

User Manual

Release 1.5

PAT-Cell-Press

Electrochemical test cell



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Manufacturer and Customer Service

EL-Cell GmbH
Tempowerkring 8
21079 Hamburg – Germany

Telephone: +49 40 79012-734

Telefax: +49 40 79012-736

Email: info@el-cell.com

Website: el-cell.com

Technical Support

Telephone: +49 40 79012-734

Email: support@el-cell.com

Website: el-cell.com/support/technical-support/

Please always quote the serial number on the nameplate when contacting customer service.

Shipping Address for Repairs

EL-Cell GmbH
Tempowerkring 8
21079 Hamburg - Germany

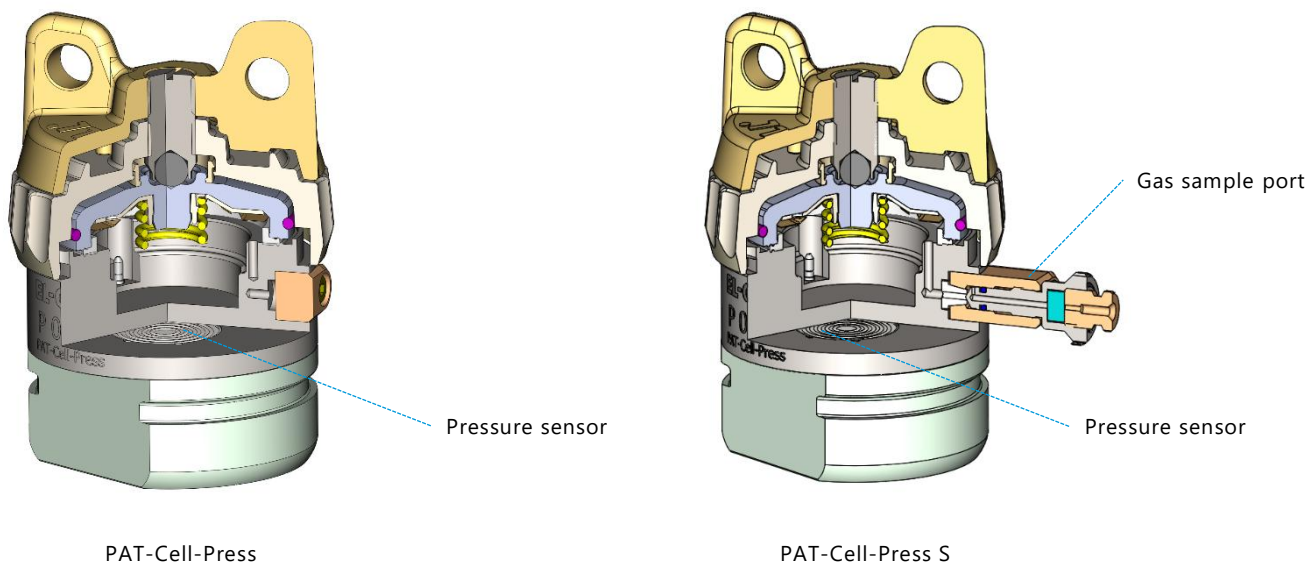
Please contact our customer service department before making a return. Without a completed decontamination report or RMA, we will not open or process shipments.

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1 Product Description

The PAT-Cell-Press is a pressure test cell for measuring gas evolution during the electrochemical cycle. It is a cableless test cell using the PAT-Core concept. As an option, the PAT-Cell-Press is also available with a gas sample port for drawing gas.



1.1 Features and Specifications

- PAT-Core design with or without reference electrode
- Laser welded pressure sensor, pressure range of 0 to 3 bar abs
- Optional gas sample port
- Dead volume with PAT-Core installed: 3.565 cm³
- Helium leak tested*
- Can be used in single-channel configuration together with the PAT-Stand-1 in combination with the PAT-Press box and the PAT-Tester-x.
- Can be used in multi-channel configuration in the PAT-Chamber-16 and PAT-Tester-i-16

*The PAT-Cell-Press has been tested for leakage at the factory. For an empty cell, pressurized with air through the sample port using a syringe, at 2 bar absolute, at 50°C, the pressure decay after 24 hours is guaranteed to be less than 0.3 mbar per hour when using a PE seal, and less than 0.02 mbar per hour when using a Al seal.

