



Translation of the original operating instructions

# ELT Vmax

Battery Leak Detector

Catalog No.  
600-301

From software version  
V1.43

minc98en1-01-(2405)



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# 1 About this Manual

This document applies to the software version stated on the title page.

Product names may occur in the document, which are added for identification purposes only and belong to the respective owner of the rights.

## 1.1 Target Groups

## 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**

## 2 Safety

### 2.1 Intended use

- The device is intended for leak testing lithium-ion batteries in a vacuum and is used to detect electrolyte leaking from a test object.
- The test objects must contain a solvent in the electrolyte, which can be detected by a quadrupole mass spectrometer.
- The ELT Vmax and the CP7 are suitable for use in the dry room.
- Only operate the device as intended, as described in the operating instructions, in order to avoid hazards due to incorrect use.
- Comply with application limits, see "Technical Data".

#### Incorrect usage

Avoid the following unintended uses:

- Placing the device in a location where strong electromagnetic fields from third-party equipment may affect the measuring results
- Using the device without a protective earth conductor on the main device or operating unit
- Use of the device in case of recognizable defects
- Use in radioactive areas
- Pumping off test specimens that are not vacuum-proof
- Use of the device in dry environments (relative humidity <30%) without consulting INFICON.
- Use outside the technical specifications, see "Technical Specifications"
- Pumping off solids
- Operation without connected and active pumps on all pump connections
- Use of accessories or spare parts, which are not included in this instruction manual
- Testing of wet or damp test objects
- Suctioning of liquids into the device
- Using the device in potentially explosive atmospheres
- Using the device with chambers that do not participate in the equipotential bonding
- Connection of dangerous electrical voltages to the device interfaces
- Installation in racks or attachment to brackets (device or optional control unit) that do not have sufficient load-bearing capacity.
- Suction of aggressive, corrosive, explosive, reactive, radioactive and microbiological substances.
- Intake of flammable or toxic substances if no pumps are connected e.g. refrigerant propane, substances from batteries

- Note: This device is not intended to be used in living areas.

## 2.2 Duties of the Operator

- Read, observe, and follow the information in this manual and in the work instructions provided by the owner. This concerns in particular the safety and warning instructions.
- Always observe the complete operating instructions for all work.
- If you have any questions about operation or maintenance that are not answered in this operating instructions, contact INFICON service.

## 2.3 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**

- Operate the device only if it is in perfect technical condition and has no damage.
- Only operate the device properly in accordance with this instruction manual, in a safety and risk conscious manner.
- Adhere to the following regulations and observe their compliance:
  - Intended use
  - Universally valid 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 instructed personnel should be permitted to work with and on the device. The instructed personnel must have received training on the device.
- Make sure that authorized personnel have read and understood the instruction manual and all other applicable documents.

### 3 Scope of Delivery, Transport, Storage

#### Scope of delivery

	Quantity
ELT Vmax	1
Unpacking instructions	1
Digital operating instructions, to download as PDF from <a href="http://www.inficon.com">www.inficon.com</a>	1

- Check the scope of delivery of the product for completeness after receipt.

#### 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.

#### Storage

Always store the device in compliance with the technical data, see Technical Data [► 16].

## 4 Description

### 4.1 Function

This device is a battery leak detector that allows you to non-destructively check for leaks, both on hard battery cells and pouch cells.

The device consists of a gas detection system, an optionally available control unit and an optionally available vacuum test chamber.

For this purpose, the test object is placed in the test chamber and the chamber is closed.

One or more test chambers are connected to the device at the same time.

After closing the test chamber\*, the measuring process is started and the test chamber is evacuated. In the case of customer test chambers and INFICON test chambers (optionally available), the customer activates the measuring process via an interface.

In case of leakage of the test object, the escaping electrolyte evaporates through the evacuation process.

The evaporated solvent components of the escaping electrolyte are fed to the Gas Detection Unit and are analyzed for DMC or deviating solvents.

\* Optional accessories

The Gas Detection Unit works under high vacuum, i.e., the pressure in the quadrupole mass spectrometer must always be less than  $5 \times 10^{-4}$  mbar. This vacuum is generated by the turbomolecular pump with the support of an optionally available diaphragm pump.

Components of the device:

- High vacuum pump system
- Inlet system for the gas flow
- electrical and electronic sub-assemblies for electrical power supply and signal processing

The optionally available CP7 enables monitoring of the measurement and diagnosis with the touch display. The measuring process is controlled by the system itself. The pump is used to evacuate the measuring chamber to the desired target pressure. A valve control system adapted to the measurement sequence allows the analysis gas to be fed to the Gas Detection Unit.

4.2 Design of device



Fig. 1: ELT Vmax

1	Connection 24 V DC	6	Purge hose connection
2	Status LED	7	Pump 1
3	Anybus I/O (IO1000 or BM1000)	8	Pump 2
4	CP7 connection	9	Test chamber connection
5	Protective conductor connection		

There is an additional connection for the protective earth conductor on the rear of the ELT Vmax.

The protective conductor can be connected either at the front or rear of the appliance.



