OPERATING INSTRUCTIONS

EN

Translation of the Original

ASM 310

Leak detector

PFEIFFER VACUUM

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

Copyright

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1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

These operating instructions are a customer document of Pfeiffer Vacuum. The operating instructions describe the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in these operating instructions refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

1.1.1 Products concerned

This document applies to products with the following part numbers:

Part Number	Description
BSAA0200MM9A	ASM 310

1.1.2 Applicable documents

Document	Part Number
Maintenance instructions - ASM 310	128864M [1)]
Operating instructions - Communication interface for leak detectors	130417 [1)]
Operating instructions - Standard sniffer probe	121780 [1)]
Operating instructions - Spray gun	121781 [1)]
Operating instructions - RC 10 remote control	124628 [1)]
EC Declaration of conformity	Included with these instructions
UKCA Declaration of conformity	Included with these instructions

1) also available at www.pfeiffer-vacuum.com

1.2 Target group

This user manual is intended for all persons in charge of transport, installation, commissioning/decommissioning, use, maintenance or storage of the product.

The work described in this document must only be carried out by persons with suitable technical training (specialized staff) or persons who have undergone Pfeiffer Vacuum training.

1.3 Conventions

1.3.1 Pictographs

Pictographs used in the document indicate useful information.

Note

Tip

Check a key point on the graphic.

Apply the stated tightening torque.

Respect the chronological order of operations and/or assembly/disassembly direction.

Correct, right choice.

Incorrect, wrong choice.

1.3.2 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

Individual action step

A horizontal, solid triangle indicates the only step in an action.

► This is an individual action step.

Sequence of multi-part action steps

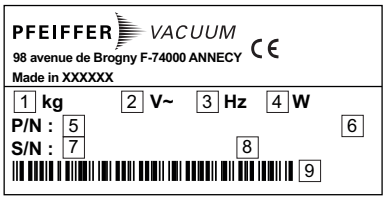
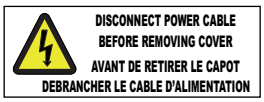
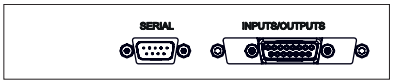
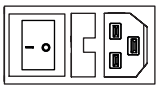
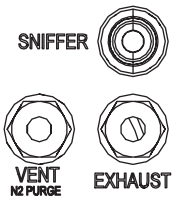
The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

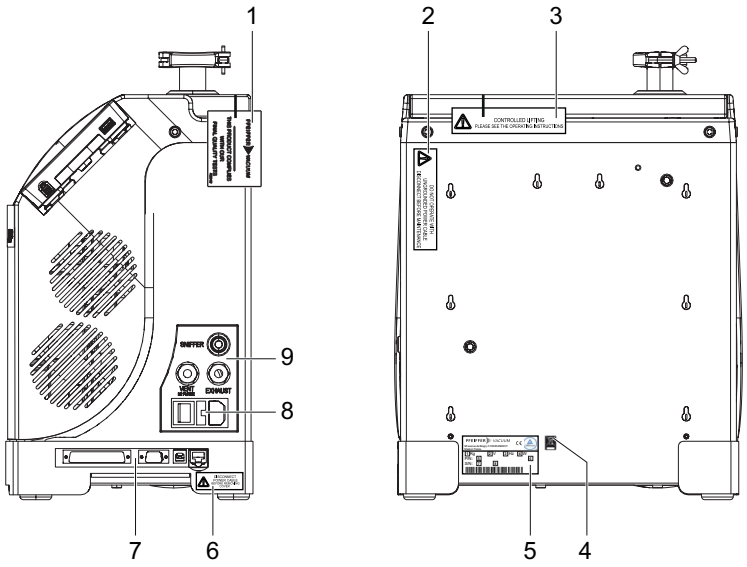
1.3.3 Labels - Marking

-	PRODUIT PERSONNALISE CUSTOMIZED PRODUCT	This label indicates that the product has been customized at the customer's request.
- 1)		This label indicates the grounding point on the product.
- 1)	PFEIFFER VACUUM He_PU / He_MU / H2_PU / H2_MU Mode 1: XXX / XXXXXX / XXX / XXXXXX Mode 2: XXX / XXXXXX / XXX / XXXXXX Mode 3: XXX / XXXXXX / XXX / XXXXXX MU Lds / XXXXXX / MU Cal / XXXXXX	For service centers use only
- 1)	PFEIFFER VACUUM Factory Firmware / Logiciel usine DD-MM-YY 4 L0XXX VXXXX XXXXXX L0XXX 1 VXXXX 2 XXXXXX 3 L0XXX VXXXX XXXXXX L0XXX VXXXX XXXXXX	This label provides information regarding firmware installed in the product. 1 Firmware name / 3 Firmware checksum 2 Firmware version / 4 Publication date
1	PFEIFFER VACUUM THIS PRODUCT COMPLIES WITH OUR FINAL QUALITY TESTS A38132	This label indicates that the product has been certified compliant with quality control upon leaving the factory.
2	DO NOT USE THE PRODUCT WITH AN UNGROUNDED POWER CABLE DISCONNECT BEFORE MAINTENANCE NE PAS UTILISER LE PRODUIT AVEC UN CABLE D'ALIMENTATION NON MIS A LA TERRE DEBRANCHER AVANT MAINTENANCE	This label indicates that some of the internal parts are electrically live and could cause electrical shock in case of contact. • Do not use the product if the main power supply cable is not earthed. • Disconnect the main power supply cable from the product before servicing the product.
3	CONTROLLED LIFTING PLEASE SEE THE OPERATING INSTRUCTIONS	This label indicates that the product must be handled using the devices identified by this label. • Comply with the rules for moving the equipment, taking weight and dimensions into account.

1) Label inside the product

4		This label indicates that the product is subject to regulations for the treatment of electrical and electronic equipment waste (refer to the EC declaration of conformity for the product).
5		Product rating plate. 1 Weight; 2 Operating voltage; 3 Operating frequency; 4 Maximum power consumption; 5 Part Number; 6 Year of manufacture; 7 Serial number; 8 Designation; 9 Serial number barcode
6		This label indicates that some of the internal parts are electrically live and could cause electrical shock in case of contact. • Disconnect the main power supply cable from the product before removing the cover.
7		**INPUTS/OUTPUTS**: Inputs/Outputs Interface connector **SERIAL**: D-Sub 9 pins RS-232 connector
8		Main switch/Circuit breaker **(On (I)/Off (O))** Mains cable part number: see Maintenance instructions of the product
9		**SNIFFER**: Standard sniffer probe pneumatic connector **VENT - N2 PURGE**: Purge or air inlet connector **EXHAUST**: Exhaust connector

1) Label inside the product



1.3.4 Abbreviations

I/O	Input/Output
^4He	Helium 4
H_2	Hydrogen
[XXXXXX]	Control panel menus and settings Example: **[Measurement] [Tracer gas]** to select the tracer gas used for the test.

2 Safety

2.1 General safety information

The following 4 risk levels and 1 information level are taken into account in this document.

⚠ DANGER

Immediately pending danger

Indicates an immediately pending danger that will result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

Indicates a pending danger that could result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

Indicates a pending danger that could result in minor injuries if not observed.

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

Is used to highlight actions that are not associated with personal injury.

► Instructions to avoid damage to property

Notes, tips or examples indicate important information about the product or about this document.

2.1.1 Safety instructions

All safety instructions in this document are based on the results of the risk assessment carried out in accordance with Low-Voltage Directive 2014/35/EU regarding electrical safety. Where applicable, all life cycle phases of the product were taken into account.

⚠ WARNING

Risk of electric shock due to non-compliant electrical installations

This product uses mains voltage for its electrical supply. Non-compliant electrical installations or installations not done to professional standards may endanger the user's life.

► Only qualified technicians trained in the relevant electrical safety and EMC regulations are authorized to work on the electrical installation.
► This product must not be modified or converted arbitrarily.
► Use only mains cable supplied with the detector.
► If replacing the mains cable, order only an original manufacturer's mains cable. See the Maintenance instructions for the reference to order.

⚠ WARNING

Risk of electric shock in case of contact with products that are not electrically isolated

When powering off _mains switch to **O**_, certain components located between the mains connection and the circuit breaker will still contain an electric charge (live). There is a risk of electric shock in case of contact.

- ► Make sure that the mains connection is always visible and accessible so that it can be unplugged at any time.
- ► Disconnect the mains cable from the electrical network before working on the product.
- ► Wait 5 minutes after power-off before working on the product and/or removing the cover(s).

⚠ WARNING

Risk of serious injury due to falling objects

When transporting parts/components and during product maintenance, there is a danger of injury caused by loads slipping or falling.

- ► Carry small and medium-size components with both hands.
- ► Transport components that weigh more than 20 kg using suitable lifting gear.
- ► Wear safety shoes with steel toes in accordance with directive EN 347.

⚠ WARNING

Health risk in conjunction with hazardous substances on tested parts

Leak detection must be carried out in an environment that is safe for the operator and the device. Responsibility for safe operation of the device lies solely with the product user and/or integrator.

- ► Do not test parts or equipment that pose a risk due to aggressive, chemical, corrosive, flammable, reactive, toxic, and explosive substances, or condensable vapors, even in very small quantities.
- ► Take appropriate safety measures in line with the applicable legislation.

⚠ WARNING

Risk of injury from contact with pressurized neutral gas

The product uses a pressurized inert gas (e.g. nitrogen) as the purge gas. Installations that do not comply with or are not configured according to professional standards can endanger the user's life.

- ► Install a manual valve on the circuit at a distance of 3 m from the product, so that the neutral gas supply can be locked out.
- ► Observe the recommended supply pressure.
- ► Always lock out and disconnect the neutral gas circuit before working on the product.
- ► Regularly check the condition of the pipework and supply circuit connections.

⚠ CAUTION

Risk of crushing related to product tilting

Although the product fully complies with EU safety regulations, there is a risk of tilting when the product is not correctly installed or used.

- ► Place the product on a flat, hard floor.
- ► Keep the product on its 4 feet.

2.1.2 Precautions

Duty to provide information on potential dangers

The product holder or user is obliged to make all operating personnel aware of dangers posed by this product.

Every person who is involved in the installation, operation or maintenance of the product must read, understand and adhere to the safety-related parts of this document.

Obligation to provide personal protective equipment

The operators or employers are obliged to provide the user of the product with the necessary personal protective equipment (PPE).

Persons responsible for installing, operating and repairing the product must wear PPE for safety.

Infringement of conformity due to modifications to the product

The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

- Following the installation into a system, the operator is required to check and re-evaluate the conformity of the overall system in the context of the relevant European Directives, before commissioning that system.

Installation and use of the accessories

The products can be fitted with special accessories.

The installation, use and refurbishment of the connected accessories are described in detail in the respective operating instructions.

- Only use original manufacturer accessories.
- Accessory part numbers (see chapter “Accessories”).

Only qualified personnel trained in safety regulations (EMC, electrical safety, chemical pollution) are authorized to carry out the installation and maintenance described in this manual. Our service centers can provide the necessary training.

- ► Do not remove the blanked-off flange from the inlet port while the product is not in use.
- ► Do not expose any part of the human body to the vacuum.
- ► Follow the safety and accident prevention requirements.
- ► Regularly check compliance with all precautionary measurements.
- ► Do not turn on the product if the cover is not in place.
- ► Do not move the product while it is in use (product powered on).

2.2 Intended use

The leak detector is designed to detect and/or quantify a possible installation or component leak by searching for the presence of a tracer gas in the pumped gases.

Only the tracer gases identified in this manual may be used.

The product may be used in an industrial environment.

2.3 Foreseeable misuse

Misuse of the product will render the warranty and any claims void. It may impair the protection provided by the detector. Any use, whether intended or not, that diverges from the uses already mentioned will be treated as non-compliant; this includes but is not limited to:

- use of a tracer gas with a hydrogen concentration greater than 5%,
- testing parts that are soiled or that have traces of water, vapors, paint, adhesive, detergent or rinsing products,
- pumping of liquids,
- pumping of dust or solids,
- pumping of corrosive, explosive, aggressive or flammable fluids,
- pumping of reactive, chemical or toxic fluids,
- pumping of condensable vapors,
- operation in potentially explosive areas,
- product movement as soon as the product is power on,
- use of accessories or spare parts, which are not named in this manual,
- use of accessories or spare parts, which are not sold by the manufacturer.

The product is not designed to carry people or loads and is not for use as a seat, stepladder or any other similar purpose.

3 Transportation and Storage

3.1 Product receipt

Condition of the delivery

- Check that the product has not been damaged during transport.
- If the product is damaged, take the necessary measures with the carrier **and** notify the manufacturer.

► Keep the product in its original packaging so it stays as clean as it was when dispatched by us: only unpack the product once it has arrived at the location where it will be used.
► Keep the blank-off flange on the inlet port (inlet) when the product is not in use.

Keep the packaging (recyclable materials) in case the product needs to be transported or stored.

3.2 Unpacking/Packing

⚠ CAUTION

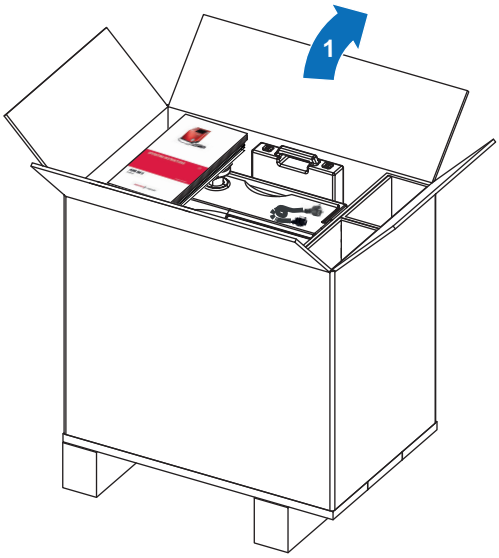
Risk of crushing related to product tilting

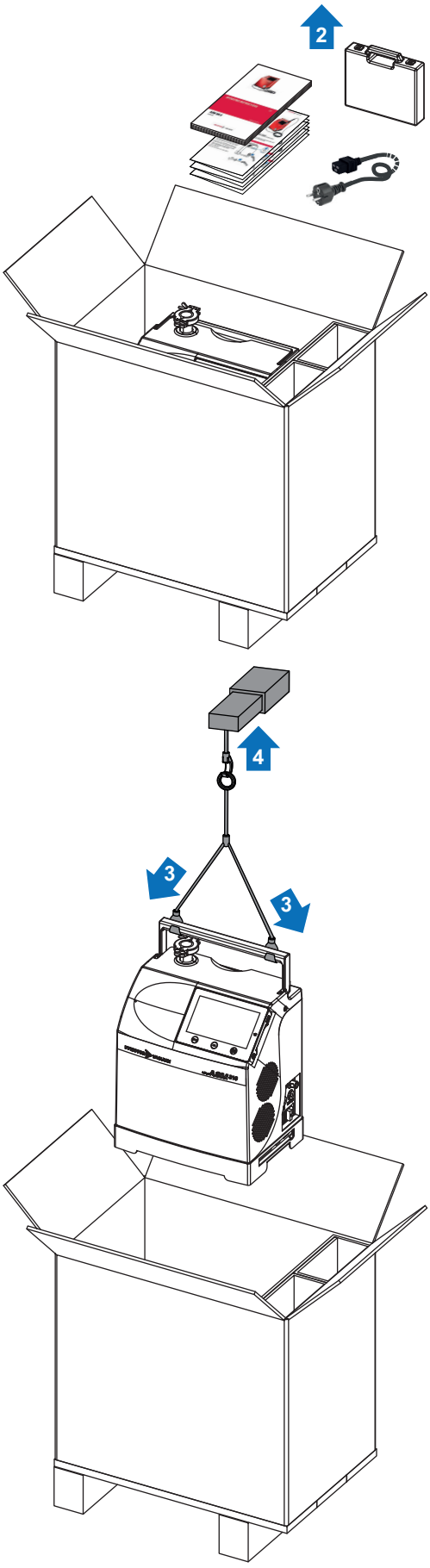
Although the product fully complies with EU safety regulations, there is a risk of tilting when the product is not correctly installed or used.

► Place the product on a flat, hard floor.
► Keep the product on its 4 feet.

Unpacking

► Use a lifting device suitable for the product's weight to lift the product.
► Use a 3-strand strap with the following characteristics:
  – Length for each strand: > 500 mm
  – Load per strand: > 100 kg




2
4
3
3

Packaging

When sending the detector to a service center, keep the accessories delivered with the detector. Do not return them with the product.

► Proceed in reverse order of unpacking.

3.3 Handling

⚠ WARNING

Risk of crushing during product handling

Given the weight of the product, there is a risk of crushing during handling operations. Under no circumstances shall the manufacturer be liable if the following instructions are not followed:

► Only qualified staff trained in handling heavy objects are authorized to handle the product.
► The lifting devices provided **must be used** for the product and the procedures set out in this document must be followed.

⚠ WARNING

Risk of serious injury due to falling objects

When transporting parts/components and during product maintenance, there is a danger of injury caused by loads slipping or falling.

► Carry small and medium-size components with both hands.
► Transport components that weigh more than 20 kg using suitable lifting gear.
► Wear safety shoes with steel toes in accordance with directive EN 347.

NOTICE

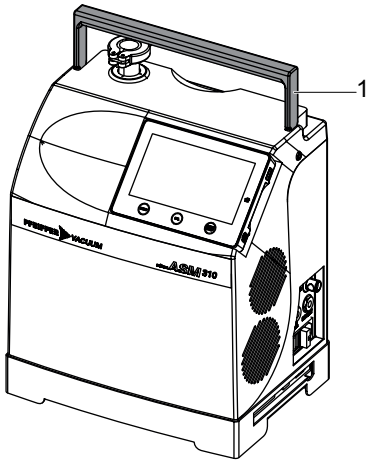
Damage to the equipment if a detector is handled while switched on

When switched off (main switch/circuit breaker at **O**), some components remain temporarily switched on. There is a risk of electric shock in case of contact.

If it is necessary to move or work on the product, the user must first make sure that the detector is fully shut down. There is a risk of damage to some of the detector's components.

► Make sure that the mains connection is always visible and accessible so that it can be unplugged at any time.
► Unplug the power cable.
► Wait 5 minutes after power-off before working on the product.

A cart has been specially designed to handle the leak detector (see chapters "Accessories" and "Transport").



1 Handle

► To move the product, 2 people should grasp it by the handle, or a lifting device should be used (see chapter "Unpacking/Packing").

3.4 Transport

⚠ WARNING

Risk of crushing related to product tilting

Although the product fully complies with the EU safety regulations, there is a risk of tilting when it is moved over the floor or is not properly secured or used.

- ► Do not place the product on a plane with an incline greater than 3° (or 6%): its weight could cause the operator to be dragged.
- ► Place the product on a flat, hard floor.
- ► Use the wheels to move the product.
- ► Do not push the product sideways.
- ► Do not press on the sides of the product.
- ► Do not leave anything pressing against the product.

NOTICE

Damage to the equipment if a detector is handled while switched on

If it is necessary to move or work on the product, the user must first make sure that the detector is fully shut down, otherwise there is a risk of damage to some of the detector components. When the main switch/circuit breaker is set to **O**:

- ► Unplug the power cable.
- ► Wait 5 minutes after power-off before working on the product.

Transport case

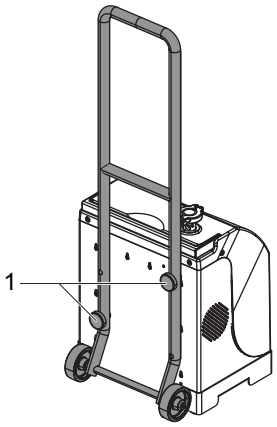
We recommend that you use the transport case that was specially designed for the ASM 310 (see “Accessories” chapter).

Accessories can be stored in the foam of the case.

Transport cart

The transport cart makes it easier to move the detector (see “Accessories” chapter).

Maximum permitted weight on the transport cart: 26 kg



1 Fixing screws delivered with the cart

► You must attach the cart to the leak detector.

3.5 Storage

Pfeiffer Vacuum recommends storing the products in their original transport packaging.

New product storage

► Leave the product in its packaging.
► Leave the blanked-off flange in place on each port.
► Store the product in a clean and dry environment according to the permitted temperature conditions (see chapter “Technical data”).
► Beyond 3 months, factors such as temperature, humidity, salt in the air, etc. could damage some components (elastomers, lubricants, etc.). If this happens, contact your service center.

Extended storage

With this procedure, the detector remains under vacuum, reducing the degassing time spent when it is switched on again.

1. Install the blank-off flange on the inlet port.
2. In the **‘Test’** menu, check:
   - that the ‘hard vacuum’ test method is selected,
   - that the most sensitive test mode is selected,
   - that the inlet vent valve is set to ’Operator’.
3. Start the test by pressing the **START/STOP** button.
   – Wait until the leak detector reaches the most sensitive test mode.
4. Make sure that the inlet vent is disable.
5. Stop the detector (set main switch/circuit breaker to **O**).
6. Wait for the control panel turn off.
7. Unplug the main power supply cable.

4 Product description

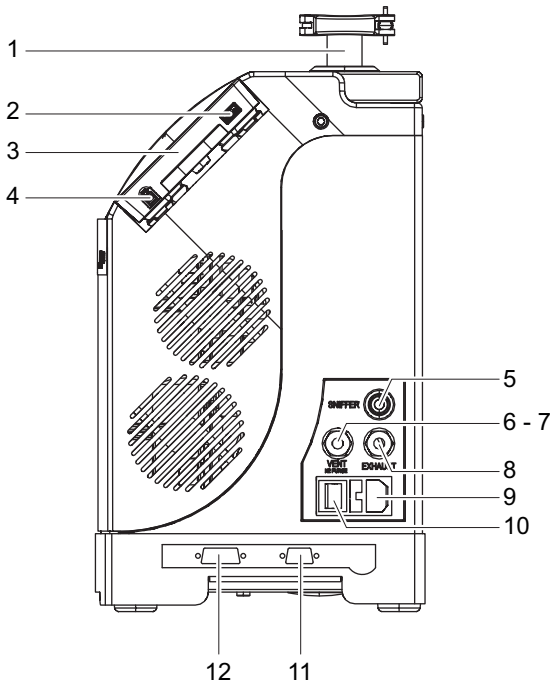
4.1 Product identification

To correctly identify the product when communicating with our service center, always have the information from the product rating plate available (see chapter "Labels").

4.1.1 Scope of delivery

- 1 leak detector
- 1 set of documentation (USB stick, operating instructions, simplified memos for the detector and the RS-232 serial link)
- 1 main power supply cable for Europe (France/Germany) and/or 1 power cable for US
- 1 calibration certificate for the internal calibrated leak
- 1 quality control certificate for the product
- 1 Quality Control label
- 1 maintenance kit
- 1 15-pin male D-Sub connector cover
- 1 15-pin D-Sub connector

4.2 Connection interface



1 Detector inlet port (inlet)

2 Connector for USB stick (at the user's expense)

3 Control panel

4 RC 10 remote control connector [1)]

5 Standard sniffer probe connector **(SNIFFER)** [1)]

6 Purge inlet connector (neutral gas) **(VENT/N2 PURGE)** [1)]

7 Inlet vent connector **(do not obstruct) (VENT/N2 PURGE)** [1)]

8 Exhaust for primary pump with filter **(EXHAUST)**

9 Power supply

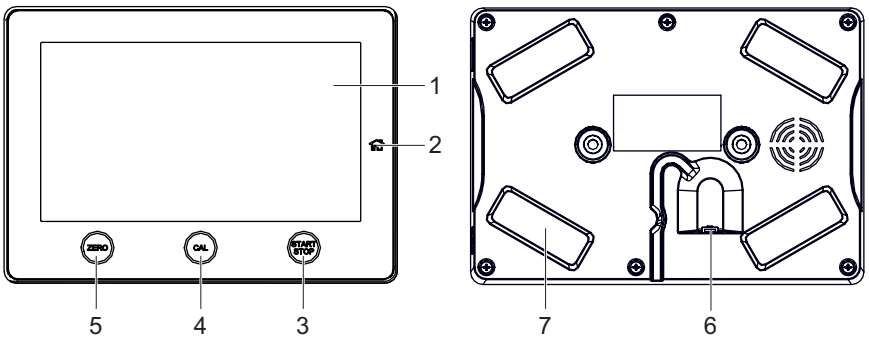
10 Main switch/Circuit breaker **(I/O)**

11 RS-232 9-pin D-Sub communication interface connector **(INPUTS/OUTPUTS)** [1)]

12 15-pin D-Sub I/O communication interface connector **(INPUTS/OUTPUTS)** [1)]

1) Accessory (at the customer's expense)

4.3 Control panel description



1 Touchscreen

2 Main screen access button

3 **START/STOP** button
Test Start/Stop

4 **CAL** button
Internal calibration, external calibration or calibration check is launched depending on the setting (see chapter “Calibration type”).

