



Translation of the original operating instructions

TC3000L

Large rigid test chamber for ELT3000

Catalog No.
600-101

From software version

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mimc95en1-03-(2501)



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1 About this Manual

1.1 Target Groups

This instruction manual is intended for operators and technically qualified personnel with experience in leak detection technology and the integration of leak detectors in leak detection systems. In addition, the installation and use of the device require knowledge of electronic interfaces.

1.2 Warnings



DANGER

Imminent hazard resulting in death or serious injuries



WARNING

Hazardous situation resulting in potential death or serious injuries



CAUTION

Hazardous situation resulting in minor injuries

NOTICE

Hazardous situation resulting in damage to property or the environment

1.3 Definition of Terms

Minimum detectable leak rate

The minimum detectable leak rate that can be detected by the leak detector under ideal conditions ($< 1 \times 10^{-6}$ mbar l/s*).

* Helium equivalent leak rate For DMC at a pressure difference of 1000 mbar to 0 mbar.

GCU

Gas Control Unit (basic unit, operating unit)

GDU

Gas Detection Unit

DMC

Dimethyl carbonate, typical solvent in battery electrolyte. CAS No. 616-38-6

MSDS

Material Safety Data Sheet

2 Safety

2.1 Owner Requirements

The following notes are for companies or any person who is responsible for the safety and effective use of the product by the user, employees or third parties.

Safety-conscious operation

- Only operate the test chamber and the battery leak detector if it is in technically perfect condition and shows no signs of damage.
- Only operate the test chamber and the battery leak detector as intended, in a safety-conscious and hazard-conscious manner and in compliance with these operating instructions.
- Provide ambient conditions that are suitable for operating staff, the test chamber and the test specimen.
- Adhere to the following regulations and observe their compliance:
 - Intended use
 - General applicable safety and accident prevention regulations
 - International, national and local standards and guidelines
 - Additional device-related provisions and regulations
- Only use original parts or parts approved by the manufacturer.
- Keep this instruction manual available on site.

Personnel qualifications

- Only allow instructed personnel to work with the test chamber and the battery leak detector. The instructed personnel must have received appropriate training. This includes knowledge of the dangers posed by leaking electrolyte/solvent.
- Make sure that authorized personnel have read and understood the instruction manual and all other applicable documents.

2.2 Intended use

The test chamber is designed for leak testing of Li-ion cells and Li-ion batteries. Uncharged cells / batteries can be tested safely. For testing charged cells / batteries, further safety measures must be taken to avoid personal injury and damage to property.

- For validation of the test, cells prepared as leaky are placed in the chamber. The preparation of the cells, which creates further hazards, is performed by the operator and is not an integral part of the test or the device. Testing of leaking cells will result in soiling of the test chamber and possibly "contamination". Cells to

be tested with the test chamber must be pre-qualified. For this purpose, uncharged cells are examined, for example, to determine whether they can withstand the stresses of the leak testing. Suitable measures for the safety of man and machine must be taken by the operator.

- The test objects must be filled with an electrolyte in which one solvent component ideally consists of dimethyl carbonate (DMC, CAS No. 616-38-6).
- Depending on the internal structure of the test objects and the external geometries, local mechanical stresses can occur on the test objects. This can damage the test objects themselves, but also other components located in the test chamber.
- Make sure that the test chamber and the outer wall of the test objects are clean. Leak testing with charged test objects represents an additional safety risk and should only be carried out by appropriately trained personnel and with the installation of further safety measures.
- To avoid short circuits between the test object and chamber wall, use the insulator included in the scope of delivery.
- An external pump may optionally be connected to the ISO-KF16 connection in accordance with the requirements from the documentation. The pump is not included in the scope of delivery. The pump capacity must be at least 40 L/min to 1000 L/min. The optional external pump must be connected via an electrically switchable valve, a corrugated tube and, if necessary, a suitable adapter.

