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PHOENIX Vario

Helium leak detector

Translation of the original operating instructions

Catalog Number 250002V02



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1 About these instructions

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

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

1.1 Target groups

1.2 Warnings



Hazardous situation potentially resulting in death or serious injuries



Hazardous situation potentially resulting in minor injuries

NOTICE

Risk for damage to property or the environment

2 Safety

2.1 Intended use

The device is a leak detector for detecting and measuring leaks in test objects. The device is suitable for leak testing as per the vacuum method and the sniffing method.

- · Operate the device only according to this instruction manual.
- · Comply with application limits, see "Technical Data".

Improper use

Avoid the following, non-intended uses:

- Use outside the technical specifications, see "Technical Data".
- · Test of wet or damp test objects
- Pumping down of explosive, aggressive, corrosive, flammable, toxic or reactive substances
- Pumping down of condensable fluids and vapors.
- · Pumping of gases contaminated with particles
- · Shock loads or vibrations
- · Using the device in potentially explosive atmospheres.
- · Scanning of mains power cables with a sniffing probe
- · Sudden ventilation of vacuum systems
- · Connect a test object that is not vacuum resistant
- Pumping out gases containing halogens such as fluorine or chlorine in high concentration or over a long period of time. Use with refrigerants or SF6.
- · Operation without exhaust pipe for devices with oil sealed backing pump

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

2.2 Owner requirements

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

Safety conscious operation

- Only use the device when it is technically in good order and condition.
- Only operate the device in accordance with this instruction manual, in a safety and risk conscious manner.
- · Adhere to the following regulations and observe their compliance:
 - Intended use
 - General applicable safety and accident prevention regulations
 - International, national and local standards and guidelines

- Additional device-related provisions and regulations
- Only use original parts or parts approved by the manufacturer.
- · Keep this instruction manual available on site.

Personnel qualifications

- Only instructed personnel should be permitted to work with and on the device. The instructed personnel must have received training on the device.
 - Make sure that authorized personnel have read and understood the operating instructions and all other applicable documents.

2.3 Operator responsibilities

- Read, observe and follow the information in these operating instructions and the working instructions created by the owner, especially the safety instructions and warnings.
- · Carry out any work only based on the complete operating instructions.
- If you have any questions regarding operation or maintenance that you cannot find answers to in this manual, please contact customer service.

2.4 Dangers

The measuring instrument was built according to the state-of-the-art and the recognized safety regulations. Nevertheless, improper use may result in risk to life and limb on the part of the user or third parties, or damage to the measuring instrument or other property may occur. Hazards due to liquids Liquids and chemical substances can damage the instrument. and chemicals Never try to find toxic, caustic, microbiological, explosive, radioactive or other harmful substances with the device. Dangers from electric There is a danger to life from the contact of conductive parts inside the device. power Disconnect the device from the power supply prior to any installation and maintenance work. Make sure that the electric power supply cannot reconnected without authorization. The device contains electric components that can be damaged from high electric voltage. Before connecting the device to the power supply, make sure that the supply voltage specified on the device is the same as the local power supply. Explosion hazard Hydrogen is a flammable and explosive gas. Use only tracer gases with a concentration of hydrogen that cannot explode in combination with oxygen. The allowable composition of venal gas mixtures can be read in the safety data sheets of the respective manufacturers.

| Risk of uncontrolled movements as a result | When operating the device in "vacuum" operation mode there will be a negative pres- sure created at the inlet flange. |
|--|--|
| of being frightened | If the inlet flange is not properly closed by a blank flange or connected to a test set, the vacuum pull on your hands or limbs could be alarming or frightening. |
| Injury from bursting ob- jects | There is risk of injury from bursting objects causes by a test object notwithstanding the vacuum pressure when a test object is connected. |

• Take appropriate precautions.

3 Description

3.1 Function

The device is a leak detector for detecting and measuring leaks in test objects. The device is suitable for leak testing using the vacuum method and the sniffer method.

- When using the vacuum method the test object is evacuated and subjected to Helium or forming gas from the outside. To do this it is necessary to establish a vacuum connection between the device and the test object.
- When using the sniffer method an over-pressure is established in the test object using Helium or a forming gas. The test object is then inspected on the outside using a sniffer probe.

3.2 Operation modes

3.2.1 Operation mode "Vacuum"

The inlet flange is located on the upper side of the device.

You can mount a suitable external calibration leak on the inlet flange and perform an external calibration, see also "External calibration [▶ 42]". Alternatively, you can perform an internal calibration, see also "Internal calibration [▶ 42]".

To be able to perform leak testing using the vacuum method the inlet flange must be connected to the desired specimen.

If the pressure in the specimen is less than the surrounding pressure, then Helium (which is sprayed over the specimen) can penetrate into the specimen if there is a leak. Helium can be detected in the leak detector using a mass spectrometer.

3.2.2 Operation mode "Sniffing"

To be able to inspect test objects under overpressure with a sniffer line you can connect the sniffer SL300.

The vacuum connection of the sniffer line SL300 is connected to the upper side of the device on the inlet flange.

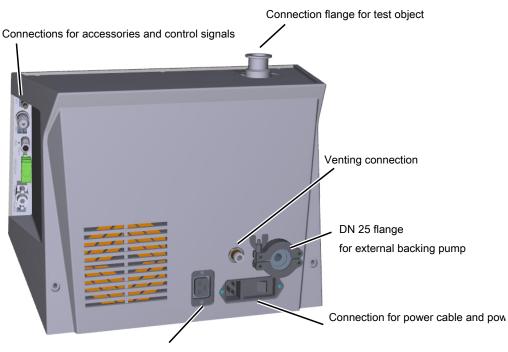
The electrical connection of the sniffer line SL300 is connected to the connector "AC-CESSORIES" on the rear of the device, see "Connections for accessories and control signals [▶ 17]".

3.3 Device setup

3.3.1 Overall device



Fig. 1: Front view



Power output for external backing pump

Fig. 2: Back view

3.3.2 Operating unit



Fig. 3: Control unit - front view

The control unit consists of a touchscreen and a control panel with the buttons START, STOP and ZERO (background suppression) on the housing.

See also "Assembly of the touchscreen [> 15]", see also "START button [> 12]".

The LED lighting of the buttons on the control panel changes its display color according to the device state, see also "Meaning of the button LEDs [▶ 13].

The remote control RC310 is optionally available, see also "Accessories and spare parts [▶ 65].

You can also operate the device using a notebooks or tablets, see also "Operate leak detector via web browser [▶ 72]".

See also

- B Updating the software [▶ 50]
- Measurement data [> 43]

3.3.2.1 START button

- To start the measurements.
- Can be operated via touchscreen or on the control panel (Hardware button).
- If you press the START button on the control panel again during measurement, the maximum leak rate (Q_{max}) that has occurred since START is displayed. See also "Assembly of the touchscreen [▶ 15]".
- If you press the START button on the control panel during measurement, the maximum leak rate display is updated.

| Function | Touchscreen | Control panel |
|---------------------------|------------------------------------|-------------------------------|
| Starting | START | START button |
| Display maximum leak rate | Cannot be operated via touchscreen | Press the START button again. |

3.3.2.2 STOP button

- To stop the measurements.
- Can be operated via the touchscreen of the control panel.
- Using the STOP button on the control panel you can do more than just stopping the measurements but also perform ventilation.

| Function | Touchscreen | Control panel |
|----------|-------------|--|
| Stop | STOP | STOP button |
| Vent | \geq | Press the STOP button again and keep it pressed for approx. 2 seconds. |

| Function | Touchscreen | Control panel |
|----------|-------------|--|
| | | (Prerequisite is the setting "ventilation mode" "man- ual", see Change vacuum settings [> 36] " ".) |

3.3.2.3 ZERO button

- To hide the "Background signal", see also "Definition of terms".
- Can be operated via the touchscreen of the control panel.
- Using the ZERO button you can switch ZERO on and off. For further details see "Set and use the function ZERO [▶ 38]".

| Function | Touchscreen | Control panel |
|----------------------------|--------------------|--|
| Background suppression ON | > 0€ | ZERO button |
| Background suppression OFF | € 0→ | Press the ZERO button again and keep it pressed for approx. 2 seconds. |

The actual measured leak rate is considered to be a background signal. Depending on the selected variant of operation mode the background signal is hidden until the display limit of the respective vacuum range is reached.

After pressing the ZERO button, background suppression is automatically adjusted to the course of the falling leak rate signal. As a result, the detection of leaks is possible even with slowly falling signal.

Display limits according to factory setting:

1×10⁻⁷ mbar l/s in GROSS

1×10⁻¹⁰ mbar I/s in FINE

1×10⁻¹² mbar l/s in ULTRA

To switch-off the function ZERO again, press the button ZERO for about 2 seconds.

The function ZERO should be activated only if the leak rate signal is stable and no leak is measured. See also "Set and use the function ZERO [▶ 38]".

See also

Change vacuum settings [> 36]

3.3.2.4 Meaning of the button LEDs

| START button LED | STOP button LED | Meaning |
|------------------|-----------------|-----------------------------------|
| Off | Flashing red | No connection to the control unit |

| START button LED | STOP button LED | Meaning |
|---|-----------------|--|
| Pulsing blue | Pulsing blue | Run-up |
| Off | Green | Standby vented (Vent valve open) |
| Off | Blue green | Standby pumped out (Vent valve close) |
| Pulsing green | Off | Pump down |
| Off | Flashing green | Internal calibration |
| Flashing green | Off | External calibration |
| Green | Off | Measuring |
| Yellow (warning, faulty measurement possible) | Off | Measuring with warning not ac- knowledged |
| Off | Red | Error |
| Red | Red | Service mode is activated |

| ZERO button LED | |
|-----------------|----------------------------|
| Off | No measurement operation |
| Off | ZERO blocked |
| Blue | ZERO OFF |
| Flashing blue | ZERO blocked by SMART-ZERO |
| Green | ZERO ON |
| Red | Service mode is activated |

3.3.2.5 Meaning of the status LED

The status LED is located on the back of the instrument inside of the connector block for the equipment and control signals, see also Connections for accessories and control signals [▶ 17].

| Status LED | Meaning |
|----------------|--------------------------------------|
| Flashing red | No communication with operating unit |
| Flashing blue | Run-up |
| Blue | Standby |
| Flashing green | Evacuate (pumping) |
| Flashing green | Calibrating |
| Green | Measuring |
| Yellow | Measuring with warning not acknowl- |
| | edged |
| Red | Error |

3.3.2.6 Assembly of the touchscreen

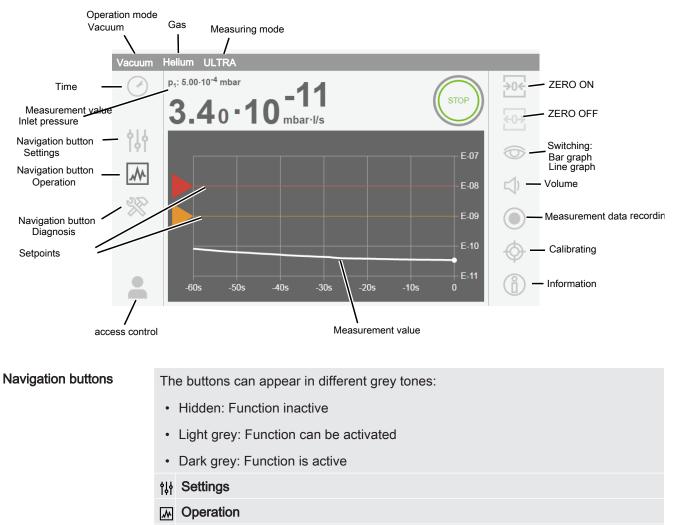
The display is a touchscreen.



The touchscreen responds to being touched lightly. To correctly select the chosen function, avoid strong pressure.

You can always see symbols for the navigation on the display.