5 **ZERO** button
Autozero.

6 Detector connection cable connector

7 Fixing magnet (x4)

5 Installation

5.1 Detector installation

⚠ WARNING

Risk of serious injury due to falling objects

When transporting parts/components and during product maintenance, there is a danger of injury caused by loads slipping or falling.

- ► Carry small and medium-size components with both hands.
- ► Transport components that weigh more than 20 kg using suitable lifting gear.
- ► Wear safety shoes with steel toes in accordance with directive EN 347.

⚠ CAUTION

Risk of crushing related to product tilting

Although the product fully complies with EU safety regulations, there is a risk of tilting when the product is not correctly installed or used.

- ► Place the product on a flat, hard floor.
- ► Keep the product on its 4 feet.

NOTICE

Leak detector ventilation

In cases of poor ventilation, there is a risk of deterioration of the detector's internal components by heating.

- ► Comply with the ambient operating temperature.
- ► Do not obstruct the ventilation grids.
- ► Ventilation grids should be cleaned regularly.
- ► Leave a free space of at least 10 cm all around the leak detector.
- ► Store nothing under the detector.

The inlet pressure must be no higher than atmospheric pressure. Pressure that is too high can damage the detector.

The detector's performance depends on the type of accessories used and on the quality of the mechanical connections.

- ► Comply with these recommendations to optimize measurement (see chapter “Pre-requisites for optimizing use”).
- ► Choose the location for set up according to the dimensions of the detector (see chapter “Dimensions”).
- ► Handle the detector using the handling device (see chapter “Handling”).
- ► The leak detector must be installed on a horizontal flat surface.
- ► Make sure that the test area is not polluted by the tracer gas (ventilated room).
- ► Test that the entire line is completely sealed when the detector is attached to the pumping circuit, to ensure that the connections are correct (pump, pipes, valves, etc.).
- ► When assembling the vacuum circuit, use accessories to shut off the product and make maintenance easier (inlet shut off valves, purge systems, etc.).

5.2 Purge and inlet vent connection

5.2.1 Standard equipment

NOTICE

Risk of pollution from tracer gas

The leak detector should not be used in an environment with a high concentration of tracer gas. The tracer gas risks polluting the leak detector.

The manufacturer cannot be held responsible for the product's pollution with tracer gas.

► Ensure good ventilation in the area where the detector will be used.

NOTICE

Incorrect use of purge

A leak detection operation should be carried out on parts or equipment that don't contain trace of substances that are aggressive, chemical, corrosive, inflammable, reactive, toxic, explosive, or on condensable vapors, even in small quantities.

► Do not use the purge to dilute these hazardous products. This is not its purpose.

The detector is equipped with an inlet vent optimizing the detector's operation.

- If no inlet vent system is connected, the inlet vent is connected to the ambient air.
- The inlet vent status (opened or closed) depends on the parameters set by the user (see the chapter "Inlet vent").

5.2.2 Connection of a neutral gas line (purge)

It is possible to connect the detector to a neutral gas line (purge) (at the customer's expense).

The status of the neutral gas line (purge) (open or closed) is managed by the detector and cannot be configured by the operator.

The use of a neutral gas (nitrogen, for example) allows for the leak detector background to be reduced.

The neutral gas should be different than the tracer gas used.

In addition to the purge, activating the 'Pollution' function is recommended (see chapter "Pollution function").

⚠ WARNING

Risk of injury from contact with pressurized neutral gas

The product uses a pressurized inert gas (e.g. nitrogen) as the purge gas. Installations that do not comply with or are not configured according to professional standards can endanger the user's life.

► Install a manual valve on the circuit at a distance of 3 m from the product, so that the neutral gas supply can be locked out.
► Observe the recommended supply pressure.
► Always lock out and disconnect the neutral gas circuit before working on the product.
► Regularly check the condition of the pipework and supply circuit connections.

NOTICE

Incorrect use of purge

A leak detection operation should be carried out on parts or equipment that don't contain trace of substances that are aggressive, chemical, corrosive, inflammable, reactive, toxic, explosive, or on condensable vapors, even in small quantities.

► Do not use the purge to dilute these hazardous products. This is not its purpose.

Flow

To guarantee best performance, the neutral gas supply must be dry and filtered, with the following characteristics:

- relative excess pressure: 200 hPa
- flow rate: 5 sccm (if pressure = 1 bar (absolute) at the inlet)

Use pressure
If the neutral gas pressure is too high, the inlet vent valve may remain closed.

- 0 to 0.3 bar relative (≈ 0 to 4.5 psig)
- 1 to 1.3 bar absolute (≈ 14.5 to 19 psig)

Procedure

► Connect the neutral gas pipework to the neutral gas purge connector (see chapter “Connection interface”).

5.3 Connecting the exhaust

NOTICE

Risk of deterioration due to overpressure at exhaust

Too much pressure at the detector’s exhaust risks damaging the detector.

► Ensure that the customer application exhaust line is always under slightly negative pressure.
► Make sure the detector’s exhaust pressure does not exceed 200 hPa (relative).

The detector exhaust filter **(EXHAUST)** must never be removed.

The detector exhaust **(EXHAUST)** must never be obstructed.

5.4 Electrical connection

⚠ WARNING

Risk of electric shock due to non-compliant electrical installations

This product uses mains voltage for its electrical supply. Non-compliant electrical installations or installations not done to professional standards may endanger the user’s life.

► Only qualified technicians trained in the relevant electrical safety and EMC regulations are authorized to work on the electrical installation.
► This product must not be modified or converted arbitrarily.
► Use only mains cable supplied with the detector.
► If replacing the mains cable, order only an original manufacturer's mains cable. See the Maintenance instructions for the reference to order.

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

Electrical safety
The leak detector is Class I equipment and therefore must be earthed.

► Make sure the main switch/circuit breaker is set to **O**.
► Connect the power supply to the leak detector using the power cable supplied with the detector (see chapter “Connection interface”).
► See chapter “Technical characteristics”.
► If replacing the mains cable, order only an original manufacturer's mains cable: see the maintenance instructions for the reference to order.

5.5 Connecting the part/installation to be tested

NOTICE

Risk of deterioration of parts or installations

There is a risk of deterioration for parts or installations connected to the leak detector vacuum circuit.

► Make sure that the parts or installations connected to the detector's pump inlet withstand a negative pressure of $1 \cdot 10^3$ hPa in relation to the atmospheric pressure.

- The maximum permitted weight at the detector's inlet must be no more than 5 kg and the maximum torque must be 3 N · m.
- The inlet pressure must be no higher than atmospheric pressure. Pressure that is too high can damage the product.
- The detector's performance depends on the type of accessories used and on the quality of the mechanical connections.
- When assembling the vacuum circuit, use accessories to shut off the product and make maintenance easier (inlet shut off valves, purge systems, etc.).
- Comply with these recommendations to optimize measurement (see chapter "Pre-requisites for optimizing use").

Connection

► Remove the blanked-off flange that covers the detector's inlet port and save it for reuse during storage or transport.
► Use pipes with a diameter equal to the diameter of the detector's inlet. The pipes should be as short as possible and completely sealed.
► Connect the part or the installation to be tested using the connection accessories available in the product catalogue.
► Connect the part or the installation to be tested using the flexible pipeworks. Never use rigid or flexible plastic pipework (compressed air style tube).

6 Commissioning

6.1 Detector start-up

1. Connect the main power supply cable.
2. Set the main switch/circuit breaker to **I**.
3. For first start-up: set the language, unit, date and time (the user can modify these settings at a later time).
4. Wait for the detector to enter “Stand-by” mode.

6.2 Detector powering off

1. Set the switch/circuit breaker to **O**.
2. Disconnect the mains power cable.
3. Wait 5 minutes before working on the detector, removing the cover or moving the detector.

Pump stop due to power failure

When there is a mains power failure, the detector shuts down: it switches on again automatically when power is restored.

7 Operation

7.1 Use conditions

⚠ WARNING

Risk of injury due to the use of hydrogen as tracer gas

Hydrogen can be used as a tracer gas for leak detection. Depending on its concentration, in the worst scenario, there may be a risk of explosion.

- ► Never use a tracer gas with a hydrogen content greater than 5%.
- ► Use hydrogenated nitrogen as a tracer gas: mix of 95% N_2 and 5% H_2.

NOTICE

Leak detector ventilation

In cases of poor ventilation, there is a risk of deterioration of the detector's internal components by heating.

- ► Comply with the ambient operating temperature.
- ► Do not obstruct the ventilation grids.
- ► Ventilation grids should be cleaned regularly.
- ► Leave a free space of at least 10 cm all around the leak detector.
- ► Store nothing under the detector.

NOTICE

Risk of deterioration from solid particles

The tested applications may generate solid particles.

It is recommended in this case to protect the detector inlet (inlet port).

- ► Install a filter at the detector inlet (see chapter "Accessories").

Environmental conditions: see chapter "Technical characteristics".

7.2 Prerequisites for optimizing use

Before each commissioning, and in order to optimize the use of the leak detector, the user must observe the following points.

- ► Become familiar with the safety instructions.
- ► Check that all the connections are correct.
- ► Do not move the product as soon as the product is switched on.
- ► Make sure that the leak detector is in an environment free of tracer gas.
- ► Perform leak detector calibration.
- ► Test only clean, dry parts/installations with no trace of water, vapor, paint, detergent or rinsing products.
- ► Check that the connected part/installation is impervious to tracer gas.

7.3 Operation monitoring

In case an issue happens during operation, the user is advised on the detector control panel.

Type of fault	Control panel	
Warning		Press on **[i Next]** to display the fault.
Error		Message display. Press on **[i Next]** to display the fault.
Critical error		Display of “Critical error - E244” message. Contact our service center.

7.4 Test Start/Stop

Prerequisites
See chapter “Start-up of the detector”

Test method
The test method is chosen depending on the part to be tested.

There are 2 possible test methods:

- Hard Vacuum
- Sniffer

Hard vacuum test

The test can also be started using a remote control (accessory): see the remote control operating instructions.

1. Select the ‘hard Vacuum’ test method (see chapter “Test method”).
2. Select the test mode (see chapter “Test mode”).
3. Set the reject point and warning set point if necessary (see chapter “Set points”).
4. Put the detector on ‘Stand-by’ mode.
   – In ‘Stand-by’ mode, the leak rate displayed corresponds to the detector’s background.
5. Carry out air inlet by pressing the **[VENT]** function key.
6. Prepare the part/installation to be tested (see chapter “Part/installation connection to be tested”).
   – Spray method
     – Connect the part/installation to be tested to the leak detector inlet port.
     – Evacuate the air from the part/installation to be tested.
   – Bombing method
     – Place the part to be tested in a pressurization chamber with the tracer gas.
     – Remove the part to be tested from the chamber and put it in the test chamber connected to the leak detector inlet port.
7. Start the test by pressing the **START/STOP** button.
   – Spray method
     – Spray the tracer gas on the points on the part that are likely to leak.
8. The various test steps are displayed.

   When the detector has reached the most sensitive test mode, wait for the measurement to stabilize: the measurement displayed corresponds to the measured leak rate.
9. Stop the test by pressing the **START/STOP** button.

Sniffer test

1. Prepare the part/installation to be tested.
2. Select the ‘sniffer’ test method (see chapter “Test method”).
3. Set the reject point and warning set point if necessary (see chapter “Set points”).
4. Put the detector on ‘Stand-by’ mode.
5. Connect the sniffer probe (accessory).
6. Start the test by pressing the **START/STOP** button.
7. Then run the sniffer probe slowly over the areas of the part to be tested that may leak: the leak rate displayed varies when a leak is detected (quantitative value of the measured leak rate).
8. Stop the test by pressing the **START/STOP** button.

7.5 Calibration

Calibration is used to ensure that the leak detector is correctly adjusted to detect the tracer gas selected and display the correct leak rate.

A calibrated leak is used to calibrate the leak detector.

The internal calibrated leak of the detector is a ^{4}He calibrated leak. By default, the leak detector is calibrated in ^{4}He.

To use the detector with another tracer gas, it is mandatory to perform an external calibration with an external calibrated leak charged with this tracer gas.

Detector calibration

20 minutes after switching it on, the detector suggests that the user perform a calibration. For correct use of the detector and to optimize the accuracy of the measurement, **this calibration must be performed.**

It is recommended to perform a calibration:

- at least once a day,
- for intense operation: start calibration at the beginning of each work session (e.g. work in shifts, every 8 hours),
- if it is uncertain whether the detector is working properly.

Internal calibrated leak

The internal calibrated leak is specifically designed for the leak detector.

The calibrated leak is supplied with a calibration certificate.

The internal calibrated leak of the detector is in the range of 10^{-7} mbar·l/s.

To perform an external calibration of the detector, use an external calibrated leak in the rejet point range necessary for the application.

External calibrated leak

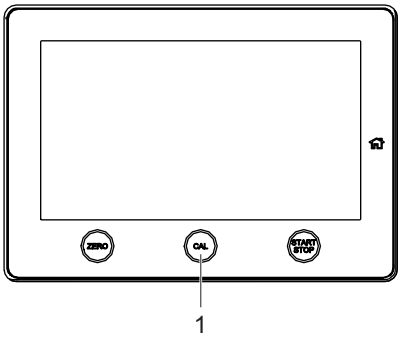
The operator must use a calibrated leak containing the tracer gas selected (^{4}He, Mass 3 or H_2).

The manufacturer does not provide calibrated leaks in Mass 3 and H_2.

The choice of external calibrated leak depends on application requirements: use a calibrated leak from the same leak rate range as the leak to be measured.

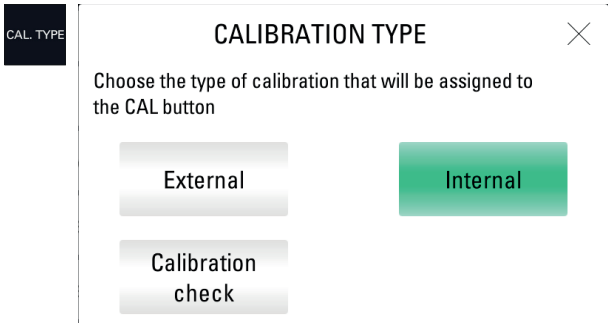
7.5.1 Calibration type

The user assigns a calibration type to the **CAL** button.



1 **CAL** button

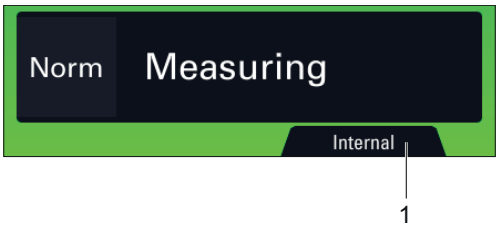
To assign a calibration type to the **CAL** button, assign a function key to **[CAL. TYPE]** (see chapter “Function keys”).



Procedure

1. Press the **[CAL. TYPE]** function key.
2. Select the calibration type to assign to the **[CAL. TYPE]** function key.
   - Internal calibration: calibration of the leak detector with the internal calibrated leak (factory configuration)
   - External calibration: calibration of the leak detector with an external calibrated leak
   - Calibration check (see chapter “Calibration check”)
3. Confirm the selection **[X]**.

The calibration type assigned to the **CAL** button is displayed on the main screen.



1 Calibration type assigned to the **CAL** button

Test method	Calibration type selected	Main screen display
Hard vacuum test	Internal calibration	Internal
	External calibration	External
	Calibration check	Check
Sniffer test	Concentration	Concentration
	External calibration	Sniffer

7.5.2 Calibration in hard vacuum test mode with internal calibrated leak

Internal calibrated leak

The internal calibrated leak is specifically designed for the leak detector. It is composed of:

- a reservoir filled with ^{4}He tracer gas (no internal calibration with other tracer gases),
- a temperature sensor (to take into account the effect of temperature on the leak rate),
- an integrated diaphragm (to calibrate the leak rate),
- an identification label (identical to the identification label of an external calibrated leak).

The calibrated leak is supplied with a calibration certificate.

Use a calibrated leak in the range of ≈ 10^{-7} mbar · l/s (≈ 10^{-8} Pa · m^3/s).

In the case of intensive use of the detector, a spare internal calibrated leak is recommended. By default, the detector can be calibrated with an external calibrated leak.

Calibration
Calibration can be performed when the detector is in ‘Stand-by’ mode.

1. Configure the following settings:
   - test method: hard vacuum (see chapter “Test method”)
   - calibration type: internal (see “Calibration type”)
   - type of calibrated leak: internal (see chapter “Calibrated leak”)
   - calibration: operator (see chapter “Calibration function”)
2. Check the leak settings (leak rate corrected for temperature and time as needed) (see chapter “Calibrated leak”).
3. Press the **CAL** button to start a calibration.

To stop a calibration, press the **CAL** button 3 times in under 5 seconds.

7.5.3 Calibration in hard vacuum test mode with external calibrated leak

External calibrated leak
The operator must use a calibrated leak containing the tracer gas selected (^{4}He, Mass 3 or H_2).

There are several types of external calibrated leaks, with or without reservoir, with or without valve, covering several ranges of leaks.

The manufacturer does not provide calibrated leaks in Mass 3 and H_2.

The choice of external calibrated leak depends on application requirements: use a calibrated leak from the same leak rate range as the leak to be measured.

Calibration with an external calibrated leak is advised when the reject point is far from the internal calibrated leak value.

Calibration

To stop a calibration at any time, press the **CAL** button 3 times in under 5 seconds.

1. Configure the following settings:
   - test method: hard vacuum (see chapter “Test method”)
   - calibration type: external (see “Calibration type”)
   - type of calibrated leak: external (see chapter “Calibrated leak”)
   - calibration: operator (see chapter “Calibration function”)
2. Verify the setting for the external calibrated leak used (see chapter “Calibrated leak”).
3. As needed, correct the parameters of the external calibrated leak used (see the label for the calibrated leak or the calibration certificate).
4. Select the tracer gas for the external calibrated leak (see chapter “Calibrated leak”).
5. Check that the detector is in ‘Stand-by’ mode.
6. Carry out air inlet by pressing the **[VENT]** function key.
7. Place the external calibrated leak on the detector inlet port.
8. Press the **CAL** button to start a calibration.
9. Follow the instructions given by the leak detector.
   – Press **[Next]** to move to the next step.

At the end of the calibration, the detector returns to ‘Stand-by’ mode.

7.5.4 Calibration in sniffer test with external calibrated leak

External calibrated leak
The operator must use a calibrated leak containing the tracer gas selected (^{4}He, Mass 3 or H_2).

There are several types of external calibrated leaks, with or without reservoir, with or without valve, covering several ranges of leaks.

The manufacturer does not provide calibrated leaks in Mass 3 and H_2.

The choice of external calibrated leak depends on application requirements: use a calibrated leak from the same leak rate range as the leak to be measured.

Calibration

1. Configure the following settings:
   - test method: sniffer (see chapter “Test method”)
   - calibration type: external (see “Calibration type”)
   - type of calibrated leak: external (see chapter “Calibrated leak”)
   - calibration: operator (see chapter “Calibration function”)
2. Select the tracer gas for the external calibrated leak (see chapter “Tracer gas”).
3. Verify the setting for the external calibrated leak used (see chapter “Calibrated leak”).

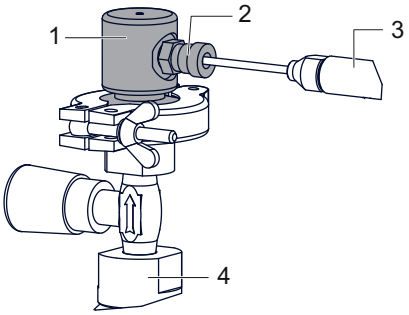
   Correct the temperature, month and year if necessary.
4. Press the **CAL** button to start a calibration.
5. Follow the instructions given by the leak detector.
   – Press **[Next]** to move to the next step.

To stop a calibration, press the **CAL** button 3 times in under 5 seconds.

Adaptor for external calibrated leaks

A DN 16 ISO-KF or DN 25 ISO-KF adaptor is used to calibrate the detector with an external calibrated leak in sniffer test mode (with Standard sniffer probe only).

Adaptor part number (see chapter “Accessories”).



1 DN 16 ISO-KF or DN 25 ISO-KF adapter
2 Fixing screws
3 Sniffer probe
4 Calibrated leak

1. Attach the adaptor to the external calibrated leak used for the calibration with a centering ring and a clamp.
2. Press the **CAL** button to start a calibration.
3. Place the sniffer probe in the calibration port.
4. Tighten the fixing screw.
5. Follow the instructions given by the leak detector.
   – Press **[Next]** to move to the next step.
6. Loosen the fixing screw.
7. Remove the sniffer probe from the calibration port.
8. Follow the instructions given by the leak detector.
   – Press **[Next]** to move to the next step.
9. Wait 10 s (at least) before reading the leak rate.

7.5.5 Calibration in sniffer test on concentration

Concentration = volume at atmospheric pressure filled with a gas mixture for which the tracer gas content is known.

Calibration on concentration can only be carried out in sniffer test mode, with the detector in ‘Stand-by’ mode.

Before starting this function, make sure that the leak detector is in an environment free of tracer gas pollution.

1. Configure the following settings:
   - test method: sniffer (see chapter “Test method”)
   - calibration type: Concentration (see “Calibration type”)
   - calibration: calibration (see “Calibration function”)
2. Select the tracer gas for the concentration (see chapter “Tracer gas”).

3. Press the **CAL** button to start a calibration.
4. Follow the instructions given by the leak detector.
   – Press **[Next]** to move to the next step.

At the end of the calibration, the detector returns to ‘Stand-by’ mode.

7.6 Zero Function

The zero function helps the user to identify very small leak rate variations in the surrounding background noise or to dilate small measured leak rate fluctuations on the analog display.

Do a zero

Configuration (see chapter “Zero activation”).

Over time, there may be a deviation in the leak rate display. Zeroing must be performed regularly in the following cases:

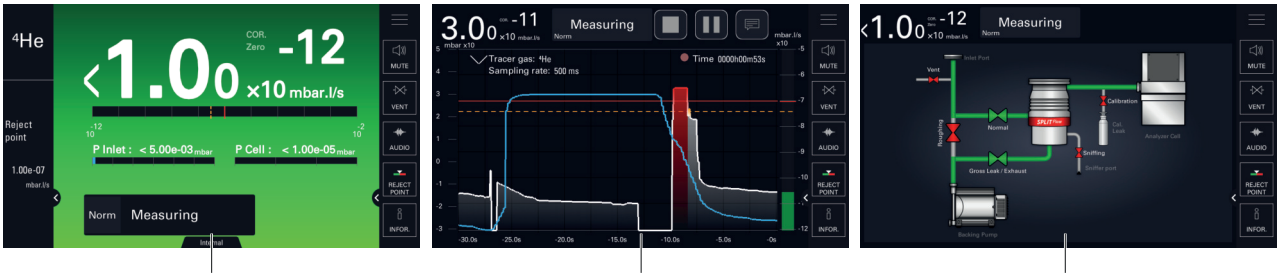
- when the detector’s background value increases,
- before performing a precise measurement.

1. Press the **ZERO** button.

7.7 Touchscreen

The touch screen is interfaced with the detector and is used to:

- display information about the test,
- access the available functions,
- set the detector's parameters.