2 Variants

PAT-Cell-Press



Features

Laser welded pressure sensor, 0 to 3 bar abs

PAT-Cell-Press S



Features

Laser welded pressure sensor, 0 to 3 bar abs

Gas sample port

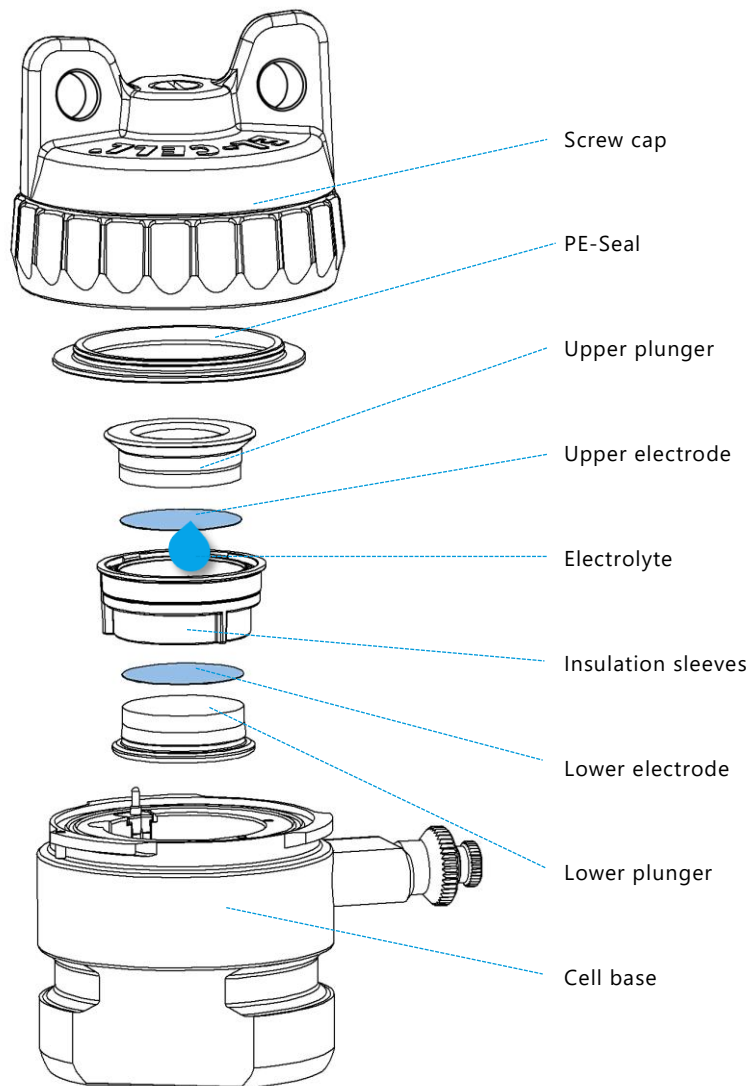
3 Safety Precautions

Use proper safety precautions when using hazardous electrode materials and electrolytes. Wear protective glasses and gloves to protect yourself against electrolytes that may accidentally spill out during disassembly. Upon cell disassembly, dispose of all materials properly. Metallic lithium and some insertion compounds may decompose heavily in contact with water and other solvents and can cause fire.

4 Assembling the PAT-Cell-Press

This section describes how to assemble the PAT-Cell-Press test cell. A separate manual provides a more detailed description of the PAT-Core.

Note: The assembly must occur under the protective atmosphere in a glove box.



