

User Manual

Release 2.52

PAT-Cell

Electrochemical test cell



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Content

1 Product description.....	4
2 Features.....	4
3 Working principle of the PAT-Cell	5
4 Safety precautions.....	6
5 Cell Assembly	6
6 Disassembly and Cleaning	7
7 Unpacking	8
8 Technical data	9
9 Consumables	10
10 Spare parts	11
11 Technical support.....	13
12 Warranty	13

1 Product description

The PAT-Cell is a standard test cell for two- and three-electrode testing of battery materials by using the PAT-Core. For connection to a potentiostat or battery tester, the PAT-Cell must be inserted into a PAT-Stand or PAT-Tester. It has no sockets for direct cable connections.



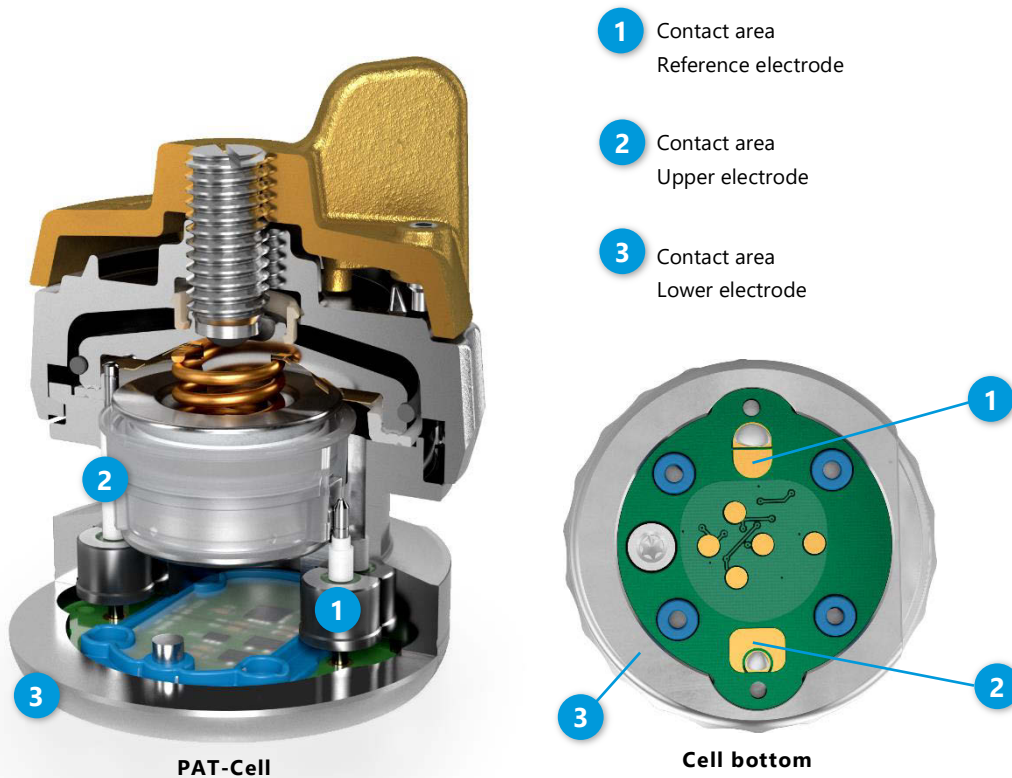
2 Features

- Enables long-term stable 2- and 3-electrode testing with the PAT-Core
- Can be used with all the different versions of the PAT-Core
- Compatible with all common aprotic, aqueous, and highly corrosive electrolytes
- Electrode feedthroughs with glass-to-metal seals for improved temperature resistance
- PAT-Button for automatic cell identification in EL-Software
- Compatible with metal seal lid for using aluminum lid seal
- Helium leak tight

3 Working principle of the PAT-Cell

The PAT-Cell is a leadless test cell. The two or three electrodes of the inside PAT-Core can only be accessed through the contact areas at the cell bottom. The PAT-Cell may be inserted into any socket of a PAT docking station (PAT-Stand and PAT-Chamber) and PAT battery tester.

The inside PAT-Core of the PAT-Cell is an unsealed container for the electrodes, the separator and the electrolyte. The cell becomes hermetically tight only after encasing the PAT-Core inside the outside housing consisting of the cell base and cell lid. A compression spring mounted to the cell lid serves to define the mechanical pressure onto the cell stack.

