals must be agreed between T&B electronic and the operator. The spark detector is also designed so that it is almost impossible for dust to be deposited on the receiver optics (self-cleaning effect). A standard IR test diode allows the proper function of the detector to be checked from the spark alarm unit.

Spark detector FST-1/FST-2/FST-3
Housing as spark detector FSK-1 (FSK-2, FSK-3), but with the following modifications:
daylight insensitive thermal spark detector for detecting sparks and heat radiation above 300°C with built-in daylight filter. Suitable for installation in open systems subject to extraneous light, but without direct exposure to sunlight. Maximum ambient temperature of the electronic components 60°C.

Spark detector FSL-1/FSL-2/FSL-3
Spark detector with optical fibre for temperatures up to 300°C.

Spark detector FSK-1-S/FSK-2-S
Electronics as spark detector FSK-1 (FSK-2), but with the following modifications:
acid-resistant plastic housing, completely sulphuric acid proof. The spark detector is suitable for installation on production lines in the battery and chemical industries. Detection range up to approx. 25 metres.

**All spark detectors are also available as ATEX version.**
Extinguishing Devices

Automatic extinguishing devices are used for fast, reliable extinguishing of sparks detected in mechanical and pneumatic conveyor systems. There are various versions of the automatic extinguisher, differing in the number of extinguishing valves and nozzles used. The following extinguishing devices are available, depending on the diameter of the suction pipe or shaft:

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>SP1D-R</th>
<th>SP2D-R</th>
<th>SP1D-R + SP2D-R</th>
<th>2x SP2D-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 400</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An extinguishing device, e.g. the SP2D-R, consists of a ball-valve, dirt-trap, solenoid valve, 2 extinguishing nozzles and the relevant piping. The dirt-trap consists of a fine-mesh sieve, and protects the solenoid valve from dirt. The connection for the extinguishing device is at least R = 1".

The solenoid valve is quick-opening, and is fitted with a damping device against water shocks.

The extinguishing nozzles are made of V2A (option V4A), and spray extinguishing water into the transport system being protected. In order to be able to create the required spray pattern from the extinguishing nozzles, a flow pressure of at least P = >5 bar must be available at the extinguishing nozzles. The extinguishing nozzles are equipped with an automatic shut-off, which prevents the nozzles being contaminated with transported materials and dust. The resetting of the nozzle valve plate is carried out by means of a spring.

The installation diameter measures 40 mm and is quickly carried out by means of a special hole-cutter. Due to the rapid-fitting device, inspection flaps for maintenance work are not necessary. The nozzles are mounted in the sides of the duct. Protection against frost (pipe-heating) is therefore possible right up to the extinguisher nozzles.

The signals received and evaluated by the spark alarm unit actuate the extinguishing device. The solenoid valve opens within a fraction of a second, and a finely atomised water spray is injected into the transport system at a high pressure of P = >5 bar. The sparks have to pass this barrier, where they are extinguished quickly and reliably.

The quantity of extinguishing water is exactly calculated and sprayed into the duct over an angle of 120°. This achieves the optimal extinguishing effect, while still only using a few litres of water for each extinguishing procedure. The following filter systems are not damaged by this optimal quantity of extinguishing water.

Prefabricated insulated covers are available for all extinguishing systems to be installed in areas prone to frost.

**All extinguishing devices are also available as ATEX version.**
Components of the pressure booster system

1. Water inlet R = 3/8”
2. Float switch
3. Overflow
4. Level switch
5. Supply container, 600 litres or 1000 litres
6. Vertical centrifugal pump
7. Galvanised high-pressure hose
8. Electronic switch unit
9. Non-return valve
10. Operating pressure switch
11. Safety valve
12. Flow switch
13. Ball-valve, pressure side
14. Membrane pressure vessel
15. Drain

A pressure booster system WDS is required in all cases where a flow pressure of extinguishing water of $P_{\text{min}} = 5$ bar to the extinguishing system cannot be guaranteed.

The WDS system consists principally of multi-stage vertical centrifugal pump and a membrane pressure vessel (admission pressure 6 bar). Extinguishing water used is automatically replaced after each extinguishing procedure.

The VB water tank is only required if a supply of at least 240 litres/minute cannot be guaranteed for the centrifugal pump. The water tank also serves to provide a biological separation between town water supply and extinguishing water.