Additionally, you can see, depending on the context, other symbols and elements.



🛞 Diagnosis

Table 1: Navigation buttons

Function buttons

The buttons can appear in two different grey tones:

- Light grey: Function can be activated
- Dark grey: Function is active
- General function symbols

| \bigotimes | Cancel | ongoing | function |
|--------------|--------|---------|----------|
| <u>v</u> y | ounoor | ongoing | ranotion |

Confirm entry or selection

<u>↑</u> Load

.**↓** Save

🗹 Edit

Delete

Table 2: Function buttons

Other symbols

Authorization "User"

- Authorization "Operator"
- Authorization "Supervisor"
- ✓ View the time or set the time

See also "Overview of Rights Groups [▶ 26]".

3.3.3 Vacuum connections

3.3.3.1 Inlet

The inlet is located on the upper part of the device. This is a DN 25 KF flange.

If you select the vacuum leak test mode, connect the test object or the vacuum chamber onto the flange.

If you are testing applications where dust or dirt is accumulating, use the O-ring with filter. In this case, the pump down times are extended.

Use the inlet for connecting the sniffer line SL300, too.

3.3.3.2 Connection for venting / purging

At the back side of the device there is the connection for venting or purging, see also Overall device [▶ 10].

Vent Normally, the specimens are ventilated with ambient air after completion of the test. If necessary, the test specimens can be ventilated with a different gas (e.g., fresh air, dry air, nitrogen, etc.) to a maximum of 1050 mbar pressure.

Purge To purge use a Helium free gas at atmospheric pressure. The surrounding air may be contaminated with traces of Helium due to spraying or filling up large containers. In such cases connect a gas supply line (this means Nitrogen or fresh air or similar) over the purge gas connection. The pressure of the gas line should not be more than 1050 mbar.

3.3.4 Connections for accessories and control signals

NOTICE

The electronics of the device can be destroyed.

► Only connect devices which are provided for the appropriate interfaces.

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



Fig. 4: Connections for accessories and control signals at the back side of the device.

| REMOTE1 | For connecting the remote control RC310C via cable, maxi- mum length 28 m, or for direct connection of the radio trans- mitter via an adapter. The remote control is not part of the scope of delivery of the device. |
|----------------|--|
| REMOTE2 | Enables the connection via radio transmitter for the radio control via a special adapter. |
| ACCESSORIES | Electrical connection for sniffer line SL300 or partial flow system. |
| STATUS | To display the status of the device, see also "Meaning of the status LED [▶ 14]". |
| HDMI | For connection to the HDMI interface of a touch monitor, maximum cable length 3 m. |
| ● ← | 2 USB connections. To transfer data and to perform updates with an USB stick (FAT32-formatted). To connect a touch monitor via USB cable. |
| LD | Connection for bus module or I/O module, maximum line length 10 m |
| 뭉 | Network interface, maximum length 3 m |

3.3.5 Markings on the device



Device cannot be scrapped with the normal domestic waste.

3.4 Technical data

Mechanical data

| Catalog number 250002V02 | PHOENIX Vario |
|--------------------------------------|--------------------------|
| Dimensions (L \times W \times H) | 486 mm x 313 mm x 380 mm |
| Weight | 25 kg |
| Inlet flange test object | DN 25 KF |
| Inlet flange prevacuum | DN 25 KF |

Electrical data

| Catalog number 250002V02 | PHOENIX Vario |
|--|--|
| Main fuse | Circuit Breaker TA45 20A thermal fuse |
| Max. power | 350 VA without mains output for externalbacking pump3230 VA max. |
| Power output for external backing pump | Voltage: Mains input Max. (load) current: 12 A Max. permitted leakage current in failure mode: 2.5 mA |
| Supply voltage EU | - |
| Supply voltage US | - |
| Supply voltage JP | - |
| Supply voltage multi-range power unit | 100 - 240 V, 50 / 60 Hz |
| Ingress protection | IP 40 |
| Excess voltage category | II |
| Electronic interfaces | REMOTE1, REMOTE2, ACCESSORIES, HDMI, USB, LD, Ethernet |

Physical data

| Catalog number 250002V02 | PHOENIX Vario |
|--|------------------------------|
| Minimum detectable helium leak rate vac- | 5·10 ⁻¹² mbar l/s |
| uum mode | |

| Catalog number 250002V02 | PHOENIX Vario | |
|---|--|--|
| Response time | < 1 s | |
| Maximum inlet pressure | 15 mbar | |
| Helium pumping speed ULTRA | >3.1 l/s | |
| Detectable masses | ⁴ He, H ₂ , mass 3 | |
| Minimum detectable helium leak rate snif- fer mode | 1·10 ⁻⁸ mbar l/s | |
| Gas flow through sniffer line SL300 | 20 - 25 sccm | |
| Measurement range | 12 decades | |
| Run-up time | 110 s | |
| Ion source | 2 long lasting iridium cathodes | |

Ambient conditions

| Catalog number 250002V02 | PHOENIX Vario | |
|-------------------------------|---|--|
| Max. altitude above sea level | 2000 m | |
| Maximum relative humidity | 80% at $30^\circ\text{C},$ linear decreasing to 50% at 40°C | |
| Storage temperature | - 10°C to +60°C | |
| Operating temperature | + 10 °C + 40 °C | |
| Pollution degree | 2 | |

4 Installation

4.1 Setup



Health risk due to exhaust fumes and vapors

If you establish a connection between your leak detector and an external oil sealed backing pump, dangerous combustion products can arise at the backing pump.

Connect an exhaust pipe at the exhaust of the backing pump in such cases.



Danger from moisture and electricity

Moisture entering the device can lead to personal injury due to electric shocks as well as damage to property due to short circuiting.

- Only operate the device in dry environments and only in buildings.
- Operate the device away from sources of liquid and moisture.
- Place the device where you can always reach the mains plug.
- Do not operate the device standing water and do not let even a drop of water or other liquids on the device.
- Prevent the device from coming into contact with bases, acids and solvents.

NOTICE

Material damage from overheated device

The device heats up during operation and can overheat without sufficient ventilation.

- Please note the technical specifications.
- Ensure sufficient ventilation, especially on the ventilation slots on the left and right of the device: There should be free space in the front, to the rear and sides of the unit of at least 10 cm.
- ► Keep heat sources away from the device.

NOTICE

Operating system can be attacked via USB or Ethernet

The Linux operating system used in the leak detector is not updated automatically and can therefore contain security gaps. This vulnerability may be exploited through the Ethernet and USB interfaces of the leak detector to provide unauthorized access to the system.

- Ensure that no unauthorized person has access to these interfaces, for example through a USB port / Ethernet port lock.
- In order not to jeopardize the security of your company network, never connect the leak detector directly to the public Internet. This is true for connections over WLAN as well as over Ethernet.
- However, if you want to access the web interface of the leak detector remotely, we recommend an encrypted Virtual Private Network (VPN) connection. However, we cannot assume any guarantee for the security of VPN connections, which are provided by third parties.



Prevention of measurement errors due to leaks in the Helium source in the device surroundings

We recommend that you regularly check around the device to a distance of 10 m all large Helium sources for gross leaks. Use a sniffer line to do this.

4.2 Connecting the leak detector to the power supply system



Danger from electric shock

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

- Only use the included 3-wire power cable.
- Make sure that the mains plug is always accessible.

NOTICE

Damage through wrong power supply

 Only connect the device to the power supply when the tension shown on the type plate corresponds to the one of your power supply connection.

The power entry connector is located at the rear side of the device, see Overall device [▶ 10].

4.3 Connecting the backing pump



Selection of the backing pump

The device can only switch to the more sensitive measuring modes FINE and ULTRA if the pressure generated in the test object by the backing pump is < 2 mbar.

► Only use a backing pump that generates a pressure < 2 mbar.



Easier usage by using the integrated power output

If you use the power output on the back of the device to supply the external backing pump, the power switch for the leak detector also controls the power of the external backing pump, turning both on or off. In that case ensure the maximum line length of 2.5 m, a wire gauge of at least AWG14 (1,5 mm²) and the compliance with the UL standard.

For example, you can connect Leybold backing pumps as follows:

- SCROLLVAC SC5D, SC15D, SC30D (EU and US/JP)
- TRIVAC D4B,D8B (EU and US/JP)
- TRIVAC D16B,D25B (EU)
- SOGEVAC SV16D, SV28BI (EU and US/JP)
- SOGEVAC SV40BIFC (EU)

✓ You have an external backing pump.

- \checkmark You have a vacuum connection DN 25 KF for connecting the PHOENIX Vario.
 - Assemble the vacuum connection between your backing pump and the flange connection on the back of PHOENIX Vario.
 - **2** To ensure the electricity supply, connect your backing pump either with an external socket or with the power output socket on the back of the leak detector.

⇒ Please note the dimensioning of the power output socket for max. 12.5 A. The mains voltage of the backing pump must correspond to the mains voltage of the device.

See also

Setup backing pump [> 26]

4.4 Check the Operation of the Device

NOTICE

Damage to the turbo molecular pump due to jerking movements

Jerking movements can damage the running turbo molecular pump.

Avoid any jerking movements or vibrations to the instrument during operation and for up to 1 minute after switching off.

Do not switch on the device when the ambient temperature is less than 10 °C.

- ✓ A DN 25 KF blank flange is available (if not already installed on the inlet flange on top of the device).
- ✓ A vacuum connection between leak detector and backing pump has been established. See also Connecting the backing pump [▶ 22].
- ✓ A helium calibration leak is available (optional).
 - 1 Check if the inlet on top of the device is blank flanged If this is not so, flange a blank flange with an O-ring gasket on the inlet on the upper side of the device.
 - 2 Make sure the power supply of both devices has been established. If you use the power output socket on the back of the leak detector, note the dimensioning of the power output socket for max. 12.5 A.
 - 3 Switch on both devices.
 - After switching on pieces of status information are shown on the touchscreen about the speed of the turbo molecular pump, the pre-vacuum pressure, the emission and the active cathode. The start process takes about 3 minutes and is completed with a short acoustic signal. Now, the device is in "Standby" mode.
 - 4 Press the START button.
 - The inlet is evacuated and then the measuring mode for the measured leak rate is shown.
 In case a test object was connected, you would start with spraying helium on

the outside.

- In case you would like to suppress any possible existing background signals (Helium background in the test object) press the ZERO button.
 In order to reverse the background suppression press the ZERO button on the control panel for 2 3 seconds, see "ZERO button [▶ 13]".
- 6 Press the STOP button.
 - \Rightarrow The device switches to the mode "Standby".
 - If you press the STOP button on the control panel for a few seconds the inlet of the device is ventilated.
- 7 If you want to end the test now you can switch off the device.
- *8* If you want to check the internal calibration wait, for getting a better quality of measurement results, 15 to 20 minutes until the device has warmed up.
- **9** To call the calibration menu press on the cross hair icon •.
- 10 Select "Internal".
- 11 Press the button.
 - ⇒ The automatic internal calibration starts and requires approx. 30 seconds.
- 12 If you want to check the measurement accuracy of the device using the optional Helium calibration leak remove the blank flange from the inlet and connect an open Helium calibration leak onto the inlet.
- 13 Press the START button.
 - ⇒ The inlet is evacuated and the leak rate of the test object is measured and displayed.
- *14* Press the STOP button to interrupt the measurement.
 - ⇒ The leak detector changes into the Standby mode.
- **15** Press the STOP button on the housing until the message STANDBY / VENTED appears on the display.
 - \Rightarrow The inlet is now in the vented state.
- *16* Separate the Helium calibration leak from the inlet and flange the inlet blank again.
- 17 Switch off the device via the mains switch.