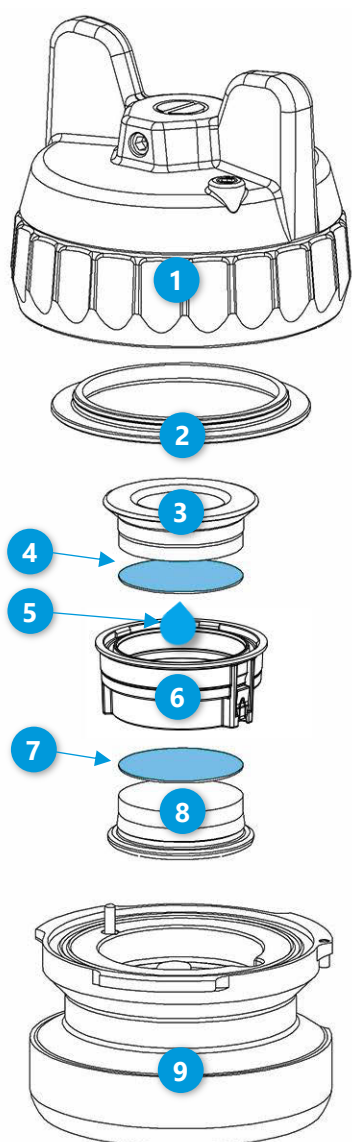


4 Safety precautions

Use proper safety precautions when using hazardous electrode materials and electrolytes. Wear protective glasses and gloves to protect you against electrolytes that may accidentally spill out during filling and disassembly. Upon cell disassembly, dispose of all materials properly.

5 Cell Assembly

This section describes how the PAT-Cell has to be assembled to conduct proper battery tests. Please note that the assembly has to take place under a protective atmosphere in a glove box.



1. Put the **insulation sleeve (6)** onto the worktop with the smaller side pointing upwards.

2. Insert the **lower electrode (7)** into the sleeve with the active layer facing downwards.

3. Attach the **lower plunger (8)**. The lower plunger is available in different gap sizes to account for the thickness of the lower electrode and the separator used.

4. Turn the assembly upside down.

5. Align the contact spring of the sleeve with the horizontal contact pin inside the **cell base (9)**. Then insert the assembly into the cell base.

6. Evenly dispense approx. 100 μL of **electrolyte (5)** on top of the separator with a pipette. Note: The optimum amount of electrolyte will depend on the thickness and porosity of the separator and the electrodes used.

7. Insert the **upper electrode (4)** into the insulation sleeve with the active layer facing downwards.

8. Attach the upper plunger (3).

9. Attach the **screw cap (1)** to the cell base with the wing nut fully released.

10. Tighten the wing nut clockwise to seal the cell.

11. Attach the cell into a free socket of a PAT docking station or PAT-Tester.

6 Disassembly and Cleaning

When working with aprotic, moisture-sensitive electrolytes such as LiPF_6 , it is best to always leave the cell base and cell lid in the glove box and only expose the PAT core components to room air for cleaning or disposal.

Note that excess electrolyte may leak from the PAT-Core and cause contamination in the cell base and on the contact pins. For standard electrodes and standard separators use 100 μl electrolyte.

If the cell base or lid has been in contact with ambient air or if they are being used for the first time, they must be dried in a vacuum at 80°C for at least 12 hours before use.

Stainless steel plungers can be cleaned with water, acetone, or ethanol. If necessary, persistent stains can be removed from the plungers with aqueous nitric acid (20%, 2 hours at room temperature). Insulating sleeves made of PP are intended for single use. Insulating sleeves made of PEEK or PPS can be cleaned with water, acetone, or ethanol and are reusable after careful drying (120°C, vacuum, >12 hours).

Never immerse the cell base in liquid. In particular, avoid contact of the electronic components on the bottom of the cell base with liquid.

Notes:

- Protect yourself against chemical hazards. Electrolytes may spill out during cleaning. Electrode materials and electrolytes may react with ambient atmosphere or solvents used for cleaning. Wear appropriate protective equipment, goggles, and gloves.
- Clean all cell parts right after disassembly. Leaving cell parts in contact with the ambient atmosphere while still being wetted with electrolytes may result in severe corrosion.

