



Translation of the original operating instructions

UL1000, UL1000 Fab

Helium leak detector

Catalog No.

UL1000: 550-000A, 550-001A, 550-002A / UL1000 Fab: 550-100A, 550-101A, 550-102, 550-111R

From software version
V5.19 (Operating unit)

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1 General information

We recommend that you carefully read this operating instructions to ensure optimal operating conditions right from the start.

These operating instructions contain important informations on the function, installation, start-up and operation of the UL1000 and UL1000 Fab.

We reserve the right to modify the design and the specified data. The illustrations are provided without obligation.

1.1 Notes on the use of these operating instructions

1.1.1 Explanation of 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

1.1.2 Symbols of Vacuum Technology

Given in the following are some important vacuum symbols which are used in these operating instructions.



Vacuum pump in general



Turbo molecular pump



Manometer



Valve

1.1.3 Definition of Terms

Automatic tuning / mass setting

This function adjusts the mass spectrometer so that a maximum leak rate indicator is achieved. The control computer changes the voltage that accelerates the ions within the selected mass range so that a maximum ion current is detected by the ion detector. During each calibration, the mass is adjusted automatically.

Autoranging

The range of the preamplifier and the vacuum ranges are selected automatically.

The autoranging feature of the UL1000 and UL1000 Fab covers the entire range or leak rates depending on the selected operating mode: Vacuum mode or sniffing mode. Not only the leak rate signal, but also the pressure in the test object (inlet pressure PE) and the foreline pressure (PV) are used for control purposes. Range switching between the main ranges is performed via valves. Fine range switching within the main ranges is implemented by switching over the gain factor of the preamplifier.

Automatic zeroing

Measurement and automatic adjustment of the helium background.

This function determines the internal device zero, which is then deducted from the currently measured leak rate signal. This function is enabled by pressing the START key provided the UL1000 or UL1000 Fab have run at least 20 s in "Standby" mode or in "Ventilation" mode. If the before suppressed helium background further decreases and only the display limit appears, the ZERO-level will be adjusted automatically.

GROSS

GROSS is a measurement mode which allows high inlet pressure (1 to 15 mbar). The minimum detectable leak rate is 1×10^{-6} mbar l/s.

FINE

FINE is the medium measurement mode with inlet pressure between 2 and 0.4 mbar. The minimum detectable leak rate is 1×10^{-10} mbar l/s.

Foreline pressure

Pressure of the backing pressure between the turbo molecular pump and the backing pump.

Internal helium background

The existing helium partial pressure in the measurement system. The level of the internal helium background is measured in the "Standby" mode and subtracted from the measured signal. (See above: Automatic zeroing)

Minimum detectable leak rate

The minimum detectable leak rate that can be detected by the UL1000 or UL1000 Fab ($\leq 5 \times 10^{-12}$ mbar l/s).

Menu

The menu allows the user to program the UL1000 and UL1000 Fab according to their requirements. The menu has a structure that branches out in a tree-like manner.

Measure / Measurement mode

The UL1000 or UL1000 Fab measures the leak rate of the test object.

ULTRA

ULTRA is the most sensitive measuring range with inlet pressures below 0.4 mbar. The minimum detectable leak rate is 5×10^{-12} mbar l/s.

Factory delivery condition

Status of the UL1000 and UL1000 Fab like supplied by the factory.

1.2 Support from INFICON Service

If a device is returned to INFICON or an authorised representative of INFICON, please indicate whether the instrument is free of substances damaging to healths or whether it is contaminated. If it is contaminated, also indicate the type of hazard. Devices without a declaration of contamination must be returned by INFICON to the sender. For a copy of the declaration of contamination form, see below.

A maintenance and service contract is recommended.

- 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.
- Use the original packaging when returning.
- Before sending the device, attach a copy of the completed contamination declaration.

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

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 _____
 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

1.3 Introduction

1.3.1 Purpose

The UL1000 and UL1000 Fab are helium leak detectors. These instruments may be used to detect the location and the size of leaks on objects under test in two different ways:

- With the vacuum leak testing method, the test object is first evacuated and sprayed with helium from the outside. It is required that a vacuum connection is provided between the UL1000 and UL1000 Fab and the test object.

or

- with the sniffer leak testing method, a helium overpressure is generated in the test object and the test object is tested from the outside with a sniffer line that is connected to the inlet of the leak detector.

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 also "Technische Daten [► 15]".

Incorrect usage

Avoid the following unintended uses:

- Use outside the technical specifications, see "Technische Daten [► 15]"
- Testing of wet or damp test objects
- Pumping off aggressive, flammable, explosive, corrosive, microbiological, reactive or toxic substances, creating a hazard
- Pumping down of condensible fluids and vapors
- Pumping hydrogen concentrations, which can explode in combination with oxygen. The allowable composition of venal gas mixtures can be read in the safety data sheets of the respective manufacturers.
- Pumping out gases containing halogens such as fluorine or chlorine in high concentration or over a long period of time. Use with refrigerants or SF₆.

To prevent interference with electrical devices, do not operate the device in residential areas.

For pumping down condensable gases and steams:

For UL1000 only:

Note: Pumping down condensable gases and steams: When pumping test objects water vapour that is inside can attain to the fore pump. With the water vapor that is in the air - especially in humid areas or when using humid or wet test objects - the acceptable compatibility of water vapor or capacity of water vapor of the fore pump respectively can be exceeded.

If the vapor pressure rises above the permissible value, vapor condenses in the pump oil. This changes the oil properties and there is risk of corrosion of the pump.

While using the leak detector with condensable gases and steams the oil of the fore pump has to be controlled regularly, so you can recognize a condensation of water vapor in the pump. Normally the oil is clear and transparent, if it contains water vapor it is cloudy and milky at operating temperature.

After switching off the pump the water vapor condenses and increases the water content in the oil.

NOTICE

Risk of property damage due to corrosion

The leak detector must not directly be switched off after the process, in which condensable gases or steams are pumped, is finished. It must be running at least 20 min with open gas ballast valve (see also "Purging [▶ 47]") until the oil of the pump is free from detached steams.

Not following these instructions can lead to corrosion in the pump and thus to damages for which no warranty can be accepted.

- ▶ The height of the oil of the pump has to be controlled regularly.
- ▶ The normal intervals of changing the oil from the manufacturer have to be taken care of. See instructions of the rotary vane pump.

NOTICE

Risk of property damage from halogens such as fluorine or chlorine

Gases that contain halogen molecules (i.e. fluorine, chlorine), i.e. refrigerants and SF₆, should not be pumped by the leak detector in higher concentrations and over a longer time period.

The coating layer of the cathodes of the ion source can be affected. This could cause a burn out of the cathodes.

For UL1000 Fab only:

NOTICE

Risk of property damage due to condensable gases and steams

Condensable gases and vapors can reach the interior of the appliance and destroy the backing pump.

Particular care must be taken when pumping down the test object in areas with high humidity. The humidity in the air already taxes the pump. The same applies for wet test objects.

If you plan to detect noxious matters contact the manufacturer. Rules for decontamination will be developed then. If parts of the appliance need to be cleaned, you must contact the manufacturer. Please send a filled out copy of the declaration of contamination beforehand.

1.3.2 Technical Data

1.3.2.1 Physical data

UL1000, UL1000 Fab	
Max. inlet pressure	15 mbar
Minimum detectable helium leak rate in vacuum mode (ULTRA)	$< 5 \times 10^{-12}$ mbar l/s ^{1.)}
Lower detection limit in sniffing mode	$< 5 \times 10^{-8}$ mbar l/s
Maximum displayable helium leak rate in ULTRA	0.1 mbar l/s
Measurement range	12 decades
Time constant of the leak rate signal (blanked off, 63% of the final value)	< 1 s
Pre-vacuum suction capacity (air)	25 m ³ /h (50 Hz) 30 m ³ /h (60 Hz)
Max. pumping speed (helium) at inlet in vacuum mode	
• ULTRA mode	2.5l/s
Detectable masses	2, 3 and 4
Mass spectrometer	180° magnetic sector field
Ion source	2 cathode, Iridium/Yttrium oxide
Inlet flange	
• Standard	DN 25 KF
• For 550-102 only	DN 40 KF
Run-up time (after starting)	≤ 3 min

- To get down to the minimum detectable leak rate range some conditions must be fulfilled:
 - UL1000 and UL1000 Fab must be fully warmed up.
 - The ambient conditions must be stable (temperature, no vibrations/shocks).
 - The test object must have been evacuated long enough (background is no longer decreasing).
 - The helium background suppression (ZERO) must be activated.
- Assumption of laminar flow for the pressure ranges GROSS and FINE, for which the helium pumping speed corresponds to the air pumping speed.

1.3.2.2 Electrical data

UL1000, UL1000 Fab	
Part no. 550-000A, 550-100A, 550-102	230 V ±5%, 50 Hz
Part no. 550-001A, 550-101A	115 V ±5%, 60 Hz
Part no. 550-002A	100 V ±5%, 50/60 Hz
Part no. 550-111R	For the respective variant, see the device's type plate: <ul style="list-style-type: none"> 100 V ±5%, 50/60 Hz

UL1000, UL1000 Fab	
	<ul style="list-style-type: none"> • 115 V \pm5%, 60 Hz • 230 V \pm5%, 50 Hz
Power consumption	1100 VA
Power supply cable	country-specific

1.3.2.3 Additional technical data

UL1000, UL1000 Fab	
Valves	electromagnetic
Dimensions (L × W × H) incl. handle	1068 × 525 × 850 mm
Dimensions (L × W × H) incl. handle	42 × 21 × 33 in
Weight	110 kg
Noise level	< 70 dB(A)
Noise level (50 cm distance)	< 56 dB(A)
Audio alarm	90dB(A)
Pollution degree	2
Overvoltage category	II

1.3.2.4 Ambient conditions

UL1000, UL1000 Fab	
For use within buildings only	
Permissible ambient temperature (during operation)	+10 °C ... +40 °C
Permissible storage temperature	0 °C ... +60 °C
Max. relative humidity	80 % at 31 °C linear decrease to 50 % at 40 °C
Max. permissible altitude above sea level (during operation)	2000 m

1.4 Unpacking



NOTICE

Property damage due to transportation fixings

Before starting up make sure that the transportation fixing is removed, see also "Transport [► 20]".



Retain the packaging materials in the event of complaints.

To remove the device from the pallet, use the foam ramp included in the packaging.

Unpack the UL1000 or UL1000 Fab immediately after delivery, even if the device will be installed later on.

Examine the shipping container for any external damage. Completely remove the packaging materials.

Check if the delivery of the UL1000 and UL1000 Fab is complete and carefully examine the device visually.

If any damage is discovered, report it immediately to the forwarding agency and the insurance. If the damaged part has to be replaced, please contact our orders department.

1.4.1 Scope of delivery

Item	Quantity
Helium leak detector UL1000 or UL1000 Fab	1
Mains connection cable (country-specific)	1
Mains cable fixture	1
O-ring with filter (for use with applications with dust / dirt accumulation)	1
Exhaust hose adapter with clamps (if the pre-installed exhaust filter is not used)	1
Cable ties	1
Set of spare fuses	1
Allen key	1
Bellow Clips (2 + 2)	1
Opener to assist in opening the device flaps	1
Wedge to open the device	1
Hooks to wrap mains cable (with screws)	1
Digital operating instructions, to download as PDF from www.inficon.com	1

1.4.2 Accessories and Options

The parts listed below can additionally be ordered:

Item	Order number
SL200, sniffer line 4m length	14005
SL200, sniffer line 14m length	14006
Helium sniffer QUICK-TEST, QT100	15594
Toolbox (detachable)	551-000
Helium bottle holder	551-001
ESD mat	551-002
SMART-Spray with 2 HeliCan Helium containers 50 ml, battery, charging cable, wrist strap, BT-Dongle, adapter cable for BT-Dongle	551-050
Remote control RC1000WL, wireless	551-015
Remote control RC1000C, cable version	551-010
Extension Cable, 8 m for remote control	14022
Test chamber TC1000	551-005
Spray gun with hose	16555

Item	Order number
Connector set	20099024
LeakWare (software)	14090

1.4.2.1 Sniffer line SL200

By use of the sniffer line the UL1000 and UL1000 Fab can easily be converted to a sniffer leak detector. The length of the sniffer line is 4 m or 14 m.

1.4.2.2 Toolbox

The toolbox is a detachable compartment with a lockable lid. Fittings and small parts can be stored here together with the remote control, see also "Remote control RC1000WL [► 18]". The storage volume is approximately 5 l.

The toolbox is placed on the working surface and fixated by the handle.

1.4.2.3 Helium bottle holder

The helium bottle holder allows you to carry a helium reservoir and a spray gun with the UL1000 and UL1000 Fab. Only small to medium size bottles (max. 10 l, 200 bar) fit without compromising the stability of the UL1000 and UL1000 Fab.

1.4.2.4 ESD mat

This mat is placed on the working surface of the UL1000 and UL1000 Fab and is clamped and grounded by the inlet port ring. The mat avoids electrical discharges between the working surface and sensitive test objects.

1.4.2.5 Helium spraying device SMART-Spray

The device is a mobile, cable-free and hose-free helium spraying device. This allows you to apply helium to a test specimen from the outside and in the event of a leak, this is displayed. Working with SMART-Spray makes your leak detection significantly faster, easier, more reliable and more effective, while saving helium at the same time.

1.4.2.6 Remote control RC1000WL

The wireless remote control RC1000WL allows to operate the UL1000 and UL1000 Fab from distance up to 100 m. The remote control provides the functions START, Stop/Vent, ZERO, it shows the measured leak rate as a bar graph, as a numerical value or as a diagram on the display (see the RC1000 manual).

The measurement values can be stored in the internal memory of the RC1000WL for a period of up to 24 hours. Then the data can easily be transferred to a USB stick.

An internal trigger can be set to provide a warning if the limit leak rates are exceeded. The warning occurs visually on the display and audibly via the built-in loudspeaker or the connected headset respectively.

The remote control RC1000WL is in a robust housing, which allows working ergonomically. Magnets on the lower side allow installation from horizontal to vertical metal surfaces.

The RC1000WL enables remote operation of the leak detectors UL1000 and UL1000 Fab using a connection cable of up to 28 m in length.



Fig. 1: RC1000WL wireless remote control

1.4.2.7 Test chamber TC1000

This test chamber turns the UL1000 or UL1000 Fab into a complete workstation to test hermetically sealed components.

Also as per Standard MIL-STD 883 testing can be performed easily, quickly and accurately. The tests start automatically once the cover of the chamber is closed. Test parameters such as measuring time and rejection rate can be set in the "Auto Leak Test" menu, see also "Auto Leak Test settings [▶ 66]". The test is performed automatically, the result is shown by red and green LEDs which are located on the test chamber.



Fig. 2: Test chamber TC1000

2 Installation

2.1 Transport



NOTICE

Risk of property damage due to transportation with lifting equipment

The UL1000 and UL1000 Fab are not equipped with crane eyes. Both devices must not be transported using lifting equipment.



NOTICE

Risk of property damage due to incorrect transportation

When transporting over longer distances the original packaging must be used.

The castors must not be locked in the process.

UL1000 Fab with Triscroll TS 620

For transportation of the device, the chassis plate where the pump is mounted on has to be secured by a transportation fixing.

This transportation fixing consists of two screws. To get access to the transportation fixing, remove the side covers of the UL1000 Fab.

There are orange labels on the bottom part pointing to these screws.



Fig. 3: Transport protection

The screws tightened to the chassis plate secure the appliance during transportation. For operation of the UL1000 Fab, the screws must be loosened first. For this, first loosen the counter nut, see next figure.

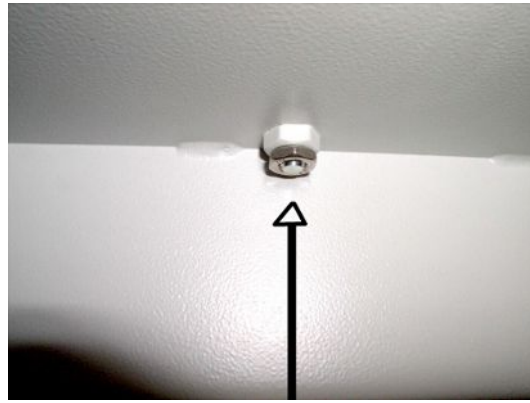


Fig. 4: Counter nut

Unscrew the screws approximately 10 mm and then tighten the counter nuts again.



Fig. 5: Transport protection

For transportation, tighten the screws again and fixate them with the counter nuts.

2.2 Working location

- 1 Move the UL1000 / UL1000 Fab to the desired position and lock the castors.
- 2 Make sure that no tracer gases that could influence the measurement result on the test object are already emitted in the room of the working location. The sniffer line can be used for this purpose.

**⚠ DANGER****Danger due to electric shock**

The mains cable connected at both ends may be damaged or the wall socket may be torn out if the leak detector is moved and the mains cable is tensioned as a result.

Moisture penetrating the device can cause personal injury due to electric shock and property damage due to short circuits.

- ▶ Check the power cord for damage before each use. Make sure that the power cord is never under tension.
- ▶ If you want to move the device, disconnect the power cord from the wall socket.
- ▶ To prevent unintentional movement, fix the device at the destination by locking the wheels with the parking brake.
- ▶ Only operate the device in dry environments and only in buildings.
- ▶ Operate the device away from sources of liquid and moisture. Position the device so that you can always reach the plug for unplugging.
- ▶ Do not operate the device in standing water and do not allow even a drop of water or other liquid on the device.

**⚠ WARNING****Health risk due to exhaust fumes and vapors**

Exhaust fumes and vapors from pumps can be a health risk.

- ▶ For operation in poorly ventilated rooms when using gases hazardous to health, connect an exhaust pipe to the exhaust connection.
- ▶ Make sure that the exhaust filter is not blocked.

NOTICE**Property damage due to aggressive substances or ambient conditions**

- ▶ Avoid contact with bases, acids or solvents.
- ▶ The device should also not be exposed to extreme climatic conditions.

**NOTICE****Property damage due to overheating**

- ▶ Ensure a sufficient air cooling.
- ▶ The air inlet as well the air outlet openings must never be obstructed.

2.3 Electrical connections



Generally the local regulations for electrical connections must be observed.

2.3.1 Power supply



DANGER

Danger due to electric shock

Improperly grounded or fused products may be dangerous to life in case of a fault. The use of the device is not permitted without a connected protective conductor.

- ▶ Only use the included 3-wire power cable.
- ▶ In regions with a power supply of 100 to 120 V with plug type NEMA 5-15 (e.g. North and Central America, Taiwan and Japan), only the supplied "Hospital-Grade" power cord may be used.
- ▶ If the cable is damaged, it must be replaced with an original "Hospital-Grade" spare part (INFICON p/n 200000587).
- ▶ Note that "Hospital-Grade" power cables are marked with the same lettering and green dot as the NEMA 5-15 power plug.
- ▶ Ensure that the appliance coupler (socket on the power switch) is always easily accessible.
- ▶ Immediately disconnect the device from the mains in case of visible defects. This also applies to the development of smoke.



NOTICE

Pulling on the power cord may cause damage to the power outlet.

The power cord can be secured against accidental unplugging.

- ▶ If someone intentionally or accidentally pulls the power cord
- ▶ when the device is being moved around,
- ▶ or someone stumbles over the cable, the power outlet may be damaged.
- ▶ Place the power cord so that no one can accidentally pull it or trip over it.



NOTICE

Risk of property damage due to incorrect mains connection

Before connecting the UL1000 / UL1000 Fab to the mains you must make sure that the mains voltage rating of the UL1000 / UL1000 Fab coincides with the locally available mains voltage.

The device must exclusively be connected to a single phase supply with fuses for installation (Circuit breaker 16 A max. according to IEC/EN 60898-1 with tripping characteristic B).

The mains voltage rating for the UL1000 / UL1000 Fab can be read off from the name plate beneath the mains socket at the back side, see also Connections for accessories and control signals [▶ 24]". This voltage is fixed and can not be changed.

A separate fuse for each of the mains conductors has been integrated into the mains switch.

The mains voltage is applied to the device via the detachable mains cable which is supplied with the instrument. A mains socket, see also "Connections for accessories and control signals [▶ 24]", is intended for this purpose at the back side of the instrument.

To prevent the mains cable from being accidentally disconnected, it can be fixed with the mains cable fuse supplied.

The cable can be secured like shown in the following figure:



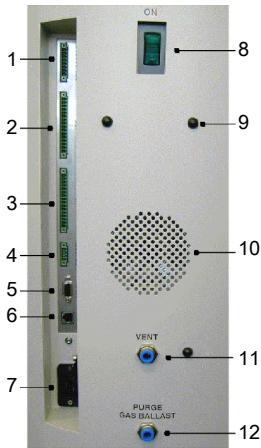
Fig. 6: Mains cable with fixing

If the device is not operating the cable can be stored at the cable holders.



Fig. 7: Cable holders

2.3.2 Connections for accessories and control signals



1	Accessories	7	Power supply
2	Digital output	8	Power switch
3	Digital input	9	Mounting for cable holder

4	Recorder	1 0	Speaker
5	RS232	1 1	Vent
6	Remote control RC1000WL / Helium spraying device SMART-Spray	1 2	Purge (UL1000 Fab) / Gas ballast (UL1000)

The sockets Accessories, Digital Out, Digital In and Recorder have pin 1 on top. The pin numbers are counted downwards. The socket 2 and 3 are coded mechanically to avoid a confusion with the counter plug. For the connection with the counter plug (i. e. set of plugs 20099024) remove the guide lugs, so that the plug fits the socket.

The connections for the external devices show a safe disconnection from the power supply and are within the range of the safety extra low voltage (SELV).



NOTICE

Property damage due to connection of devices with excessive voltage

Only connect devices that don't exceed 60 VDC, 25 VAC.

2.3.2.1 Accessories

The SL200 sniffer line or the TC1000 test chamber can be connected to this connection, see also "Connections for accessories and control signals [► 24]":

Contact pins 1 and 3 are fused with a 0.8 A slow-blow fuse. The amount of power which can be drawn is limited to 10 W. The contacts are numbered from top to bottom.

Contact	Signal
1	+24 V, continuous voltage, power supply for the INFICON sniffer line SL200.
2	GND24 (reference potential for the 24 V voltage)
3, 6	Input
4, 5, 7, 8	Output

2.3.2.2 Digital Out

The following relay outputs are available for further signal processing. The maximum rating for the relay contacts is 25 VAC and 1 A.

Contact	Signal
1	+24V, bridged with pin 1 of socket "IN" (Digital In)
2	GND_24V (reference potential for the 24 V voltage)
3	Trigger 1
4	Trigger 2
5	Free
6	ZERO active
7	Ready
8	Calibration active
9	Calibration request

10	ERROR
11	Warning
12	Purge
13	Measure
14	Recorder Strobe
15	Reference potential for the digital output signals
16	Free

Description of the operation mode of the digital outputs:

Trigger 1

Is open in case trigger level 1 is exceeded or the device is not in measuring mode.

Trigger 2

Is open in case trigger level 2 is exceeded or the device is not in measuring mode.

ZERO active

Is closed in case Zero function is running.

Ready

Is closed in case device is ready for measurement (Emission on, no error).

Calibration active

Is closed when device is in calibrating routine.

Calibration request

Is opened in case of calibration request.

Special case: During external calibration an open Calibration request output indicates that the external calibrated leak has to be closed.

Error

Is open in case an error is shown.

Purge

Is closed in case purge is active.

Measure

Is closed in case the device is in measure mode.

Recorder Strobe

Is closed in case recorder output is invalid. Used only if recorder output is set to "leak rate".



Functionality of the relays is not supervised by the system (no error message). In particular for critical, frequent or long term use, we recommend the use of suitable supervision procedures.

2.3.2.3 Digital In

These inputs can be used to operate the UL1000 / UL1000 Fab with a programmable logic control (PLC).

Contact	Signal
1	+24 V, bridged with pin 1 of socket „Out“ (Digital Out)
2	GND_24V (reference potential for the 24 V voltage)
3	Start
4	Stop
5	ZERO
6	CAL
7	Clear
8	Purge
9	Free
10	Free
11	Common
12	Free
13	Free
14	Free
15	Free
16	Free

Description of how the digital inputs work:

ZERO

Change from low to high: Switch ZERO on.

Change from high to low: Switch ZERO off.

Start

Change from low to high: Activate START.

Stop

Change from low to high: Activate Stop.

When this input is longer high than defined in "Vent delay [▶ 64]" then ventilate it additionally.

Purge

Change from low to high: Activate purge.

Change from high to low: Deactivate purge.

Clear

Change from low to high: Confirm error message.

CAL

Change from low to high:

If the device is in standby mode: Start internal automatic calibration. If the device is in measurement mode: Start external calibration (prerequisite: external test leak must be open and leak rate signal stable).

Change from high to low:

For external calibration: Confirmation that the external test leak is closed and the leak rate signal is stable.

