



## Portable PEM – Pressure Electrolysis for Hydrogen Generation



Fully integrated pressure electrolysis system.

### Feel free to ask!

We are happy to provide competent advice, without obligation and specific to your application.

### Fraunhofer-Institute for Solar Energy Systems ISE

Heidenhofstr. 2  
79110 Freiburg  
Germany  
Tel.: +49 (0) 7 61/45 88-0  
Fax: +49 (0) 7 61/45 88-90 00  
[www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)

### Contact

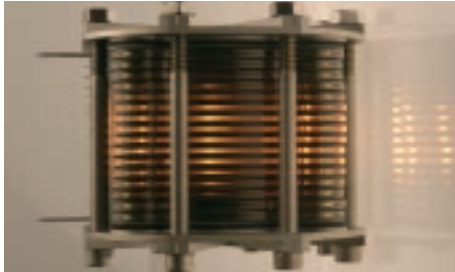
Dr Tom Smolinka  
Tel.: +49 (0) 7 61/45 88-52 12  
Fax: +49 (0) 7 61/45 88-92 12  
E-mail: [Tom.Smolinka@ise.fraunhofer.de](mailto:Tom.Smolinka@ise.fraunhofer.de)

Hydrogen is required for many applications e.g. in laboratories, for medical technology, welding or as a supply for fuel cells. However, a gas bottle is not always available or does not always have a large enough capacity. Required is rather a compact device that can provide hydrogen, has a simple operation and minimum maintenance.

Under the leadership of Fraunhofer ISE and the GKSS research centre, an association made up of six businesses developed a portable PEM pressure electrolyser for generating pure hydrogen. The dry hydrogen of quality 4.0 is supplied at a pressure level of 9.5 bar absolute. The device is especially suited for filling metal hydride storages for fuel cell applications.

The electrolyser functions entirely automatically. The control system is governed by a microprocessor. An integrated gas drying which consists of a membrane module and a molecular sieve guarantees maintenance-reduced operation. Here a membrane module functions as the first drying step. Through the use of a downstream molecular sieve, the service life can again be increased many times.

When required, an ion exchange module can be implemented so that deionized water need not be used. Further, it has been successful to manufacture the fluid distributor structures of the electrolysis cell stack with injection moulding, with which the costs and the weight could be reduced.



Cell stack of the pressure electrolyser of which the distributor structures are processed out of plastic.



User-friendly front panel that facilitates easy use at the touch of a button.



Control system based on a microprocessor.

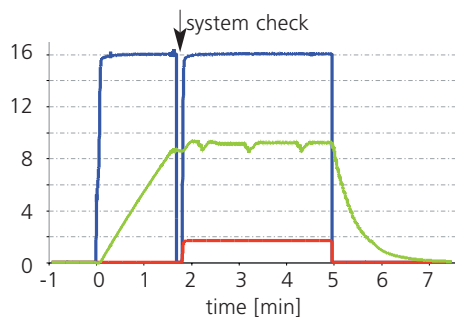


Figure 3: Start-up and shut-down procedure of the hydrogen generator (blue: current [A]; red: H<sub>2</sub> production rate [NI/min]; green: system pressure [bar]).

#### Technical Data of PEM pressure electrolyser

Production rate	110 NIH <sub>2</sub> per hour	
Hydrogen quality	99.99 % (4.0)	
Rest humidity	not detectable	
Impurities	Oxygen	< 10 ppm
	Nitrogen	< 100 ppm
Power supply	230 VAC, 50 Hz, PFC	
Power input	700 VA	
Required water quality	Deionized water, optional ion exchange module for use with tap water	
Max. production amount with one full water tank	300 NI H <sub>2</sub>	
Operating pressure	9.5 bar absolute	
Protection category	IP 20	
Operation	Easy operation via front panel	
Outer dimensions	60 x 62 x 50 cm <sup>3</sup> (B x H x T)	
Weight	48 kg	

#### Project partners



[www.fsm-elektronik.de](http://www.fsm-elektronik.de)



[www.ht-hyrotechnik.de](http://www.ht-hyrotechnik.de)



[www.herr-gmbh.de](http://www.herr-gmbh.de)



[www.prinzoptics.de](http://www.prinzoptics.de)



[www.emea.donaldson.com](http://www.emea.donaldson.com)



[www.fumatech.de](http://www.fumatech.de)



[www.gkss.de](http://www.gkss.de)

Financial support for the development was granted within the Program "Innovative Networks" under the project carrier VDI/VDE-IT through the German Federal Ministry for Economics and Labor.