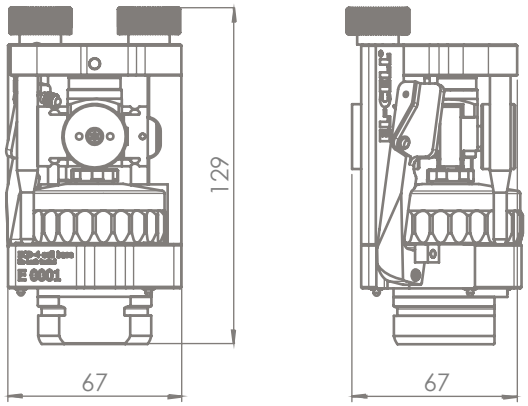
Dimensions in mm:



ECD-4-nano

Advanced test cell for the measurement of electrode expansion with nanometer resolution.

The ECD-4-nano is a high-resolution electrochemical dilatometer. It offers a capacitive parallel plate sensor system with a resolution of better than 5 nanometers. This makes the ECD-4-nano the perfect instrument for detecting thickness changes of the individual electrode or the full cell stack during the electrochemical cycle.
The ECD-4-nano's completely redesigned test cell features a corrosion-resistant cell bottom and a new One-Seal concept that significantly improves tightness over previous ECD-3 models. This enables stable long-term operation as well as the use of a wide range of electrolytes.
To further improve workflow and handling, we have now integrated the ECD-4-nano into the PAT system. The dilatometer can be inserted directly into a PAT-Tester-x or a docking station such as the PAT-Clamp-1. This allows a space-saving and fast setup of the instrument. Needless to say, the integrated PAT-Button also ensures automatic recognition of the test cell in our EL-Software measurement software.

Use Cases:

- Expansion of the individual electrode
- 3-electrode setup with ring-shaped reference electrode
- Expansion of the full cell stack (2-electrode setup)
- For aprotic electrolytes

Product website:

Key Features

- Capacitive displacement sensor (range 250 µm, resolution ≤ 5 nm)
- Additional gas pressure (0 to 3 bar) and temperature sensor (-20 to 80° C)
- Cableless connection via PAT socket, with electronic cell tag (PAT-Button)

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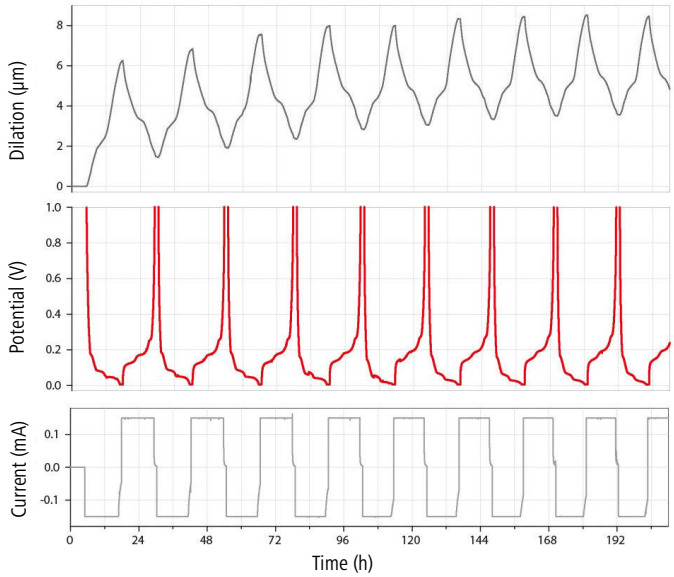
Specifications	
Height / Width / Depth in mm	129 / 67 / 67
Electrode setup	2- and 3-electrode
Reference electrode type	Ring-shaped
Weight	2 kg
Glass T-Frit (Separator) dimensions	12.5 / 10 mm x 3.5 mm
Working (upper) electrode diameter	≤ 10 mm
Counter (lower) electrode diameter	≤ 10 mm
Test specimen	Electrode films, optional single crystals / grains (Diameter ≤ 10 mm, thickness ≤ 1 mm)
Load on test specimen	approx. 1 N
Gas pressure sensor range	0 to 3 bar abs.
Chemical compatibility	Aprotic organic electrolytes
Cell electrolyte volume	Half cell mode: approx. 0.2 ml Full cell mode: approx. 0.03 ml
Operational temperature range (cell and sensor)	-20 to 80 °C
Operational temperature range (conditioning electronics)	0 to 40 °C
Displacement sensor system	capacitive
Displacement range	250 µm
Displacement resolution	≤ 5 nm

Sample test results



Setup details:

Graphite vs. Li in LP30

Measuring the thickness change of the graphite electrode (Single electrode operation mode)

During the experiment, a constant load / force of 1 Newton is applied to the graphite electrode.

Additionally, gas pressure and temperature are monitored (not shown)

Devices in use:

- ECD-4-nano inside a temperature chamber
- PAT-Tester-x8 with a single PAT-Channel-1