

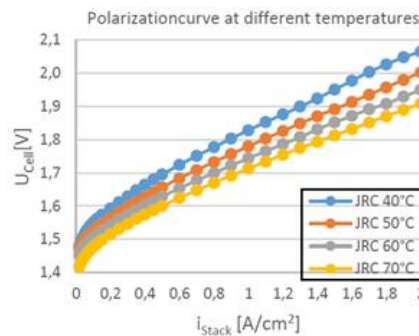
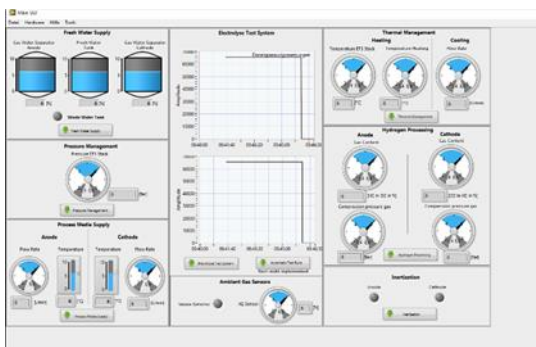


## Electrolysis Test Bench ProHBench

Our newly designed 1,5 kW **Electrolysis Test Bench “ProHBench”** offers several testing possibilities for the rapidly growing market for hydrogen technologies! The highly customizable Electrolysis Test Bench is utilized to validate your specific materials and components or to benchmark with our standard configuration:



Obtain polarization curves and test your materials in programmable long-term runs, get immediate live feedback at your HMI, and supervise each value of your process, even from remote.



### Advantages

- separated in process cabinet and electric cabinet
- HMI for automated test runs and live monitoring
- easy and fast change of MEA samples
- graphical user interface
- database connection for data acquisition
- remote control, automated operation
- water quality recording
- anode feed water recycling
- up to 50 sensors to monitor the process:
  - ❖ Pressure
  - ❖ Temperature
  - ❖ Water conductivity
  - ❖ ...
- PLC based automation
- N<sub>2</sub> purge on cathode and anode

- testing stacks /cells up to 1500 W (300 W per cell)

▪ ...

Connect any your own electrolyzer test cell or use our patented **Electrolysis Test System (ETS)**, which can be customized from *one to five cells* (each 4 or 25cm<sup>2</sup>) and allows to perform simultaneous testing of multiple samples.

Questions or want more information? Write us or follow the link to our homepage.

### Contact

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# Electrolysis Test Bench ProHBench

## Standard Positions

<i>Application</i>	<b>Testing of electrolysis materials</b>
<i>operating resources</i>	hydrogen, oxygen/air, hydraulic fluid, nitrogen
<i>operating temperatures</i>	ambient to 80°C
<i>ultrapure water treatment</i>	incl. several filter stages, ion exchanger, pumps, storage tank
<i>anode circuit</i>	incl. pumps, heating/cooling, flow meter, gas/water separator with level sensor, valve technology, temperature, and pressure sensors,
<i>cathode circuit</i>	incl. gas-water separator with level sensor, valve technology
<i>safety technology</i>	incl. permanent ventilation, flow sensor, smoke detector, and hydrogen sensor
<i>electrical cabinet</i>	circuit breaker, FI-protection switch, shunt distribution, coupling relay, PNOZ relay (emergency-stop), measuring transformer, measuring transducer
<i>frame construction</i>	aluminum frame construction with rollers, monitor holder
<i>PLC + PC + visualization</i>	box PC with operating system, monitor, and PLC incl. digital, analogue input as well as output boards, operating and monitoring software
<i>software interfaces</i>	connection to user-defined database systems (SQL, MySQL, MariaDB, Protégé etc.); connection to MATLAB Simulink

## Optional Positions

- analytics incl. gas drying and pressure control
- H<sub>2</sub>/O<sub>2</sub> analytics incl. gas drying and pressure control H<sub>2</sub>/O<sub>2</sub> up to 5 bar
- cathode circuit with process water supply
- cathode circuit extension by pumps, heating/cooling, flow meters, valve technology, temperature, and pressure sensors
- explosion proof ventilation
- nitrogen purge
- nitrogen flushing device with semi-automatic switch over
- current and single voltage sensors
- current sensor for connection of external potentiostats as well as single voltage measurement
- software upgrade database bound storage of process variables (MySQL, MariaDB)

For information on our **Electrolysis Test Systems**, which perfectly fit into our test bench, ask for our specific flyer.



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# Electrolysis Test Bench

## ProHBench

### Technical Specifications

#### Cells

<i>number of cells</i>	1 to 5
<i>cell area</i>	4 cm <sup>2</sup> or 25 cm <sup>2</sup>
<i>max. current density</i>	6 A cm <sup>2</sup>
<i>Nominal voltage</i>	2 V long-term 2.5 V short-term
<i>power per cell</i>	300 W (for active area 25 cm <sup>2</sup> ) 48 W (active area 4 cm <sup>2</sup> )
<i>cell temperature range</i>	up to 90°C

#### Process media handling

<i>pipng</i>	6 mm stainless steel
<i>feed water reservoir</i>	5L, manual refill, level sensor
<i>feed water supply anode and cathode</i>	50 ml – 2 L, regulated by flow sensor
<i>feed water temperature range</i>	up to 80°C
<i>back pressure</i>	0 – 1 bar
<i>filter and ion exchanger</i>	In-line

#### Electric source

<i>programmable DC power supply</i>	
<i>max. voltage</i>	20 V
<i>max. current</i>	170 A
<i>power</i>	3.4 kW
<i>interfaces</i>	LAN, USB, RS-232
<i>slew-rate control</i>	included
<i>internal resistance</i>	included
<i>programming simulation</i>	

#### Hydrogen processing

<i>hydrogen outlet pressure</i>	optional 5 bar
<i>water separator</i>	2 water gas separators, 2 condensate separators
<i>purge gas</i>	With nitrogen, half automated. nitrogen store in test bench
<i>safety</i>	H <sub>2</sub> in O <sub>2</sub> and O <sub>2</sub> in H <sub>2</sub> Sensors, ventilation check, smoke detector

#### Electrolyzer cell connections

<i>process media</i>	flex line to 6mm screw in (anode/cathode input/output)
<i>heating via hydraulic medium</i>	flex line to 6 mm screw in
<i>voltage measurement</i>	laboratory plug F4,8 flat plug 4,8
<i>current application</i>	2 flexible cables with eyelets

#### Physical environment

<i>electrical cabinet and nitrogen station</i>	approx. 200 cm x 90 cm x 90 cm (H x D x L)
<i>process cabinet</i>	approx. 200 cm x 90 cm x 90 cm (H x D x L)
<i>power source</i>	CEE 3*16A 380-400VAC, 50-60 Hz
<i>operating temperature</i>	5-40°C