7 Unpacking

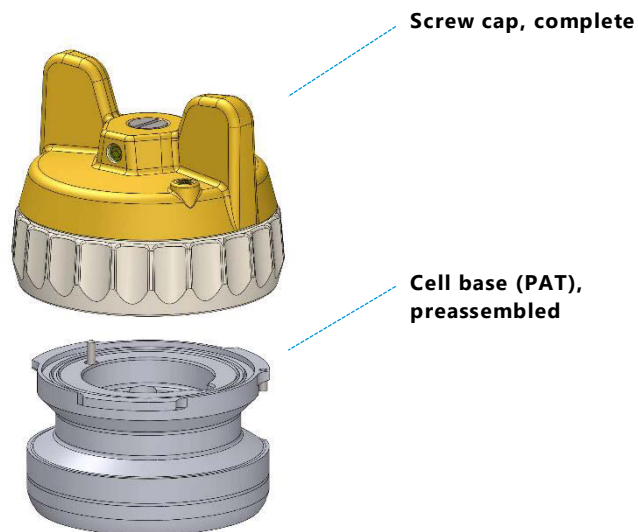
Check the contents of the package against the list given below to verify that you have received all of the required components. Contact EL-CELL, if anything is missing or damaged.

Note: Damaged shipments must remain within the original packaging for freight company inspection.

List of components:

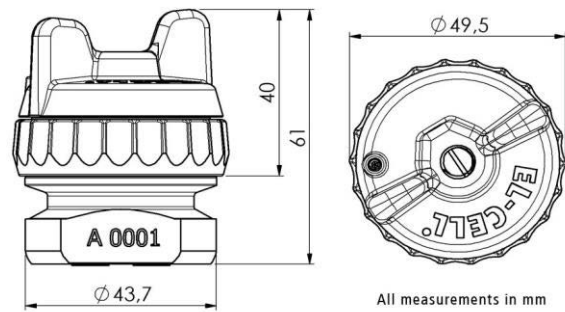
PAT-Cell test cell without PAT-Core

Note: The components of the PAT-Core (insulation sleeves and plungers) must be purchased separately.



8 Technical data

- Diameter: **49.5 mm**
- Height: **61 mm**
- Weight: **0.4 kg**
- Electrode diameter: **18 mm**
- Temperature resistance **-20 to +80 °C**

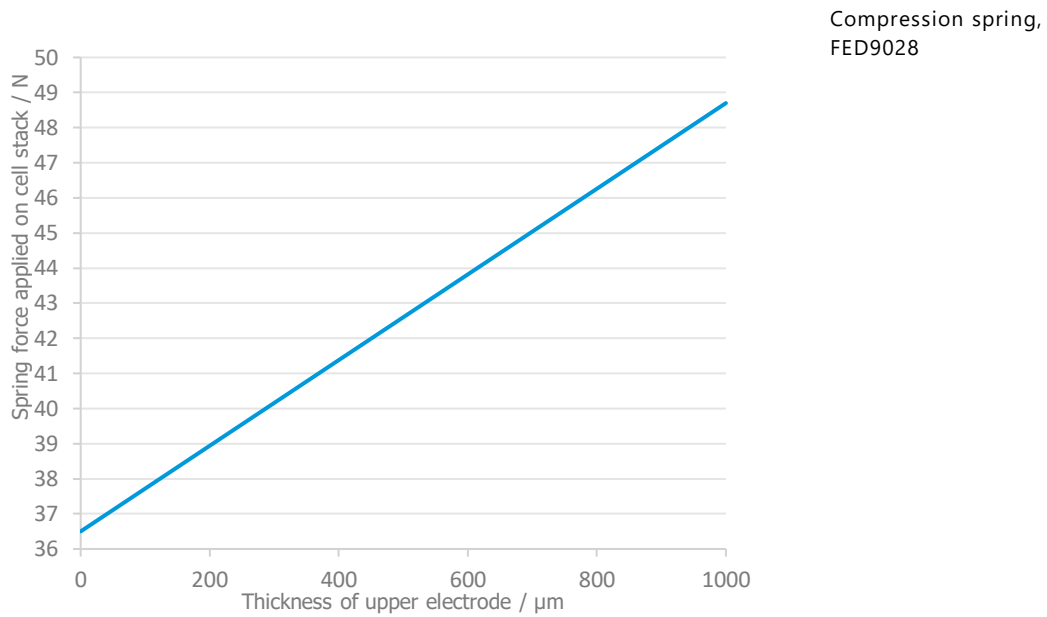


8.1 Compatible PAT Docking Stations

The PAT-Cell can be used with all PAT docking stations and PAT-Testers

- PAT-Clamp-1
- PAT-Stand-1
- PAT-Stand-4
- PAT-Stand-16
- PAT-Chamber-16
- PAT-Tester-x
- PAT-Tester-i-16

