# Operating Instructions

## SmartTest


## HLT 550
## HLT 560
## HLT 570

IG 0100 BE_D (0707)

PFEIFFER VACUUM

Product identification

The data specified on the rating plate are necessary in correspondence with Pfeiffer Vacuum. Therefore transfer the data to the copy.

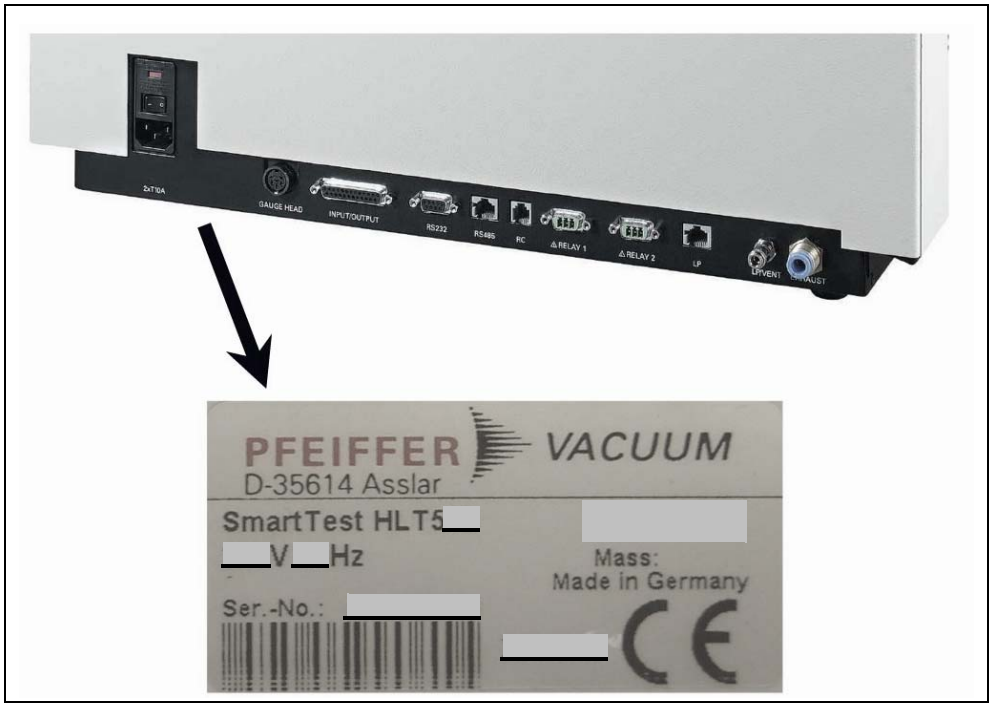



Fig. 0-1

Validity

This document is valid for products with the article number

SmartTest

PT L02 000 (HLT 560, 230 V~, with rotary vane pump UNO 005 A)
PT L02 001 (HLT 560, 120 V~, with rotary vane pump UNO 005 A)
PT L02 002 (HLT 560, 100 V~, with rotary vane pump UNO 005 A)

SmartTest

PT L02 020 (HLT 550, 100 ... 230 V~, with backing pump provided by the customer)

SmartTest

PT L02 010 (HLT 570, 230 V~, with diaphragm pump MVP 035)
PT L02 011 (HLT 570, 120 V~, with diaphragm pump MVP 035)
PT L02 012 (HLT 570, 100 V~, with diaphragm pump MVP 035)

This document is based on firmware versions beginning with V2.0.
If the instrument does not work as described, check whether your instrument is equipped with these firmware versions.
Subject to technical modifications without prior notice. The figures are not to scale.

# Content

# 1 Safety

## 1.1 Introduction

This chapter describes the safety requirements which must be observed on all accounts when using the SmartTest Helium Leak Detector.
All persons working on and with the leak detector must have read and understood the chapters relevant to their activities. This chapter is binding for all persons and all activities.

## 1.2 Use for the Intended Purpose

The SmartTest Helium Leak Detectors serve for measurement and localisation of small and very small leaks both on components and modules and on fittings and systems. They are suitable both for underpressure leak testing (vacuum method with or without partial current operation) and for overpressure leak testing (sniffing method).
The SmartTest Helium Leak Detectors may only be used for leak testing for the gases specified in the "Technical Data".
The SmartTest Helium Leak Detectors are designed specially for industrial applications and are used:

- for quality control in manufacturing processes
- for quality control of production plants
- as a service unit

Use for the intended purpose also includes:

- use of standard and original accessories
- observance of this document and compliance with the instructions and regulations therein

**Warning**

The Helium Leak Detector SmartText may not be operated in standing or under flowing or dripping water. The same applies for all other kinds of liquids.
Avoid contact of the SmartText with bases, acids and solvents as well as extreme climatic conditions.
No corrosive process gases may be pumped with the SmartText.
Failure to observe this will lead to voiding of the guarantee.

**Warning**

The leak detector must not directly be switched off after the process, in which condensable gases or steams are pumped, is finished. It must be running (at leakst 20 minutes) with opend gas ballast valve until the oil of the pump is freed from detachted steams.

*When not taking care of this instruction there can be a corrosion within the pump. So damages will occure.*

The heighth of the oil of the pump has to be controlled regularly.
The normal intervalls of changing the oil from the producer have to be taken care of. See instructions of the rotary vane pump.

**Note**

Caution: Danger of injury
Although this instrument is distinguished by high standards of quality and safety and has been built and tested according to the latest state of the art, injury or material damages cannot be totally ruled out in the event of misuse or use for a purpose which was not intended.
Therefore read this document carefully and especially observe the "Safety" chapter. Keep this document close to the instrument at all times.

## 1.3 Personnel

*Operating personnel*

The operating personnel may operate the SmartTest leak detector in normal operation. The normal operation includes **only** the following activities:

- operation
- the care and maintenance work described in this document

*Maintenance personnel*

The maintenance personnel may operate the SmartTest leak detector in normal operation and perform maintenance work necessary for trouble-free operation of the instrument.
In order to be authorised to maintain the SmartText leak detector, the person concerned must have taken part in an initial training conducted by a Pfeiffer Vacuum employee or an experienced member of staff of the system user. (See Maintenance Instructions IG 0108 BE for further information.)