Fig. 2: CP7

1	Display
2	Connection USB

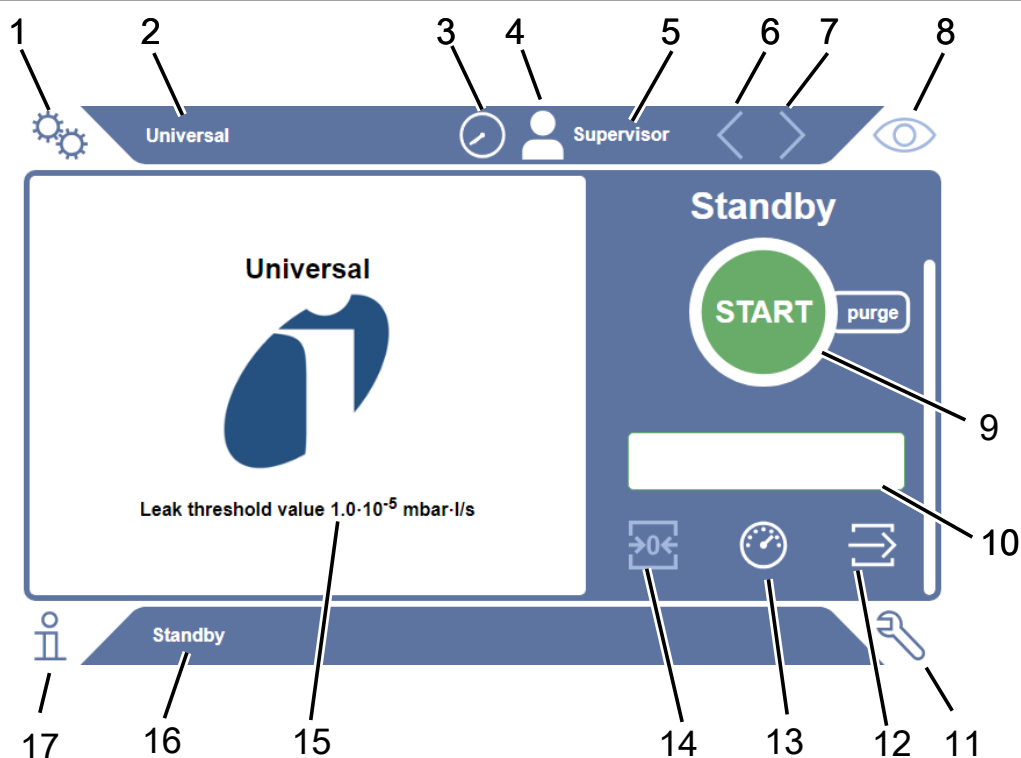
### 3 Protective conductor connection

The connections for the I/O module and another connection for the protective conductor are located on the back of the CP7.

## 4.2.1 Structure of the CP7 touchscreen



The CP7 is available as an option and is not included in the scope of delivery.














1	Navigation button settings	10	Optional input field
2	Product name	11	Navigation diagnostic button
3	Time	12	Purge
4	Access control	13	Measure
5	User name	14	ZERO
6	Previous page	15	Setpoint
7	Next page	16	Name of current window
8	Navigation operation button	17	Navigation information button
9	Start button		

**Function buttons**

The buttons can appear in three different colors:

- Gray: Function is disabled,
- Light blue: Function selectable
- White: Function is active.

General function symbols

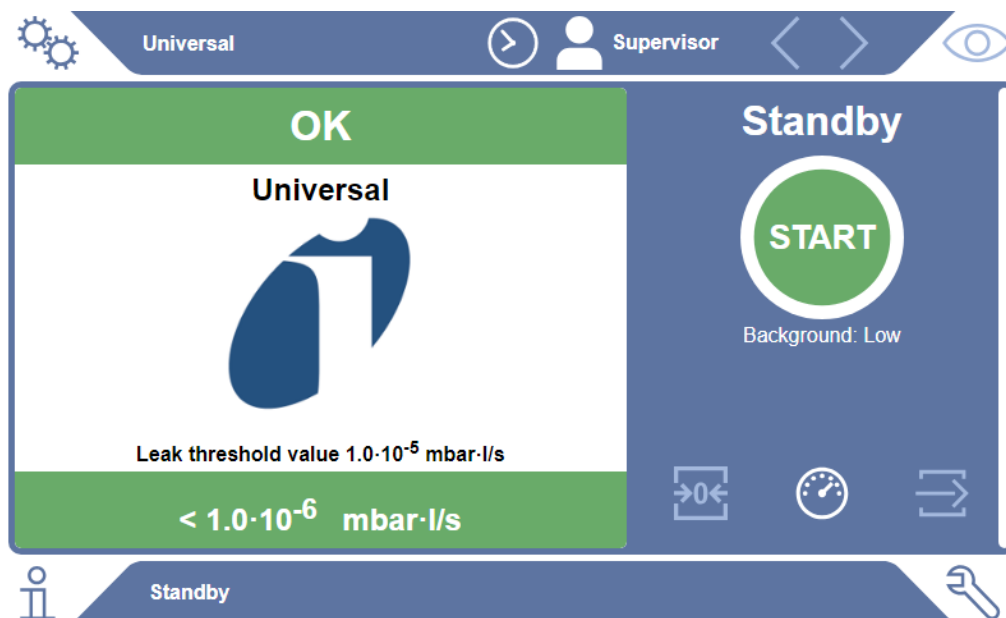
	Cancel ongoing function
	Call up help for the current function
	Confirm entry or selection
	Load
	Analysis
	Save
	Edit
	Copy
	Delete
	Page forward
	Page back

The measurement result is displayed in the measurement window on the left. For more information, see Result display.

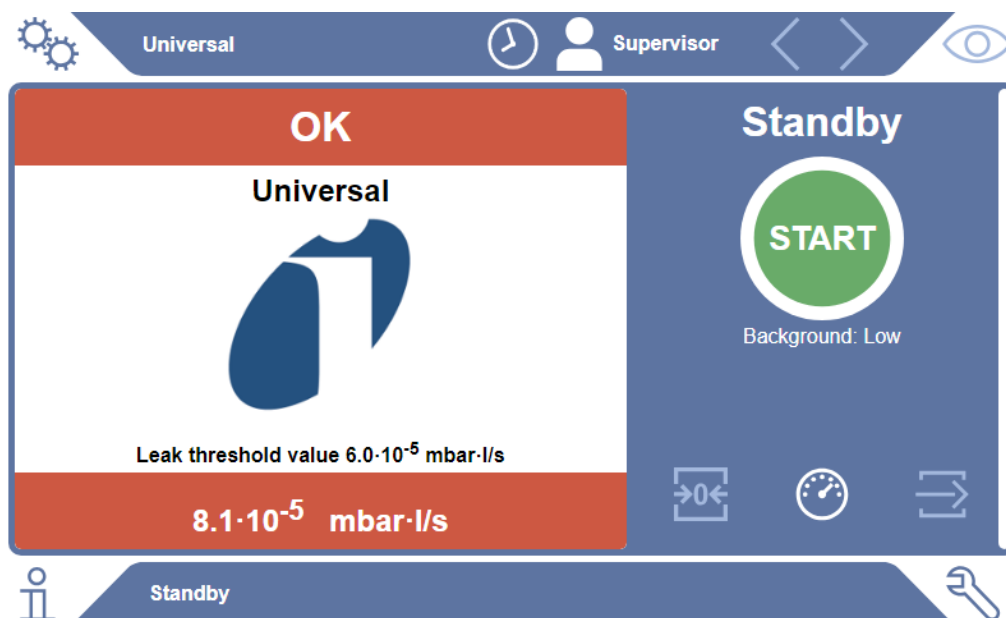
## 4.2.2 Result display on the CP7

The measured leak rate is highlighted in color and numerically in the "Standby" window on the left side.