The signals at these inputs are only accepted if the control location is at "PLC "or "Local and PLC, see also "Control location [► 70]".

2.3.2.4 Recorder

The recorder outputs , see also "Connections for accessories and control signals [► 24]", can be used to record the leak rate, the inlet pressure, and the foreline pressure. Both recorder outputs can be set individually for the output of leak rates and pressures.

The measured values are output via an analog signal in the range from 0 V to 10 V. The resolution is limited to 10 mV. The measuring voltage is applied to contacts 1 and 4, the reference potential (GND) is applied to the contacts 2 and 3. The contacts are numbered from top to bottom.

A diagram showing the relationship between pressure and leak rate versus output voltage, see also "Diagram [► 109]".



The recorder outputs are electrically isolated from the other connections. If in spite of this hum interferences are apparent it is recommended to operate the UL1000 / UL1000 Fab and the recorder from the same mains phase. If this is not possible, ensure that the earth connections of both devices are at the same potential.

Pin	Signal
1	Analog 1
2	GND (reference potential)
3	GND (reference potential)
4	Analog 2

2.3.2.5 RS232

This RS232 interface, see also "Connections for accessories and control signals [► 24]", is wired as DCE (data communication equipment) and permits the connection of a PC for monitoring and data logging. The connection is made via a 9-pin Sub-D socket and standard interface cable (1:1 cable). For more information refer to the Interface Description.

Pin	Signal
2	RxD
3	TxD
5	GND
7	RTS
8	CTS

2.3.2.6 Remote control RC1000/Wireless transmitter/SMART-Spray

Remote control
RC1000/Wireless
transmitter

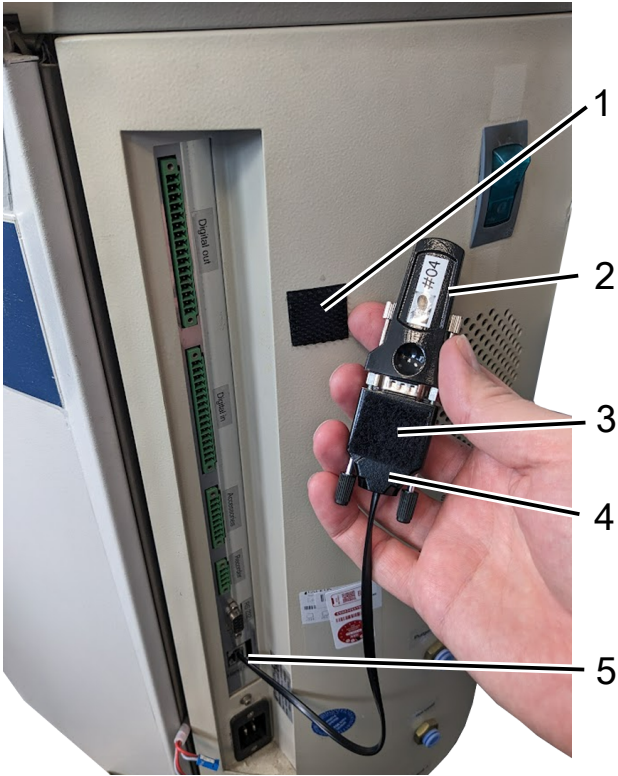
This interface (see also "Connections for accessories and control signals [► 24]") is designed as a serial interface and can be used to control the UL1000 / UL1000 Fab via a remote control. The RC1000 remote control can be connected via a connection cable with RJ45 plug or via the wireless transmitter (also with RJ45 plug).

Refer to the RC1000 Technical manual for further information. The remote control is not included in the standard scope of delivery of the UL1000 / UL1000 Fab

Connection of leak
detector and SMART-
Spray

Procedure

- ✓ Your leak detector has software version V5.19 (basic unit) or higher installed. On an UL1000 device, you will find information about the installed software version under "Main menu > Info", then under "Button No. 3" (Show internal data), page 4/4. To install the software, see the separate operating instructions for the SMART-Spray helium spraying device.
- ✓ You have a functional helium sprayer SMART-Spray.
- ✓ You have a separate IFCBT-Dongle (radio transmitter) and a BT adapter with adapter cable for the IFCBT-Dongle.
- ✓ Adhesive pads are available.



1	Adhesive pad
2	IFCBT-Dongle
3	Adhesive pad
4	BT adapter
5	Interface

- 1 Screw the IFCBT-Dongle onto the BT adapter.
- 2 Insert the RJ plug located at the end of the adapter cable into the interface on the back of the leak detector.

- 3 Stick one side of the adhesive pad to the BT adapter and the other side to the UL1000 or UL1000 Fab. To achieve the optimal Bluetooth signal range, fasten the adhesive pad as close to the top as possible on the UL1000 or UL1000 Fab.
- 4 Glue the BT adapter to the UL1000 or UL1000 Fab.



⇒ The BT adapter with IFCBT-Dongle is attached and connected to the UL1000.

- 5 If the leak detector is not yet switched on, switch on the leak detector.
- 6 To activate the electronic Bluetooth connection, select "Main menu > Settings > Interfaces > Remote protocol".
- 7 Select button no. 7 "LD protocol". The operation of the SMART-Spray is enabled via the RJ socket on the leak detector.

⇒ The leak detector is prepared for the Bluetooth connection with the SMART-Spray .

To the interface for RC1000 remote control / radio transmitter / SMART-Spray:

Pin	Signal
2	+24 V (0.8 A slow-blowing fuse)
3	0V
4	RxD
5	TxD

2.4 Vacuum connections

2.4.1 Inlet



⚠ CAUTION

Danger of injury due to sucking inlet flange

If the Vacuum-Mode of the UL1000 / UL1000 Fab is activated, the connection flange may suck body parts around the connection flange.

- Keep body parts off the connection flange.

The inlet port is located at the top of the UL1000 / UL1000 Fab. This is a DN 25 KF flange.

If the vacuum mode is chosen, a test object or a test chamber has to be connected to the inlet port, see also "Operation mode [► 56]".

The inlet port is also used for the connection of the SL200 sniffer line.

2.4.2 Exhaust



⚠ WARNING

Health risk due to escaping gases

Depending on the chamber the UL1000 / UL1000 Fab is attached to and the gas inside the chamber harmful gases can get into the air through the exhaust of the leak detector.

The exhaust flange (see also "Connections for accessories and control signals [► 24]") is located underneath the UL1000 / UL1000 Fab at the back side. This is a DN 16 KF flange.

When shipped only the exhaust filter is preassembled. The filter cartridge is supplied together with the leak detector and can be installed at the exhaust.

Instead of this an exhaust line can be connected at the exhaust adapter.

2.4.3 Venting connection

Normally, the test objects are vented with ambient air after completion of the test. If necessary, the test objects can be ventilated with a different gas (e.g. fresh air, dry air, nitrogen, a.o.) to a maximum of 1050 mbar pressure. In this case a vent hose has to be connected to the hose adapter, see also Connections for accessories and control signals [► 24]".

2.4.4 Connection purge gas (UL1000 Fab) / gas ballast (UL1000)

For purge modes it is recommended to use Helium-free gases at atmospheric pressure. The surrounding air may be contaminated with large amounts of Helium due to spraying or filling up large containers. In this case a gas supply line (i. e. nitrogen, fresh air, a.o.) should be connected to the hose adapter. The pressure of the gas line must not be more than 1050 mbar.

The connectors 11 and 12 are quick connectors for hose diameters of 8/6 mm.

2.5 Delivery condition

The following parameters are set like shown when in the menu of the UL1000 and UL1000 Fab under "Settings > Parameters load/save", "load default values" is chosen:

Autoscale	On
Scaling	logarithmic
Display area	4 decades
Time axis	32 s
LCD invers	Off

Background in standby mode	Off
Automatic calibration request	Off
Mass	4 (helium)
Recorder Output	Leak rate
Volume	2
Leak rate unit	mbar l/s
Operation mode	Vacuum
Trigger level 1	1E-9 mbar l/s
Trigger level 2	1E-8 mbar l/s
Leak rate external test leak (Vacuum)	1E-7 mbar l/s
Leak rate external test leak (Sniffer)	1E-5 mbar l/s
Vent delay	2 s
Automatic purge	On
Pressure unit	mbar
Minimum volume	0
Beep	On
Maximum evacuation time	30 min.
Audio Alarm Type	Trigger alarm
Maximum inlet pressure when sniffing	1 mbar
Minimum Inlet pressure when sniffing	0.1 mbar
Number of decimal places at leak rate displayed	1
Scroll display	On
Particle protection	Off
Direct access to calibration routine	On
Contamination protection	Off
Switch-off limit for contamination protection	1E-3 mbar l/s
Control location	Local
Alarm delay	30 s
Leak rate filter	I•CAL
ZERO	Released

3 Initial Operation Checks

The steps for an initial operation are described in this chapter. It is explained how to switch on the UL1000 / UL1000 Fab, how to measure and how to carry out an internal calibration.



If during the initial operation the UL1000 / UL1000 Fab acts in an unexpected or strange way, the leak detector can be switched off by the mains switch at any time.

3.1 Needed Equipment

The following parts will be needed:

- DN 25 KF blank flange (if not already installed on the inlet flange)
- A helium test leak with a DN 25 KF adapter (optional)

3.2 Initial Operation

Please proceed with the following description of the initial operation step by step, see also "Operation of the UL1000 and UL1000 Fab [► 46]" for a more detailed description.

3.2.1 Start up and Measure



NOTICE

Risk of damage to the turbo pump due to abrupt movements

Abrupt movements can damage the running turbo pump.

- Avoid abrupt movements and vibrations of the instrument (e.g. running over cables, door sills) during operation and up to 4 min after switching off since the turbo pump can be damaged.



NOTICE

Risk of property damage due to low ambient temperature

- Don't switch the UL1000 / UL1000 Fab on when ambient temperature is below 10 °C.

- 1 Unpack the UL1000 / UL1000 Fab and inspect it for any external damage, see also "Unpacking [► 16]".
- 2 Connect the device to the mains power, see also "Power supply [► 23]".
- 3 Switch on the leak detector using the mains switch, see also Connections for accessories and control signals [► 24].StartupStartup

After powering on a welcoming picture appears on the screen of the control panel, followed by status informations on the speed of the turbo pump, the foreline pressure, the emission and the active filament.

The start up procedure takes about 3 min and the end is indicated by a short signal tone. The UL1000 / UL1000 Fab is now in standby mode.



Fig. 8: View of the UL1000 Fab

1	Control unit	2	Inlet
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- 1 Check if the inlet port is blanked off. If not, mount a blank flange with an O-Ring on the inlet port.
- 2 Press the START button. The inlet port will be evacuated and the measured leak rate will be displayed a moment later. This is the measurement mode. If a test object were now connected, you could start spraying it with helium from the outside.



Fig. 9: Control unit

1	LC display	8	Button no. 5
2	Button no. 1	9	Button no. 6
3	Button no. 2	10	Button no. 7
4	Button no. 3	11	Button no. 8
5	Button no. 4	12	MENU button
6	START button	13	Stop button
7	Control unit	14	ZERO button

- 1 To correct for any background signal (residual helium in the test object) you may press the ZERO button. To undo the background suppression, simply press the ZERO button for 2 to 3 s.
- 2 Press the Stop button and the UL1000 / UL1000 Fab will go to standby mode. If you press the Stop button for a few seconds the inlet of the UL1000 / UL1000 Fab will be vented.

- 3 To finish the startup procedure please see also "Verification [► 35]". To calibrate please see also "Internal calibration [► 35]".

3.2.2 Internal calibration

Now proceed with the internal calibration, see also "Internal calibration [► 82]". To achieve better quantitative measurement results, it is best to wait (15 to 20 min) until the device has warmed up.

- 1 Press the CAL (Calibration) button, see also "Start up and Measure [► 33]", to get into the calibration menu.
- 2 Select "internal", see also "Start up and Measure [► 33]", to choose the internal calibration.
- 3 Select "automatic", see also "Start up and Measure [► 33]". The automatic internal calibration starts and requires about 30 s.
- 4 Press the Stop button, see also "Start up and Measure [► 33]", until the message STANDBY / VENTED appears on the display. The inlet port is now vented.

3.2.3 Verification

To verify the measuring accuracy with an external test leak, follow the steps described below. If no test leak is available continue with step 6.

- 1 Remove the blank flange from the inlet port and connect an open helium test leak to the inlet port.
 - 2 Press the START button again, see also "Start up and Measure [► 33]". The inlet will be evacuated and the leak rate of the test leak will be measured and displayed.
 - 3 Press the Stop button, see also "Start up and Measure [► 33]", to interrupt the measurement. The leak detector goes into standby mode.
 - 4 Press the Stop button again, see also "Start up and Measure [► 33]", until the message STANDBY / VENTED appears on the display. The inlet is now in the vented state.
 - 5 Remove the helium test leak from the inlet port and put a blank flange onto the inlet port again.
 - 6 Switch off the leak detector using its mains switch, see also Connections for accessories and control signals [► 24]".
- ⇒ The first operation is finished.

4 Description and Working Principle

4.1 Introduction

The UL1000 and UL1000 Fab are helium leak detectors for vacuum applications, i.e. the test object is evacuated while the test is performed. The vacuum is achieved with an integrated pumping system.

Another operating mode of the UL1000 and UL1000 Fab is the sniffer mode, which can only be used in combination with a sniffer line, see also "Accessories and Options [► 17]".

4.2 Build of the UL1000 and UL1000 Fab

The UL1000 and UL1000 Fab are a self-contained unit in a metal housing on wheels. This housing contains the entire vacuum system and the according power supplies. On top of the leak detector is the inlet flange and the control unit, see also "Control unit [► 39]".

4.2.1 Vacuum system

The following vacuum diagram shows the major components inside the UL1000 and UL1000 Fab:

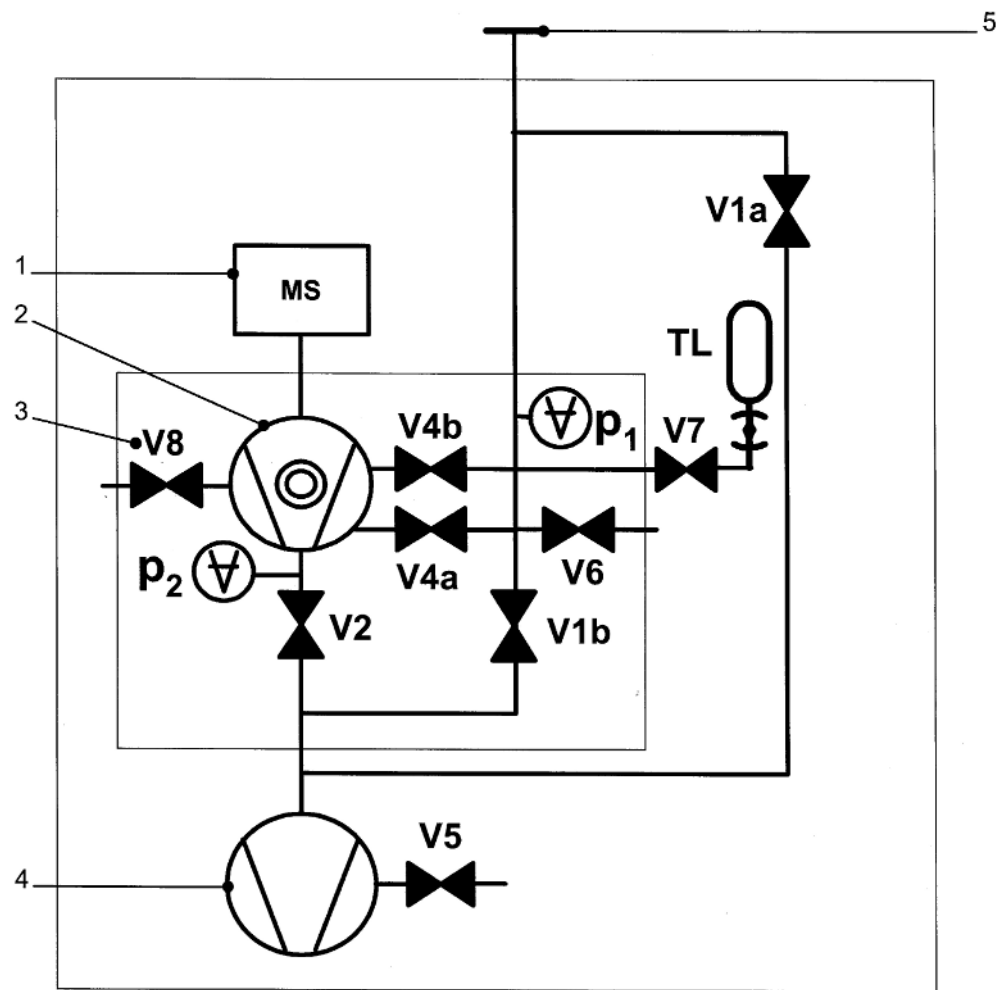


Fig. 10: Vacuum diagram UL1000 and UL1000 Fab

1	MS: Mass spectrometer, helium sensor (180° magnetic field mass spectrometer)	4	Scroll pump (provides the foreline pressure for the TMP and also pumps down the test objects)
2	Turbo molecular pump (TMP, used to generate the high vacuum required by the MS)	5	Inlet flange
3	V1a to V8: Solenoid valves for controlling gas flows		

The mass spectrometer is mainly composed of the ion source, the magnetic separator and the ion collector.

Gas molecules getting into the mass spectrometer are ionized by the ion source. These positively charged particles are accelerated into the magnetic field following a circular path. The radius of this circular path depends on the mass-to-charge ratio of the ions. Only helium ions can pass this filter to reach the ion collector where the stream of the ions is measured as an electrical current.

The operation of the mass spectrometer requires a vacuum pressure in the range of $< 1 \times 10^{-4}$ mbar. This pressure is provided by the turbo molecular pump which in turn is backed up by a scroll pump.

In addition to the function of the pump system for generating and maintaining the pressure in the mass spectrometer, the pump system also is used to evacuate the test objects. It is made sure that the pressure in the mass spectrometer is low enough under all circumstances. The valves V1a, V1b, V2, V4a, and V4b control the

gas flows when measuring. Valves V5 (only UL1000), V6, and V8 are used to vent the system and the turbo pump. Valve V7 opens and closes the internal test leak during calibration.

If the pressure in the test object is less than the ambient pressure, then helium which is sprayed over the test object can penetrate into the test object in case of a leak. As soon as the pressure conditions allow, one of the valves to the TMP opens. Now helium can penetrate into the mass spectrometer contrary to the pumping direction of the TMP.

See also "Operation modes [► 43]" for further details.

4.2.2 Control unit

The control unit contains a liquid crystal display (LC display), the START, Stop, ZERO (background suppression) and MENU buttons and also eight buttons for the different menus and inputs.

The control unit itself is rotatable.



Fig. 11: Control unit

1	LC display (see also "LC display [► 39]")	8	Button no. 5
2	Button no. 1	9	Button no. 6
3	Button no. 2	10	Button no. 7
4	Button no. 3	11	Button no. 8
5	Button no. 4	12	MENU button (see also "MENÜ button [► 42]")
6	START button (see also "START button [► 40]")	13	Stop button (see also "STOP button [► 40]")
7	Control unit	14	ZERO button (see also "ZERO button [► 40]")

4.2.2.1 LC display

The LC display, see also "Control unit [► 39]", is the communication interface to the operator. The control unit displays the leak rates, the status report of the leak detector, messages, warnings and errors.

4.2.2.2 START button

- Pressing the START button, see also "Control unit [► 39]", starts the measurements on the UL1000 and UL1000 Fab.
- If the START button is pressed again in measuring mode, the maximum leak rate display (Q_{\max}) is activated. The maximum leak rate that has been reached since the START button was pressed again is then displayed.
- If you press the START button on the control unit again during the measurement, the display of the maximum leak rate is updated.



Display of the maximum leak rate after connecting the helium spraying device SMART-Spray

After connection and activation, the maximum leak rate is only shown on the SMART-Spray display for space-related reasons.

4.2.2.3 STOP button

Pressing the Stop button, see also "Control unit [► 39]", interrupts the measurements. If this button is pressed longer the inlet port is vented according to the conditions defined in the menu "Vent delay". See also "Vent delay [► 64]" select the time parameters of the venting.

4.2.2.4 ZERO button

Pressing the ZERO button, see also "Control unit [► 39]", activates the background suppression.

When pressing the ZERO button the currently measured leak rate is taken as a background signal and is subtracted from all further measurements. As a result the displayed leak rate then is:

- 1×10^{-6} in GROSS
- 1×10^{-10} in FINE
- 1×10^{-12} in ULTRA

After pressing the ZERO button, the background suppression is automatically adjusted to the course of the falling leak rate signal. This makes it possible to detect leaks even with a rapidly falling signal.

To reverse the background suppression keep the ZERO button pressed for 3 s.

See also the figure below.

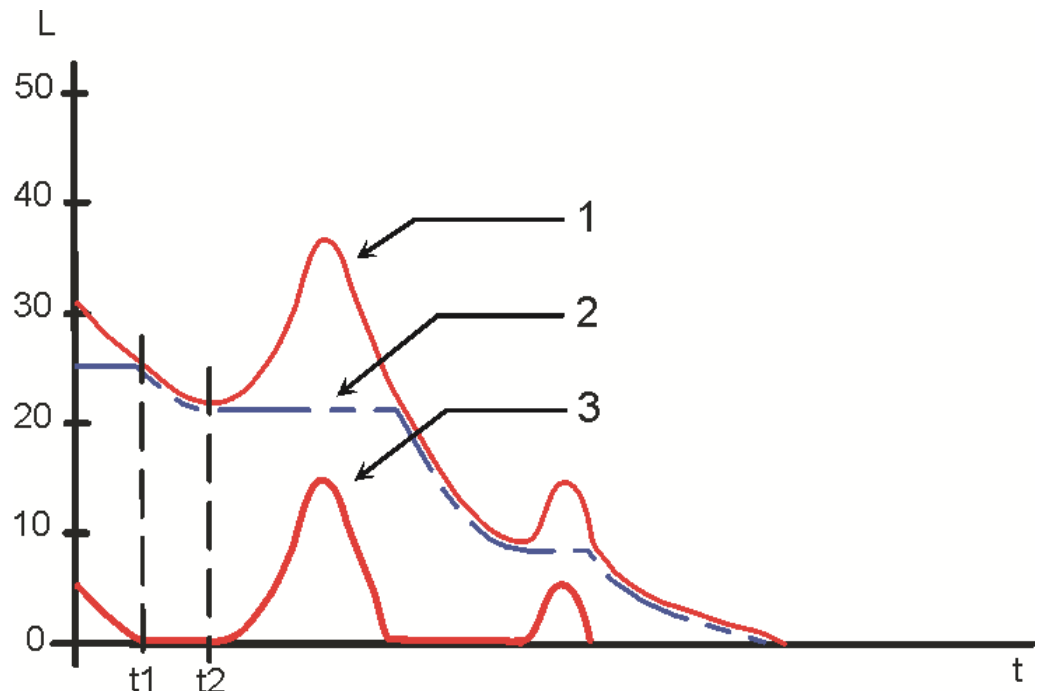


Fig. 12: Falling background

1	Measured signal	3	Displayed leak rate
2	Saved value (background)		

When the measurement signal declines below the saved background value, the background value will automatically be equated with the measurement signal. As soon as the measurement signal is increasing again the saved background value remains constant. Increases of the signal are displayed clearly as a leak. This simplifies the measurement of the smallest leakage rates.

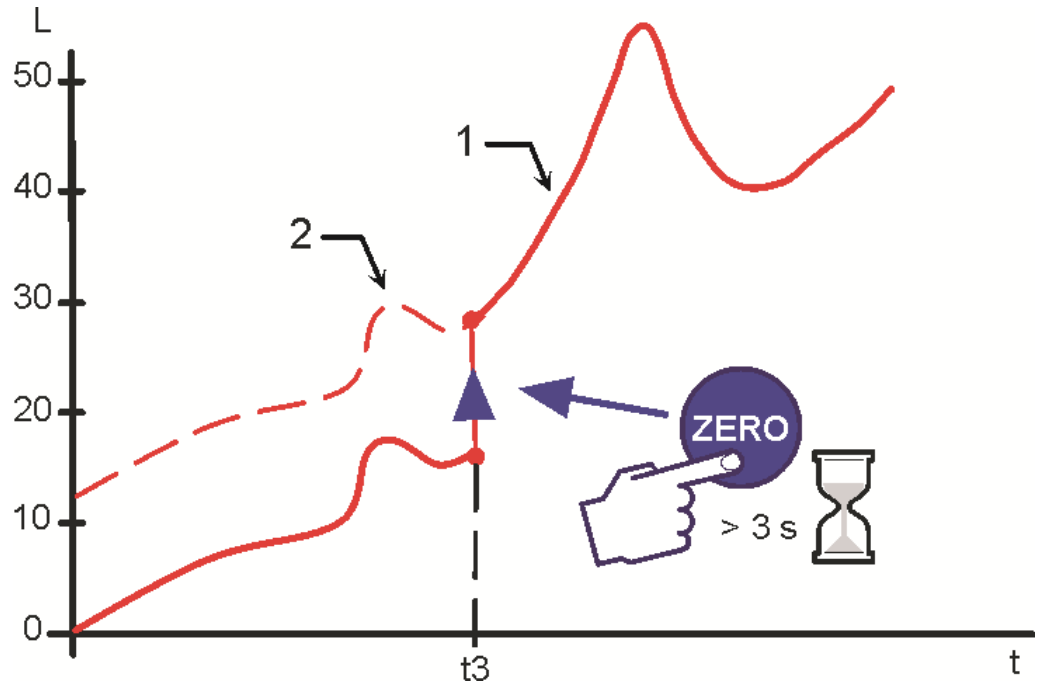


Fig. 13: Undo Zero

1	Displayed leak rate	2	Measured signal
---	---------------------	---	-----------------

To see the measurement signal, the ZERO button must be pressed for approx. 3 seconds. The saved value will be reset to zero, the background signal is no longer suppressed.