*Service personnel*

The service personnel may operate the SmartText leak detector in normal operation and perform maintenance and service work.
The SmartText leak detector may be serviced **only** by trained Pfeiffer Vacuum staff or trained employees of the system user with a similar qualification.
Training as a master electrician or a similar professional training is necessary in order to work on the electrical components.
See Maintenance Instructions IG 0108 BE for further information.

## 1.4 Symbols Used

The following symbols are used with explanatory text to alert people to remaining risks during use for the intended purpose and to stress important technical requirements.


**Danger**

Specifications for the prevention of bodily injuries of all kinds

**Warning**

Specifications for the prevention of severe material and environmental damage

**Note**

Specifications for handling or use. Failure to observe these can lead to faults or minor material damage.

**Qualified Personnel**

Work identified by this symbol may only be performed by persons who have a suitable technical training and the necessary experience.

## 1.5 Responsibility and Guarantee

Pfeiffer Vacuum will accept no responsibility and provide no guarantee and exclude itself from all liability in the event that the user or third parties

- use the product for a purpose for which it was not intended
- fail to observe the "Technical Data"
- manipulate the product in any way (conversions, modifications, etc.)
- operate the product with accessories which are not listed in the appropriate product documentation

## 1.6 General Safety Rules

*Legal regulations*

The generally applicable legal and otherwise binding regulations for the prevention of accidents and protection of the environment must be observed in addition to this document.
Such regulations may also extend to the handling of hazardous substances or provision/wearing of personal safety equipment etc. for example.

*Probable risk*

On suspicion that safe operation is no longer possible, the instrument must be taken out of operation and secured against accidental starting.
This may be the case:

- when the device shows visible signs of damage
- when liquid has penetrated the instrument
- when the instrument is no longer working
- after long periods of storage under adverse conditions
- after great transport stress

*Energy connections, protective earthing*

Make sure the instrument is suitable for operating on the local power supply before connecting it.
The mains plug may only be plugged into a shockproof socket

**Danger**

Caution: Mains voltage
Improperly earthed products may be dangerous to life in the event of a malfunction.
Connect the product in accordance with local regulations and earth correctly. Interruption of the earthed conductor inside or outside the instrument is not permissible.

*Installation of protective devices*

An exhaust pipe must be installed under certain circumstances.
See Chapter 5.1.2.

*Misuse of protective devices*

Only fuses of the specified type with the specified current rating may be used as replacements.

*Opening the instrument*

**Danger**

Caution: Mains voltage, hot parts and rotating components
Removal of the housing shells is dangerous to life and limb.
The housing shells may never be removed in the course of the work described in this document.

*Sending in for repairs*

A completed and signed "Contamination Declaration" (Appendix) must be enclosed with every product sent in for repair.
Products not clearly declared ”free of contamination” will be decontaminated at extra cost.

*Spare parts*

Only original spare parts may be used for repairs. See maintenance Instructions IG 01008 BE.

## 1.7 Scope of Delivery

The scope of delivery includes the following parts:

- Basic device HLT 5xx
- Power-Subcon; relay plug
- Cap for Power-Subcon; relay plug
- Connecting plug: Ventilation sniffer connection
- Filter mat fan 500µm
- Power cable
- Set of hexagonal wrenches
- Set of fuses
- Documentation

# 2 Technical Data

## 2.1 General

| | |
|---|---|
| Dimensions | 550×460×304 mm (L×W×H) |
| Weight | 44 kg HLT 560, HLT 570<br>34 kg HLT 550<br>approx. 150 kg HLT 565/572/575 with carriage and pump |
| Max. permissible acceleration in operation | 1 G (horizontal) |
| Test connection | DN 25 ISO-KF |
| Cooling air | |
| Inlet | Bottom, with dust filter |
| Outlet | Side |
| Exhaust gas connection | For hose ø8/6 mm |
| External backing pump connection | DN 25 ISO-KF |
| Venting connection ($N_2$) | Sniffing line connection for hose ø6/4 mm |
| Standards and regulations | Declaration of Conformity (Appendix) |
| Degree of protection | IP 40 |
| Degree of contamination | 2 (EN 61010) |

## 2.2 Mains Connection

| | |
|---|---|
| Voltage / frequency | 230 V ±10% / 50 Hz<br>120 V ±10% / 60 Hz<br>100 V ±10% / 50/60 Hz |
| Protection class | 1 |
| Overvoltage category | II |
| Current | <10 A |
| Power consumption | <400 VA (HLT 560)<br><150 VA (HLT 550)<br><300 VA (HLT 570) |
| Fuses | 2 pieces, 10.0 A slow blow, 250 V, ø5×20 mm |

## 2.3 Environmental Data

| | |
|---|---|
| Temperature | |
| Storage | –10 °C … +70 °C |
| Operation | +10 °C … +35 °C |
| Relative humidity | max. 80% to +31 °C, decreasing to 50% at +35 °C |
| Use | Only indoors,<br>altitude up to 2000 m above sea level |
| Noise level | <70 dB/A (according to IEC standard) |

## 2.4 Measure

| | |
|---|---|
| Operating modi | Vacuum / sniffing |
| Operation standby | ≤3 minutes (runup time pump) |
| Inlet pressure | ≤18 mbar (temporarily up to 25 mbar) |
| Filaments | 2 (Iridium yttrated) |
| Filter stages | none,<br>static<br>dynamic |
| Measuring rate | 20 Hz |
| Display rate | 3 Hz |
| Alarm | |
| Acoustics / Volume | adjustable |
| Threshold value / Pre-warning | adjustable |
| Relay output | adjustable |
| On-screen displays | Leak rate vs. time, analogue / digital |