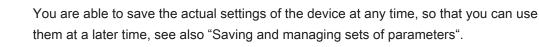
5 Operation

5.1 Switch ON

- ► To switch on the device, press the power button.
 - ⇒ When delivered the device shows the screen "Standby" after run-up.

| Vacu | Jum H | lelium | | | |
|----------|-----------|------------------------|-------|---------------|-----------------------------|
| | | STANDBY | | | |
| | | | PURGE | | \rightarrow \rightarrow |
| Fig. 5: | Window | [,] "Standby" | | | |
| g. J. | * *IIIGOW | Otanoby | | | |
| START | Startin | ig the measuremen | t | Ф | Calibrating |
| \equiv | Purgin | ıg/gas ballast | | \rightarrow | Vent |

5.2 Basic settings



5.2.1 Setting date, time and time zone

- ✓ Supervisor rights
 - 1 || > Setup > General > Date and time
 - 2 Set up.
 - *3* Save <u>↓</u>.

Alternatively, press \bigcirc in the upper window bar and make your settings.

5.2.2 Setup backing pump

To achieve the correct leak rate display in the vacuum ranges GROSS and FINE, fill in the information concerning the backing pump.

- ✓ ▲ Supervisor rights
 - 1 || > Setup > Backing pump
 - *2* Concerning the backing pump, make your choice between "Dry" and "Wet". If you use an oil sealed backing pump, fill in "Wet".
 - **\boldsymbol{\beta}** Concerning the "Pumping speed", fill in the m³/h (integer number).
 - **4** Save <u>↓</u>.

5.2.3 User profile settings

| | 5.2.3.1 | Overview of Rights Groups |
|------------|---------|--|
| | | The rights of auser depend upon which group he belongs to. |
| User | | Members of the group 스 User can |
| | | perform measurements, |
| | | view history of the measurement results, |
| | | view device information, |
| | | view error logs. |
| Operator | | Members of the group Operator have all the rights of the group User. Moreover, they can |
| | | create / modify / delete users, |
| | | export / delete measurement data, |
| | | modify measurement settings, |
| Supervisor | | Members of the group Supervisor have all the rights of groups User and Operator . Moreover, they can |
| | | create / modify / delete operators, |
| | | create / modify / delete supervisors, |
| | | Perform software updates, |
| | | modify date / time. |
| | 5.2.3.2 | Select, modify, create user profile |
| | | ✓ 🎴 La Operator or Supervisor rights |
| | | 1 ∮ļ∮ > Users |

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

2 You have the following possibilities:

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

 \Rightarrow The "User profile" window opens.

Otherwise, press an already created user name and choose from the tool bar:

①, to load a user profile.

 \Rightarrow The login window opens.

- 了, to modify a user profile.
 - \Rightarrow The "User profile" window opens.

⑦, to delete a user profile .

- \Rightarrow A confirmation screen appears.
- *3* After selecting some tools, the "User profile" window opens. If this window opens, enter a user name, change it, or keep it as required.

| | User profile | | | |
|--------------|--------------|---------|--------|---|
| \bigcirc | Name | Mueller | | |
| | PIN | | | |
| ٩١٩ | Group | < | User | > |
| \mathbb{M} | Language | < | German | > |
| R | | | | |
| | | | | |
| | | | | |

- 4 If the "PIN" field is not filled in or you want to change the content, enter a 4-digit PIN.
- 5 To assign the required rights to the user, select a group. Via < and > select between the groups User, Operator and Supervisor. See "Overview of Rights Groups [▶ 26]".
- 6 In the field "Language" assign a language to the user via \langle and \rangle .
- 7 Save ↓.

5.2.3.3 Modify Personal Settings

As a user with limited rights (**User**) you can also modify your language or PIN. By this the associated user profile is correspondingly adapted. Access to the entire user profile is not necessary.

- *1* Press on your name which appears on the top left of the display.
 - ⇒ The window "User accounts" opens.
- 2 Select the "Change own PIN" or "Change own language" button as required.

5.2.4 Switch off Automatic Login

Factory setting

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

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

In the login window, all users can login, which have been already registered in the device, see "Select, modify, create user profile [> 26]".

- ✓ Supervisor rights
 - 1 || > User accounts > Manage Auto Login
 - 2 In the "Manage Automatic Login" window, deactivate the option "Active".
 - 3 Save ↓.
- ⇒ After restarting the device, the current settings are applied.

5.2.5 Switch on Automatic Login

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

- ✓ ▲ Supervisor rights
- ✓ The requested user was already created. See "Select, modify, create user profile [▶ 26]".
 - 1 ||| > User accounts > Manage Auto Login
 - 2 Enter the name of the user in the "Name" field. Note the uppercase / lowercase.
 - 3 Enter the current PIN of the user profile in the "PIN" field.
 - 4 In the window "Manage Automatic Login", activate the option "Active".
 - 5 Save ↓.

5.2.6 Presentation of the measurement screen



To switch between the different diagram presentation press ☺ on the measurement screen, see "Assembly of the touchscreen [▶ 15]".

You can select between the following presentations:

- Line graph
- Bar graph

You can further configure the different diagram presentations. See "Changing the presentation of the line graph [▶ 29]" and "Changing the presentation of the bar graph [▶ 30]".

5.2.6.1 Changing the presentation of the line graph

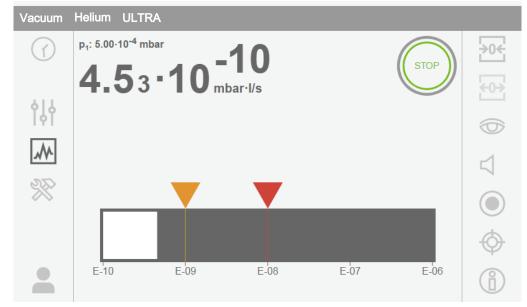


Fig. 6: Presentation of the line graph

Operator or Supervisor rights

- 1 ||| > Display > Line graph
- 2 In the field "Scaling" select between "Linear" and "Logarithmic".
- 3 Select between the different viewable "Decades".
- **4** To dynamically adjust the upper and lower limit on the leak rate, activate the option "Autoscale".
- 5 In the field "Time axis" select the length of the time axis "30", "60", "90", "120" or "240" seconds.
- *6* If the option "Autoscale" is not active, select "Lower diagram limit" in the field the desired decade.

7 Save 🕹.



5.2.6.2 Changing the presentation of the bar graph

Fig. 7: Presentation as bar graph

✓ ▲ Operator or Supervisor rights

- 1 || > Display > Bar graph
- 2 In the field "Scaling" select between "Linear" and "Logarithmic".
- 3 Select between the different viewable "Decades".
- **4** To dynamically adjust the upper and lower limit on the leak rate, activate the option "Autoscale".
- *5* If the option "Autoscale" is not active, select "Lower diagram limit" in the field the desired decade.
- 6 Save ↓.

5.2.6.3 Change general display settings

- - 1 ||| > Display > General
 - 2 If very small leak rates are of no interest to your application and you want to raise the lower leak rate limit, select between 1 to 6 decades in the "Raise lower leak rate limit". Raising the lower leak rate limit can facilitate the assessment of the leak rate display.
 - 3 To set whether to display the internal background leak rate in the "Standby" window, enable or disable the "Show background at standby" option.The internal background is created from the remaining gas, which has not yet

been pumped out. Very clean systems show a background in the range of 1 x 10^{-11} mbar l/s. Under normal conditions there is a background of 1 x 10^{-10} mbar l/s or 1×10^{-9} mbar l/s.

4 Save ↓.

5.2.7 Change units

For the vacuum operation mode you can select between "Torr·l/s", "atm·cc/s", "Pa·m³/s", and "mbar·l/s".

After switching the operation mode "Sniffer" in addition to the modes mentioned above you can also select between the units "oz/yr", "g/a" and "ppm".

You can also choose between the following pressure units: "mbar", "Pa", "atm" and "Torr".

- - 1 ||| > Setup > General > Units
 - *2* If necessary change the units of the "Leak rate unit vacuum", the "Leak rate unit sniff" and the "Pressure unit".
 - ⇒ The option "Equal to display " is activated according to the factory settings so that the units for the interface can be shown exactly as the units of the device.
 - 3 In order to independently select the units of the interface deactivate the option "Equal to display.
 - \Rightarrow Further fields to set the units of the interface are shown.
 - **4** To order to set the selected units so that they can also be used for the interface, activate the option "Equal to display".
 - 5 Save <u>↓</u>.

5.2.8 Change audio settings

In addition to the visual display of the measurement results you can change the settings to the volume, to the Notification beep and to the audio alarm.



Damage to the hearing due to loud audio

The alarm level of the device can exceed 85 dB(A).

- Adjust the volume accordingly.
- Only expose yourself a short time to the alarm.
- Use hearing protection.
- ✓ △ △ Operator or Supervisor rights

- 1 🙀 > Audio
- 2 In order to change the volume of the audio alarm and the notification sounds, select the desired "Volume". Do not fall below the set value for the "Minimum volume" in the next field
 - ⇒ Setting range: 0 ... 15
 - \Rightarrow You can listen to the set volume using the "Test" button.
- 3 If necessary, change the minimum volume.
 - The "Minimum volume" is the volume for the audible alarm which cannot be undershot. If you select a value greater than 0, the lowest volume level is shown on the measurement screen after pressing the volume icon. This allows you to prevent a non-authorized person from setting a value that is below the ambient noise level.
 - ⇒ Setting range: 0 ... 15
- 4 If you want to define the cause of an alarm or the type of notification beep more accurately, then make your selection with the "Audio alarm mode" between "Leak rate proportional", "PINPOINT", "SETPOINT", "TRIGGER" and "Off".
 - ⇒ "Leak rate proportional": The frequency of the audible signal is proportional to the bar graph display or diagram height. The frequency range is 300 Hz to 3300 Hz.
 - ▷ "PINPOINT": The sound of the acoustic signal changes its frequency within a specific range of leak rates. This range extends from a decade below the selected setpoint value to a decade above. Below this leak rate range, the sound is constantly low, above the sound is constantly high.
 - ⇒ "SETPOINT": The pitch is proportional to the leak rate. The signal sounds if the leak rate exceeds the set setpoint 1. See also "Setting setpoints [▶ 35]".
 - ⇒ "TRIGGER": If the set setpoint 1 is exceeded, then a two-pitch signal is issued. See also "Setting setpoints [▶ 35]".
- 5 If you want to suppress the alarm for some time after pressing the START button, then set "Audio alarm delay". For example: Time period during the pump down of a test chamber system.
 - After pressing the START button the audible signal is activated as soon as the leak rate falls below the setpoint value 1 or the alarm delay time expires. This setting is only for the audible alarm type "Setpoint" and "TRIGGER".
- 6 If you wish to have notification beeps, activate the option "Notification beep".
- 7 Save ↓.

5.2.9 Change the protection settings

You can protect the device from Helium contamination with gross leaks and from the penetration of particles. Furthermore, you can change the maximum evacuation time.

- ✓ Supervisor rights
 - 1 || > Setup > Measurement > Protection
 - *2* If you want to switch-on the gross leak protection, activate the option "Gross leak protection" and set under "Gross leak protection limit" a shut-down threshold.
 - ⇒ The device closes the inlet valve as soon as the measured leak rate exceeds the shut-down threshold. This will prevent an excess amount of helium from entering the mass spectrometer. Consequently, the leak detection unit is prevented from becoming contaminated by Helium. The helium entering the specimen can be pumped out using an external pump. If no external pump is being used, we recommend that the test object is vented before continuing with the measurement.
 - *3* If you want to prevent particles from being sucked into the device make sure that the test object is first pumped down with another parallel running pump. Activate the option "Particle protection" additionally.
 - ⇒ The leak detector only starts with the pump down once the inlet pressure has fallen below 1 mbar.
 - **4** To change the maximum evacuation time after a gross leak is detected, enter the desired time in seconds under "Max. evacuation time gross leak".
 - This setting determines when a gross leak warning message is signaled. The factory setting is 600 s. If the inlet pressure drops below 100 mbar within this time span, a fault message is signaled. This menu point is especially useful with series tests that always have the same test conditions.