1 Main screen **[Home]**: Information about the current test
2 Graph screen: Monitoring and recording of the leak rate
3 Synoptic: Schematic diagram of the detector and the status of the valves

The contents of the screens are provided as an example: depending on the detector settings, the display may be different.

► Remove the film that protects the touch screen upon delivery.
► Use the touch screen manually without using hard objects such as pens, screwdrivers, etc.
► Use the RS-232 to control/set the detector if the touch screen is out of service (broken screen).

Screenshot

To take a screenshot, press the **[SCREEN SHOT]** function key (see chapter “Function keys”).

- The screenshots are always saved in the internal memory.
- Name of screenshots: ScreenYYYYMMDD_HHMMSS (Example: Screen20210203_143302).

7.7.1 Navigation

Symbols

Symbol	Description
	Available on the control panel Return to the main screen from any menu **[Home]** in the instructions
	Return to previous menu
	Access to a sub-menu
	Access secured with password • Red closed padlock: access prohibited (password access) • Green open padlock: access permitted
	Enabling slider • Black slider: function not enabled • Green slider: function enabled
	Action button (access to a setting, function, etc.)
	Navigation tools • << >>: access to the first/last item • < >: access to the previous/next item **[<< >>] [< >]** in the instructions
	Error message
	Critical error message
	Access error/warning message **[i Next]** in the instructions
	Setting tool • The green slider indicates the set value. • To increase/decrease this value, press on the right/left of the cursor.
	Access the Settings menu
	Return to home page **[X]** in the instructions
	Saving the change made **[✔]** in the instructions
	Display/Hide an area
	Cursor for screen navigation (horizontal or vertical)

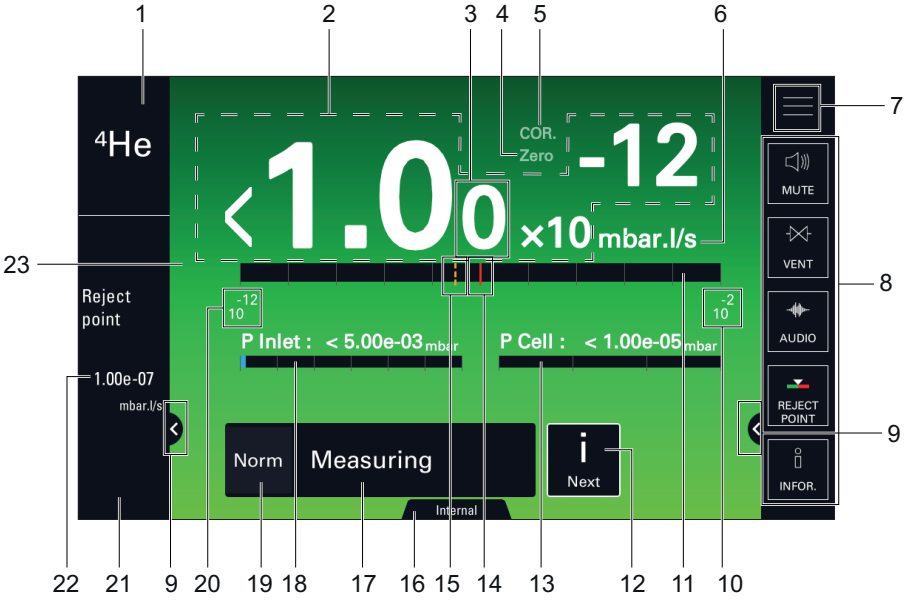
Access to the main/graph/synoptic screen

The synoptic can be hidden or shown (see chapter “Screen setting”).

Access to the synoptic and function keys

- ► The synoptic can be hidden or shown (see chapter “Screen setting”).
- ► The function keys can be displayed (enabled) or hidden (disabled) (see chapter "Function keys").

7.7.2 Main screen (Home)



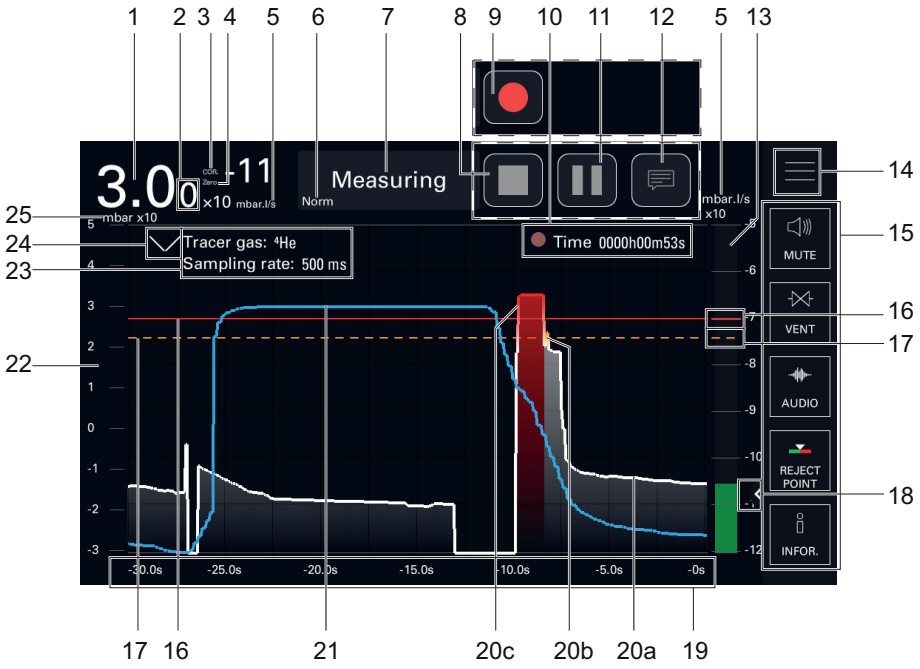
Item	Function	Name of the pictogram in the operating instructions
1	Tracer gas selected	-
2	Leak rate digital display	-
3 [1)]	Display 2nd digit	-
4 [1)]	**Zero** indicator: zero function applied	**ZERO**
5 [1)]	**COR** indicator: correction factor applied	**COR**

1) Display according to detector settings
2) Display only
3) Display if test in progress

Item	Function	Name of the pictogram in the operating instructions
6	Leak rate unit	-
7	Access to the menu Settings	**[SETTINGS]**
8	Function key bar	-
9	Display/Hide an area	**[EXPAND]**
10	High decade (max) of the bargraph	-
11	Leak rate bargraph display (color according to test result)	-
12	**[i Next]** indicator: error/warning message to be viewed	**[i Next]**
13 [1)]	Analyzer cell pressure	-
14 [3)]	Set reject point (red plot)	-
15 [1)]	Warning point set (orange plot)	-
16	Calibration type selected	-
17	Current status of the detector	-
18 [1)]	Detector inlet pressure	-
19	Test mode selected	-
20	Low decade (min) of the bargraph	-
21 [1)2)]	Sniffer probe flow (if Sniffer method selected)	-
22 [1)]	Set reject point digital display	-
23	The color of the screen varies depending on the test result: • green screen: measured leak rate below the reject point • red screen: measured leak rate above the reject point Gray screen: detector in ‘Stand-by‘ mode	-

1) Display according to detector settings
2) Display only
3) Display if test in progress

7.7.3 Graph screen



► Press on the screen to access the graph settings (see chapter "Graph screen: graph parameters").

Item	Function	Name of the pictogram in the operating instructions
1	Leak rate digital display	-
2 [1]	Display 2nd digit	-
3 [1]	**COR** indicator: correction factor applied	**COR**
4 [1]	**Zero** indicator: zero function applied	**ZERO**
5	Leak rate unit	-
6	Test mode selected	-
7	Current status of the detector	-
8 [2]	Stop the recording	**[STOP REC]**
9 [2]	Start recording	**[START REC]**
10 [2]	Total recording time ● white dot: no recordings in progress ● flashing red dot: recording in progress ● fixed red dot: recording paused	-
11 [2]	Pause/Resume recording	**[STBY REC]**
12 [2]	Comments access	**[COMMENT]**
13	Bar graph display of the leak rate ● Green bargraph: measured leak rate below the warning point ● Orange bargraph: measured leak rate between the warning point and the reject point ● Red bargraph: measured leak rate above the reject point	-
14	Access to the menu Settings	**[SETTINGS]**
15	Function key bar	-
16	Set reject point (red plot)	-
17 [1]	Warning point set (orange plot)	-
18	Display/Hide an area	**[EXPAND]**
19	Display time	-
20 [3]	Leak rate plot ● 20a - white plot: measured leak rate below the warning point ● 20b - orange bargraph: measured leak rate between the warning point and the reject point ● 20c - red plot: measured leak rate above the reject point	-
21	Detector inlet pressure plot (blue)	-
22	Detector inlet pressure range	-
23	Data on recording ● Tracer gas selected ● Sampling rate set	-
24	Show/hide data on recording (item 23)	-
25	Detector inlet pressure unit	-

1) Display according to detector settings

2) Display according to recording settings

3) Display if test in progress

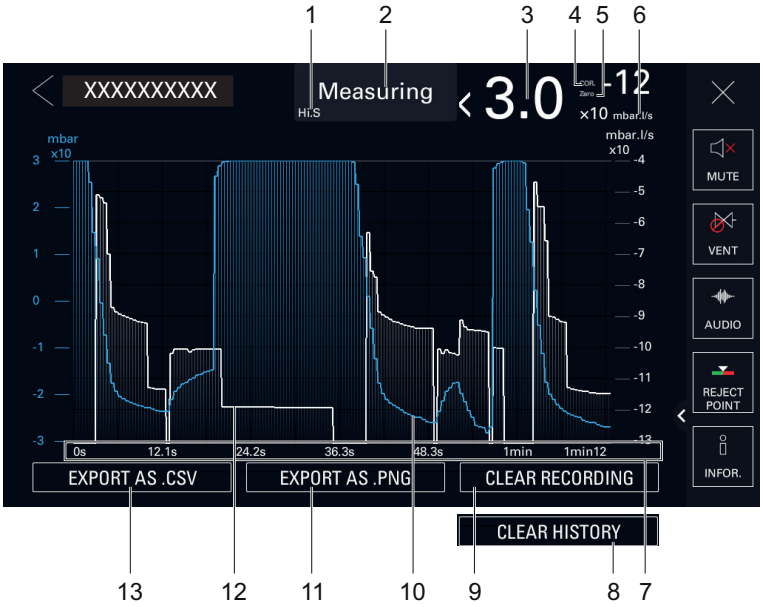
Navigation

The user can view some or all of a recording, without stopping the recording in progress.

► Drag the plot to the left/right to browse the recording in progress.

► Press on the graph screen then **[View record]** to view all of the recording in progress.

Graph



1 Test mode selected
2 Current status of the detector
3 Leak rate digital display
4 **COR** indicator: correction factor applied
5 **Zero** indicator: zero function applied
6 Leak rate unit
7 Total recording time
8 Button to delete the graph history
9 Button to clear the recording in progress
10 Inlet pressure plot (blue)
11 Button to save a .png screenshot
12 Leak rate plot (white)
13 Button to save a .csv file

7.7.4 Graph screen: graph parameters

Access: Press on the screen to access the graph parameters.				**Choice - Setting limit** [1]
Range	Display time	To be set Maximum time range displayed on the screen		12 s – 1 h
	Auto scale	To be enabled The automatic scale is used to display the measured leak rate centered on 2 or 4 decades. The scale varies according to the leak rate measured. When auto scale is enabled, the scale configured for the leak rate is no longer taken into account. See example below		Enabled Disabled
		if auto scale is enabled	To be selected Number of auto scale decades Example: leak rate = $5 \cdot 10^{-5}$ mbar · l/s ($5 \cdot 10^{-6}$ Pa · m^3/s) • Auto scale 2 decades: scale from $1 \cdot 10^{-4}$ – $1 \cdot 10^{-6}$ mbar · l/s ($1 \cdot 10^{-5}$ – $1 \cdot 10^{-7}$ Pa · m^3/s) • Auto scale 4 decades: scale from $1 \cdot 10^{-3}$ – $1 \cdot 10^{-7}$ mbar · l/s ($1 \cdot 10^{-4}$ – $1 \cdot 10^{-8}$ Pa · m^3/s)	2 decades 4 decades
	Decade if auto scale is disabled	High decade	To be set High decade (max) of the bargraph Note: Maximum of 10 decades between high and low decade	-11 – +6
		Low decade	To be set Low decade (min) of the bargraph Note: Maximum of 10 decades between high and low decade	-12 – +5
	Show inlet pressure	To be enabled Displaying/Hiding the inlet pressure		Enabled Disabled
	Pressure decade if 'Show inlet pressure' is enabled	High decade	To be set Configuration of the maximum decade for the inlet pressure	-2 – +3
		Low decade	To be set Configuration of the minimum decade for the inlet pressure	-3 – +2
Enable record	To be enabled Show/hide **[COMMENT]**, **[START REC]**, **[STBY REC]** and **[STOP REC]** on the graph screen (see chapter "Graph screen").			Enabled Disabled
Sampling rate if 'Enable record' is enabled	To be set Time between 2 recorded measurements			100 ms – 30 s
Clear recording if 'Enable record' is enabled	Function to be started This function deletes all recordings in progress.			-
View record if 'Enable record' is enabled	Function to be started This function is used to display all recordings in progress.			-

1) Initial setting: see chapter "Tree diagram to the Settings menu"

7.7.5 Graph screen: recording

Recording is used to store the measurements taken during the test in the control panel memory. **It will not save these measurements**.

For each measurement, the leak rate and inlet pressure are recorded.

During recording, all of the leak detector functions are available.

After the detector is turned off (by a power failure or user manual shutdown), the current recording is cleared.

A record may include several measurements. The successive measurements are recorded one after the other in the recording: a visual cue (Δ) indicates the measure change.

To start a new recording, you must first save the current one.

When the memory is full and a recording is in progress, recording is automatically stopped.

1. Update the recording settings if necessary (see chapter "Graph screen: graph parameters").
2. Press **[COMMENT]** to add a comment (see chapter "Graph screen").
   - Optional: this comment can be added at any time during the recording or during a pause
   - Comments can be viewed later in the backup .CSV file.
3. Press **[START REC]** to start recording.
   - **[START REC]** is replaced by: **[STOP REC]**, **[STBY REC]** and **[COMMENT]**.
   - Total recording duration: a flashing round dot is displayed, indicating that a recording is in progress.
   - None of the measurements displayed on the plot before the recording starts will be recorded.
4. If necessary, press **[STBY REC]** to pause.
   - The pictogram glows red without flashing.

     Total recording duration: the red dot is steady, indicating that the recording is paused.
   - None of the measurements displayed on the plot during the pause will be recorded.
5. Press **[STBY REC]** again to re-start recording.
6. Repeat the previous steps as many times as necessary.
7. Press **[STOP REC]** to stop recording.
   - Return to the recording in progress to continue (the measures already saved will be retained): press **[<]** then **[START REC]**.
   - To stop and save the recording in progress: press **[STOP REC]** (see chapter "Graph screen: saving a recording").

7.7.6 Graph screen: graph history

The Graph history automatically records a history of the leak rate and inlet pressure values once the leak detector is on. It is not the user who triggers recording of the history. **They do not save these values.**

The history recording continues even when the user has started a recording (see chapter "Graph screen: recording").

The history is recorded in the leak detector's buffer memory.

The maximum duration of the history recording depends on the current setting:

- 12 s display time: 60 min history recording
- 1 h display time: 298 h history recording (≈ 12.4 days)

► Double press on the graph screen to view the Graph history.

The user can save the recording of the history: see chapter "Graph screen: save".

The user can zoom in on the recording of the history: see chapter "Graph screen: viewing".

The user can view the details of each point in the history recording: see chapter "Graph screen: viewing".

7.7.7 Graph screen: save and delete

The user can save the following recordings:

- recording in progress (see chapter "Graph screen: recording").
- graph history recording (see chapter "Graph screen: graph history")

It is saved in the form of a file (.csv) or a screenshot (.png)

Saving is not automatic.

The saved recording can be stored in a USB stick or in the internal memory of the detector.

View a saved file: see chapter "Graph screen: viewing”.

Saving a file (.csv)

The saved file (.csv) contains all the measurements taken (leak rate and inlet pressure) during the recording. It allows further processing.

The default separator is "tab".

The default name of the file (.csv) is RecordYYYYMMDD_HHMMSS (example: Record20210727_143635).

1. Start a recording (see chapter “Graph screen: recording”) or display the graph history (see chapter “Graph screen: graph history”).
2. Press **[STOP REC]** to stop recording (see chapter "Graph screen").
3. Press **[Export as .CSV FILE]**.
   - Automatic opening of the File Manager menu window
4. Select the storage location (**[Internal Memory]** or **[USB Stick]**) for the file to be saved.
5. Press the lower left frame and enter the name of the file to be saved.
6. Press **[✔]** to confirm the entry.
7. Press **[SAVE]** to complete the save.
   - The message “Record file saved successfully” is displayed to confirm the save.

Save a screenshot (.png)

The screenshot (.png) displays all the measurements taken (leak rate or inlet pressure) during the recording.

To save the plot of the leak rate measurements and the plot of the inlet pressure measurements, the procedure must be carried out twice while viewing each of the plots (see chapter "Graph screen").

The default name of the screenshot (.png) is ScreenYYYYMMDD_HHMMSS (Example: Screen20210203_143302).

1. Start a recording (see chapter “Graph screen: recording”) or display the graph history (see chapter “Graph screen: graph history”).
2. Press **[STOP REC]** to stop recording (see chapter "Graph screen").
3. View the plot to save (see chapter “Graph screen”)
4. Press **[Export as .PNG]**.
   - Automatic opening of the File Manager menu window
5. Select the storage location (**[Internal Memory]** or **[USB Stick]**) for the file to be saved.
6. Press the lower left frame and enter the name of the file to be saved.
7. Press **[✔]** to confirm the entry.
8. Press **[SAVE]** to complete the save.
   - The message “Record file saved successfully” is displayed to confirm the save.
9. Optional: to save a screenshot of the 2nd plot.

   View the 2nd plot to save (see chapter “Graph screen”)
10. Do steps 4 to 8 again.

Delete a recording

The user can delete the following recordings:

- recording in progress (see chapter "Graph screen: recording").
- graph history recording (see chapter “Graph screen: graph history”)
  - Clearing the recording of the graph history deletes the entire leak detector buffer memory.

1. Display the recording to be deleted.
2. Press **[CLEAR GRAPH]** to clear the recording (see chapter "Graph screen").
3. Press **[CLEAR HISTORY]** to delete the graph history (see chapter "Graph screen").
4. Press **[OK]** to confirm.

7.7.8 Graph screen: display

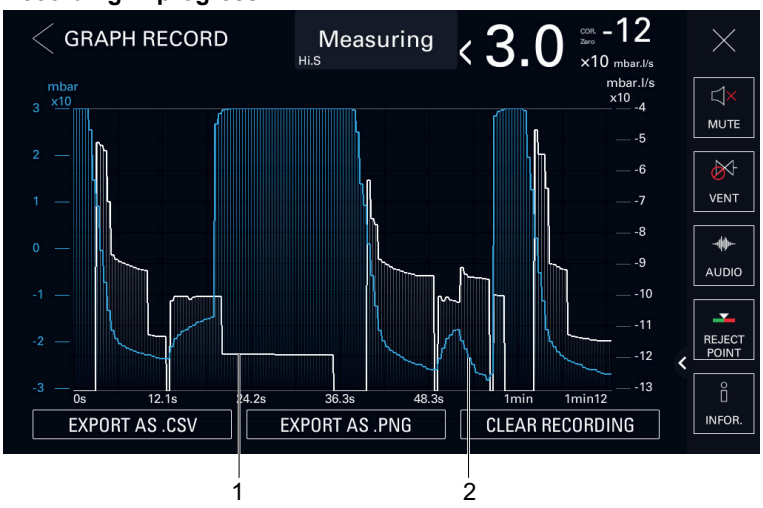
The user can display the following recordings:

- recording in progress (see chapter "Graph screen: recording").
- recording saved (see chapter “File manager menu”).
  - A recording can be viewed even if it is in progress.
- graph history (see chapter “Graph screen: graph history”)
  - A recording can be viewed even if it is in progress.

The user can view the details of a measurement for each point saved (see chapter "Details of a measurement").

The user can zoom in on the current display (see chapter "Zoom function").

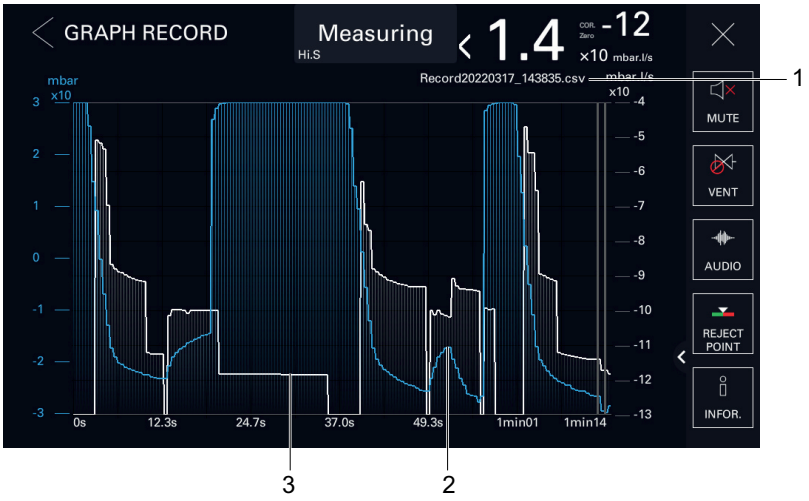
Recording in progress



1 Leak rate plot (white)

2 Inlet pressure plot (blue)

Recording saved

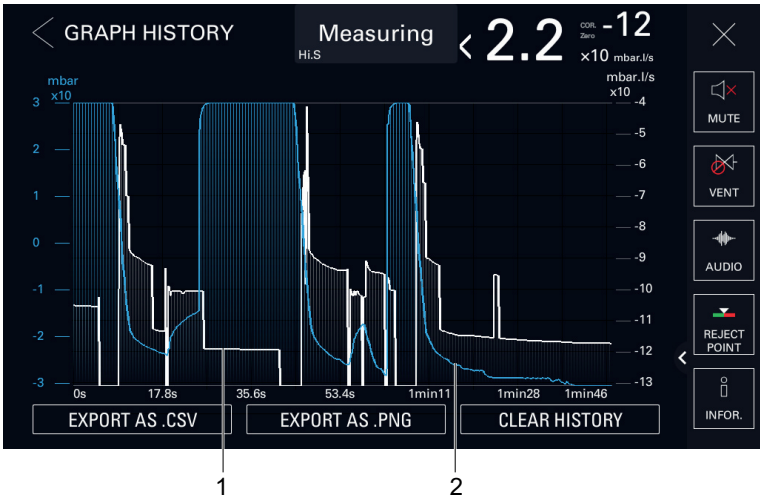


1 Viewed file name

2 Inlet pressure plot (blue)

3 Leak rate plot (white)

Graph history

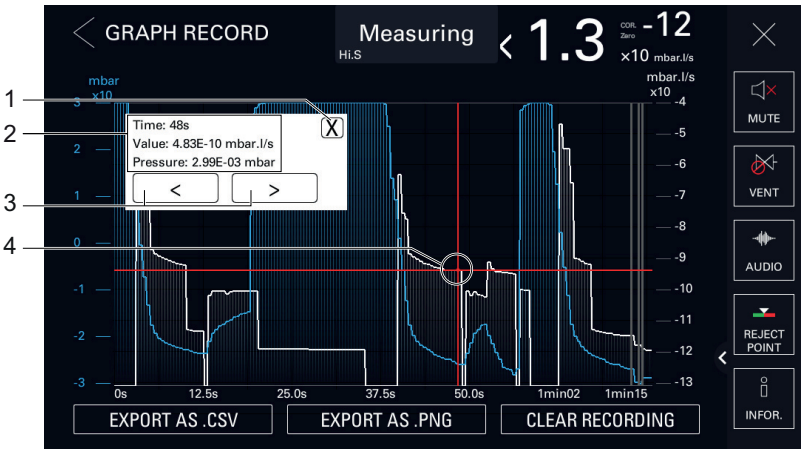


1 Leak rate plot (white)

2 Inlet pressure plot (blue)

7.7.9 Details of a measurement

The user can view the details of a measurement (leak rate and inlet pressure) for each point of the recording in progress, the graph history, or saved recording (.csv file).



