

Hydrogen Analysis with Reliable Explosion Protection

Standardized Enclosure Solution
for Use at H₂ Refueling Stations

At a Glance

- Fully certified and ready-to-use standard solution with purge and pressurization
- Precise measurement of the purity of hydrogen directly at the refueling facility
- Global approvals for international use
- Optimal Ex p type of protection for future-oriented technologies



The Application

Fuel cells require hydrogen (H₂) with a high degree of purity. To prevent damage and ensure optimal operation, the quality of the gas is checked at the H₂ filling stations. Since hydrogen is a flammable element, this means that filling pumps are always located in a hazardous area. However, in general, analysis equipment does not have specific approval for use in hazardous areas and must not be used in these areas without additional precautions.

The Goal

A large analysis equipment manufacturer based in the USA wants to design a standard solution for its portfolio that allows end customers to measure the purity of hydrogen directly at refueling facilities. To achieve this, the company's own hydrogen analysis equipment—which did not have Ex certification—needed to be used in hazardous areas. Pepperl+Fuchs was commissioned to provide a suitable type of protection for the components to enable the solution to be used in Zone 1/21 and Zone 2/22 environments.

Detailed shots of the solution: special stainless steel tubes to the analyzers, door handles for quick access, and air holes for safe explosion protection



The Solution

The three necessary analysis devices are housed in an enclosure equipped with a purge and pressurization system. In addition, many other useful features are added. For example, special piping is laid to the analyzers, door handles are installed, and special air holes are drilled in specific locations to ensure that the purging process clears all areas of the explosive atmosphere. To compensate the high power dissipation and to keep the heat development under control, an air conditioner is installed on the outside of the enclosure.

Once all required components are installed, the enclosure is first purged with an inert gas or clean air. An overpressure of a few millibar is then established inside the enclosure. The enclosure, valve, and enclosure protection vent of the system ensure that no flammable gas can enter the enclosure.

The Pepperl+Fuchs portfolio includes the Bebcu EPS® 6500 Series system for this purpose. The system operates automatically and performs the purging procedure independently, builds up the necessary overpressure, and continuously monitors it. With an intuitive user interface, the system can be configured to meet the specific needs of each application. In addition, the enclosure features a bypass function for easy servicing and commissioning.

The Benefits

The customer receives a fully certified plug-and-go solution for use at hydrogen refueling facilities, which they can offer to their end customers as standard. The end customers, in turn, can use the solution directly at their refueling facility.

The purge and pressurization system ensures explosion protection. In case of a fault, the control unit shuts down the device and outputs a message. However, this only occurs if the readings fall below the default minimum pressure value over a certain period of time. If there is a slight drop in pressure, the integrated leak compensation accounts for the loss, allowing the fault to be corrected during operation.

Pepperl+Fuchs is a pioneer in explosion protection and offers tailored engineering in addition to its products, including full certification and the construction of enclosure solutions in accordance with ATEX, IECEx, and NEC directives.

Technical Features

- Global approvals ATEX and IECEx—further on request
- Suitable for Zone 1/21 and Zone 2/22 applications
- State-of-the-art analyzers to monitor hydrogen quality
- Air conditioner to control the heat development
- Viewing window for a direct view of the analyzer displays
- Easy access to all equipment through doors on all sides
- Bypass function for easy servicing and commissioning

