

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 for quantifying thickness changes with a resolution of better than 5 nanometers. Its capacitive parallel plate sensor offers exceptional stability and sensitivity while the force applied to the electrode can be continuously adjusted between 1 and 15 N. 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.

Additional sensors for gas pressure and temperature are installed as standard, supplementing the options for sample characterization.

The test cell features a corrosion-resistant base and a One-Seal concept for superior tightness, enabling stable long-term operation and compatibility with a wide range of electrolytes.

For space-saving, cable-free setups, the ECD-4-nano connects wirelessly via the PAT socket to minimize cable-induced artifacts and simplify handling and installation. This way, the dilatometer can be inserted directly into a PAT-Tester-x-8 or a docking station such as the PAT-Stand-1. The integrated PAT-Button enables automatic cell detection in EL-Software.

Key Features

- Capacitive displacement sensor (range 250 μm , resolution $\leq 5 \text{ nm}$)
- Additional gas pressure (0 to 3 bar) and temperature sensor (-20 to 80° C)
- Adjustable force on electrode/ cell stack (up to 20 N/cm²)
- Cableless connection via PAT socket, with electronic cell tag (PAT-Button)

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:



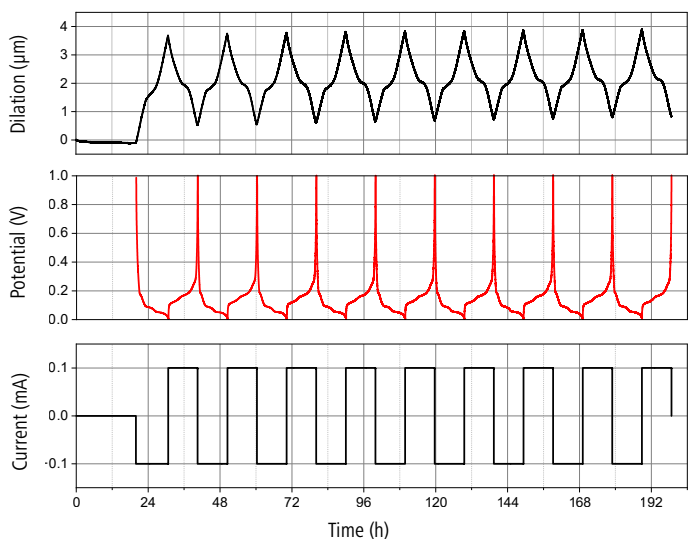
Manual (PDF):



Specifications

Height (with sensor cable) / (without sensor cable)	272 mm / 173 mm
Width	68 mm
Depth	77 mm
Weight	2 kg
Electrode setup	2- and 3-electrode
Reference electrode type	Ring-shaped
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
Load on test specimen	approx. 1 N to 15 N
Gas pressure sensor range	0 to 3 bar abs.
Chemical compatibility	Aprotic organic electrolytes
Cell electrolyte volume	Half cell mode: approx. 0.24 ml Full cell mode: approx. 0.04 ml
Operational temperature range (cell and sensor)	-20 °C to +80 °C
Operational temperature range (sensor box)	0 °C 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 +2 % VC

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

During the experiment, a constant load / force of 15 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