1. Put the **insulation sleeve** onto the worktop with the smaller side pointing upwards.
2. Insert the **lower electrode** into the sleeve with the active layer facing downwards.
3. Attach the **lower plunger**. The lower plunger is available in different gap sizes to account for the thickness of the electrodes and separator used.
4. Turn the assembly upside down.
5. Align the sleeve's contact spring with the horizontal contact pin inside the **cell base**. Then, the assembly is inserted into the cell base.
6. With a pipette, evenly dispense approximately 100 μL of **electrolyte** on top of the separator. Note: The optimum amount of electrolyte will depend on the separator's thickness and porosity and the electrodes used.
7. Insert the **upper electrode** into the insulation sleeve with the active layer facing downwards.
8. Attach the **upper plunger**.
9. Attach the **screw cap** to the cell base with the wing nut fully released.
10. Tighten the wing nut clockwise to seal the cell.

5 Disassembly and Cleaning

When working with aprotic, moisture-sensitive electrolytes such as LiPF_6 , it is best to leave the cell base and lid in the glove box and only expose the PAT-Core components to room air for cleaning or disposal. Note that excess electrolytes 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 is contaminated with electrolyte, clean it in the glove box with a cloth and a battery-compatible solvent such as DMC.

If the cell base or lid has been in contact with ambient air or is being used for the first time, it 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 with aqueous nitric acid (20%, 2 hours at room temperature).

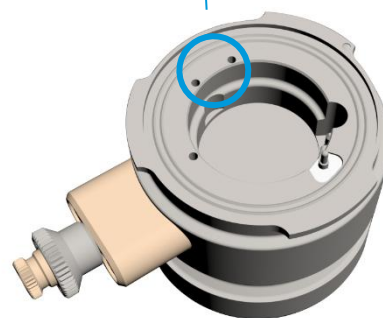
Insulating sleeves made of PP are intended for single use. Insulating sleeves made of PEEK or PPS can be cleaned with water, acetone, or ethanol and are reusable after careful drying (120°C, vacuum, > 12 hours).

Never immerse the cell base in liquid. In particular, avoid contact with the electronic components on the bottom of the cell base with liquid. The two adjacent holes at the top of the cell base (circled in the picture below) connect to the laser-welded pressure sensor inside the lower part.

No liquids must enter these holes during cell assembly, operation, and cleaning to avoid corrosion.

Refer to the troubleshooting section for help if liquid gets into one of the holes.

Holes towards the stainless steel membrane of the laser welded pressure sensor. **Avoid contact with electrolyte or other liquids!**



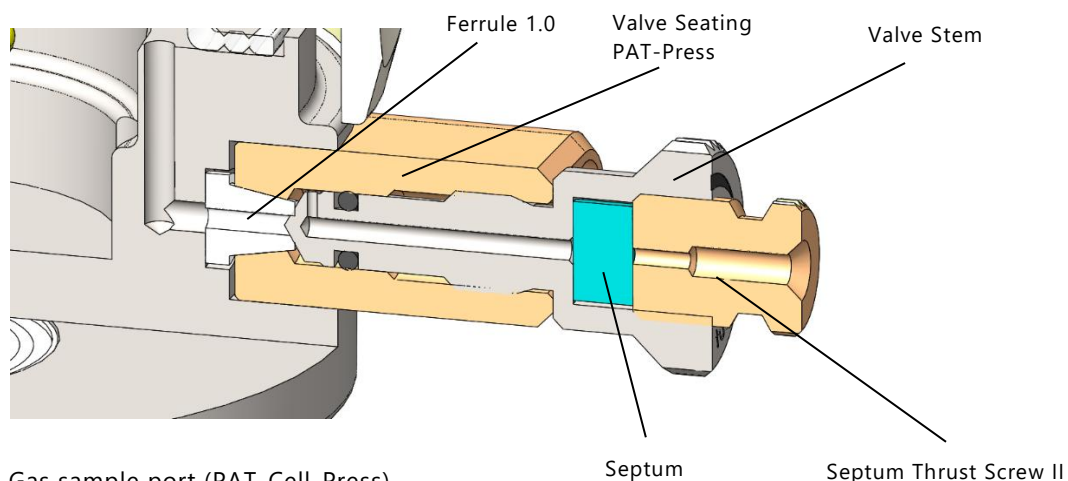
Notes:

Protect yourself against chemical hazards. Electrolytes may spill out during cleaning, and electrode materials and electrolytes may react with the ambient atmosphere or solvents used for cleaning. Wear appropriate protective equipment, such as 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.