The ZERO function should only be activated when the leak rate signal is stable. In the I•ZERO setting, the ZERO function can only be used if the falling background signal is stable, see also "ZERO [► 69]".

4.2.2.5 MENÜ button

When pressing the "MENU" button (see also "Control unit [► 39]") the select menu is shown on the display. This functions independently of the operating mode except during calibration.

If the menu is opened during the current session the operator will be lead to the last screen before the menu was left.

Pushing the MENU button again leads back to the screen of the previous operating mode and the previous screen is shown.

4.2.2.6 Buttons

The function of the eight buttons left or right of the display (see also "Control unit [► 39]") depends on the current menu.

Special functions

When settings can be selected in a submenu two of the buttons have almost always the same function:

- Button no. 1 (see also "Control unit [► 39]") is assigned the "back/cancel" function.

It allows to escape from a submenu without any changes of the present settings and return to the previous menu page.

- Button no. 8 (see also "Control unit [► 39]") is the confirmation button (OK).

The selected settings or edited settings are saved and the previous menu page will be displayed again.

4.2.2.7 Numerical input

If a menu page has been opened in which numeric entries can be made, proceed as follows:

- If you don't want to change anything, press button no. 1 "Cancel".
- The number whose value can be changed is displayed inverted. With button no. 8 and button no. 4 you can select the position to be changed.
- To change the digit at the selected point, press the button with the corresponding digit pair. A sub-menu opens, in which the desired digit value can be selected. The submenu closes automatically and the next digit of the total number is now shown inverted.
- Having reached the last digit all corrections have to be confirmed by OK (button no. 8).

Example

Fig. 14: Numerical entry of trigger level 1, see also "Trigger level 1 [► 59]"

To change the trigger level from 1×10^{-9} mbar l/s to 3×10^{-9} mbar l/s, press button 2/3 (button no. 3), see also "Control unit [► 39]". A submenu opens, see also "Control unit [► 39]", in which the desired value 3 can be selected using button 4.

4.3 Operation modes

4.3.1 Vacuum mode

As mentioned (see also "Vacuum system [► 36]") the test object has to be evacuated to allow helium which is sprayed on the outside to enter through any possibly existing leaks due to the pressure difference.

When pressing the "START" button (see also "START button [► 40]") valves V1a and V1b open and the test object is pumped down by the backing pump (UL1000) or scroll pump (UL1000 Fab). At the same time valve V2 is closed to avoid an impermissible pressure increase in the turbo pump and the mass spectrometer. When valve V2 is closed, the turbo molecular pump operates without support of the scroll pump. Since the mass spectrometer is already evacuated no further gas is pumped from there. Thus the pressure p2 remains constant or increases only slowly.

If, e.g. due to a very long pump-down process, the pressure p2 does increase, then the evacuation will be interrupted (V1a and V1b closed) at $p_2 > 10$ mbar and V2 will be opened shortly to restore an appropriate foreline pressure ($p_2 < 1$ mbar).

The following diagrams show the gas flow during evacuation and during the modes "GROSS", "FINE", and "ULTRA".

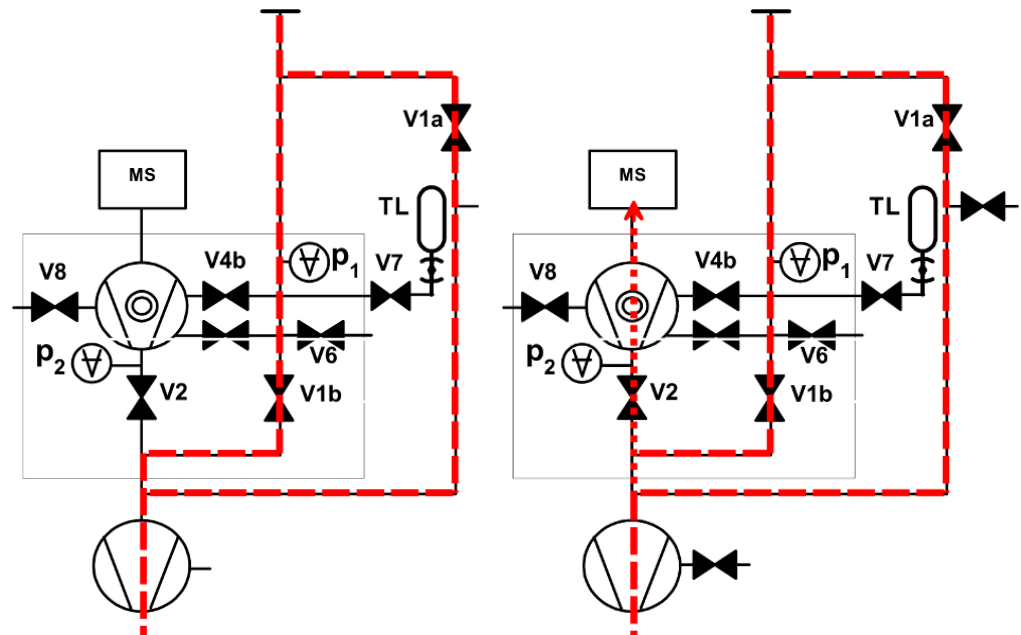


Fig. 15: Left: Evacuation (no measurement), right: GROSS mode

The conditions for the evacuation process described are maintained until the inlet pressure p_1 has dropped below 15 mbar. Now valve V2 opens. Possibly present helium can now flow into the mass spectrometer against the pumping direction of the turbo molecular pump, where it is then detected. This mode is called GROSS; the minimum detectable leak rate is 1×10^{-6} mbar l/s.

Since the scroll pump continues to evacuate the test object the inlet pressure p_1 continues to drop. Below 2 mbar the UL1000 and UL1000 Fab will switch to FINE mode, i.e. the valve V4a opens and the valve V1b closes. The gas flow now enters the turbo pump at an intermediate level. The sensitivity of the system now is higher, the minimum detectable leak rate is 1×10^{-10} mbar l/s.

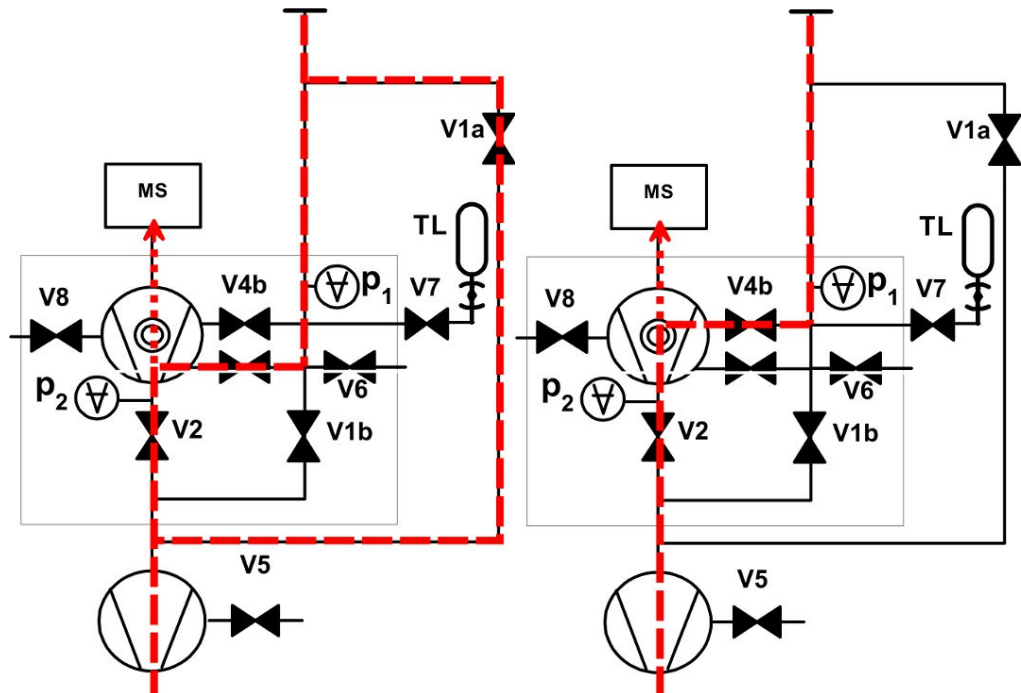


Fig. 16: Left: FINE mode, right: ULTRA mode

Now the lower part of the turbo pump further evacuates the test object and after the pressure p_1 has fallen below 0.4 mbar the UL1000 or UL1000 Fab switches into ULTRA mode, i.e. V1a and V4a close and V4b opens. The gas inlet into the turbo pump is on a higher level now. The pumping speed at the inlet port is now 2.5 l/s, the minimum detectable leak rate limit is 5×10^{-12} mbar l/s.

A special setting of the UL1000 and UL1000 Fab stops the autoranging procedure as described above. With the mode "FINE only" (see also "Operation mode [► 56]") the leak detector will stay in FINE mode regardless of the inlet pressure. The valve V1a is closed in this case.

4.3.2 Sniffer mode

For the sniffer mode a sniffer line (preferably the INFICON standard sniffer line 14005) is connected to the inlet port. When pressing the START button, see also "START button [► 40]", the system starts to pump air through the sniffer line. Due to the constant gas flow through the sniffer line the device software will switch directly into FINE mode and stay there. The inlet pressure will not drop further down. By measuring the inlet pressure the device software makes sure that the gas flow through the sniffer line is at the right level. If this is not the case, warnings are displayed. The minimum detectable leak rate in sniffer mode is 1×10^{-7} mbar l/s.

The INFICON QT100 sniffer system can also be used in sniffer applications. Since the QT100 provides a lower inlet pressure it is recommended to keep the leak detector in vacuum mode to avoid the wrong generation of pressure warnings. The machine factor (see also "Machine factor [► 66]") has to be set to the value 400.

4.3.3 Mode Auto Leak Test

In this mode tests of hermetically sealed test objects can be performed automatically. If the optional test chamber TC1000 is used, the test starts automatically when the cover is closed.

Results are achieved within a very short time. The internal test leak of the leak detector is used for dynamic calibration to match the desired test cycle.

Leak rates in the range of 10^{-9} mbar can be detected within 5 s.

5 Operation of the UL1000 and UL1000 Fab

The UL1000 or UL1000 Fab is switched on by pressing the mains switch, see also "Start up and Measure [► 33]". After less than 3 min, the start up is completed; the leak detector is in standby mode and ready for measuring.

Connect the test object to the inlet port and press the "START" button. The UL1000 or UL1000 Fab then evacuates the test object. The evacuation time depends on the volume of the test object. During evacuation the screen constantly displays the inlet pressure.

Once the pressure of 15 mbar (11 Torr or 1500 Pa) is reached the leak detector switches to measuring mode. The corresponding measured leak rate is then displayed. For further explanations on the displayed information see also "Display in measuring mode [► 47]".

The displayed leak rate corresponds to the helium background concentration in the test object. Since the UL1000 or UL1000 Fab continues to pump down the test object this background leak rate will further reduce. As soon as the leak rate is low enough for the respective requirements you may start spraying the test object with helium from the outside to find leaks.

At the end of the test, press the Stop button and hold it down for a few seconds to vent the test object.

5.1 Display

The display is used to either show leak rate signals or program specific settings and get information by means of the software menu, see also "Description of the menus [► 50]". In addition messages and maintenance instructions are displayed on the screen, see also "Error and warning messages [► 87]".

5.2 Display in run-up Mode

During the run-up (approx. ≤ 3 min), the following is shown on the display:

- RPM of the turbo pump
- Foreline pressure
- State of emission
- Active cathode
- A bar graph showing the run-up progress



If the display is too bright or too dark you can change the contrast setting, see also "Contrast [► 55]".

During run-up the menu button can be pressed (see also "MENÜ button [► 42]") to get to the select menu.

5.3 Display in standby mode

In standby mode the states are shown in the lower edge of the display, see also "Status line of the display [► 48]". Furthermore in standby mode calibration (see also "Calibration [► 82]") can be accessed and purging can be started, see also "Purging [► 47]".

5.3.1 Purging

Each time the UL1000 or UL1000 Fab switches to standby, a purging process is automatically triggered for 20 s. During this purging process the scroll pump is flushed through the purge connection, see also "Connections for accessories and control signals [► 24]".

In standby mode, this purging process can also be started manually (button 7). By pressing the button again the process will be stopped. Also by pressing the START button the process will be stopped.

5.4 Display in measuring mode

In measuring mode the leak rates can be displayed in two different ways:

- Numerically, combined with a bar graph
- As trend (leak rate versus time), see also "Trend mode [► 49]"

In the lower right corner of the display (next to the button no. 8) you will find a symbol that allows to switch between the display modes by pressing button no. 8. See also "Numerical display mode [► 49]" and "Trend mode [► 49]" for an explanation of the different display modes.

Access to calibration (button no. 5) and to the speaker volume for the acoustic signal (buttons no. 2 and no. 3) is the same in all operation modes. Also the status symbols in the bottom line are the same in all display modes.

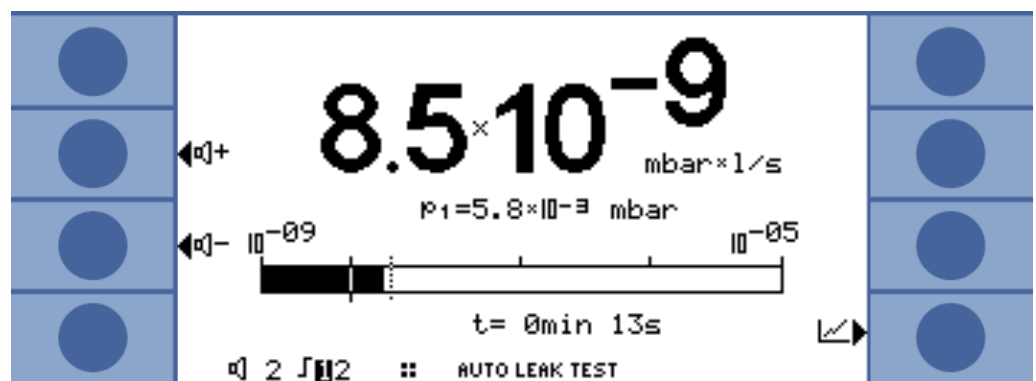


Fig. 17: Display, measuring mode

5.4.1 Calling up calibration

In all operation modes the button no. 5 is used to call up the calibration routine. See also "Calibration [► 63]" for further informations regarding calibration.

5.4.2 Volume for the acoustic signal



⚠ CAUTION

Hearing damage due to loud alarm signal

The alarm level of the UL1000 / UL1000 Fab can exceed 85 dB(A).



- ▶ Only expose to the audio alarm for a short time or use ear protection.

On the left hand side two speaker symbols are shown, combined with the signs "+" and "-". By pressing the corresponding buttons (buttons no. 2 and no. 3) the volume can be adjusted to a convenient value. In the bottom line of the display another speaker symbol is shown, combined with a number. This number indicates the current volume (ranges from 0 to 15).

See also "Volume [▶ 60]" informations on volume, alarms, and signal tones.

5.4.3 Status line of the display

The status line at the bottom of the display informs the user about the following (reading from left to right):

Display symbols	Meaning	Explanation
	Volume	See also "Volume for the acoustic signal [▶ 48]".
S1	Trigger 1	If the trigger thresholds are exceeded, these symbols are displayed inverted.
S2	Trigger 2	See trigger 1.
• •	Covered mass	The number of points shows the mass number (4 points = helium, 2 points = hydrogen).
	Warning triangle	See also "Notes [▶ 87]".
VAC	Operation mode	"VAC" or "SNIF" indicate the selected operation mode. (see also "Operation mode [▶ 56]")
ULTRA	Vacuum ranges	Depending on the inlet pressure the UL1000 or UL1000 Fab may be in GROSS, FINE or ULTRA mode which is indicated here. (see also "Operation modes [▶ 43]")
ZERO	ZERO	Indicates whether the background suppression function is active.
COR	Corrected leak rate	Indicates whether the leak rate is assigned a correction factor. (see also "Machine factor [▶ 66]")
Auto Leak Test	Auto Leak Test	Indicates whether the model was selected.
I•ZERO	I•ZERO	Indicates that the function I•ZERO is active.

Display symbols	Meaning	Explanation
STABLE	Stable	Indicates that the background signal is stable. (see also "ZERO [▶ 69]")

5.4.4 Numerical display mode

The display shows the leak rate in big digits, see also "Display in measuring mode [▶ 47]". Also the unit of the leak rate is shown. Underneath the leak rate the inlet pressure is displayed in smaller digits. The units of the leak rate and the pressure can be defined in the menu, see also "Units [▶ 60]".

Below this the same leak rate is shown graphically as a bar. The scale of this bar, i.e. the number of decades included in this bar, can be defined in the menu, see also "Display-range auto/manual [▶ 54]". The programmed trigger levels (see also "Trigger level 1 [▶ 59]" and "Trigger level 2 [▶ 60]") are indicated at the bar by short vertical lines: A solid line for trigger 1 and a dotted line for trigger 2.

Additionally the inlet pressure is displayed in smaller digits above the bar graph.

5.4.5 Trend mode

In trend mode the measured leak rate is displayed over time. In addition to the currently measured leak rate, the inlet pressure is also displayed digitally. The time axis can be defined in the menu, see also "Time axis [▶ 54]". The intensity axis (y-axis) is defined the same way as the bar graph, see also "Linear / logarithmic scaling [▶ 53]".



Fig. 18: Display, trend mode

6 Description of the menus

Pressing the "MENU" button displays the main menu regardless of the current operation mode.

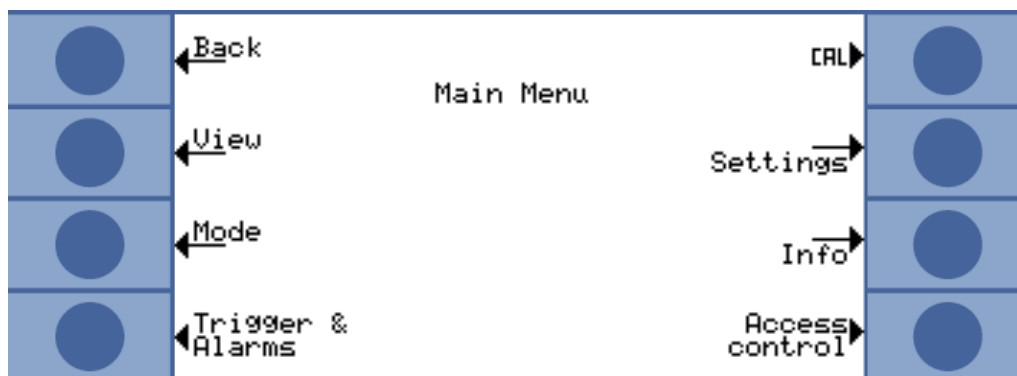


Fig. 19: Main Menu

The main menu leads the operator to several submenus described in the following chapters.

6.1 Main Menu

The main menu shows 7 sub-menus. The technical functions of the leak detector have been logically summarized in these submenus. From here the next levels of the menu tree can be reached.

Tip: All following chapters show the path to get to the described menu line right underneath the headline. This path is indicated by a dot (•).

Key No.	Designation	Description
1	Back	Return to the previous screen
2	Display	Display settings like scaling, contrast, system background (see also "Display [▶ 53]")
3	Operation mode	Selection of different operation modes like Vacuum, Sniff (see also "Operation mode [▶ 56]")
4	Trigger and Alarms	Settings of units, trigger levels and alarms (see also "Trigger and Alarms [▶ 59]")
5	Calibration	Calibration of the UL1000 and UL1000 Fab (see also "Calibration [▶ 63]")
6	Settings	Settings of internal machine parameters (see also "Settings [▶ 63]")
7	Info	Information on the UL1000 and UL1000 Fab (electrical and vacuum data) and service menu (see also "Info [▶ 79]")
8	User authorization	Access restrictions (see also "User authorization [▶ 80]")

6.1.1 Overview of the menu paths

1. Level	2. Level	3. Level
Display [▶ 53]	Linear / logarithmic scaling [▶ 53]	
	Display-range auto/manual [▶ 54]	
	Time axis [▶ 54]	
	Contrast [▶ 55]	
	Background in standby [▶ 55]	
	Decimal places [▶ 56]	
	Lower display limit [▶ 56]	
Operation mode [▶ 56]	Sniff / Vacuum / Auto Leak Test	
Trigger and Alarms [▶ 59]	Trigger level 1 [▶ 59]	
	Trigger level 2 [▶ 60]	
	Volume [▶ 60]	
	Units [▶ 60]	
	Alarm delay [▶ 61]	
	Audio alarm type [▶ 61]	
Calibration [▶ 63]	Internal	Manual
		Automatic
	External	Edit leak rate
		Start

1. Level	2. Level	3. Level
Settings [▶ 63]	Vacuum settings [▶ 64]	Automatic purge (UL1000 Fab only) [▶ 64]
		Vent delay [▶ 64]
		Vacuum ranges [▶ 65]
		Auto leak test settings
		Machine factor [▶ 66]
		Internal test leak rate [▶ 66]
	Zero & Background [▶ 69]	Background suppression [▶ 69]
	Mass [▶ 70]	ZERO [▶ 69]
	Interfaces [▶ 70]	Paging function RC1000WL
		Control location [▶ 70]
		RS232 protocol [▶ 71]
		Recorder output [▶ 72]
		Scaling Recorder Output [▶ 73]
	Miscellaneous [▶ 74]	Date/Time [▶ 74]
		Language [▶ 74]
		Leak rate filter [▶ 75]
		Part number
		Mains frequency [▶ 75]
		Service interval exhaust filter [▶ 75]
		Maintenance message exhaust filter [▶ 75]
	Parameter save / load [▶ 76]	Save parameter set [▶ 76]
	monitoring [▶ 76]	Load parameter set [▶ 76]
		Calibration request
		Particle protection
		Contamination protection
		Pressure limits for sniff mode
		Maximum evacuation time
Info [▶ 79]	Display settings	Pressure limits for vacuum ranges
	Display internal data	
	Vacuum schematic	
	Error list display	
	Calibration history	
	Calibration factors	
	SERVICE	
User authorization [▶ 80]	Access to CAL function [▶ 80]	
	Changing the menu PIN [▶ 81]	
	Change device PIN [▶ 81]	

6.2 Display

- Main Menu > View
(see also "Main Menu [► 50]")

In this menu all features that influence the way data are displayed are put together.

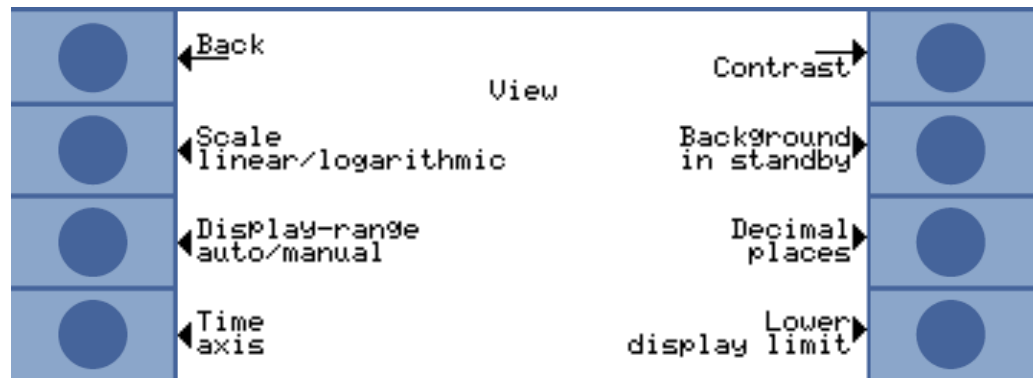


Fig. 20: View Menu

Key No.	Designation	Description
1	Back	Return to the main menu
2	Scale linear/logarithmic	Settings for bargraph and trend mode (see also "Linear / logarithmic scaling [► 53]")
3	Display-range auto/manual	Manual or automatic scaling (see also "Display-range auto/manual [► 54]")
4	Time axis	Time axis in trend mode (see also "Time axis [► 54]")
5	Contrast	Settings for display contrast (see also "Contrast [► 55]")
6	Background in standby	Background displayed in standby mode ON or OFF (see also "Background in standby [► 55]")
7	Decimal places	Selection of number of decimal places (see also "Decimal places [► 56]")
8	Lower display limit	Setting of the lower detection limit shown on the display (see also "Lower display limit [► 56]")

6.2.1 Linear / logarithmic scaling

- Main Menu > View > Scale linear/logarithmic
(see also "Main Menu [► 50]" and "Display [► 53]")

These settings apply to the bar graph (bar underneath the digits in measurement mode) and Y-axis in trend mode.