8.2 Spring force in relation to the thickness of the upper electrode:



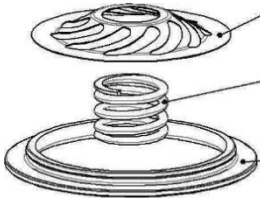
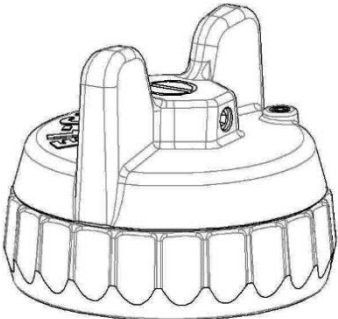
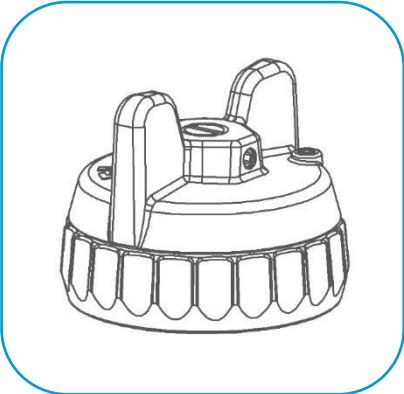
9 Consumables

Seals (single-use):

- Sealing ring, PE (lid, 10 pcs) [ECC1-00-0232-A/X](#)
- Sealing ring, PTFE (lid, 10 pcs) [ECC1-00-0232-B/X](#)
- Sealing ring, PEEK (lid, 10 pcs) [ECC1-00-0232-E/X](#)

10 Spare parts

Components screw cap

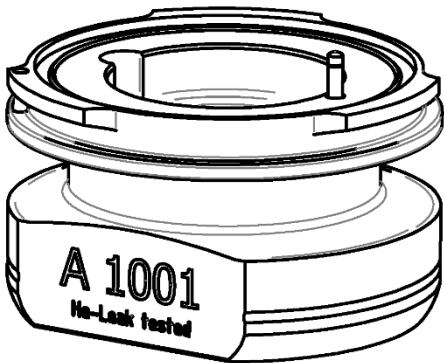
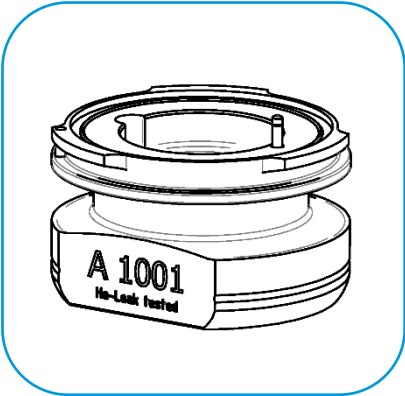


Disc spring
ECC1-00-0233-A

Compression Spring
FED9028

Sealing ring
ECC1-00-0232-A

Components cell base



Cell base II GTMS (PAT-Cell), assy
ECC1-00-0260-E

! Legacy version

- Cell base (PAT)
ECC1-00-0234-A
- Button holder
ECC1-00-0247-B
- Shaft ring
FED9029
- Button (PAT)
ECC1-00-0253-A
- Screw
N_965

11 Technical support

Technical support for this product is exclusively provided by EL-Cell GmbH.

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12 Warranty

For a period of one year from the date of shipment, EL-Cell GmbH (hereinafter Seller) warrants the goods to be free from defects in material and workmanship to the original purchaser. During the warranty period, Seller agrees to repair or replace defective and/or nonconforming goods or parts without charge for material or labor, or, at the Seller's option, demand return of the goods and tender repayment of the price. The buyer's exclusive remedy is repair or replacement of defective and nonconforming goods, or, at the Seller's option, the repayment of the price.

Seller excludes and disclaims any liability for lost profits, personal injury, interruption of service, or consequential incidental or special damages arising out of, resulting from, or relating in any manner to these goods.

This Limited Warranty does not cover defects, damage, or nonconformity resulting from abuse, misuse, neglect, lack of reasonable care, modification, or the attachment of improper devices to the goods. This Limited Warranty does not cover expendable items. This warranty is void when repairs are performed by a non-authorized person or service center. At the Seller's option, repairs or replacements will be made on-site or at the factory. If repairs or replacements are to be made at the factory, the Buyer shall return the goods prepaid and bear all the risks of loss until delivered to the factory. If Seller returns the goods, they will be delivered prepaid and Seller will bear all risks of loss until delivery to Buyer. Buyer and Seller agree that this Limited Warranty shall be governed by and construed in accordance with the laws of Germany.

The warranties contained in this agreement are in lieu of all other warranties expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

This Limited Warranty supersedes all prior proposals or representations oral or written and constitutes the entire understanding regarding the warranties made by Seller to Buyer. This Limited Warranty may not be expanded or modified except in writing signed by the parties hereto.