Technical article, published in cav (03/2016)

Ex zones without cables

Safety first – Ex protection and plant safety

How do switches and sensors get their power and signals? In addition to the tried-and-tested cabled connections, process engineers are increasingly using cable-free, radio-controlled systems. Adaptation of this technology to the requirements of explosion protection has been a challenge for developers, but one which can now be considered met.

At first sight, the two fields of radio transmission and explosion protection do not go together. The German word for spark (causing an explosion) isFunke, which seems dangerously close to the German word for radio (transmitting a signal),Funk. And indeed, radio networks in explosive environments are generally critical because they introduce energy. But signal transmission from a switch or sensor to a receiver unit involves radio signals with extremely low energy levels, so that risks can reliably be ruled out. At the same time, wireless switchgear addresses the desire of machine manufacturers and users for a solution which is as simple as possible - whereby „simple“ refers both to installation and to maintenance. In explosive zones, particularly high demands are made of the interface between conventional switching devices and their cables: cable ducts and connectors all have to be Ex-compatible. For moving machine elements, even greater special safety precautions have to be taken, e.g. in order to avoid electrically charging the components.

The established solutions – Ex-compatible connectors, switchgear with terminal compartments, Ex-compatible conductor lines and rotary feedthroughs – require effort in their construction, often resulting in considerably higher costs. It is therefore understandable that the focus shifted to wireless (radio) technologies, especially as they are already widely accepted in other areas of industry.

Wireless-Ex technology

However, this new technology was not yet available, and existing solutions could not simply be adapted to suit the sensitive field of explosion protection. As a manufacturer of top-quality switchgear with core competencies in the areas „Wireless“ and „Extreme“, steute was predestined to look into this matter with the required intensity. The result was development of a Wireless-Ex technology which is now available in its second generation.

The first generation was founded on the EnOcean wireless standard, the basic version of which can be found throughout the building and industrial automation

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industries. Its key features include high transmission reliability combined with low energy levels (approx. 10 mW), as well as unidirectional communication. An individual 32-bit identification number is the prerequisite for several switching devices being able to work simultaneously within one transmission area. Non-sensitivity of signal transmission with regard to signals from other wireless networks, such as DECT, Wi-Fi, etc., is also guaranteed. The maxmimum range is 30m indoors and 300m outdoors. Power is supplied self-sufficiently via an electrodynamic generator.

The latest generation of Wireless-Ex switching devices communicates bidirectionally; batteries provide the power required. Photo: Ex RF 96 switches

This wireless technology was certified in accordance with the ATEX directives and introduced to the market. Applications include the position monitoring of valves in gas pumping stations, coupling components in the hose stations of major chemical plants and lances in manual powder coating plants.

The Wireless-Ex switching devices communicate beyond the Ex zone, sending signals to repeaters or receiver units which can be installed in control cabinets.

Bidirectional communication

In a second step, development has now progressed further – this time on the basis of the sWave-868-MHz and 915-MHz wireless technology developed by steute.

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This industry-compatible wireless protocol permits bidirectional communication, facilitating the transmission of presence signals, for example. This is a particularly good idea in the frequent applications where switching devices are used to monitor, say, plant components and have few switching actions. The bidirectional protocol also permits monitoring of battery voltage. Overall, higher availability is achieved without any significant increase in cost.

The switching devices work on batteries, and the batteries can be changed within an Ex zone without any problems. Since the wireless receivers are usually installed in a control cabinet outside the Ex zone, they do not have to fulfil explosion protection regulations.

All steute switching devices with the Wireless-Ex technology are in the „intrinsically safe“ protection type group and designed for protection level „i“ in accordance with EN 60097-11. This means that they conform to the standards for gas Ex zones 1 and 2, as well as dust Ex zones 21 and 22. The EC-type examination certificate was issued by a nominated body.

The sWave Wireless-Ex technology is used in the Ex RF 96 position switch series, as well as the Ex RF IS series of inductive sensors with their cylindrical design and different diameters. These devices are operated in combination with a universal wireless transmitter which also guarantees intrinsically safe voltage supply. Machine manufacturers and users can thus not only profit from the advantages of Wireless-Ex technology in conventional automation and process engineering, but also in explosive environments.

New to the steute Wireless-Ex range are inductive sensors with a universal transmission module, which also guarantees voltage supply.

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