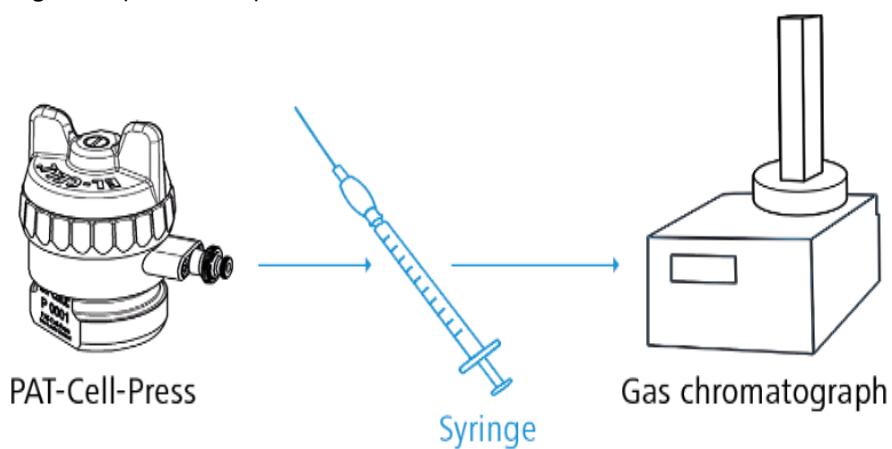
6 Sample Valve with Septum Port (if installed)

The gas sample valve draws gas samples for further characterization from the test cell's head space.



Gas sample port (PAT-Cell-Press)
[ECC1-00-0155-C](#)

In the closed state, the valve spindle is seated on the PTFE ferrule, preventing bleeding through the pierced septum.



6.1 How to Draw Gas Samples

1. Pierce the septum with a sample syringe appropriate for the subsequent gas analysis, e.g., a gas chromatograph. We recommend using a syringe with a pencil-point needle to prevent clogging when the septum of the sample port is pierced. The equipment includes a 1 ml syringe ([LAB0024](#)) and a pencil-point needle ([LAB0039](#)).
2. Open the valve by turning the valve handle counter-clockwise by approx. 90 degrees
3. Fill the syringe by drawing back the syringe piston.
4. Close the valve by turning the valve handle clockwise till finger tight, and remove the syringe.

Note: Do not connect the sample port directly or permanently to an external device.

7 Unpacking

Check the packages' contents against the list 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-Press

- PAT-Cell-Press without PAT-Core
- Sealing ring PE (10x) [ECC1-00-0232-A/X](#)

Note: The PAT-Cell-Press is shipped with an inserted PE seal that serves only as a transport lock. Replace the sealing ring before operating the cell.

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

List of components PAT-Cell-Press S

- PAT-Cell-Press without PAT-Core
- Septum (10x) [ECC1-00-0097-B/X](#)
- Syringe 1ml (w/o Luerlock) [LAB0024](#)
- Spinal needle pencil-point (27g) [LAB0039](#)
- Sealing ring PE (10x) [ECC1-00-0232-A/X](#)
- Ferrule 1.0 (2x) [ECC1-00-0029-B/2](#)

Note: The PAT cell press is shipped with an inserted PE seal that serves only as a transport lock. Replace the sealing ring before operating the cell.

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

8 Technical Data

Diameter: **49.5 mm**

Height: **73 mm**

Width: **70 mm / 49.5 mm** (with/without Sample port)

Electrode diameter: **18 mm**

Temperature operation range: **-20 to +80°C**

Dead volume: **3.565ml / 8.144 ml** (with inserted PAT-Core / without PAT-Core)

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

The spring force applied to the cell stack is 40 N + -5N, provided the upper electrode is between 0 and 0.8 mm thick. In this range, the electrode thickness does not significantly influence the force.