1 Window closes

2 Details of the selected measurement:
- Time: the time of measurement with regard to the end of the recording
- Value: exact value of the leak rate measured
- Pressure: exact value of the inlet pressure measured

3 Point-to-point navigation tool

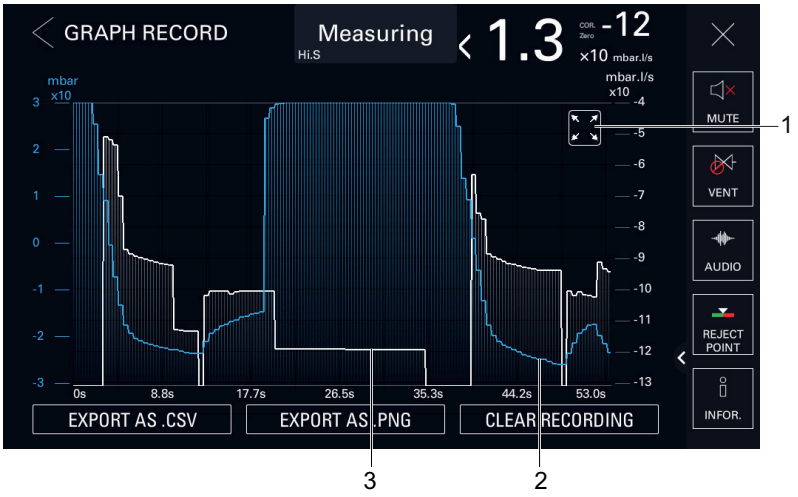
4 Measurement selected

1. Press the measurement point on the plot to be viewed until a red cross appears.
   - A window with details appears.
   - Press **[X]** to close the window.
2. To adjust the selection, move forward/backward from point to point by pressing the navigation tools.

7.7.10 Zoom function

At any time, it is possible to zoom in on the display.

A pictogram appears once the zoom function is enabled. It disappears when the zoom function is no longer applied.



1 Pictogram indicating that the zoom function is applied
2 Inlet pressure plot (blue)
3 Leak rate plot (white)

- ► To zoom in, place two fingers on the touch screen area and move them away from each other.
- ► To zoom out, place two fingers slightly apart from each other on the touch screen and bring them towards each other.

7.7.11 Function key bar

The function key bar is used to view settings, access a menu (shortcut) or start a direct action.

	Pictogram	Name of the pictogram in the operating instructions
Function keys permanently displayed		**[MUTE]**
		**[VENT]**

	Pictogram	Name of the pictogram in the operating instructions
Function keys available depending on the setting		**[AUDIO]**
		**[CAL. TYPE]**
		**[COR.]**
		**[INFOR.]**
		**[MEMO]**
		**[METHOD]**
		**[MODE]**
		**[PAGING]**
		**[REGEN]**
		**[REJECT POINT]**
		**[SCREEN SHOT]**
		**[SWITCH SETPOINT]**
		**[TIMER]**
		**[TRACER GAS]**

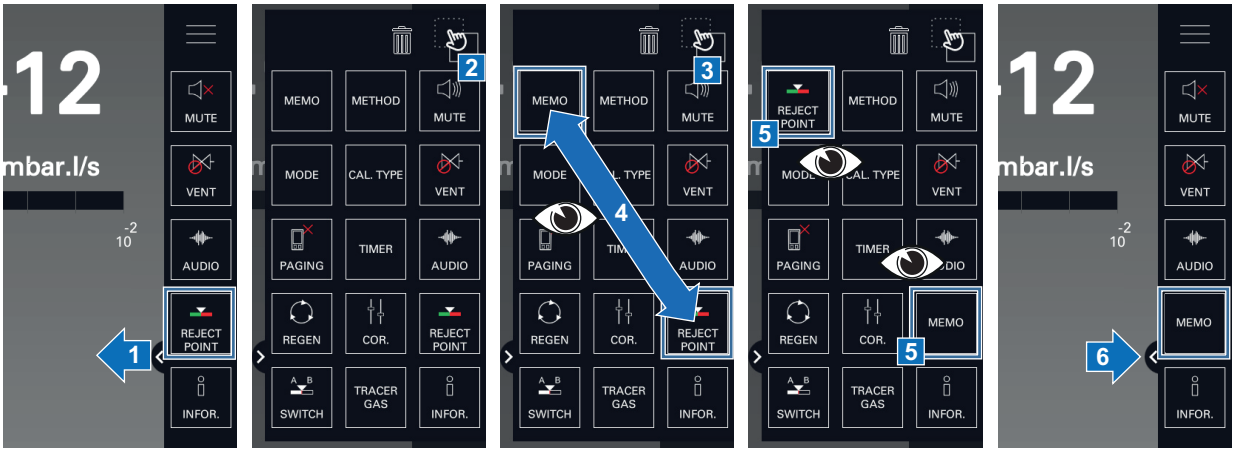
Description of the function key bar

1	Bin	5	Additional function keys available (see chapter “Function keys”)
2a	Setting access button	6	Close the function key bar
2b	Setting validation button	7	5 function keys permanently displayed
3	2 permanent function keys	8	Open the function key bar
4	3 adjustable function keys		

Function key permanently displayed in the bar

- Only the 5 function keys on the right side of the bar are displayed permanently.
- The other function keys available can be accessed by opening the bar.

Example: Switching the **[REJECT POINT]** and **[MEMO]** function keys

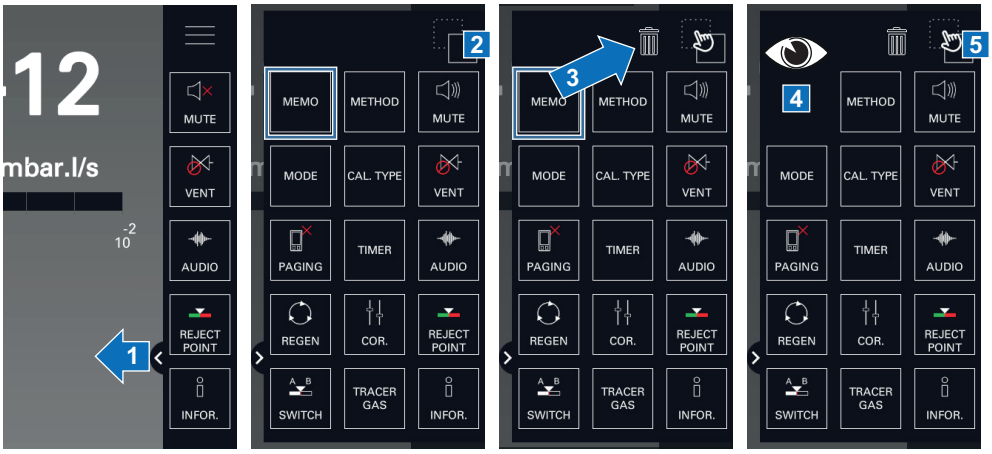


The user switches a function key by dragging one function key to replace another.

Removing a function key from the bar

- It is also possible to delete a function key from the bar by disabling it (see chapter "Function keys)).
- To display a deleted/disabled function key in the bar, it must be enabled again (see chapter "Function keys").

Example: Remove the **[MEMO]** function key


12
mbar.l/s
-2
10
MUTE
VENT
AUDIO
REJECT POINT
INFOR.
1
2
MEMO
METHOD
MODE
CAL. TYPE
PAGING
TIMER
REGEN
COR.
SWITCH
TRACER GAS
3
4
5

8 Settings menu

The Settings menu allows the user to set the product according to its specific use.

The functions of the Settings menu are divided into 6 menus.

► From the control panel, press **[SETTINGS]** (see chapter “Home” or “Graph screen”).

Functions by menu
MEASUREMENT menu ● Tracer gas ● Set points ● Correction factor ● Calibrated leak settings ● Target value
TEST menu ● Method ● Mode ● Probe type ● Cycle end ● Inlet vent ● Memo Function ● Zero activation ● Regeneration ● Massive mode ● Calibration check ● Calibration mode ● Start-up timer
CONFIGURATION menu ● Unit ● Date ● Time ● Language ● Sound volume ● Function keys ● Screen settings ● Access/Password
MAINTENANCE menu ● History ● Information ● Last maintenance operations ● Timers before next maintenance ● Maintenance turbo pump and cell ● Burn-in ● Internal Pirani Calibration ● Save LD Parameters
FILE MANAGER menu
ADVANCED menu ● Input/Output ● Service

Temporary access to a locked menu

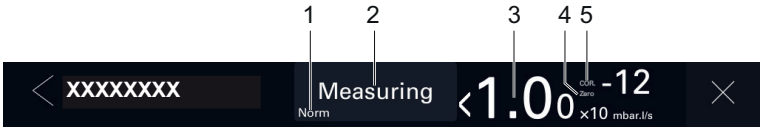
Temporary access: after returning to the main screen, the menu is once again locked.

► See chapter “Access - Password”.

Permanent display on the setting menus

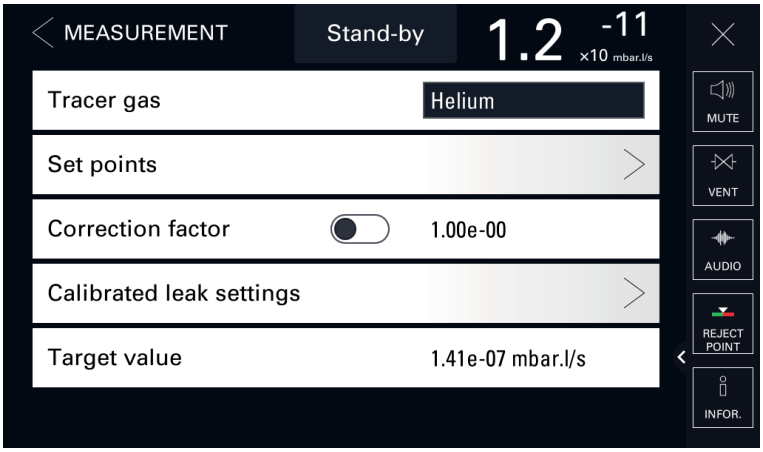
The leak rate can be viewed at any time by the user.

The leak rate is permanently displayed on the settings menus (except on the 'File manager' menu).



1 Current status of the detector
2 Test mode set
3 Digital display of leak rate and its unit
4 **Zero** indicator: zero function applied
5 **COR** indicator: correction factor applied

8.1 Measurement menu

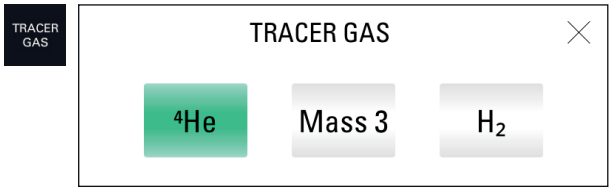


8.1.1 Tracer gas

This menu is used to select the tracer gas.

Access: Menu [Measurement] [Tracer Gas]		Choice - Setting limit [1]
Tracer gas	To be selected The tracer gas is the gas searched for during a test.	Helium 4 Mass 3 Hydrogen
1) Initial setting: see chapter “Tree diagram to the Settings menu”		

For quick access from the main screen, use the **[TRACER GAS]** function key.



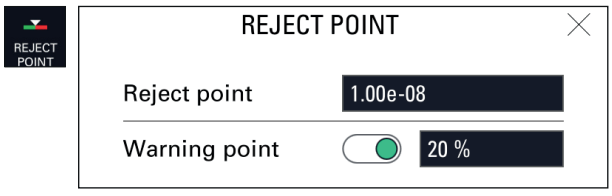
8.1.2 Set points

This menu is used to define the different set points (pollution, test, pressure).

Access: Menu [Measurement] [Set points]			Choice - Setting limit [1]
Pollution	To be enabled This is a safety device for the detector. It prevents too much leaked tracer gas from penetrating the detector. We recommend setting the pollution set point to a maximum of 4 decades above the reject set point. If the leak rate rapidly increases above the pollution set point, the cycle stops automatically and the leak detector returns to 'Stand-by' mode. The function is only available with the 'hard vacuum' test method. **Useful function if the part or installation to be tested is likely to have gross leaks.**		Enabled Disabled
	To be set		$1 \cdot 10^{-19}$ – $1 \cdot 10^{+19}$
Hard Vacuum Set Points	Reject point	To be set for each tracer gas The reject point is the acceptance set point for parts. ● Measured leak rate < reject point: part accepted ● Measured leak rate > reject point: part rejected The set point is not displayed on the main screen or graph screen when the detector is in 'Stand-by' mode.	$1 \cdot 10^{-13}$ – $1 \cdot 10^{+06}$
	Warning point	To be enabled The warning point is an intermediate set point defined according to the reject point. It indicates that the user is approaching the reject point, but the part tested is good. The set point is not displayed on the main screen or graph screen when the detector is in 'Stand-by' mode. Display of the test result: see details below.	Enabled Disabled
		To be set Example: reject point = $5 \cdot 10^{-5}$ -> if 20%, warning point = $1 \cdot 10^{-5}$	0–100%
Sniffer set points	Reject point	To be set for each tracer gas The reject point is the acceptance set point for parts. ● Measured leak rate < reject point: part accepted ● Measured leak rate > reject point: part rejected The set point is not displayed on the main screen or graph screen when the detector is in 'Stand-by' mode.	$1 \cdot 10^{-12}$ – $1 \cdot 10^{+06}$
	Probe Clogged	To be set The probe clogged set point is used to verify that the sniffer probe (accessory) is operational. When the probe flow is below the 'Probe clogged' set point, a code is displayed to inform the operator.	$1 \cdot 10^{-19}$ – $1 \cdot 10^{+19}$
	Warning point	To be enabled The warning point is an intermediate set point defined according to the reject point. It indicates that the user is approaching the reject point, but the part tested is good. Display of the test result: see details below.	Enabled Disabled
		To be set Example: reject point = $5 \cdot 10^{-5}$ -> if 20%, warning point = $1 \cdot 10^{-5}$	0–100%

1) Initial setting: see chapter "Tree diagram to the Settings menu"

For quick access from the main screen, use the **[REJECT POINT]** function key.



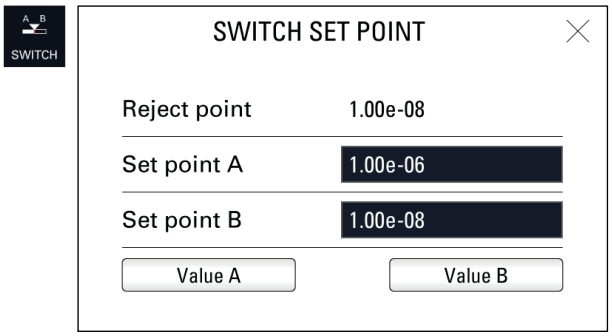
Display of the test results

Test result	Display Control panel
Leak rate below the warning point or the reject point if the warning point is disabled	Screen: green Bargraph: white Graph: white line
Leak rate between warning point and reject point	Screen: green Bargraph: orange Graph: orange line
Leak rate greater than the reject point	Screen: red Bargraph: white Graph: red line

Switch set point function

The Switch set point function is used to store 2 reject points and then assign one to the hard vacuum test or sniffer reject point (depending on the test method set).

► Allocate a function key to **[SWITCH SETPOINT]** (see “Function keys”).



Access: [SWITCH SETPOINT]		Choice - Setting limit [1]
Reject point	Read only Set reject point ● hard vacuum test set point or sniffer set point depending on the test method set ● Set point for the tracer gas selected	-
Set point A	To be set Reject point A is an acceptance set point for parts.	$1 \cdot 10^{-13} – 1 \cdot 10^{+06}$
Set point B	To be set Reject point B is an acceptance set point for parts.	$1 \cdot 10^{-13} – 1 \cdot 10^{+06}$
Value A	Function launching Allocation of the reject point value A to the reject point	-
Value B	Function launching Allocation of the reject point value B to the reject point	-

1) Initial setting: see chapter “Tree diagram to the Settings menu”

8.1.3 Correction factor

The correction factor is used to correct the leak rate measured by the leak detector when the tracer gas concentration is less than 100%.

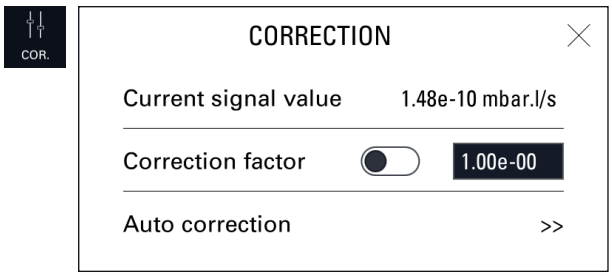
A light indicating that the function is enabled is displayed on the main screen.

Use of the correction factor must not replace calibration.

Access: Menu [Measurement] [Correction factor]		Choice - Setting limit [1]
Correction factor	To be enabled	Enabled Disabled
	To be set	$1 \cdot 10^{-18} – 1 \cdot 10^{+18}$

1) Initial setting: see chapter “Tree diagram to the Settings menu”

For quick access from the main screen, use the **[COR.]** function key.



Example
The table below shows the leak rate displayed according to the correction factor applied.

Example: leak rate displayed with a calibrated leak of $1 \cdot 10^{-5}$ mbar · l/s ($1 \cdot 10^{-6}$ Pa · m^3/s) (with 100% ^{4}He)

% He in the gas used	100%	50%	5%	1%
Leak rate displayed on the leak detector without correction factor	$1 \cdot 10^{-5}$ mbar · l/s ($1 \cdot 10^{-6}$ Pa · m^3/s)	$5 \cdot 10^{-6}$ mbar · l/s ($5 \cdot 10^{-7}$ Pa · m^3/s)	$5 \cdot 10^{-7}$ mbar · l/s ($5 \cdot 10^{-8}$ Pa · m^3/s)	$1 \cdot 10^{-7}$ mbar · l/s ($1 \cdot 10^{-8}$ Pa · m^3/s)
Correction factor value	1	2	20	100
Leak rate displayed on the leak detector with correction	$1 \cdot 10^{-5}$ mbar · l/s ($1 \cdot 10^{-6}$ Pa · m^3/s)			

Display
The **COR** indicator light is displayed on the control panel when the correction factor value is not 1.

The leak rate displayed takes into account the correction factor applied.

Correction factor calculation

When the leak detector is connected to an installation equipped with its own pumping system, only part of the leak will be measured by the leak detector. Calibration gives a direct reading of the leak rate by taking into account the loss of tracer gas of the leak pumped by the pumping unit.

Calibration is performed via the Correction function.

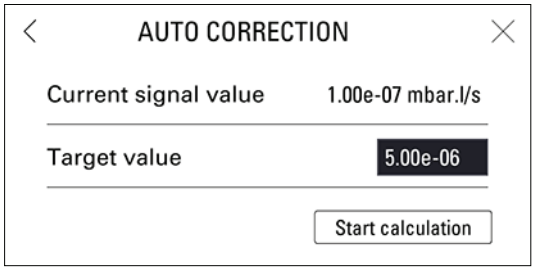
Correction must be performed when the leak detector is already calibrated with its internal calibrated leak.

When an external calibrated leak is used, it is recommended to take into account the calibration date and temperature effect for calculating the target value from the calibrated leak value featured on its identification label.

Corrected leak rate = target value = measured leak value x correction factor

1. Allocate a function key to **[COR.]** (see “Function keys”).
2. Select the ‘hard Vacuum’ test method (see chapter “Test method”).
3. Press the **START/STOP** button to start a test.
4. Press the **[COR.]** function key.
5. Enable the correction factor.

6. If the value of the correction factor to be applied is known:
   a Press **[Value]**.
   b Set the correction factor to be applied. The correction factor is the coefficient to be applied to the measured leak rate.
   C Press **[✔]**.
   C Press **[X]**.
7. If the value of the correction factor is unknown:
   a Press **[>>]** to access the 'Auto Correction' function.



   b Press **[Target Value]**.
   C Set the target leak rate of the target value.
   d Press **[Start Calculation]**.
   e Press **[X]** to exit the function.
8. if no factor is enabled, it is 1 by default

The value of the correction factor is calculated automatically and updated.

The **COR** indicator light is displayed on the control panel when the value of the correction factor is not 1.

The 'Auto correction' function is automatically enabled.

The digital display takes into account the applied correction factor.

The bargraph display does not take into account the applied correction factor.

8.1.4 Calibrated leak settings

This menu is used to enter and view the settings of the calibrated leaks (see chapter "Calibration").

► Update these settings when changing or recalibrating a calibrated leak.

Access: Menu [Measurement] [Calibrated leak settings]		**Choice - Setting limit** [1]
Tracer gas	To be selected The tracer gas is the gas searched for during a test. This is the gas contained in the calibrated leak used for calibration.	Helium 4 Mass 3 Hydrogen
Type	To be selected Type of calibrated leak used for calibration ● Internal: calibration based on the detector's internal calibrated leak 'Hard vacuum' test method only ● External: calibration based on external calibrated leak (^{4}He, Mass 3 or H_2 leak). ● Concentration: calibration from a gas mixture for which the tracer gas concentration is known. Sniffer test method only	Internal External Concentration

1) Initial setting: see chapter "Tree diagram to the Settings menu"
2) Use the information indicated on the calibrated leak used for calibration or on its calibration certificate.
3) If sniffer test method selected

Access: Menu [Measurement] [Calibrated leak settings]		Choice - Setting limit [1]
Unit	To be selected Unit of calibrated leak used for calibration [2]	mbar · l/s Pa · m^3/s Torr · l/s mTorr · l/s atm · cc/s sccm sccs ppm [3]
Leak value	To be set Value of calibrated leak used for calibration [2]	$1 \cdot 10^{-18} – 1 \cdot 10^{+18}$
Loss per year (%)	To be set Set the loss per year for the calibrated leak used for calibration [2]	0 – 99
Reference temperature (°C)	To be set Reference temperature for the calibrated leak used for calibration [2]	0 – 99
Temperature coefficient (%/°C)	To be set Temperature coefficient for the calibrated leak temperature used for calibration [2]	0.0 – 9.9
Date	To be set Month and year of calibration for the calibrated leak used for calibration [2] Format: MM/YYYY	-
Type	To be selected Source of displayed temperature • Internal: measured temperature by the internal calibrated leak temperature sensor • External: set temperature by the operator	Internal Externeal
Internal Temperature (°C) (if internal 'Type')	Read only Temperature of the detector's internal calibrated leak	-
External Temperature (°C) (if external 'Type')	To be set Configuration of external temperature	0 – 99

1) Initial setting: see chapter "Tree diagram to the Settings menu"
2) Use the information indicated on the calibrated leak used for calibration or on its calibration certificate.
3) If sniffer test method selected

When the parameters are saved, all the data from all the set calibrated leaks (1 internal leak (^{4}He) and 3 external leaks (^{4}He, Mass 3 and H_2)) is stored.

8.1.5 Target value

The target value is the value of the calibrated leak measured and corrected for temperature, taking into account the loss/year.

The temperature and the loss/year must be taken into account on calculating the target value.

This information is provided on the calibrated leak identification label.

Access: Menu [Measure] [Target Value]	
Target value	Read only

8.2 Test menu

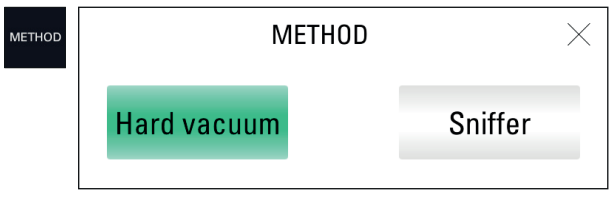
1 Test method: hard vacuum 2 Test method: Sniffer

8.2.1 Test method

This menu is used to select a test method.

