

Source: Albert & Hummel GmbH

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# Test bench for conditioning electrolysers

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FLUID CONTROL SYSTEMS

# Process valves for a fully automated test bench

Valves are an indispensable part of many testing facilities for hydrogen applications, such as fully automated test benches for conditioning electrolysers. They require properties such as corrosion resistance, tightness and reliability.

In PEM electrolysis, a proton exchange membrane serves as an ionically conductive medium between the anode and cathode. When voltage is applied, water is split at the anode. Oxygen is produced and the protons migrate through the membrane to the cathode, where they react to form hydrogen. Before start-up, the electrolysers must undergo testing on the test bench and be conditioned. They are humidified because the membranes need a certain degree of moisture to function properly.

With this in mind, Albert & Hummel GmbH has developed a fully automated test bench for electrolysers and their stacks for one of its customers. Bürkert provides support on the fluidics side.

## About Albert & Hummel

Albert & Hummel, based in Bamberg, has been an expert partner in specialist machine construction and the development of customised automation and control solutions for over 30 years.

Over that time, its development work has also focused on testing and manufacturing innovative energy and drive systems.

### Purified water for conditioning PEM membranes

Good humidification is extremely important for optimising the performance of electrolyte membranes on the test bench. To this end, purified water (demineralised water) is passed through the electrolyser test bench under defined conditions. The flow rates and different temperature and pressure levels then ensure that the desired conditioning takes place. During conditioning, the purified water is pumped through the test bench in different ways. A bypass control system ensures the desired flow rate is met, a heat exchanger achieves the necessary temperature and pumps are responsible for the pressure level. Numerous valves take care of filling and emptying the pipes and switch between the different flow paths of the purified water.

### Agile project environment has high demands

All the components used in the test bench must satisfy high demands. The valves, for example, must be able to switch reliably and quickly, must integrate well into the control environment and must not corrode when they come into contact with demineralised water. Another factor that made this application more difficult was the repeated changes to the valve specifications during the development of the test bench. However, the Bamberg-based specialist machine manufacturer found that Bürkert served as an expert partner who ensured seamless collaboration even in the face of a highly agile project environment. Promises were kept and met quickly, delivery deadlines were adhered to and support was provided consistently in the process of the partners identifying a suitable solution together.



### Valves for reliable and fast switching

Today, the new electrolyser test bench features four process control valves with ELEMENT control heads (Type 8802), ten on/off process valves (Type 8801) and numerous solenoid valves of Types 6240 and 6027.

- Pressure range: PN 25
- Corrosion-resistant V4 stainless steel
- Seals for purified water applications

Plastic valves, which are able to cope well with demineralised water, could not be used due to the high pressure levels involved.

The process control valves in flow-optimised stainless steel housings have already proven themselves to be reliable in many other application areas under difficult usage conditions, including hydrogen applications.

- Easy integration of automation modules at all configuration levels: electrical optical position feedback, pneumatic control units and integrated fieldbus interfaces
- Control head variant communicates with the higher-level controller via classic analogue signals
- Long service life and tightness thanks to self-adjusting v-seal packing gland
- Compactness, smooth surface design and integrated pilot air ducts in the highly integrated system consisting of a valve and automation unit

The other valves used in the electrolyser test bench have also proven themselves in many applications and provide support for the system with the following features:

- Pressure/leak-proof
- Reliable
- As little pressure loss as possible

The process control valves in the flow-optimised stainless steel housing have already proven reliable in many application areas under difficult usage conditions.





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### Green hydrogen – electrolysis

Green hydrogen, produced by electrolysis using electricity from renewable energy sources such as solar, hydro and wind power, is one of the most important building blocks in achieving a sustainable, climate-neutral energy industry. The functional principle of electrolysis was discovered as far back as the early 19th century. It involves an electrical current breaking down the components of water. Today, hydrogen can be used in a variety of ways: as an energy source, a process gas and an energy storage medium. Electrolysers split water into its components, hydrogen and oxygen.

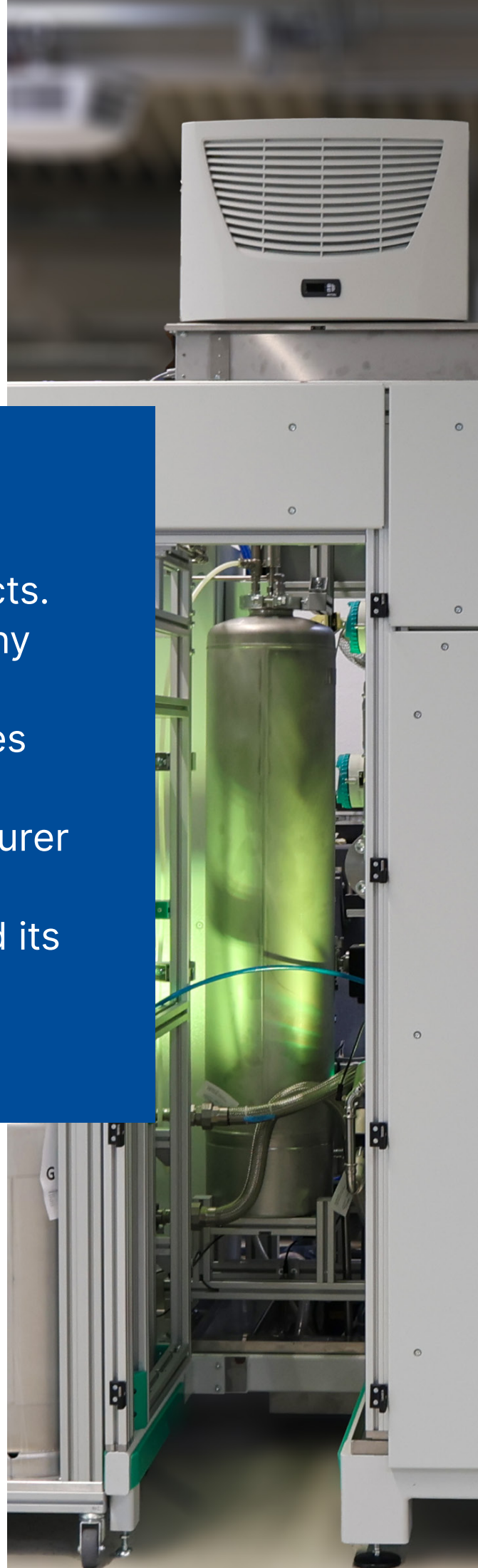


The numerous solenoid valves are pressure-resistant and leak-proof, helping the test bench as a whole to operate reliably and with as little pressure loss as possible.



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Albert & Hummel intends to collaborate with the fluidics expert again on future projects. The Bamberg-based company plans to develop further test benches for various industries that also involve fluids. The specialist machine manufacturer praised the outstanding cooperation with Bürkert and its wide range of valves and measurement technology.





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