9 Consumables

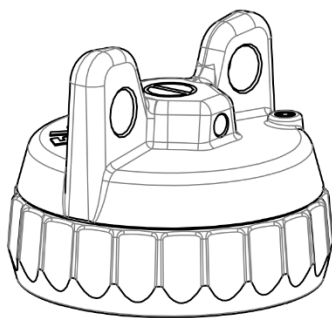
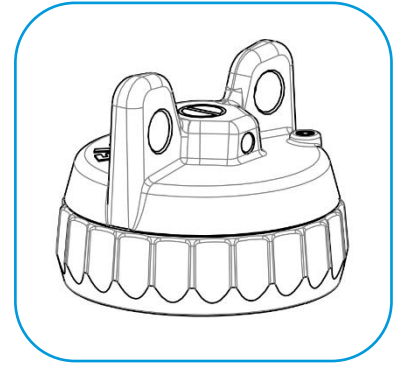
Sealing ring PTFE (10x) [ECC1-00-0232-B/X](#)

Sealing ring PE (100x) [ECC1-00-0232-A/C](#)

Sealing ring Al (10x) [ECC1-00-0232-G/X](#)

10 Spare Parts

Screw cap insulated (PAT), complete ECC1-00-0236-D



Lid inset (metal seal)
ECC1-00-231-C

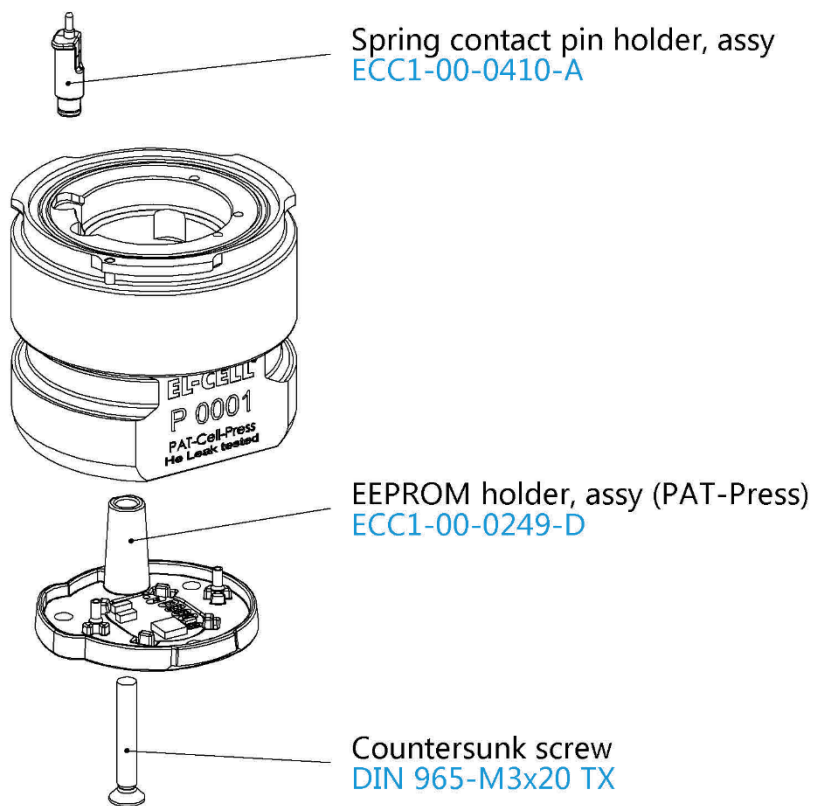
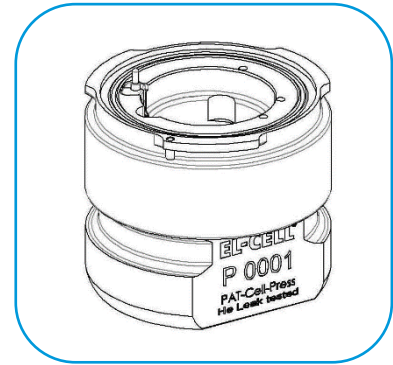
Disc Spring
ECC1-00-0233-A