Access: Menu [Test] [Method]		Choice - Setting limit [1]
Method	To be selected The test method is chosen depending on the part to be tested. For more information about leak detection test methods, see **Leak detector compendium** on the www.pfeiffer-vacuum.com website.	Hard Vacuum Sniffer
1) Initial setting: see chapter “Tree diagram to the Settings menu”		

For quick access from the main screen, configure a function key to **[METHOD]** (see chapter “Function keys”).

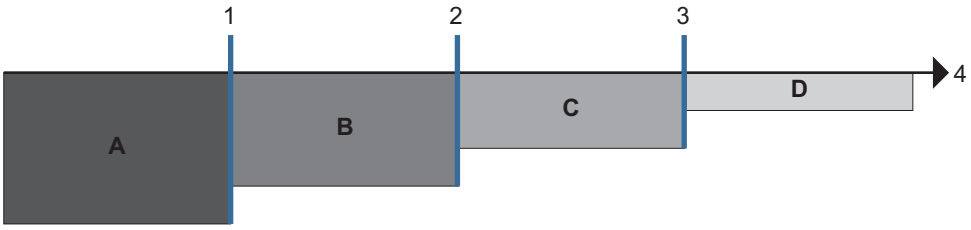


By default, the leak detector is set to work in a hard vacuum test, in the most sensitive test mode: this setting meets the majority of users’ needs.

8.2.2 Test mode

This menu lets you to select a test mode with the hard vacuum test method.

The leak detector will automatically switch to the test mode selected when the internal pressure reaches the crossover set point.

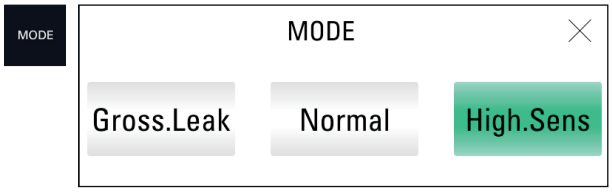


A Roughing
B Gross Leak mode
C Normal mode
D High sensitivity mode

1 Set point for switching to Gross Leak mode
2 Set point for switching to Normal mode
3 Set point for switching to High sensitivity mode
4 Pressure

Access: Menu [Test] [Mode]		Choice - Setting limit [1]
Mode	To be selected	Gross Leak Normal High sensitivity
1) Initial setting: see chapter “Tree diagram to the Settings menu”		

For quick access from the main screen, configure a function key to **[MODE]** (see chapter “Function keys”).



By default, the leak detector is set to work with 'hard vacuum' test method and 'normal' test mode: this setting meets the majority of users’ needs.

8.2.3 Type of probe

This menu is used to select the sniffer probe mode used in sniffer (see chapter “Accessories”).

Access: Menu [Test] [Probe type]		Choice - Setting limit
Probe type	Read only Standard sniffer probe: model with rigid nozzle only	Standard

Set the probe clogged set point to verify that the sniffer probe is operational (see chapter “Set points”).

8.2.4 Cycle end

This function allows automatic check of the roughing time and test timer in a hard vacuum test.

Access: Menu [Test] [Cycle end]		Choice - Setting limit [1]
Cycle end	To be selected ● Operator: manual cycle end by the user ● Automatic: automatic cycle end based on configuration below	Operator Automatic
Roughing timer (If automatic 'Roughing timer')	To be enabled Roughing duration check	Enabled Disabled
	To be set (optional) Maximum permitted roughing duration If the control is enabled and time expires (detector still in roughing) = part rejected	0 – 1 h
Test timer (If automatic 'Test timer')	To be set (required) Duration of measurement When time expires, the measured leak rate is displayed.	0 – 1 h

1) Initial setting: see chapter “Tree diagram to the Settings menu”

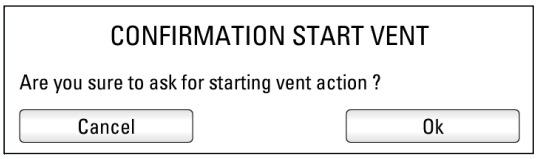
Function to be used to automate a small production.

8.2.5 Inlet vent

This function allows an inlet vent after a hard vacuum test stop.

This function is used to return to atmospheric pressure the detector’s inlet, and therefore the connected part or installation.

This function is secure: confirmation is requested each time the operator requests an inlet vent.



NOTICE

Risk of pollution of the test chamber or of the process

Never program an ‘automatic’ inlet vent when the detector is connected to a hard vacuum test or process chamber.

► Select ‘Operator’ and delete the function key allocated to the automatic inlet vent. The inlet vent must be carried out using the menu, which can be password locked.

Access: Menu [Test] [Inlet vent]		Choice - Setting limit [1]
Inlet vent	To be selected ● Operator: the inlet vent is carried out by the user by pressing on the **[VENT]** function key or on the corresponding pictograph on the main screen. ● Automatic: the inlet vent is automatically carried out when the **START/STOP** key is pressed to stop the test.	Operator Automatic
Delay (If automatic 'Inlet vent')	To be set (required) Delay = time between test stop and automatic opening of the inlet vent valve. This allows a managed valve to close automatically before inlet vent.	0 – 2 s

1) Initial setting: see chapter “Tree diagram to the Settings menu”

Access: Menu [Test] [Inlet vent]		Choice - Setting limit [1]
Vent timer (If automatic 'Inlet vent')	To be enabled (optional) Activation of the automatic closure of the inlet vent valve.	Enabled Disabled
	To be set Vent timer = time between the opening of the air inlet valve and its automatic closing. This is used to limit the consumption of dry air or nitrogen if the purge is connected.	00'00" – 59'59"

1) Initial setting: see chapter “Tree diagram to the Settings menu”

For quick access from the main screen, configure a function key to **[VENT]** (see chapter “Function keys”).

- The **[VENT]** function key is required for the operator to carry out a manual inlet vent (see chapter “Function keys”).
- To lock the command for the inlet vent valve, delete the **[VENT]** function key. The icon remains on the main screen as an indicator but manual activation by the operator is disabled.

By connecting an inlet vent (or nitrogen) line to the inlet vent, the detector’s tracer gas pollution is reduced.

8.2.6 Memo Function

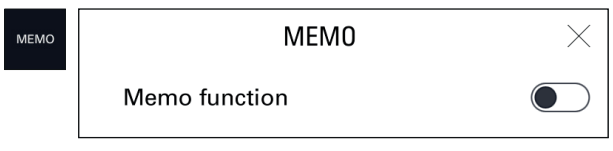
This function freezes the main screen at the end of a test: the last measured leak rate from the test is displayed and flashes.

This function is only available with the ‘hard vacuum’ test method as soon as the ‘gross leak’ test mode is reached.

Access: Menu [Test] [Memo Function]		Choice - Setting limit [1]
Active	To be enabled Activation of the Memo function	No Yes
Display time	To be enabled ● Enabled = the value of the measured leak rate flashes for the set duration. ● Disabled = the value of the measured leak rate will flash until a new test begins.	Enabled Disabled
	To be set Display time	00'00" – 59'59"

1) Initial setting: see chapter “Tree diagram to the Settings menu”

For quick access from the main screen, configure a function key to **[MEMO]** (see chapter “Function keys”).



8.2.7 Zero activation

This function helps the user to identify very small leak rate variations in the surrounding background noise or to dilate small measured leak rate fluctuations on the analog display.

Access: Menu [Test] [Zero activation]		Choice - Setting limit [1]
Activation	To be selected • None: **ZERO** button inactive • Operator: user activation by pressing on the **ZERO** button, depending on configuration (see below: Zero Exit) • Automatic: depending based on configuration (see below: Trigger)	None Operator Automatic
Zero exit (If operator 'Activation')	To be selected Type of press to exit the function (see below) • Press once: activate/deactivate zero by quickly pressing the **ZERO** button. • Press > 3s: – activation: quickly press the **ZERO** button. Each time the key is pressed quickly, a new zero is carried out. – deactivation: keystroke > 3 s the **ZERO** button.	Press once Press > 3s
Trigger (If automatic 'Activation')	To be selected Factor for initiating the carrying out of another zero.	Timer Set point
	To be set Initiation value	00'00" – 59'59" (if timer 'Trigger') $1 \cdot 10^{-19}$ – $1 \cdot 10^{+19}$ (if set point 'Trigger')
1) Initial setting: see chapter “Tree diagram to the Settings menu”		

Using this function is recommended when the background of the tracer gas is stable. This function is used to measure a leak rate that is lower:

- than 2 decades in hard vacuum test mode: $1 \cdot 10^{-12}$ mbar · l/s ($1 \cdot 10^{-13}$ Pa · m^3/s) minimum
- than 2 decades in sniffer mode: $5 \cdot 10^{-9}$ mbar · l/s ($5 \cdot 10^{-10}$ Pa · m^3/s) minimum

than the detector’s background, when the detector is no longer in roughing.

8.2.8 Regeneration

This function is used to ‘clean’ the tracer gas from the detector by automatically carrying out a series of short tests and inlet vents between each test. This is used to decrease the background following pollution with tracer gas.

NOTICE

Risk of pollution

► Before starting this function, make sure that the leak detector is in an environment free of tracer gas pollution.

For quick access from the main screen, configure a function key to **[REGEN]** (see chapter “Function keys”).

It is recommended to use this function when the background noise of the detector is high

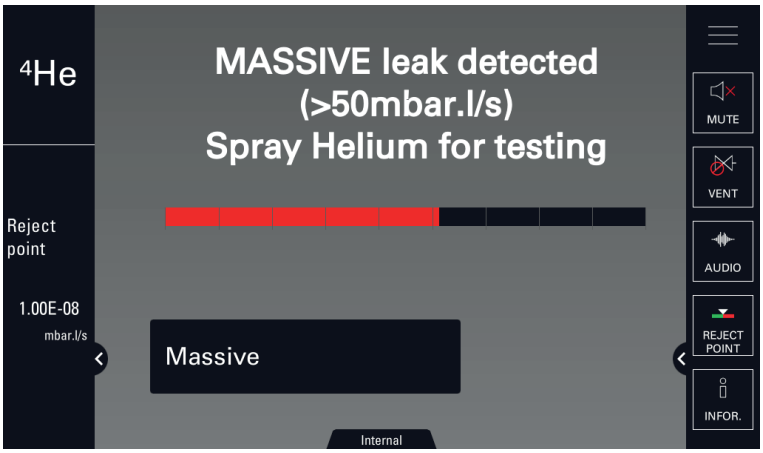
1. Check that the detector is in ‘Stand-by’ mode.
2. Check that the inlet vent is “automatic.”
3. From the Settings screen, press **[Test] [Regeneration]**.
4. Install a blank-off flange on the detector’s inlet port.
5. Press **[Start]**.
   – Regeneration stops automatically after 1 hour.
6. To stop regeneration before the automatic stop time, press **[Stop]** or the **START/STOP** key.
   – Start a test (‘Zero activation’ function not enabled) to check that the detector is no longer polluted.

After regeneration, the inlet vent configuration is the same as it was before regeneration.

8.2.9 Massive Mode

This mode allows the detector to perform a test (^{4}He only) on a very large leak when the detector has not shifted to Gross Leak Mode and remains in roughing.

Massive mode can only be used if an external gauge is selected (see chapter “External gauge”):



Access: Menu [Test] [Massive Mode]		Choice - Setting limit [1]
Active	To be selected Prerequisites for the detector to shift automatically into Massive mode: ● function enabled ● pressure < 100 hPa ● pressure stabilized for at least 30 s A message informs the use that the detector has shifted automatically into Massive mode. The detector can then perform a qualitative test of a leak (information leak > 50 mbar · l/s (5 Pa · m^3/s) only). The maximum use time is 55 minutes.	No Yes
Sensitivity	To be selected ● High = large volume test (default configuration, recommended) ● Low = test on volume < 1 l (if necessary)	High Low

1) Initial setting: see chapter “Tree diagram to the Settings menu”

8.2.10 Calibration check

Calibration check allows the user to save time because this operation is faster than full calibration.

The calibration check is performed with the leak detector’s internal calibrated leak (leak type parameter = ’internal’).

Calibration check is enabled if the calibration is set to ‘Check at start’ (see chapter “Calibration function”).

The leak detector compares the measured leak rate of the internal calibrated leak with the set leak rate of the internal calibrated leak:

- If the ratio is within the limits allowed, the leak detector is properly calibrated.
- If the ratio is out of limits, a message appears suggesting that a full calibration of the leak detector be started.

Access: Menu [Test] [Calibration check]			Choice - Setting limit [1]
Check	To be selected ● Operator: calibration check not enabled ● Automatic: calibration check enabled		Operator Automatic
Frequency	Every cycle	To be set Set point (cycles) initiating calibration check Calibration check begins when either the ‘Cycles’ or the ‘Time’ set point is reached.	0 – 9999
	Every hour	To be set Set point (time) initiating calibration check Calibration check begins when either the ‘Cycles’ or the ‘Time’ set point is reached.	00'00" – 59'59"

1) Initial setting: see chapter “Tree diagram to the Settings menu”

Calibration check can be launched when the detector is in ‘Stand-by’ mode using one of 2 methods.

Calibration type assigned to the CAL button (see chapter “Calibration type”)	Method
Calibration check	Press once on the **CAL** button.
Internal calibration External calibration	Press twice on the **CAL** button in under 5 seconds.

To stop a calibration check, press the **CAL** button 3 times in under 5 seconds.

8.2.11 Calibration function

Calibration is used to check that the leak detector is correctly adjusted to detect the tracer gas selected and display the correct leak rate (see chapter “Calibration”).

Access: Menu [Test] [Calibration]	Choice - Setting limit [1]
To be selected ● Start-up Calibration starts automatically when the detector is switched on. ● Operator Calibration initiated by the user by pressing the **CAL** button. You are advised to wait 20 minutes after switching on the detector before starting a calibration. An information message is displayed if a calibration if launched before these 20 minutes are up.  ● Check at start Depending on its settings, a calibration check is launched automatically when the detector is switched on, or it can be launched manually by the operator (see chapter “Calibration check”).	Start-up Operator Check at start

1) Initial setting: see chapter “Tree diagram to the Settings menu”

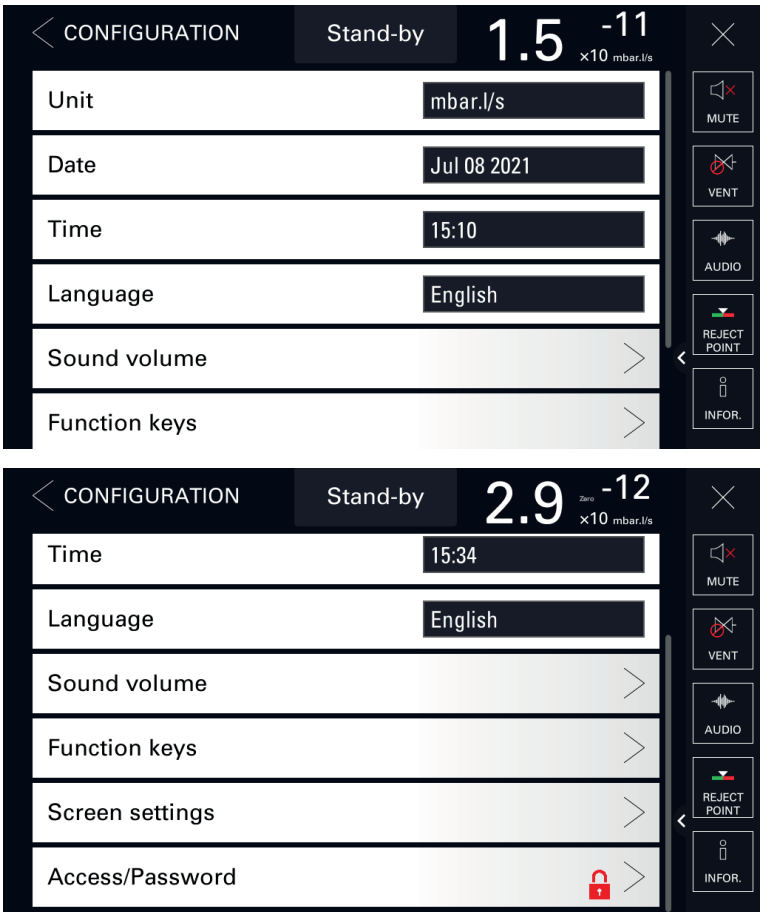
8.2.12 Start-up time delay

The start-up timer prevents the leak detector from being used for a pre-determined duration after it has been switched on.

No measurements can be made if the leak detector is not thermally stabilized, or while traces of tracer gas remain in the detector.

Access: Menu [Test] [Start-up timer]	Choice - Setting limit [1]
To be set Initiation value	00'00" – 59'59"
1) Initial setting: see chapter “Tree diagram to the Settings menu”	

8.3 Configuration menu



8.3.1 Unit - Date - Time - Language

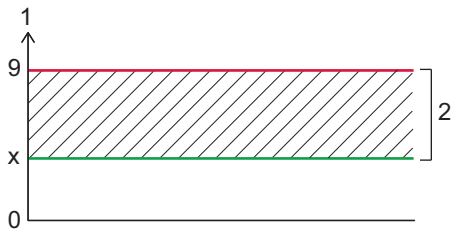
Access: Menu [Configuration]		Choice - Setting limit [1]
Unit	To be selected [1]	mbar · l/s Pa · m^3/s Torr · l/s atm · cc/s ppm sccm sccs mtorr · l/s
Date	To be set [1]	- Format: mm/dd/yyyy
1) No default settings: set by user on switching the detector on for the 1st time		

Access: Menu [Configuration]		Choice - Setting limit [1]
Time	To be set [1]	- Format: hh:mm:ss
Language	To be set [1]	English French German Italian Chinese Japanese Korean Spanish Russian Portuguese

1) No default settings: set by user on switching the detector on for the 1st time

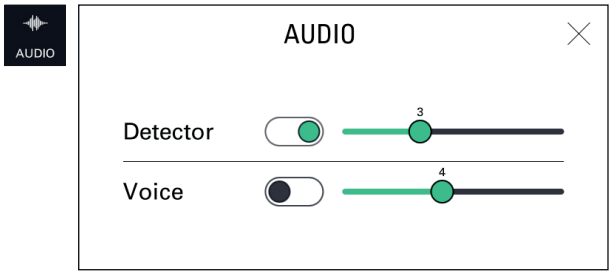
8.3.2 Sound volume

This menu is used to set the sound volumes for the leak detector.

Access: Menu [Configuration] [Sound Volume]		Choice - Setting limit [1]
Detector	To be enabled The audio alarm of the detector informs the user that the reject point has been crossed.	Enabled Disabled
	To be set Level 9 = 90 dBA	1 – 9
Voice	To be enabled The voice of the detector informs the user of the status of the detector or the actions to be carried out.	Enabled Disabled
	To be set	1 – 9
Detector min. sound	To be enabled The minimum detector sound defines a minimum level for sounds (see 'Detector' parameter).  1 - Sound range (1–9) 2 - Possible settings range for the sound level (see 'Detector' parameter) x - Minimum detector sound set: no sound will be below x.	Enabled Disabled
	To be set The ‘Detector’ parameter values are automatically corrected if the minimum detector sound is greater than the set values. The ‘Detector’ parameter values are retained if the minimum detector sound is lower than the set values.	1 – 9

1) Initial setting: see chapter “Tree diagram to the Settings menu”

For quick access from the main screen, use the **[AUDIO]** function key.



To quickly turn off the sound of the detector and the sniffer probe, use the **[MUTE]** function key.

The red cross on the pictogram indicates that the "Mute" function is enabled.

8.3.3 Function keys

The function keys are is used to view settings, access a menu (shortcut) or start a direct action.

An enabled function key is available in the function keys bar (see chapter “Function keys bar”).

Access: Menu [Configuration] [Function keys]		**Choice - Setting limit** [1]
Timer Audio Cor. Mute Reject point Infor. Tracer gas Vent Method Mode Memo Paging Regen Cal type Screen Shot Switch Set point	Enable for each function key Function key display in the function keys bar 16 function keys are offered but only a maximum of 15 can be made available (enabled) in the function keys bar. The 16th function key is greyed out. To enable it, disable another function key first.	Enabled Disabled

1) Initial setting: see chapter “Tree diagram to the Settings menu”

8.3.4 Screen settings

This menu is used to enter the control panel settings.

Access: Menu [Configuration] [Screen settings]		**Choice - Setting limit** [1]
Brightness	To be set	0 – 20
Paging Function	Function available only if a wireless remote control is detected. To be selected When a wireless remote control (accessory) is used, the ’Paging’ function makes it possible to easily find the remote if it is located within its field of use with the detector. When the function is activated, the remote control emits a sound signal so it can be located. To stop the sound signal, deselect the Paging function. Function key: see below.	Enabled Disabled

1) Initial setting: see chapter “Tree diagram to the Settings menu”

Access: Menu [Configuration] [Screen settings]			Choice - Setting limit [1]
Leak rate bargraph	See details below		-
Application windows	Std-by Value	To be selected Leak rate display in 'Stand-by' mode	Hide Show
	Show inlet pressure	To be selected Inlet pressure display.	Hide Show
	Show second pressure	To be selected Display of the cell pressure or of an external gauge. ● None: no display ● Cell.: analyzer cell pressure display ● Ext.: external gauge pressure display (at the customer's expense) The external gauge (at the customer's expense) is a gauge installed on the customer's application, connected to the 37-pin I/O board.	None Cell. Ext.
	Show synoptic	To be selected Synoptic display (see chapter "Navigation").	Hide Show
Reset screen parameters	Function launching This function is used to load the default settings of the control panel.		-

1) Initial setting: see chapter "Tree diagram to the Settings menu"

For quick access from the main screen, configure a function key to **[PAGING]** (see chapter "Function keys").

Leak rate bargraph details

This menu is used to enter the bargraph settings.

Access: Menu [Configuration] [Leak rate bargraph]		Choice - Setting limit [1]
Zoom on set point	To be enabled Zoom on set point is used to display on the bargraph the reject set point centered on 2 decades.	Enabled Disabled
High decade	To be set High decade (max) of the bargraph	-12– +6
Low decade	To be set Low decade (min) of the bargraph	-13 – +5
Lower display limit	To be set This limit defines the lower display limit for the measured leak rate. The measured leak rate is not displayed if it is lower than the set lower display limit.	$1 \cdot 10^{-13} – 1 \cdot 10^{+06}$
Show 2nd digit	To be enabled Display of a second digit after the decimal point for digital display of the leak rate	Enabled Disabled

1) Initial setting: see chapter "Tree diagram to the Settings menu"

8.3.5 Access - Password

This menu is used to manage the access rights to the various menus and/or screens.

Regardless of the user level, a password is required to access this menu.

The default password is 5555.

The password is not saved in the control panel. If the password is forgotten, it can be found using the RS-232: see RS-232 operating instructions.

Access: Menu [Configuration] [Access/Password] + password		Choice - Setting limit [1]
User level	To be selected 3 user levels can be used to restrict the display and access to settings and functions. See details below	Restricted access Medium access Full access
Password	To be set This function is used to block access to one or more Settings menus. To access a locked menu, the user will be asked to provide the password.	-
Customized access	To be set Access to certain items may be permitted or prohibited. See details below	-

1) Initial setting: see chapter “Tree diagram to the Settings menu”

User level and customized access

The rights defined in the 2 tables below are the **default** rights for each user level.

These rights can be customized: they can be assigned/withdrawn (see chapter "Access - Password").

	User level		
	Restricted access	**Medium access**	**Full access**
START/STOP, **CAL**, **ZERO** buttons	Invalid No settings can be made without a password	Valid	
6 setting menus	Invalid No setting possible without a password (temporary access allowed)		Valid
Function keys	• Hidden except for **[VENT]** and **[MUTE]** • Displayed if padlock removed (customized access)		Displayed

Temporary access to a locked menu

To access a locked menu, the user is asked to provide the password.

Temporary access: after returning to the main screen, the menu is once again locked.