Incorrect usage

Avoid the following unintended uses:

- Testing of partially or fully charged cells and batteries without further safety measures
- Use outside the technical specifications, see "Technical Data".
- Testing of non-vacuum-tight Li-ion cells, batteries or other test objects.
- Testing of Li-ion cells, batteries or other test objects that do not withstand the loads that occur during testing. Depending on the internal structure of the test objects and the external geometries, local mechanical stresses can occur on the test objects. This can damage the test objects themselves, but also other components located in the test chamber.
- Testing of test objects whose current collectors may be short-circuited via the test chamber (e.g. the lid or other conductive points).
- Testing of test objects that come into contact with the sealing lips of the chamber.
- Testing of wet or damp test objects.
- Test of test objects with significant differences in temperature to the environment.
- Testing of damaged test objects, batteries or other test objects.
- Testing of test objects without insulators.
- Testing of other components or substances than lithium-ion batteries.

- Testing of dirt test objects, operation of a dirty test chamber.
- Setup and operation in explosive atmospheres.
- Setup and operation in locations with very low humidity.
- Operation of the chamber by insufficiently trained personnel.
- Use outside the technical specifications.
- Insufficient spacing between the test objects in the test chamber.
- Use in radioactive areas.
- Closing the test chamber while your fingers are in the swivel range of the test chamber.
- Use of impermissible accessories or spare parts.
- Installation by untrained or unauthorized personnel. Only installation by trained personnel or Inficon employees is permitted.
- Swapping of the exhaust air ("INLET") and supply air ("VENT") lines on the ELT3000.
- Pumping out condensable liquids or vapors.
- Use of an incorrectly dimensioned optional external pump.
- Use of the optional pump connection for sudden ventilation.
- Testing of excessively small or excessively light test objects that can move in an uncontrolled manner during ventilation.
- Use of tools that may damage the sealing surfaces of the test chamber during mechanical cleaning.
- Operating the device without a connected potential equalization.

The test chamber is not intended to be used in residential areas and cannot ensure adequate protection of radio reception in such environments. The battery leak detector does not perform a safety function. In the event of strong electromagnetic interference, measured values could be falsified. It is recommended to check the function of the test chamber regularly (e.g. with a calibration leak).

2.3 Dangers

The measuring instrument was built according to the state-of-the-art and the recognized safety regulations. Nevertheless, improper use may result in risk to life and limb on the part of the user or third parties, or damage to the unit or other property may occur.

**⚠ WARNING****Danger to health due to hazardous materials and substances**

Test specimens are usually filled with substances that are hazardous to health. If these substances leak during the test, they are freely accessible to the operator after the test.

- ▶ Wear appropriate protective clothing, especially gloves, gowns, and face shields.
- ▶ Ensure sufficient ventilation at the installation location.
- ▶ Avoid contact with skin, eyes, or clothing.
- ▶ Avoid inhaling these substances.
- ▶ Only test specimens for leak tightness that do not show any damage or smell of electrolyte or solvent after initial inspection.
- ▶ Before removing the test specimen (visual check and smell test), check whether any contents of the test specimen have leaked out.
- ▶ Pay attention to the risks posed by released electrolyte components and their reaction products.
- ▶ Defective test specimens can develop gross leaks during the leak testing. In the case of test specimens with gross leaks, observe the company's internal regulations for handling electrolyte and the safety instructions in the safety data sheets.
- ▶ Do not pump out toxic or corrosive gases.
- ▶ Clean the device regularly and keep it clean at all times.
- ▶ Observe the safety instructions in the safety data sheets for the test objects.
- ▶ Operate the device only with a connected exhaust air connection and in well-ventilated rooms. Alternatively, the device may be used in rooms where hazardous substances under test are monitored.
- ▶ When nitrogen or argon is used as a purge gas, it can cause asphyxiation at dangerous room concentrations. Suitable measures must be taken. The pressure in the gas line to the purge gas connection must not exceed 100 mbar over atmospheric pressure. An exhaust gas line must be connected.

**⚠ WARNING****Fire and explosion hazard**

Reaction products during combustion can lead to further health risks.

- ▶ Do not operate the device unattended.
- ▶ Only operate the device with the exhaust hose connected.
- ▶ Do not pump off explosive gases.



CAUTION

Warning about hand injuries

Danger of crushing by opening the flap if the clearance is too small at the top and rear.

Danger of crushing when closing the test chamber lid in the gap between the test chamber lid and the test chamber, or between the test chamber rings.

