

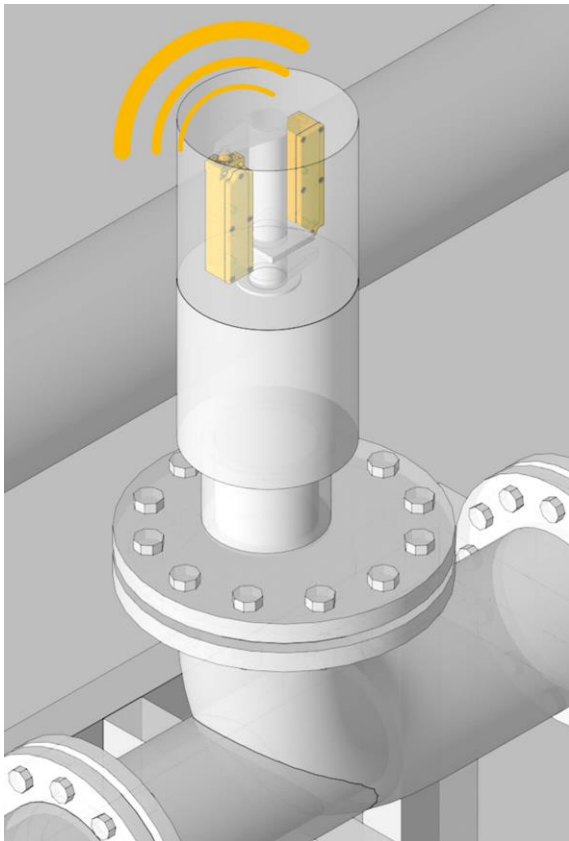


"Wireless Ex" sensors for valve position monitoring

Wireless has benefits – also and especially for valve position monitoring within the hydrogen infrastructure. Valve manufacturers have access to electromechanical position switches and non-contact sensors in Ex variants with industry-compatible point-to-point wireless communication.

Hydrogen technology is really taking off. Generation of a total capacity of 52 GW is planned across Europe, and in Germany numerous lighthouse projects are already underway. For example, Thyssenkrup is planning to "fire" its blast furnaces with hydro-

gen in order to produce climate-neutral steel. A syndicate in Emsland is preparing to store hydrogen for this project. An electrolyser built by RWE in Lingen by RWE is to generate the gas. And of course, countless smaller and no less innovative projects are in place.



Valve position monitoring with sensors has benefits when the valves are in hydrogen networks, especially in combination with wireless signal transmission.

Plan: 6000 km of hydrogen pipelines in Germany alone

What all these projects require is a well-developed infrastructure, in other words: a distribution network. Two larger regional networks based at chemical sites already exist: one stretching 240 km from the Ruhr Area into the Rhineland, and a 150 km pipeline within the East German chemicals triangle around Bitterfeld.

These pipelines are part of a German hydrogen pipeline network stretching nearly 6000 km, planned by the long-distance gas pipeline operators association (FNB Gas). The plan does not entail building new pipelines throughout, but also includes the utilisation of existing (natural gas) pipelines.

Challenge: valve position monitoring under special conditions

Independently of whether this precise plan or another one is ultimately realised: with the growth of the hydrogen economy there will be a considerable need for valves to regulate the flow of hydrogen not only within the networks, but also inside generation and distribution plants, as well as to consumers.

The positions of these valves must in turn be monitored, a well-established application field for specialised manufacturers of electro-mechanical switches and non-contact sensors, with many such valves already in use. When selecting switches and sensors to monitor valves in the hydrogen economy, however, two central aspects must be taken into account. The first: because hydrogen is explosive, gas explosion protection rules apply (zones 1 and 2 to ATEX). The second: hydrogen molecules are extremely small. Because of this, and because the pressure level is extremely high at up to 700 bar, leak tightness requirements are very strict.

