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## Dust risk eliminated

### Switchgear in bulk goods plants

The conditions for switchgear in the processing or manufacturing of powders, pellets and other bulk goods are often adverse: regulations for dust explosion protection often apply, while dust pollution is often so great that conventional switching devices would have severely limited lifetimes.



Fig. 1: Wireless technology makes it possible to eliminate cable glands – always a plus in any dirty environment.

Fig. 2: Bulk goods conveyor technology makes extreme demands on switching devices, such as this emergency pull wire switch in a plant for processing limestone.

PROFESSIONAL-GUIDE	Industry	Plant construction	○○○	DECISION-FACTS	<p>For operators</p> <ul style="list-style-type: none"> <li>• The dust caused by handling bulk goods makes conventional switchgear difficult to use and also poses the risk of explosion.</li> <li>• In very dusty environments, as well as in conjunction with strong wear and tear and very high or low temperatures, special switching devices are required, designed for extreme conditions.</li> <li>• The solutions presented here have the necessary robust design and are approved for use in gas and dust Ex zones.</li> </ul>
		Chemistry	○○○		
		Pharma	○○		
		Outfitter	○○○		
	Function	Designer	○○		
		Operator	○○○		
		Purchaser	○○○		
	Manager	○			



Fig. 3: For rough environments and dust explosive zones: the Ex 97 series of position switches.

Fig. 4: Dusts are often also corrosive. The "Extreme" switches, such as the position switches in the Ex 99 series, are designed for just such conditions.

Fig. 5: Particularly where dust pollution is high, non-contact sensors provide an alternative to electromechanical switchgear.

A picture of an emergency pull wire switch along the length of a bulk goods conveyor illustrates more clearly than a thousand words the kinds of demands involved. The switching device shown here (Fig. 2) is installed in a limestone processing plant in the United Arab Emirates. The dust pollution is clearly visible. In addition to very fine dust, extreme operational conditions include mechanical wear and tear, high temperatures up to 50°C and permanently high humidity due to the proximity of the ocean, which is unfavourable for electrical components. Saltwater is used throughout the plant to rinse away the dust, requiring that switchgear also be highly anti-corrosive. In particular outdoors, devices must be able to withstand extreme temperature differences between day and night. Belt alignment switches are also widely used. In bulk goods conveyor systems these switches monitor an even alignment of the conveyor and transmit a signal if the belt should deviate from its normal course. In such applications, a "normal" switching device would reach its limits extremely

quickly. Mechanical and plant engineers for bulk goods technology can, however, draw upon switching devices which have been developed especially for such heavy-duty applications and which have long lifetimes even in extremely adverse ambient conditions. Different emergency pull wire switches from the steute "Extreme" range feature a robust plastic housing, for example, as well as a draw gear made of stainless steel. Alternatively, series are also available with aluminium housings; protection classes extend to IP 69 K.

*Dust, heat, corrosion: bulk goods plants often combine "Extreme" and "Ex" conditions.*

### Risk of dust explosions

One of the design features of the Extreme switchgear range is careful sealing and optimal use of materials and coatings. The position switches in series Ex 97 are a clear illustration of this, with a plastic housing which is anti-corrosive, dustproof and extremely impact-resistant. Their standard and compact mounting dimensions conform

to DIN EN 50047 and permit universal use in machines and plants for bulk goods technology in Extreme applications. These Extreme switching devices also have an unusually wide temperature range, down to -60°C, and are fit for use in safety-related applications. The position switches, which are available with different actuators, can also be used in explosive dust Ex zones 21 and 22. This combination of "Extreme" and "Ex" is frequently found in conjunction with bulk goods technology because the risk of dust explosions is always present when organic bulk goods are processed or manufactured. The range of applications stretches from pharmaceuticals, to foodstuffs, to chemicals such as pigments and additives for the manufacture of plastics. The newly developed Ex 99 series includes larger standard longlife switches (DIN EN 50041) for Extreme applications. Extreme ambient conditions include corrosion, dust, subzero temperatures and strong mechanical wear and tear. Like the Ex 97 series, the Ex 99 series can also be used in dust Ex zones 21 and 22, as well as in gas Ex zones 1 and 2. A typical application field for this series is the

position monitoring of access and cleaning flaps in bulk goods handling plants.

### **Alternative: non-contact switching**

Especially in Extreme zones, it can make sense to eliminate electromechanical switchgear and use non-contact sensors instead. One of the advantages of the latter is optimal sealing because there are no moving parts – i.e. mechanical actuators. Here there are also various options available to engineers – for example, the cylindrical Ex RC M 20 KST magnetic sensors. Even in extremely dusty environments, they have a long lifetime and work reliably in temperatures down to -60°C, while still passing the 7 Joule impact test required for Ex approvals. Wireless switchgear can also provide particular advantages in adverse ambient conditions. They require no cable glands, making it easier to ensure highly effective sealing. For this application field, the manufacturer has developed anti-corrosive and dustproof wireless magnetic sensors in its RF RC series. Maintenance is kept to a minimum since the lifetime of the replaceable lithium batteries is 1 million switching cycles.

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