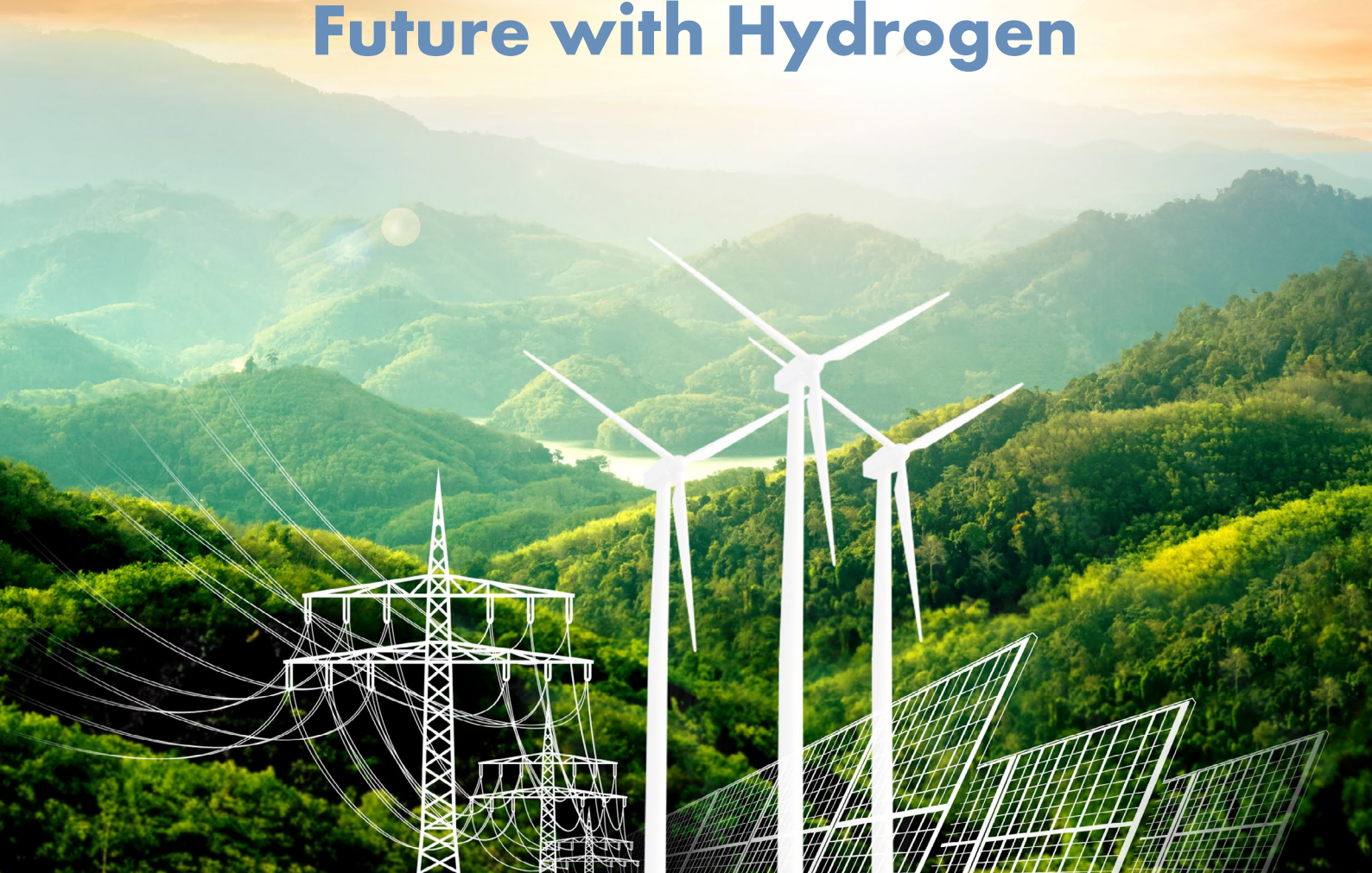
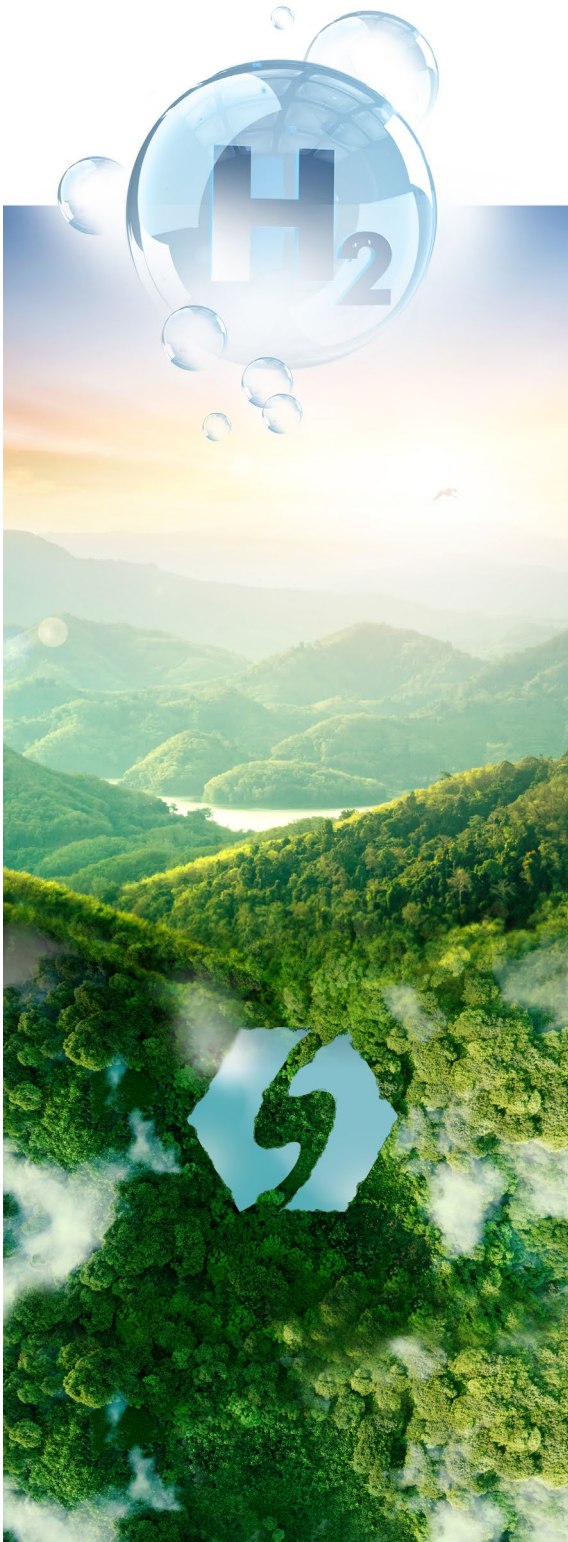