*Vacuum mode*

| | |
|---|---|
| Smallest detectable leak rate | according to AVS 2.1 |
| $^4He$, | $<5\times10^{-12}$ mbar l/s |
| $^3He$ | $<5\times10^{-10}$ mbar l/s |
| $H_2$ | $<5\times10^{-8}$ mbar l/s |
| Greatest detectable leak rate | |
| $^4He$, | 1 mbar l/s |
| $H_2$, $^3He$ | $1\times10^{-2}$ mbar l/s |
| Measuring range | $10^{-12}$ … 1 mbar l/s |
| Dimensional units of the display | mbar l/s, Pa m³/s, sccm, sccs<br>Torr*l/s, atmcc/s |
| Detectable gases | $^4He$, $^3He$, $H_2$ |
| Response time (to 63% of the signal) | <0.3 s |
| Suction rate for helium | >2.5 l/s at $p_{inlet}$ < 0.5 mbar |
| Suction rate at inlet with large backing pump (on HLT 550) | depending on the external pump |

| | |
|---|---|
| Pump time for high sensitivity | |
| at volume 0.5 l | 2 s (HLT 560, HLT 570) |
| at volume 10 l | 70 s (HLT 560)<br>200 s (HLT 570) |
| at volume 100 l | 700 s (HLT 560)<br>2100 s (HLT 570) |
| Pump time up to first measurement | |
| at volume 0.5 l | 2 s (HLT 560, HLT 570) |
| at volume 10 l | 45 s (HLT 560)<br>135 s (HLT 570) |
| at volume 100 l | 500 s (HLT 560)<br>1300 s (HLT 570) |
| Internal test leak | → Rear of the instrument |

*Sniffing mode*

| | |
|---|---|
| Smallest detectable leak rate<br>$^4He$, $^3He$, $H_2$ | according to AVS 2.1<br>$<5\times10^{-8}$ mbar l/s |
| Greatest detectable leak rate | |
| $^4He$,<br>$H_2$, $^3He$ | 1 mbar l/s<br>$1\times10^{-2}$ mbar l/s |
| Measuring range | $1\times10^{-8}$ ... 1 mbar l/s |
| Dimensional units of the display | mbar l/s, Pa m³/s, ppm, sccm, sccs, g/a, oz/yr, Torr*l/s, atmcc/s |
| Detectable gases | $^4He$, $^3He$, $H_2$ |
| Response time | <1 s with 3 m sniffing line |

## 2.5 Interfaces

Connecting plug arrangement and detailed data, see Communication Protocol IG 0105 BE.

## 2.6 Backing Pumps

*HLT 550*

To be provided by the customer

*HLT 560*

| | |
|---|---|
| Pfeiffer Vacuum UNO 005 A | Single-stage rotary vane pump, oil sealed |
| Volume flow rate | 4 $m^3/h$ at 50 Hz, 5 $m^3/h$ at 60 Hz |

*HLT570*

| | |
|---|---|
| Pfeiffer Vacuum MVP 035 | Two-stage diaphragm pump, oil-free |
| Volume flow rate | 2 $m^3/h$ |

## 2.7 Turbo Pump

| | |
|---|---|
| Pfeiffer Vacuum TMH 071 | Turbo pump with interstage pumping |
| Volume flow rate for $N_2$ | 60 l/s |

# 3 Description

The SmartTest Helium Leak Detectors are microprocessor-controller leak detecting instruments. All the processes in the instrument are controlled automatically.

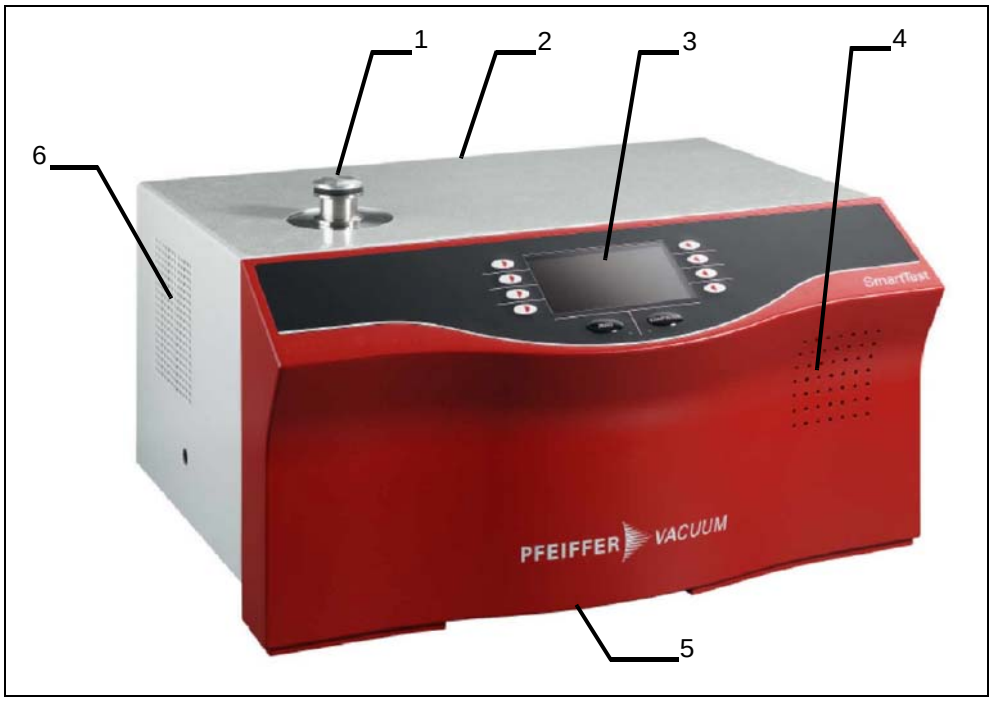



Fig. 3-1

***1*** Test connection
KF25 connection for connecting test objects

***2*** Rear
Rear with mains connection, interfaces, connection for remote control, sniffing probe and venting

***3*** Instrument operation
Display and control unit

***4*** Loudspeaker
Housing opening for loudspeaker signals

***5*** Fresh air opening
Opening in housing for fresh air supply

***6*** Exhaust air opening
Opening in housing for exhaust air discharge

*Extension stages*

Depending on the application the basic SmartTest instrument is extended with:

- an external backing pump
- a carriage

See Operating Instructions Helium Leak detector SmartTest with Cart.

