

► Functional safety and Industrial Security for applications in the hydrogen industry

H₂ – Safe and Secure



On the one hand, hydrogen (H₂) is considered the energy source of the future. On the other, hydrogen is a highly flammable gas. For safe production, handling and use, you need suitable safety systems to reliably prevent and manage hazardous situations when dealing with hydrogen. When designing plant for the generation of hydrogen, and when transporting hydrogen, it is imperative that you ensure adequate ventilation and leak detection. Safety controllers such as PNOZmulti 2 or the automation system PSS 4000 have already proven themselves in applications in the hydrogen industry – on hydrogen refuelling stations, for example. The control systems from Pilz reliably detect gas leaks through the evaluation of gas detectors and safely monitor temperature, pressure, fill level, voltage, current, and also emergency stop. Your hydrogen applications can thereby be not only safely implemented, but also economically.

With increasing digital networking, it is also essential that you consider the topic of Industrial Security in order to protect sensitive plant data. Pilz also offers tried and tested solutions for this.



Your benefits at a glance

- Control and monitor all safety-related functions
- Monitoring of safety functions such as pressure, temperature, current, voltage and leak, gas and flame detection
- Certified hardware: PNOZmulti 2 and PSS 4000 up to SIL 3 certified in accordance with EN IEC 61511; satisfy the requirement according to EN IEC 61508
- Intuitive software tool: Configurable function blocks – no programming skills required
- High productivity through integrated diagnostics and comprehensive visualisation options



► From hydrogen production to use – Safe and Secure with Pilz



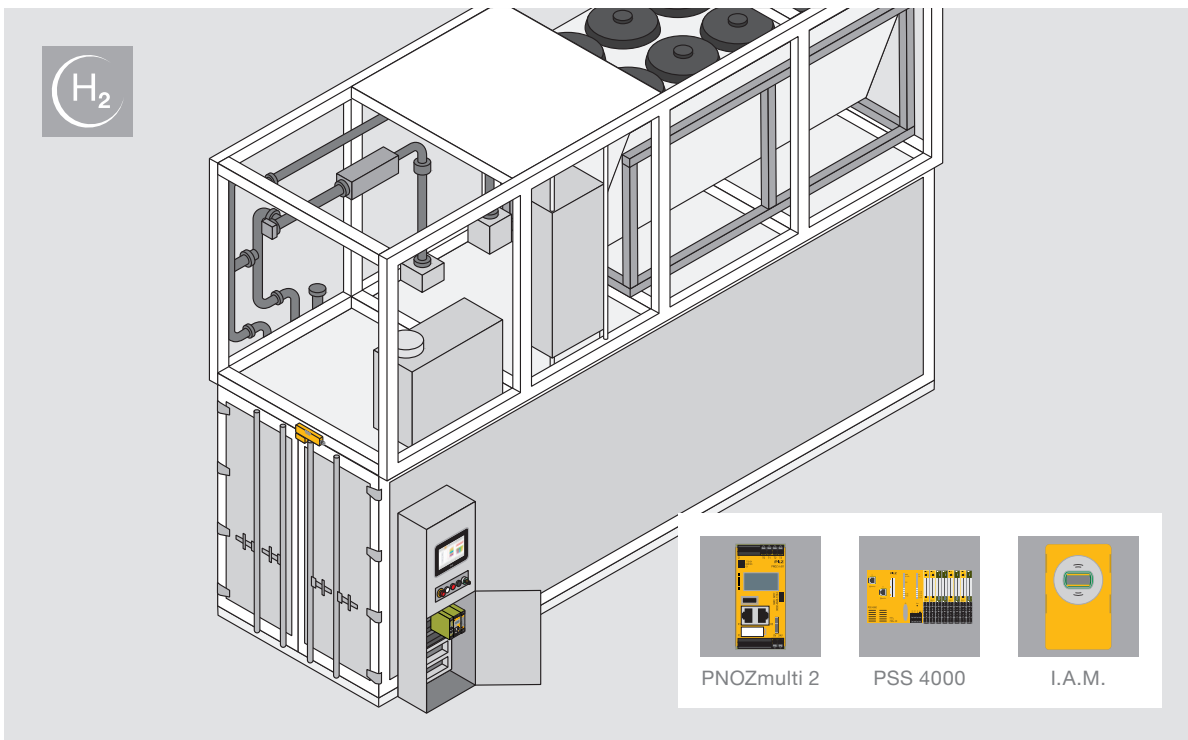
The element hydrogen (H_2) exists in large quantities and in many organic compounds. But it is only present in bonded form, for example in a water molecule (H_2O) together with the element oxygen (O_2). A reforming process is primarily used to generate hydrogen, but electrolysis is also increasingly being used. There are safety risks during the production, storage, transport and use of hydrogen – Pilz supports you in tackling these.

