



Hydrogen Test Systems

PEM FC • PEM EL • AEM • AEL EL • DM FC SINGLE CELLS & STACKS

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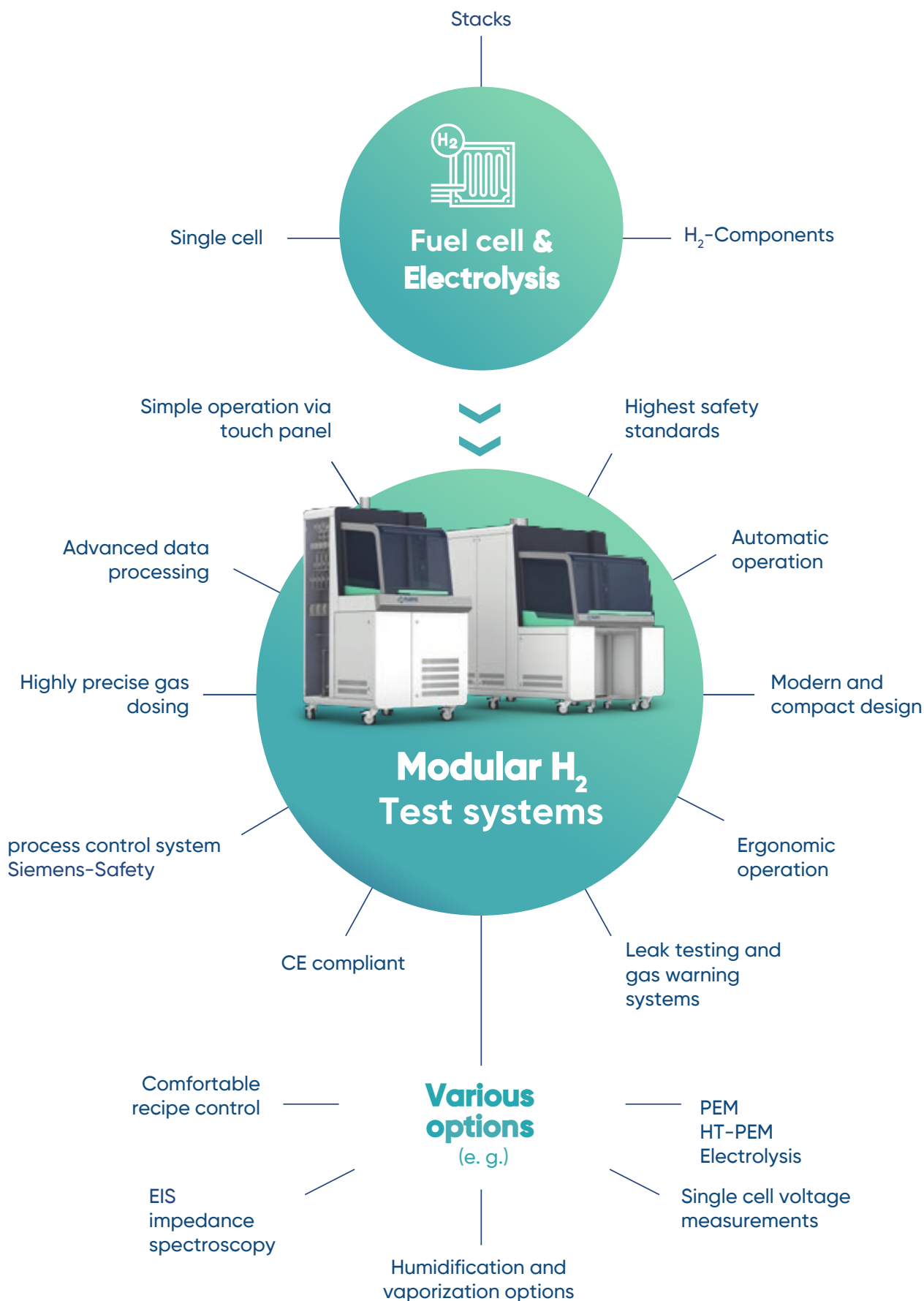
SINGLE CELLS & STACKS

With our decades of experience in gas dosing and liquid vaporization, as well as the construction of complex research facilities, our company group develops flexible, user-friendly, and innovative testing systems for fuel cells and electrolyzers.

We offer systems for testing individual cells up to complete stacks. Special emphasis was placed on ensuring the safe, simple, and automated operation of our equipment during development.