**Measurement result:** If the leak rate is below the setpoint, the measurement result is shown on a green background.  
**Leaktight**

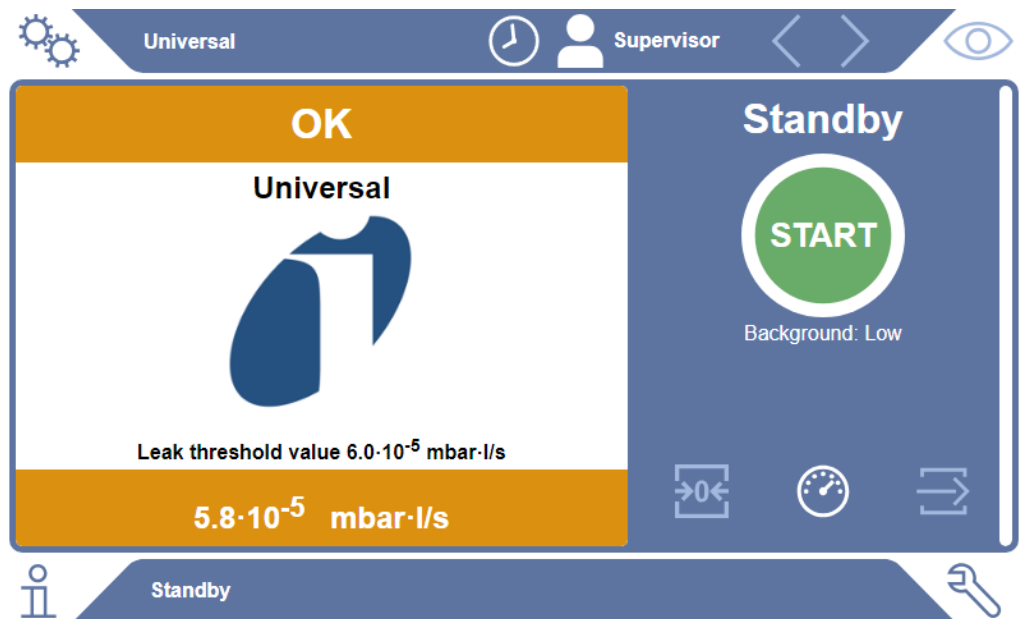


**Measurement result:** If the leak rate is above the setpoint for leaks, the measurement result is shown on a red background.  
**Leaking**



**Measurement result:** If the leak rate is above the setpoint for warning but still below the setpoint for leaks, the measurement result is shown on an orange background. The specification of a setpoint for a warning is optional.

**Warning**



## 4.3 Technical Data

### 4.3.1 Mechanical data

	<b>600-301</b>
Dimensions (W x H x D)	440mm x 234mm x 550mm
Weight	25 kg

### 4.3.2 Ambient conditions

	<b>600-301</b>
Permissible ambient temperature (during operation)	10 °C to 40 °C
Permissible storage temperature	-10 °C to 60 °C
Max. relative humidity up to 31°C	80 %
Max. relative humidity from 31°C to 40°C	Decreasing on linear basis from 80% to 50%
Max. relative humidity above 40°C	50 %
Relative humidity during storage and transport	Minimum 10% Maximum 90%
Pollution degree	2
Max. altitude above sea level	2000 m
Degree of cleanliness of the operating environment (clean room or clean room class)	ISO CLASS 6
Use	Indoors only

### 4.3.3 Electrical data

	<b>600-301</b>
Current	4A
Voltage	24 V DC $\pm$ 5%
Electronic interfaces	Anybus I/O Connection, Controll Unit

### 4.3.4 Physical data

	600-301
Minimum detectable leak rate	5 x 10 <sup>-8</sup> mbar l/s (helium equivalent leak rate, at a pressure difference of 1000 mbar versus 0 mbar for 100% DMC (dimethyl carbonate))
Measurement range	4 decades
Detectable masses	2 to 200 amu
Mass spectrometer	Quadrupole mass spectrometer
Ion source	2 cathodes
Time until ready for operation	< 3 min in normal operation

### 4.3.5 Materials in the gas flow

- Nickel-plated brassNickel-plated brass
- PTFE (polytetrafluorethylen)
- PU (polyurethane)
- PA (polyamid)
- POM (polyacetal)
- PBT (polybutylenterephthalat)
- NBR (Acrylnitril-Butadien-Kautschuk)
- steel
- Aluminum
- Nylon
- FKM & FPM (fluororubber)
- Quartz capillary
- Adhesive (Epotec 302-3M)
- Tungsten

## 4.4 Factory Settings

Auto login	On
Default user	Supervisor
Supervisor PIN (default)	1111
Pre-set product	Universal
Measuring mass	59
Calibration mass	59
Leak threshold value	1.00E-5 mbar*l/s

Warning threshold value	8.00E-6 mbar*l/s
Pre-LD	4 seconds
LD	2 seconds
Operation mode	Inline with baseline correction

## 5 Installation



### **DANGER**

#### **Health risk due to escaping gases and vapors**

- ▶ Do not test grossly leaking test specimens.
- ▶ Avoid inhaling harmful gases or vapors.
- ▶ Observe the safety instructions in the safety data sheets for the test objects.
- ▶ Provide an installation location where blockage of the exhaust lines is not possible or can be detected.
- ▶ Provide an installation location with adequate ventilation or alternatively an installation location where air quality is tested and monitored for harmful substances.
- ▶ Only test specimens with approved solvent.
- ▶ Check whether the components installed in the device are resistant if you use solvents (including mixtures of solvents) that are not listed.



### **DANGER**

#### **Danger due to electric shock**

Operating the ELT Vmax or the CP7 without connected potential equalization can result in dangerous electric shocks.

- ▶ Connect the ELT Vmax and the CP7 to an equipotential bonding.
- ▶ Do not operate ELT Vmax and the CP7 in the immediate vicinity of dangerous electrical voltages.
- ▶ Disconnect the ELT Vmax from the power supply immediately by pulling out the 24V DC plug in the event of recognizable defects.
- ▶ Disconnect the power supply in an emergency with an emergency stop.
- ▶ Connect all test chambers to the equipotential bonding during integrated operation. This prevents uncontrolled electrostatic discharge when opening and closing the test chambers.



### **WARNING**

#### **Danger from moisture and electricity**

Moisture entering the battery leak detector can lead to personal injury due to electric shocks, as well as damage to property due to short circuiting.

- ▶ Only operate the battery leak detector in a dry environment.
- ▶ Do not operate the battery leak detector near sources of liquid or moisture.