## 3.1 Measuring System

The measuring system consists (simplified) of:

- a test connection
- a backing pump
- a turbo pump
- a few valves
- a helium sensor

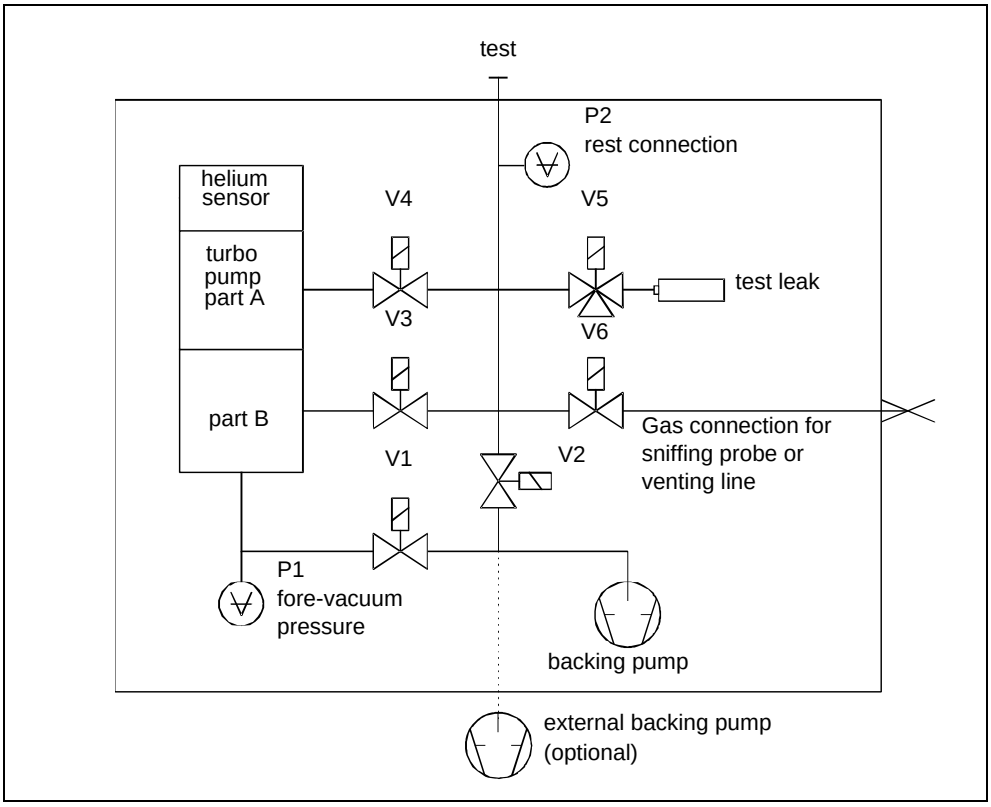



Fig. 3-2

The sample is flanged to the test connection. The valves V1, V2, V3 and V4 connect the sample and the helium sensor without an unsuitable operating state occurring for this.
A test leak is connected with valve V5 for calibration.
The valve V6 serves for venting so that the sample can be removed again. It is also used as a sniffing connection.
All valves open electromagnetically and close with spring force.
The measuring tube P1 measures the fore-vacuum pressure, P2 the pressure at the test connection.

## 3.2 Detection Principles

*Counterflow*

The sample is connected to the backing pump via valve V2. At a pressure p2 £ 15 mbar *) the valve V1 to the turbo pump is opened. Helium can get to the helium sensor through the two partial pumps A and B against the pumping direction. The mass-dependent compression capacity of the two partial pumps keeps away heavy gases. The proportion of helium which gets through to the helium sensor depends on the suction performance of the backing pump and the compressions of the two partial pumps.

*Twin-Flow™*

The gas flow from the sample goes through the test connection.
Twin-Flow™ low: At pressure p2 < 5 mbar*) V1 and V3 are open
Twin-Flow™ high: At pressure p2 < 0.5 mbar*) V1 and V4 are open
The gas flow passes through partial pump B to the backing pump and the test connection is pumped up to high vacuum. The suction performance of the partial pump B is approx. 40 l/s. Only the partial pump A acts in counterflow and allows light gasses such as hydrogen and helium to get through to the helium sensor on account of the mass-dependent compression capacity.

## 3.3 Leak Detection Methods

When searching for leaks with the SmartTest the test gas entering or escaping through leaks in the sample is detected.
For gas to flow through a leak a pressure difference between the inside and outside of the sample is necessary. For this either excess pressure or vacuum pressure is generated inside the sample.

*Vacuum method*

In the vacuum method test gas is blown against the wall of the evacuated sample from the atmosphere side. It enters the sample at leaks and is fed to the leak detector.
The sample must be vacuum pressure-proof.
The sensitivity stages

counterflow ⇒ Twin-Flow™ low ⇒ Twin-Flow™ high

are run through.
The detection limit is lower than in the sniffing method. The helium concentration at the leak must be known in order to quantify the leak. The state of equilibrium must be waited for.

* Factory settings. Other valve settings. See Chapter 6.4.4.6.4.

*Sniffing method*

In the sniffing method the test gas escaping from leaks in the sample into the atmosphere is detected.

The sample must withstand the applied test pressure.

In operation with the sniffing probe a constant gas flow is sucked in from the atmosphere. The helium proportion of the air (5.2 ppm) causes a leak rate display of approx. $1 \times 10^{-6}$ mbar l/s which can be eliminated by the ZERO function.

