



Fig 1 In many areas of industry, wireless communication for switches and sensors has already become established.

## Wireless Ex switchgear: technology & application examples

### Switches and sensors: free of cables in Ex zones

When Ex switches and sensors require no electrical cables and can transmit their signals beyond the Ex zone, then depending on the application in question the advantages can be considerable. More and more users are now opting for this technology – including and especially in sensitive application fields.

**H**ow is the switch or sensor powered? How does it communicate? In the process industry, remote control systems – wireless alternatives to conventional cabled systems – are

becoming increasingly popular. And there are good reasons for this, some of which apply to the whole of industry, while others are specifically relevant to explosion protection.

## Demand for simplified connections

One thing which seems to be true throughout industry is a desire for simplification and flexibility. Wireless switching devices can be installed anywhere, which is especially advantageous where cables are difficult to lay (e.g. for pull-wire switches used to open rolling gates from a forklift, installed on the ceiling) or where a switching device is required on a rotating or mobile piece of machinery.

Criteria specific to explosion protection include the especially high requirements for interfaces between switching devices and their cables in Ex zones. Cable entries and connectors must be explosion-proof to prevent the explosive atmosphere from coming into contact with an electric arc or spark. The types of protection required, such as "intrinsic safety", "flame-proof enclosure", etc. are all described in the DIN/EN standard 60079-0 to -35. In conjunction with



Fig 2 The Wireless Ex switching devices transmit beyond the Ex zone, sending their signals to repeaters or receivers which can be installed in a control cabinet.



Fig 3 The latest generation of wireless Ex switching devices communicates bidirectionally, with the power being supplied by batteries. Here the Ex RF 96 series of position switches.

moving machine elements, special additional safety precautions apply in order to e.g. avoid any electrostatic charging of the components.

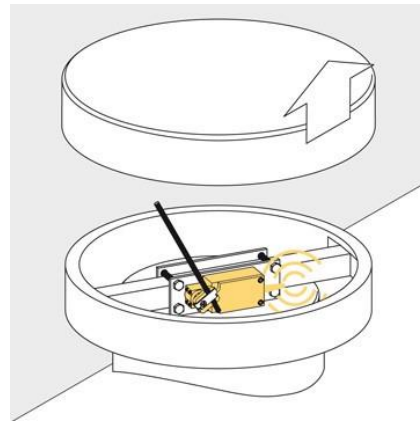
## Explosion protection and wireless communication – how does that work in practice?

For all these reasons, both the manufacturers and the users of Ex-protected machines and plants are understandably interested in using wireless (remote control) technologies, not least because they are already established in other areas of industry (Fig 1).

Several basic requirements have to be fulfilled, however. The wireless system must be suitable and certified for use in Ex zones. And that means: the system must be low-energy so that it does not pose any kind of ignition or explosion risk. Which in turn means: simply adapting a conventional wireless industrial solution to the sensitive field of explosion protection is not going to be possible. In addition, the transmission protocol must not be sensitive to other wireless networks or to the often



**Fig 4** The Wireless Ex range includes inductive sensors with a universal transmitter module which also ensures the supply of power.



**Fig 5** Wireless Ex switching devices can monitor access doors to natural gas plants or storage tanks.

adverse ambient conditions in industrial production (reflections from machine enclosures, etc.).

As a manufacturer of high-quality switching devices with the two core competences "Wireless" and "Extreme", steute has addressed this topic in considerable depth and developed a "Wireless Ex" solution based on its own sWave technology (868 MHz/915 MHz).

### **Suitable for industry and Ex-compatible**

The maximum range of the wireless signal is 40 m indoors and 450 m outdoors. The wireless protocol meets industrial standards and permits bidirectional communication, for example to transmit status signals. This is particularly helpful for the many applications in which switching devices are used for monitoring of e.g. plant components and do not need to switch very often. The bidirectional protocol also enables the battery voltage to be monitored.

The switching devices run on lithium-MnO<sub>2</sub> battery cells, which are approved for use in Ex zones. The batteries can be

changed within the Ex zone. Since the switches or sensors are able to transmit their output signals beyond the Ex zone to a wireless receiver housed inside a control cabinet, the receiver unit does not have to comply with explosion protection requirements (Fig 2).

If multiple wireless sensors are to be installed in one wireless zone, their software can be equipped with a "Listen Before Talk" (LBT) function. This means that the radio modules first ensure that the frequency is free before they transmit a signal.

### **Wireless switchgear for gas-Ex and dust-Ex**

All steute switching devices with "Wireless Ex" technology are "intrinsically safe" and comply with protection level "ib" to EN 60097-11. This means that they are approved for gas-Ex zones 1 and 2, as well as dust-Ex zones 21 and 22. They have been awarded the CE type test certificate by a nominated body.

The sWave "Wireless Ex" technology is used in the Ex RF 96 position switch series (Fig 3), and also in the Ex RF IS series of

inductive sensors with a cylindrical design and diameters ranging from M 12 to M 30. They are operated in combination with a universal wireless transmitter which also guarantees an intrinsically safe power supply (Fig 4).

## **Broad range of applications**

This wireless technology can be used in very different areas of the process industry. The abovementioned Ex RF 96 position switch (see Fig 3), for example, is used to monitor the maintenance doors of process tanks. If the flap is opened, the switch remotely sends a communication to e.g. a control room.

A similar application for wireless Ex position switches is on the access doors to liquid gas plants or underground tanks at petrol stations (Fig 5). These are security applications in Ex-protected environments. Wireless signal transmission is advantageous because no cables have to be laid outdoors to the plants and tanks.

Since the benefits of Wireless Ex technology are obvious and increasingly popular, steute will successively expand its product range. In addition to further position switches and sensors, other ideas include remodelling command devices and foot switches for explosion-protected remote communication.

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