

Pressure  
Temperature  
Level  
Flow

# Hydrogen at your fingertips



**WIKAI**

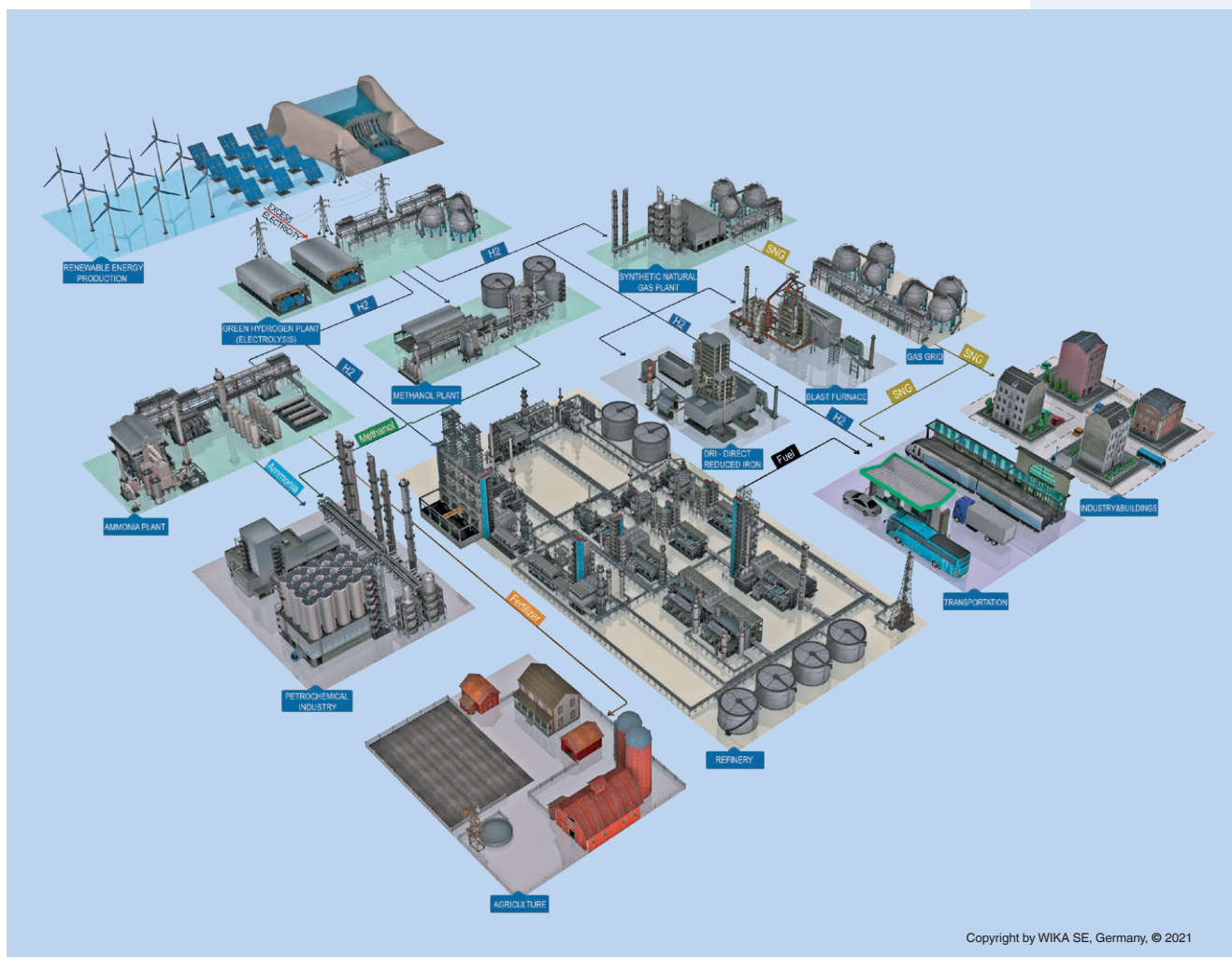
Part of your business

# Partner for the hydrogen industry

Hydrogen applications have been around the process industry for decades, with demand primarily being driven by refineries, methanol & ammonia production and direct reduced iron steel production. Conventional hydrogen production typically uses natural gas or coal as feedstock. Looking forward, hydrogen is expected to play an important role in decarbonising the world's economy - if produced from renewable energy sources such as solar and wind energy.

Hydrogen processing, production, distribution and storage expose the equipment used to challenging conditions, with temperatures as low as  $-253\text{ }^{\circ}\text{C}$ , pressures of 700 bar and beyond and hydrogen migration-related impacts on metals and materials.