To detect a leak, the sniffing probe is applied to the points of the sample under helium overpressure which are suspected of leaking. An increased leak rate value indicates an increased concentration of helium and therefore a leak. The higher the pressure and the helium concentration in the sample, the smaller the leaks which can be detected.

The sensitivity stages

counterflow ⇒ Twin-Flow™ low

are run through.

The detection sensitivity and the quantifiability of the leak rate are less favourable than in the vacuum pressure leak detection.

## 3.4 Test Gases

For reasons of economy and detection sensitivity $^4$He (helium with mass 4) is generally used as a test gas for leak detection. Under certain conditions, e.g. at increased $^4$He concentration on the sample, it may be useful to change to a different test gas such as $^3$He (helium with mass 3) or $H_2$ (hydrogen, mass 2). These gases can also be detected with the leak detector.

**Danger**

Caution: Danger of explosion

Hydrogen forms a highly explosive gas mixture with air.

Great caution is necessary when using hydrogen! No smoking, no naked flames, avoid sparks.

**Note**

Because of the high percentage of water in typical residual gases, the leak rate background in the measurement of hydrogen is fairly high (in a range from $10^{-7}$ mbar l/s).

For the leak detection the test gas can be diluted with a neutral gas such as nitrogen or argon. This helps to reduce contamination of the atmosphere and an increase in the signal background especially in case of serious leaks. The leak rate signal is then of course reduced according to the test gas concentration.

## 3.5 Background Suppression

The background signal may increase dependent on the measuring conditions (e.g. high percentage of helium in the ambient air).
The background signal can be suppressed to enable easy measurement of small leak rates despite a high background.
The background suppression can be locked or activated automatically with every START. See Chapter 6.4.4.2.

*Rising background*

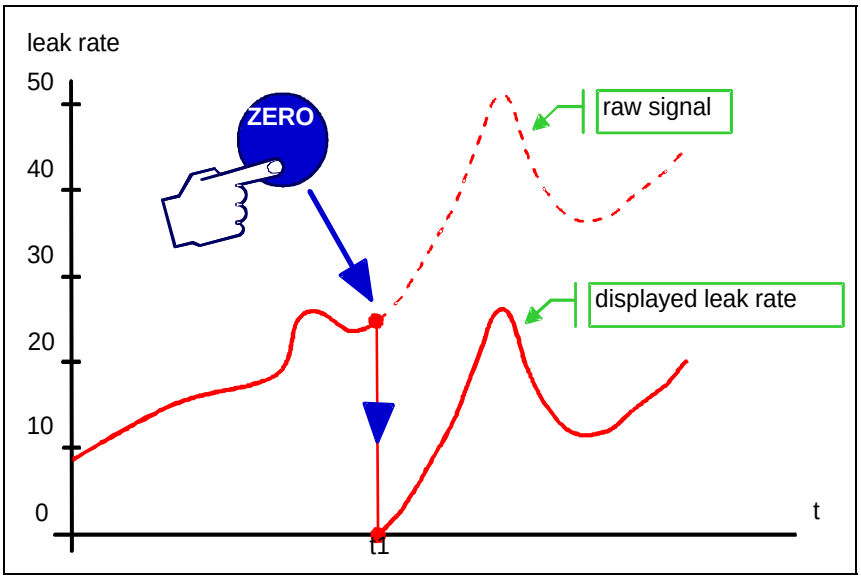



Fig. 3-3 Rising background

By pressing the ”ZERO” key the momentary raw signal (e.g. at time t1) is saved as a background value and is then subtracted from the following measured values. See Chapter 6.4.4.2.
The status message Zero appears in the measured value display.

*Falling background*

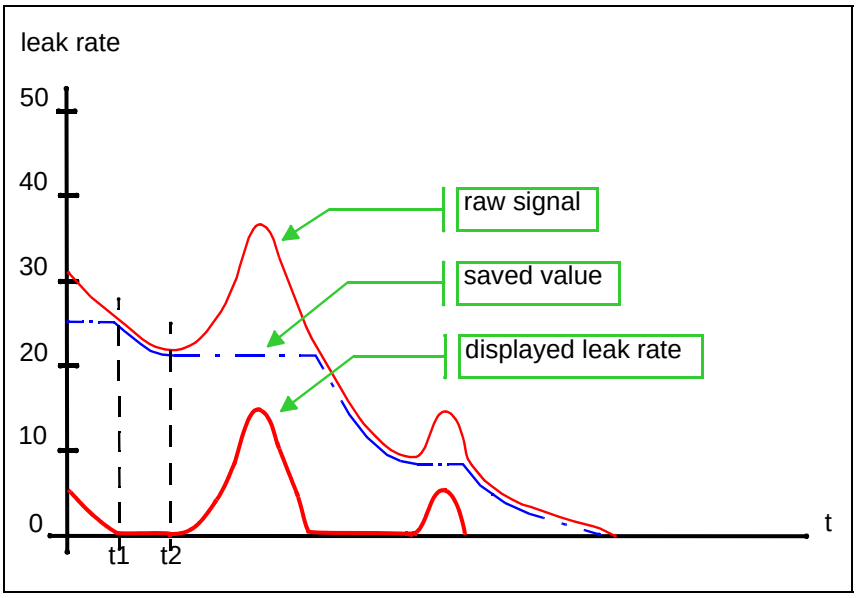



Fig. 3-4 Falling background

If the raw signal falls below the saved background value this is automatically set equal to the raw signal (e.g. at time t1). As soon as the raw signal rises again (e.g. at time t2), the saved background value remains constant. Signal increases are displayed clearly as a leak.
This greatly simplifies measurement of the smallest leak rates.