### **⚠ WARNING**

#### **Danger from falling or tripping**

- ▶ Only place the ELT Vmax, the optionally available CP7 and the optional vacuum chamber on a non-slip, stable, shock- and vibration-free surface.
- ▶ Install the ELT Vmax and the optional CP7 in a 19" rack.
- ▶ Do not shake the ELT Vmax during operation or for five minutes after switching off.
- ▶ Always operate the ELT Vmax and the optionally available CP7 as a desktop unit or installed in a 19" rack. The CP7 can also be mounted on a suitable monitor holder.
- ▶ Lay the hose lines and cables so that there is no risk of tripping.



### **⚠ CAUTION**

#### **Verletzungsgefahr durch Beschädigung elektrischer Komponenten**

Screws that are too long when fastening the CP7 will damage electrical components inside and cause a fire.

- ▶ Fasten the CP7 using screws with a maximum thread length of 10 mm.



#### **Property damage due to vibration**

Parts of the measurement technology rotate and must not be shaken. The parts continue to rotate for several minutes after the Gas Detection Unit is shut down.

- ▶ Place the Gas Detection Unit, the Gas Control Unit and the optional vacuum chamber only on a non-slip, stable, vibration and shock-free surface.
- ▶ The GDU must not be shaken during operation and at least five minutes after being switched off.



### **NOTICE**

#### **Defect due to excessive voltage**

Defect in the ELT Vmax due to voltage higher than 24 V DC

- ▶ Connect the ELT Vmax to 24 V DC.



#### **Use of ELT Vmax and CP7 in the dry room**

Please note that the mechanical stability of plastics such as polyamides or polypropylenes can deteriorate more quickly and the affected components may crack or the surface may change. This could result in a shortened service life.

- ▶ Carry out the daily calibration and reference measurement of the ELT Vmax.
- ▶ Wear ESD protective clothing when working in the drying room. Increased sensitivity to electrostatic charging is to be expected.

**Procedure**

The battery leak tester consists of the subcomponents gas detection system with vacuum control unit, optional operating unit and optional vacuum test chamber. The installation, connection and commissioning of the battery leak detector may only be carried out by INFICON trained and instructed employees.

ELT Vmax Use as a table-top appliance Distance dimensions of the rubber feet depth 448 mm, width 344 mm

- In order not to distort the measurement results, select a location where the room temperature for the battery leak detector is as constant as possible.
- Do not expose the device to direct sunlight.

Connect the devices as described below.



Fig. 3: ELT Vmax

1	Connection 24 V DC	6	Purge connection
2	Status LED	7	Pump 1
3	Anybus I/O	8	Pump 2
4	Connection of CP7, IO1000 or BM1000	9	Test chamber connection
5	Protective conductor connection		

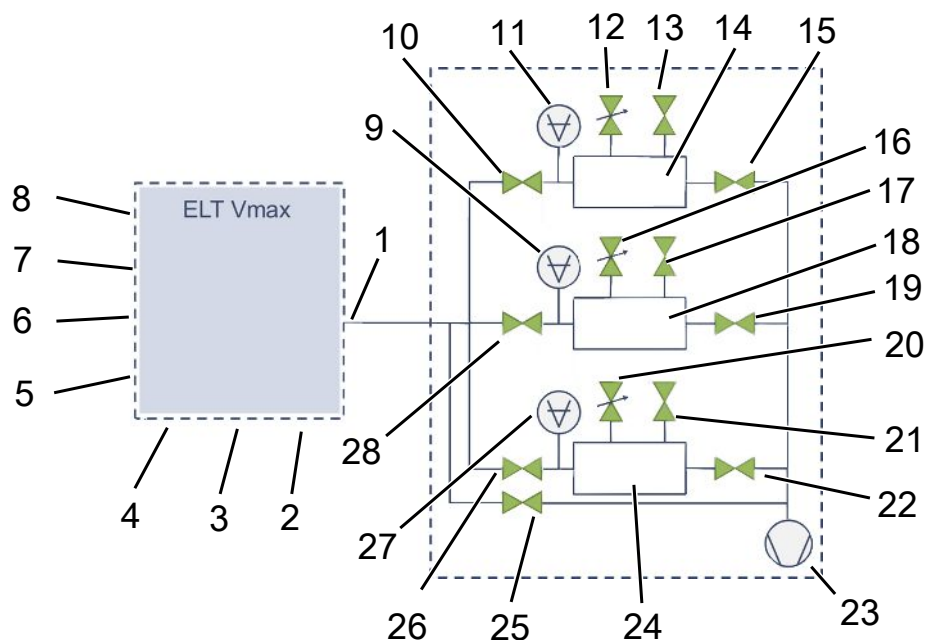


Fig. 4: CP7

1	Display
2	Connection USB
3	Protective conductor connection

The connections for the I/O module and another connection for the protective conductor are located on the back of the CP7.

## Connection diagram of ELT Vmax / system example with 3 test chambers



### ELT Vmax

1	Test chamber connection	5	Protective conductor connection
2	Pump connection 2	6	Connection CP7
3	Pump connection 1	7	Connection of IO1000 / BM1000
4	Purge connection	8	Connection 24 V DC

### System example with 3 test chambers

9	Chamber pressure measuring point	19	V External pump
10	V (valve) to disconnect the ELT Vmax	20	V Carrier gas
11	Chamber pressure measuring point	21	V for ventilation
12	V Carrier gas	22	V External pump
13	V for ventilation	23	External pump
14	Test chamber A	24	Test chamber C
15	V External pump	25	V Bypass
16	V Carrier gas	26	V to disconnect the ELT Vmax
17	V for ventilation	27	Chamber pressure measuring point
18	Test chamber B	28	V to disconnect the ELT Vmax

## 6 Operation



### ⚠ CAUTION

#### Health risk due to gases and vapors

Operation of the battery leak detector may produce hazardous vapors.

- ▶ Only operate the device with active pumps on all pump connections.
- ▶ Connect the battery leak detector to an exhaust line.
- ▶ Avoid inhaling harmful gases or vapors.
- ▶ Observe the safety instructions in the safety data sheets for the test objects.
- ▶ Provide an installation location where blockage of the exhaust lines is not possible or can be detected.
- ▶ Provide an installation location with adequate ventilation or alternatively an installation location where air quality is tested and monitored for harmful substances.



### NOTICE

#### Property damage due to overheated device

The battery leak detector becomes warm during operation and may overheat without adequate ventilation.

- ▶ Do not block the ventilation opening for the filter.
- ▶ Make sure that there is adequate ventilation at the Gas device
- ▶ Keep heat sources away from the battery leak detector.
- ▶ Do not expose the battery leak detector to direct sunlight.
- ▶ Please note the technical specifications.