Compression Spring
FED9028

Sealing ring

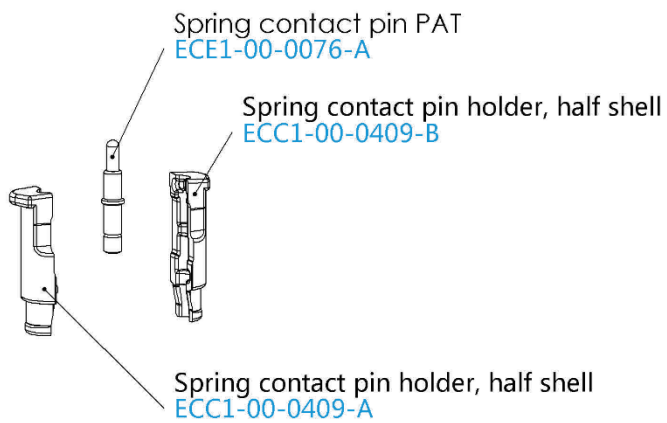
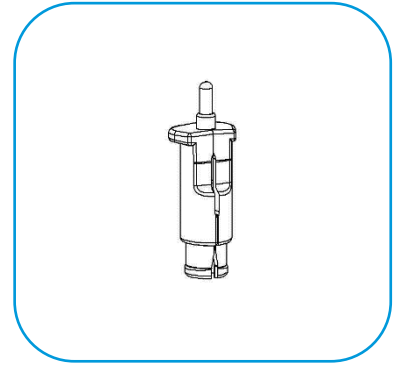
Cell base GTMS (PAT-Press), assy

ECC1-00-0255-A



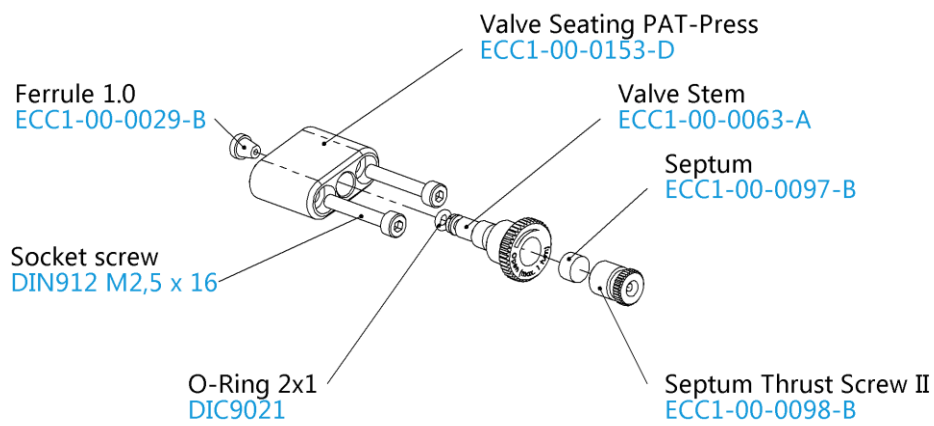
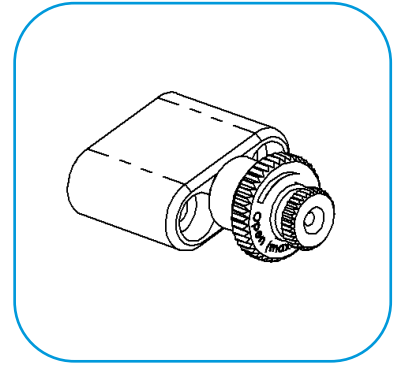
Spring contact pin holder, assy

ECC1-00-0410-A



Gas sample port (PAT-Press), assy

ECC1-00-0155-C



11 Troubleshooting

What can I do if an electrolyte has entered one of the holes in the cell base?

Please only attempt this in an emergency, as there is a risk of damaging the cell. Flush the holes with an appropriate solvent (e.g., distilled water) by applying low pressure. Afterward, the cell base should be dried overnight at 80° C to remove liquid residues.

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 defect 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. Buyer's exclusive remedy is repair or replacement of defective and nonconforming goods, or, at Seller's option, the repayment of the price.

Seller excludes and disclaims any liability for lost profits, personal injury, interruption of service, or for 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 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, 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.