The scale of the bar graph can either be linear or logarithmic. With the arrows (up and down) it can be determined how many decades the bar graph covers.

Usually using a logarithmic scale is recommended because leak rates may change easily over several decades.

"Button no. 2": Linear

Pressing this button switches the linear scale on, starting at zero.

"Button no. 3": Arrow down (Number of decades)

Pressing this key reduces the number of displayed decades. The minimum value is 2 decades. Only available if "log" (button no. 6) was chosen.

"Button no. 6": Logarithmic

A logarithmic scale is used.

"Button no. 7": Arrow up (Number of decades)

Pressing this key increases the number of displayed decades. The maximum value is 9 decades. Only available if "log" (button no. 6) was chosen.

6.2.2 Display-range auto/manual

- Main Menu > View > Display-range auto/manual
(see also "Main Menu [► 50]" and "Display [► 53]")

The upper limit of the displayed leak rate range can be set manually or automatically. These settings apply to the bar graph (bar underneath the digits in measurement mode) and Y-axis in trend mode.

With the upper limit defined here the lower limit is set to a value based on the number of decades, see also "Linear / logarithmic scaling [► 53]".

"Button no. 2": Manual

The upper limit of the displayed range can be set manually.

"Button no. 3": Arrow down

Decreases the upper limit if manual is chosen. The minimum value is 10^{-11} mbar l/s.

"Button no. 6": Automatic

The limit of the displayed range will be chosen automatically.

"Button no. 7": Arrow up

Increases the upper limit if manual is chosen. The maximum value is 10^{+3} mbar l/s.

"Button no. 8":

Save the settings and return to the previous menu.

If a linear scale is selected, the lower limit is always zero. The upper limit is only a default value. You can change this on the measurement screen with button no. 6 and button no. 7 if you have chosen manual display ranging.

6.2.3 Time axis

- Main Menu > Display > Time axis
(see also "Main Menu [► 50]" and "Display [► 53]")

The length of the time axis in the trend mode can be changed in several steps from 16 s to 960 s.

"Button no. 3": Arrow down

Decrease the length of the time axis. The minimum value is 16 s.

In the "AUTO" setting, the time interval is automatically extended during measuring mode. The maximum value is 960 s.

"Button no. 5": ?

Help text

"Button no. 7": Arrow up

Increase the length of the time axis. The maximum value is 960 s.

6.2.4 Contrast

- Main Menu > View > Contrast
(see also "Main Menu [▶ 50]" and "Display [▶ 53]")

The contrast of the display can be changed. The changes are visible immediately. Under normal conditions a contrast setting of approx. 50 is recommended.



If by accident the display has been set too bright or too dark so that it can not be read off, this may be changed as follows:

Switch off the UL1000 and UL1000 Fab and turn it on again. During the run-up phase, press buttons no. 3 or no. 7 until you can read the display properly again. This setting is only saved in EPROM permanently when the setting is confirmed in the contrast menu. If there is no confirmation, the previous settings will be applied after switching the device on again.

"Button no. 3": Arrow down
Decrease the contrast (darker). The minimum values is 0.

"Button no. 4": Invert display
Invert the contrast of the display.

"Button no. 5": ?
Help text

"Button no. 7": Arrow up
Increase the contrast (lighter). The maximum values is 99.

6.2.5 Background in standby

- Main Menu > View > Background in Standby
(see also "Main Menu [▶ 50]" and "Display [▶ 53]")

The internal background signal can be displayed in standby mode (ON) or not (OFF). The factory setting is OFF.

"Button no. 3": OFF
The internal background signal will not be displayed.

"Button no. 5": ?
Help text

"Button no. 7": ON
The internal background signal will be displayed.

The internal background is generated by residual gas (e. g. helium) that has not been pumped down yet. Sources for residual gas are air or absorbed gases from the inner surfaces of the leak detector. This background will never disappear completely. Very clean systems which have been pumped down for a long time will show a background in the 10^{-11} mbar l/s range. Under normal conditions a background in the 10^{-10} mbar l/s or low 10^{-9} mbar l/s range is expected.

When pressing the START button the current internal background is subtracted from all further measured signals automatically. Thus it is made sure that only the net leak rate from test object is measured.

When the leak detector is switched to Standby/Vent again a new background is taken over after 25 s. The updated value is underlined. This means that if you press the START button and the background value is underlined, the current background

signal will be subtracted. If you press the START button and the background value is not underlined, the previous background signal from the last standby mode will be subtracted.

6.2.6 Decimal places

- Main Menu > View > Decimal places
(see also "Main Menu [► 50]" and "Display [► 53]")

The number of the displayed decimal places for the leak rate can be chosen. The factory setting is 1.

"Button no. 3": 1

The leak rate is displayed with one decimal place.

"Button no. 7": 2

The leak rate is displayed with two decimal places.

Two decimals are especially useful, when the I•CAL leak rate filter is used, see also "Leak rate filter [► 75]".

6.2.7 Lower display limit

- Main Menu > View > Lower display limit
(see also "Main Menu [► 50]" and "Display [► 53]")

This setting limits the display of the leak rate in the measurement mode. It is effective only for the vacuum mode.

"Button no. 3, 7":

Changing of the lower display limit between 1×10^{-5} and 1×10^{-12} mbar l/s.

"Button no. 5": ?

Help text

6.3 Operation mode

- Main Menu > Mode
(see also "Main Menu [► 50]")

The Mode menu enables through a sub menu the selection of the different operation modes.

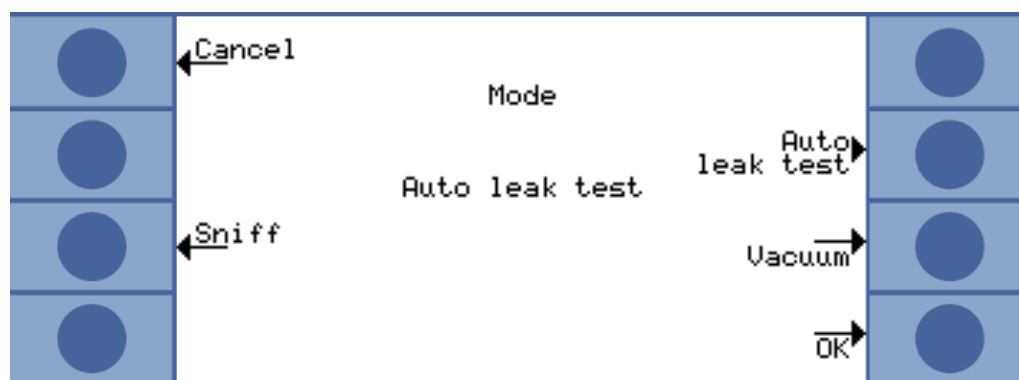


Fig. 21: The Mode Menu

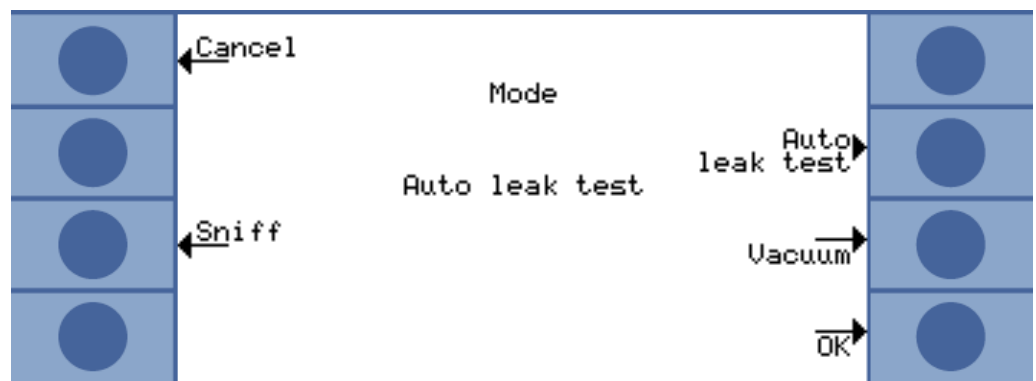
Button no.	Designation	Description
1	Cancel	Return to the main menu without any changes.

Button no.	Designation	Description
3	Sniffing	The sniffer mode is used. (see also "Sniffer mode [► 45]")
6	Auto leak test	See also "Auto Leak Test [► 57]".
7	Vacuum	The normal vacuum mode is used.
8	OK	Save the settings and return to the previous menu.

6.3.1 Auto Leak Test

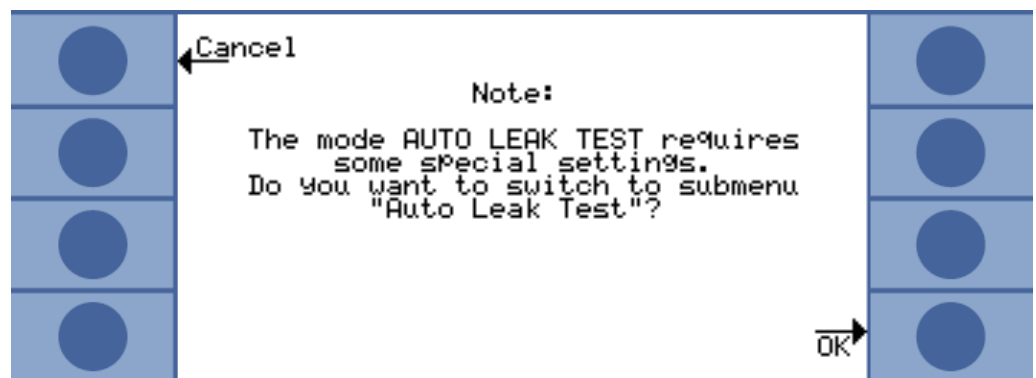
- Main Menu > Mode > Auto Leak Test
(see also "Main Menu [► 50]" and "Operation mode [► 56]")

After selecting the operation mode "Auto Leak Test" the following screen appears on the display:

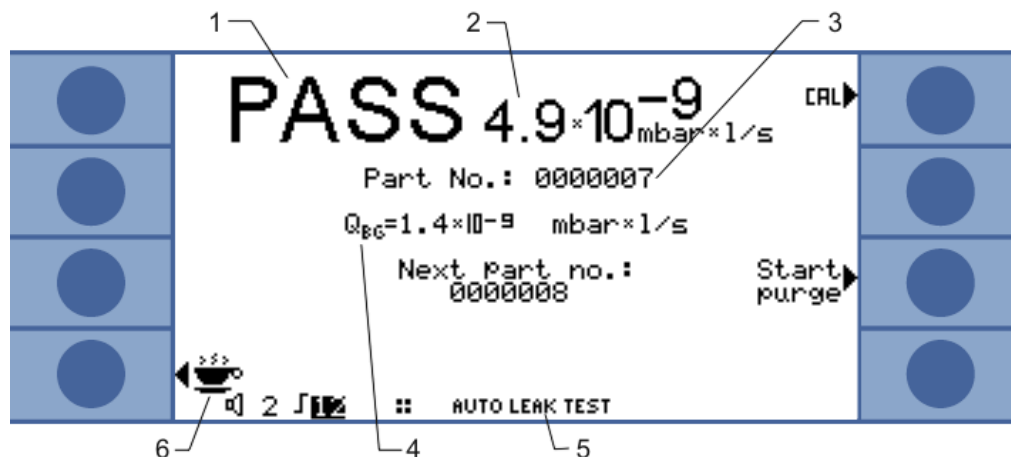


When the button "OK" is pressed, the "Settings" menu is called up, see also "Auto Leak Test settings [► 66]".

Note: The UL1000 can request a calibration if the operating mode is changed. In such a case, an information message appears.



After the test has been completed, the image on the standby display shows these settings:



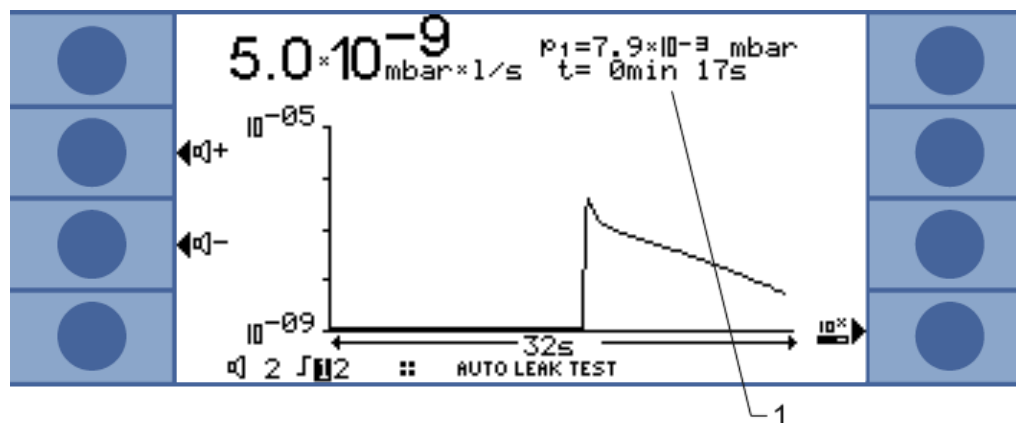
1	Test result	4	Background
2	Measured leak rate	5	Mode
3	Number of the tested test object	6	Pause

Testing of test objects

The test can be started with the "START" button. When using the test chamber TC1000, the test starts automatically when closing the test chamber lid. After the set cycle time or if the measured leak rate has gone below the trigger level the test stops and the chamber will be vented.

The test can be stopped any time by pressing the "Stop" button.

After starting, the test runs according to the set presets:



1	Remaining measuring time
---	--------------------------

Shut down

When the test chamber should remain under vacuum after switching off the device, press the pause button . Follow the instructions on the display and switch off the leak detector.

This function can also be used if a test should be interrupted. You can start measuring again by pressing the button "RESTART".

6.4 Trigger and Alarms

- Main menu > Trigger & Alarms
(see also "Main Menu [► 50]")

The trigger levels, the volume of the acoustic signal and the units of leak rates and pressures can be set in this menu.

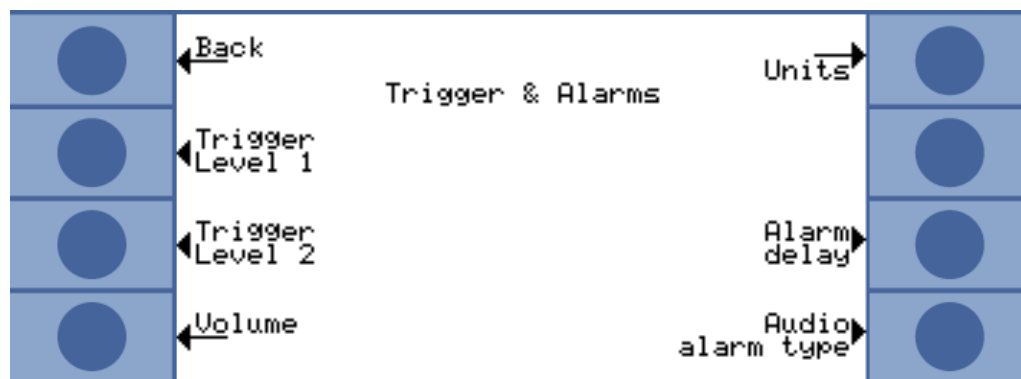


Fig. 22: Trigger & Alarms Menu

Button no.	Designation	Description
1	Back	
2	Trigger level 1	Definition of Trigger level 1 (see also "Trigger level 1 [► 59]")
3	Trigger level 2	Definition of Trigger level 2 (see also "Trigger level 2 [► 60]")
4	Volume	See also "Volume [► 60]"
5	Units	Selection of leak rate and pressure units (see also "Units [► 60]")
7	Alarm delay	See also "Alarm delay [► 61]"
8	Audio alarm mode	Selection of different alarm types (see also "Audio alarm type [► 61]")

6.4.1 Trigger level 1

- Main Menu > Trigger & Alarms > Trigger level 1
(see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

The value for trigger level 1 can be set here, see also "Numerical input [► 42]" for the description of the entry.

Trigger 1 and Trigger 2 are programmable switching thresholds. When these thresholds are exceeded the UL1000 or UL1000 Fab reacts as follows:

Display

In the status line of the display the signs for Trigger 1 and Trigger 2 are displayed inverted as soon as the set leak rates are exceeded (i.e. if the measured leak rate exceeds the programmed value).

Relay output

The trigger-relais of the digital output switches, see also "Digital Out [► 25]" for further details.

Alarm/Speaker

Additionally trigger level 1 defines the trigger thresholds for the various alarms, see also "Audio alarm type [► 61]".

6.4.2 Trigger level 2

- Main Menu > Trigger & Alarms > Trigger level 2
(see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

The value for trigger level 2 can be set here, see also "Numerical input [► 42]" for the description of the entry.

If trigger level 2 is exceeded the corresponding relay switches. This is also indicated on the display, see also "Trigger level 1 [► 59]".

6.4.3 Volume

- Main Menu > Trigger & Alarms > Volume
(see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

The minimum volume and the current volume of the acoustic signal can be set here.

The minimum volume is the volume for the acoustic alarm signal that cannot be exceeded. Thus it is avoided that the volume setting is accidentally set to a value that is below the noise level of the environment.

The current volume can be set between 15 (maximum) and the value defined as minimum volume.

"Button no. 2": Arrow down

Decrease the minimum volume. The minimum values is 0.

"Button no. 3": Arrow down

Decrease the current volume. The minimum settable value is limited by the minimum volume.

"Button no. 4": Beep off/on

"Button no. 5": ?

Help text

"Button no. 6": Arrow up

Increase the minimum volume. The maximum value is 15.

"Button no. 7": Arrow up

Increase the current volume. The maximum value is 15.

6.4.4 Units

- Main Menu > Trigger & Alarms > Units
(see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

The preferred units can be selected. You can select between 4 pressure units (mbar, Pa, atm, Torr) and 5 leak rate units (mbar l/s, Pa m³/s, Torr l/s, atm cc/s).

Note: In sniffer mode the following measuring units are additionally selectable: ppm, g/a eq (helium leak rate equivalent to R134a), oz/gr eq (helium leak rate equivalent to R134a).

"Button no. 2": Arrow up

Scroll up through the selection rows to select a pressure unit.

"Button no. 3": Arrow down
 Scroll down through the selection rows to select a pressure unit.

"Button no. 6": Arrow up
 Scroll up through the selection rows to select a leak rate unit.

"Button no. 7": Arrow down
 Scroll down through the selection rows to select a leak rate unit.

6.4.5 Alarm delay

- Main Menu > Trigger & Alarms > Alarm delay
 (see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

In some applications (e. g. during pump down of a "test chamber system") it might be necessary to block an alarm for some time after pressing the "START" button.

This delay time of the alarm can be changed here.

"Button no. 3": Arrow down
 Decrease the delay time. The minimum value is 0 s.

"Button no. 5": ?
 Help text

"Button no. 7": Arrow up
 Increase the delay time. The maximum value is 10 min up to infinity.

After pressing the START button the acoustic signal is activated as soon as the leak rate falls below trigger level 1 or the alarm delay time expires. This setting only applies to the acoustic alarm types "Setpoint" and "Trigger alarm", see also "Audio alarm type [► 61]".

6.4.6 Audio alarm type

- Main Menu > Trigger & Alarms > Audio alarm type
 (see also "Main Menu [► 50]" and "Trigger and Alarms [► 59]")

The optimum alarm type should be selected depending on the task.

"Button no. 2": Pinpoint
 This function is used to localize a leak of known size, see also "Pinpoint [► 62]".

"Button no. 3": Prop. leak rate
 The sound pitch is proportional to the leak rate. This alarm type is the most frequently used, see also "Leakage Rate Proportional [► 62]".

"Button no. 5": ?
 Help text

"Button no. 6": Setpoint
 The sound pitch is proportional to the leak rate, but a sound is only generated when the leak rate has exceeded trigger 1, see also "Setpoint [► 62]".

"Button no. 7": Trigger alarm
 A constant alarm signal is generated as soon as trigger level 1 is exceeded, see also "Trigger alarm [► 62]".

6.4.6.1 Pinpoint

The tone of the acoustic signal changes its frequency only within a leak rate window which comprises a range from a decade below the value of trigger level 1 to a decade above the value of trigger level 1. Below this window the sound is constantly low and above the window it is constantly high.

For example: The trigger level 1 is 4×10^{-7} mbar l/s. Thus the window ranges from 4×10^{-8} mbar l/s up to 4×10^{-6} mbar l/s.

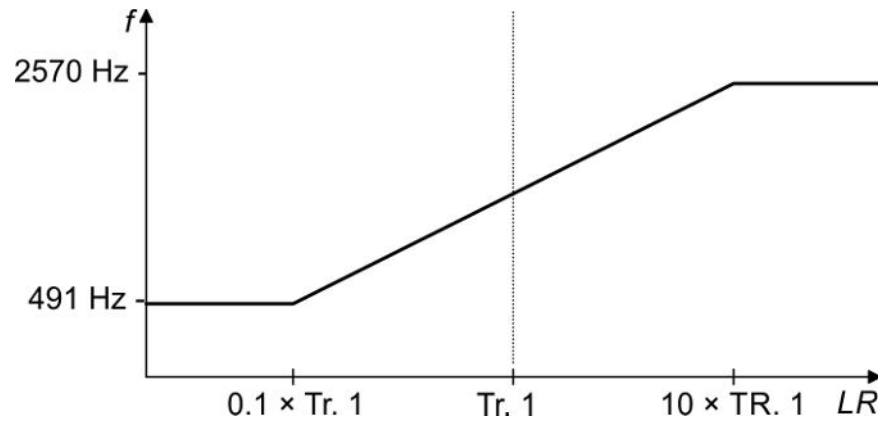


Fig. 23: Pinpoint

6.4.6.2 Leakage Rate Proportional

The frequency of the audible signal is proportional to the bar graph display. The frequency range is 300Hz to 3300Hz. See also "Linear / logarithmic scaling [► 53]" for the definition of the number of decades.

6.4.6.3 Setpoint

The acoustic signal is off as long as the leak rate is below the value of trigger level 1. Above trigger level 1 the tone varies proportional to the leak rate.

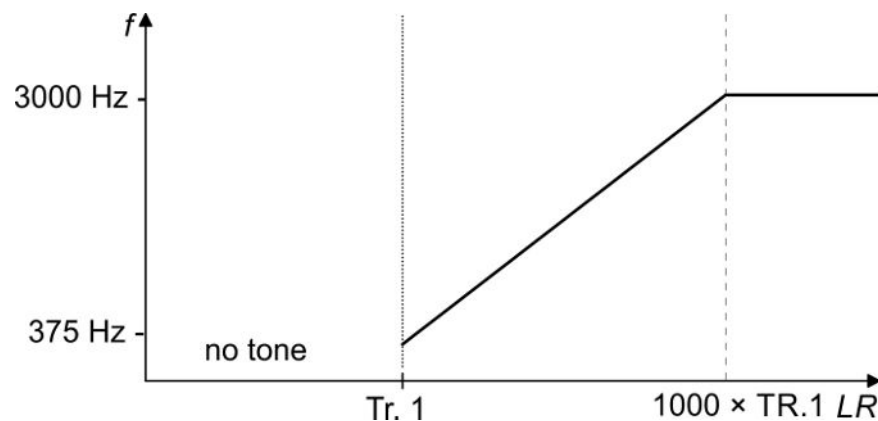


Fig. 24: Setpoint

6.4.6.4 Trigger alarm

As soon as the leak rate exceeds the value for trigger level 1, a multi-frequency signal is generated. This does not vary as the leak rate varies.

6.5 Calibration

- Main Menu > Calibration
(see also "Main Menu [▶ 50]")

See also "Calibration [▶ 82]" for a detailed description of the calibration.