After pressing the START button the specimen is evacuated. If the corresponding pressure conditions (p1 < 100 mbar) is not reached within the time that is to be set here or falls below, the pump down process is aborted and a warning message appears in the display.

The time that is to be selected depends on the one hand on the desired reaction time for the gross leak message and on the other hand on the volume of the test object and from the affect of the pumping speed.

If the pump down process should not be aborted enter "0". This corresponds to the entry "infinitely".

- 5 To change the maximum evacuation time before the measurement, enter the desired time in seconds under "Max. evacuation time until measurement". The "evacuation time until measurement" is about the time until the first approved measuring range is reached. The factory setting is 1800 s.
 - If the anticipated pressure conditions are not reached during the evacuation time, a warning message is shown after the expiration of the evacuation time.
 For the pressure conditions, see also the following setting options:

ጰጰ > Setup > Measurement > Pressure limits and

6 Save ↓.

See also

Change vacuum settings [> 36]

5.2.10 Activate or deactivate maintenance requests

Enables or disables warnings when the time for maintenance is exceeded. The time until the next maintenance is displayed.

✓ Supervisor - rights

- 1 ||| > Setup > Maintenance requests
 - ⇒ In the "Enable/disable maintenance requests" window, you can activate or deactivate the maintenance requests for the following modules:
 - Calibration leak
 - TMP
 - Filter sniffer tip
 - backing pump
 - Exhaust filter
 - Air filter
- 2 Set up.
- 3 Save ↓.

5.2.11 Modify Other Settings

- You can set whether you need to be notified for calibrations or not. The factory setting is "OFF".
- Furthermore, you can, for safety reasons for example, set whether the device is only to be operated via the touchscreen and not via the buttons on the control panel or via the remote control. The factory settings for the "Local operation" is activated and allows all operating possibilities.

- 1 ||| > Setup > Measurement > Miscellaneous
- *2* If you want to switch-on the calibration request, activate the option "Calibration request".
 - ⇒ If this option is switched-on there is a corresponding message 30 minutes after switched-on or when the temperature of the device has changed by more than 5 °C since the last calibration.

- *3* If you want set whether the device is only to be operated via the touchscreen deactivate the option "Local control".
 - ⇒ The buttons START, STOP and ZERO are then blocked in the control panel. The buttons of the remote control can also not be used.
- 4 Save <u>↓</u>.

5.3 Settings for the measurements

5.3.1 Select operation mode

- - 1 || > Operating mode
 - 2 Select between "Vacuum" and "sniffing / SL300".
 - *3* Save ↓.

5.3.2 Select gas



Danger from a Hydrogen explosion

Hydrogen can explode in combination with oxygen. The allowable composition of venal gas mixtures can be read in the safety data sheets of the respective manufacturers.

- ► Ensure that the share of hydrogen does not exceed the described concentration.
- ✓ Supervisor rights
 - 1 **\|** > Setup > Measurement > Mass
 - Make a selection from: "Hydrogen" H₂ (2 amu) "Helium" ⁴He (4 amu) "Mass 3" ³He (3 amu)
 - 3 Save ↓.

5.3.3 Setting setpoints

You can set the leak rate for the setpoint to 1, 2, 3 and 4 separately.

When the setpoints are exceeded:

• If the setpoint 1 or 2 is exceeded, the measurement line in the measurement window changes color. • The setpoint relay of the digital output switches, see also "I/O module [▶ 67]" or the interface description.

Also setpoint 1 defines the trigger point for the different alarms, see also "Change audio settings [▶ 31]". It is also the limit for SMART, see "Set and use the function ZERO [▶ 38]".

- - 1 || > Setpoints
 - *2* Set up.
 - 3 Save ↓.

5.3.4 Change vacuum settings

| Vacuum ranges | You can activate the vacuum ranges GROSS, FINE and ULTRA for your measure- ments.activate for measurementactivate for measurementVacuum rangesVacuum ranges | | | |
|-------------------|---|--|--|--|
| | All 3 areas can be activated at the same time. If several areas are activated, they switch automatically depending on the inlet pressure. In this way different sensitivities can be measured with. | | | |
| | At least one range must be activated. | | | |
| | ✓ 🗳 🛓 Operator or Supervisor rights | | | |
| | 1 የ ↓ † > Setup > Measurement > Vacuum | | | |
| | 2 Activate the desired vacuum range under "Vacuum range". | | | |
| | <i>3</i> Save <u>↓</u> . | | | |
| Vent | Under "Vent mode" you have the choice between "Immediate", "No ventilation" and "Manual". If "Immediate" is activated, the ventilation is triggered when changing to Standby. If "manually" is activated the ventilation is only triggered after a prolonged pressure on the button STOP or by pressing at \rightarrow in the window "Standby". | | | |
| | ✓ 🗳 🙅 Operator or Supervisor rights | | | |
| | 1 \ ↓ > Setup > Measurement > Vacuum | | | |
| | 2 Set up. | | | |
| | <i>3</i> Save <u>↓</u> . | | | |
| Purge/Gas ballast | You can automatically purge the backing pump for 20 seconds when you change to "Standby". | | | |
| | ✓ 🎴 单 Operator or Supervisor rights | | | |
| | 1 행하 > Setup > Measurement > Vacuum | | | |
| | 2 If necessary activate or deactivate the option "Automatic purge". | | | |

- ⇒ If you switch off the automatic purging you can switch on or off the purging by pressing <u>→</u>.
- *3* Save ↓.

5.3.5 Setting the machine factor

If you are measuring in the operation mode "Vacuum" and using an external pump in parallel, the measured leak rate would be too small in comparison to the leak rate based on an internal calibration.

If you would like to compensate for this you can multiply the measured leak rate with the suitable machine factor and then have the value shown. This factor is used only in the vacuum mode and not in the sniffing mode.

When taking into consideration the Helium pumping speed of the device, the machine factor can also be estimated. The measurement of the leak rate is more accurate using an external calibration leak with the test object - once with the external pump switched and once without. The machine factor then results from the quotient of the calculated calibration factors.

The machine factor can also be used to correct the leak rate display with respect to the air equivalence. The machine factor for this correction is 0.37.



Using Quicktest QT100

If you are measuring in the operation mode "Sniff" and have a Quicktest QT100 connected to the inlet, the measured leak rates would be too small compared to leak rates based on internal calibration. For the Quicktest QT100 a machine factor of approx. 400 has to be set.

To obtain accurate results based on internal calibration, it is necessary to compare this factor with an external calibration leak. For this, calibrate both with an external and the internal calibration leak and note the determined calibration factors in each case.

Correct the machine factor using the following formula:

New machine factor = (old machine factor) * (External calibration factor) / (Internal calibration factor)

Calibrate again after adjusting the machine factor!

Further information can be found in the operating instructions for the QUICKTEST QT100.

Operator or Supervisor rights

- 1 || > Setup > Measurement > Calibration leak
 - ⇒ The field "Machine factor helium" is shown.
- 2 Set up.

3 Save <u>↓</u>.

5.3.6 Set external calibration leak

To use an external calibration leak for calibration, enter the leak rate of the calibration leak.

✓ △ △ Operator or Supervisor rights

- 1 |||| > Setup > Measurement > Calibration leak
- *2* Adopt the printed value and the associated unit from the calibration leak or certificate.

Do not change the combination of the printed value and associated unit, even if your device is otherwise set to other units!

3 Save <u>↓</u>.

See also

External calibration [> 42]

5.3.7 Change pressure limits

Pressure limits for the vacuum mode.

With this function the factory-set switching points between the vacuum ranges GROSS, FINE and ULTRA can be changed. This can be necessary if the device is pumped down with gases other than air. The pressure signal of the gas type inlet pressure gage (Pirani) can then deliver the corresponding switching values of the sequence flow of the device. By changing the preset switching point this can be compensated for.GROSSGROSSVacuum rangesVacuum rangesFINEFINEVacuum ranges-Vacuum rangesULTRAULTRAVacuum rangesVacuum rangesChange pressure limitsChange pressure limitsVacuum rangesVacuum ranges

- Supervisor rights
 - 1 || > Setup > Measurement > Pressure limits
 - ⇒ You can change the named pressure limits. Preset values see "Factory settings". GROSS -> FINE
 - FINE -> ULTRA
 - 2 Set up.
 - 3 Save ↓.

5.3.8 Set and use the function ZERO

 Why should I use
 To be able to clearly measure small leakages the function ZERO should be used.

 ZERO?
 To be able to clearly measure small leakages the function ZERO should be used.

With each leak testing there is a "Background signal" (see "Definition of terms") that disrupts the search or the measurement of leakages.

- To hide the background signal, activate the function ZERO.
- You can also use ZERO to hide a currently displayed leakage, which interferes with searches for other or even smaller leaks.



A currently displayed leak is hidden through ZERO.

By using the function ZERO not only is the background signal hidden, but also the representation of a current leak.

Only activate the ZERO function, if a leak is not measured at the same time. The ZERO function should be activated before the tracer gas is used.

Activate or deactivate ZERO is activated by factory settings. **ZERO** ✓ **Supervisor** - rights 1 1 1 Setup > Measurement > ZERO and filter 2 If necessary change "ZERO mode". The factory settings is "SMART". ⇒ Effect of SMART: The ZERO function remains blocked until the background decreases sufficiently slowly so that a leak the size of setpoint 1 can be measured. As soon as the function ZERO is unblocked it is shown in the status display by "Stable". ⇒ Effect of ZERO: When you press the ZERO button, the current leak rate value is set to the lower display limit. Note: The ZERO button should not be pressed when there is a rapidly falling background, otherwise, when compared to the background change, small leak rate signals may be incorrectly hidden. ➡ Effect of ZERO with ULTRA: The setting automatically activates the ZERO function "ZERO", as soon as the ULTRA measurement range is reached the first time after pressing the START button and the leak rate has been fallen below setpoint 3. ⇒ If you select"OFF", the ZERO button does not work. 3 Save ↓. ⇒ If ZERO is activated, start the function by pressing the ZERO button. See also "ZERO button [▶ 13]". How do I switch on the Briefly press the ZERO button on the control panel or the touchscreen, Through it selected ZERO functhe current leak rate value is set to the lower display limit. tion? How do I switch off the Press the ZERO button on the control panel for more than 2 seconds or on the touch-**ZERO** function? screen +++.

Procedure

5.3.9 Change leak rate filter

The leak rate filter "AUTO" is preset. AUTO ensures that the averaging time is optimally adapted to the leak rate range.

Signals are averaged in optimized time intervals, based on the respective leak rate range. In addition, disturbance peaks are eliminated, which are unrelated to the leak rate signals and provides unusually short response times even with low leakage rate signals. The algorithm used offers excellent sensitivity and response time.

With the leak rate filter "Fixed" there is also a filter with a fixed time constant available.

✓ ▲ Supervisor - rights

- 1 Yes Setup > Measurement > ZERO and filter
- 2 Make a selection between "AUTO" and "Fixed" under "Leakage rate filter".
- *3* Save ↓.

5.3.10 Change background suppression

The measurement system of the leak detector contains a residual amount of helium and hydrogen even without connection to a test chamber. This creates an internal measurement signal component already before pressing the START button.

After activating "Background suppression" the internal background and selectably also the background in the inlet area is deducted from the leak rate. This happens after pressing the START button automatically.

- Supervisor rights
 - 1 || > Setup > Measurement > ZERO and filter
 - 2 Make your selection in the field "Background suppression" between "Internal only", "Inlet area" and "Switched off".
 - ⇒ Internal only

Factory setting. With every measurement the internal measurement signal component of the device is deducted by pressing the START button. The accuracy of the measurement results are no longer impaired by the internal background.