*Absolute measurement*

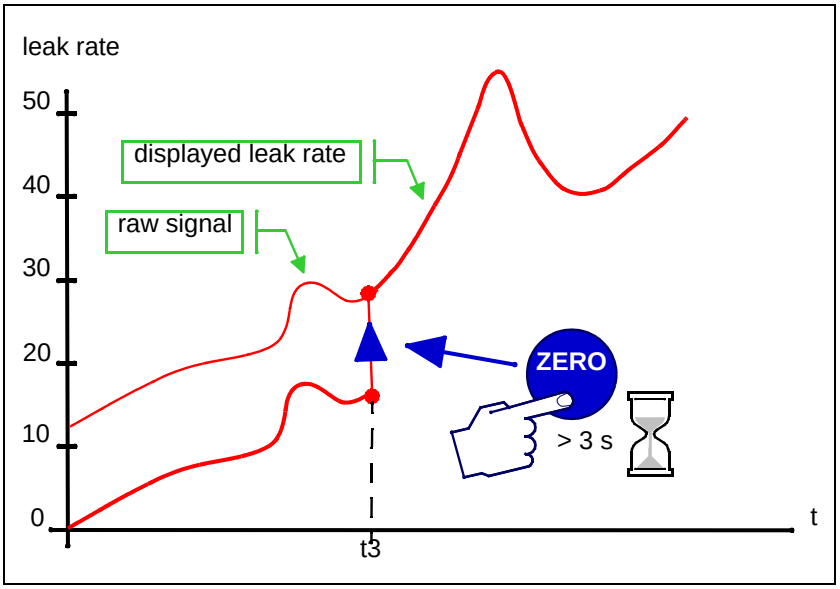



Fig. 3-5 Absolute measurement

If you want to see the raw signal (including background), press the ZERO key for about 3 s.
The saved value is set to zero (e.g. at time t3), the background signal is no longer suppressed.

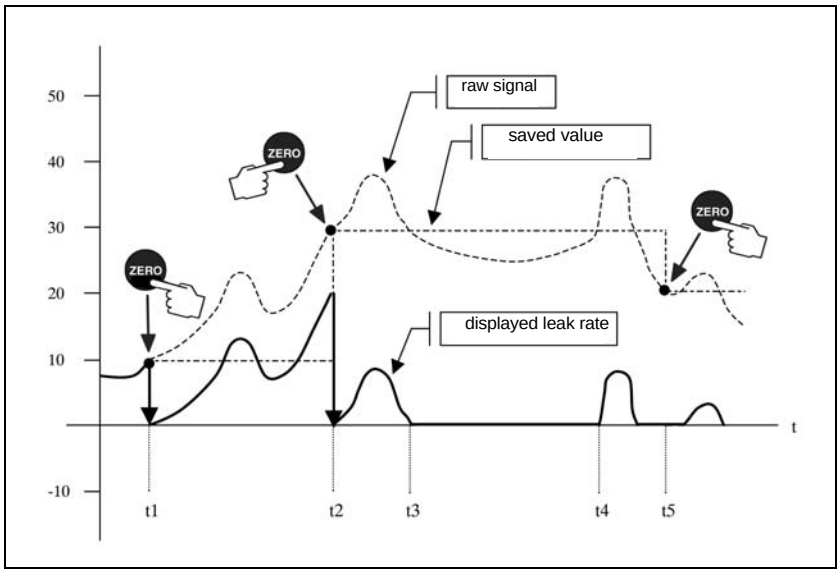



Fig. 3-6 Zero constant function

By pressing the "ZERO" key the momentary raw signal (e.g. at time t1, t2, t5) is saved as a background value and is then subtracted from the following measured values/raw signals.
The status message Zero appears in the measured value display.
The automatic background suppression is locked. The zero value is retained after pressing the Stop key. Pressing the Zero key again overwrites the zero value. The zero value is set to "0" at Power Off or changing the zero function.
If the raw signal of the leak rate drops below the saved value/background value (see time: t3 to t4), it is not evaluated but the slightest detectable leak rate/detection limit is displayed.
So leaks are not displayed (raw signal) that are smaller than the saved underground value (saved value).

# 4 Manual Control Elements

## 4.1 Instrument Operation

The operating unit is the display, operation and control unit for the leak detector.

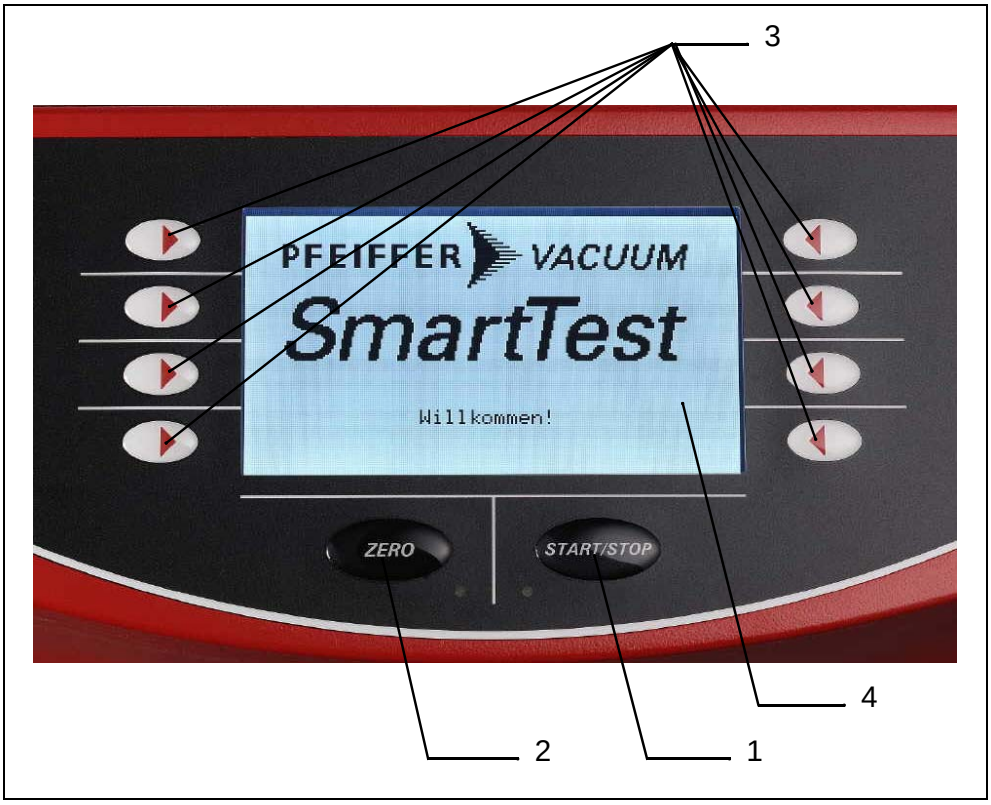



Fig. 4-1 Functions of the buttons on the display

***1*** START/STOP key
The measuring process is started and stopped with the START/STOP key.

***2*** ZERO key
ZERO activates the background suppression in measurement mode. When you press the key longer than 3 seconds you will deactivate the underground pressure.