- ▶ Ensure that there is sufficient space where the devices are located, see also "Setup".
- ▶ Only open and close the test chamber when your fingers are outside the test chamber halves and outside the pivoting range of the test chamber.
- ▶ Do not touch the hinge when closing the test chamber.



Measurement inaccuracies due to dirty test chamber

Escaping electrolyte can contaminate the test chamber.

- ▶ After detecting leakage, check the elastomer films of the test chamber for contamination caused by escaping electrolyte.
- ▶ Avoid inhaling harmful gases or vapors.
- ▶ Keep the gaskets for Test chamber clean. Do not use grease or lubricants.
- ▶ Remove coarse soiling with a dust-free cloth. This soiling can falsify the measurement results. The device features a purging function which can be carried out in case of minor soiling, see ELT3000 instructions "Purging the device". Use personal protective equipment.

3 Scope of delivery, transport

Scope of delivery

Item	Quantity
Test chamber TC3000L	1
Operating instructions	1
Insulator	1
Inline filter	1
"VENT" hose	1
"INLET" hose	1
Angle clips	12

- ▶ Check the scope of delivery after receipt of the product to make sure it is complete and to check for external damage.

Transport

NOTICE

Damage caused by transport

Transport in unsuitable packaging material can damage the device.

- ▶ Keep the original packaging.
- ▶ Only transport the device in its original packaging.

4 Description

Overview TC3000L

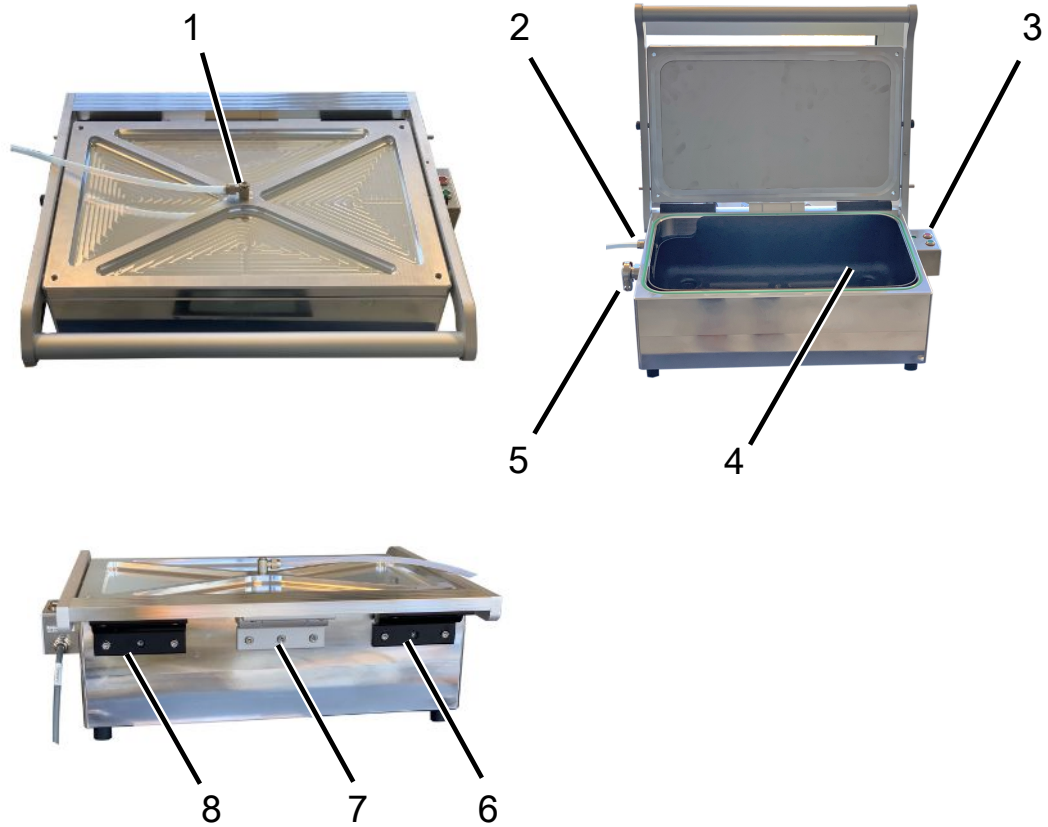


Fig. 1: TC3000L

1	"INLET" connection	5	connection for optional auxiliary pump
2	"VENT" connection	6	Hinge (spring-loaded)
3	Proximity switch with red-green display (for automatic measurement start)	7	Hinge (dampened)
4	Insulator	8	Hinge (spring-loaded)

4.1 Function

The test chamber, in conjunction with the Gas Control Unit of the ELT3000, makes it possible to perform leak testing on test objects. Test objects that are not vacuum-tight can thus be tested for leak tightness.