Basic equipment of our test systems

- › Mobile system with safety-oriented housing (cover) for connection to the customer's exhaust system
- › Ergonomically safe operation on the test subject due to accessibility from three sides with the cover open. The cover is simply lifted upwards for installing the test subject
- › Maximum system safety through ventilation, operation, and control concepts
- › Highly precise gas dosing over wide flow ranges according to customer requirements
- › Manual opening and closing of gases to and from the test specimen, even with the hood closed
- › N₂-Flushing of the test subject
- › Pressure and temperature measurement at the anode and cathode outlets
- › Safety-oriented removal of condensate water on the anode and cathode sides
- › Electronic load with zero-volt option (digitally controlled), integrated into a housing
- › Modern and user-friendly system design
- › Flexible and upgradable software package (FLU-Data) for convenient data processing, storage, display, and sharing of all data
- › Remote maintenance module Remote-Plus for quick
- › CE



System Control

Each system features hardware-based control with the following characteristics:

- › Standalone and safety-oriented process control system (Siemens S7) at SIL1/SIL2 level
- › External operation and evaluation via mirrored remote PC
- › Key system for manual and automatic modes
- › Hood clamp, allowing mechanical access to test item only in safe condition
- › Safety shutdown in case of hazard
- › Entire hardware including a local PC integrated into the system housing

System specifications

Standard specifications for fuel cell test systems FLU-H₂-Tester FCs

Test unit	Single cell	Stack
Dimensions	1,1 x 1,3 x 2,05 m (Width x Depth x Height) **	1,5 x 2,5 x 2,05 m(Width x Depth x Height)
Test unit positioning	Under exhaust hood Flexible holder with tray **	Positioned under exhaust hood on transport cart, inserted into housing
Electronic Load	2 kW, max. 450 A, 0...5 V	15 kW, max. 210 A, 0...200 V, with grid feedback *
H ₂ -Flow Range	0,3...260 Ln/h *	400...12.000 Ln/h *
H ₂ -Circulation	-	900...5.400 Ln/h *
O ₂ /Air-Flow Range	1,5...1250 Ln/h *	1.400...42.000 Ln/h *
Pressure regulation range	0 – 4 bar (g) *	optional
Cooling of the unit	optional	Pure water circuit (made of plastic), 10...85 °C
Cathode gas humidification	optional	Gas-to-Gas humidifier, other variants optional

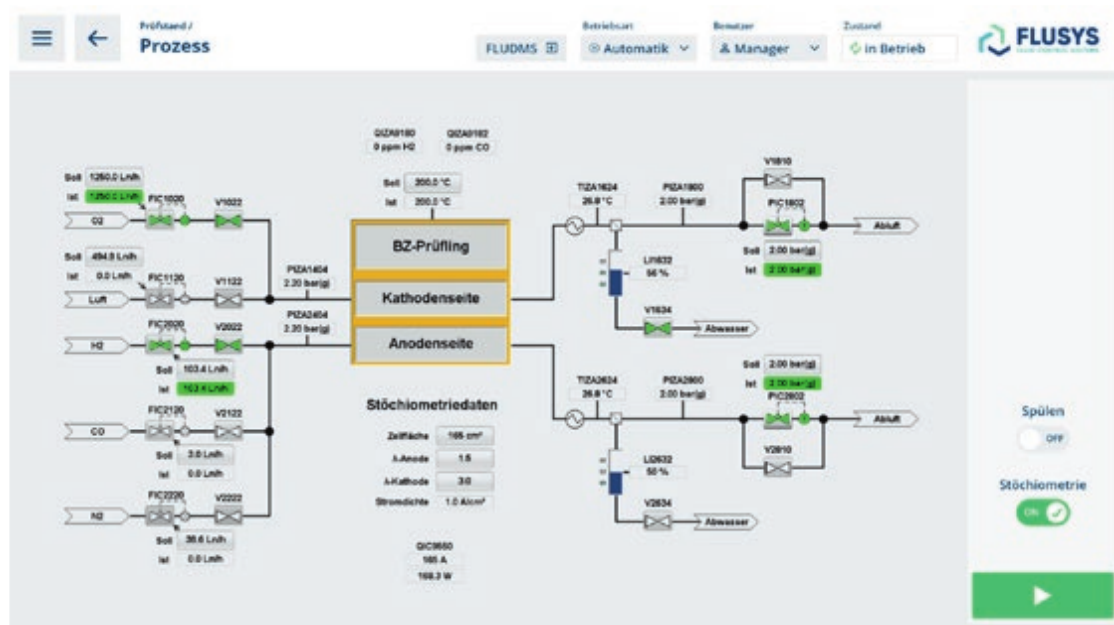
* Other values on request

** Listed here: Base HT-PEM specifications for electrolysis – and higher power test stands are customized

Options

Options to address the different requirements and wishes of our customers:

- › Dosing of additional gases (e.g., CO)
- › H₂ in O₂-Measurement on cathode side
- › O₂ in H₂-Measurement on anode side
- › Gas flow sensors downstream after water separation for mass balance
- › Different humidification/evaporation options (depending on requirements)
- › EIS-integrated impedance spectroscope (Zahner Zennium XC) including storage of standard measurement routines - integration of devices from other manufacturers possible
- › Future-oriented and expandable software package for recording, long-term storage, and display of all relevant system data (see flyer FLU-Data)
- › HT-PEM-package
 - Control of external electrical heaters (30...220 °C)
 - Reading temperature sensors including safety shutdown
 - Heat exchanger on the outlet side for cooling gases
- › Tilting device for stacks
- › Pre-tensioning device for stacks with digital torque measurement (also in combination with Neige device)
- › Barcode scanner for test items including integration into SQL database
- › Documentation and control in another language







Single cell test system



Single cell test system with open hood



Stack test system



Stack test system with ergonomic stack loading