## 6.1 Switch on and login

- ▶ Switch on the power supply to start the ELT Vmax.
  - ⇒ On delivery, the device displays the measurement screen after a start-up phase on the CP7.



## 6.2 Basic settings, only in conjunction with optional CP7

### 6.2.1 Setting the language

You can set the language in the user settings, see "Select, modify, create user profile [► 26]".

### 6.2.2 Setting date, time and time zone

✓  **Supervisor** rights


- 1  > General > Date and time
- 2 Adjust.
- 3 Save .

### 6.2.3 User profile settings

#### 6.2.3.1 Overview of rights groups


The rights of a user depend upon which group they belong to.

##### User

Members of the group  **User** can


- Select between saved products,
- Perform measurements,
- View history of the measurement results,
- View device information,
- View error logs.

##### Operator

Members of the group  **Operator** have all the rights of the group **User**. In addition, they can

- Create/modify/delete products,
- Create/modify/delete users,
- Create/modify/delete images,
- Export/delete measurement data,
- Modify measurement settings.


##### Supervisor

Members of the group  **Supervisor** have all the rights of groups **User** and **Operator**. In addition, they can

- Create/modify/delete operators,
- Create/modify/delete supervisors,
- Perform software updates

- Modify date/time.

### 6.2.3.2 Select, modify, create user profile

✓  **Operator** or **Supervisor** rights

1  > User accounts > Manage user accounts


⇒ Existing users and associated groups are displayed in list form.

2 You have the following options:


To create a new user profile, select  at the bottom of the window.

⇒ The window "User settings" will open.


Otherwise, press a previously created user name and choose the following from the displayed tool bar:

, to load a user profile.

⇒ The login window opens.

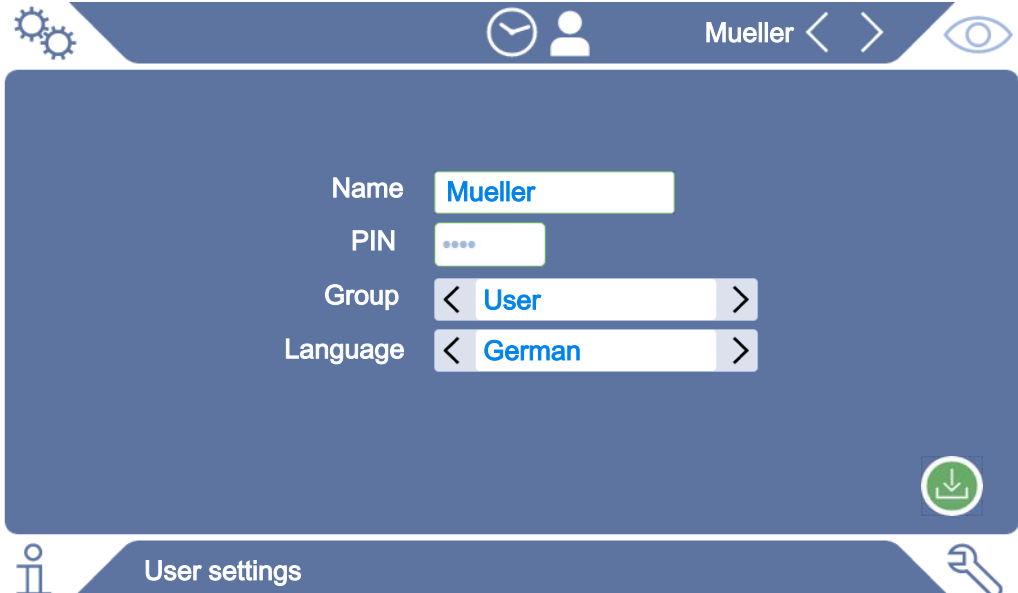
, to modify a user profile.

⇒ The window "User settings" will open.


, to delete a user profile.

⇒ A confirmation prompt appears.

3 After selecting the settings, the "User settings" window opens. In this case, enter a user name, change it or keep it as required.



4 If the "PIN" field is not filled in or you want to change the content, enter a 4-digit PIN.

- 5 To assign the required rights to the user, select a group. Via < and > select between the groups "User", "Operator" and "Supervisor". See Overview of rights groups [► 25].
- 6 In the field "Language" assign a language to the user via < and >.
- 7 Save .

### 6.2.3.3 Modify personal settings

Even as a user with limited rights (**User**), you can modify your language or PIN. The associated user profile is then changed accordingly. Access to the entire user profile is not necessary.

- 1 Press on your username, which appears on the top right of the display.  
⇒ The "User options" window opens.
- 2 Select either the button "Change PIN" or "Change language" as required.

## 6.2.4 Switch off Automatic Login





### Factory setting

As per factory settings, after switching on the device the user "Supervisor" automatically logs in and the measurement screen is brought up. This default user also has the permissions of the group "Supervisor". Without changing this setting, any user can operate all functions without restriction.

You can specify that the login window appears after you turn on the device instead of automatic login.

The login window allows all users who have been already registered on the device to log in, see "Select, modify or create product (measurement settings)".

#### ✓ Supervisor rights

- 1  > User accounts > Manage Automatic Login
- 2 Deactivate the option "Active" in the window "Auto Login".
- 3 Save .


⇒ After restarting the device, the current settings are applied.


## 6.2.5 Switch on Automatic Login

You can specify whether a user of your choice is automatically logged in after the device is switched on without the login window.

#### ✓ Supervisor rights

- ✓ The requested user has already been created. See "Select, modify, create user profile [► 26]".

- 1  > User accounts > Manage Automatic Login

- 2 Enter the name of the user in the "Name" window. The input is case-sensitive.
- 3 Enter the current PIN of the user profile in the "PIN" window.
- 4 Activate the option "Active" in the window "Auto Login".
- 5 Save .

## 6.3 Settings for the measurements


### 6.3.1 Select, modify or create product (measurement settings)


For setting measurement specifications you need a product that has been created.



If you change the parameters such as the setpoint via an external controller, "No Product" is shown on the display.


---


✓  **Operator** or **Supervisor** rights

**1**  > Products

⇒ Existing products are displayed as a list.

**2** Press a product name and choose from the displayed tool-bar or from the display:

, to load a product.

, to modify product settings.


⇒ The window "Product Settings" will open.

, to copy product settings.

⇒ The "Product Settings" window opens with the entries of the copy source.

, to delete a product.

⇒ A confirmation screen appears.

, to create a new product.

⇒ The window "Product Settings" opens.

**3** Click on "Settings" / "Product" to open the "Product settings" window. In this case, enter under "Product Name" a product name as required, change it or keep it.