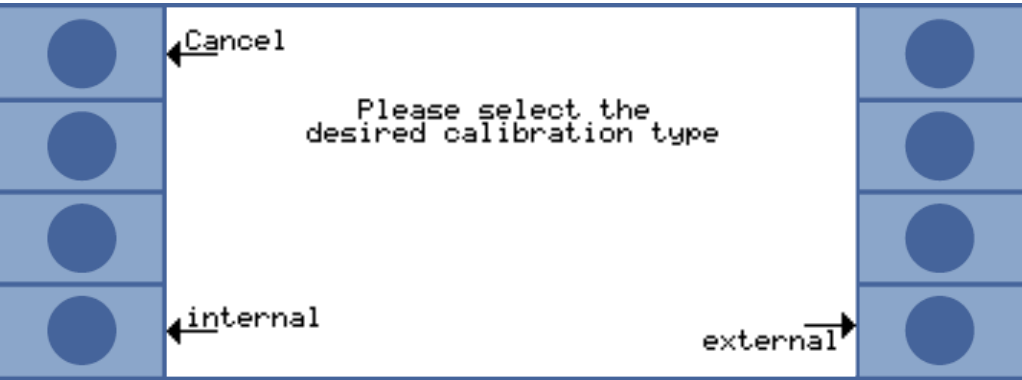


Fig. 25: Calibration Menu

6.6 Settings

- Main Menu > Settings
(see also "Main Menu [▶ 50]")

This menu allows to observe and to change the settings of the device.

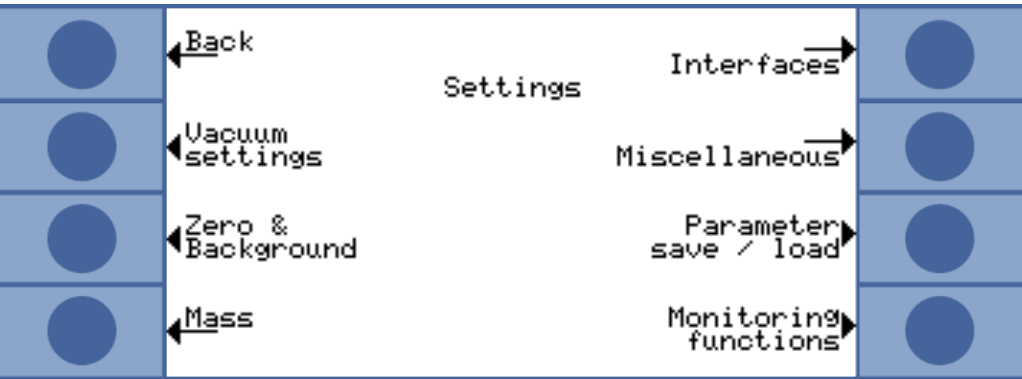


Fig. 26: Settings menu

Button no.	Designation	Description
1	Back	Return to the main menu
2	Vacuum settings	Settings related to the vacuum system (see also "Vacuum settings [▶ 64]")
3	Zero & Background	Settings related to zero and underground (see also "Zero & Background [▶ 69]")
4	Mass	Switching between helium and hydrogen (see also "Mass [▶ 70]")
5	Interfaces	The connections of the recorder outputs (analog outputs) can be defined here and the location of the control unit (loc. RS232, PLC) can be chosen. (see also "Interfaces [▶ 70]")

Button no.	Designation	Description
6	Miscellaneous	Settings that are rarely set can be changed here (date, language). (see also "Miscellaneous [▶ 74]")
7	Loading / saving parameters	See also "Parameter save / load [▶ 76]"
8	monitoring	Protective functions of the UL1000 and UL1000 Fab can be selected. (see also "monitoring [▶ 76]")

6.6.1 Vacuum settings

- Main Menu > Settings > Vacuum settings
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

This menu allows to observe and to change the settings for the vacuum system.

"Button no. 2": Automatic purge (UL1000 Fab only)
(see also "Automatic purge (UL1000 Fab only) [▶ 64]")

"Button no. 3": Vent delay
(see also "Vent delay [▶ 64]")

"Button no. 4": Vacuum ranges
(see also "Vacuum ranges [▶ 65]")

"Button no. 5": Auto Leak Test settings
(see also "Auto Leak Test settings [▶ 66]")

"Button no. 6": Leak rate internal test leak
(see also "Internal test leak leak rate [▶ 66]")

"Button no. 7": Machine factor
(see also "Machine factor [▶ 66]")

6.6.1.1 Automatic purge (UL1000 Fab only)

- Main Menu > Settings > Vacuum settings > Automatic purge (UL1000 Fab only)
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Vacuum settings [▶ 64]")

Through this menu it is possible to set an automatic purge for a duration of 20 s when switching from measuring mode to standby mode, see also "Purging [▶ 47]".

"Button no. 2": Off
Automatic purge is switched off.

"Button no. 3": On
Automatic purge is switched on. When switching from measuring mode to standby mode the backing pump is purged automatically for 20 s.

6.6.1.2 Vent delay

- Main Menu > Settings > Vacuum settings > Vent delay
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Vacuum settings [▶ 64]")

With this menu item it is possible to define the delay time until the inlet port is vented after pressing the Stop button. When the Stop button is pressed for a period of time which is shorter than the vent delay time specified here, the UL1000 or UL1000 Fab will only change to standby mode.

When the Stop button is pressed for a period of time which is longer than the vent delay time specified here, the inlet port will be vented.

"Button no. 2": Immediately

The inlet port will be vented immediately after pressing the Stop button.

"Button no. 3": After 1 second

The inlet port will be vented with a time delay of 1 s.

"Button no. 4": After 1.5 seconds

The inlet port will be vented with a time delay of 1.5 s.

"Button no. 5": ?

Help text

"Button no. 6": After 2 seconds

The inlet port will be vented with a time delay of 2 s.

"Button no. 7": No vent

The inlet port can not be vented with the Stop button.

6.6.1.3 Vacuum ranges

- Main Menu > Settings > Vacuum settings > Vacuum ranges
(see also "Main Menu [► 50]", "Settings [► 63]" and "Vacuum settings [► 64]")

With this menu it is possible to adjust different operating modes for the leak detection process. These settings are only active in vacuum mode, see also "Operation mode [► 56]".

"Button no. 2": ULTRA ONLY

In this mode the UL1000 and UL1000 Fab remains in the "ULTRA" range after falling below 0.4 mbar at the inlet flange, see also "Vacuum mode [► 43]". When showing the pressure at the inlet flange > 0.4 mbar the UL1000 or UL1000 Fab switches immediately into the operation mode "evacuation".

"Button no. 3": FINE ONLY

In this operation mode the UL1000 or UL1000 Fab remains in the "FINE" range after falling below 2 mbar at the inlet flange. Valve V1a will be closed. When the pressure at the inlet flange is increasing > 1 mbar the UL1000 or UL1000 Fab switches immediately into the operation mode evacuation. The minimum detectable leak rate of "FINE ONLY" is 1×10^{-10} mbar l/s.

The advantage of FINE ONLY is that no valves switch during measuring mode in this setting.

"Button no. 4": SOFTPUMP

In this mode the UL1000 or UL1000 Fab keeps the valve V1a closed when pumping down in "GROSS" and "FINE" mode. In this way, the pumping speed is reduced by a factor of approx. 2.

"Button no. 5": ?

Help text

"Button no. 6": HIGHPUMP (UL1000 only)

In this mode the UL1000 / UL1000 Fab keeps the valve V1a opened in "ULTRA" mode to increase the pumping speed at the inlet port. This helps shortening the pump down time for testing bigger test objects.

"Button no. 7": All ranges (default settings)

This is the default setting, see also "Vacuum mode [► 43]".

6.6.1.4 Internal test leak leak rate

- Main Menu > Settings > Vacuum settings > Internal test leak leak rate
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Vacuum settings [▶ 64]")

The value of the internal test leak can be entered here. See also "Numerical input [▶ 42]" for the description of the entry.



Normally there is no reason to edit the leak rate of the internal test leak except after a change of the internal test leak. False specifications for the leak rate of the internal test leak lead to incorrect leak rate measurements!

6.6.1.5 Machine factor

- Main Menu > Settings > Vacuum settings > Machine factor
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Vacuum settings [▶ 64]")

The machine factor takes into account that an external pumping system is used. On the basis of an internal calibration, all measured leak rates would be too small in such a case. The measured leak rates are multiplied with the machine factor and the results are displayed. This factor is used only in vacuum mode (and not in sniffing mode).

See also "Numerical input [▶ 42]" for the description of the entry.

The machine factor can be estimated by taking into consideration the helium absorbing capability of the UL1000 and UL1000 Fab and the external pump.

More accurate is the measurement of the leak rate of an external test leak on the test object - once with and once without the external pump switched on. The difference between the results determines the machine factor.

If the helium sniffer QT 100 is used, the machine factor must be set to the value 400.

The machine factor can also be used to correct the leak rate display with respect to an air equivalence. The machine factor for this correction is 3.7×10^{-1} . If this setting is used, the status on the display is indicated by "COR".

6.6.1.6 Auto Leak Test settings

- Main Menu > Settings > Vacuum settings > Auto Leak Test settings
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Vacuum settings [▶ 64]")

All parameters for tests on hermetic sealed test objects can be set.

Measuring time

The measuring time can be set between a minimum and a maximum value.

Settings (Time)	Interval
1 - 20 s	1 s steps
20 - 30 s	2 s steps
30 - 60 s	5 s steps
1 - 3 min	10 s steps
3 - 10 min	30 s steps
10 - 30 min	1 min steps

The measuring time (maximum value) depends on the volume of the chamber, volume of the test object and the rejection leak rate.

If the set trigger level (trigger level 1) is fallen below during measuring, measuring is ended with the result "PASS", even if the maximum value of the measuring time has not yet been reached.



Fig. 27: Measuring time, minimum and maximum value

Examples for time settings (using the Inficon Test Chamber with a volume of 430 cm³):

Range of rejection leak rate	Measuring time
10E-5	2 s
10E-6	2 s
10E-7	2 s
10E-8	> 5 s
10E-9	> 10 s*

*external calibration with a 10E-9 test leak (i.e. TL 9) is recommended.

Note: If the measuring time has been changed, a calibration is requested.

Trigger level 1

The rejection leak rate for a test object can be in the range from 10E-1 to 10E-9 mbar l/s.



Series error messages

The number of failed test objects in series can be set from 1 to 9. In the mode "disabled" this function is switched off.



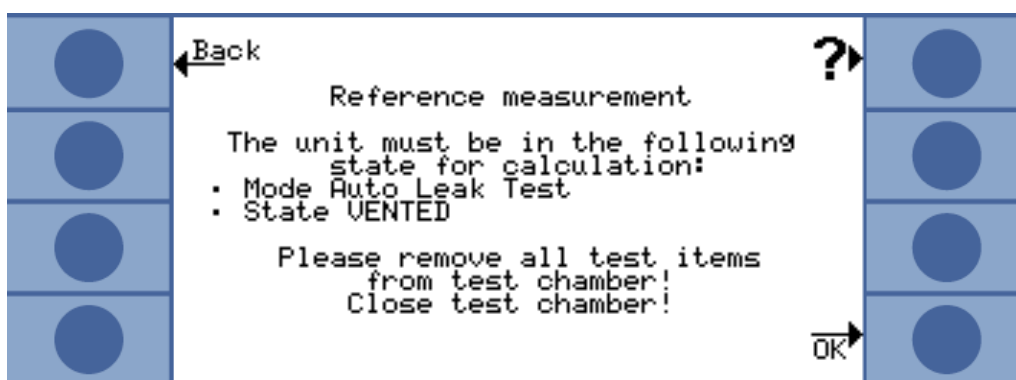
When the button "OK" is pressed, a reference measurement can be performed to clean the test chamber and measure the level of the helium background. This is subtracted from the result in the following measurements.

Parts under test

The number of the first test object can be entered. The number counts automatically up until the next test cycle. In the mode "disabled" this function is switched off.



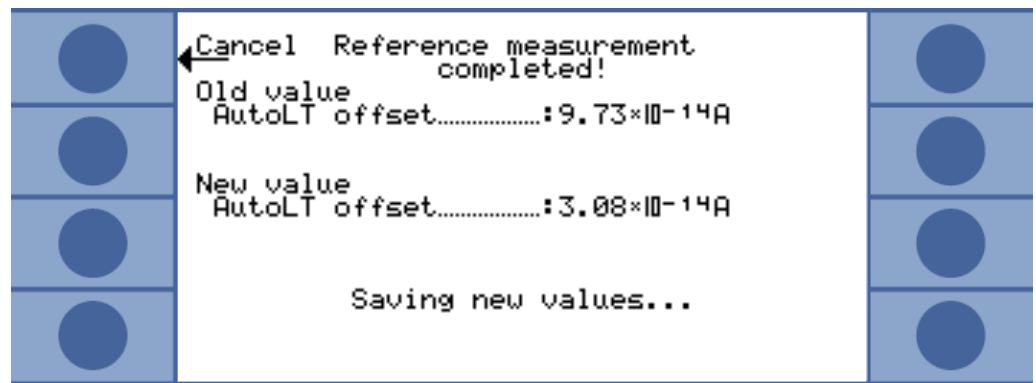
Reference measurement



This mode can be used to clean up the test chamber from helium backgrounds or after a series of failed tests. The chamber is evacuated 3 times and vented.

The reference measurement includes a calibration procedure with the internal test leak TL of the UL1000. After this clean up the current helium background is measured and will be subtracted from the results of the following measurements.

The new values of the measured background will be saved automatically:



6.6.2 Zero & Background

- Main Menu > Settings > Zero & Background
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

The background suppression within the UL1000 and UL1000 Fab as well as the characteristics of the ZERO functions can be selected here.

"Button no. 3": Background suppression
(see also "Background suppression [▶ 69]")

"Button no. 7": ZERO
(see also "ZERO [▶ 69]")

6.6.2.1 Background suppression

- Main Menu > Settings > Zero & Background > Background Suppression
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Zero & Background [▶ 69]")

For each measurement, the internal helium background is subtracted by pressing the "START" button.

"Button no. 3": Off

The internal background suppression is switched off.

"Button no. 7": On (default setting)

The internal background is measured when the START button is pressed and subtracted from the measuring signal.

6.6.2.2 ZERO

- Main Menu > Settings > Zero & Background > ZERO
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Zero & Background [▶ 69]")

This setting enables (respectively disables) the Z"ZERO" button on the control panel.

"Button no. 2" ZERO at ULTRA

This setting automatically activates the ZERO function as soon as the "ULTRA" measuring range is reached for the first time after pressing the "START" button. In this operation mode the background suppression also can be used manually by pressing the ZERO button.

"Button no. 3": locked

The button ZERO on the control unit is locked.

"Button no. 5": ?

Help text

"Button no. 6" I•ZERO

In this setting, the slope of the falling background signal is measured. The leak rate signal must be sufficiently stable to find a leak about the size of the set trigger 1.

This is displayed in the status bar with the signal "STABLE", see also "Status line of the display [► 48]".

With the I•ZERO function, the background suppression is locked as long as the leak rate signal is not stable enough (gradient of the falling background signal is > 0.5x set trigger level 1). The set trigger level 1 is displayed in the display when the I•ZERO function is activated.

"Button no. 7": Enable

The ZERO function can be activated using the ZERO button on the control unit.

6.6.3 Mass

- Main Menu > Settings > Mass
(see also "Main Menu [► 50]" and "Settings [► 63]")

The mass of the tracer gas used can be set here. For this the UL1000 or UL1000 Fab must be in standby mode.

"Button no. 2": H₂ (2 amu)

Hydrogen with the mass of 2 amu will be measured.

"Button no. 3": ³He (3 amu)

The isotop of helium with the mass of 3 amu will be measured.

"Button no. 7": ⁴He (4 amu)

Helium with the mass of 4 amu will be measured.

6.6.4 Interfaces

- Main Menu > Settings > Interfaces
(see also "Main Menu [► 50]" and "Settings [► 63]")

The parameters of the interfaces can be set here.

The recorder output has 2 channels, see also "Connections for accessories and control signals [► 24]".

"Button no. 3": Control Location

(see also "Control location [► 70]")

"Button no. 4": RS232 Protocol

(see also "RS232 protocol [► 71]")

"Button no. 6": Remote protocol

(see also "RS232 protocol [► 71]")

"Button no. 7": Recorder output

(see also "Recorder output [► 72]")

"Button no. 8": Scaling Recorder Output

(see also "Scaling Recorder Output [► 73]")

6.6.4.1 Control location

- Main Menu > Settings > Interfaces > Control Location
(see also "Main Menu [► 50]", "Settings [► 63]" and "Interfaces [► 70]")

"Button no. 2": PLC

The UL1000 or UL1000 Fab is controlled via the Digital In connector, see also "Digital In [► 27]". The buttons "START", "Stop" and "ZERO" on the device are locked.

"Button no. 3" RS232

The UL1000 or UL1000 Fab is controlled via the RS232 interface by an external computer. In this operation mode the UL1000 and UL1000 Fab can not be controlled via keyboard.

"Button no. 4": All

The UL1000 or UL1000 Fab can be operated via the Digital In connector, the RS232 interface and the keyboard.

"Button no. 5": Local & PLC

The UL1000 or UL1000 Fab is controlled via the buttons START, Stop and ZERO on the device and the Digital In connectors.

"Button no. 6": Local & RS232

The UL1000 or UL1000 Fab is controlled via the buttons START, Stop and ZERO on the device and the RS232 interface.

"Button no. 7": Local

The UL1000 or UL1000 Fab is controlled via the buttons START, Stop and ZERO.

6.6.4.2 RS232 protocol

- Main Menu > Settings > Interfaces > RS232 Protocol
(see also "Main Menu [► 50]", "Settings [► 63]" and "Interfaces [► 70]")

"Button no. 3": Diagnostics

Allows the reading of device parameters, e.g. during maintenance.

"Button no. 4": Printer Manual

In this setting, leak rates can be sent via the RS232 interface to printers with an RS232 input or to PCs. The measured values can be read out using standard hyperterminal programs.

The transmission rate of the printer function is fixed at 9600 baud, 8N1. The connected devices must be set to these parameters. The leak rate is output in this format:

"LR = 1.00E-10 09.Apr.07 08:25 MEAS"

LR	Leak rate
	In case of overflow or underflow the symbol < (leak rate is less than the stated value) or > (leak rate is greater than the stated value) is output accordingly.
1.00E-10	Output of the leak rate in the unit set up, followed by date and time.
MEAS	The UL1000 / UL1000 Fab is in measuring mode.

The information is output in measuring mode by pressing the "START" button or activating the "START" input on the "Digital In" connector.

"Button no. 5": ?

Help text

"Button no. 6": UL2xxLeak Ware

When a PC is connected to the control unit, it allows measurement values to be read out via the "Leak Ware" software package (for operation of the Leak Ware, see the corresponding operating instructions).



The calibration function of the Leak Ware is not suitable for operation with the UL1000 and UL1000 Fab.

- Please execute the "STORE DATE" function in the "Single Part Measurement" operation mode so that the measured value recording starts.

"Button no. 7": ASCII

Allows operation of the UL1000 and UL1000 Fab via a RS232 terminal. For details, see the interface description of the device.

6.6.4.3 Recorder output

- Main Menu > Settings > Interfaces > Recorder output
(see also "Main Menu [► 50]", "Settings [► 63]" and "Interfaces [► 70]")

The signals to be recorded by the recorder at both recorder outputs can be set in this submenu.

"Button no. 1": Cancel

Return to the previous menu without any changes of the current settings.

"Button no. 2": Arrow up

Select recorder output 1 or 2.

"Button no. 3": Arrow down

Select recorder output 1 or 2.

"Button no. 5": ?

Help text

"Button no. 6": Arrow up

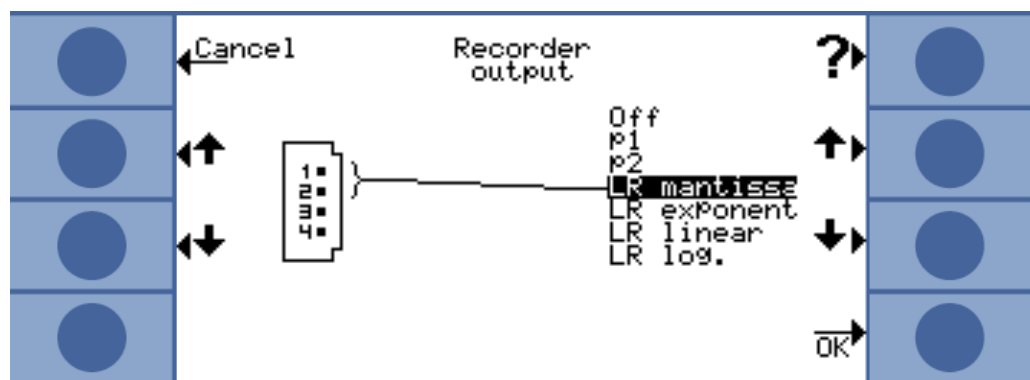
Select the output signal of the recorder output. Further information can be found under the keywords below.

"Button no. 7": Arrow down

Select the output signal of the recorder output. Further information can be found under the keywords below.

"Button no. 8": OK

Saving of set parameters



Off

The recorder output is switched off (0 V).

p1 / p2

The inlet pressure p1 or the foreline pressure p2 is recorded. The output voltages are scaled logarithmically.

The signals p1 and p2 behave as the characteristic curve of the TPR265, see also "Diagram [► 109]".

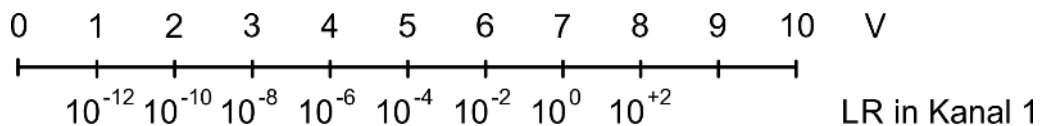
LR lin

The output voltages are scaled linearly. The output voltage is 0 V to 10 V in scalable steps from 0.5 V to 10 V per decade.

For setting the scaling see also "Scaling Recorder Output [► 73]".

LR log

The output voltages are scaled logarithmically. The output voltage is 1 V to 10 V in scalable steps from 0.5 V to 10 V per decade.



For setting the scaling see also "Scaling Recorder Output [► 73]".

LR mantisse

The leak rate mantissa is output linearly from 1 V to 10 V.

LR exponent

The exponent is output as a step function: $U = 1 \text{ V}$ to 10 V with steps of 0,5 V per decade starting with $1 \text{ V} = 1 \times 10^{-12}$.

6.6.4.4 Scaling Recorder Output

- Main Menu > Settings > Interfaces > Scaling Recorder Output
(see also "Main Menu [► 50]", "Settings [► 63]" and "Interfaces [► 70]")

In this sub-menu you can adjust the scaling of the recorder outputs. This setting is only possible when selecting the signals LR lin or LR log.

"Button no. 2": Arrow down
Set decade of the upper limit value.

"Button no. 3": Arrow down
Scaling of the previously set range in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade, where the complete range is 10 V (only for "LRlog").

"Button no. 6": Arrow up
Set decade of the upper limit value.

"Button no. 7": Arrow up
Scaling of the previously set range in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade, where the complete range is 10 V (only for "LRlog").

For example:

Upper limit value is set to 10^{-5} (= 10 V)

Scaling is set to 5 V/decade

Lower limit value consequently is 10^{-3} (= 0 V)

6.6.4.5 Protocol Remote Control

- Main Menu > Settings > Interfaces > Protocol Remote Control
(see also "Main Menu [► 50]", "Settings [► 63]" and "Interfaces [► 70]")

"Button no. 3": RC1000 protocol

Allows the RC1000 remote control to be operated via the RJ socket on the leak detector, see also "Remote control RC1000/Wireless transmitter/SMART-Spray [► 29]".

"Button no. 5": ?

Help text

"Button no. 7": LD protocol

Allows the SMART-Spray to be operated via the RJ socket on the leak detector, see also "Remote control RC1000/Wireless transmitter/SMART-Spray [► 29]".

6.6.5 Miscellaneous

- Main Menu > Settings > Miscellaneous
(see also "Main Menu [► 50]" and "Settings [► 63]")

The current date and time, the preferred language and the mains frequency can be set in this submenu.

"Button no. 2": Time&Date

(see also "Date/Time [► 74]")

"Button no. 3": Language

(see also "Language [► 74]")

"Button no. 4": Leak rate filter

(see also "Leak rate filter [► 75]")

"Button no. 6": Mains frequency

(see also "Mains frequency [► 75]")

"Button no. 7": Service interval exhaust filter

(see also "Service interval exhaust filter [► 75]")

"Button no. 8": Maintenance message exhaust filter

(see also "Maintenance message exhaust filter [► 75]")

6.6.5.1 Date/Time

- Main Menu > Settings > Miscellaneous > Time&Date
(see also "Main Menu [► 50]", "Settings [► 63]" and "Miscellaneous [► 74]")

The settings for date and time can be changed on the two subsequent pages. See also "Date/Time [► 74]" for the description of the entry.