Place the test object in the test chamber. By pumping out the air from the test chamber, a pressure gradient between test object and test chamber is generated.

Due to this pressure gradient, gas flows through leakages out of the test object and into the test chamber. This gas is sent to the GDU (Gas Detection Unit) for analysis.

After the analysis, the result is compared with the setpoint. A distinguishable leak-proof/leaky signal is output.

4.2 Markings on the device

The markings on the device have the following meanings:



Device cannot be disposed of as normal domestic waste.



Note: Only put objects that are obviously undamaged and vacuum-tight in the device.



Warning about hand injuries



Read operating instructions

4.3 Technical Data

Mechanical data

Dimensions (L × W × H)	420mm x 550mm x 200mm
installation depth	600 mm
Weight	17.0 kg

Electrical data

Operating voltage	24 V DC
Power consumption	5 VA

Physical data

Pressure range	1080 hPa to 1 hPa
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Ambient conditions

Temperature range (°C)	10 °C to 40 °C
Relative humidity (%)	80 % at 30 °C, linear decrease to 50 % at 40 °C
Height above sea level (m)	2000 m
Pollution degree	II

5 Installation

⚠ CAUTION

Risk of injury from falling or tipping device

If the device slips off its surface, it can fall down and crush your feet.

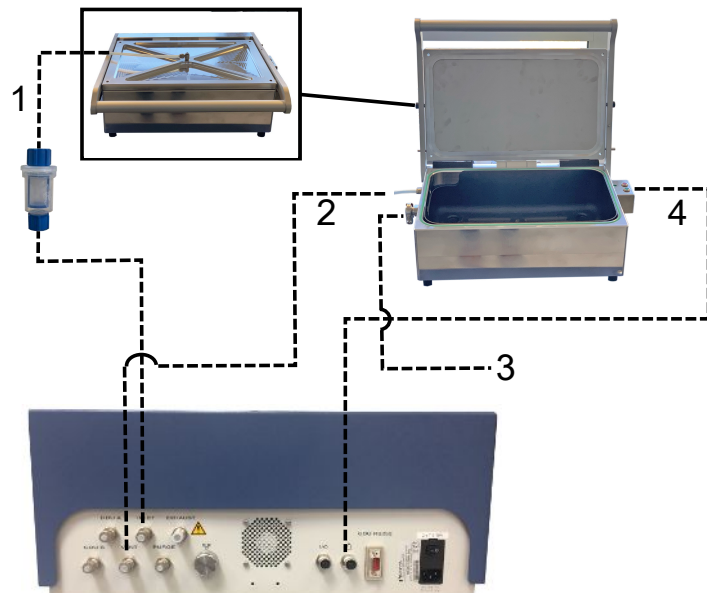
- ▶ Only place the test chamber on a clean, horizontal, non-slip and vibration-free surface.
- ▶ The recommended setup height of the chamber is 70-90 cm. It is up to the operator to choose the most ergonomic setup height.
- ▶ Do not place the test chamber on the gas control unit.
- ▶ Use non-slip rubber bumpers for the device feet.

NOTICE

Property damage due to improper installation

It is recommended to have the installation carried out by INFICON or by trained personnel.