1. Access the Settings menu
2. Press **[Configuration] [Access/Password]**.
3. Enter password.

Access to the graph screen, menus and locked functions

Access to the following items may be permitted or prohibited:

- graph screen
- settings menus: Measurement, Test, Configuration, Maintenance, File Manager and Advanced
- function keys: [AUDIO], [COR.], [MUTE], [REJECT POINT], [INFOR.], [TIMER] and [TRACER GAS]

1. Access the menu **[Access/Password]**.
2. Press **[Configuration] [Access/Password]** + password + **[Customized access]**.
3. Press the padlock to lock/unlock.
   - The presence of an open green padlock indicates that access to the item is permitted (unlocked).
   - The presence of a closed red padlock indicates that access to the item is prohibited (locked).

Customizing user levels

Depending on the user level, access to the following items may be permitted or prohibited:

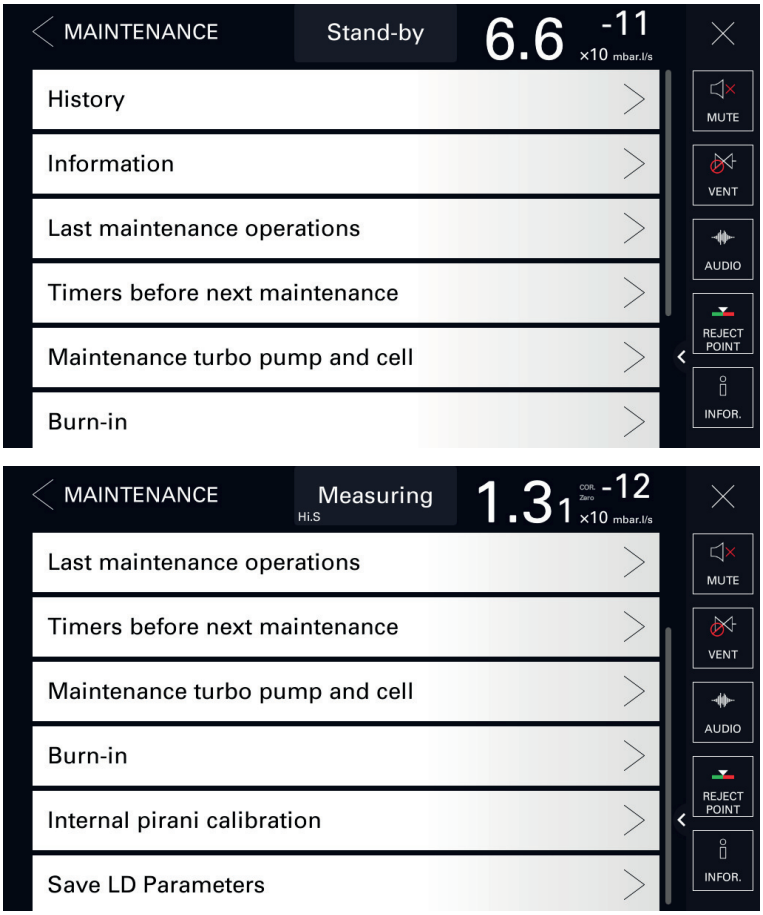
- graph screen
- settings menus: Measurement, Test, Configuration, Maintenance, File Manager and Advanced
- function keys: [AUDIO], [COR.], [MUTE], [REJECT POINT], [INFOR.], [TIMER] and [TRACER GAS]

It is possible to customize the rights for each user level.

1. Select the user level to customize.
2. Press **[Configuration] [Access/Password]** + password + **[Customized access]**.

3. Press the padlock of the item to allow/deny access.
   - a green padlock indicates that access to the item is permitted.
     - If the item is a function key, the function key is added to the function key bar.
   - a red padlock indicates that access to the item is prohibited.
     - If the item is a function key, the function key is removed from the function key bar.
4. Repeat the operation for each user level to be customized.

8.4 Maintenance menu



8.4.1 History

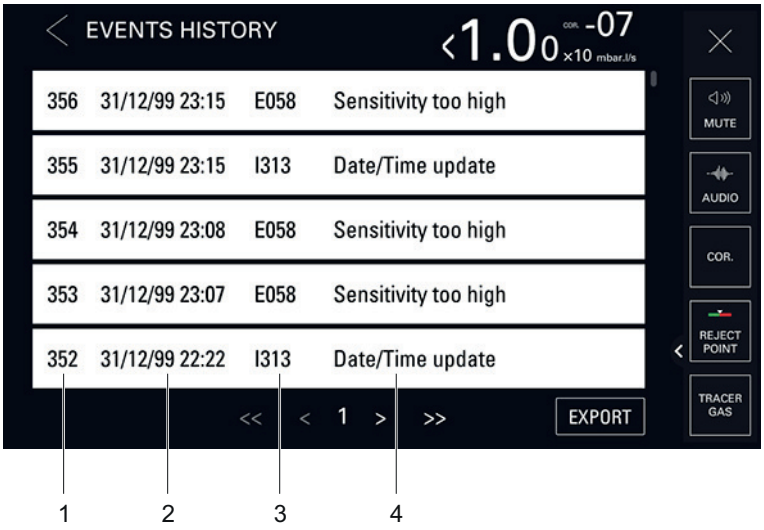
This function is used to view the event and calibration histories.

Events history

An event can be an error (Exxx), a warning (Wxxx) or information (Ixxx).

The events history records the events that have occurred.

Access: Menu **[Maintenance] [History] [Events history]**



1 Chronological event number
2 Date and time of the event
3 Code for the event
4 Description of the event

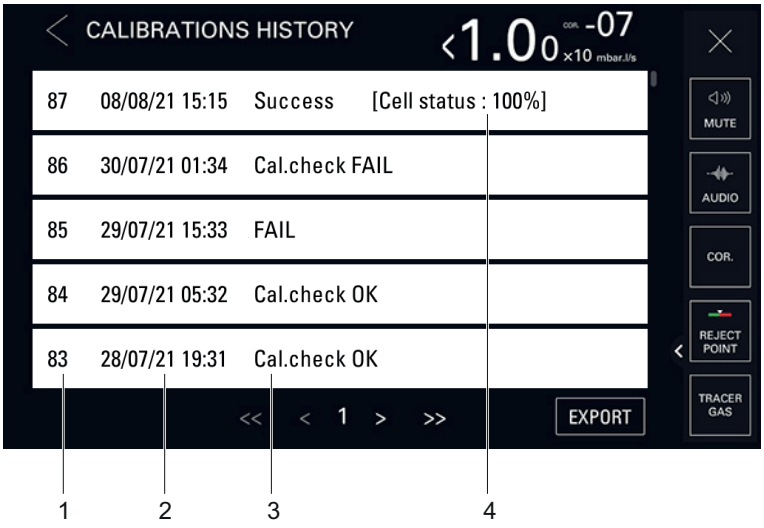
Information coding:

Code	Event	Description
I300	Air inlet	Inlet vent
I301	Stop on pollution	Test stops automatically if measured leak rate pollution > Pollution
I302	Reset timer backing pump	Backing pump timer reset
I303	Reset timer turbo pump 1	Secondary pump 1 hour timer reset
I306	Reset timer filament #1	Filament 1 hour timer reset
I307	Reset timer filament #2	Filament 2 hour timer reset
I308	Reset cycles counter	Cycle timer reset
I309	Emission increase	^{4}He, Mass 3: change in emission intensity (Ie) $_{2}$H: change in emission intensity (Ie)
I310	Calibration restart	Automatic start of a new calibration
I311	Detector stop	Shutdown the detector
I312	Detector start	Start-up of the detector
I313	Date/Time update	Date or time modification
I314	Cell firmware update	Analyzer cell firmware update
I315	CPU firmware update	Detector firmware update
I316	LCD firmware update	Control panel firmware update
I317	Voice update	Voice update
I318	Full parameters reset	Complete detector parameter reset
I319	Filament change	Filament change from the Maintenance menu
I321	Storage delay	Detector switched off for 15 days (minimum)

Calibrations history

The calibrations history records the calibrations made.

Access: Menu **[Maintenance] [History] [Calibrations history]**



1 Chronological calibration number
2 Date and time of the calibration
3 Calibration result (see below)
4 Indicator of analyzer cell performance (see below)

Result	Description	
Success [Cell status: xxx %]	Calibration success	
	[Cell status: xxx %]	Indicator of analyzer cell performance. Default settings: between 90% and 100% Normal operation: between 10% and 100% Normal wear on some cell components will reduce this value over time but will not reduce the accuracy of the detector's measurements.
FAIL	Calibration failure	
Cal. check OK	Calibration check successful	
Cal. check FAIL	Calibration check failure	

History export

An export can be generated containing the event **and** calibration history.

2 possible modes of access:

- **[Maintenance] [History] [Events history]**
- **[Maintenance] [History] [Calibrations history]**

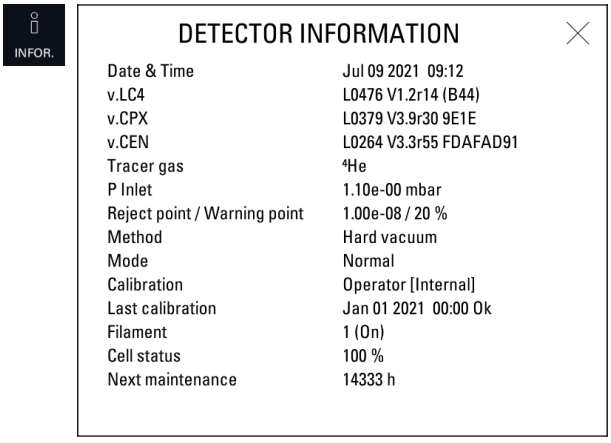
1. Insert a USB stick into the control panel.
2. Press **[Export]**.

   The message “Events and calibrations exported” is displayed to confirm the export.

8.4.2 Information

This function is used to view information on the leak detector.

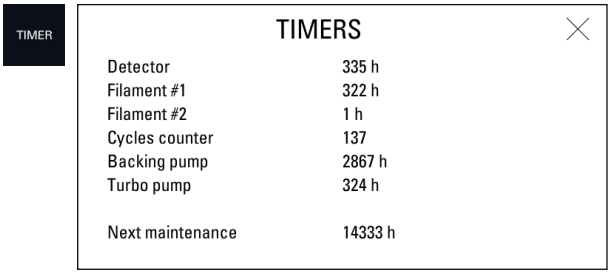
For quick access from the main screen, use the **[INFOR.]** function key.



Detector information
Reminder: for viewing only in this menu

Access: Menu [Maintenance] [Information] [Detector]	
Timer	Running time for detector
Date and time	Date and time
Software release .LC4	Control panel firmware information
Software release .CPX	Leak detector firmware information
Software release .CEN	Analyzer cell firmware information
Inlet pressure	Inlet pressure
Reject point	Set reject point
Warning point	Warning point set
Correction	Correction factor status
Tracer gas	Tracer gas selected
Filament	Filament selected
Cell status	Status of the cell
Method	Test method set
Mode (if 'hard vacuum' method) Probe type (if 'sniffer' method)	Test mode selected Type of probe selected
Calibration	Calibration set
Last calibration	Time since the last calibration performed
Next maintenance	Time before the next maintenance to be performed

For quick access from the main screen, use the **[TIMER]** function key.



Analyzer cell information
Reminder: for viewing only in this menu

Access: Menu [Maintenance] [Information] [Analyzer cell]	
Filament selected	Read only Filament selected for the measurement (2 filaments in the analyzer cell).
Filament	Read only Status of filament selected (on/off)
Cell status	Read only Performance indicator of the analyzer cell for the selected filament. ● Default settings: between 90% and 100% ● Normal operation: between 10% and 100% Normal wear on some cell components will reduce this value over time but will not reduce the accuracy of the detector's measurements.
Triode pressure	Read only For Service Centers only.
Electronic zero	Read only For Service Centers only.
Target value	Read only (see chapter “Target value”)
Acceleration voltage	Read only For Service Centers only.
Emission measurement	Read only For Service Centers only.
Sensitivity coefficient	Read only For Service Centers only.
Cell temperature	Read only The temperature at the analyzer cell
Timer filament 1	Read only Running time for filament 1
	Function to be started 1. Press the running time for filament 1. 2. Press **[Reset timer]** to reset the timer.
Timer filament 2	Read only Running time for filament 2
	Function to be started 1. Press the running time for filament 2. 2. Press **[Reset timer]** to reset the timer.

Backing pump information

Access: Menu [Maintenance] [Information] [Backing Pump]	
Timer backing pump	Press **[>]** to display the details.
	Read only Running time for backing pump
Status	Read only Pump status
Speed	Read only Pump at set operating speed

Turbomolecular pump information

Access: Menu [Maintenance] [Information] [Turbo pump]	
Timer turbo pump	Press **[>]** to display the details.
	Read only Running time for turbomolecular pump

Access: Menu [Maintenance] [Information] [Turbo pump]	
Status	Read only Pump status
Speed	Read only Pump at set operating speed

8.4.3 Last maintenance operations

This function displays the last maintenance operations performed on the detector and recorded by the service technician.

The message “No maintenance done” is displayed if no maintenance has been recorded.

Reminder: for viewing only in this menu

Access: Menu [Maintenance] [Last maintenance operations]	
Date	Date of the maintenance work
Inspector name	Maintenance technician who performed the work
Number total hours	Number of hours of detector operation at the time of maintenance
Comments	Comment entered by the service technician

8.4.4 Counters before next maintenance

This function displays the remaining periods before the next maintenance.

Reminder: for viewing only in this menu

Access: Menu [Maintenance] [Counters before next maintenance]	
Valves	Number of cycles completed versus number of cycles before next maintenance
Backing pump	Number of hours of backing pump operation versus the number of hours before the next maintenance
Turbo pump	Number of hours of turbomolecular pump operation versus the number of hours before the next maintenance

8.4.5 Maintenance turbo pump and cell

Access: Menu [Maintenance] [Maintenance turbo pump and cell]		Choice - Setting limit [1]
Filament	To be selected Filament selected for the measurement (2 filaments in the analyzer cell).	Filament 1 Filament 2
Stop and vent	Function to be started This function is used to shut down the secondary pump and to perform an inlet vent so that the secondary pump and the analyzer cell are at atmospheric pressure. See below	-

1) Initial setting: see chapter “Tree diagram to the Settings menu”

Stop and vent

To carry out maintenance on a vacuum circuit component, the vacuum circuit of the detector must be at atmospheric pressure.

1. Press **[Stop and vent]**.
   - The turbomolecular pump slows to a speed that allows venting.
   - A message notifies the user when the leak detector can be shut down.
   - If the user does not wish to stop the detector, press **[Restart leak detector]**. The detector start-up screen is displayed.
2. Stop the leak detector.
3. Wait until the control panel turns off completely and unplug the main power supply cable before working on the detector.

8.4.6 Burn-in

This function is used to prepare the detector, leaving it in optimal working condition by automatically carrying out a series of short tests and inlet vents between each test.

NOTICE

Risk of pollution

► Before starting this function, make sure that the leak detector is in an environment free of tracer gas pollution.

Access: Menu [Maintenance] [Burn-in]	
Inlet vent	Only available if the inlet vent is set to 'Operator'. Access the 'Inlet vent' menu From the 'Inlet vent' menu, return to the 'Burn-in' menu by pressing **[<]**.
Start without calib.	Function to be started Function launching Series of tests and inlet vents
Start with calibration	Function to be started Test runs, inlet vents and calibrations Available in hard vacuum test only
Stop	Stop burn-in in progress

Prerequisites

- Detector in 'Stand-by' mode
- "Automatic" inlet vent selected

Procedure

1. Implement the preliminary conditions.
2. Install a blank-off flange on the detector's inlet port.
3. Press **[Start without calib.]** or **[Start with calib.]**.
4. Press **[Stop]** or the **START/STOP** button to stop the burn-in.

8.4.7 Internal Pirani gauge calibration

This function is used to calibrate the detector's Pirani internal gauge.

In the event of degassing of the customer application, regular calibration is recommended.

The internal Pirani gauge is only used for detector operation. The values displayed should not be used as a reference point or condition external actions.

Access: Menu [Maintenance] [Internal Pirani calibration]	
Pressure	Read only Limit pressure or atmospheric pressure display depending on the procedural step. ● Pressure ≈ 5000 -> Limit pressure display ● Pressure ≈ 30000 -> Atmospheric pressure display
Inlet pressure	Read only Inlet pressure display.
HV valid	Function launching Setting the limit pressure (≈ 5000)
Hard Vacuum	Displaying the limit pressure
Atm valid	Function launching Setting the atmospheric pressure (≈ 30000)
Atmospheric	Displaying the atmospheric pressure
Start/Stop	Function launching Test start
Inlet vent	Function launching

Prerequisites

1. Put a plug on the detector's inlet port so that the detector can pump on itself.
2. Check that the air inlet connector is not blocked.
3. Check the following settings.

Parameter	Value	See chapter ...
Test method	Hard vacuum	“Test method”
Test mode	Most sensitive selected (Normal or High Sensitivity according the leak detector model)	“Test mode”

Procedure

1. Implement the preliminary conditions.
2. Set the air inlet to 'automatic' (see chapter “Air inlet”).
3. Check on the main screen that the air inlet valve is open (see chapter “Main screen”).
4. Set the cycle end to 'operator' (see chapter “Automatic cycle end”).
5. Access the “Internal Pirani calibration” menu.

   Access: Settings Screen + Menu [Maintenance] [Internal Pirani calibration]
6. Step 1: setting of the atmospheric pressure
7. Put the leak detector on ‘Stand-by’ mode.
8. Wait at least 5 minutes.
9. Check that the value is stable.
10. Check that the value is between 29000 and 34000.
11. Press **[Valid Atm]** to validate the step.
12. Step 2: setting of the limit pressure
13. Press **[Start/Stop]** to start a test.
14. Wait at least 5 minutes.
15. Check that the value is stable.
16. Check that the value is between 3000 and 6000.
17. Press **[Valid HV]** to validate the step.

8.4.8 Saving/Loading of the detector parameters

Saving of parameters

This function is used to save the following detector parameters:

- all of the parameters set in the “Settings” chapter.
- all of the parameters set in the “Graph screen: graph parameters” chapter.

Access: Menu **[Maintenance] [Save LD Parameters] [Save LD Parameters]**

The file manager opens (see chapter “File manager menu” of the operating instructions).

1. Press **[Internal Memory]** or **[USB Stick]** to select the desired location.
2. Rename the file, if necessary.
   – The created backup file is called “Setting” by default.
3. Press **[Save]**.
   – The backup file is a .CF4. file.

Loading of parameters

This function is used to load the previously saved detector parameters.

Access: Menu **[Maintenance] [Save LD Parameters] [Load LD Parameters]**

The file manager opens (see chapter “File manager menu” of the operating instructions).

1. Press **[Internal Memory]** or **[USB Stick]** to select the desired location.
2. Select the backup file to be loaded (.CF4).
3. Press **[Open]**.

8.5 File Manager menu

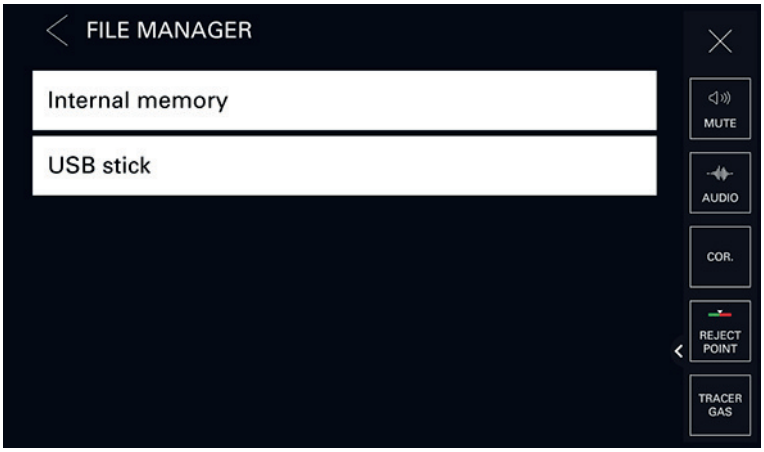
This function is used to manage saved files:

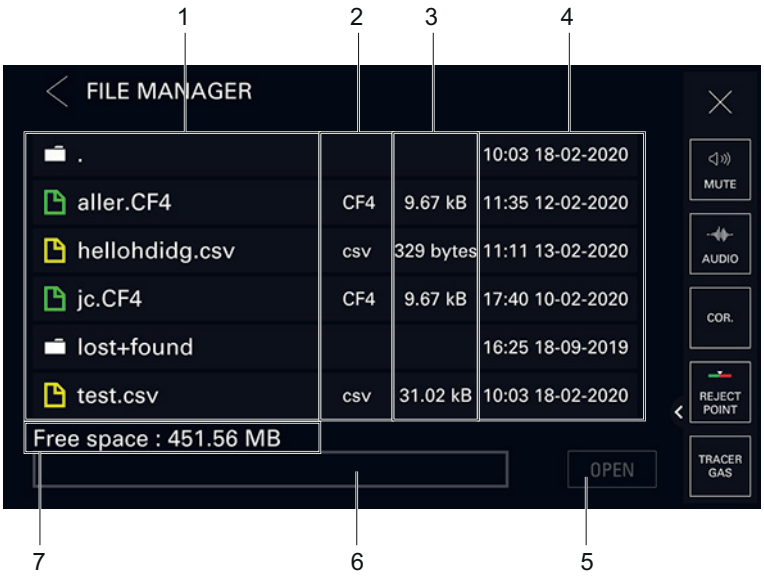
- in the detector’s internal memory,
- on a USB stick.

Type of USB stick

All commercial USB sticks with a FAT 32 format can be used (32 GB max.).

Promotional USB sticks are prohibited: they are not reliable.





1 Folder and/or file saved
2 Date and time saved
3 Button for opening the selected file **[OPEN]**
4 Navigation tools
5 Memory size available in the selected medium (USB stick or internal memory)

Access to data

1. Insert the USB stick if necessary.
2. Press **[Internal Memory]** or **[USB Stick]** to select the desired medium.

   The list of available folders and/or files is displayed.
   a Double click on a folder to access its contents.
   b Select the file to view.
   c Press **[OPEN]** to display it.

Access to 'navigation' and 'edit' modes

1. Press an item (folder or file). It will be highlighted in red.

   In 'navigation' mode, any selected item is highlighted in red.
2. Press this item (folder or file) until it is highlighted in green. The 'edit' mode is enabled.

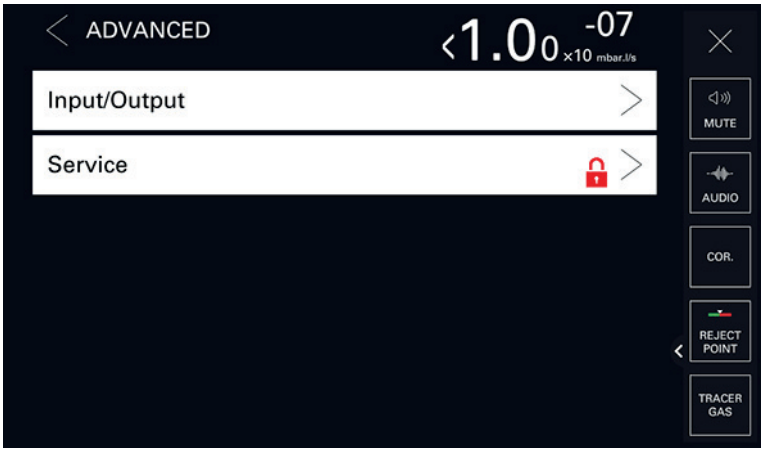
   In 'edit' mode, any selected item is highlighted in green.

   Possible actions in 'edit' mode:
   - Press **[DELETE]** to delete the selected item.
   - Press **[RENAME]** to rename the selected item.
   - Press **[MOVE TO]** to move the selected item.
3. Press an item (folder or file) until it is highlighted in red. The 'edit 'mode is disabled, the 'navigation' mode is enabled.

   In 'navigation' mode, any selected item is highlighted in red.

8.6 Advanced menu

Advanced functions reserved for specific uses of the detector (advanced settings requiring proper knowledge of leak detection).



8.6.1 Input/Output

Serial link 1 and serial link 2

The parameters displayed depend on the choices made.