6.6.5.2 Language

- Main Menu > Settings > Miscellaneous > Language
(see also "Main Menu [► 50]", "Settings [► 63]" and "Miscellaneous [► 74]")

The preferred language can be selected with the buttons 3 and 7. The factory setting is English.

Selectable languages: English, German, French, Italian, Spanish, Polish, Chinese (Mandarin), Japanese (Katakana), Korean



The factory language setting (English) can be reset by pressing the buttons 2 and 6 simultaneously during run-up of the leak detector.

6.6.5.3 Leak rate filter

- Main Menu > Settings > Miscellaneous > Leak rate filter
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Miscellaneous [▶ 74]")

The leak rate filter type can be selected here. The factory settings is "I•CAL".

"Button no. 3": Fixed

A filter with a fixed time constant will be used.

"Button no. 5": ?

Help text

"Button no. 7" I•CAL

I•CAL ensures that the averaging time is optimally adapted to the leak rate range.

The abbreviation I•CAL stands for Intelligent Calculation Algorithm for Leakrates. This ensures that the signals are averaged at optimal time intervals and this is based on each leak rate range. I•CAL also determines interference spikes, which bear no relevance to the leak rate signals and delivers unusually short reaction times even with low leak rate signals.

The algorithm used provides excellent sensitivity and response time; the use of this setting is strongly recommended.

6.6.5.4 Mains frequency

- Main Menu > Settings > Miscellaneous > Mains frequency
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Miscellaneous [▶ 74]")

This mains frequency setting takes the mains frequency-dependent pumping speed of the scroll pump into account. The frequency of the used mains supply can be entered here. The factory setting is 50 Hz for 230 V and 60 Hz for 115 V.

"Button no. 3": 50 Hz

The UL1000 or UL1000 Fab are operated on a 50 Hz mains supply.

"Button no. 6": 60 Hz

The UL1000 or UL1000 Fab are operated on a 60 Hz mains supply.

6.6.5.5 Service interval exhaust filter

- Main Menu > Settings > Miscellaneous > Service interval exhaust filter
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Miscellaneous [▶ 74]")

Here you can enter the maintenance interval of the exhaust filter.

"Button no. 3": Down

Decrease of the service interval in steps of 500 hours.

"Button no. 5": ?

Help text

"Button no. 7": Up

Increase of the service interval in steps of 500 hours. Upper limit 4000 h.

6.6.5.6 Maintenance message exhaust filter

- Main Menu > Settings > Miscellaneous > Maintenance message exhaust filter
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Miscellaneous [▶ 74]")

The exhaust filter must be maintained at regular intervals to ensure the correct function of the UL1000 and UL1000 Fab. If this message is activated, the UL1000 or UL1000 Fab reminds the user of the due maintenance.

"Button no. 3": Off

"Button no. 5": ?

Help text

"Button no. 7": On



NOTICE

Property damage due to overheating of the pump motor

If the service message is ignored and the exhaust filter is not replaced a risk of overheating the pump motor exists.

6.6.6 Parameter save / load

Main Menu > Settings > Parameter save / load

(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

Allows individual settings to be saved and loaded or reset to the factory settings.

"Button no. 2": to "button no. 4":

The current settings can be saved under a freely selectable name. The saving of 3 different sets is possible.

(see also "Save parameter set [▶ 76]")

"Button no. 5": Load default values

The factory setting are loaded again.

"Button no. 6": to "button no. 8":

One of 3 saved parameter sets can be loaded.

(see also "Load parameter set [▶ 76]")

6.6.6.1 Load parameter set

- Main Menu > Settings > Parameter save / load > Load
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Parameter save / load [▶ 76]")

One of the 3 stored parameter sets can be called up by pressing the buttons 6, 7 or 8. This sentence is first displayed and can then be accepted (button 8) or rejected (button 1).

6.6.6.2 Save parameter set

- Main Menu > Settings > Parameter save / load > Save
(see also "Main Menu [▶ 50]", "Settings [▶ 63]" and "Parameter save / load [▶ 76]")

Press the buttons 2, 3 or 4 to start saving the current parameters. The parameter set is given a name for this. If the suggested name should be changed, this can be done using button 4 "Change name". Otherwise, press button 8 "Save".

6.6.7 monitoring

- Main Menu > Settings > Monitoring functions
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

Calibration request

- Main Menu > Settings > Monitoring functions > Calibration request
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

Here you can set whether or not the operator should be reminded of the need for calibration. The factory setting is "Off".

"Button no. 3": Off

The calibration request does not appear.

"Button no. 7": On

The calibration request appears.

If the calibration request is switched on, a corresponding message will appear when 30 min have elapsed after powering on or if the temperature of the UL1000 and UL1000 Fab has changed by more than 5 °C (9 °F) since the last calibration.

Particle protection

- Main Menu > Settings > Monitoring functions > Particle protection
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

This mode can be switched on and off.

If this mode is switched on the UL1000 or UL1000 Fab will first start to pump down when the inlet pressure has dropped below 1 mbar, i.e. it is assumed that the test object is pumped down by another pump in parallel.

Purpose: If the leak detector itself does not have to pump down gas at high pressures, no particles that might possibly be carried in the gas flow can enter the leak detector.

"Button no. 3": Off

"Button no. 5": Help text

"Button no. 7": On

Contamination protection

- Main Menu > Settings > Monitoring functions > Contamination protection
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

If this mode is switched on the UL1000 or UL1000 Fab closes all inlet valves as soon as the measured leak rate exceeds the programmed leak rate. This will prevent an excess amount of helium from entering the mass spectrometer. Consequently, the leak detection unit is prevented from becoming contaminated by helium. The helium that has entered the test object can then be pumped down by an external pump. If no extra pump is available it is recommended to vent the test object before measuring is continued.

"Button no. 3": Off

"Button no. 4": Enter limit value

Numerical input of the switch-off limit

"Button no. 5": Help text

"Button no. 7": On

"Button no. 8": OK

Pressure limits for vacuum ranges

- Main Menu > Settings > Monitoring functions > Pressure limits for vacuum ranges
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

This function can be used to change the factory-set switching points between the operating modes "GROSS"- "FINE"- "ULTRA". This can be necessary when gases other than air are pumped down with the UL1000 and UL1000 Fab. The pressure signal of the gas type-dependent inlet pressure display (Pirani) can then supply other switching values of the UL1000 and UL1000 Fab sequence control accordingly. By changing the preset switching point this can be compensated for.

"Button no. 2, 6": Change over threshold "EVAC-GROSS"
15 mbar to 3 mbar (factory setting 15 mbar).

"Button no. 3, 7": Change over threshold "GROSS-FINE"
2 mbar to 0.5 mbar (factory setting 2 mbar)

When changing these values the change over threshold for "FINE-ULTRA" will automatically be retightened to 0.4 mbar to 0.1 mbar.

"Button no. 4": Settings for ARGON
Press again the button for default values for air

"Button no. 5": ?
Help text

Pressure limits for sniff mode

- Main Menu > Settings > Monitoring functions > Pressure limits for sniff mode
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

This function is activated automatically in sniffing mode. The pressure limits define a maximum and a minimum inlet pressure. If the pressure is not in this range error messages are generated:

"Inlet pressure > Upper limit": Capillary defective

"Inlet pressure < Lower limit": Gas flow through the capillary is too low (blocked capillary).

"Button no. 3, 6": Setting of the maximum pressure: upper limit 2 mbar.

"Button no. 4, 7": Setting of the minimum pressure: lower limit 0.02 mbar

"Button no. 5": ?
Help text

Maximum evacuation time

- Main Menu > Settings > Monitoring functions > Maximum evacuation time
(see also "Main Menu [▶ 50]" and "Settings [▶ 63]")

This menu item is used to determine when a gross leak message is to be made. The gross leak monitoring works on two levels and the threshold can be adjusted when required (factory settings 30 min). This menu point is especially useful with series tests that always have the same test conditions.

After pressing the "START" button the test object is evacuated. If the corresponding pressure conditions ($p_1 < 100$ mbar) is not reached within the time that is to be set here or falls below, the pump down process is aborted and a warning message (W76) appears on the display.

The times to be selected depend, on the one hand, on the desired reaction time for the gross leak message,, and on the other hand, on the present volume of the test object and on the effective pumping speed.

If the time period was set to endless, the oil level of the rotary vane pump should be checked more often.

"Button no. 2":

Reduce the maximum evacuation time until $p_1 < 100$ mbar. Within this set period of time the inlet pressure at the test flange must have dropped below 100 mbar. The duration may be selected freely between 1 s and 9 min or can be set to endless.

"Button no. 3":

Reduce the maximum time until ready for measurement. Within this time period, ready for measurement must be achieved, i.e., the inlet pressure must have dropped to < 15 mbar (according to the set pressure limits). The duration may be selected freely between 5 s and 30 min or can be set to endless.

"Button no. 5": ?

Help text

"Button no. 6":

Increase the maximum evacuation time until $p_1 < 100$ mbar, maximum value infinite.

"Button no. 7":

Increase the maximum time until ready for measurement, maximum value infinite.

6.7 Info

- Main Menu > Info
(see also "Main Menu [► 50]")

The Info menu allows access to submenus through which different information about the UL1000 and UL1000 Fab can be displayed.

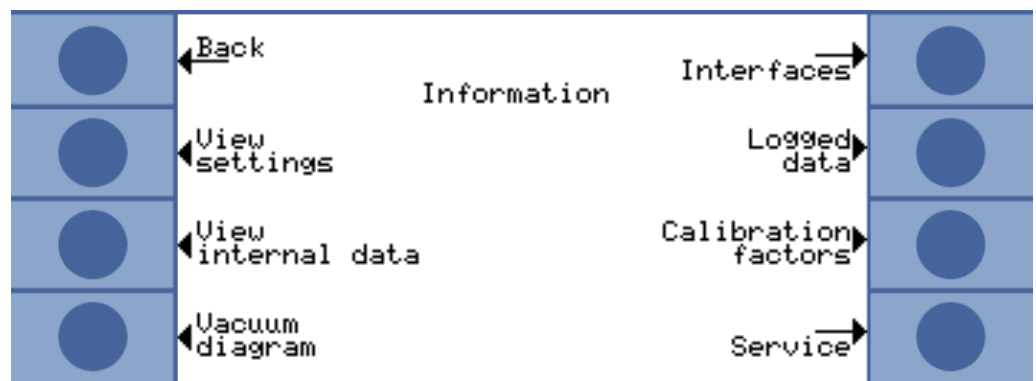


Fig. 28: Info menu

"Button no. 2": View settings

The current settings will be displayed on 4 pages, e.g. trigger levels, test leak mass, date and time.

"Button no. 3": View internal data

Information on measured internal data will be displayed on 4 pages. Information on the current software version is displayed on page 4.

"Button no. 4": Vacuum diagram

The vacuum diagram of the UL1000 or UL1000 Fab will be displayed. This diagram shows, among other things, which valves are currently open or closed.

"Button no. 5": Interfaces

Information on the interfaces of the device will be displayed on 4 pages.

"Button no. 6": Logged data

The error list, service list, calibration history and the test protocol can be displayed.
The test protocol can be deleted.

"Button no. 7": Calibration factors

The calibration factors for the different masses, the machine factor will be displayed.

"Button no. 8": Service

See also "SERVICE [► 80]".

6.7.1 SERVICE

- Main Menu > Info > Service
(see also "Main Menu [► 50]" and "Info [► 79]")

With the main menu special functions can be accomplished (e. g. manual switching of the valves). The access to the service menu is protected by a PIN. This PIN is not communicated with the delivery of the leak detector but after an adequate service training. For further information on the service menu, please refer to the service menu instructions of the device.

6.8 User authorization

- Main Menu > Access Control
(see also "Main Menu [► 50]")

This menu can be used to restrict access to certain functions of the UL1000 and UL1000 Fab.

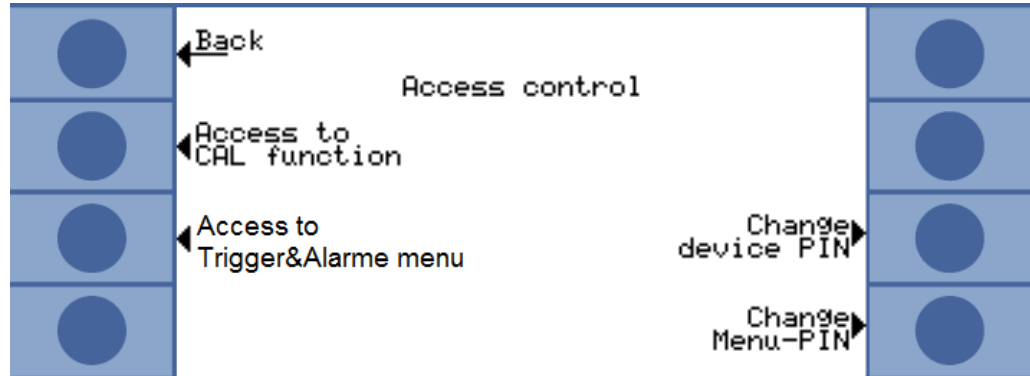


Fig. 29: Access Control Menu

"Button no. 2": Access to CAL function

(see also "Access to CAL function [► 80]")

"Button no. 3": Access to Trigger & Alarms menu

(see also "Access to Trigger&Alarme menu [► 81]")

"Button no. 7": Change device PIN

(see also "Change device PIN [► 81]")

"Button no. 8": Change Menu-PIN

(see also "Changing the menu PIN [► 81]")

6.8.1 Access to CAL function

- Main Menu > Access Control > Access to CAL function
(see also "Main Menu [► 50]" and "User authorization [► 80]")

Here it can be selected whether the access to the calibration menu is restricted or not.

"Button no. 3": Off

The calibration function is only available at the main menu. If the menu PIN (see also "Changing the menu PIN [► 81]") is activated, this PIN is required to calibrate the device.

"Button no. 5": ?

Help text

"Button no. 7": ON

The calibration function is available at the main menu during standby mode and measuring mode.

"Button no. 8": OK

Save the settings and return to the previous menu.

6.8.2 Access to Trigger&Alarme menu

- Main Menu > Access Control > Access to Trigger&Alarms menu
(see also "Main Menu [► 50]" and "User authorization [► 80]")

That allows access to this function (see also "Trigger and Alarms [► 59]") even at a blocked menu access (see also "Changing the menu PIN [► 81]").

6.8.3 Changing the menu PIN

- Main Menu > Access Control > Change Menu- PIN
(see also "Main Menu [► 50]" and "User authorization [► 80]")

Access to the menu can be restricted by entering or changing the personal identification number (PIN). There is no PIN check if this is set to "0000".

See also "Numerical input [► 42]" for the description of the entry.



Under all circumstances memorize the PINs. The PINs can only be reset by INFICON's service organization.

6.8.4 Change device PIN

- Main Menu > Access Control > Change device PIN
(see also "Main Menu [► 50]" and "User authorization [► 80]")

Access to the UL1000 or UL1000 Fab can be restricted by entering or changing the device PIN. If the device PIN is not "0000" the UL1000 or UL1000 Fab will ask for this PIN directly after powering on. The UL1000 or UL1000 Fab can not be used without entering the device PIN.



Under all circumstances memorize the PINs. The PINs can only be reset by INFICON's service organization.

7 Calibration

7.1 Introduction

The UL1000 or UL1000 Fab can be calibrated in two different ways:

- Internal calibration through the internal test leak.
- External calibration by means of an additional test leak which then is attached to the inlet port or the test object.

During the calibration procedure the mass spectrometer is tuned to a maximum helium signal and this signal is then referred to the known leak rate of the internal or external test leak. Although the UL1000 and UL1000 Fab are very stable, a calibration is recommended from time to time to make sure that ambient temperature changes, contaminations or other impacts do not affect the measuring accuracy.

When the unit is used constantly the calibration should be performed at least once a day. Otherwise the frequency of calibration depends on the frequency of use of the leak detector.



To get an optimized calibration the leak detector should warm up at least 20 min.

When calibrating with a test leak, the leak rate of the test leak should not be lower than 1×10^{-9} mbar l/s to ensure a stable calibration signal.

7.2 Calibration routines

The calibration routine can be started by pressing the button "CAL" (button no. 5) in 3 different locations:

- In the main menu
- In standby
- In measuring mode

Access via standby or measuring mode may be locked under certain circumstances, see also "Access to CAL function [► 80]". In this case there will be no inscription on the corresponding button.

A started calibration can be terminated at any time by pressing the "Stop" button (see also "STOP button [► 40]") or by pressing the button no. 1 (Cancel).

Once the calibration was activated the user must choose between an internal and an external calibration. To do this, press the corresponding button.

7.2.1 Internal calibration

There are two options for the internal calibration of the UL1000 and UL1000 Fab:

- If the leak detector is blanked off or disconnected from any connected chamber by a valve at the inlet port, the automatic calibration can be chosen (button no. 8).

- If the leak detector is connected to a vacuum chamber or a bigger test object, a manual calibration must be performed because the reaction times on opening or closing the internal test leak vary depending on the volume of the connected part.



Automatic calibration should be performed whenever possible.

7.2.1.1 Automatic internal calibration

After selecting this calibration method, the entire calibration is carried out automatically. At the end of the calibration process (after approx. 25 s), a signal tone sounds. Thereafter the leak detector is ready for further use.

7.2.1.2 Manual internal calibration

When "Manual Internal Calibration" is selected it is assumed that the UL1000 or UL1000 Fab is connected to a test object (if this is not the case select "Automatic Internal Calibration", see also "Automatic internal calibration [► 83]").

After starting "Manual Internal Calibration" the UL1000 or UL1000 Fab pumps down the test object (if not already evacuated) and opens the internal test leak. Depending on the volume of the test object it may take some time until the helium signal stabilizes. Therefore the user has to confirm that the signal has reached a stable level (button no. 8).

The leak detector now runs through the tuning process and closes the internal test leak automatically. Again the volume of the test object determines how long the leak detector takes to pump down the helium until a stable background level is reached, which has to be confirmed by the user.

Thereafter the leak detector is calibrated.

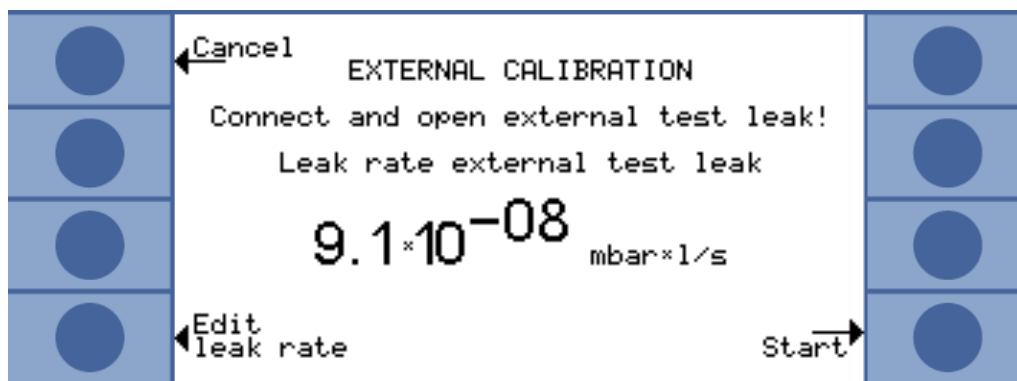
7.2.2 External calibration

For an external calibration a test leak has to be attached to the test object or directly to the inlet port of the leak detector.

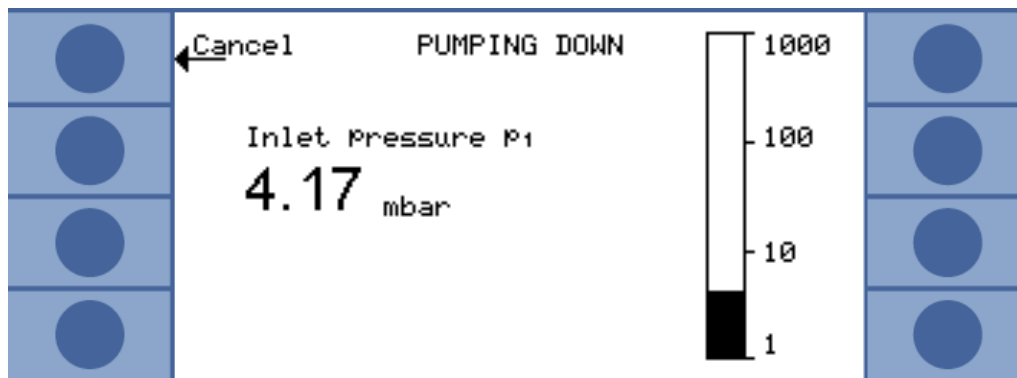
Note: After an internal calibration, the displayed leak rate value may deviate from the printed value of the external test leak due to the uncertainties and temperature coefficients of the test leaks.

After "External Calibration" (button no. 8) has been chosen the following messages are displayed and the described actions are required.

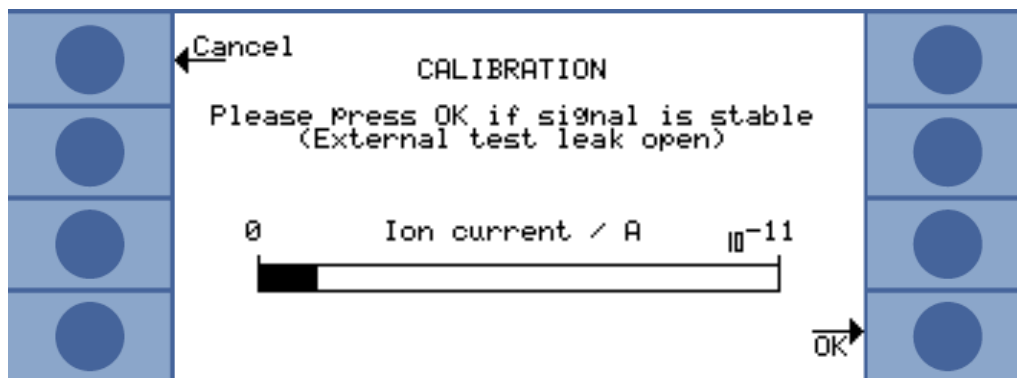
- 1 Make sure the test leak is connected and open.
- 2 Read the leak rate at the test leak and compare it with the leak rate displayed. If there are deviations, press the button no. 4 (change leak rate) and correct the value.
- 3 If the leak rates match press "START" (button no. 8).



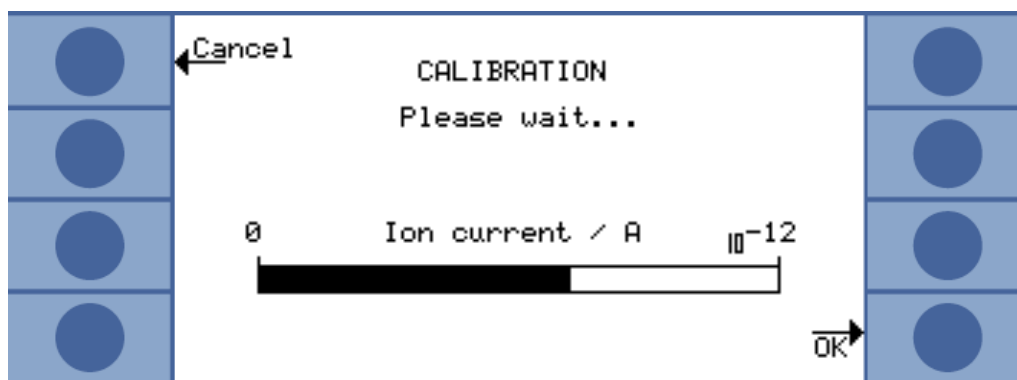
4 No action required here.



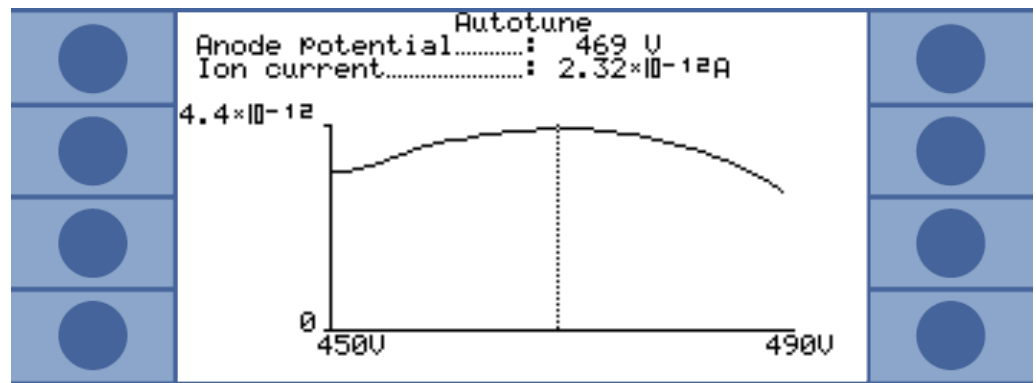
5 The bar display shows a signal, which may fluctuate only slightly. If this is the case press "OK" (button no. 8).