The level switch with dry-running protection (4) with water tank (5) or supply pressure valve when connected directly to a water pipe, prevents the WDS from operating in the event of an interruption in the water supply.

The pump is switched on at a pressure of $P = 7$ bar, and switched off by the operating pressure switch (10) at a pressure of $P = 9$ bar.

A non-return valve (9) installed on the pressure side prevents any reverse flow of extinguishing water following the build-up of pressure.

Ball-valves installed as standard on the suction pressure side of the WDS serve as an aid to maintenance.

The electronic switch unit (8) is installed in a switch cabinet on the WDS. The complete controls are fully integrated into the electronic extinguishing water monitoring system of the spark alarm unit. Operational readiness and any possible faults are both displayed visually and signalled acoustically.

The complete WDS system is supplied fully wired with all piping. The connection between the vertical centrifugal pump and the membrane pressure vessel consists of a galvanised high-pressure hose with $R = 2”$ (7).

If the initial supply pressure is greater than $P = 3$ bar, a pressure-reducer must be installed on the suction side.

The flow switch DFW (12) is installed on the pressure side of the pump (DFW option).

The water connection for the WDS on the suction side should have a diameter of at least $R = 1.5”$. The piping to the extinguishing devices on the pressure side should not have a cross-section of less than $R = 1.25”$.

The overall size of the WDS system to be installed will be specified by T&B electronic during the project planning stage.

### Dimensions of pressure booster system

<table>
<thead>
<tr>
<th>Type</th>
<th>WDS 180</th>
<th>WDS 300</th>
<th>WDS 600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (mm)</td>
<td>1,500</td>
<td>1,600</td>
<td>1,750</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>1,235</td>
<td>1,835</td>
<td>1,850</td>
</tr>
<tr>
<td>Depth (mm)</td>
<td>500</td>
<td>600</td>
<td>750</td>
</tr>
</tbody>
</table>

### Technical data of centrifugal pump

<table>
<thead>
<tr>
<th>Type</th>
<th>HVXA15/7,5</th>
<th>HVU25T/3Y+12</th>
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</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>60</td>
<td>135</td>
</tr>
<tr>
<td>Electric motor</td>
<td>400 V/5.5 kW</td>
<td>400 V/9.0 kW</td>
</tr>
<tr>
<td>Protection type</td>
<td>IP 55</td>
<td>IP 55</td>
</tr>
</tbody>
</table>

### Technical data of pressure vessel

<table>
<thead>
<tr>
<th>Type</th>
<th>WDS 180</th>
<th>WDS 300</th>
<th>WDS 600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (mm)</td>
<td>550</td>
<td>550</td>
<td>750</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>1,235</td>
<td>1,835</td>
<td>1,850</td>
</tr>
<tr>
<td>Weight empty (kg)</td>
<td>110</td>
<td>150</td>
<td>230</td>
</tr>
</tbody>
</table>
**Auxiliary Extinguishing Water Equipment**

**Flow switch DFW**
In conjunction with the standard fitted extinguishing water control at the spark alarm unit, the flow switch monitors the extinguishing devices and their operation. Faults are signalled acoustically and displayed visually on the spark alarm unit. The whole extinguishing procedure is reliably monitored, and any leakages are displayed at once. The flow switch can be supplied in sizes R = 1.25” up to 3”. If a pressure booster system (WDS) is being used, the flow switch (DFW) is factory-installed directly behind the pressure-side pipe socket slide of the pressure booster system.

**Water tank VB1**
Water tanks are used, if a water flow of 180 l/min at 2 bar cannot be ensured by the available water supply. Additionally by the pressure-free inlet a biological separation between city water and extinguishing water is achieved, i.e. it cannot flow back possibly contaminated water into the potable water supply system. The inflow of water is mechanically actuated via a float valve. The tank is connected to the pressure booster system (WDS) by a pipe of R = 1.5”.
The tank is supplied with a flat cover.
Water capacity: 600 l  
Internal dimensions: Length 1,200 mm  
Weight: 50 kg  
Width 800 mm  
Height 1,005 mm

**Water tank VB2**
Similar design to VB1, but with the following differences:
Water capacity: 1,000 l  
Internal dimensions: Length 1,200 mm  
Weight: 56 kg  
Width 1,000 mm  
Height 1,190 mm
**Waterpipe Heating**

**Self-regulating heating band HB1**
If extinguishing pipes are laid in areas prone to frost, they must be protected against freezing. By means of the self-regulating heating band, the extinguishing system is warmed up electrically. The heating effect depends on the actual outdoor temperature. Overheating is impossible because the maximum temperature of the heating band is about 40°C. The heating band is connected to the heating band monitoring by connection set AG1. Heating band is laid alongside the extinguishing pipe and fixed to it with aluminium adhesive tape. Intersections and bends will not damage the heating band. Adequate insulation of the extinguishing water pipe with glass wool glass etc. should be ensured. Operating voltage is 230 V with an output of 10 watts per metre at 5°C.

