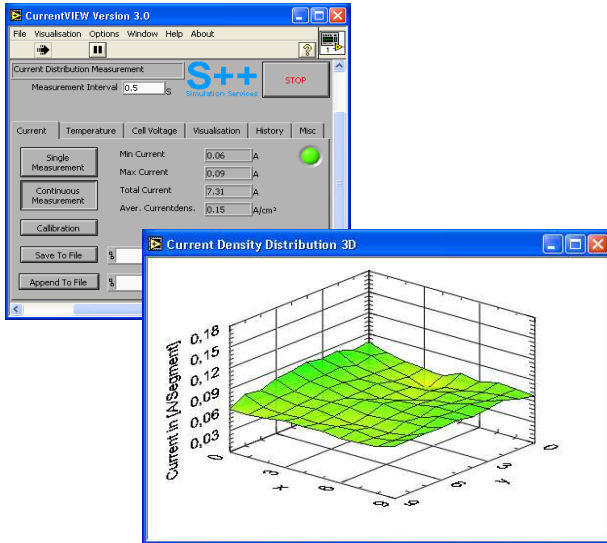
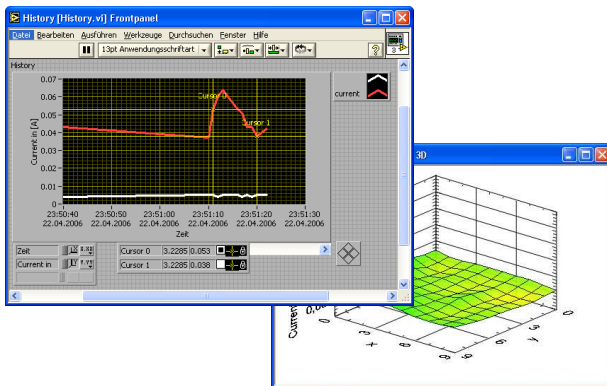


User Interface CurrentVIEW



The user interface **CurrentVIEW** is easy to use and self-explanatory. It allows:

- + single and continuous measurements
- + visualization in 2D, 3D and as values
- + saving data as text files in spreadsheet format
- + saving data as pictures in jpg format
- + saving and reviewing of data streams.



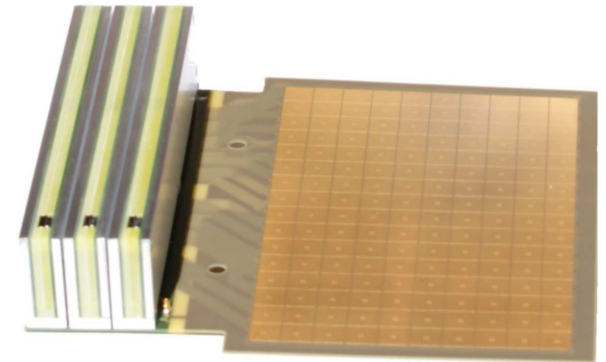
Also a dll can be introduced into an existing environment.

Specifications

general data	
current measurement range	a wide range is possible
measurement time for current	depends on the amount of measurement cells (e.g. 20 ms for 160 measurement cells)
position of measurement	at an arbitrary position in a stack up to 60 V (higher optional) or single cells
sensor plate	
segments	gold plated
size of measurement cells	depends on the design
thickness	0.4 – 3.5 mm
maximal operating temperature	100°C (180° optional)
electronic	
input	80 current measurement cells or 150 temperature measurement cells
interface	USB-Interface (CAN-Bus optional)
power supply	over USB
operating environment	0-40°C, humidity: no condensation
software	
	User interface and device drivers for Windows XP (32 bit)

current scan shunt

Simple method for current density distribution measurement in fuel cell stacks.



- + detailed analysis of flow fields
- + detailed analysis of materials
- + optimization of fuel cells
- + fault diagnostics in fuel cells
- + long-term tests
- + resolution depends on design
- + current range depends on design
- + standard devices are available
- + special designs on request
- + mass production possible

With the **current scan shunt**, the current density distribution in fuel cells can be measured. Because of the simple internal structure it is suitable for mass production. It is easy to use and the evaluation electronic can be plugged by USB to any computer.

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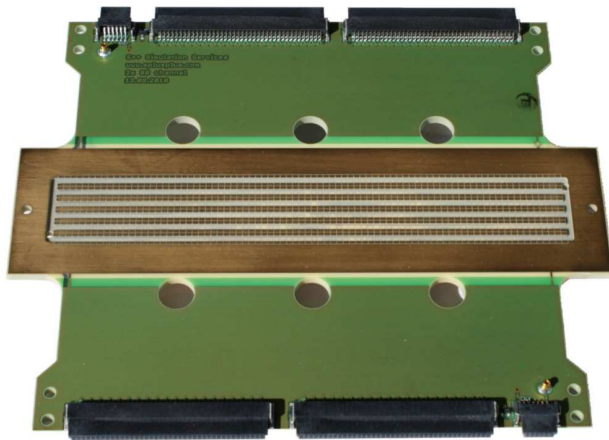


In a fuel cell the local conditions differ, which leads to an inhomogeneous mass conversion resulting in an inhomogeneous current production. One of the keys towards a better understanding of PEM fuel cells, DMFC and other electrochemical cells is the measurement of the current density distribution. It is important for a save and reliable operation as well as a high lifetime.