Future with Hydrogen



The element hydrogen and its significance



- **Hydrogen (H)** is the smallest chemical element in the periodic table.
- On Earth, it occurs primarily in bound form in **water (H₂O)**. Unbound, hydrogen exists primarily in molecular form (H₂) as a colorless and odorless gas.
- Hydrogen plays a **key role** in the chemical industry and is used in the production of ammonia, methanol and other important chemicals.
- The combustion of hydrogen produces only water vapor, **no harmful emissions**. Hydrogen is therefore a clean alternative to fossil fuels, e.g. in vehicle drives and heating systems or for **electricity generation**.
- Surplus electricity from solar and wind energy can be converted into **"green" hydrogen** using water electrolysis and thus stored in the long term.
- Global annual **hydrogen demand** is expected to rise from 3,000 terawatt hours (TWh) today to up to 22,000 TWh in 2050*.
- From a purely technical perspective, over **1,500,000 TWh** of green hydrogen could be produced per year in 2050*.

*Source: DVGW

SERTO-products and Services in the Hydrogen value chain

Value chain

Generation

- Electrolysis (alkaline, PEM, AEM)
- Splitting water into H₂ and O₂ using electricity



Storage and transportation

- as compressed gas
- as liquid gas
- chemically bound



Application

- Power generation by means of fuel cells
- Fuel gas generation by means of methanisation
- Fuel production by means of synthesis
- Direct use as a reducing agent in steel production



Example projects



Service package with engineering, components, tubes, assembly, leak test

Example: AEM electrolyser

SERTO supplies the completely assembled module for the gas aftertreatment incl. external components.



