

# Laboratory bench for sub-scale and PEM membrane testing

## Stand-alone testing solutions



This set of 20 stand-alone test benches is designed to test both complete stacks and individual membranes. Each bench can test up to two complete stacks or three membranes at the same time. By design, the membrane and short-stack test rigs share the same external layout and structure. They differ only in the power supply model, the pump and the sizing of the hydraulic components.

## THE SYSTEM

The test benches are designed both for laboratory use and for quality control on production lines. Their primary purpose is to characterize electrolyzer stacks and cells and to perform durability testing.

Each bench is designed to run continuously for more than 8,000 hours.

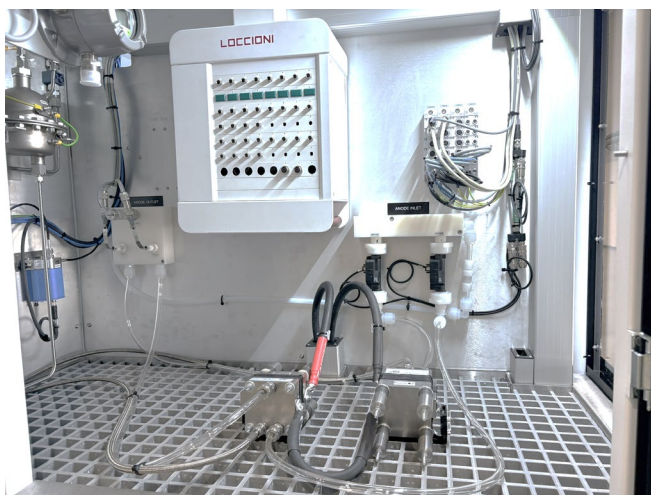
## MAIN FEATURES

The main features of the system are:

- > Flexibility: prototypes of different sizes and capacities, with different hydraulic and electrical connections, can be installed and tested.
- > Hydrogen outlet pressure: from 0.5 barg (minimum) to 32 barg (maximum).
- > Single water circulation loop.
- > Full plastic circuit on the anode side.
- > Full instrumentation: process and electrical sensors for complete characterization (water, hydrogen, oxygen and electrical parameters).
- > Nitrogen supply circuit for inerting pipes and components and for pressurizing the cathode.
- > Spare I/O channels in the automation software for additional sensors and probes.
- > Integration of external devices, such as a gas chromatograph or an EIS analyzer.



1. Anode circuit



2. Cathode circuit

The control software is a custom application running on a Siemens PLC. Through the HMI, the user can monitor and control the status of the hardware and run routines and functions, including:

- > User access management
- > Hardware monitoring and calibration
- > Manual control from the process synoptic
- > Automated routines and functions
- > Integration with external SCADA systems
- > Safety functions handled by a dedicated safety PLC



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