- 1 Under "Max. Leak Rate", enter the value at which the product is to be reported as "leaking". The default setting is  $1 \times 10^{-5}$  mbar l/s.
- 2 Optionally, you can activate a setpoint warning.
- 3 To enter a barcode, use the touchscreen to enter or scan the bar code in the activated input field.
- 4 Via "Select Image" load a product image that will be displayed on the screen during the measurement.  
If your image is not stored on the device, expand the image database. After pressing  $\oplus$  you can transfer images (JPG, PNG; max. 400 x 400 px) from a USB flash drive (FAT32 format) to the image database.
- 5 Save  $\downarrow$ .

### 6.3.2 Select product



- 1  $\text{⚙️} > \text{Products}$   
 $\Rightarrow$  Existing products are displayed. If you cannot find the desired product, you can create it, see "Select, modify or create product (measurement settings) [► 29]". Click the desired product name.
- 2 Load  $\uparrow$ .

### 6.3.3 Using the input field in the measurement window

If required, you can set up an input field in the measurement window to enter an additional information text there. For example, a serial number or batch number.

This text is not only displayed in the measurement window, but also saved during data recording. The text is assigned to the measurement performed.

## 1. Setting up the input field for the measurement window

- 1  > Device
- 2 Activate the "Optional input field".
- 3 Save .

## 2. Filling or changing the input field in the measurement window

- ✓ You have activated the optional input field.
  - 1 Touch the input field in the measurement window.
  - 2 Enter the desired text using the keyboard that appears.
- ⇒ After restarting the device, the input field is empty.
- ⇒ The input field is automatically cleared after completion of the next measurement
- Alternatively, you can also use a barcode scanner. To do this, scan the barcode of your test specimen with a commercially available barcode scanner. This is automatically transferred to the input field. When scanning several barcodes, they are separated from each other by a |.



Reading a barcode with a barcode scanner is possible in this window.

---

## 6.4 Measure



### ⚠ CAUTION

#### Warning about hand injuries

- ▶ 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.



### NOTICE

#### Property damage due to improper filling of the test chamber

Leaking liquids entering the tubing, can interfere with the function of the device. Sharp objects, fats or oils may damage the diaphragm, chamber ring and sealing lips.

- ▶ Avoid contamination of the measuring chamber by oils, fats, or hydrocarbons.
- ▶ Do not use sharp-edged objects without a protective frame in the test chamber.



#### Avoid measuring inaccuracies:

- ▶ Place the batteries so that the gaskets of the test chamber halves are not covered or contacted!
- ▶ Avoid measuring test objects with significant differences in temperature to the surroundings.
- ▶ Keep the gaskets for the test chamber halves clean. If you do not remove contaminants, measuring results may be distorted.
- ▶ Do not damage the sealing surfaces. Mechanical damage, such as scratches, can cause the chamber to leak.
- ▶ Do not clean the test chamber with solvents/alcohols. These can also falsify measurement results.

- ✓ You have installed a single-chamber or multi-chamber system, see "Installation [▶ 19]".
- ✓ You have made general settings, see "Basic settings, only in conjunction with optional CP7 [▶ 25]".
- ✓ You have saved the settings for the desired product in the device.
- ✓ You have selected the desired product, see "Select product [▶ 30]".
- ✓ The measurement process of the ELT Vmax is designed so that the connected test chamber is prepared before the measurement is started with the ELT Vmax. This was to enable the addition of carrier gas.
  - 1 Call up the measurement screen (optionally available CP7).
  - 2 Place the test specimen in the test chamber and close it.

- 3** Open the valve to the external pump and evacuate the test chamber to a target pressure of approx. 3-10 mbar.
- 4** Close the valve to the external pump.
- 5** Open the carrier gas valve and the valve to the ELT Vmax.
- 6** If you are using the CP7, start the measurement by pressing the "START" button.
- 7** Alternatively, use the IO module/interface protocol to start via the interface.
- 8** View the result of the measurement process.
  - ⇒ CP7: The measured leak rate is highlighted in color and numerically in the "Measurement" window on the left side. In addition, the word "OK", "Leak Warning" or "Leak" is displayed, see "Bringing up measurement data [► 34]". After completion of the measurement you can remove the object and measure additional test objects.
  - ⇒ Interface: The leak rate determined by the ELT Vmax can be read out using the corresponding command of the interface protocol you have selected.
  - ⇒ Once the measurement is complete, the ELT Vmax returns to standby mode.
- 9** Close the valve to the ELT Vmax and the carrier gas valve.
- 10** Ventilate the measuring chamber via the vent valve. You can then remove the test specimen from the chamber
- 11** In preparation for the subsequent measurement, you can evacuate the measuring line in parallel via V Bypass. Use the readable pressure p3 as a guide. This should reach a value of <4.5 mbar.
- 12** If you want to cancel the measurement, stop the measurement process at any time.



As soon as step 3 has been completed, the evacuation of the next test chamber can begin.

If you repeat the measurements with the same test object, the measurement results may differ. This is usually due to a reduced amount of solvent caused by the previous measurement.

---

## 6.5 Perform ZERO measurement after contamination



Use this function for low levels of contamination. The current background value is then set to zero. If there are high background values, first use the "Purge" function.

The result is displayed in green and the values are applied. A warning or an error is displayed in the event of a problem.

1 Select  > .

2 Empty the measuring chamber.

3 Start the ZERO measurement.

⇒ The result is displayed in green and the values are applied. In the event of an error, the result is displayed in red.

## 6.6 Purge device (simple purge)



Use this function for contamination. This is used to purge test chambers and hose lines in order to reduce the background value.

Simple purge is started via the system


The ELT Vmax performs an automatic purging process after the function is started. Here, the test chamber and vacuum system are cyclically pumped out and ventilated so that the background is reduced in the device following contamination.

## 6.7 Measurement data and device information

### 6.7.1 Bringing up measurement data

1  > Measurements

⇒ The measurements performed are displayed in short form line by line.

2 To display the detailed view of a measurement, tap on an entry and then on the displayed symbol .

⇒ All information stored for this measurement is displayed.

### 6.7.2 Transferring measurement data

Measurement results are automatically saved in the device. The last 500,000 measurements are saved. You can transfer measurement data from the internal memory to a connected USB flash drive.

✓  **Operator** or **Supervisor** rights

**1** To transfer data from the internal memory, connect a USB flash drive with FAT32 formatting to any of the USB ports of the device.

**2**  > Measurements

**3** Save .

⇒ All measurement data are transferred. There is an indication when the export is completed. The measurement data remain saved on the device.