Fitting expertise paired with manufacturing expertise and capacity

Example: Sensor for measuring the hydrogen concentration and/or purity.

SERTO supplies the sensor housing with integrated fitting connections.

Optimum tubing thanks to compact design and variety of materials of SERTO fittings

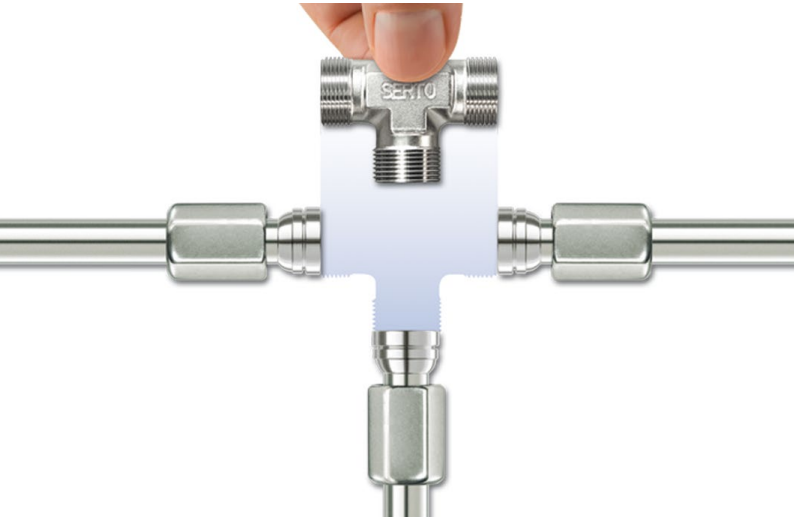
Example: railway catering trolley with PEM fuel cell for the power supply.

SERTO supplies tubing for the hydrogen, supply air and exhaust air path.



SERTO – Your partner for hydrogen applications

SERTO Tube union system



Radial – brilliant

- Radial tube union system
- Metallic, flat sealing surfaces
- High tightness (helium leak rate 10^{-8} mbar•l/s)

Standard range products

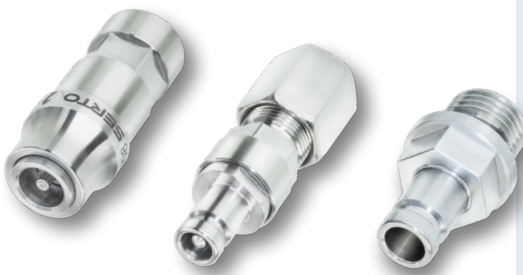


Stainless steel tube unions

- Stainless steel 1.4571 – material with low tendency to hydrogen embrittlement
- FKM/EPDM soft seals – suitable for hydrogen
- Tube unions of size 6-12, tested according to EC79

Regulating and non-return valves

- High internal and external tightness
- Compact design
- High KV values
- Low turbulence



Quick couplings series Q51

- Ergonomic design and one-handed operation
- High flow rate with low pressure loss
- Various connections (male/female thread, hose nozzle, tube connection)
- Various sealing materials (FKM, EPDM, VMQ, NBR)

New customised developments for hydrogen applications



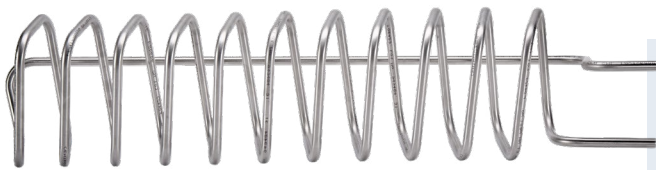
- Non-return valves with opening pressure 0.03 bar
- Non-return valves with adjustable opening pressure
- Proportional relief valves with adjustable opening pressure

Various materials

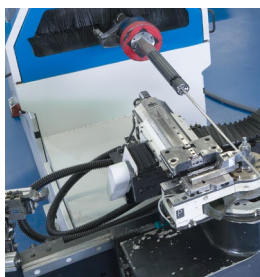
- Tube unions, valves and couplings out of suitable materials for all fluids of the overall system
- Brass products for liquid cooling lines
- PA tube unions for air supplies
- PVDF components for lines with DI water or aggressive fluids



System solutions



- Special cleaning and lubrication
- Module assembly
- Tube bending shop
- Engineering
- Customised packaging





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