Non-contact position monitoring in Ex zones

For valve position monitoring, two types of devices are fundamentally available: electro-mechanical (position) switches and non-contact sensors. The latter have the enormous benefit, especially within hydrogen networks, of detecting the current position of a valve without any mechanical contact with the valve spindle. The pressure chamber containing the explosive hydrogen can thus remain isolated or encapsulated, and no extra sealing is required. The valves are then switched via solenoids. This increases safety and simplifies construction.

Such non-contact monitoring under Ex protected conditions can be realised, for example, using inductive sensors from the steute Controltec range. The Ex IS RF for Ex zones 1 and 2 features long switching distances and requires no "target" as a counterpart.

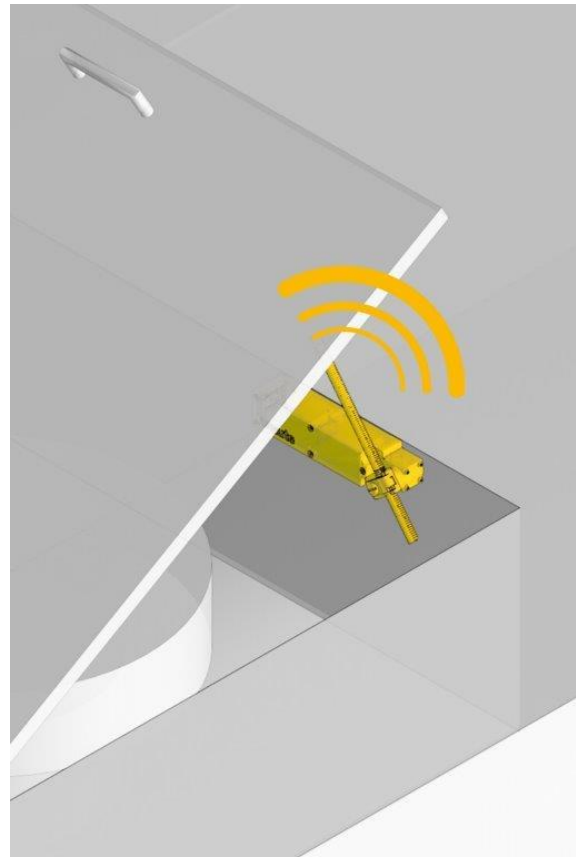


The steute "Industrial Wireless" range also includes Ex position switches suitable for radio transmission.

Wireless technology: true benefits within the hydrogen infrastructure

An additional benefit in the application field "practicable valve position monitoring within the hydrogen infrastructure" is achieved by sensors which communicate with their corresponding receiver via remote control. This is facilitated by a separate Ex RF 96 ST radio module which uses an industry-compatible point-to-point wireless protocol tried and tested in many application cases. Communication between sensor or radio module and receiver is via the steute "sWave" wireless technology, available on different frequencies (868 MHz, 915 MHz, 917 MHz and 922 MHz). The receiver is then usually installed outside the Ex zone.

The sensor is powered via a lithium battery which can be replaced inside the Ex zone. This type of power supply permits the use of



Wireless switches and sensors are fundamentally a good option for different applications within the hydrogen infrastructure.

additional functions, such as monitoring the device via a status signal or increasing availability in conjunction with potential interference thanks to LBT (Listen Before Talk) technology. In addition, battery power simplifies installation under Ex conditions since Ex-compatible cabling is then superfluous – a solution which is as efficient as it is elegant, and one that has already been favoured by multiple valve manufacturers.

Ex-protected modular wireless switchgear

The modular system for wireless switching devices and modules in the steute "Industrial Wireless" range provides freedom for users in their selection. For example, the electro-mechanical position switches in the Ex RF 96 series are available as wireless variants. They

monitor the position of the valve spindle, are available for gas Ex applications and are thus suited to valve position monitoring within the hydrogen infrastructure. Moreover, the

wireless Ex switches and sensors can also assume other tasks within the hydrogen economy, for example the position monitoring of flaps and guard doors.

Author:



Sascha Elsner
Product Manager Wireless Applications
steute Technologies

Images: steute Technologies GmbH & Co. KG