**Connection set AG1**
The connection set (shrink-on sleeve), together with the relevant connection box, is used for connecting the self-regulating heating band to the normal installation cable.

**Outdoor thermostat TH1**
The outdoor thermostat is used to switch the individual sections of the heating band on and off if the outside temperature falls too far (t=<5°C). The thermostat comes in an insulated switch-housing for surface mounting, protection class IP 54.

**Heating band monitor HBW/3**
The heating band monitor controls and monitors the separate heated extinguishing water circuits. As the heating band cable is fed back, the end of the heated extinguishing water pipe is also monitored. The heating band monitor is built into a switch cabinet with transparent front panel for wall-mounting, protection class IP 54.
The heating band monitor is electrically connected to the extinguishing water monitoring system at the spark alarm unit. The functions ‘heating band on’ and ‘failure of heating band’ are transmitted to the spark alarm unit, where they are signalled acoustically and displayed visually. The heating band is controlled by the TH1 outdoor thermostat.
The switch box is supplied fully wired and must be connected to a 400V/16A power supply. The HBW/3 heating band monitor can be used for a maximum of 3 separate heating band circuits, each with a length of 110m.

**Heating band monitor HBW/6**
Function and technical operation as HBW/3, but for the connection of up to 6 separate heating band circuits.
Accessories

Horn H3
The horn sounds the alarm in the event of spark propagation and is actuated by a relay of the spark alarm unit. The yodel signal is audible from a great distance, producing a sound level of 108 dB (A) at a distance of 1 metre. A power supply of 24 V=14 - 67 mA is required. The protection class conforms to IP 54 (IEC 60529).

Strobe light B3
A failure of the spark extinguishing system is displayed visually by the strobe light, actuated by the failure relay of the spark alarm unit. Its orange cover and a light intensity of 5 Joule/14 cds make the strobe light visible from a great distance. The flash frequency is 1 Hz. A power supply of 24 V=270 mA is required. The protection class conforms to IP 54 (IEC 60529).

Connection box KK1 (for BM4/BM5/BM6)
The connection box is designed for the plug-in connection of 1 to 6 thermal detectors, and facilitates installation and maintenance. The thermal detectors are connected to the internal circuit board via their standard plugs. It is only necessary to connect the cable from the spark alarm unit. The connection box is supplied complete with all cable screw connections. The protection class conforms to IP 66.

Connection box KK2 (for BM4 and BM5)
For the plug-in connection of FSK-2 spark detectors to the BM4 and BM5 spark alarm unit. Otherwise as KK1, with protection class IP 65. For max. 2 spark detectors per connection box.

Connection box KK3 (for BM6)
For the plug-in connection of FSK-3 spark detectors to the BM6 spark alarm unit. The protection class conforms to IP 66. For max. 2 spark detectors per connection box.

Connection box KK1 ATEX, KK2 ATEX and KK3 ATEX
For the plug-in connection of FSK-1 ATEX (KK1 ATEX), FSK-2 ATEX (KK2 ATEX) and FSK-3 ATEX (KK3 ATEX). For max. 2 spark detectors per connection box. The protection class conforms to IP 66.
Certificates

VDS/ATEX/ISO 9001
Our current certificates are our homepage:
www.tbelectronic.de
under the heading of Certificates.

VDS-Certificate:
VDS - approved manufacturer
of spark extinguishing systems

TÜV-Certificate:
Approval of the quality assurance system
TÜV 03 ATEX 2187 Q
Category of products:
Equipment for preventive fire protection
Principle of protection:
Electrical equipment for using in areas with
flammable dust

TÜV-Certificate:
Development, Design, Manufacturing, Installation,
Sales and Service of Spark Detecting-, Spark Aborting
and Spark Extinguishing Systems
DIN EN ISO 9001 : 2008