⇒ Inlet area

Additionally to the deduction of the internal background, pressing START with every measurement also deducts the background of the inlet area. IF you would like to switch this on, make sure that the background of the inlet area is determined, see "Determine the background of the inlet area [▶ 41]". We recommend that the calculation of the inlet area background is occasion-ally repeated, because the device pumps down any background present in the inlet area after a certain time.

⇒ Switched off

No background suppression.

3 Save ↓.



High background value

If the actual background is higher than 1×10^{-8} mbar l/s, it can no longer be automatically deducted. The high background must be pumped down in this case.

5.3.10.1 Determine the background of the inlet area

This function determines the value of the internal Helium background.

If "Zero and Filter" are shown in the window under background suppression with value "Inlet area" selected, this value is then deducted from the measured signal when-START is pressed. See also "Change background suppression [▶ 40]".

- ✓ Inlet blank flange
- ✓ Operation mode Vacuum Mode
- ✓ The device is in the state "Standby" or "Measure".
 - 1 Select the cross-hair icon \oplus .
 - 2 Select "Calibration Inlet background.
 - 3 To start the automatic determination of the intake background, press).

5.3.11 Change the sniffer line pressure monitoring

In the operation mode Sniffing (SL300) automatic pressure monitoring is activated. The preset pressure limits define a maximum and a minimum inlet pressure. If the pressure does not lie within these limits then generally the caliper is either blocked or broken. Fault messages are issued according to the following rules:

Inlet pressure > Upper limit: Caliper defective.

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

✓ **Supervisor** - rights

- 1 || > Setup > Measurement > Sniff > Capillary surveillance
 - ⇒ You can change the following settings, to view the preset values see Factory settings.
 - "Pressure SL300 capillary blocked" (Untergrenze)

"Pressure SL300 capillary broken" (Obergrenze)

- *2* Set up.
- *3* Save ↓.

5.3.12 Calibrating

In order to be able to measure leak rates correctly, the leak detector has to be adjusted at regular intervals by calibration. The mass spectrometer is tuned automatically.

You can perform the calibration using the device internal calibration leak or use an external calibration leak. Normally calibration should take place on a daily basis or if there is some doubt as to the measurement ability of the device.



NOTICE

When using Nitrogen or Helium-3 (3 He) as tracer gas an internal calibration is not possible. In this case use an external calibration leak.

The operation modes Vacuum and Sniffer must be separately calibrated when using an external calibration.

A calibration should only take place when the device is at operating temperature. Calibrate at least 20 minutes after switch-on.

5.3.12.1 Internal calibration

✓ The device is in the state "Standby" or "Measure".

- 1 Select the cross-hair icon \oplus .
- 2 Select "Internal".
- 3 Press ().
- \Rightarrow The device performs an internal calibration.

5.3.12.2 External calibration

Operator or Supervisor rights

- 1 Mount the calibration leak on the inlet of the device.
- 2 || > Setup > Measurement > Calibration leak
- 3 Adjust the leak rate of the calibration leak used, see also "Set external calibration leak [▶ 38]".
- 4 Place the device in the state "Standby" or "Measure".
- **5** Press the cross-hair icon $\mathbf{\Phi}$.
- 6 Select "External".
- 7 Press ().
- 8 Follow the instructions on the screen.

5.4 Measuring

- ✓ The inlet flange on the upper side of the device is prepared for the pending measurement. Optionally connected there: Calibration leak, specimen, sniffer line SL300 or blank flange.
- ✓ A vacuum connection between leak detector and backing pump has been established. See also Connecting the backing pump [▶ 22].
- ✓ Possible alternatives to the operating possibilities on the device are set up (optional):

I/O module, remote control, WiFi connection to the notebook or tablet. Also see "Accessories and spare parts [▶ 65] " and "Operate leak detector via web browser [▶ 72]".

- 1 Switch on leak detector and backing pump.
- 2 Make sure that the desired operation mode is set (see "Select operation mode [▶ 35]").
- 3 Make sure that the correct basic settings and the settings for the current measurement are carried out. See "Basic settings [▶ 25]" and "Settings for the measurements [▶ 35]".
- Make sure that calibration takes place daily.
 When performing a calibration, note the 20 minute warm-up time. See "Calibrating [▶ 42]".
- 5 In standby mode, initiate the measurement process by pressing the START button.
- *6* Keep track of the measurement results either as line, bar or circle graph, see "Presentation of the measurement screen [▶ 29]" and "Assembly of the touchscreen [▶ 15]".
- 7 To display the maximum leak rate (Q_{max}) on the measurement screen during a measurement, press the START button again. Also see "START button [▶ 12] " and "Assembly of the touchscreen [▶ 15]".
- 8 To measure small leak rates more easily, press the ZERO button when required, see "Set and use the function ZERO [▶ 38]".
- *9* Record the measured values if necessary, see "Configure data recording [▶ 44]" and "Assembly of the touchscreen [▶ 15]".
- 10 Switch the instrument off.

5.5 Measurement data

The measured values are recorded in a database. The data recording can always take place or via the Start-Stop-Button. The measured values can be exported to a USB flash drive (FAT32 format) in the CSV format. The CSV formats are supported in English and German. The extent of the export can be determined through different criteria.

5.5.1 Configure data recording

NOTICE

Reduces the service life of the memory

The recording of many measured values reduces the service life of the internal memory.

Disable data recording when you no longer need it.

Operator or Supervisor rights

- 1 || > Setup > Data recording
- 2 If necessary change the "Max. database size".
 - The standard size of the database corresponds approximately to the number of measurement values that can take place throughout the period of one year. This however corresponds to a database size of approx. 16 GB.
 - ⇒ If storage is needed for the recording and the maximum set database size (in measurement values) has been exceeded, the oldest records are automatically deleted so that 5% of the specified capacity is freed for new data.
- 3 If necessary change "Export file prefix".
 - ⇒ The export files receive the name "Prefix + time stamp + extension (e.g.icmeas20160720-082829.csv).
- 4 To record immediately after starting the device, activate the option "Enabled".
 - ⇒ This option is deactivated as standard. To start or stop a recording without activating this option press on the measurement display.
- 5 Save ↓.

5.5.2 Configure and implement export

✓ △ △ Operator or Supervisor rights

- 1 ℜ > Measurement data export
- 2 Select under "Export format" between "CSV en" and "CSV de". Standard is "CSV en".

For "CSV en", the decimal separator is a dot and the column separator is a comma.

For "CSV de", the decimal separator is a comma and the column separator is a semicolon.

- *3* If necessary change the preset "Sample distance": "Minimum", "1", "2", "5" or "10" seconds.
 - ⇒ With the setting "Minimum" all measured values are exported in the search area.

- ⇒ With the settings "1", "2", "5" or "10" seconds only the measured values of the search area are exported whose temporal difference is 1, 2, 5 or 10 seconds.
- **4** If necessary change the preset "Time criterion". As choices there are "Back from now" or "Rangeavailable".

Make sure that the export process is limited to 1 day maximum. This corresponds to 1 million measurement values with full recording. If you want export data from a larger time period perform several exports.

- ⇒ "Back from now": A time period can be set in seconds to coincide with the moment retroactive from when the export process should begin.
- ⇒ "Range": An export time period can be exported. To do this make your entries in the available fields, to start below left and to stop below right.
- 5 Save ↓.
 - ⇒ Storing automatically starts the export.

5.5.3 Measurement data database: Information and delete

function

- ✓ Supervisor rights
 - - \Rightarrow The following is displayed:
 - "Current database size" in [Byte]
 - "Measurement values": Number of measurement values in the database "Max. database size": Number of measurement values that can be stored in the database

"Level"

- "Oldest record": Time stamp of the oldest measurement value
- "Newest record": Time stamp of the newest measurement value
- 2 If it is necessary to delete and re-create the entire database, press on the button "Clear database".

5.6 Lock screen

You can protect the screen against unintended operation by accidental movement.

You can activate or deactivate this protection at any time after starting up the device.

- 1 || > Lock screen
 - ⇒ The screen lock will be activated and an icon "safety lock" will be displayed on the screen.
- *2* To terminate the screen lock, tap the screen in any position and confirm the question in the dialog window.

5.7 Use external monitor

You are able to use an external touch monitor instead of the internal monitor. You can use either the internal or the external monitor.

- ✓ You have a touch monitor with connections for HDMI and USB, furthermore an appropriate power supply. HDMI is required to transmit the images, USB is required to transmit the sound.
 - 1 Connect the HDMI cable and the USB cable of the touch monitor with the connector block of your leak detector, see also "Connections for accessories and control signals [▶ 17]". For proper operation, make sure that the cable length does not exceed 3 m.
 - 2 || > Display > Switch monitor > External monitor
 - \Rightarrow The picture will be displayed on the external monitor.
- Instead of changing the monitor display, you can connect the external monitor before switching on the device.
 - ⇒ Then the picture will be displayed on the external monitor without changing settings.

Switch to internal monitor

When the instrument is switched on, you will be able to switch to internal monitor at any time.

► 🙀 > Display > Switch monitor > Internal monitor

5.8 Information

5.8.1 Retrieve information about the device

Diverse information on the device is shown: Software and serial numbers, network information and operating hours.

- Solution > Solution
- % > Info > Device> Network
- Solution > Solution

5.8.2 Call information on the assemblies

Diverse measurement values and information to the following assemblies is shown: Preamplifier, ion source, turbo molecular pump (TMP), processor assembly MSB, backing pump and its frequency converter.

- ▶ ※ > Info > Assemblies > Ion source
- Section 2 Assemblies > MSB
- ▶ ※ > Info > Assemblies > TMP
- ► 🛞 > Info > Assemblies > Preamplifier

5.8.3 Information on connected accessories

- ▶ ※ > Info > Accessories > I/O module
- \Rightarrow If an I/O module is connected, you will find details.

5.8.4 Call the energy data information

Diverse measure supply voltages, electrical power and temperatures are shown.

- ► 🛞 > Info > Energy > Power
- ▶ ※ > Info > Energy > Voltage (1)

⇒ In this window the first part of the information to the voltage is shown.

▶ ※ > Info > Energy > Voltage (2)

 \Rightarrow In this window the second part of the information to the voltage is shown.

5.8.5 Call the latest information to the current measurement

value

- Section 2 Sec
 - \Rightarrow The leak rate and different pressure values are shown.
- Solution > Measurement values > Temperature
 - ⇒ Different temperature values are displayed.

- Section 2 Sec
 - ⇒ The current runtime information is displayed.
- 5.8.6 Call the latest information to the current calibration value
 - Solution > Solution

5.9 Log

- 5.9.1 Call the error and warning log
 - Section 2 Sec

If there are more than 20 entries always the oldest entry is deleted.

5.9.2 Call the TMP log

Display of the fault and warning history of the turbo molecular pump.

The entries are for the entire period of use of the device. If there are more than 10 entries always the oldest entry is deleted.

► 🛞 > Logs > TMP

5.9.3 Call calibration log

The entries are for the entire period of use of the device. If there are more than approx. 20 entries always the oldest entry is deleted.

Section 2 Sec

5.9.4 Call maintenance log

Sector Sector

If there are more than 20 entries always the oldest entry is deleted.

5.10 Device settings

5.10.1 Viewing and customizing individual parameters

You are able to get a quick overview of the actual settings of the device and you can make modifications, if needed.

 \checkmark You have the required right to change the specific parameter.

- 1 || > Sets of parameters > Parameter list
 - ⇒ The device settings will be displayed as a list.
- *2* Modify individual parameters, if needed.
- **3** Save <u>↓</u>.
- To modify parameters, press alternatively a subheading in the list. A separate setting window will be opened, where you can change and save.
 - ⇒ After changing a parameter setting in a separate window press ⊗ to return to the list of parameters.

