Safety switchgear for niche applications

Belt and braces: Ex protection and plant safety

Machine safety in explosive environments: when switchgear is required for this combined application, two different – and complex – sets of rules and standards have to be complied with, both of which make high demands on the products in question. Even though this field is a "niche within a niche", users still have diverse options regarding their choice of safety switchgear and sensors, including the position switches with a safety function in the Ex 97 and Ex 99 series.

Pictures: Steute

Safety in Ex zones is provided, for example, by the EX AZ 16

Both machine safety and explosion protection are subject to comprehensive, normative sets of rules and standards, which are listed in the European Machinery Directive and Atex guidelines. In addition, international regulations (e. g. IECEx) and national standards or directives (UL/CSA, EAC …) sometimes apply in both areas. This places high demands on the switching devices used to monitor the position of guard doors on machines in Ex zones because both sets of rules apply equally here. In some types of application, such as shipbuilding or oil exploration, account also has to be taken of factory and manufacturer's standards, and for good reason: the risk of explosion is ever-present and the physical work involved is hard and prone to accidents. The safety measures must therefore be particularly effective.

The Ex AZ 16 series was especially developed for such niche applications: it is a safety switch with a separate actuator, a "classic" in its original basic design (without Ex protection) when it comes to machine safety.

The Ex variant has the same dimensions as the original version, making the switching devices fully compatible for mounting. Users can also expect the same high standards of reliability and durability. The separate terminal compartment conforms to the Ex e type of protection and hence meets the demands for explosion protection; if desired, the Ex AZ 16 is optionally available with a cable assembly. It is suitable for use in Ex Zones 1 and 21 (gas) as well as Ex

Zone 22 (dust). Alternatively, the machine builder can choose non-contact safety sensors – for example the Ex HS Si 4 series which, in combination with an actuator, monitors the position of guard doors. Its features include particularly high shock resistance. The cylindrical safety sensors in the Ex RC Si M 30 series with a separate actuator, which are also available in an Extreme version with IP 69K protection, are another possible option.

Particularly in areas with a risk of dust explosion, such as conveyor plants for bulk goods, emergency stop pull-wire switches are used. They serve as an "extended" emergency stop button, allowing the emergency stop function to be realised across distances of up to 2 x 100 m. The Steute Ex range includes several ZS series, which are able to fulfil their safety-related task even in adverse environments.

Impact-resistant, perfectly sealed and suitable for temperatures down to -60 °C: Ex position switches with safety function in series Ex 99

Ex standard position switches

Among the new features of the Ex range are two series of position switches which are also suited for functional safety applications. The switches in the Ex 97 and Ex 99 series can be used universally, thanks to their standard dimensions according to DIN EN 50047 and 50041 and numerous different actuators (rolling plunger, rolling lever, turning lever…). Atex and IECEx have approved both series for use in Ex zones 1 and 2 (gas) as well as 21 and 22 (dust). In addition, they are designed for temperatures down to -60 °C, where high demands are placed on the housing and seals. The high IP 66 protection of the switchgear, for example, must still be guaranteed at these temperatures following a 7-joule impact test.

The rugged housing of the safety position switches is manufactured from high-quality fibre glass reinforced plastic for this reason. The seal of the housing cover on the Ex 97 is vulcanised across the entire surface. The plunger has a redundant sealing system. The sealing materials have been approved by their manufacturers for temperatures as low as -95 °C while the lubricants are rated for -75 °C. This means a sufficient safety net compared to the approved temperature for the switch as a whole, which is -60 °C. Earthing and equipotential bonding are no longer necessary owing to the insulated plastic design.

The applications for the Ex 97 and Ex 99 include safety monitoring of flaps and doors in the oil & gas industry and in shipbuilding. Depending on the actuator – there are several options to choose from – the switches in this series can also be used as "normal" position switches without a safety function.

Metal alternative

Users who prefer a safety position switch with a metal housing can opt for the Ex 98 series, featuring a robust, anti-corrosive aluminium housing with a stainless steel cover, high protection classes and standard dimensions to DIN EN 50041. The various actuators can be mounted 4 x 90° apart and approval for areas with a risk of gas or dust explosion goes without saying. This series can be used down to -40 °C and is thus also predestined for extremely cold environments. Several series approved for potentially explosive atmosphere are likewise available, even in applications requiring a solenoid interlock, for instance because dangerous coasting movements are to be expected.

Wide selection even for niches

This short overview shows that even with complex niche applications such as those combining explosion protection and functional safety, machine builders and plant operators still have different options when selecting switchgear. And this is still the case if yet more requirements are added to the mix, such as an extremely robust design or suitability for sub-zero temperatures.

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As an alternative way of monitoring guard doors in explosive environments, the Ex HS Si 4 series of safety sensors is also available

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