Measurement data is only saved if you are using a CP7.

If you do not use CP7, make sure you have your own data collection

---

### 6.7.2.1 Transferring analysis data

The CP7 records data in the internal memory for each measurement and in the event of an error.

You can either send this file to INFICON via email or request an upload link from support.

#### How to provide INFICON with this data

**1** Connect a FAT32 formatted USB flash drive to the control unit

**2** Navigate to the "Diagnosis  → Service Export" page in the operating unit

**3** Press the "Export Service Data" button

⇒ The progress of the export is displayed in the operating unit and can take several minutes (< 25 minutes) after a longer period of use.



⇒ The USB flash drive should now contain the data export. The file name consists of the parts "ServiceExport" - "Serial number" - "Date and time".

The data export can be several megabytes (MB) in size after a longer period of use.

This is a password protected archive.

### 6.7.3 Delete measurement data

You can delete measurement data from the internal memory of the device.

✓   **Operator** or **Supervisor** rights

1  > Measurements

2 Press .

⇒ All recorded measurement data is deleted.

### 6.7.4 Bringing up device information

▶  > Device information

⇒ The stored information is displayed.

### 6.7.5 Bringing up log

Button to display device messages in list form. This information is useful when you contact the manufacturer's service department.

▶  > Protocol

## 6.8 Updating the software

The device includes various software versions for device operation, the basic device and the detection system. The version numbers are independent of each other.

### 6.8.1 Updating the software of the operating unit

Import the software updates using a USB memory stick.




#### NOTICE

##### Loss of data due to disconnection

Loss of data due to disconnection

- ▶ Do not switch off the device and do not remove the USB flash drive while the software is being updated.

- 1 Copy the file into the main directory of a FAT32 formatted USB flash drive.
- 2 Connect the USB flash drive to a USB port on the device.
- 3  > Update > Update operating unit
  - ⇒ The active software version of the operating unit is shown at the top of the window.  
If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.
- 4 In order to load the new software version, press on the button "Update".
  - ⇒ After completion there is an automatic restart of the operating unit.

## 6.8.2 Updating the software of the basic unit

Install software updates using a USB flash drive.




### NOTICE

#### Loss of data due to disconnection

Loss of data due to disconnection

- Do not switch off the device and do not remove the USB flash drive while the software is being updated.

- 1 Copy the file into the main directory of a FAT32 formatted USB flash drive.
- 2 Connect the USB flash drive to the USB port on the device.
- 3  > Update > Update Basic Unit
  - ⇒ At the top in the window, the active software version of the basic unit is shown.  
If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.
- 4 In order to load the new software version, press on the button "Update".
  - ⇒ After completion there is an automatic restart of the system.

### 6.8.3 Updating the software of the Gas Detection Unit

Install software updates using a USB flash drive.




#### NOTICE

##### Loss of data due to disconnection

Loss of data due to disconnection

- ▶ Do not switch off the device and do not remove the USB flash drive while the software is being updated.

- 1 Copy the file into the main directory of a FAT32 formatted USB flash drive.
- 2 Connect the USB flash drive to the USB port on the device.
- 3  > Update > Gas detection unit
  - ⇒ At the top in the window, the active software version of the basic unit is shown.  
If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.
- 4 In order to load the new software version, press on the button "Update".
  - ⇒ After completion there is an automatic restart of the system.

## 6.9 Restoring factory defaults

You can restore the device to factory settings.



### Loss of settings and measurement data

After resetting to factory defaults, only the manufacturer factory settings are stored in the memory of the device.

- ▶ Save important measurement data on a USB stick beforehand. See "Transferring measurement data [▶ 34]".

✓  **Supervisor** rights

- ▶  > Reset device

## 6.10 Advanced settings


- ▶  > General > Measurement


Improper changes can result in faulty measurements.

- ▶ Only make changes to the settings on this page after consultation with INFICON.

## 6.11 Call up active errors and warnings with CP7

### Active errors

Errors or warnings are displayed on the active user interface. In addition, the diagnosis symbol changes color .

- 1  > Errors and warnings
  - ⇒ The "Errors and Warnings" button is only available as long as errors or warnings are active; errors and warnings are displayed in list form.
- 2 To perform measurements, confirm active errors or warnings with the "Clear" button.
  - ⇒ The information displayed is closed.

See also "Warning and error messages".

## 6.12 Logging off from the device

- 1 Press on your username, which appears on the top right of the display.
  - ⇒ The "User options" window opens.
- 2 You log off from the device via the button "Log off".
  - ⇒ The login window opens.

## 7 Cleaning and maintenance

All cleaning and maintenance work described here must be carried out without opening the side walls!

---

### **DANGER**

#### **Risk of death from electric shock**

There are high voltages inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any cleaning and maintenance work. Ensure that the electrical supply cannot be switched back on unintentionally.

▶

---

### **DANGER**

#### **Risk of injury due to electrolyte**

- ▶ Avoid contact with skin, eyes, or clothing.
- ▶ Wear appropriate protective clothing, especially gloves, gowns, and face shields.
- ▶ Observe the information on the relevant safety data sheet and follow the applicable work instructions.
- ▶ Rinse off electrolyte or acid splashes immediately with clean water.
- ▶ Consult a physician if necessary.

---

### **CAUTION**

#### **Danger due to dropping heavy loads**

The device is heavy and can damage persons and items through tilting or dropping.

- ▶ Place the device only on a sufficiently sturdy surface.
-

## 7.1 Maintenance of ELT Vmax

### 7.1.1 ELT Vmax: Cleaning the housing

The housing consists of a painted metal housing.

- 1 Make sure that the ELT Vmax is disconnected from the power supply.
- 2 Only use water for moistening.
- 3 Avoid cleaning agents that contain alcohol, fat or oil.
- 4 Wipe the housing with a soft damp cloth.

### 7.1.2 ELT Vmax: Change filter mat

Filter mat	Order number 200013816
Required tools	None

In production rooms with increased dust load, the filter mat can become contaminated. Replace the filter mats if there is significant contamination.

✓ You have a new filter mat.

- 1 Make sure that the device is disconnected from the power supply.
- 2 Remove the plastic grille. It is only attached by catch tabs.
- 3 Remove the used air filter from the plastic grille and insert a new one.
- 4 Refit the plastic grille together with the new air filter.