Functional safety in the electrolysis process

Several safety requirements must be considered for alkaline or PEM electrolysis. Detection of gases and flames is mandatory to initiate appropriate safety measures such as venting. The lack of a constant power source can present an additional safety problem (cross over-phenomenon). Therefore, a fault in the electrical part – voltage or current – may lead to a potential risk of explosion. Furthermore, it may be necessary for you to establish systems for access and permission management in order to prevent manipulation of any kind.

The safe small controller PNOZmulti 2 uses safe analogue inputs and the flexibility of the user-friendly software tool to control and monitor all the necessary safety functions such as pressure, temperature or fill level. With large plants, depending on the number of inputs and outputs the automation system PSS 4000 can also be used.



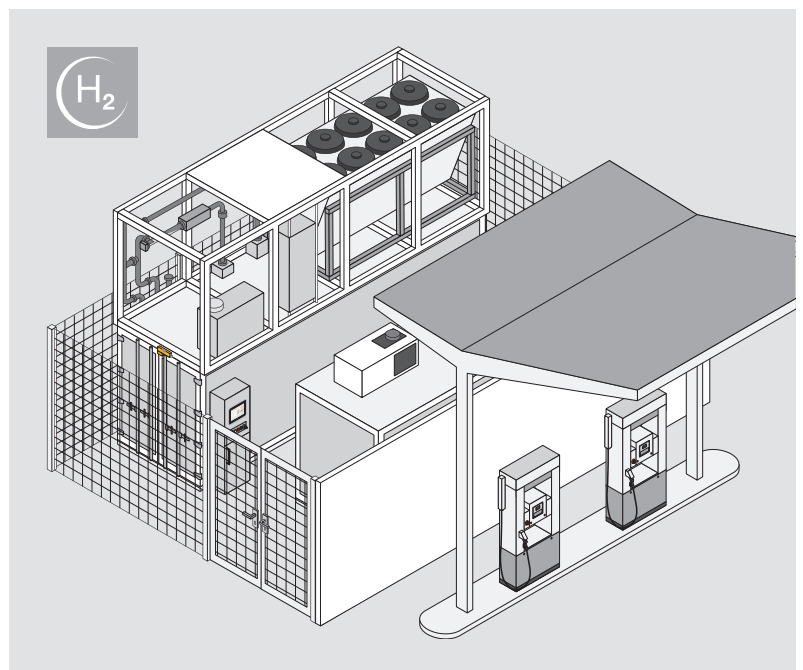


Generating green hydrogen from water with the electrolysis process, using renewable energy sources