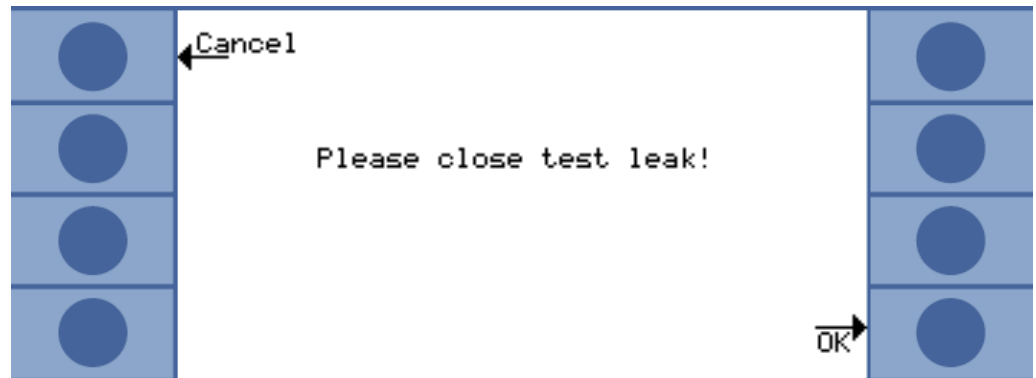
6 No action required here.



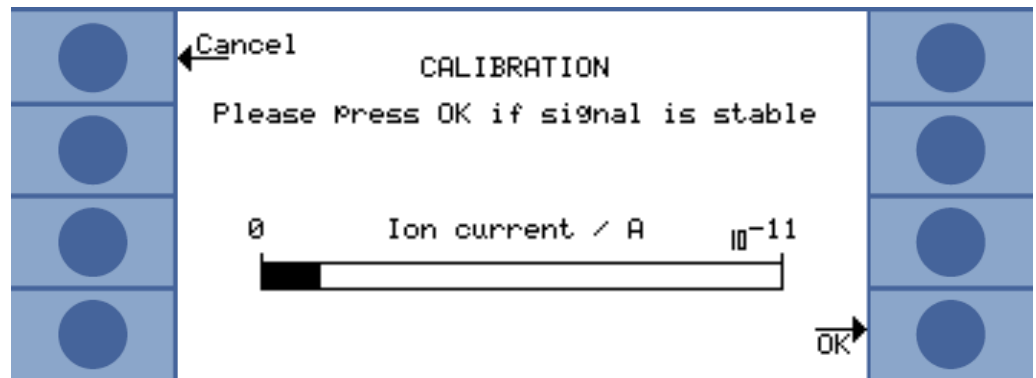
7 No action required here.



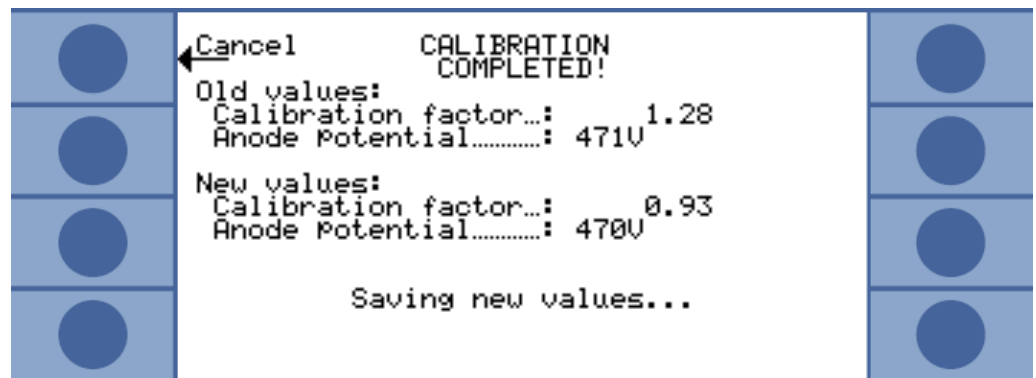
- 8 Close the external test leak and confirm with OK (button no. 8).



- 9 The bar display shows a signal that cannot be reduced any further. Small fluctuations are acceptable. If this is the case, press OK (button no. 8).



- 10 The UL1000 or UL1000 Fab displays the old and the newly calculated calibration factor.



7.3 Value range of the calibration factor

To avoid incorrect calibrations, the UL1000 or UL1000 Fab controls the calibration factor for plausibility at the end of the calibration routine:

When the new calibration factor is not considerably higher or lower ($< \text{factor } 2$) than the previous calibration factor, the new factor will be accepted automatically. When the new calibration factor deviates more strongly from the previous factor, the user can decide if he wants to accept it anyway (e. g. after changing the system configuration) or not (e. g. because of a maloperation).

Note: When calibration is started via SPS or RS232 no testing for plausibility is occurring.

When calibrating internally it is also monitored if the newly calculated calibration factor is higher than 10 or lower than 0.1. In this case a corresponding warning (see W81 resp. W82 in "List of error & warning messages [► 88]") is displayed and the calibration will be canceled.

8 Error and warning messages

The UL1000 and UL1000 Fab are equipped with comprehensive self-diagnostic facilities. If an error or warning condition is detected it is indicated via the LC display to the operator.

In the case of an error or warning message a signal sounds. The frequency changes every 400 ms from 500 Hz to 1200 Hz and vice versa so that the signal stands out well from ambient noises normally encountered.

Error and warning messages are logged and can also be displayed at a later time through the menu information, see also "Info [► 79]".

8.1 Notes


Warning Messages

Warnings are indicated

- when the UL1000 or UL1000 Fab detects an abnormal condition or
- when the UL1000 or UL1000 Fab wants to remind the operator of something (e. g. that a calibration is required or that the time period for the next maintenance has passed).

The UL1000 or UL1000 Fab will display a message on the LC display and will remain in standby mode or in measuring mode.

The warning messages will remain on the display until they have been confirmed by pressing "OK" (button no. 8). After that the UL1000 or UL1000 Fab can be used again (possibly with some restrictions). As long as a warning status exists the status line shows a warning triangle, see also "Status line of the display [► 48]".

The warning message can be displayed in standby mode by pressing the button . It shows up with a warning message.

Error messages

Error messages are events which force the UL1000 or UL1000 Fab to interrupt the measuring operations. In this case the UL1000 or UL1000 Fab closes all valves (standby mode).

The error messages will remain on the display until they have been confirmed by pressing "Restart" (button no. 8). After that, the UL1000 or UL1000 Fab restarts. In some cases it may be helpful to check some settings or measured values before the UL1000 or UL1000 Fab restarts. Therefore it is also possible to press the button "Menu" (button no. 4 or Menu button) to enter the menu of the UL1000 or UL1000 Fab. When you exit the menu, the same error message will be displayed again.



Under extreme conditions (e. g. unknown software error) the built-in monitoring function (watchdog) will prevent uncontrolled operation of the UL1000 or UL1000 Fab. This monitoring function forces a restart of the UL1000 or UL1000 Fab. The leak detector will afterwards be in standby mode. No error message will be displayed.

8.2 List of error & warning messages

The following pages contain a list of all error and warning messages. Warning messages begin with the letter "W" followed by a number. Error messages begin with the letter "E" followed by a number.

No.	Displayed message	Description and possible remedy of cause
W03	Suppressor test failed	<ul style="list-style-type: none"> The MSV card defective The preamplifier is defective The suppressor cable is faulty
E04	Temperature monitoring turbo molecular pump defect	Short circuit in the temperature sensor
E05	Temperature monitoring turbo molecular pump defect	Temperature sensor is interrupted
E07	TMP power supply defective	Check TMP supply.
E08	TMP acceleration time too high	Frequency 15 min after start < 1200 Hz
W15	Leak rate too high! Switched to standby to prevent contamination!	<ul style="list-style-type: none"> The monitor function "Contamination protection" is activated and a leak rate above the set limit value has been detected. Gross leak. Switch-off limit value too low. Alarm delay set too short.
W16	Turbo molecular pump service interval expired!	The service interval for the turbo pump has expired.
W17	Forepump service interval expired!	The service interval for the fore pump has expired!
W18	Exhaust filter service interval expired!	The service interval for the exhaust filter is expired!
W21	EEPROM write time out	EEPROM defective MC 68 defective
W22	EEPROM parameter queue overflow	EEPROM defective MC 68 defective
E23	24 V at OPTION output is too high	The voltage 24 V at socket "OPTION" is too high.
E24	24 V at OPTION output is too low	<ul style="list-style-type: none"> Fuse F2 on the I/O board is defective.
E25	Receded valve voltage too low (< 7V)	<ul style="list-style-type: none"> I/O board is defective
W28	Real-time clock was reset! Please enter date and time.	<ul style="list-style-type: none"> Battery on MC 68 is discharged or defective. MC 68 had been replaced.
E29	24V supply for fans is too low. (< 20V)	<ul style="list-style-type: none"> Fuse F1 on the wiring level is defective.

No.	Displayed message	Description and possible remedy of cause
E30	24V supply for the remote control is too low. (< 20V)	<ul style="list-style-type: none"> Fuse F1 on the I/O board is defective.
W31	The offset voltage of the preamplifier is too high. (< 5mV)	<ul style="list-style-type: none"> The preamplifier is defective
W32	Preamplifier temperature is too high. (<60 °C)	<ul style="list-style-type: none"> The ambient temperature is too high. The air filter is soiled.
W33	Preamplifier temperature is too low. (<2 °C)	<ul style="list-style-type: none"> The ambient temperature is too low. The temperature sensor is defective.
E34	24 V supply voltage at MSV board is too low!	<p>Signal MVPZN on the MSV board is active. 24 V voltage on the MSV board is too low, $U < 18.3 \text{ V}$.</p> <ul style="list-style-type: none"> Fuse F1 on the MSV board has blown. 24 V power supply voltage is missing. Switch off the UL1000 or UL1000 Fab! The missing voltage will cause the exhaust valve on the rotary vane pump to close which in turn can lead to a contamination of the vacuum system. Reference voltage UREF on the MSV board XT7/1 is too high, $U > 5 \text{ V}$.
E35	Anode-cathode voltage is too high!	<p>Anode-cathode voltage is higher than 130 V.</p> <ul style="list-style-type: none"> MSV is defective.
E36	Anode-cathode voltage is too low!	<p>Anode-cathode voltage is lower than 30 V.</p> <ul style="list-style-type: none"> MSV is defective.
E37	Suppressor voltage reference value too high.	<p>Signal MFSZH on the MSV board is active. The nominal value for the suppressor signal is too high.</p> <ul style="list-style-type: none"> The suppressor voltage has been affected by a short circuit. MSV is defective.
E38	Suppressor potential too high.	<p>Suppressor potential is higher than 363 V.</p> <ul style="list-style-type: none"> MSV is defective
E39	Suppressor potential too low.	<p>Suppressor potential is lower than 297 V.</p> <ul style="list-style-type: none"> MSV is defective.
E40	The anode potential exceeds its nominal value by over 10%.	<p>The actual value of the anode voltage exceeds the nominal value by 10%. The nominal value can be displayed in the service menu (see also "SERVICE [► 80]").</p> <ul style="list-style-type: none"> MSV is defective.
E41	The anode potential has dropped below its nominal value by over 10%.	<p>The actual value of the anode voltage has dropped below the nominal value by more than 10%. The nominal value can be displayed in the service menu (see also "SERVICE [► 80]").</p> <ul style="list-style-type: none"> Inrush of air.

No.	Displayed message	Description and possible remedy of cause
		<ul style="list-style-type: none"> MSV is defective.
E42	Setpoint of the anode potential is too high!	Signal MFAZH on the MSV board is active. <ul style="list-style-type: none"> The anode voltage is short-circuited. The nominal value for the anode voltage is too high. The anode voltage is limited to 1,200 V.
E43	Cathode current is too high! MSV Cat-Heater I>>l	<ul style="list-style-type: none"> Signal MPKZH on the MSV board is active. Cathode current is too high, I > 3.6 A. MSV is defective.
E44	Cathode current is too low!	<ul style="list-style-type: none"> Signal MPKZN on the MSV board is active. Cathode current is too low, I < 0.2 A. MSV is defective.
W45	Emission for cathode 1 can not be switched on.	Signal MSIBE on MSV board is not active. Emission for cathode 1 can not be switched on. The UL1000 or UL1000 Fab switches to cathode 2. Order new ion source.
W46	Emission for cathode 2 can not be switched on!	Signal MSIBE on MSV board is not active. Emission for cathode 2 can not be switched on. The UL1000 or UL1000 Fab switches to cathode 1. Order new ion source.
E47	Emission for both cathodes cannot be switched on!	Signal MSIBE on MSV board is not active. Emission can not be switched on. Exchange the cathode by changing the ion source. After replacing the ion source, you need to be able to switch on both cathodes manually in the service menu.
E48	Anode heater defective!	Signal MSAFD on the MSV board is active. Anode heater fuse has blown. Replace fuse F2 on the MSV board.
E50	No communication with turbo pump.	Clock from the frequency converter has failed. No communication with the frequency converter.
E52	TMP frequency is too low!	<ul style="list-style-type: none"> The TMP frequency is too low. Frequency converter is defective. Turbo molecular pump is defective.
W53	Temperature at electronic unit is too high! (> 55°C)	<ul style="list-style-type: none"> The ambient temperature is too high. Ventilation has failed. The air filter is soiled.
E54	Temperature at electronic unit is too high! (> 60°C)	<ul style="list-style-type: none"> Ambient temperature is too high. Internal ventilation has failed. Air filters are dirty and have to be changed.

No.	Displayed message	Description and possible remedy of cause
W55	Temperature at the electronic unit is too low (< 2 °C).	<ul style="list-style-type: none"> The temperature sensor on the wiring plane indicates $T < 2\text{ °C}$. Run-up time for the backing pump will be longer. Temperature sensor is defective.
E56	Inlet pressure p1 too low!	<p>$U < 0,27\text{ V}$; Cathode defective.</p> <p>Change thermovac-sensor that measures p1.</p>
E58	Foreline pressure p2 too low!	<p>$U < 0,27\text{ V}$; Cathode defective.</p> <p>Change thermovac-sensor that measures p2.</p>
E60	p2 > 10 mbar after 5 min since switching on.	<p>PV > 3.8 mbar after $t > 5\text{ min}$ since switching on. Run-up time of the backing pump is too long.</p> <ul style="list-style-type: none"> Backing pump defective. Valve V2 does not open.
E61	Emission fail.	<p>Emission should be switched-on.</p> <p>MSV assembly signals an error. MENB emission current outside the acceptable range.</p>
W62	Flow through capillary is too low!	<p>The flow of the sniffer line is monitored in sniffing mode. If the pressure falls below a minimum limit, the flow through the capillary is too low (contamination) or the capillary is blocked (foreign object, particle).</p> <p>The minimum limit can be set with the menu. The factory settings is 0.1 mbar, see also "monitoring [▶ 76]".</p>
W63	Capillary broken	<p>The flow of the sniffer line is monitored in sniffing mode. If the pressure exceeds the maximum limit, the gas flow through the capillary is too high (not tight, broken capillary). The maximum gas flow can be set with the menu. The factory settings is 1.0 mbar, see also "monitoring [▶ 76]".</p>
E73	Emission off (P_2 too high)	<p>PV $\gg 0.2$ or 3 mbar due to an inrush, i. e. the UL1000 or UL1000 Fab will try again to resume measuring mode.</p>
W76	Maximum of "evacuation time" exceeded.	<ul style="list-style-type: none"> Test object has a gross leak. Wrong setting of the maximum evacuation time.
W77	Maximum signal is outside the mass matching range!	<p>The signal maximum has shifted to the limit values for the mass adjustment.</p> <ul style="list-style-type: none"> Leak rate signal was instable during mass adjustment. Re-calibrate. Check the basic setting for the anode voltage through the service menu. Check the test leak.

No.	Displayed message	Description and possible remedy of cause
W78	Signal difference between opened and closed test leak too small.	The amplifier voltage difference between opened and closed test leak is lower than 10 mV. Test leak has not been closed properly.
W79	Signals too low	Test leak is too small or has not been opened. Preamplifier voltage < 10 mV.
W80	Please recalibrate the device!	The automatic request of calibration is activated (see also "Automatic internal calibration [► 83]") and at least one of the following conditions is fulfilled: <ul style="list-style-type: none"> • 30 min have passed since switching on. • Temperature of the pre-amplifier has changed more than 5 °C since the last calibration. • Mass settings were changed.
W81	Calibration factor too low	The calculated calibration factor is outside the permissible range (< 0.1). The old factor is retained. Possible causes: <ul style="list-style-type: none"> • The conditions necessary for calibration have not been satisfied. • The leak rate of the internal test leak which was entered is much too small. • The internal test leak is defective.
W82	Calibration factor too high!	The calculated calibration factor is outside the permissible range (> 10). The old factor is retained. Possible causes: <ul style="list-style-type: none"> • The conditions necessary for calibration have not been satisfied. • The leak rate of the internal test leak which was entered is too big. • The internal test leak is defective or empty.
W83	All EEPROM parameters lost! Please check your settings!	<ul style="list-style-type: none"> • EEPROM on wiring board is empty and was initialized with default values. All parameters must be re-entered. • If the warning occurs again after switching back on, the EEPROM is probably defective on the wiring level.
W85	EEPROM parameters lost! Please check your settings!	<ul style="list-style-type: none"> • Writing access was interrupted. Check the settings. • An update of the software was done. In this case the message can usually be ignored.

No.	Displayed message	Description and possible remedy of cause
		<ul style="list-style-type: none">If the warning occurs again after switching back on, the EEPROM is probably defective on the wiring level.
W86	AC/DC factor too low	Calibration conditions not maintained Leak rate of test leak entered wrong Test leak defective
W87	AC/DC factor too high	Calibration conditions not maintained Leak rate of test leak entered wrong Test leak defective

9 Maintenance work

9.1 General information



⚠ DANGER

Danger due to electric shock

For all maintenance work performed on the UL1000 / UL1000 Fab, the leak detector must be disconnected from the mains!



NOTICE

Property damage due to pollution

To avoid property damage, make sure the environment is clean and use clean tools during work on the vacuum system.



Complying with the following maintenance plan is mandatory for the UL1000 / UL1000 Fab. If the corresponding maintenance intervals are not complied with, this will then void your warranty for this device.

Service level II and III maintenance work on the UL1000 / UL1000 Fab must only be performed by personnel authorized for this work by INFICON GmbH Cologne.

Note the corresponding service levels here in the maintenance plan:

- Service level I: Customer
- Service level II: Customer with technical training
- Service level III: Authorized INFICON service technician

Signing a maintenance contract for this device is recommended.

When one of the maintenance intervals is reached, a warning is shown on the display of the UL1000 / UL1000 Fab leak detector after every switching on. If this message is ignored, it appears as a warning triangle in the status line of the display until the maintenance interval has been confirmed.

Depending on the application the device, the 1500 hours maintenance can be varied.

9.2 Returning the device 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.

- ▶ 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 sending the device, attach a copy of the completed contamination declaration.

A copy of this form which you may copy is printed at the beginning of the operating instructions.

9.3 Maintenance plan legend

- I: Service level I, customer
- II: Service level II, customer with technical training
- III: Service level III, authorized INFICON service technician
- X: Carry out maintenance as per operating hours or duration
- X₁: No time limit, only operating hours
- X₂: Perform maintenance work according to duration
- X₃: Dependent on environmental influences, operating conditions, pollution and application process

UL1000 only

As a preventive measure it is recommended for the UL1000 to check the oil level and the color of the oil of the rotary vane pump once per month. The oil change intervals for the oil of the D16 B backing pump are recommendations and may vary depending on the way the leak detector is used.

The pump has been specified for use in the leak detector UL1000 with Arctic Oil and must for this reason be filled with Arctic Oil only (Part No. 20099091). When using any other kind of oil, INFICON GmbH Cologne must reject all warranty claims relating to the backing pump.

9.4 Maintenance plan

Assembly	Maintenance work UL1000 / UL1000 Fab	Operating hours / years					Service level	Spare part no.
		1500	4000	8000	16000	24000		
		1/4	1	2	3	4		
Vacuum system								
Backing pump D16 B	Check oil level, if required exchange	X					I, II	
	Change oil	X ₃	X				II	20099091
	Overhaul the backing pump				X		III	
Scroll pump Agilent TS 620	Exchange the tip seal			X ₁			III	200001671
	Exchange the scroll head				X		III	200001665R

Assembly	Maintenance work UL1000 / UL1000 Fab	Operating hours / years					Service level	Spare part no.
		1500	4000	8000	16000	24000		
		1/4	1	2	3	4		
SplitFlow 80	Changing the oil wick cartridge			X ₃			II	200003801
	Revision: Change bearings and replace oil wick cartridge					X ₂	III	200003800 200003800R
Valve block	Clean valve, replace valve seals		X ₃	X			III	200000594
	Dismantle and clean the valve block			X ₃	X		III	200000593
	Replace filter of vent and purge gas line		X ₃	X ₁			I, II, III	200000683
	Adjust Pirani			X			III	
Silencer UL1000 Fab	Replace	X ₁					I, II, III	20099183
Exhaust filter UL1000	check, drain	X					I, II, III	
	Replace filter cartridge			X ₁			I, II, III	200000694
Electrical								
Fan assembly	Blow out chassis wall base fan	X ₃	X ₁				I	
	Replace replacement filter cell for chassis wall fan	X ₃	X ₁				I	200000685

9.5 Maintenance Groups

For better overview the maintenance plan for the UL1000 / UL1000 Fab can be subdivided in to 5 maintenance groups.

- 1500 hours maintenance
- 4000 hours maintenance, at least once a year
- 8000 hours maintenance
- 16000 hours maintenance
- 24000 hours maintenance

9.5.1 Notes for the maintenance of the SplitFlow 80

The turbo molecular pump SplitFlow 80 is filled with an operating fluid for the lubrication of the ball bearings. The operating fluid reservoir must be replaced together with the bearing after a period of 4 years, irrespective of the number of operating hours reached by the turbo pump. The operating fluid reservoir should be replaced by an INFICON service technician or an INFICON authorized person.

Under extreme loads or when used in impure processes shorter exchange intervals have to be chosen.

If the turbo pump should be shut down for longer than a year the operating fluid reservoir must be changed before the shutdown.

Replacement of the pump after 3 years is recommended for those customers, who must guarantee a 100% availability for the leak detector. In this case the SplitFlow 80 will be replaced by a refurbished pump (R pump).

9.5.2 Description of the maintenance operations



DANGER

Danger due to electric shock

The protective conductor distributor screw at the bottom of the chassis must not be loosened. Without the protective conductor connection the operator is not protected against electric shock.

Modifications to the UL1000 / UL1000 Fab which exceed the scope of normal maintenance work must only be performed by trained personnel.

9.5.3 Opening the device for maintenance purposes



DANGER

Danger due to electric shock

Before removing one of the covers of the UL1000 and UL1000 Fab the leak detector must be disconnected from the mains!

Required tools

Side wall separator from the accessories

- Vacuum components which are fitted to the inlet of the UL1000 / UL1000 Fab must be disconnected from the inlet system.
- As shown, insert the side wall separator between cover and chassis and press it down until the cover disengages from the holding fixture. Press the cover on both sides out of the holding fixture. Slightly tilt the cover outwards and lift it out of the guide pins in the bottom of the device.
- The correct position where to apply the side wall separator is marked by a dent on both covers.
- Open both covers in the same way.



Fig. 30: Opening the UL1000 / UL1000 Fab

1	Side wall separator	2	Dent in the side wall
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9.6 Checking and replacing the air filter insert



DANGER

Danger due to electric shock

Before removing one of the covers of the UL1000 and UL1000 Fab the leak detector must be disconnected from the mains!

The extent to which the air filter insert in front of the fans is contaminated should be checked every 3 months (under aggravated conditions, monthly). Contaminated filter inserts must be exchanged since under such circumstances the cooling performance for the turbo pump and the device itself is reduced.

Required tools

Side wall separator from the accessories

Required material

Replacement filter insert P/N 200 000 685

- To open the leak detector see also "Opening the device for maintenance purposes [► 97]".
- Take hold of the filter insert with two fingers at the cut outs shown and pull the filter insert out of the guide. Should this not be possible, use a tool to press the filter through the rear ejection bore to the front.