5.10.2 Saving and managing sets of parameters

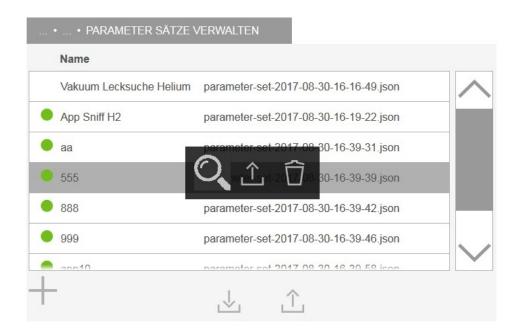
A set of parameters is a collection of parameters with the relevant settings of the device. You are able to save sets of parameters in text-based files at any time. The parameters can be viewed in clearly arranged form.

- ✓ **Supervisor** rights
 - 1 ||| > Sets of parameters > Manage sets of parameters
 - Sets of parameters already created will be displayed as a list. If the values of a saved set of parameters match the actual settings of the device 100 %, a green dot will be displayed.
 - 2 To create a new set of parameters, press +.
 - In the next window you can insert a free text description. The prefix "parameter-set" and the date of saving are used for the file name. Save ↓. You are able to save max 10 sets of parameters.
 - *3* To open the context menu of a created set of parameters, press the desired set of parameter and choose

Q, to view further details concerning the parameters contained. If parameters do not match actual device settings, an orange dot will be displayed. If there is a missing setting, a red dot will be displayed (after a software update for example). We recommend to view the missing setting, to create a new set of parameters and to delete the old set of parameters.

 \uparrow , to activate a set of parameters.

 $\widehat{\Box}$, to delete a set of parameters.



5.10.3 Exporting or importing sets of parameters

You are able to transfer saved sets of parameters from the internal memory to an attached USB flash drive and to import the sets again.

- Supervisor rights
 - 1 || > Sets of parameters > Manage sets of parameters
 - 2 To export all sets of parameters to a USB flash drive (formatted in FAT32) if needed, press ↓ below the list.
 - - All sets of parameters on the USB flash drive will be saved in the device, if the number of 10 is not exceeded. Using a PC you can delete redundant sets of parameters on the USB flash drive before transferring.
 - You must not modify parameters of a set of parameters on the USB flash drive before importing. You cannot transfer these files to the device after the modification.

5.11 Updating the software

The device has two different software versions: One for the user interface and one for the basic unit. Each has its own independent versions number.

5.11.1 Update the user interface software

Import software updates using a USB flash drive.

NOTICE

Data loss due to an aborted connection

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

✓ **Supervisor** - rights

- *1* Copy the file into the main directory of a FAT32 formatted USB flash drive.
- 2 Connect the USB flash drive to a USB port on the device.
- 3 🛞 > Update > Update operating unit
 - At the top in the window the active software version of the user interface is shown.

If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.

- 4 In order to load the new software version, press on the button "Update".
- ⇒ After completion there is an automatic restart of the operating unit.

5.11.2 Updating the software of the basic unit

Import software updates using a USB flash drive.

NOTICE

Data loss due to an aborted connection

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

Supervisor - rights

- 1 Copy the file into the main directory of a FAT32 formatted USB flash drive.
- 2 Connect the USB flash drive to the USB port on the device.
- 3 🛞 > Update > Update basic unit
 - At the top in the window the active software version of the basic unit is shown.

If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.

- 4 In order to load the new software version, press on the button "Update".
- ⇒ After completion there is an automatic restart of the system.

5.11.3 Update the software in expert mode

✓ **Supervisor** - rights

- 1 🛞 > Update > Update operating unit/basic unit > Expert
 - ⇒ Software versions already available on the device are shown in a list.
- 2 Highlight any of the software versions as required and proceed to step 5.
 - \Rightarrow Resetting to an older software version is possible.
- *3* If alternatively you want to add a new software version, connect a FAT32 formatted USB flash drive with the update file to one of the USB ports of the device.
- 4 In order to load the new software version, press on +.
- 5 To activate the new version, select the desired list entry and press \uparrow .
- \Rightarrow After completion there is an automatic restart of the system.

5.12 View vacuum diagram

To check the function and the operating state of the measuring system at a glance, call up the simplified diagram of the vacuum diagram.

S > Vacuum diagram

5.13 Resetting to factory settings

You can restore the device to factory settings.



Loss of settings and measurement data

After resetting to factory settings only the manufacturer factory settings are in the memory of the device. The software of the device is not reset when restoring the factory settings.

- Supervisor rights
- ► \$\$\$ > Setup > General > Reset settings > Reset now

5.14 Logging off from the device

- *1* Press on your name which appears on the top left of the display.
 - ⇒ The window "User accounts" opens. See also "Modify Personal Settings
 [▶ 27]".
- 2 You log off from the device via the button "Log off".
 - \Rightarrow The login window opens.

5.15 Switching off the device.

You can switch off the device at the mains switch at any time. The parameters set in the device remain saved.

6 Warning and error messages

| | During operation, the display shows information that helps you operate the instrument. Measurement values are displayed along with current unit modes, operating instruc- tions as well as warnings and error messages. The instrument is equipped with exten- sive self-diagnostic functions. If the electronics detect a faulty state, the device will show this as far as possible on the display and will interrupt operation when neces- sary. Warning and error messages consist of a number, a descriptive text, and often an associated measured value (e.g., a measured voltage). |
|-------------------------|--|
| Warnings | Warnings warn of instrument modes that can impair the accuracy of measurements. Operation of the instrument is not interrupted. For details about the cause and the remedy, press ⑦. To close a warning message, press the button "Clear" after reading. |
| Error messages | Errors are events that force the interruption of the operation. For details about the cause and the remedy, press ⑦. Once you have found the cause for the error continue operation by pressing the button "Clear". |
| Active errors and warn- | This menu item is only displayed when the template contains errors or warnings: |
| ings | ► 🕄 > Errors and warnings |
| Confirmed warnings | If an active warning is acknowledged without rectifying the cause, it is displayed under "Confirmed warnings". |
| | ► 弐 > Confirmed warnings |
| Reference on the dis- | An overview of possible errors and warnings can be found at: |
| play | • $\frac{o}{11}$ > Help > Errors and warnings |

6.1 List of warning and error messages

| Timeout during | The EEPROM on the VI-Board is de- | Contact customer service |
|--------------------|-------------------------------------|---|
| communication with | fective or does not exist | |
| EEPROM on VI- | | |
| Board | | |
| | communication with EEPROM on VI- | communication with fective or does not exist EEPROM on VI- |

| | One EEPROM pa- rameter has been initialized | A new parameter was introduced by a software update | Confirm the warning message Check that the message does not appear when you restart the device Check whether the factory settings correspond with the new parameter of your application. |
|------|---|---|--|
| | | The EEPROM on the VI-Board is de- fective | Confirm the warning message Check if the message occurs each time when you restart the device Contact customer service |
| W106 | W106 Several EEPROM parameters have been initialized | A software update introduced new parameters | Confirm the warning message Check that the message does not appear when you restart the device Check whether the factory settings comply with the new parameters of your application. |
| | | The EEPROM on the VI-Board was replaced | Confirm the warning message Check that the message does not appear when you restart the device Check whether the factory settings comply with the new parameters of your application. |
| | | The EEPROM on the VI-Board is de- fective | Confirm the warning message Check if the message occurs each time when you restart the device Contact customer service |
| E107 | Internal IIC commu- nication error | Internal IIC communication error | Contact customer service |
| E108 | Internal IIC2 com- munication error | Internal IIC2 communication error | Contact customer service |
| W110 | Real-time clock was reset! Please enter date and time | The real-time clock has not been set | Enter the correct date and timeCheck that the message does not appear when you restart the device |
| | | Battery jumper on the MSB not set | Contact customer service |
| | | Rechargeable battery on MSB is dis- charged or defective | Contact customer service |
| | | Real-time clock defective | Contact customer service |
| | | | |

| W122 | No response from the BUS-Modul | Connection to BUS module inter- rupted | Check the connection to the BUS module. |
|------|-------------------------------------|---|--|
| | | | Replace the connection cable to the bus module |
| | | Bus module defective | Replace the bus module |
| | | Bus module connection on the de- vice defective | Contact customer service |
| W125 | I/O module no longer connected | Connection to I/O module interrupted | Check the connection to the I/O module. |
| | | | Replace the connection cable to the I/O module |
| | | I/O module defective | Replace the I/O module |
| | | I/O module connection on the device defective | Contact customer service |
| W127 | Wrong bootloader version | The bootloader is not compatible with application | Contact customer service |
| E129 | EEPROM contains data from wrong de- | The software of the basic unit does not match the EEPROM | Contact customer service |
| | vice class | The EEPROM does not match this device class | Contact customer service |
| W151 | No communication | A software update or a parameter re- | Confirm the warning message |
| | with operating unit | set has been executed | Check that the message does not appear when you restart the device |
| | | Internal connection problem between the basic unit and the operating unit | Contact customer service |
| W152 | No communication with control panel | Internal connection problem between the basic unit and the control panel | Contact customer service |
| W171 | CU1000 not sup- ported | A CU1000 can not be used with this device | Disconnect the CU1000 from this device |
| W201 | Voltage U24V_MSB | Malfunction of 24V power supply unit | Contact customer service |
| | too low | Short circuit or overload in the 24V supply | Contact customer service |
| W202 | Voltage U24V_MSB too high | Malfunction of 24V power supply unit | Contact customer service |
| W203 | 24V valve supply | Malfunction of a valve | Contact customer service |
| | voltage out of range | Short circuit or overload in the 24V valve supply | Contact customer service |

| W206 | 24V operating unit | Malfunction of operating unit | Contact customer service |
|------|--|---|--|
| | supply voltage out of range | Short circuit or overload in the 24V operating unit supply | Contact customer service |
| W207 | 12V internal supply voltage out of range | Short circuit or overload in the 12V supply | Contact customer service |
| W208 | 24V fan supply volt- | Malfunction of a fan | Contact customer service |
| | age out of range | Short circuit or overload in the 24V fan supply | Contact customer service |
| W209 | 24V DIV1 supply voltage out of range | Short circuit or overload in the 24V DIV1 supply | Contact customer service |
| W210 | 24V DIV2 supply voltage out of range | Short circuit or overload in the 24V DIV2 supply | Contact customer service |
| W211 | 5V internal supply voltage out of range | Short circuit or overload in the inter- nal 5V supply | Contact customer service |
| W212 | 5V sniffer line sup- | Sniffer line defective | • Use another sniffer line, if possible |
| | ply voltage out of | | Contact customer service |
| | range | Short circuit or overload in the 5V sniffer line supply | Contact customer service |
| W221 | Internal voltage 24V_RC voltage out of range | The remote control is defective | • Use another remote control, if pos- sible |
| | | The cable connected to REMOTE CONTROL connector is defective | Use another cable, if possible |
| | | The accessory connected to ACCES- SOIRIES connector is defective | • Use another accessory, if possible |
| | | The cable connected to ACCES- SOIRIES connector is defective | Use another cable, if possible |
| | | Short circuit or overload in the 24V_RC supply | Contact customer service |
| W222 | Internal voltage 24V_IO voltage out | The module connected to LD con- nector is defective | Use another module, if possible |
| | of range | The cable connected to LD connec- tor is defective | Use another cable, if possible |
| | | Short circuit or overload in the 24V_IO supply | Contact customer service |
| W223 | Internal voltage 24V_TMP1 voltage out of range | Short circuit or overload in the 24V_TMP1 supply | Contact customer service |
| | | | |