Application

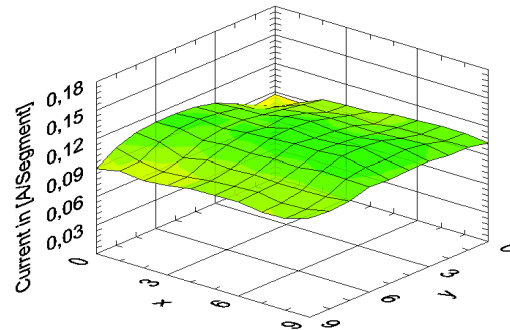
The device of type **current scan shunt** shown on the first page has a resolution of 16 x 10 current and 8 x 5 temperature measurement cells and an active area of 150 cm². Because of the simple internal structure it is suitable for mass production. So the **current scan shunt** can also be applied in series production of fuel cells. It can be used for example for control applications.

The picture below shows a sensor plate where the channels are milled into the surface of the sensor plate. Two of the channels are equipped with 80 current measurement cells.



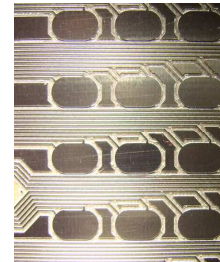
Because the sensitive parts in the sensor plates are very thin the thickness can vary over a wide range so that it is possible to mill channels into the surface. So if it is wished by the customer the sensor plate can be used as a flow field and the gas diffusion layer can be placed directly on the gold plated sensor plate. The sensor plate can be placed at an arbitrary position in the stack.

The next picture shows a typical current distribution.



Measurement Principle

The devices of **current scan shunt** series use a low resistance shunt resistor for current measurement. We produce two different designs. The first one is made out of material with a very low temperature coefficient. In this case the measurement is temperature independent and no further calibration is necessary. This is an efficient and easy way for measurement. The following picture shows some of the internal resistors during production.



The second design is made from a special copper layer. Because of the high temperature coefficient of copper temperature compensation is necessary during the measurement.

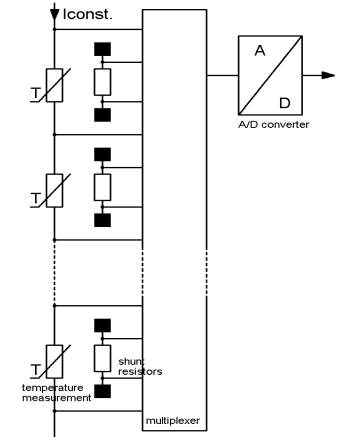
The **current scan shunt** is produced in license of the DLR (German Aerospace Center).



For both designs the signals from the shunt resistors are connected to a multiplexer who automatically switches the signals to an amplifier and evaluation electronic with Analog-to-Digital converter as shown in the following picture.

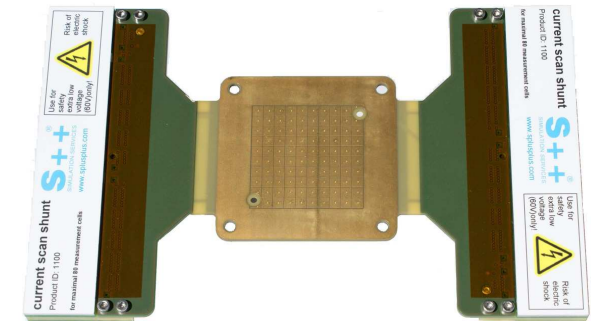
The resolution is limited, by reason of the complexity. The complexity grows quadratic with the number of rows and columns of measurement cells. For each measurement cell two wires are necessary, therefore for an array with $n \times n$ measurement cells $2n^2$ wires are necessary.

So the current scan shunt is the best choice if there is enough space for the wires, especially for small fuel cell or when a lower resolution is sufficient. For large fuel cells we recommend the **current scan line** device of our successful current scan product line, which works in a different way and has a linear complexity.



Available standard device

Standard devices are available with 25 cm² and 50 cm². The following picture shows a 25 cm² sensor plate with 10 x 10 current and 5 x 5 temperature measurement cells.



Custom made devices

We realize nearly any custom required design. The only restriction for the measurement cells is the available space for the internal wires. The electronics can be mounted in plane like in the picture above or perpendicular to the sensor plate like in the picture on the first page. The maximal size is nearly not restricted and depends only from the technical feasibility.