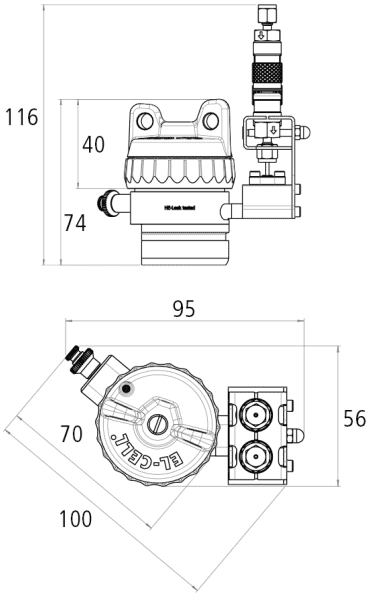
Measurements in mm:



PAT-Cell-Gas II

For in-situ gas analysis in a flow-through setup.

The PAT-Cell-Gas II is a test cell dedicated to in-situ gas analysis of battery materials in a flow-through set-up. For this purpose, the test cell features gas inlet and outlet ports with self-locking couplings compatible with 1/16-inch Swagelok tube fittings. In addition, options include built-in digital gas pressure and temperature sensors or a septum port for gas sampling with a syringe.

The cell stack is placed on top of a perforated or grooved current collector (flow field), which is to be purged with a gentle stream of gas. The lower electrode must be gas-permeable to allow gas exchange with the feed gas. Typically, the cell is used with gas diffusion electrodes (such as for Li-air) or with Li-ion battery electrodes with a meshed current collector. The special design minimizes backmixing of gas from the flowfield into the headspace and is thus very suitable for time-resolved gas analysis with a mass spectrometer, for example.

All PAT-Cell-Gas II variants are designed for use with EL-CELL potentiostats to fully utilize all sensor functions.

Use Cases:

- 2- or 3 electrode setup
- In-situ gas analysis in a flow-through setup
- Time-resolved gas analysis
- Quantifying gas evolution / consumption
- Taking gas samples for subsequent analysis

Product website:

Manual (PDF):

Key Features

- Cableless test cell with all advantages of the PAT-Core
- PAT series test cell with gas inlet and outlet with 1/16 inch Swagelok Tube Fitting
- Optional digital gas pressure sensor (0 to 3 bar abs.) and gas sample port available
- PAT-Button for automatic cell identification in EL-Software

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PAT-Cell-Gas II Working Modes

Mode 1: Air mode

Upper plunger (current collector), stainless steel

Counter electrode e.g. LFP

Insulation sleeve (PP) with separator and reference electrode

Working electrode e.g. gas diffusion electrode

Lower plunger (current collector) with perforated plate, stainless steel

Gas flow inside the lower plunger

The lower plunger with perforated plate allows for electrochemical characterization of gas diffusion electrodes used for instance in Li-air batteries. The lower electrode is contacted by and "breathes" through the perforated stainless steel current collector supporting it. During operation, the pressure gradient building up between cell headroom and the gas volume below the perforated plate effectively prevents back-mixing. The relatively large volume below the perforated is at the expense of time resolution, but makes this solution robust against clogging of the gas path.

Mode 2: OEMS mode

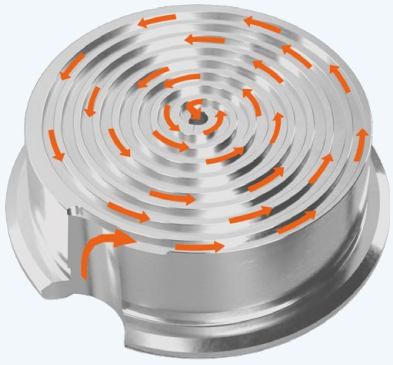
Upper plunger (current collector), stainless steel

Counter electrode e.g. LFP

Insulation sleeve (PP) with separator and reference electrode

Working electrode e.g. gas diffusion electrode

Lower plunger (current collector) with flow field, stainless steel



Gas flow along the surface of the lower plunger

The PAT-Core setup using a lower plunger with flow field provides almost perfect plug-flow of the purge gas being essential for quantitative time-resolved analysis. Gases evolved or consumed at the working electrode may be analysed through the composition change of the gas stream that is to be passed along the spiral-type flow field below the working electrode.

The composition of the outgoing gas can be analyzed by e.g. mass spectrometry. The pressure gradient between cell headroom and spiral-type flow field effectively prevents back-mixing. This and the tiny gas volume of the flow field ensure best possible time resolution.