⇒ Filter mat has been changed

## 7.2 Maintenance plan

Maintenance	Description	Part number	Operating hours			Period	Maintenance level
			500	2000	10000		
Clean or replace the filter mat	Filter mat	200013816				*	I
Replace the operating fluid reservoir	Operating fluid reservoir	200003801			X		II
Replace the internal filter	Internal filter	200013817			X		II

\*As required

Explanation of maintenance levels:

Maintenance level I: Customer without any technical training

Maintenance level II: Customer with technical and INFICON training

Maintenance level III: INFICON Service

## 8 Decommissioning

### 8.1 Disposing of the device

The device can either be disposed of by the operator or be sent to the manufacturer. The device 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.

### 8.2 Send in battery leak detector for maintenance, repair or disposal



#### **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. Devices sent in without a return number and completed contamination declaration will be returned to the sender by the manufacturer.

► 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 the shipping address.
- 2** Use the original packaging when returning.
- 3** Before shipping the instrument, attach a copy of the completed contamination declaration to the outside of the package.

For contamination declaration see below.

## 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.

<b>1 Description of product</b> Type _____ Article Number _____ Serial Number _____	<b>2 Reason for return</b> _____ _____
----------------------------------------------------------------------------------------------	----------------------------------------------

<b>3 Operating fluid(s) used</b> (Must be drained before shipping.) _____
------------------------------------------------------------------------------

<b>4 Process related contamination of product:</b> <table style="width: 100%;"> <tr> <td style="width: 50%;">toxic</td> <td style="width: 10%;">no <input type="checkbox"/> 1)</td> <td style="width: 10%;">yes <input type="checkbox"/></td> <td style="width: 20%;"></td> </tr> <tr> <td>caustic</td> <td>no <input type="checkbox"/> 1)</td> <td>yes <input type="checkbox"/></td> <td></td> </tr> <tr> <td>biological hazard</td> <td>no <input type="checkbox"/></td> <td>yes <input type="checkbox"/> 2)</td> <td></td> </tr> <tr> <td>explosive</td> <td>no <input type="checkbox"/></td> <td>yes <input type="checkbox"/> 2)</td> <td></td> </tr> <tr> <td>radioactive</td> <td>no <input type="checkbox"/></td> <td>yes <input type="checkbox"/> 2)</td> <td></td> </tr> <tr> <td>other harmful substances</td> <td>no <input type="checkbox"/> 1)</td> <td>yes <input type="checkbox"/></td> <td></td> </tr> </table>	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!
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"/>																							

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

<b>5 Harmful substances, gases and/or by-products</b> 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

<b>6 Legally binding declaration:</b> 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 _____ Phone _____ Email _____ Name _____	Post code, place _____ Fax _____
Date and legally binding signature _____	Company stamp _____

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

## 9 Appendix

### 9.1 Accessories

Product	Catalog number
E-Check calibration leak (DMC)	600-105
E-Check Connection Kit (E-Check not included in the scope of delivery)	600-106
CP7 operating unit	600-310
Carrier gas capillary 10 sccm	600-107
Module I/O 1000	560-310
Data cable I/O 1000	
2 m	560-332
5 m	560-335
10 m	560-340
Bus module BM1000	
Profibus	560-315
Profinet	560-316
DeviceNet	560-317
Ethernet / IP	560-318

## 9.2 Certificates

### 9.2.1 CE Declaration of Conformity



We – INFICON GmbH - herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON GmbH.

In case of any products changes made, this declaration will be void.

Designation of the product:

**Battery leak detector**

Models: **ELT Vmax**

Catalogue number: **600-301**

The products meet the requirements of the following Directives:

- **Directive 2014/30/EU (EMC)**
- **Directive 2011/65/EU (RoHS)**

Applied harmonized standards:

- **EN 61326-1:2013**  
**Class A according to EN 55011**
- **EN IEC 63000:2018**

Cologne, March 25<sup>th</sup>, 2024

Matthias Fritz, Managing Director LDT

Cologne, March 25<sup>th</sup>, 2024

pro Winfried Schneider, Research & Development

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## 9.2.2 Declaration of Incorporation



### EC DECLARATION OF INCORPORATION

We – INFICON GmbH – herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON GmbH.

In case of any products changes made, this declaration will be void

Designation of the product:

**Battery leak detector**

Models: **ELT Vmax**

Catalogue number: **600-301**

The products meet the requirements of the following Directives:

- **Directive 2006/42/EC (Machinery)**

Applied harmonized standards:

- **EN ISO 12100:2010**
- **EN ISO 61010-1:2010+A1:2019**

**The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive (2006/42/EC), where appropriate.**

The manufacturer will electronically transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery.

The relevant technical documentation is compiled in accordance with part B of Annex VII.

Authorised person to compile the relevant technical files:

Heinz Rauch, INFICON GmbH, Bonner Strasse 498, D-50968 Cologne

The following essential health and safety requirements according to Annex II of Directive 2006/42/EC were fulfilled:

1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.5.1, 1.5.2, 1.5.5, 1.5.8, 1.5.9, 1.5.10, 1.5.11, 1.5.13, 1.6.1, 1.7.2, 1.7.3, 1.7.4

were partially fulfilled:

1.5.2, 1.5.4, 1.5.6, 1.5.7, 1.5.16, 1.6.3

Cologne, March 25<sup>th</sup>, 2024

Matthias Fritz, Managing Director LDT

Cologne, March 25<sup>th</sup>, 2024

pro  
Winfried Schneider, Research & Development

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9.2.3 China RoHS

Restriction of Hazardous Substances (China RoHS)

有害物质限制条例（中国 RoHS）

	ELT Vmax: Hazardous Substance ELT Vmax: 有害物质					
Part Name 部件名称	Lead (Pb) 铅	Mercury (Hg) 汞	Cadmium (Cd) 镉	Hexavalent Chromium (Cr(VI)) 六价铬	Polybrominated biphenyls (PBB) 多溴联苯	Polybrominated diphenyl ethers (PBDE) 多溴联苯醚
Assembled printed circuit boards 组装印刷电路板	X	O	O	O	O	O
<p>This table is prepared in accordance with the provisions of SJ/T 11364. 本表是根据 SJ/T 11364 的规定编制的。</p> <p>O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572. O: 表示该部件所有均质材料中所含的上述有害物质都在 GB/T 26572 的限制要求范围内。</p> <p>X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572. X: 表示该部件所使用的均质材料中，至少有一种材料所含的上述有害物质超出了 GB/T 26572 的限制要求。</p> <p>(Enterprises may further provide in this box technical explanation for marking "X" based on their actual circumstances.) (企业可以根据实际情况，针对含 "X" 标识的部件，在此栏中提供更多技术说明。)</p>						