Access: [Advanced] [Input/Output] [Serial Link 1] menu		Choice - Setting limit [1]
Type	Read only Link type depending on use: see the operating instructions of the accessory/ option to be used.	Serial
Mode	To be selected Link mode according to its use: see the operating instructions of the accessory/ option to be used.	Basic Table Advanced Export Data RC 500 WL RC 500 HLT 5xx HLT 2xx Ext. module
Period [2]	To be set	0 s – 24 h

1) Initial setting: see chapter “Tree diagram to the Settings menu”

2) 'Table' mode only

Access: [Advanced] [Input/Output] [Serial Link 1] menu		Choice - Setting limit [1]
Handshake	To be selected	Yes No
Power Pin 9	Read only The power depends on the mode selected.	5 V 24 V

1) Initial setting: see chapter “Tree diagram to the Settings menu”
2) 'Table' mode only

Access: [Advanced] [Input/Output] [Serial Link 2] menu		Choice - Setting limit [1]
Type	Serial link 2 is not used.	Not used

1) Initial setting: see chapter “Tree diagram to the Settings menu”

I/O Connector

Access: Menu **[Advanced] [Input/Output] [I/O connector]**

The detector is equipped with a 15-pin D-Sub I/O communication interface (see chapter “15-pin input/output communication interface”).

8.6.2 Service

Access to the Service menu is password protected.

Reserved for the Service Centers.

9 Troubleshooting guide

Operation monitoring (warning and error)
In case an issue happens during operation, the user is advised on the detector control panel.

Type of fault	Control panel	
Warning	Display of fault. 	Click on the pictogram **[i]/[i Next]** to display the fault. See below the list of faults (wxxx).
		
Error	Display of fault. 	Click on the pictogram **[!]/[i Next]** to display the fault. See below the list of faults (exxx).
		
Critical error	 	« Critical error - E244 » message display. Contact Pfeiffer Vacuum Service.
		

History
The events history records the events that have occurred.

An event can be an error (exxx), a warning (wxxx) or information (ixxx).

See chapter "History".

Warnings

For the same code, the text may be slightly different depending on the leak detector. It is advisable to search for the fault by code.

Operation to be carried out in the order indicated in the table.

Code (wxxx)	Warning	Description - Solution
w060	**Check probe type**	Check the sniffer probe connections.
		Check that the sniffing probe type used corresponds to the leak detector setting.
		Contact Pfeiffer Vacuum Service.

Code (wxxx)	Warning	Description - Solution
w097	**Temperature too high**	Make sure that the leak detector is used in the required temperature tolerance.
		Check the fans flow direction. Change it if necessary.
		Check if the fan filter is clean. Change it if necessary.
		Check that the internal calibrated leak temperature sensor is connected.
		Check if the fans are properly connected.
		Check if the fans are properly working. Change them if necessary.
		Check the internal calibrated leak temperature sensor for proper operation. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
w098	**Temperature too low**	Make sure that the leak detector is used in the required temperature tolerance.
		Check that the internal calibrated leak temperature sensor is connected.
		Change the internal calibrated leak temperature sensor.
		Contact Pfeiffer Vacuum Service.
w120	**Cell maintenance to be planed**	Contact Pfeiffer Vacuum Service.
w140	**Calibrated leak maintenance**	Check the calibrated leak parameters.
		Check the leak detector date and time setting. Correct them if necessary.
		Recommended maintenance for the calibrated leak.
		Contact Pfeiffer Vacuum Service.
w145	**Maintenance required**	Contact Pfeiffer Vacuum Service.
w150	**Backing pump maintenance**	Contact Pfeiffer Vacuum Service.
w154	**Roughing pump maintenance**	Contact Pfeiffer Vacuum Service.
w155	**Backing pump maintenance**	Contact Pfeiffer Vacuum Service.
w160	**Turbo pump maintenance**	Contact Pfeiffer Vacuum Service.
w176	**Ie current increase at 1.5 mA**	Contact Pfeiffer Vacuum Service.
w180	**New filament #2 required**	Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
w181	**New filament #1 required**	Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
w182	**Emission too low on filament 2**	Contact Pfeiffer Vacuum Service.
w183	**Emission too low on filament 1**	Contact Pfeiffer Vacuum Service.
w203	**External calibrated leak**	Use an external calibrated leak to calibrate the leak detector.
		Contact Pfeiffer Vacuum Service.
w205	**Calibration aborted**	Calibration stop by the operator before the end of the calibration cycle. Launch again a calibration.
		Contact Pfeiffer Vacuum Service.
w211	**Manual calibration**	Calibration in manual. Set calibration to automatic to launch calibration.
		Contact Pfeiffer Vacuum Service.
w215	**Background too high for test**	Do not run the test if the background is too high in relation to the residual max function activated.
		Contact Pfeiffer Vacuum Service.

Code (wxxx)	Warning	Description - Solution
w220	**Filament request off**	Switch on the filament.
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
w222	**Test stop on pollution**	The test is stopped because the leak rate exceeds the depollution threshold.
		Contact Pfeiffer Vacuum Service.
w230	**Calibration required (if technician intervention)**	Calibration checking result: defective leak detector calibration. Launch a calibration.
		Contact Pfeiffer Vacuum Service.
w235	**Calibration required (set time between 2 calibrations reached)**	Set time between 2 calibrations reached. Launch a calibration.
		Contact Pfeiffer Vacuum Service.
w240	**Calibration required (number of cycles between 2 calibrations reached)**	Set cycles number between 2 calibrations reached. Launch a calibration.
		Contact Pfeiffer Vacuum Service.
w241	**Calibration required (if automatic filament change-over and calibration with external calibrated leak)**	External calibrated leak is selected. Launch an calibration.
		Contact Pfeiffer Vacuum Service.
w242	**Internal Pirani uncalibrated**	Adjust the PI1 inlet gauge.
		Contact Pfeiffer Vacuum Service.
w244	**Cell tuning uncalibrated**	Contact Pfeiffer Vacuum Service.
w245	**Temperature too high**	Make sure that the leak detector is used in the required temperature tolerance.
		Check the fans flow direction. Change it if necessary.
		Check if the fan filter is clean. Change it if necessary.
		Check that the internal calibrated leak temperature sensor is connected.
		Check if the fans are properly connected.
		Check if the fans are properly working. Change them if necessary.
		Check the internal calibrated leak temperature sensor for proper operation. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
w249	**Check lithium battery**	Change the supervisor board battery.
		Contact Pfeiffer Vacuum Service.
w250	**Adjust date and time**	Check the leak detector date and time setting. Correct them if necessary.
		Contact Pfeiffer Vacuum Service.
w255	**Out start condition**	Read the 2nd message displayed with this message.

Errors

For the same code, the text may be slightly different depending on the leak detector. It is advisable to search for the fault by code.

Operation to be carried out in the order indicated in the table.

Code (exxx)	Error	Description - Solution
e040	**Roughing pump failure (second turbo pump)**	Check if the turbo pump cable is properly connected.
		Check if the valve is properly connected (exhaust valve).
		Open the exhaust valve of the customer installation.
		Contact Pfeiffer Vacuum Service.
e050	**Cell zero stability**	Contact Pfeiffer Vacuum Service.
e056	**Background trouble**	Degas the analyzer cell for several minutes. Launch after a calibration.
		Check the calibrated leak parameters.
		Change the internal calibrated leak.
		Contact Pfeiffer Vacuum Service.
e057	**Lack of sensitivity**	Check the calibrated leak parameters.
		Change the internal calibrated leak.
		Contact Pfeiffer Vacuum Service.
e058	**Sensitivity too high**	Check the calibrated leak parameters.
		Contact Pfeiffer Vacuum Service.
e059	**Calibrated test mode lost**	Adjust the PI1 inlet gauge.
		Check the customer application (calibration on a too important volume).
		Contact Pfeiffer Vacuum Service.
e065	**Background too high**	Check the calibrated leak parameters.
		Check the test area for tracer gas contamination (test to be performed using the sniffing method).
		Launch a calibration with an external calibrated leak.
		Contact Pfeiffer Vacuum Service.
e070	**Peak adjust error**	Check if the customer installation is piloted by the leak detector. Check the pressure thresholds set in the leak detector.
		Set the correct test mode.
		Modify the system external calibrated leak to match the defined test mode. Installation client
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e071	**Characterization pic M3 error**	Contact Pfeiffer Vacuum Service.
e072	**Characterization pic M4 error**	Contact Pfeiffer Vacuum Service.
e073	**Characterization pic M2 error**	Contact Pfeiffer Vacuum Service.
e080	**Calibrated leak year error**	Check the calibrated leak parameters.
		Check the leak detector date setting. Correct it if necessary.
		Contact Pfeiffer Vacuum Service.
e089	**Emission lost**	Contact Pfeiffer Vacuum Service.
e093	**Dynamic calibrated failure**	Redo the dynamic coefficient calculation procedure.
		Contact Pfeiffer Vacuum Service.
e095	**Cell zero OFF limits**	Contact Pfeiffer Vacuum Service.
e096	**Calibration failure**	Read the 2nd message displayed with this message.

Code (exxx)	Error	Description - Solution
e097	**Temperature too High**	Make sure that the leak detector is used in the required temperature tolerance.
		Check the fans flow direction. Change it if necessary.
		Check if the fan filter is clean. Change it if necessary.
		Check that the internal calibrated leak temperature sensor is connected.
		Check if the fans are properly connected.
		Check if the fans are properly working. Change them if necessary.
		Check the internal calibrated leak temperature sensor for proper operation. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e098	**Temperature too low**	Make sure that the leak detector is used in the required temperature tolerance.
		Check that the internal calibrated leak temperature sensor is connected.
		Change the internal calibrated leak temperature sensor.
		Contact Pfeiffer Vacuum Service.
e099	**24V DC troubles**	Contact Pfeiffer Vacuum Service.
e160	**Sniffing probe clogged**	Check if the sniffer probe is clogged.
		Check that the sniffer probe tube is not pinched.
		Check the probe clogged threshold.
		Change the sniffer probe filter.
		Change the sniffer probe.
		Contact Pfeiffer Vacuum Service.
e161	**Probe flow overload**	Check that the hybrid cable is properly connected.
		Check the filament position and its status. Change it if necessary.
		Change the sniffer probe.
		Contact Pfeiffer Vacuum Service.
e180	**Emission failure**	Read the 2nd message displayed with this message.
e185	**Triode safety**	Adjust the PI1 inlet gauge.
		Degas the analyzer cell for several minutes. Launch after a calibration.
		Check the test crossover pressure thresholds setting of the leak detector. Correct the thresholds if necessary.
		Check the test crossover pressure thresholds setting of the customer installation. Correct the thresholds if necessary.
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e188	**Turbo pump speed**	Check if the turbo pump cable is properly connected.
		Check if the valve is properly connected (exhaust valve).
		Open the exhaust valve of the customer installation.
		Contact Pfeiffer Vacuum Service.
e192	**Filament current too high**	Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.

Code (exxx)	Error	Description - Solution
e194	**Filament #2 collector shortcircuit**	Check that the filament is properly positioned (no contact with the cover).
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e195	**Filament #1 collector shortcircuit**	Check that the filament is properly positioned (no contact with the cover).
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e205	**Backing pump failure**	Allow the backing pump to cool down and check room temperature.
		Check the fans flow direction. Change it if necessary.
		Check if the fan filter is clean. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e206	**Backing pump temperature too high**	Allow the backing pump to cool down and check room temperature.
		Check the fans flow direction. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e210	**Backing pump failure**	Backing pump switch OFF. Switch on it.
		Backing pump switch is blocked.
		Contact Pfeiffer Vacuum Service.
e220	**No collector voltage**	Switch on the filament.
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e224	**-15V cell failure**	Contact Pfeiffer Vacuum Service.
e230	**Filaments #1& #2 bad**	Contact Pfeiffer Vacuum Service.
e231	**No emission on filament 1 & 2**	Contact Pfeiffer Vacuum Service.
e235	**Cell pressure > 1e-04mbar**	Degas the analyzer cell for several minutes. Launch after a calibration.
		Check the filament position and its status. Change it if necessary.
		Contact Pfeiffer Vacuum Service.
e238	**No cell communication**	Check that the cable between the supervisor board and the analyzer cell is properly connected.
		Contact Pfeiffer Vacuum Service.
e239	**No turbo pump communication**	Check if the cable is connected to turbo pump.
		Contact Pfeiffer Vacuum Service.
e241	**Turbo pump speed (cell turbo pump)**	Check if the turbo pump cable is properly connected.
		Check if the valve is properly connected (exhaust valve).
		Open the exhaust valve of the customer installation.
		Contact Pfeiffer Vacuum Service.
e243	**EEPROM default**	Contact Pfeiffer Vacuum Service.
e244	**Turbo pump #2 failure**	Refer to the maintenance manual for the relevant turbo pump (SplitFlow, HiPace).
		Contact Pfeiffer Vacuum Service.
e245	**Turbo pump failure**	Refer to the maintenance manual for the relevant turbo pump (SplitFlow, HiPace).
		Contact Pfeiffer Vacuum Service.
e247	**Check turbo pump connector**	Check if the turbo pump is properly connected.
		Contact Pfeiffer Vacuum Service.

Code (exxx)	Error	Description - Solution
e248	**Check turbo pump connector**	Check if the turbo pump is properly connected.
		Contact Pfeiffer Vacuum Service.
e251	**+15V cell failure**	Contact Pfeiffer Vacuum Service.
e252	**24V cell failure**	Contact Pfeiffer Vacuum Service.
e253	**Timekeeper RAM failure**	Change the supervisor board battery.
		Contact Pfeiffer Vacuum Service.
e255	**An error occured**	Read the 2nd message displayed with this message.

Informations

For the same code, the text may be slightly different depending on the leak detector. It is advisable to search for the fault by code.

Code (ixxx)	Information	Description - Solution
i300	**Air inlet**	The leak detector has suffered an unplanned air inlet.
i301	**Stop on pollution**	The test has been stopped by Pollution function.
i302	**Reset timer backing pump**	The backing pump maintenance timer has been reset.
i303	**Reset timer turbo pump 1**	The turbo pump 1 maintenance timer has been reset.
i304	**Reset timer turbo pump 2**	The turbo pump 2 maintenance timer has been reset.
i305	**Reset timer turbo pump 3**	The turbo pump 3 maintenance timer has been reset.
i306	**Reset timer Filament #1**	The filament 1 maintenance counter has been reset.
i307	**Reset timer Filament #2**	The filament 2 maintenance counter has been reset.
i308	**Reset count cycle**	The cycle counter has been reset (valve cycles).
i309	**Emission increase**	The filament emission current during operation has increased (analysis cell maintenance required).
i310	**Calibration restart**	The calibration has been automatically relaunched a second time.
i313	**Date/Time update**	The date and/or time have been changed.
i318	**Full parameters reset**	The leak detector parameters have been reset.
i319	**Filament change**	The used filament has been changed (filament 1 to filament 2 or filament 2 to filament 1).
i320	**Internal Pirani calibration**	The internal Pirani gauge has been calibrated.
i321	**Storage delay**	The leak detector doesn't start since 15 days (minimum).
i322	**Purge could not be opened**	The purge valve is blocked or the purge circuit is obstructed.
i325	**Manual purge OFF**	The leak detector purge has been closed manually.
i326	**Manual purge ON**	The leak detector purge has been opened manually.
i328	**Purge OFF**	The leak detector purge is closed.
i329	**Purge ON**	The leak detector purge is opened.
i330	**Purge Auto.**	The leak detector purge is in automatic mode.
i331	**Purge manual**	The leak detector purge is in manual mode.
i332	**Safety Mode**	The leak detector operates in security mode.
i333	**Backing pump current draw**	Backing pump current consumption increased (backing pump maintenance to be planned).
i336	**Massive mode activated**	The leak detector has switched to Massive mode.

10 Maintenance/Replacement

Maintenance intervals and responsibilities

The detector maintenance operations are described in the Maintenance instructions for the detector.

The manual specifies:

- maintenance intervals,
- maintenance instructions,
- shutting the product down,
- tools and spare parts.

11 Accessories

Accessory	Description	Part Number
RC 10 WL remote control (wireless)	-	124193
Standard sniffer probe	Piping 5 m - Rigid nozzle 9 cm	SNC1E1T1
	Piping 5 m - Rigid nozzle 30 cm	SNC1E2T1
	Piping 10 m - Rigid nozzle 9 cm	SNC2E1T1
	Piping 10 m - Rigid nozzle 30 cm	SNC2E2T1
Calibrated leaks	Tracer gas: 100% ^{4}He	Contact us
Adaptor for external calibrated leak/sniffer probe	DN 25 ISO-KF	110716
	DN 16 ISO-KF	110715
Spray gun	Standard model	112535
	Elite model	109951
ECB Wi-Fi external communication box	-	125902
Inlet filters	Available in bronze or stainless steel, 5 to 20 µm mesh	Contact us
Transport cart	-	114820
Transport case	-	119594

12 Technical data and dimensions

12.1 General

Databases of technical characteristics of Pfeiffer Vacuum leak detectors:

- Technical characteristics according to:
  - AVS 2.3: Procedure for calibrating gas analyzers of the mass spectrometer type
  - EN 1518: Non-destructive testing. Leak testing. Characterization of mass spectrometer leak detectors
  - ISO 3530: Methods of calibrating leak detectors of the mass-spectrometer-type used in the field of vacuum technology
- Standard conditions: 20 °C, 5 ppm ^{4}He ambient conditions, degassed detector
- Zero function or background suppression enabled
- Acoustic pressure level: distance in relation to the detector 1 m.

12.2 Technical characteristics

Parameters	ASM 310
Dimensions (L x W x H)	350 x 254 x 415 mm
Connection flange (inlet)	DN 25 ISO-KF
Flow rate for He	1.1 l/s
Backing pump capacity	1.7 m^3/h
Start-up time (20 °C) with calibration	< 3.5 min
Start-up time (20 °C) without calibration	< 2 min
Sound level	< 45 dB(A)
Max. power consumption	300 W
Maximum test pressure	15 hPa
Weight	21 kg
Detectable gases	^{4}He, Mass 3 , H_2
Test method	Hard vacuum and sniffer
Minimum detectable leak rate for helium (sniffer leak detection)	$1 \cdot 10^{-7}$ atm cc/s ($1 \cdot 10^{-8}$ Pa m^3/s)
Minimum detectable leak rate for helium (hard vacuum leak detection)	$1 \cdot 10^{-12}$ atm cc/s ($1 \cdot 10^{-13}$ Pa m^3/s)
Power supply [1)]	90-240 V~, 50/60 Hz
Fore vacuum pump	Dry pumping
1) According to IEC/UL/CSA regulations, products can withstand a supply voltage variation of ± 10%.	

Environmental conditions

Parameters	ASM 310
Use temperature	10–40 °C
Storage temperature	-25–+70 °C
Maximum air humidity	95%, non-condensing
Maximum magnetic field	3 mT
Pollution degree	2
Maximum altitude above sea level	2000 m
Use	Indoor use only
Penetration protection rating	IP 20 compliant [1)]
1) IP degree is replace by Nema type in North America.	

12.3 Units of pressure

Unit	mbar	bar	Pa	hPa	kPa	Torr / mm Hg
mbar	**1**	$1 \cdot 10^{-3}$	100	**1**	0.1	0.75
bar	1000	**1**	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	**1**	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	**1**	$1 \cdot 10^{-3}$	100	**1**	0.1	0.75
kPa	10	0.01	1000	10	**1**	7.5
Torr / mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	**1**
1 Pa = 1 N/m²						

Tbl. 1: Units of pressure and their conversion

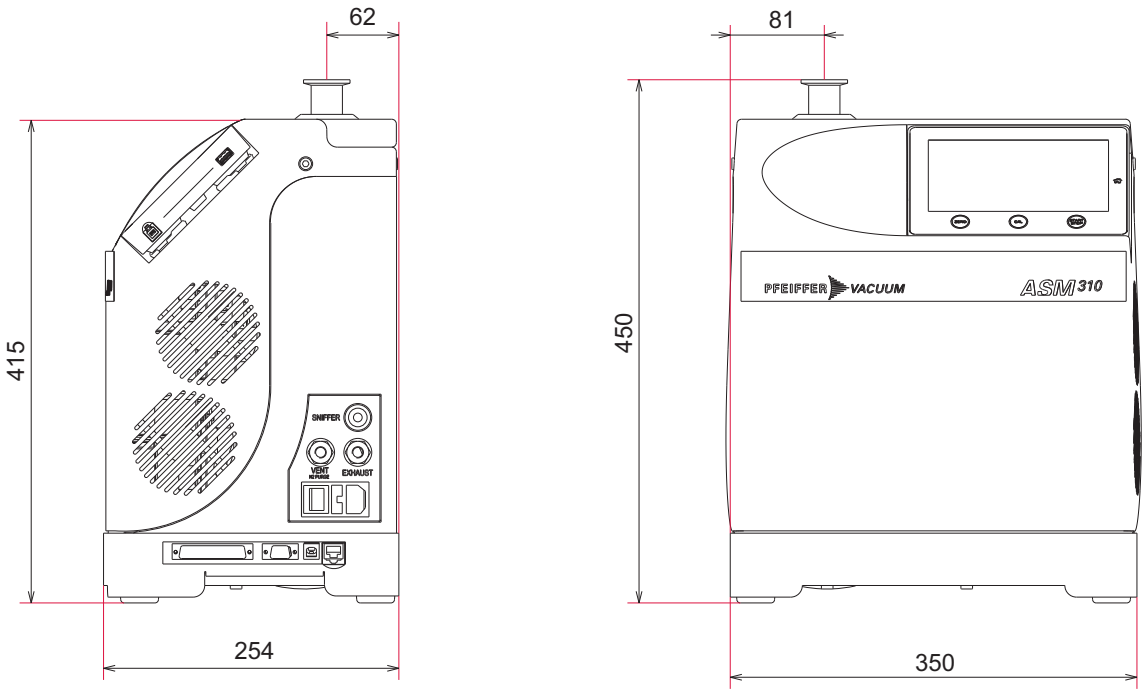
12.4 Gas throughputs

Unit	mbar l/s	Pa m³/s	sccm	Torr l/s	atm cm³/s
mbar l/s	**1**	0.1	59.2	0.75	0.987
Pa m³/s	10	**1**	592	7.5	9.87
sccm	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	**1**	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	**1**	1.32
atm cm³/s	1.01	0.101	59.8	0.76	**1**

Tbl. 2: Gas throughputs and their conversion

12.5 Dimensions

(mm)



13 Appendix

13.1 Tree diagram of the Settings menu

Next tables indicate the default settings for the leak detector.

When the leak detector is switched off, values and parameters are saved for the next start-up.

Access: Settings Screen + Menu [Measurement]				**Choice - Setting limit**
Tracer Gas				**Helium 4** [1)] Mass 3 Hydrogen
Set points	Pollution	Status		Enabled **Disabled** [1)]
		Setting (if enabled)		$1 \cdot 10^{-19} – 1 \cdot 10^{+19}$ **$1 \cdot 10^{-05}$** [1)]
	Hard Vacuum Set Points	Reject point		$1 \cdot 10^{-13} – 1 \cdot 10^{-06}$ **$1 \cdot 10^{-07}$** [1)]
		Warning point	Status	**Enabled** [1)] Disabled
			Setting (if enabled)	0–100% **20%** [1)]
	Sniffer set points	Reject point		$1 \cdot 10^{-12} – 1 \cdot 10^{+06}$ **$1 \cdot 10^{-04}$** [1)]
		Probe Clogged		$1 \cdot 10^{-19} – 1 \cdot 10^{+19}$ **$1 \cdot 10^{-06}$** [1)]
		Warning point	Status	**Enabled** [1)] Disabled
			Setting (if enabled)	0–100% **20%** [1)]
Correction factor	Status			Enabled **Disabled** [1)]
	Setting (if enabled)			$1 \cdot 10^{-18} – 1 \cdot 10^{+18}$ **$1 \cdot 10^{+00}$** [1)]

1) Default setting

2) General information: read only

3) No default setting: setting performed by the user at the 1st detector start-up

4) Information indicated on the calibrated leak used for calibration or on its calibration certificate.