Hydrogen refuelling stations – Safe and Secure

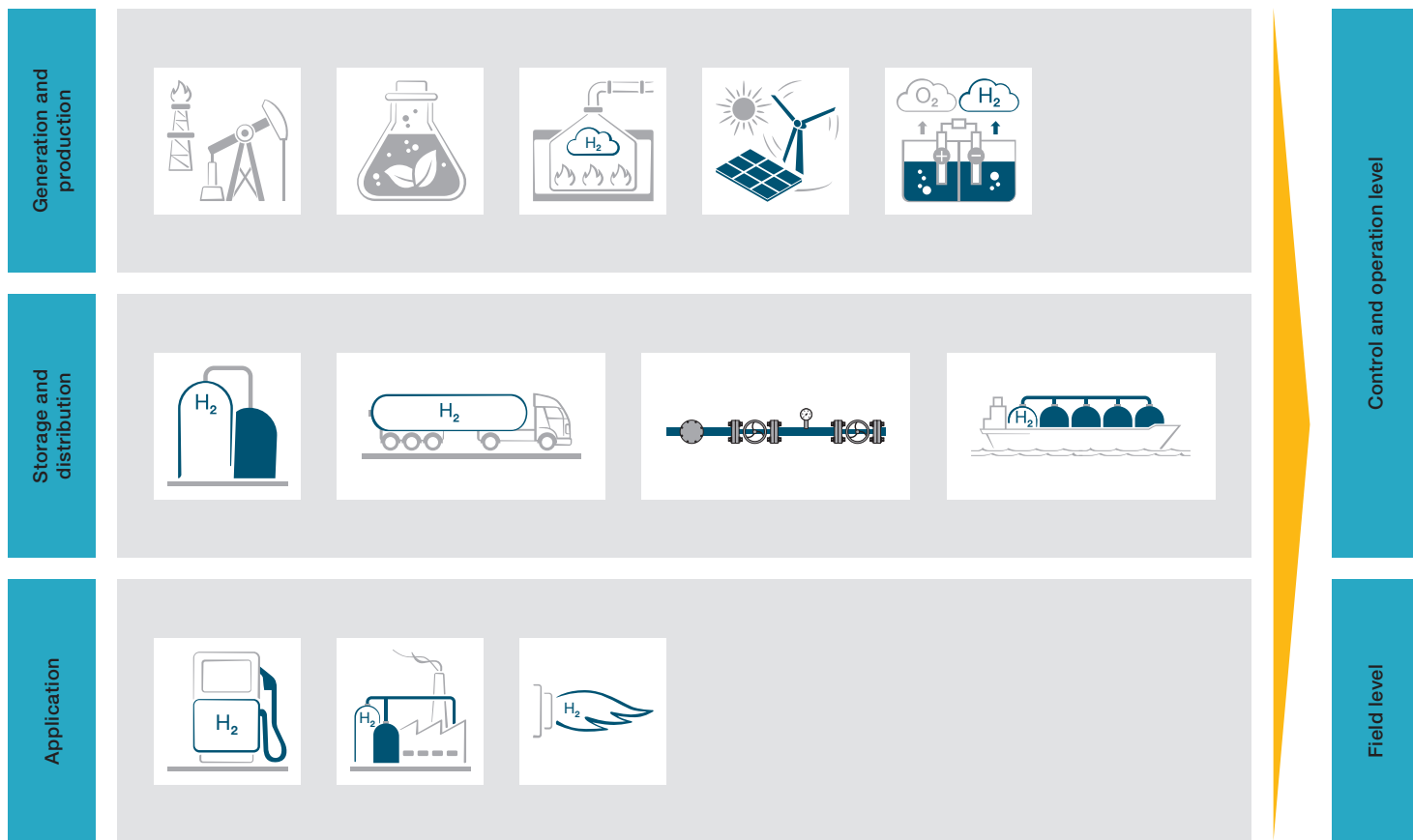
A hydrogen refuelling station (HRS) comprises a compression area in which the gas can be compressed up to 1 000 bar, a cooling system, high-pressure storage tanks and the fuel pump. Typical safety functions that must be taken into consideration are hydrogen leak, flame and smoke detection as well as temperature and pressure monitoring. The automation system PSS 4000 has the necessary functions to safely monitor all the safety requirements of an HRS. Thanks to the decentralised inputs/outputs and the failsafe analogue input functions, the entire system can be safely controlled.

You can guarantee the security of control networks in the areas of factory automation and process control with Pilz solutions from the field of Industrial Security. The SecurityBridge application firewall or “Identification and Access Management”, I.A.M. for short, are options for you in this regard.



Hydrogen refuelling station

Online information
at www.pilz.com/hydrogen



During all steps in the lifecycle of hydrogen – Pilz supports you with safe products!

Functional safety in the steam reforming process

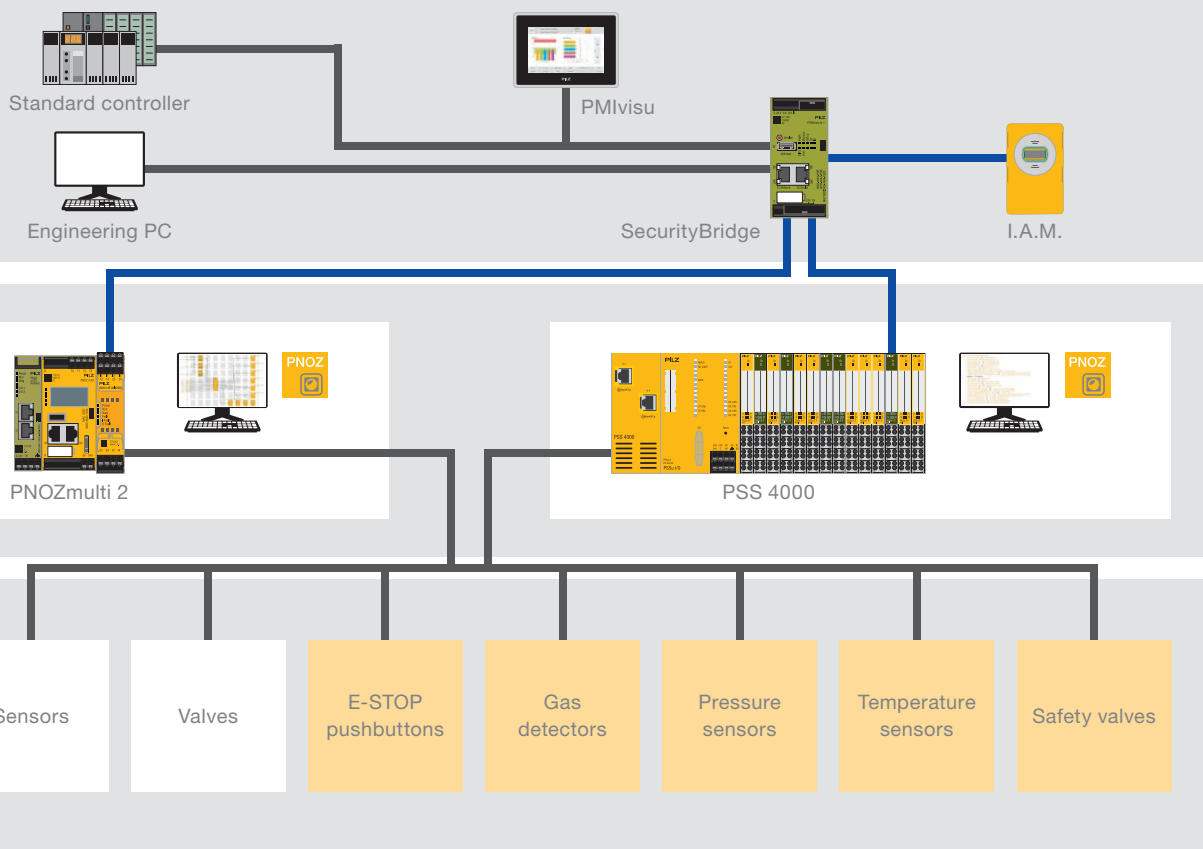
Steam reforming is currently the most important method for the generation of hydrogen from water and carbon-based energy carriers. Natural gas is the most important raw material today, but methanol, biogas or biomass can also be used as the starting material. This process requires high temperatures that are reached through the use of gas burners.

