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Open or closed?

Switchgear for monitoring valve positions

Manufacturers of valves in search of suitable switchgear for position monitoring have a choice to make. Different electromechanical switches are available, as well as different sensors. Some series are suitable for explosive environments or sub-zero temperatures, while more recent options include "Wireless" switchgear.

Wherever valves are integrated in automated plants, their positions require monitoring. Often they are located in adverse environments, which could include corrosive or explosive atmospheres (e.g. in the chemicals industry) or extreme temperatures (e.g. in the oil and gas industry). Other applications need to take hygiene into account, including steam cleaning. The chosen switching devices are used to monitor the positions of valves, flaps or other controls and instruments.

Position switches: new series

Several new switchgear series have been presented over the past months which were developed with valve position monitoring at least partly in mind. They include the position switches in series Ex 99 with standard dimensions to DIN EN 50041. These switches have been approved and certified according to Atex and IECEx for gas Ex zones 1 and 2, as well as dust Ex zones 21 and 22. And they are also suitable for use in sub-zero temperatures down to –60°C, as is frequently the case in oil and gas exploration, for example. In these conditions, the choice of materials and the extremely impact-resistant design of the plastic housing are ideal.

There has also been a new development concerning the more compact standard switches (DIN EN 50047) for "Extreme" applications: series Ex 97. This series is also very durable in extreme environments – corrosion, sub-zero temperatures (down to

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The Ex 98 HS with integrated sensor technology and analogue output signal permits precise monitoring of proportional valve positions

–60°C) and severe mechanical wear and tear – and can also, like series Ex 99, be used in Ex zones.

The sealing materials used in both series are manufacturer-guaranteed down to –95°C, the lubricants down to –75°C, allowing for a considerable "safety net" regarding the approved switchgear temperature of –60°C. Users can therefore be certain that the new position switches will work reliably, even in truly extreme conditions.

Analogue signals from Ex position switch

Further development of the Ex 98 Ex position switches in their robust metal housing was set in motion by a valve manufacturer. A switching device was required which could not only monitor the position of a valve in "black or white" terms, but which could provide information about the precise switching state of a proportional valve. The solution which the developers came up with: a sensor integrated in the Ex HS 98 position switch monitors the exact position of the plunger and converts it to a standard analogue signal (0–20 mA, 4–20 mA or 0–10 V). The position switch can be programmed in the factory and thus adapted to individual requirements.

Ex magnetic sensor for temperatures down to –60°C

It is precisely in sub-zero applications that many valve manufacturers place their trust in non-contact sensors, which are not in danger of malfunctioning because of frozen mechanical parts. An additional series has now been developed for such applications: the Ex magnetic sensor series Ex RC M20 KST. These cylindrical sensors with a diameter of M 20 are cold-resistant down to –60°C and can be used in gas zones 1 and 2.

The non-contact principle simplifies sealing in extreme environments and guarantees a long life: the mechanical life is over a million switching cycles, while the electrical life has been calculated at 10^6 to 10^9 cycles. The housing material – a high-quality fibreglass-reinforced Duroplast – guarantees that the high protection class of these magnetic sensors (IP66 to IP69) in such low temperatures even remains following a 7-Joule impact test.

Magnetic switchgear has also proved advantageous for valve position monitoring because no special actuator is required inside the valve, i.e. on the spindle. A conventional permanent magnet can be used instead.

An alternative to electromechanical switches in extreme applications: the Ex magnetic sensor Ex RC M 20

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The "Wireless Ex" range includes inductive sensors with a universal transmission module also responsible for supplying power

Wireless – even in "Extreme" environments

In extreme conditions, eliminating fault-sensitive cables and connecting systems by using wireless switchgear can increase availability. "Extreme" includes explosive environments, and in these sensitive applications it is advantageous when switches can send signals out of the Ex zone by remote control.

This is the reason why the wireless technology "Wireless Ex" was developed and certified for explosive atmospheres. It can also be used for monitoring valve positions.

The Wireless Ex range includes the Ex RF 96 wireless position switch series in a slim rectangular design, as well as the Ex RF IS wireless inductive sensor series in a cylindrical design. In combination with the universal transmitter Ex RF ST they are suitable for radio transmission, and the transmitter unit also supplies them with power. Both series are certified for use in gas Ex zones 1 and 2, as well as dust Ex zones 21 and 22.

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