Installation scheme



connection for potential equalization

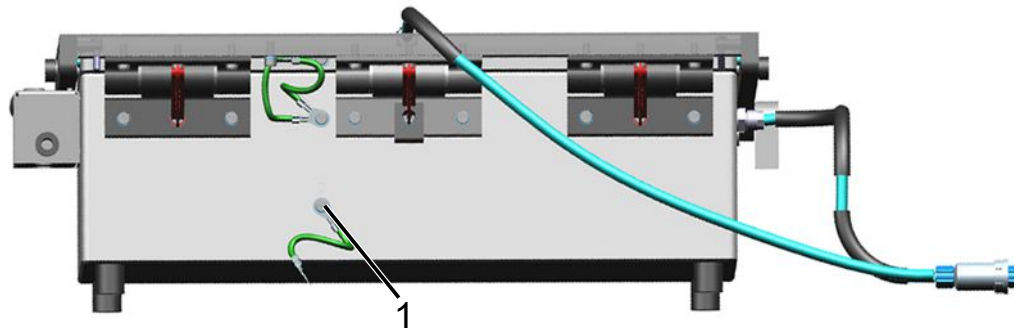


DANGER

Danger due to electric shock

Risk of bodily injury due to dangerous electric shock when operating the test chamber without connected potential equalization.

- ▶ Connect the test chamber to an equipotential bonding system.
- ▶ Do not operate the test chamber in the immediate vicinity of dangerous electrical voltages.
- ▶ Connect all test chambers to the equipotential bonding during integrated operation. This prevents uncontrolled electrostatic discharge when opening and closing the test chambers.



1 Potential equalization connection on the rear of the test chamber

1	"INLET" connection	3	External pump connection (optional)
2	"VENT" connection	4	Proximity switch connection

WARNING

Risk of injury from escaping electrolytes

- ▶ Make sure that you do not incorrectly swap the vent line and the inlet line when connecting the lines on the ELT3000 battery tester.

5.1 Connecting the external pump (optional)

CAUTION

Uncontrolled movements of the chamber lid or test objects

If the external pump is selected or connected incorrectly, the lid or test objects may pose a risk as they may move in an uncontrolled manner due to excessive air currents.

- ▶ ▶ Only use an external pump that corresponds to the permitted technical data.
- ▶ ▶ You must follow the instructions below when installing and commissioning an external pump.

To increase the pump-out capacity, you can connect an external pump to the ISO-KF16 connection. The ISO-KF16 connection is connected to a blank flange as delivered. Connect an electrically switchable valve having a minimum nominal width of DN4 to the ISO-KF16 connection. The valve must be designed for a pressure range of at least 0 to 1.5 bar (absolute). This makes it possible to switch the external pump on and off later. When using an IO1000 module connected to the ELT3000, the valve can be switched via one of the PLC outputs. Please note that the valve is switched with 24V, at a maximum power consumption of 0.75 A. You can connect a suitable pump to the valve via a corrugated tube and adapter. For this purpose, we recommend using a single-phase, dry vacuum pump having a pump capacity of at least 40 L/min (up to 1000 L/min). The external pump is not operated via the ELT3000, but must instead be permanently operated externally.

6 Operation

WARNING

Risk of injury from explosion

If both battery poles come into contact with the electrically conductive test chamber, a short circuit and thus high temperatures can occur in the tested battery.

- ▶ Do not perform a battery test without the original insulator.
- ▶ Only test obviously undamaged battery cells in this test chamber.
- ▶ Make sure that there is no material in the test chamber that could damage the battery (e.g. pointy, sharp objects).
- ▶ Leave batteries in the chamber only during the test period, and not permanently.
- ▶ Keep the test chamber clean and wash it regularly.
- ▶ No smoking.
- ▶ Keep ignition sources away from the test chamber.

WARNING

Respiratory tract irritation

The solvents in lithium-ion batteries can cause respiratory irritation and loss of consciousness if they leak from the battery.

- ▶ To avoid irritating your airways, avoid contact with electrolytes.
- ▶ Only place vacuum-tight and obviously undamaged battery cells in this test chamber.

WARNING

Damage to battery cells due to sharp foreign objects

Sharp foreign objects can penetrate into battery cells during the test procedure and cause a short circuit.

- ▶ Make sure that the test chamber is always free of sharp foreign objects.

⚠ WARNING

The solvents in lithium-ion batteries can cause respiratory irritation and loss of consciousness if they leak from the battery.

- ▶ To avoid irritating your airways, avoid contact with electrolytes.
- ▶ Only place vacuum-tight and obviously undamaged battery cells in this test chamber.

**⚠ CAUTION****Warning about hand injuries**

- ▶ Only open and close the test chamber when your fingers are outside the pivoting range of the test chamber.

⚠ CAUTION**Danger due to physical stress / ergonomics**

Continuous opening and closing of the test chamber cover can result in fatigue of the arm muscles.