***3*** Softkeys
The function of these keys depends on the current operating state. The respective meaning appears in the display.

***4*** Display
The display shows measured values, operating modi, instrument parameters and their values as well as the meaning of the softkeys.

# 5 Commissioning

## 5.1 Installation, Assembly

**Note**

See the Chapter "Technical Data" (Chapter 2) regarding the permissible ambient temperature, degree of protection, voltages, max. acceleration of the instrument in operation etc.

Despite good attenuation and vibration decoupling of the mechanical pumps in the SmartTest, vibrations of the instruments can never be ruled out totally.
To avoid humming (vibration of the instrument on a base with a similar resonance frequency) a firm, stable base should be chosen which only exhibits a slight tendency to vibrate.

### 5.1.1 Unpacking

The leak detector is delivered in a special packing ready for operation.

**Note**

The packing must be checked for damage before unpacking. If damage to the packing or the instrument itself is visible, please file a damage report with the shipping agent responsible immediately.
We recommend you to keep the special packing. This original packing offers the best protection for transport over a great distance or for returning the leak detector for servicing.

## 5.1.2 Carrying / Transport

**Note**

Only applies for type HLT560.
The pump (with oil filling) may be tilted by a maximum of 90°. In operation by a maximum 10°.

There are recesses for the hands on both sides for carrying and transporting the SmartTest, see Fig. 5-1.

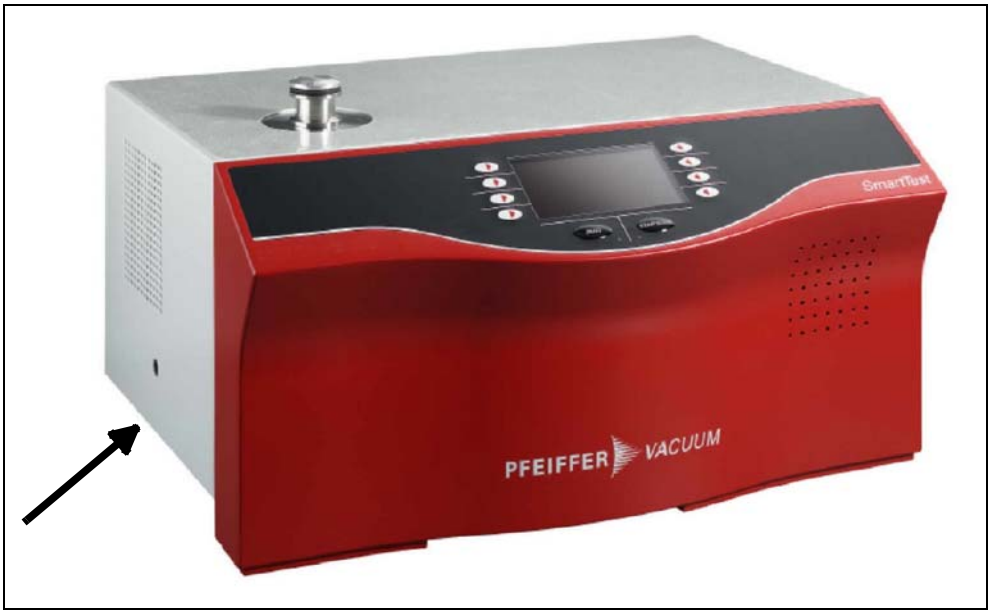



Fig. 5-1

The centre of gravity is towards the rear of the unit, therefore it must be held near the back.

**Danger**

Caution: Heavy product
When carrying heavy items your back can be injured or other injuries can occure when the item slips out of your hands.
Two people should carry the product.

## 5.1.3 Transport Lock

If your SmartText (HLT570) has a label "Transport locking" on the base, please remove the two Allan head screws (size 5) at the label.
Keep the screws.
The screws must be reinserted for transport.

## 5.2 Mount the External Backing Pump

*SmartTest HLT 550*

The external backing pump is connected at the bottom via the connection flange DN 25 ISO-KF.

*Other SmartTest models*

If large volume objects need to be tested, an additional backing pump can be connected at the bottom via the additional connection flange DN 25 ISO-KF. See Chapter 9.

## 5.3 Mounting Accessories

### 5.3.1 Sniffing Probe

Connect the sniffing probe as illustrated for sniffing operation.


Fig. 5-2 Connections for sniffing probe

***1*** Input / output connection

***2*** RC connection

***3*** Electrical connection for sniffing probe

***4*** Gas connection for sniffing probe or venting line (hose nipple ø 6/4 mm)

***5*** Exhaust gas connection (¼" quick screw connection for hose ø 8/6 mm)

**Note**

The sniffing probe must be removed for vacuum operation because the connection is used for venting.

### 5.3.2 Remote Control

Connect the optional Remote control unit to connection 2 (RC). See also Appendix.

### 5.3.3 Bypass Option

Connect the 25 poles D-sub connector of the bypass option to connection 1 (Input / Output). See also Operating Instructions.

### 5.3.4 Signaltower

Connect the 25 poles D-sub connector of the signal tower to connection 1 (Input / Output). See also Operating Instructions.