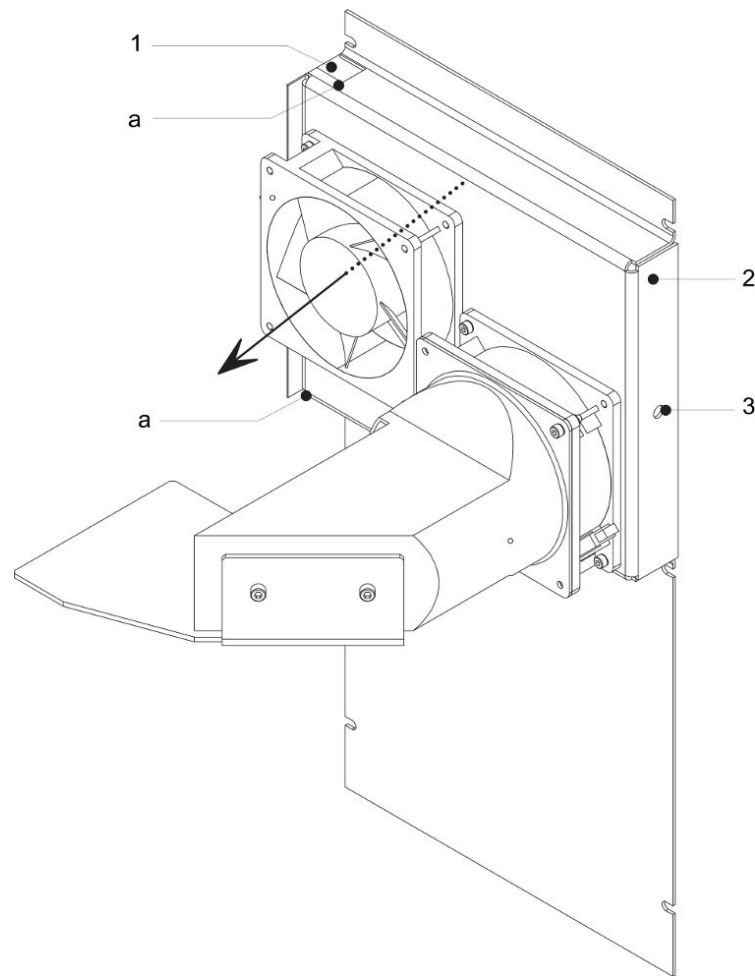


Fig. 31: Changing the air filter of the chassis wall

a	Air filter cut out	2	Air filter guide
1	Air filter insert	3	Ejection bore (rear)

- When inserting the new air filter insert, note the direction of the air flow. It is indicated by a black arrow.
Note: The side of the filter insert marked "clean air side" or the white surface of the filter insert must point in the direction of the fans.
- Push the filter insert into the guide and place the covers back on. To close the device, insert and press on the covers.

9.7 Replacing the exhaust silencer

Required material

Replacement silencer P/N 200 99 183

- Switch the UL1000 Fab leak detector off.
- Unscrew the silencer from the connection adapter and replace it by the new silencer and tighten it.

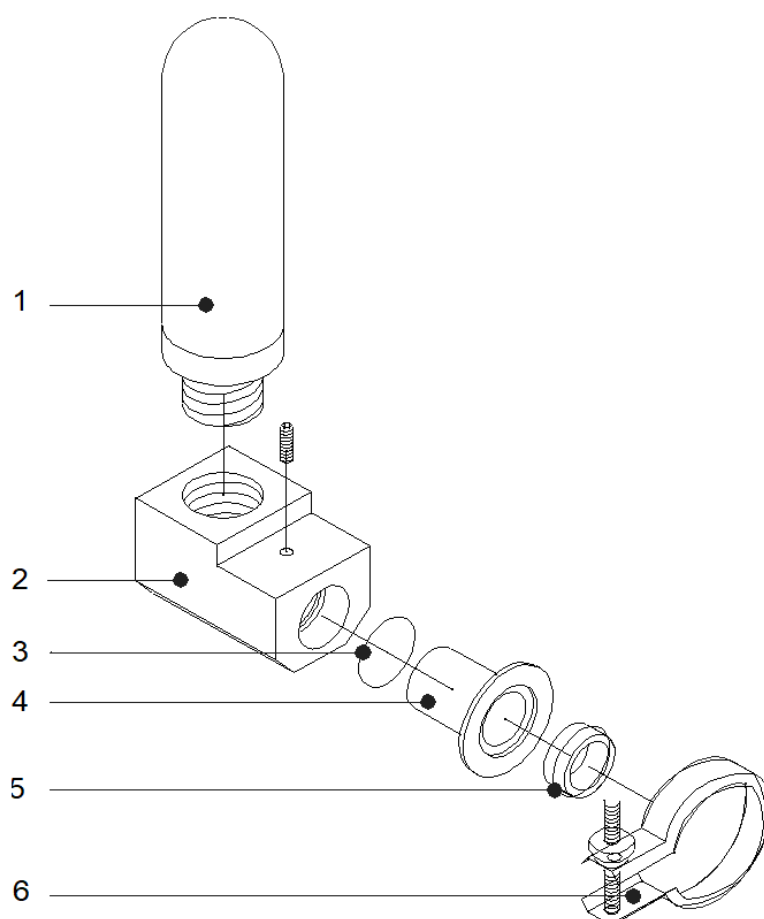


Fig. 32: Replacing the silencer

1	Silencer	4	Reducer
2	Adapter for silencer	5	Centering ring DN 25
3	O-ring, 20 x 3	6	Clamping ring clip

9.8 Checking/Emptying the exhaust filter



⚠ DANGER

Danger due to electric shock

Before removing one of the covers of the UL1000 / UL1000 Fab the leak detector must be disconnected from the mains!

Required tools

Combination wrench AF 17mm

The exhaust filter has the task of filtering out oil mist caused by the ejection of the intake air during a pumping down process. For safety reasons the exhaust filter is equipped with a valve which in the case of a blocked filter opens and passes the intake air directly to the outside. This helps to prevent damage to the backing pump by a blocked exhaust line.

For this reason, the condition of the exhaust filter should be checked regularly. Check that the exhaust filter is not blocked. As soon as the oil level in the oil reservoir vessel reaches approximately 1/3 of the maximum filling quantity, the oil reservoir needs to be emptied.

To empty the oil reservoir proceed as follows:

- Switch the device off and remove the side covers. See also "Opening the device for maintenance purposes [► 97]".
- Loosen the hexagon screw at the bottom of the reservoir and drain the oil into a suitable vessel. See also "Replace filter cartridge [► 101]", second figure. Dispose of the oil in accordance with the local regulations.
- Screw in the hexagon screw again and tighten it.
- Check the oil level of the D16 B rotary vane pump and top up oil as required.

9.8.1 Replace filter cartridge

Required tools

Side wall separator from the accessories

Required material

Replacement filter insert: P/N 200 000 694 (10 pcs.)

The installation location for the exhaust filter is given in the figure below.

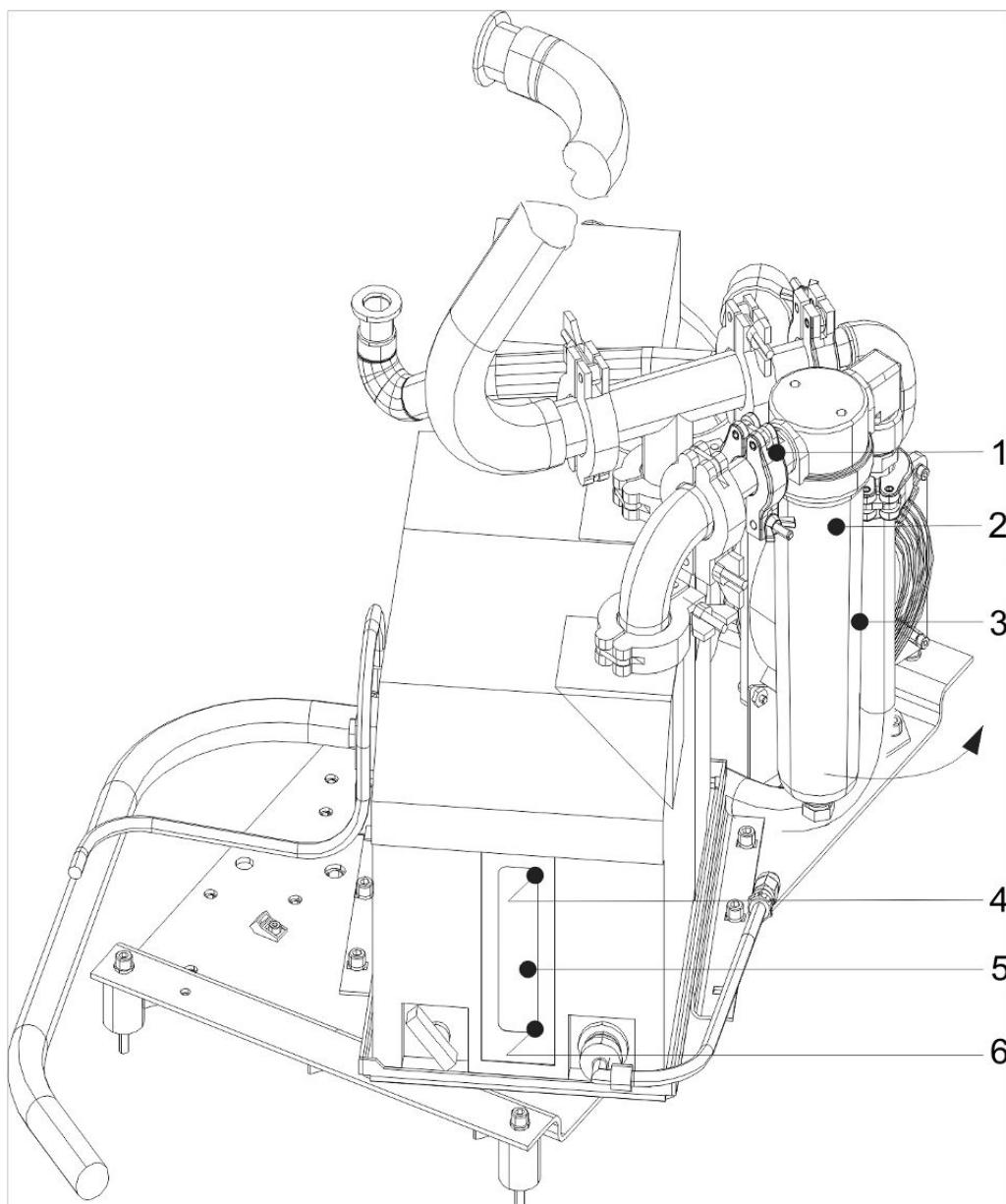


Fig. 33: Installation location of the exhaust filter

1	Clamping ring KF 16	4	Oil level mark maximum
2	Filter cartridge	5	Oil level viewing glass
3	Oil reservoir	6	Oil level mark minimum

To exchange the filter insert proceed as follows:

- 1 Loosen the clamping ring at the exhaust filter and swivel the complete filter in the direction of the arrow outwards to such an extent that the oil reservoir can be removed.
- 2 Unscrew the oil reservoir counterclockwise and empty it. Dispose of the oil in accordance with the local regulations. Use a clean cloth to clean the reservoir.
- 3 Manually loosen the filter holding screw, take out the filter insert and properly dispose of it.

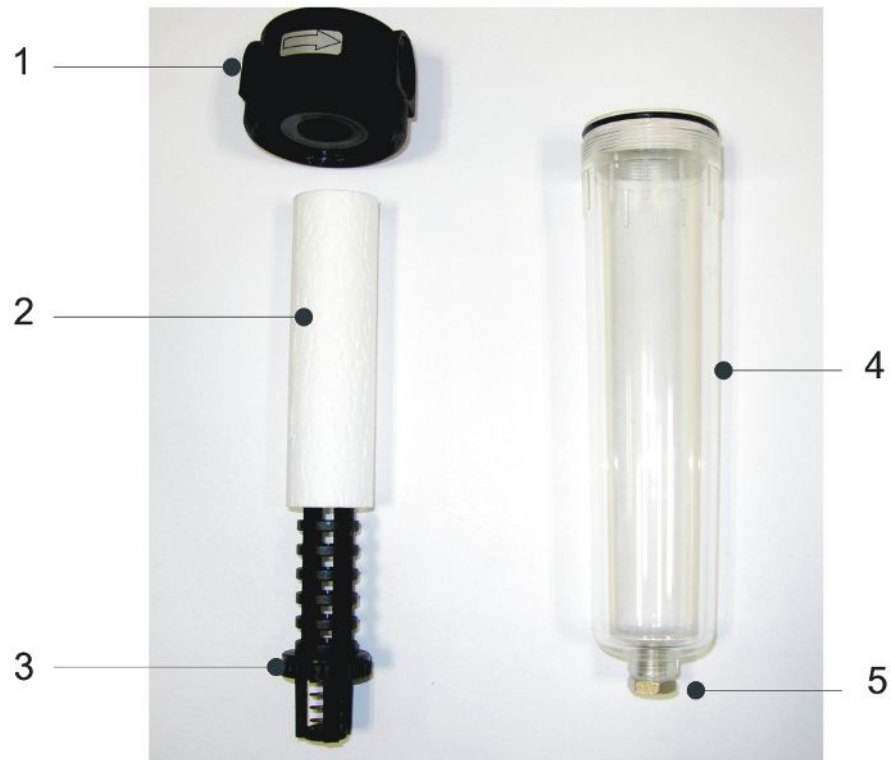


Fig. 34: Filter cartridge - exhaust filter

1	Filter cover	4	Oil reservoir
2	Filter cartridge	5	Oil drain screw
3	Filter holder		

- 4 Push the new filter insert onto the holder and screw it into the filter cover. Hand-tighten the holding device with the knurling
- 5 Finally screw in the oil reservoir and tighten it manually. Swivel the exhaust filter back in and affix it with the KF16 clamping ring at its original installation position.

9.9 Checking oil level D16B, top off



⚠ DANGER

Danger due to electric shock

Before removing one of the covers of the UL1000 / UL1000 Fab the leak detector must be disconnected from the mains!



Only check and top off the oil when the pump is switched off!

As a preventive measure it is recommended to check the oil level and the color of the pump oil once a month.

To open the device see also "Opening the device for maintenance purposes [► 97]".

Required tools

Side wall separator

Through the oil level viewing glass of the backing pump D16 B the oil level and the color of the oil can be checked visually. The oil level of the vacuum pump must be within the minimum and maximum marks.

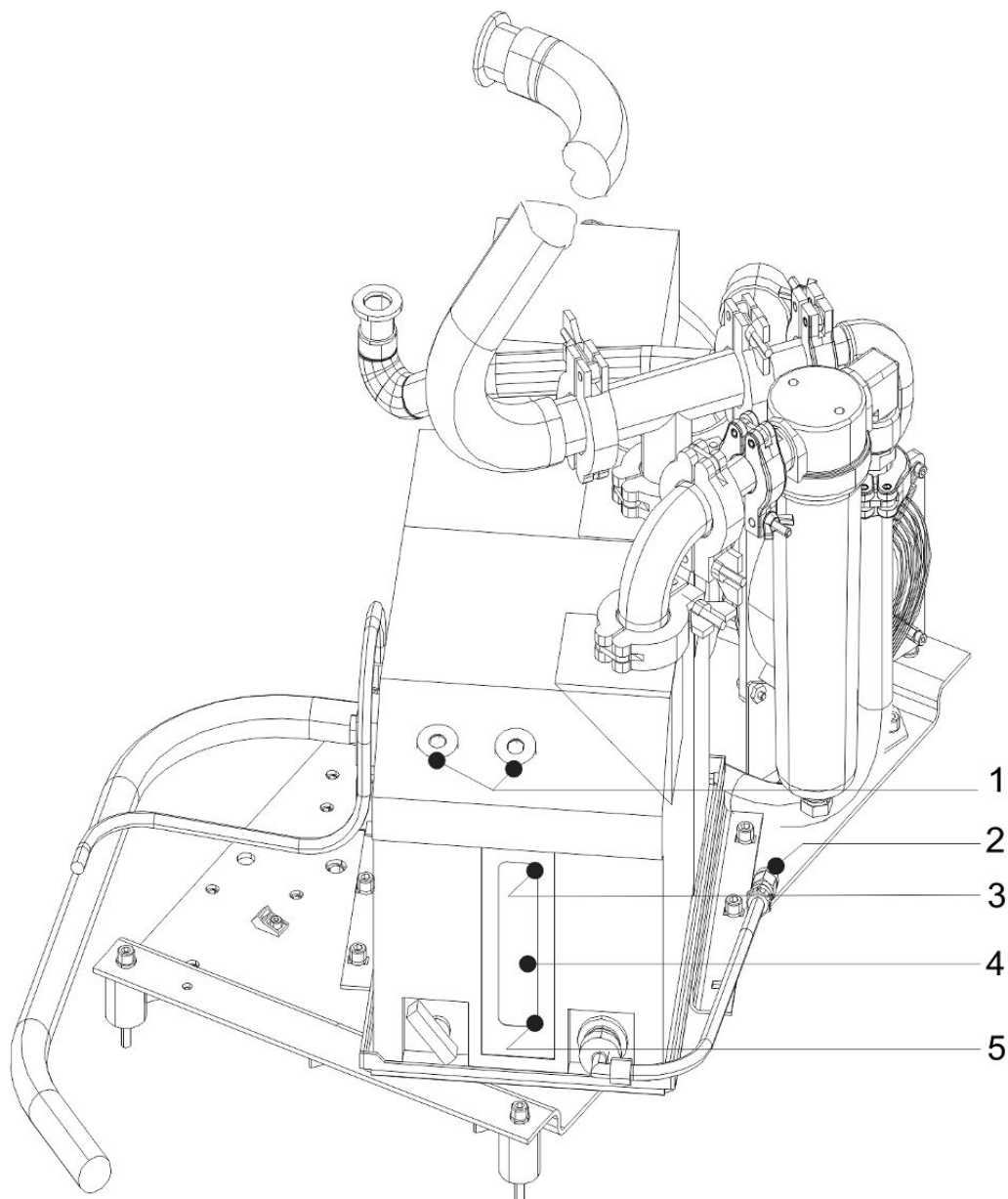


Fig. 35: Oil change D16 B

1	Oil fill opening	4	Oil sight glass
2	Oil drain plug	5	Oil level mark minimum
3	Oil level mark maximum		

- If the oil level is below the minimum mark, top off the oil, see also "Oil change D16B [► 105]".

9.10 Oil change D16B



NOTICE

Environmental damage due to used oil

Oil may cause harm to the environment! Dispose of it properly and observe the relevant environmental regulations.



After starting up, the fresh oil should be degassed. For this, let the leak detector operate in the "STANDBY" mode and open the gas ballast for approximately 20 min.



Exchange the oil always while the vacuum pump is still warm and with the vacuum pump switched off!

The oil must be exchanged when it looks contaminated or is chemically or mechanically worn out.

Further oil changes should be done before and after storing the pump for a longer period of time.

Required tools

- Side wall separator
- Allen wrench AF 5 mm; 8 mm
- Open jaw spanner AF13 mm

Required material

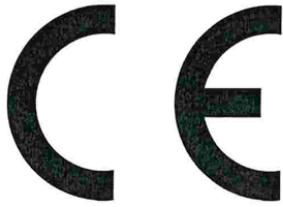
- Artic oil 1 l. P/N 200 99 091
- 1 Switch the device off and remove the covers. To open the device see also "Opening the device for maintenance purposes [► 97]".
 - 2 Cut the cable straps for the oil drain hose and run the drain hose to the oil collection vessel.
 - 3 With an allen wrench AF 5 mm unscrew the oil drain plug at the hose end (see also "Checking oil level D16B, top off [► 103]"). Use the 13 mm open jaw spanner for counteracting the screw connection.
 - 4 Drain the waste oil into a suitable vessel. As soon as the oil flow reduces, screw the oil drain plug back in.
 - 5 Switch the pump on briefly (10 s max.) and switch it off again. Remove the oil drain plug again and let the remaining oil drain out.
 - 6 Screw the oil drain plug back in again. Check the gasket and replace it if required. Fix the oil drain hose with a cable strap again.
 - 7 Unscrew oil fill plug (see also "Checking oil level D16B, top off [► 103]") from the oil fill opening and top up fresh oil up to the maximum level. The max. oil filling quantity is 0.8 l.
 - 8 Screw the oil fill plug back in again and tighten it.

9.11 Scroll pump

The maintenance intervals of the scroll pump (Agilent TS620) is given in the maintenance plan, see also "Maintenance plan [► 95]".

Maintenance of the scroll pump should only be carried out by INFICON service or a service partner authorized by INFICON.

10 CE Declaration of Conformity



EU 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 without our approval, this declaration will be void.

Designation of the product:

Helium Leak Detector

Models:

UL 1000

UL 1000 Fab

The products meet the requirements of the following Directives:

- **Directive 2011/65/EU (RoHS)**

Applied harmonized standards:

- **DIN EN 50581:2013**


Catalogue numbers:

550-000A	550-100A
550-001A	550-101A
550-002A	

Cologne, July 26th, 2017


Dr. Döbler, President LDT

Cologne, July 26th 2017


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11 RoHS

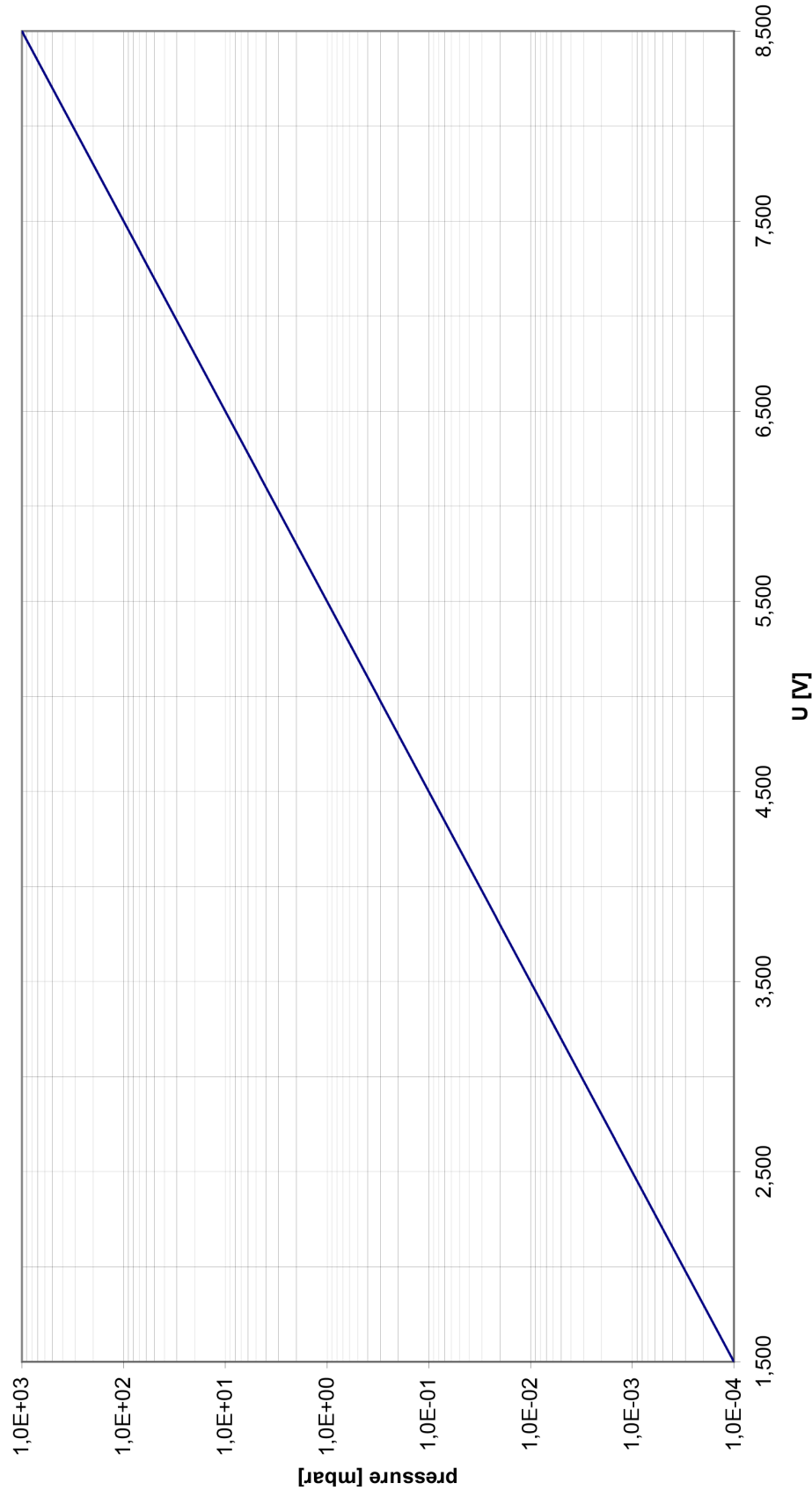
Restriction of Hazardous Substances (China RoHS)

有害物质限制条例（中国 RoHS）

	UL1000, UL1000 Fab: Hazardous Substance UL1000, UL1000 Fab: 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
Valve 阀门	X	O	O	O	O	O
Fan 风扇	X	O	O	O	O	O
Power switch 电源开关	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>						

12 Diagram

TPR265-characteristic (P1, P2; recorder-exit)



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