The safe small controller PNOZmulti 2 Burner and the automation system PSS 4000 can not only take over the control of the burner management system, they also guarantee the safety of the process. Temperature and pressure are safely controlled and monitored, for example.

Burning of hydrogen – H₂-ready

When using 100 % hydrogen or mixtures of gaseous hydrocarbon fuels, such as natural gas with hydrogen as a fuel in gas burners, the existing standards for burners with gaseous fuels apply. Standards such as EN 298, IEC/UL 60730-2-5 for burner control, EN 676 for gas burners or ISO 13577 for industrial furnaces (area of gaseous fuels) apply. These standards differentiate between gaseous, liquid and solid fuels, but there is no differentiation based on specific gases within the group of gaseous fuels. For this reason, the existing standards also apply to hydrogen.

The PNOZmulti Burner solution is 100 % ready for use for burning hydrogen or mixtures of gaseous hydrocarbon fuels.



Secure connection

I.A.M. = Identification and Access Management



Safe small controller PNOZmulti 2

- ▶ Modular system: Base units and application-specific expansion modules incl. fieldbus communication
- ▶ Can be flexibly configured using blocks in the software tool PNOZmulti Configurator
- ▶ Major time and cost savings during design and engineering, as even complex safety applications can be implemented quickly and easily with just one small controller
- ▶ Connection to numerous automation environments and communication systems



Automation system PSS 4000

- ▶ Modular system: PSSuniversal PLC as part of the automation system PSS 4000
- ▶ Can be freely programmed or configured in the software tool PAS4000
- ▶ Shorter project planning times thanks to hardware-independent programming on complex interlinked plants
- ▶ Flexibility with I/O mapping in the application
- ▶ Can be used as a standalone controller or as part of a network
- ▶ Can be integrated into existing automation structures



Online information
at www.pilz.com/hydrogen

Support

Technical support is available from Pilz round the clock.

Americas

Brazil

+55 11 97569-2804

Canada

+1 888 315 7459

Mexico

+52 55 5572 1300

USA (toll-free)

+1 877-PILZUSA (745-9872)

Asia

China

+86 400-088-3566

Japan

+81 45 471-2281

South Korea

+82 31 778 3390

Australia and Oceania

Australia

+61 3 95600621

New Zealand

+64 9 6345350

Europe

Austria

+43 1 7986263-444

Belgium, Luxembourg

+32 9 3217570

France

+33 3 88104003

Germany

+49 711 3409-444

Ireland

+353 21 4804983

Italy, Malta

+39 0362 1826711

Scandinavia

+45 74436332

Spain

+34 938497433

Switzerland

+41 62 88979-32

The Netherlands

+31 347 320477

Türkiye

+90 216 5775552

United Kingdom

+44 1536 460866

**You can reach our
international hotline on:**

+49 711 3409-222

support@pilz.com

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We are represented internationally. Please refer to our homepage www.pilz.com for further details or contact our headquarters.

Headquarters: Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, E-Mail: info@pilz.com, Internet: www.pilz.com

Printed on 100 % recycled paper for the good of the environment.

7-3-en-3-031, 2024-04, Printed in Germany
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