Incorrect setup of the test chamber can impair its moving parts.

- ▶ Plan enough breaks to avoid fatigue.
- ▶ Set up the test chamber so that there is no impairment of its moving parts.
 - ⇒ When setting up the test chamber, pay attention to the height and distance from the operator.
 - ⇒ Pay attention to the arrangement of the test object trays.
- ▶ ▶ Do not lean on the handle of the test chamber.
- ▶ If a sudden change in the opening or closing forces is observed while the chamber is being operated, all hinges must be checked immediately and replaced if necessary.

NOTICE**Property damage due to accumulation or blockage in detachable parts with solvents**

Accumulation or blockage in detachable parts due to solvents lead to functional problems.

- ▶ Replace the particle filter as needed or annually.
- ▶ Replace all gaskets and hoses as necessary, otherwise annually.

6.1 Perform leak test

This test chamber is used to perform leak tests on vacuum-tight and undamaged test objects (lithium-ion batteries).

- ✓ Test chamber and vacuum control unit are properly connected, see also "Installation [▶ 15]".
- ✓ The vacuum control unit is switched on. The two LEDs flash simultaneously during startup.
 - 1** Place the test object in the test chamber.
 - 2** By closing the lid, you actuate the proximity switch and the measurement is started.
 - ⇒ The air is pumped out of the test chamber.
 - ⇒ After the analysis, the result is compared with the configured setpoint.
 - ⇒ The red LED lights up when a leak greater than the configured setpoint has been detected.
 - ⇒ The green LED lights up when a leak less than the configured setpoint has been detected.
 - 3** You can now open the cover and remove the test object. Skin contact with electrolyte when cleaning the test chamber or removing test objects that have failed leak tests should be avoided.

7 Cleaning and Maintenance

WARNING

Burns to the skin

Leaking batteries can release electrolyte, which in combination with water becomes hydrofluoric acid and is highly corrosive.

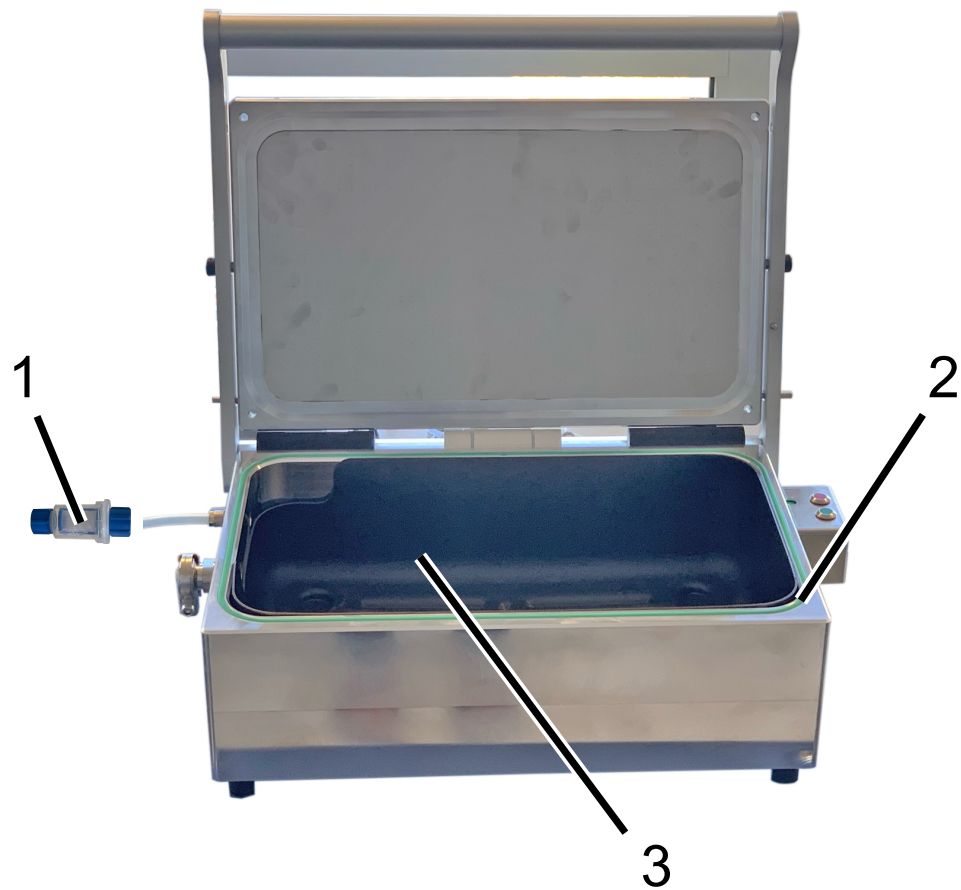
- ▶ Carefully remove minor, visible contamination of the test chamber with alcohol.
- ▶ Avoid contact with the electrolyte.
- ▶ Before sending the test chamber to INFICON Service, fill in a contamination declaration, also see [Sending in the device](#) [▶ 23]. INFICON Service then decides whether the test chamber must be sent to a decontamination center beforehand.