WIKA has long been a partner to the hydrogen industry for instrumentation-related solutions, with a proven track record, and is geared up to resolve any new challenges ahead. Whether the hydrogen is produced by conventional methods or based on renewable energies, WIKA provides solutions for the entire value chain of the hydrogen industry.

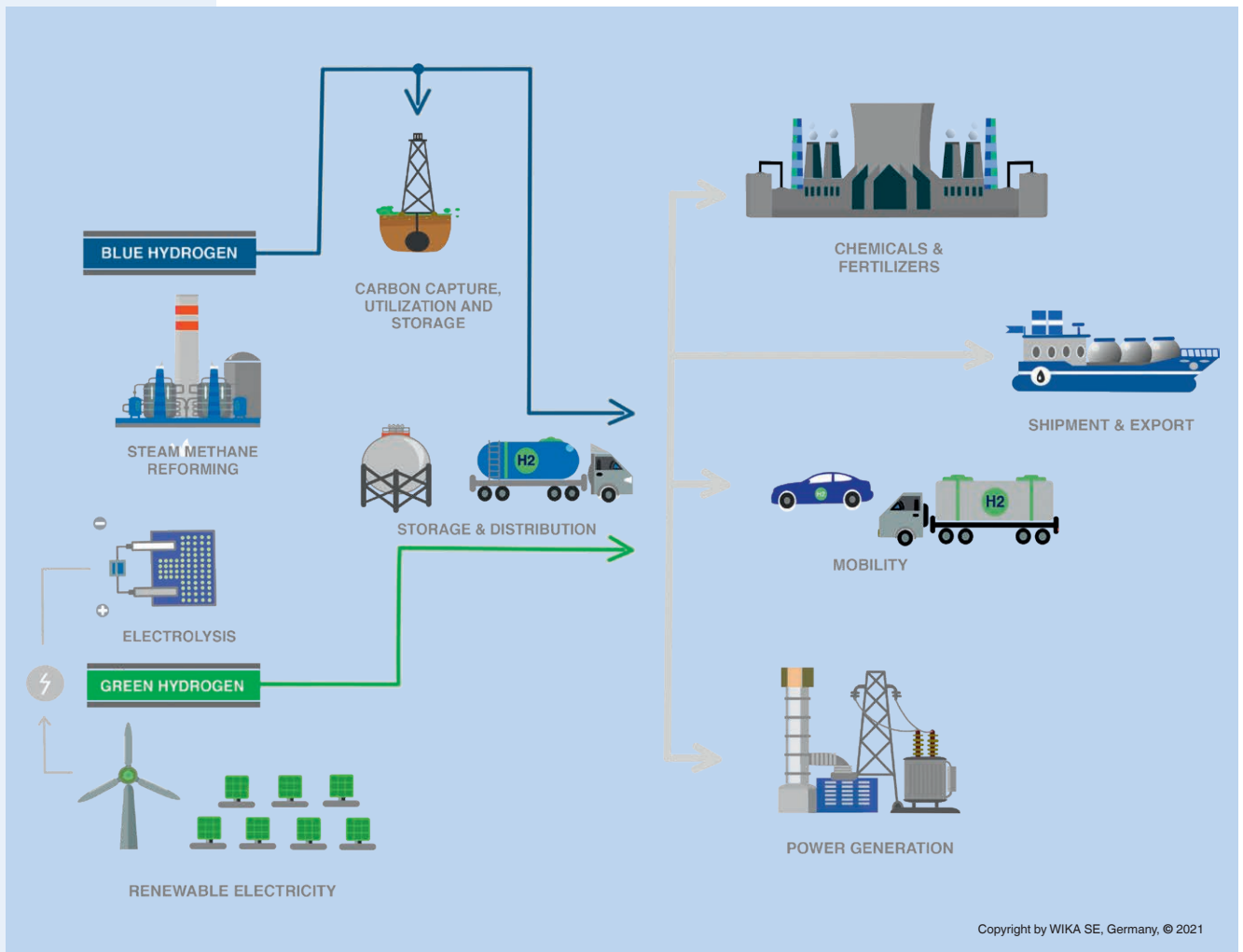


The processes of conventional and green hydrogen production differ significantly from each other. With that, instrumentation solutions need to be adjusted for best fit.

For storage, hydrogen can be compressed, liquefied or chemically combined. In the liquefied state hydrogen is reduced to 1/800th of its volume compared to that of its gas phase, enabling a very high energy density to be achieved. Whether hydrogen is stored at cryogenic temperature or in a compressed state, the instrumentation must cope with these extremes.