Access: Settings Screen + Menu [Measurement]			Choice - Setting limit
Calibrated leak settings	Tracer Gas		**Helium 4** [1)] Mass 3 Hydrogen
	Type		**Internal** [1)] External Concentration
	Unit		mbar · l/s Pa · m^3/s Torr · l/s mTorr · l/s atm · cc/s sccm sccs ppm - [4)]
	Leak value		$1 \cdot 10^{-18} – 1 \cdot 10^{+18}$ - [4)]
	Loss per year (%)		0 – 99 **6** [1) 4)]
	Reference temperature (°C)		0 – 99 **23** [1) 4)]
	Temperature coefficient (%/°C)		0.0 – 9.9 **3** [1) 4)]
	Date		Format: mm/yyyy - [4)]
	Temperature	Type	**Internal** [1)] External
		Internal Temperature (°C) (if internal 'Type')	- - [2)]
		External Temperature (°C) (if external 'Type')	0 – 99 **23** [1)]

1) Default setting
2) General information: read only
3) No default setting: setting performed by the user at the 1st detector start-up
4) Information indicated on the calibrated leak used for calibration or on its calibration certificate.

Tbl. 3: Default settings: 'Measurement' menu

Access: Settings Screen + Menu [Test]	Choice - Setting limit
Method	**Hard Vacuum** [1)] Sniffer
Mode (if hard vacuum 'Method')	Gross Leak **Normal** [1)] High sensitivity
Probe type (if sniffer 'Method')	**Standard** [1)]

1) Default setting

Access: Settings Screen + Menu [Test]			Choice - Setting limit
Cycle end	Cycle end		**Operator** [1] Automatic
	Roughing timer (if automatic 'Cycle end')	Status	**Enabled** [1] Disabled
		Setting	0 – 1 h **10 s** [1]
	Test timer (if automatic 'Cycle end')		0 – 1 h **10 s** [1]
Inlet vent	Inlet vent		**Operator** [1] Automatic
	Delay (if automatic 'Inlet vent')		0 – 2 s **0 s** [1]
	Vent timer (if automatic 'Inlet vent')	Status	Enabled **Disabled** [1]
		Setting	00'00" – 59'59" **00'09"** [1]
Memo Function	Active		Yes **No** [1]
	Display time	Status	Enabled **Disabled** [1]
		Setting	00'00" – 59'59" **00'10"** [1]
Zero activation	Activation	Setting	None **Operator** [1] Automatic
	Zero exit (if operator 'Activation')		**Press once** [1] Press > 3s
	Trigger (if automatic 'Activation')	Status	**Timer** [1] Set point
		Setting (if timer)	00'00" – 59'59" **00'10"** [1]
		Setting (if set point)	$1 \cdot 10^{-19}$ – $1 \cdot 10^{+19}$ **$5 \cdot 10^{-07}$** [1]
Regeneration	Function launching		-
Massive Mode	Active		No **Yes** [1]
	Sensitivity		**High** [1] Low
Calibration check	Check		**Operator** [1] Automatic
	Frequency (if automatic 'Check')	Every cycle	0 – 9999 **50** [1]
		Every hour	00'00" – 59'59" **00'10"** [1]

1) Default setting

Access: Settings Screen + Menu [Test]		Choice - Setting limit
Calibration	Status	**Start-up** [1] Operator Check at start
Start-up timer	Value	00'00" – 59'59" **00'10"** [1]

1) Default setting

Tbl. 4: Default settings: 'Test' menu

Access: Settings Screen + Menu [Configuration]			Choice - Setting limit
Unit			mbar · l/s Pa · m^3/s Torr · l/s atm · cc/s ppm sccm sccs mtorr · l/s **-** [3]
Date			Format: mm/dd/yyyy **-** [3]
Time			Format: hh:mm:ss **-** [3]
Language			English French German Italian Chinese Japanese Korean Spanish Russian Portuguese **-** [3]
Sound volume	Detector	Status	**Enabled** [1] Disabled
		Setting	1 – 9 **3** [1]
	Voice	Status	**Enabled** [1] Disabled
		Setting	1 – 9 **4** [1]
	Detector min. sound	Status	**Enabled** [1] Disabled
		Setting	1 – 9 **0** [1]

1) Default setting

3) No default setting: setting performed by the user at the 1st detector start-up

Access: Settings Screen + Menu [Configuration]		Choice - Setting limit
Function keys	Timer	Enabled **Disabled** [1)]
	Audio	**Enabled** [1)] Disabled
	Cor.	Enabled **Disabled** [1)]
	Mute	**Enabled** [1)] Disabled
	Reject point	**Enabled** [1)] Disabled
	Infor.	**Enabled** [1)] Disabled
	Tracer gas	Enabled **Disabled** [1)]
	Vent	**Enabled** [1)] Disabled
	Method	**Enabled** [1)] Disabled
	Mode	Enabled **Disabled** [1)]
	Memo	Enabled **Disabled** [1)]
	Paging	Enabled **Disabled** [1)]
	Regen	Enabled **Disabled** [1)]
	Cal type	**Enabled** [1)] Disabled
	Screen Shot	Enabled **Disabled** [1)]
	Switch Set point	Enabled **Disabled** [1)]

1) Default setting

3) No default setting: setting performed by the user at the 1st detector start-up

Access: Settings Screen + Menu [Configuration]			Choice - Setting limit
Screen settings	Brightness		0 – 20 **15** [1)]
	Paging Function		Enabled **Disabled** [1)]
	Leak rate bar-graph	Zoom on set point	Enabled **Disabled** [1)]
		High decade	-12– +6 **-2** [1)]
		Low decade	-13 – +5 **-12** [1)]
		Lower display limit	$1 \cdot 10^{-13}$ – $1 \cdot 10^{+06}$ **$1 \cdot 10^{-13}$** [1)]
		Show 2nd digit	Enabled **Disabled** [1)]
	Application win-dows	Std-by Value	**Hide** [1)] Show
		Show inlet pressure	Hide **Show** [1)]
		Show second pressure	**None** [1)] Cell. Ext.
		Show synoptic	Hide **Show** [1)]
	Reset screen pa-rameters	Function launching	-

1) Default setting

3) No default setting: setting performed by the user at the 1st detector start-up

Access: Settings Screen + Menu [Configuration]				Choice - Setting limit
Access/Password	User level			Restricted access Medium access **Full access** [1]
	Password			- **5555** [1]
	Customized access	if 'User level' with restricted or medium access	Graph screen	Access permitted **Access denied** [1]
			Measurement menu	Access permitted **Access denied** [1]
			Test menu	Access permitted **Access denied** [1]
			Configuration menu	Access permitted **Access denied** [1]
			Maintenance menu	Access permitted **Access denied** [1]
			File manager menu	Access permitted **Access denied** [1]
			Advanced menu	Access permitted **Access denied** [1]
		if 'User level' with full access	Graph screen	**Access permitted** [1] Access denied
			Measurement menu	**Access permitted** [1] Access denied
			Test menu	**Access permitted** [1] Access denied
			Configuration menu	**Access permitted** [1] Access denied
			Maintenance menu	**Access permitted** [1] Access denied
			File manager menu	**Access permitted** [1] Access denied
			Advanced menu	**Access permitted** [1] Access denied

1) Default setting

3) No default setting: setting performed by the user at the 1st detector start-up

Tbl. 5: Default settings: 'Configuration' menu

Access: Settings Screen + Menu [Maintenance]		Choice - Setting limit
History	Events history	- [2]
	Calibrations history	- [2]

1) Default setting

2) General information: read only

5) No default setting

Access: Settings Screen + Menu [Maintenance]					Choice - Setting limit
Information	Detector	Timer			- [2]
		Date and time			- [2]
		Software release .LC4			- [2]
		Software release .CPX			- [2]
		Software release .CEN			- [2]
		Inlet pressure			- [2]
		Reject point			- [2]
		Warning point			- [2]
		Correction			- [2]
		Tracer gas			- [2]
		Filament			- [2]
		Cell status			- [2]
		Method			- [2]
		Mode (if 'hard vacuum' method)			- [2]
		Probe type (if 'sniffer' method)			- [2]
		Calibration			- [2]
		Last calibration			- [2]
		Next maintenance			- [2]
	Analyzer cell	Filament selected			- [2]
		Filament			- [2]
		Cell status			- [2]
		Triode pressure			- [2]
		Electronic zero			- [2]
		Target value			- [2]
		Acceleration voltage			- [2]
		Emission measurement			- [2]
		Sensitivity coefficient			- [2]
		Cell temperature			- [2]
		Timer filament 1	Value		**20 h** [1] - [2]
			Reset timer	Function launching	-
		Timer filament 2	Value		**0 h** [1] - [2]
			Reset timer	Function launching	-
	Backing pump	Timer backing pump			**20/15,000 h** [1] - [2]
		Status			- [2]
		Speed			- [2]
	Turbo pump	Timer turbo pump			**20/15,000 h** [1] - [2]
		Status			- [2]
		Speed			- [2]

1) Default setting
2) General information: read only
5) No default setting

Access: Settings Screen + Menu [Maintenance]				Choice - Setting limit
Last maintenance operations	Maintenance work 1	Date		- 5)
		Inspector name		- 5)
		Total hours		- 5)
		Comments		- 5)
	Maintenance work 2	Date		- 5)
		Inspector name		- 5)
		Total hours		- 5)
		Comments		- 5)
	Maintenance work 3	Date		- 5)
		Inspector name		- 5)
		Total hours		- 5)
		Comments		- 5)
Timers before next maintenance	Valves			**500,000 cycles** 1) - 2)
	Backing pump			**20/15,000 h** 1) - 2)
	Turbo pump			**20/15,000 h** 1) - 2)
Maintenance turbo pump and cell	Filament			**Filament 1** 1) Filament 2
	Stop and vent	Function launching		-
		Restart leak detector	Function launching	-
Burn-in	Inlet vent	'Inlet vent' function access		-
	Start without calib.	Function launching		-
	Start with calibration	Function launching		-
	Stop	Function stop		-
Internal Pirani Calibration	Pressure			- 2)
	Inlet pressure			- 2)
	HV valid	Function launching		-
	Hard Vacuum			- 2)
	Atm valid	Function launching		-
	Atmospheric			- 2)
	Start/Stop	Function launching		-
	Inlet vent	Function launching		-
Save LD Parameters	Save LD Parameters		Function launching	-
	Load LD Parameters		Function launching	-

1) Default setting
2) General information: read only
5) No default setting

Tbl. 6: Default settings: 'Maintenance' menu

Access: Settings Screen + Menu [File Manager]	Choice - Setting limit
Internal memory	-
USB stick	-

Tbl. 7: Default settings: 'File Manager' menu.

Access: Settings Screen + Menu [Advanced]			Choice - Setting limit
Input/Output	Serial link 1	Type	**Serial** [1]
		Mode	Basic Table **Advanced** [1] Export Data RC 500 WL RC 500 HLT 5xx HLT 2xx Ext. module
		Period (if table 'Mode')	0 s – 24 h **1 s** [1]
		Handshake	Yes **No** [1]
		Power pin 9	5 V [1]
	Serial link 2	Type	Not used [3]
	I/O Connector	Analog Output	- [6]
Service	Access to the Service menu is password protected. Reserved for our Service Centers.		-

1) Default setting
6) See the I/O communication interface operating instructions

Tbl. 8: Default settings: 'Advanced' menu

Access: Press the [SWITCH SETPOINT] function key	Choice - Setting limit
Set point A	$1 \cdot 10^{-13} – 1 \cdot 10^{+06}$ **$1 \cdot 10^{-06}$** [1]
Set point B	$1 \cdot 10^{-13} – 1 \cdot 10^{+06}$ **$1 \cdot 10^{-08}$** [1]

1) Default setting

Tbl. 9: Initial settings: Function key - [SWITCH SETPOINT]

Access: Press the graph			Choice - Setting limit
Graph parameters	Display time		12 s – 1 h **30 s** [1]
	Auto scale	Status	Enabled **Disabled** [1]
		Setting (if 'Auto scale' is enabled)	**2 decades** [1] 4 decades
	Decade (if 'Auto scale' is enabled)	High decade	-11 – +6 **-4** [1]
		Low decade	-12 – +5 **-10** [1]
	Show inlet pressure		Enabled **Disabled** [1]
	Pressure decade (if 'Show inlet pressure' is enabled)	High decade	-2 – +3 **+3** [1]
		Low decade	-3 – +2 **-3** [1]
Enable record			Enabled **Disabled** [1]
Sampling rate (if 'Enable record' is enabled)			100 ms – 30 s **500 ms** [1]
Clear recording (if 'Enable record' is enabled)	Function launching		-
View record (if 'Enable record' is enabled)	Function launching		-

1) Default setting

Tbl. 10: Initial settings: Graph screen - Graph parameters

13.2 15-pin Input/Output communication interface

From the 'Settings' screen, press **[Advanced] [Input/Output] [I/O Connector]**.

13.2.1 Cable characteristics

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

NOTICE

Safety Extra-Low Voltage circuits

The remote control circuits are equipped with dry contact outputs (30 V - 1 A max). Overvoltages and overcurrents can result in internal electrical damage. Users must observe the following wiring conditions:

► Connect these outputs in accordance with the rules and protection of Safety Extra-Low Voltage (SELV) circuits.
► The voltage applied to these contacts should be less than 30 V and the current less than 1 A.

► 15-pin D-sub male connector for IP 20.

Inputs	Logics	14	Starting the test
	Analogs	5	Disabled
Outputs	Logics	6	Test threshold crossed
		7	ASM xxx: Selected test mode reached ASI xx: Detector ready
	Analogs	9	Mantissa (0/10 V) [1]
		10	Leak rate (logarithmic) [1]
		11	5 VDC - 750 mA max.
		12	Exponent (0/10 V)
Mass		1 - 2 - 3 - 4 - 13	-
Headset		8	Headset+ [2]
		15	Headset- [2]

1) By default: parameterizable by the customer

2) To enable the audio/headset output, it is necessary to issue a command RS-232 “=HPD” to the detector: this command will disable the loudspeaker. To disable the audio/headset output, it is necessary to issue a command RS-232 “=HPE” to the detector: this command will enable the loudspeaker.

13.2.2 Interface

See chapter “Connection interface”.

13.2.3 Save

See chapter “Saving/Loading of the detector parameters”.

A save of all the set I/O is automatically proposed at the menu exit if a parameter has been modified.

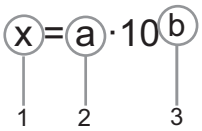
► Enter the file name and valid the save (“.IOP” file).

13.2.4 Setting

3 analog outputs (Analog Output)

9-gnd	1. Select the value to be allocated. [1] 2. Depending on the value, configure the low decade.
10-gnd	1. Select the value to be allocated. [1] 2. Depending on the value, configure the low decade.
12-gnd	Output allocated to ‘Exponent’

1) See table below



Leak rate formula

1 Leak rate
2 Mantissa
3 Exponent

The low decade is the decade corresponding with 0 V.

Value	Function
Mantissa	1/10 V [1]
Exponent	1/10 V [1]
Logarithmic	1/10 V [1]
He compound	0/10 V (compound exponent, mantissa) [1]

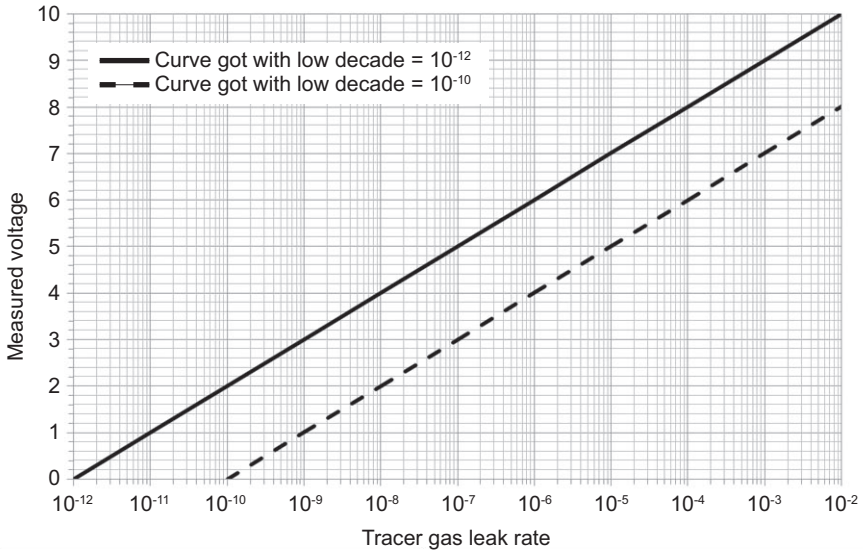
1) See chapter ‘Formulas'

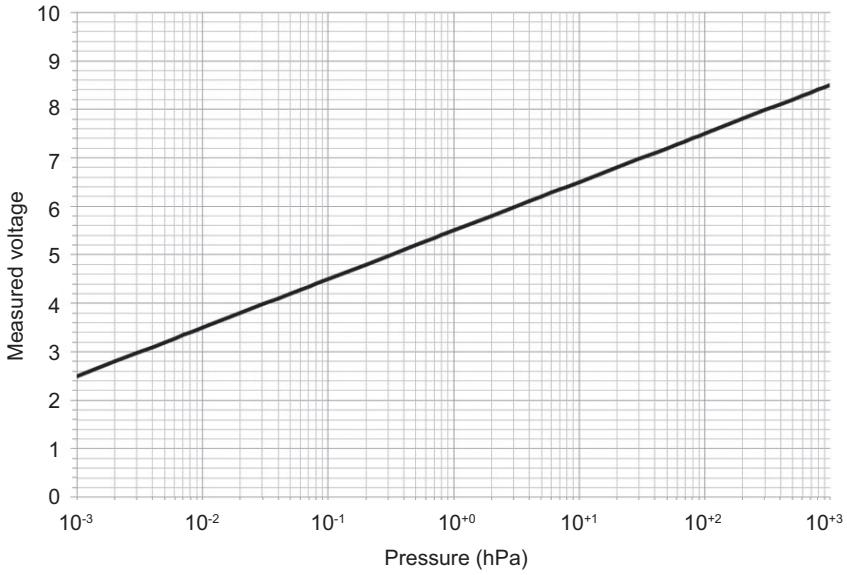
13.2.5 Formulas

Mantissa (1/10 V)	
The “Mantissa” output corresponds with the leak rate mantissa.	
Formula	U = Voltage measured (V) on analog output Mantissa = U
Examples	● U = 3.5 V -> Mantissa = 3.5 ● U = 6.9 V -> Mantissa = 6.9

Exponent (0/10 V)	
The “Exponent” output coresponds with the leak rate exponent. ● The Exponent increases by 1 V per decade. ● The starting decade corresponds withe 10 V.	
Formula	U = Voltage measured (V) on analog output D_0 = Low decade for 0 V Exponent = 10 - U + D_0
Examples	Example 1 Low decade at 10^{-12} (10 V = -12) -> D_0 = -12 ● U = 7 V -> Exposant = 10 - 7 - 12 -> Exposant = -9 ● U = 2 V -> Exposant = 10 - 2 - 12 -> Exposant = -4 Example 2 Low decade at 10^{-10} (10 V = -10) -> D_0 = -10 ● U = 7 V -> Exponent = 10 - 7 - 10 -> Exponent = -7 ● U = 2 V -> Exponent = 10 - 2 - 10 -> Exponent = -2

Logarithmic (0/10 V)	
The “Logarithmic” output corresponds with the leak rate value. ● The leak rate increases by 1 V per decade. ● The starting decade corresponds with 0 V.	
Formula	U = Voltage measured (V) on analog output D_0 = Low decade for 0 V Mantissa = $10^{(U - \text{Valeur entière (U)})}$ Exponent = Integer value (U) + D_0 Leak rate = Mantissa x 10^{Exposant}

Logarithmic (0/10 V)	
Examples	Example 1 Low decade at 10^{-12} (0 V = 1 · 10^{-12}) -> D_0 = -12 • V = 3.91 V -> Leak rate = $10^{(3,91 - 3)}$ x $10^{(3 - 12)}$ = 8.13 · 10^{-9} • V = 8.25 V -> Leak rate = $10^{(8,25 - 8)}$ x $10^{(8 - 12)}$ = 1.78 · 10^{-4} Example 2 Low decade at 10^{-10} (0 V = 1 · 10^{-10}) -> D_0 = -10 • V = 3.91 V -> Leak rate = $10^{(3,91 - 3)}$ x $10^{(3 - 10)}$ = 8.13 · 10^{-7} • V = 8.25 V -> Leak rate = $10^{(8,25 - 8)}$ x $10^{(8 - 10)}$ = 1.78 · 10^{-2}
Graph	

Inlet pressure	
The “Inlet Pressure” output corresponds with the inlet pressure source. The leak detector is equipped with an internal gauge (2.5 V/8.5 V).	
Formula	U = Voltage measured (V) on analog output Inlet pressure = $10^{(U -5,5)}$ hPa
Graph	

13.3 RS-232 Serial link

Refer to the Operating instructions of the RS-232 Serial link (see chapter “Applicable documents”).

13.3.1 Cable characteristics

Refer to the RS-232 serial link operating instructions (see chapter “Applicable documents”).

13.3.2 Interface

See chapter “Connection interface”.

13.3.3 Setting

From the "Settings" screen, press **[Advanced] [Input/Output]** then **[Serial Link 1]** or **[Serial Link 2]** .	
Type	Set the type of serial link 'Serial'. 1)
Parameter	Set the serial link mode. 1)
1) See detail below	

Type

Type	Set the 2 serial links (1) or (2) according to their use. 1)
1) See detail below	

Use	Possible allocation		Type to select
	Serial Link 1	Serial Link 1	
RS-232	Yes	No	Serial
Bluetooth transmitter for RC 500 WL remote 1)	Yes	No	Serial
RC 10 remote control 1)	Yes	No	Serial
ECB WiFi remote 1)	Yes	No	Serial
1) Accessory			

Parameters

From the "Settings" screen, press **[Advanced] [Input/Output] [Serial Link 1]** or **[Serial Link 2], [Parameters]**.	
Parameters	Set the serial link mode 1).
1) See detail below	

Modes list: according to leak detector model, some modes are not available.

Mode	Description
Basic	Continuous acquisition of data according to a defined time duration. At any time, a command can be sent to the leak detector. 5 V power supply available.
Spreadsheet	Variant on the Basic mode. Continuous data acquisition, formatted in a spreadsheet such as Excel Microsoft® Office or other similar software. 5 V power supply available.
Advanced	Full control of the detector by a supervisor The detector sends information at the supervisor's request. 5 V power supply available. **Recommended mode for automatic systems**.
Export Data	Export, via a PC, of "tickets" issued by the detector after: • Calibration with an internal/external calibrated leak, • Calibration control with an internal leak, • A test. 5 V power supply available. **Serial links 1 and 2 must not be in “Export Data” mode at the same time.**

Mode	Description
RC 500 WL	Use of a wireless remote control (model RC 500 WL). 5 V power supply available.
RC 500	Use of a wired remote control (model RC 500). 24 V power supply available
HLT 5xx	Protocol for compatibility with the HLT 5xx detector protocol. 5 V power supply available. List of orders for the protocol compatible. To refer to Operating instructions - RS-232 Serial link (see chapter “Applicable documents”).
HLT 2xx	Protocol for compatibility with the HLT 2xx.detector protocol. 5 V power supply available. List of orders for the protocol compatible. To refer to Operating instructions - RS-232 Serial link (see chapter “Applicable documents”).
Module Ext.	Full control of the detector by a supervisor. The detector sends information at the supervisor's request. 24 V power supply available **A 24 V power supply is required for using an external module (example: profibus).**

EC Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

Leak detector

ASM 310

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

Machinery 2006/42/EC (Annex II, no. 1 A)

Electromagnetic compatibility 2014/30/EU

Restriction of the use of certain hazardous substances 2011/65/EU

Waste of Electrical and Electronic Equipment 2012/19/EU

Harmonized standards and national standards and specifications which have been applied:

EN-61000-6-2: 2005

EN-61000-6-4: 2007

EN 60204-1: 2006

EN-50204: 1996

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