CAUTION

Risk of injury from contamination

Crystalline deposits or liquids in the system pose an increased risk of contamination.

- ▶ Always wear personal protective equipment during maintenance work.



1	Particle filter	2	O ring
3	Insulator		

Particle filter

- ▶ Replace the particle filter annually or as needed, e.g. noticeable solvent accumulation or blockage.

O ring

- ▶ Replace the O-ring of the test chamber in case of functional problems and external damage.

Insulator

- ▶ Replace the insulator in case of mechanical damage and wear.

8 Sending in the device



WARNING

Danger due to harmful substances

Contaminated devices could endanger health. The contamination declaration serves to protect all persons who come into contact with the device.

► Fill in the declaration of contamination completely.

- 1 Contact the manufacturer and send in a completed declaration of contamination before return shipment.
⇒ You will then receive a return number and a shipping address.
- 2 Use the original packaging when returning.
- 3 Before sending the device, attach a copy of the completed contamination declaration.

8.1 Disposal

Disposal of test chamber

The test chamber as an accessory can be disposed of by the operator or sent to the manufacturer. The test chamber consists of materials that can be recycled. This option should be exercised to prevent waste and also to protect the environment.

During disposal, observe the environmental and safety regulations of your country.



The test chamber cannot be disposed of as normal domestic waste.

9 Declaration of Contamination

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
 This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product

Type _____

Article Number _____

Serial Number _____

2 Reason for return

3 Operating fluid(s) used (Must be drained before shipping.)

4 Process related contamination of product:

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
caustic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
other harmful substances	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	

2) Products thus contaminated will not be accepted without written evidence of decontamination!

The product is free of any substances which are damaging to health
 yes

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

5 Harmful substances, gases and/or by-products

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name	Chemical name (or symbol)	Precautions associated with substance	Action if human contact

6 Legally binding declaration:

I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____

Address _____ Post code, place _____

Phone _____ Fax _____

Email _____

Name _____

Date and legally binding signature _____ Company stamp _____

Copies:
 Original for addressee - 1 copy for accompanying documents - 1 copy for file of sender

10 Declaration of Conformity



EU-Konformitätserklärung

Hiermit erklären wir, INFICON GmbH, dass die nachfolgend bezeichneten Produkte aufgrund ihrer Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der EU-Richtlinien entsprechen. Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt INFICON GmbH.

Bei einer nicht mit uns abgestimmten Änderung eines Produkts verliert diese Erklärung ihre Gültigkeit.

Bezeichnung des Produktes:

**Kammer für Batterielecksuchgerät
(als auswechselbare Ausrüstung) für
Batterie-Dichtheitsprüfgerät ELT3000**

Typen: **TC3000L**

Katalog-Nummern:

600-101

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:
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Köln, den 16. Dezember 2021

H. Bruhns, stv. Geschäftsführer

Die Produkte entsprechen folgenden Richtlinien:

- **Richtlinie 2006/42/EG (Maschinen)**
- **Richtlinie 2014/30/EU (EMV)**
- **Richtlinie 2011/65/EU (RoHS)**

Angewandte harmonisierte Normen:

- **EN ISO 12100:2010**
- **EN 61326-1:2013**
Klasse A nach EN 55011:2016+A1:2017
- **EN IEC 60204-1:2016**
- **EN IEC 63000:2018**

Köln, den 16. Dezember 2021

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