Utilising our expert knowledge and decades of experience in designing hydrogen instrumentation for the process industry, WIKA is combining this domain knowledge with its thorough understanding of the metallurgical aspects and material selection.

Our customers benefit from this expert knowledge with improved productivity, process efficiency and process safety.



# Extreme conditions

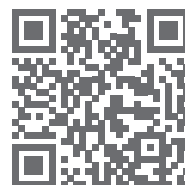
Depending on the physical state in which hydrogen is stored, different extremes in handling the media have to be tackled.

In gaseous form hydrogen is stored at pressures up to 700 bar, requiring pressure sensors capable of measuring up to 1,050 bar, for example in hydrogen fueling stations, due to temperature effects and safety factors.

In liquid form the hydrogen has a temperature of -253 °C or below. Temperature measurement solutions have to be designed to measure also this temperature at a good accuracy while keeping the good isolation of the hydrogen tank.

## Applications

- Hydrogen storage and transportation
- Hydrogen refueling stations and compressors
- Mobile application



## H<sub>2</sub> measurement solutions overcoming challenges

Demand	Challenge	Solution
H <sub>2</sub> compatible material	Risk of hydrogen embrittlement	Austenitic stainless steel (i.e. 316L; 2.4711 Elgiloy)
No loss of containment	Hydrogen penetrates materials and is explosive	Welded adaption of process media wetted components, polymeric sealing is usually not favoured
Long-term stability of signal	Hydrogen may cause sensor signal offset	H <sub>2</sub> permeation resistant sensor materials & applied barriers (i.e. glass, gold, ceramics....)
Extreme operating conditions (pressure & temperature)	Longevity and accuracy of sensor	Special sensor design solutions and qualification testing

## Tank level solutions

Besides storing hydrogen in either compressed or cryogenic tanks, there are a variety of additional tanks containing different media related to hydrogen production and utilisation that demand accurate and reliable level measurement. WIKA addresses this demand with a comprehensive level sensing portfolio providing continuous level measurement and level switching solutions.



## Extra protection when needed

### Gold-plated solutions

Under certain environmental conditions, especially at high temperatures, additional protection may be required to ensure a long-term stable measurement. For this purpose WIKA provides optional gold plating on diaphragm seals or flush pressure sensors.



## Always the right certificates

### Electronic pressure sensors

Depending on the application, WIKA provides a portfolio of electronic pressure transmitters with certifications to meet your regulatory requirements, including:

- ATEX/IECEx for stationary applications as provided by the pressure sensors IS-3, E-10 or others
- EC79/2009 for mobile applications as available for the model MH-3-HY



## Preventing fugitive emissions

### Valve and manifold solutions

No matter if your process interface is threaded, flanged or via compression fitting, WIKA instrumentation valve solutions connect the instrument leak-tight and enable you to shut off your process safely. Our EMICOgauge ready-to-install pressure gauge-valve assemblies reduce the risk of fugitive emissions and the time required for assembly and commissioning.



## Temperature measurement solutions

Our temperature measurement solutions are utilised across the full spectrum of the green and conventional hydrogen value chains incl. electrolyser temperature monitoring, steam methane reformer (SMR) temperature monitoring and tank & pipeline integrity monitoring. Our temperature sensors are suited to withstand extreme operating conditions ranging from -258 to +1,700 °C and pressures up to 1,050 bar and beyond.



## Flow measurement solutions

Flow measurement in hydrogen applications is not limited to hydrogen as the flow medium. Depending on the measurement task and process, e.g. in electrolysis applications, flow media may include nitrogen, oxygen, CO<sub>2</sub>, water, KOH (lye). WIKA is well-prepared to find the best fit solution from our portfolio of flow meters incl. variable area flow meters, primary flow components & systems, ultrasonic flow meters and magnetic-inductive flow meters.



# Your strong partner

Solutions for pressure, temperature, force and level measurement, as well as flow measurement, calibration and SF<sub>6</sub> gas solutions from WIKA are an integral component of our customers' business processes. Therefore we look on ourselves not as suppliers of measurement technology components, but rather as a competent partner, offering comprehensive solutions in close co-operation with its customers. Individually fitted and accurately aligned to each requirement.

## Industrial



Machine building and automation



Mobile working machines



Heating, ventilation and air-conditioning technology



Refrigeration technology



Industrial gases



Semiconductor industry



Power transmission and distribution (SF<sub>6</sub>)

## Process



Food and beverages



Oil and gas (up-, mid- and downstream)



Petrochemical industry



Chemical industry



Pharmaceuticals and biotechnology



Power generation



Water and wastewater



Basic materials

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