| W224 | Internal voltage 24V_PRESSURE (Pirani) voltage out of range | Short circuit or overload in the 24V_PRESSURE (Pirani) supply | Contact customer service |
|------|--|---|--|
| W240 | Voltage +15V out of | Short circuit at preamplifier | Contact customer service |
| | range | VI-Board or MSB defective | Contact customer service |
| W241 | Voltage -15V out of | Short circuit at preamplifier | Contact customer service |
| | range | VI-Board or MSB defective | Contact customer service |
| E242 | +15V or -15V volt- | Short circuit at preamplifier | Contact customer service |
| | age shorted | VI-Board or MSB defective | Contact customer service |
| W250 | REF5V voltage out | Short circuit at preamplifier | Contact customer service |
| | of range | VI-Board or MSB defective | Contact customer service |
| E252 | REF5V voltage | Short circuit at preamplifier | Contact customer service |
| | shorted | VI-Board or MSB defective | Contact customer service |
| W300 | Anode voltage too | Short circuit of the anode voltage | Contact customer service |
| | low | VI-Board or MSB defective | Contact customer service |
| W301 | Anode voltage too high | MSB defective | Contact customer service |
| W302 | Suppressor voltage too low | Short circuit suppressor or preampli- fier | Contact customer service |
| | | VI-Board or MSB defective | Contact customer service |
| W303 | Suppressor voltage too high | MSB defective | Contact customer service |
| W304 | Anode-cathode volt- age too low | Short circuit between anode and cathode | Contact customer service |
| | | VI-Board or MSB defective | Contact customer service |
| W305 | Anode-cathode volt- age too high | MSB defective | Contact customer service |
| E306 | Anode voltage wrong | The anode voltage set value is out- side the allowable range | Perform a calibrationContact customer service |
| | | MSB defective | Contact customer service |
| | | | |

| W310 Cathode 1 broken Cathode defective • Check that the other cathod been switched on • Contact customer service | e has |
|--|-------|
| Contact customer service | |
| | |
| Connection to cathode broken • Contact customer service | |
| VI-Board or MSB defective • Contact customer service | |
| W311 Cathode 2 broken Cathode defective • Check that the other cathod been switched on | e has |
| Contact customer service | |
| Connection to cathode broken • Contact customer service | |
| VI-Board or MSB defective • Contact customer service | |
| E312 Cathodes broken Both cathodes defective • Contact customer service | |
| Connection to cathode broken • Contact customer service | |
| VI-Board or MSB defective • Contact customer service | |
| E340 Emission error Pressure too high with aged cathode • Contact customer service | |
| W342 Cathode not con- nected test • Contact customer service | |
| Plug of ion source not connected • Contact customer service | |
| W350 Suppressor not con- nected defective · Contact customer service | |
| E352 Preamplifier not Connected Preamplifier defective or cable not connected connected Preamplifier defective or cable not Preamplifier d | |
| W358 Alternate preampli- Preamplifier defective • Contact customer service | |
| fier ranges Unusual leak rate waveform • Contact customer service | |
| W359 Overdriven pream- Ion source or preamplifier defective • Contact customer service | |
| plifier Mass spectrometer contaminated • Contact customer service | |
| W360 Preamplifier output Ion source bad • Contact customer service | |
| too low Mass spectrometer contaminated • Contact customer service | |
| W361 The offset voltage of Preamplifier defective • Contact customer service the preamplifier is too high | |
| W362 Preamplifier range Preamplifier defective • Contact customer service | |
| error MSB defective • Contact customer service | |
| W390 500 GOhm resistor Preamplifier defective • Contact customer service | |
| out of rangeMSB defective• Contact customer service | |

| E400 | TMP error message | Unhandled error message from the TMP | Contact customer service |
|------|--|---|--|
| E402 | No communication with turbo pump converter | TMP cable defective or not con- nected | Contact customer service |
| | | TMP converter defective | Contact customer service |
| | | MSB defective | Contact customer service |
| W405 | No TMP run-up time | Inlet pressure during run-up too high | Check that the backing pump is working during run-up |
| | | | Check that the pressure drops dur- ing run-up |
| | | | Contact customer service |
| | | TMP bearing damage | Contact customer service |
| E410 | TMP temperature too high | The ambient temperature is too high | Turn off the device and let it cool down |
| | | | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |
| E422 | No TMP run-up time | Inlet pressure during run-up too high | Check that the backing pump is working during run-up |
| | | | Check that the pressure drops dur- ing run-up |
| | | | Contact customer service |
| | | TMP bearing damage | Contact customer service |
| E430 | TMP bearing tem- perature too high (one hour > 60°C) | The ambient temperature is too high | Turn off the device and let it cool down |
| | | | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |

| W431 | TMP bearing tem- perature too high (> 60°C) | The ambient temperature is too high | • Turn off the device and let it cool down |
|------|--|--|--|
| | | | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | • Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |
| E500 | Pressure sensor p1 not connected | Pressure sensor p1 not connected or cable defective | Contact customer service |
| | | VI-Board or MSB defective | Contact customer service |
| E502 | Pressure sensor p2 not connected | Pressure sensor p1 not connected or cable defective | Contact customer service |
| | | VI-Board or MSB defective | Contact customer service |
| E520 | Pressure too high | Pressure p2 too high for at least 15s | Contact customer service |
| E521 | Pressure rise, an- ode voltage col- lapsed | Pressure rise at pressure sensor p2 and anode voltage collapsed | Contact customer service |
| W522 | Pressure rise, emis- sion break down | Pressure rise at pressure sensor p2 and emission collapsed | Contact customer service |
| W540 | Flow through capil- lary is too low! Leaks may not be detectable! | Filter is dirty | Replace the sniffer tip filter |
| | | Sniffer tip or capillary blocked | Remove the blocking of the sniffer tip |
| | | | • Use another sniffer line, if possible |
| | | | Contact customer service |
| | | The pressure limit for a blocked cap- illary is set too high | Check and change the pressure limit, if necessary |
| W541 | Flow through capil- | Filter is dirty | Replace the sniffer tip filter |
| | lary is much too low Leaks may not be detectable! | Sniffer tip or capillary blocked | Remove the blocking of the sniffer tip |
| | | | • Use another sniffer line, if possible |
| | | | Contact customer service |
| | | The pressure limit for a blocked cap- illary is set too high | Check and change the pressure limit, if necessary |

| W542 | Flow through capil- lary too high | Capillary broken or leaky | Use another sniffer line, if possibleContact customer service |
|------------------|--|---|---|
| | | The pressure limit for a broken capil- lary is set too low | Check and change the pressure limit, if necessary |
| W559 | Leak rate too high! Switched to Standby to prevent conatami- | Gross leak at test object or the con- nection to the test object | Check the tightness of the connec- tion between the leak detector and the test object |
| | nation | Gross leak protection limit is set too low | Check and change the gross leak protection limit, if necessary |
| | | Alarm delay time time too short | Check and change the alarm delay, if necessary |
| W580 | Maximum evacua- tion time until 100 mbar exceeded | Gross leak at test object or the con- nection to the test object | Check the tightness of the connec- tion between the leak detector and the test object |
| | | | • Use another test object, if possible |
| | | The settings value for the max. evac- uation time gross leak is too low | • Check and change the max. evacu- ation time gross leak if necessary |
| W581 | Maximum evacua- tion time until mea- surement exceeded | Gross leak at test object or the con- nection to the test object | • Check the tightness of the connec- tion between the leak detector and the test object |
| | | | • Use another test object, if possible |
| | | The settings value for the max. evac- uation time until measurement is too low | Check and change the max. evacu- ation time until measurement if necessary |
| W630- Phoenix | Calibration request | Operation mode or mass has changed | Perform a calibration |
| | | Runtime over 30 minutes and tem- perature change by 5 Kelvin since last calibration | Perform a calibration |
| | | Runtime over 30 minutes and no cali- bration since 24 hours | Perform a calibration |
| W670 | Calibration error (emission break down) | During calibration the emission col- lapsed | Check if the message occurs again when you perform a new calibra- tion |
| | | | Contact customer service |

| W700 | Preamplifier temper- ature is too low | Ambient temperature is too low | Increase the temperature in the en- vironment in which the device stands |
|------|--|--|--|
| | | Temperature sensor is defective | Contact customer service |
| | Preamplifier temper- ature is too high | The ambient temperature is too high | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |
| W710 | MSB temperature is too high | The ambient temperature is too high | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | • Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |
| E711 | Max. MSB tempera- ture exceeded | The ambient temperature is too high | Reduce the temperature in the en- vironment in which the device stands |
| | | Air filter dirty | • Clean the air vents or replace the filter plates |
| | | Fan blocked or defective | Contact customer service |
| W901 | Maintenance: TMP bearing lubricant | Maintenance interval for TMP bear- ing lubricant exceeded | Contact customer service |
| W903 | Maintenance: Cali- bration leak expired | Maintenance interval for calibration leak exceeded | Contact customer service |
| W904 | Maintenance: Snif- fer tip filter | Maintenance interval for sniffer tip fil- ter exceeded | Contact customer service |
| W910 | Maintenance: Back- ing pump | Maintenance interval for backing pump exceeded | Contact customer service |
| W920 | Maintenance: Ex- haust filter | Maintenance interval for exhaust fil- ter exceeded | Contact customer service |
| W925 | Maintenance: Air fil- ter | Maintenance interval for air filter ex- ceeded | Contact customer service |
| | | | |

7 Cleaning

All cleaning work that was described here may only be done without opening the device!



Life threatening hazard from electric shock

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

- Disconnect the device from the power supply prior to any maintenance work. Ensure that the electrical supply cannot be switched back on unintentionally.
- Don't open the device!

The housing of the device is composed of painted plastic parts. For cleaning the device, means should be used, as are also common to other varnish or plastic surfaces (e.g., light household cleaners).

Usually, a damp cloth is enough. Solvents that could dissolve lacquers (such as acetone) should not be used.

Use a soft brush or a vacuum cleaner to clean the ventilation slots.

8 Accessories

8.1 Accessories and spare parts

The parts listed below can additionally be ordered:

| Sniffer line | |
|--|-----------|
| SL300, 4 m length | 252003 |
| QT100 Helium Sample Probe QUICKTEST | 15594 |
| Remote control | |
| Remote control RC310, wired | 252013V01 |
| Remote control RC310WL, wireless | 252014V01 |
| Miscellaneous | |
| Search gas spray gun for Helium, with hose | 16555 |

Sniffer line SL300

By using the sniffer line the leak detector can easily be converted to a sniffer leak searcher. The length of the sniffer line is 4 m.

QUICKTEST QT100

The QT 100 ensures a quick suction of the tracer gas and thus for a short response time. This enables sniffing leak detection for larger distances between the test object and the leak detector. For the QT100 sniffer lines are available with 5 m, 20 m or 50 m length.

Remote control RC310C and RC310WL

With the RC310C remote control you can operate the leak detector over a cable with a length of up to 28 m.

With the wireless remote control RC310, you can operate the leak detector at a distance of up to 100 m.

Via remote control you control the functions START, STOP / VENT (STOP/Ventilate), ZERO (background). The measured leak rate is displayed as a bar graph, as a numeric value or as a diagram on the display of the remote controls (see the RC310 Technical Manual).

Measurement values you create over a recording time of up to 24 hours in the internal memory of the remote controls. You transfer the data easily to a USB flash drive.

You can set an internal threshold for warning when exceeding the set points. The warning occurs visually on the display and audibly via the built-in loudspeaker or the connected headset respectively.

The remote controls are placed in robust housings that allow ergonomic operation. Magnets on the lower side allow installation from horizontal to vertical metal surfaces.

8.2 I/O module

8.2.1 Create a connection between the device and the I/O

module

- ✓ Supervisor rights
 - 1 Connect the I/O module with a data cable to the LD socket on the rear of the device, see "Connections for accessories and control signals [▶ 17]".
 - 2 ||| > Setup > Accessories > Device selection
 - 3 Select the "IO module".
 - 4 Save <u>↓</u>.

8.2.2 Configuring digital outputs

The digital outputs PLC-OUT 1 \dots The available functions can be assigned in any way necessary to the 8 I/O module.

