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Gas Ex inductive sensors can communicate via a radio module (middle left) with the corresponding receiver unit (middle right) or also with gateway receivers.

**Building the hydrogen infrastructure**

# Wireless Ex sensors for valve position monitoring

**Wireless solutions have many advantages – also and including for valve position monitoring within the hydrogen infrastructure. Valve manufacturers can choose between electromechanical position switches and non-contact sensors in Ex variants, which communicate via an industry-compatible point-to-point radio connection.**

Hydrogen technology is now – finally – gaining momentum. National hydrogen strategists plan the installation of a complete infrastructure in Germany by 2032, starting with supply (from imports and own production) and storage in large caverns below ground. The hydrogen will be distributed via a network of pipelines extending over a distance of around 9,700 km, with sites including not only industrial centres, but also refuelling stations. Two larger regional networks with starting points at chemicals locations already exist: one



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spanning 240 km from the Ruhr Area into the Rhineland; the other covering 150 km within the chemicals triangle around Bitterfeld in the East of Germany. And only 40% of the overall network must be built from scratch: pre-existing long-distance natural gas pipes can be used for the other 60%.

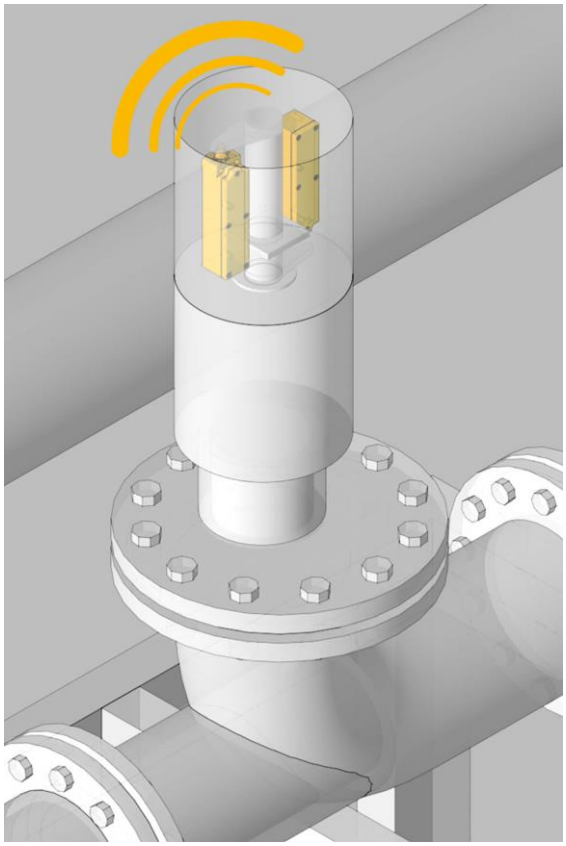
## Valve position monitoring

Regardless of whether precisely this plan is realised or another one: the installation of a hydrogen industry means that there will be a high demand for valves to regulate the flow of hydrogen not only in the networks, but also in the production and distribution plants, as well as at the points of use.

In turn, the positions of these valves require monitoring. This task – valve position monitoring – is an established application field for many specialised manufacturers of electro-mechanical switches and non-contact sensors. Many valves are already monitored in this way. When selecting switches and sensors for valves in the hydrogen industry, however, two key aspects need to be taken into consideration. First: because hydrogen is explosive, the gas explosion regulations (for zones 1 and 2 acc. to ATEX) apply. Second: a hydrogen molecule is extremely small. For this reason, and also because the pressure level is extremely high, at up to 700 bar, leak tightness requirements are also extremely strict.

## Ex zones: non-contact position monitoring

Two types of switching device are fundamentally suited to valve positioning monitoring: electromechanical (position) switches and non-contact sensors. In hydrogen networks, the latter have the real benefit of detecting the current position of the valve without mechanical contact to the valve spindle. The pressure chamber containing the explosive hydrogen can thus remain isolated or rather encapsulated, making no extra leak tightness necessary. The valves are switched via solenoids. This increases safety and simplifies construction. Non-contact monitoring under Ex conditions can be realised using inductive sensors, for example from the steute Controltec range.



Position monitoring with sensors has benefits for valves in hydrogen networks – also and especially in combination with radio-controlled signal transmission.

The Ex RF IS series for Ex zones 1 and 2 features long switching distances and, from its working principle, requires no 'target' counterpart.

## Wireless technology as a true benefit

Using sensors which communicate remotely with their corresponding receiver is also advantageous for the 'practicable valve position monitoring in the hydrogen infra-structure' application field. Communication is facilitated by a separate Ex RF 96 ST radio module using an industry-compatible point-to-



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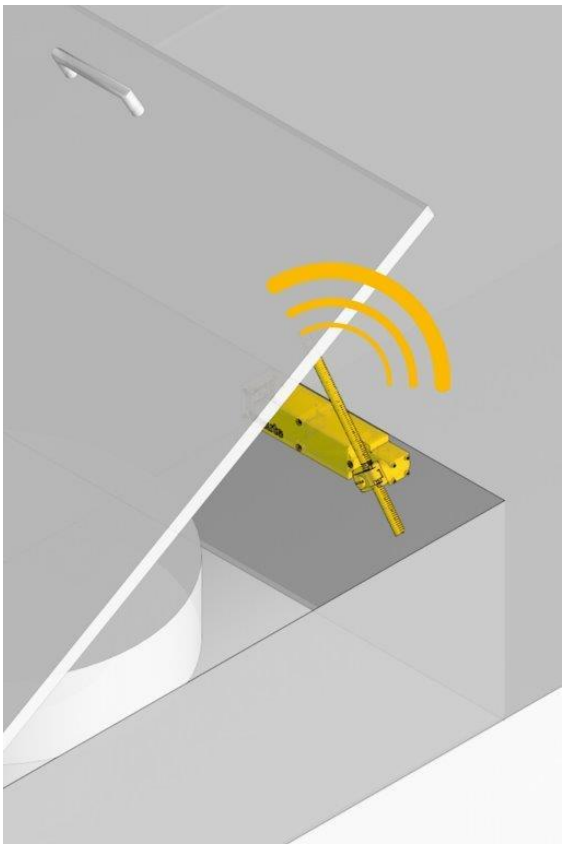

Wireless switching devices and sensors can be used in many different ways throughout the hydrogen infrastructure.

point wireless protocol which has been tried and tested in many different use cases.

The sensor (or radio module) and receiver communicate via the wireless sWave technology, available for different frequencies (868, 915, 917 and 922 MHz). The receiver is usually installed outside the Ex zone.

The sensor is powered by a lithium battery which can also be changed inside the Ex zone. This type of power supply enables additional functions, such as monitoring the sensor by status signal or increasing availability in cases of potential interference by means of LBT (listen before talk) technology. Moreover, battery power simplifies installation under Ex conditions and eliminates the need for Ex-compatible cables – a solution which is as efficient as it is elegant, and one which is already being used by multiple valve manufacturers.

## Ex-protected and modular wireless switching devices

The modular system for the wireless devices and modules within the steute Industrial Wireless range provides extensive freedom for users making their selection. For example, the electromechanical position switches in the Ex RF 96 series can be made compatible for radio. They detect the position of the valve spindle via their actuators, are available in a gas Ex variant, and are thus also suitable for valve position monitoring within the hydrogen infrastructure. The wireless Ex switches and sensors can also assume other tasks in hydrogen management – for example, monitoring the positions of flaps and guard doors. And if users would prefer to monitor the valves in their hydrogen network using cabled position switches and sensors – the steute Controltec range offers these options as well.

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