- ✓ Supervisor rights
 - 1 \$\$\$ Setup > Accessories > I/O module > Digital outputs configuration
 - 2 Select the desired "Digital output".
 - \Rightarrow The outputs PLC-OUT 1 8 are available.
 - *3* Select the desired "Function", see the table below.
 - 4 Select the desired "Mode".
 - The modes "Standard" or the mode "Inverse" are available for selection.
 To mode "Inverse": In the table overview the description of the state "open" must be replaced with the description of the state "closed".
 - 5 Save <u>↓</u>.

| Function | State: | Description |
|---------------------|---------|---|
| Off (open) | open: | always open |
| Ready for operation | closed: | Emission switched on, calibration process in- active, no error |
| | open: | Emission switched off or calibration process active or error |
| Emission on | closed: | Emission switched on |
| | open: | Emission switched off |
| Error | closed: | Error |
| | open: | No error |
| Error or warning | closed: | Error or warning |

| Function | State: | Description |
|---------------------|---------|---|
| | open: | No error or warning |
| Run-up | closed: | Run-up |
| | open: | no run-up |
| Calibration request | closed: | No external calibration: Calibration required |
| | | When external calibration or "CAL check": Request "Open or close external calibrated leak" |
| | open: | No request: Calibration not required |
| Calibration active | closed: | Device is calibrated. |
| | open: | Device is not calibrated. |
| Calibration stable | closed: | Calibration completed with calibration leak |
| | open: | Assignment not stable or calibration is inac- tive |
| Cathode 2 | closed: | Cathode 2 is active |
| | open: | Cathode 1 is active |
| Measuring | closed: | Measuring (ZERO is possible, all setpoint outputs switch depending on the leak rate.) |
| | open: | Standby or emission disabled (ZERO is not possible, all setpoint outputs will return "Leak rate threshold value exceeded".) |
| Open | open: | always open |
| Sniff | closed: | Operation mode Sniffing active |
| | open: | Operation mode Vacuum active |
| Setpoint 1 | closed: | Measured leak rate exceeds the setpoint 1 |
| | open: | Measured leak rate undercuts the setpoint 1 |
| Setpoint 2 | closed: | Measured leak rate exceeds the setpoint 2 |
| | open: | Measured leak rate undercuts the setpoint 2 |
| Setpoint 3 | closed: | Measured leak rate exceeds the setpoint 3 |
| | open: | Measured leak rate undercuts the setpoint 3 |
| Setpoint 4 | closed: | Measured leak rate exceeds the setpoint 4 |
| | open: | Measured leak rate undercuts the setpoint 4 |
| Purge | closed: | Purge valve open |
| | open | Purge valve closed |
| Standby or evacuate | closed: | State standby or evacuate active |
| | open: | State standby of evacuate not active, such as when measuring |

| Function | State: | Description |
|--------------------|---------|---------------------------|
| Status calibration | closed: | Test leak valve is open |
| leak valve | open: | Test leak valve is closed |
| Warning | closed: | Warning |
| | open: | No warning |
| ZERO active | closed: | ZERO switched on |
| | open: | ZERO switched off |

8.2.3 Configure digital inputs

These inputs can be used to operate the device with a programmable logic controller (PLC).

The digital inputs PLC-IN 1 ... The available functions can be assigned in any way necessary to the 10 I/O module.

- Active signal: typically 24 V

- Inactive signal: typically 0 V.

The 24V output of the I/O module can be used as an active signal.

Every function can be inverted.

- ✓ Supervisor rights
 - 1 || > Setup > Accessories > I/O module > Digital inputs configuration
 - 2 Select as desired "Digital input".
 - ⇒ The inputs PLC-IN 1 10 are available.
 - 3 Select the desired Function, see the table below.
 - 4 Select the desired Mode.
 - The modes "Standard" or the mode "Inverse" are available for selection.
 To mode "Inverse": In the following table overview, the arrow pointing the transfer direction in the column "Transition" must be reversed.

| Function | Transition | Description |
|-------------|-------------------|---|
| Vent | inactive→ active: | Vent inlet (only in standby state) |
| CAL | inactive→ active: | Start calibration. |
| | active→ inactive: | Apply value for background and finish calibration. |
| No function | - | The input is not functioning. Recommended setting of unused inputs. |
| Delete | inactive→ active: | Erase warning or error message / cancel calibration. |
| Sniff | inactive→ active: | Enable sniffer mode. |
| | active→ inactive: | Enable vacuum mode. |

| Function | Transition | Description |
|------------|-------------------|--|
| Purge | inactive→ active: | Switch-on purge (only in standby state) |
| | active→ inactive: | Switch-off purge (only in standby state) |
| Start | inactive→ active: | Change to the measurement mode. |
| Start/Stop | inactive→ active: | Change to the measurement mode. |
| | active→ inactive: | Switch to Standby. |
| Stop | inactive→ active: | Switch to Standby. |
| ZERO | inactive→ active: | Switch ZERO on. |
| | active→ inactive: | Switch ZERO off. |

8.2.4 Configure analog outputs

- ✓ Supervisor rights
 - 1 || > Setup > Accessories > I/O module > Analog outputs configuration
 - 2 Set-up the "Analog output 1".
 - ⇒ You can choose from "Off", Pressure p1", Pressure p2", "Leak rate mantissa",
 "Leak rate exponent", "Leak rate linear", "Leak rate logarithmic", "Leak rate mantissa hyst.", and "Via interface".
 - 3 Set-up the "Analog output 2".
 - ⇒ You can choose from "Off", Pressure p1", Pressure p2", "Leak rate mantissa", "Leak rate exponent", "Leak rate linear", "Leak rate logarithmic", "Leak rate mantissa hyst.", and "Via interface".
 - 4 Set-up the "Analog output scale".
 - ⇒ You can choose from "0.5 V / decade", "1 V / decade", "2 V / decade", "2.5 V / decade", "3 V / decade", "5 V / decade", or "10 V / decade".
 - 5 Set-up the "Exponent upper limit".
 - 6 Save <u>↓</u>.



The settings "Analog output scaling" and "Upper limit exponent" affect both analog outputs dependent on the selected function, see the table overview below.

Functions and assignment of analog outputs:

| Off | The analog outputs are | |
|-----|-------------------------|--|
| | switched off | |
| | (Output voltage = 0 V). | |

| Pressure p1 / Pressure p2 | 1 10 V; 0.5 V / decade; logarithmic | | |
|------------------------------|---|---|--|
| | 1 V = 1 x 10 ⁻³ mbar | | |
| Leak rate mantissa | 1 10 V; linear; in the se- lected unit | Useful only if the other analog output is assigned "Leak rate exponent". | |
| Leak rate exponent | 1 10 V; 0.5 V / decade; Step function; 1 V = 1 x 10^{-12} ; in selected unit | Useful only if the other analog output "Leak rate man- tissa" or "Leak rate mantissa hyst." is assigned. | |
| Linear leak rate | 0 10 V; linear; in the selected unit | The upper limit (= 10 V) is set via the parameter "Exponent upper limit" in whole decades. The lower value is always 0 (leak rate), which corresponds to 0 V output voltage. | |
| | | This setting is for both analog outputs, if an appropri- ate output function is selected. Depending on the se- lected leak rate unit there is a different absolute limit. | |
| | | The selected range can be additionally narrowed by the limits, which is valid for all interfaces. | |
| Leak rate log. | 0 10 V; logarithmic; in the selected unit | The upper limit (= 10 V) and the scale (V / decades) are set via the parameters "Exponent upper limit" and "Analog output scale". | |
| | | For example: Upper limit set to 1×10^{-5} mbar l/s (= 10 V). Scale set to 5 V / decade. The lower limit is thus 1×10^{-7} mbar l/ s (= 0 V). The logarithmic output function of both the slope in V / decade as well as the upper limit (10 V limit) can be set. This results in the minimum dis- playable value. The following slopes are available: 0.5, 1, 2, 2.5, 3, 5, 10 V/The higher the selected slope value, the smaller the displayable area. The upper limit is the same for both analog outputs. Depending on the selected leak rate unit there is a different ab- solute limit. | |
| Set by interface | The output voltage can be specified for tests with the LD log command 221. | | |
| Leak rate mantissa hyst. | 0.7 10 V; linear; in the selected unit | Useful only if the other analog output is assigned "Leak rate exponent". Through an overlap of the man- tissa in the range 0.7 to 1.0, a constant jumping be- tween two decades is prevented. 0.7 V corresponds to a leak rate of 0.7×10^{-x} . 9.9 V corresponds to a leak rate of 9.9×10^{-x} . | |

8.2.5 Setting up the I/O module protocol

To switch between ASCII and LD protocol.

- ✓ **Supervisor** rights
 - 1 || > Setup > Accessories > I/O module > I/O module protocol
 - 2 Set up.
 - 3 Save ↓.

8.3 Operate leak detector via web browser

NOTICE

Operating system can be attacked via USB or Ethernet

The Linux operating system used in the leak detector is not updated automatically and can therefore contain security gaps. This vulnerability may be exploited through the Ethernet and USB interfaces of the leak detector to provide unauthorized access to the system.

- Ensure that no unauthorized person has access to these interfaces, for example through a USB port / Ethernet port lock.
- In order not to jeopardize the security of your company network, never connect the leak detector directly to the public Internet. This is true for connections over WLAN as well as over Ethernet.
- However, if you want to access the web interface of the leak detector remotely, we recommend an encrypted Virtual Private Network (VPN) connection. However, we cannot assume any guarantee for the security of VPN connections, which are provided by third parties.

In order to be able to access the user interface of the device via WiFi there needs to be a WiFi capable USB adapter with WiFi Access Point technology inserted in the rear of device.

Minimum technical requirements:

- Interface: USB 2.0
- USB port: Type A
- Chipset: RTL819x or similar
- Support to: Access Point Client Mode

"EDIMAX EW-7612UAn V2" is a WiFi capable USB adapter, which meets the specification and has been tested with the leak detector.



The WiFi connection can be susceptible to interference. The stability depends on the range, shielding walls, other WiFi networks, interfering transmitters in the vicinity and other factors.

8.3.1 Configure the WiFi connection of the leak detector

- ✓ Supervisor rights
 - 1 | | | > Setup > Network > WiFi
 - In the field "SSID" enter the desired network name and in the field "Password" the desired password. "SSID" and "Password" have the following values preset: "Phoenix" or "phoenix40" respectively. The password should have at least 8 characters.
 - *3* To set-up that the device supports the WiFi connection activate the option "Enabled".
 - If the WiFi capable USB adapter is inserted, this will automatically start the Access Point. In order to configure the WiFi adapter of the leak detector, no USB adapter needs to be inserted.
 - 4 Save ↓.

8.3.2 Set-up the WiFi connection in the notebook or tablet



WiFi connection - quick-start

If you have already performed these preset work steps, then on most devices it is sufficient just to enter the URL.

- ✓ A WiFi capable USB adapter with WiFi Access Point Technology is connected to a USB port on the rear of the leak detector, see "Connections for accessories and control signals [▶ 17]".
- ✓ In the configuration of the leak detector, the option "Enabled" is activated, see Configure the WiFi connection of the leak detector [▶ 73].
- \checkmark The WiFi connection is automatically detected by the client.
- ✓ With old devices WPA2 may need to be set-up as the encoding.
- ✓ Java Script is enabled in the web browser. We recommend using a current version of the web browser Chrome[™], Firefox® or Safari®.
 - 1 Check in the WiFi settings of your notebook or tablet whether it is already connected the WiFi of the leak detector.
 - 2 If it is not connected to the WiFi of the leak detector, select the WiFi of the leak detector and enter if necessary the password, see "Configure the WiFi connection of the leak detector [▶ 73]", handling step 2.

- 3 To access the leak detector via the web browser of the notebook or tablet, use the following URL: phoenix.leybold.com
- \Rightarrow The current active user interface of the leak detector is called.
- ⇒ When using a notebook or tablet the same functionality is available as with the touchscreen of the leak detector.

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