### 5.3.5 Exhaustpipe

**Danger**

Caution: Exhaust gases and fumes
Exhaust gases and fumes from oil-sealed pumps may be harmful to health.
For operation in poorly ventilated rooms, an exhaust pipe should be connected to exhaust connection 5 depending on the application and gases used.

In the HLT 560 oil fumes may occur after prolonged pumping against a high pressure caused by the oil-sealed pump used.

### 5.3.6 Venting Line

For venting the samples with a certain gas – e.g. argon or dry nitrogen – this can be connected to connection 4.
The excess pressure at the venting connection may not exceed 0.2 bar.

## 5.4 Mains Connection

**Note**

Connection data

Before connecting, make sure that the operating voltage of the instrument matches the local mains voltage. You will find the specifications on the rating plate on the back of the instrument.

**Danger**

Mains voltage

Improperly earthed products may be dangerous to life in the event of a malfunction.

Only a 3-pole power cable with a properly connected protective earth may be used. Only plug the mains plug into a shockproof socket. The protective effect may not be cancelled out by an extension cable without an earthed conductor.

# 6 Operation

## 6.1 Switching On and Off

Check the correct installation of all cables and accessories and compliance with the "Technical Data".
The mains switch is on the back of the housing.
Switch on the instrument.
The instrument can be switched off at any time and in any state. The current settings will be saved.


Fig. 6-1

***1*** Mains switch
Serves to switch the instrument on and off.

**Warning**

Caution: Abrupt movements
Abrupt movements can damage the running turbo pump.
Avoid abrupt movement and vibration of the instrument (e.g. running over cables, door sills) during operation and up to 4 minutes after switching off since the turbo pump can be damaged.

The instrument designation is displayed after switching on – the instrument runs a self-test.

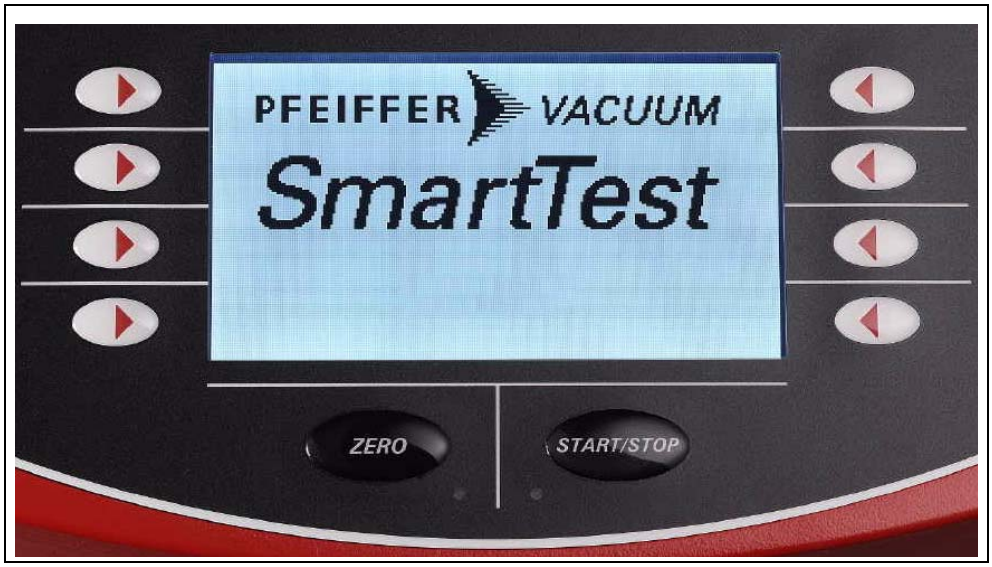



Fig. 6-2 Display SmartText

After the self-test, the message *"Pfeiffer-Vacuum; SmartText"* is displayed.

**Note**

For the most accurate measurements or for calibration, the SmartText should be allowed to warm up for at least 30 minutes

The run-up of the turbo pump starts. This lasts 2 ... 3 minutes and is visualised by the bar display.

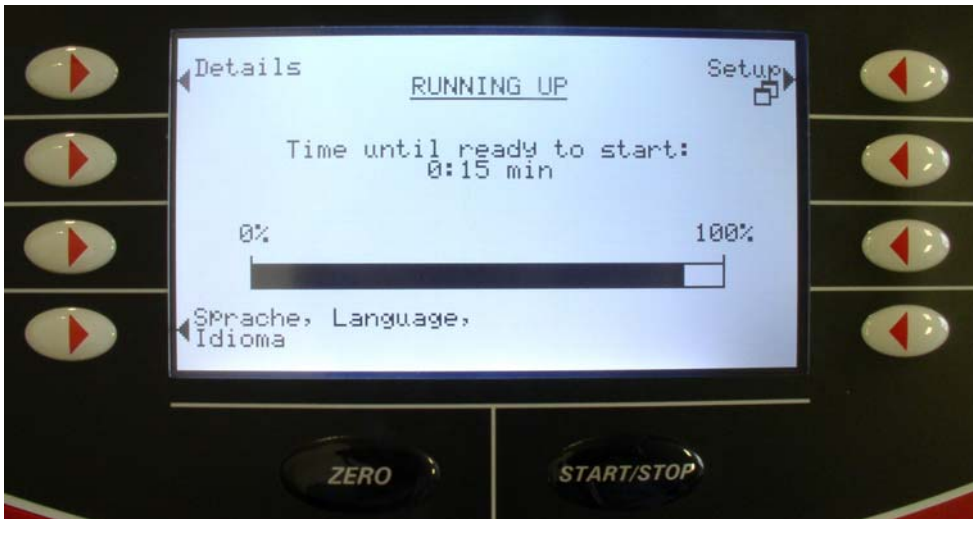



Fig. 6-3 Run-up

*Setup parameters*

When the *"Setup"* softkey is pressed, the **Setup** menu appears which allows you to set the operating parameters. (See page 6.4).

*Language*

See Chapter 6.4.3.

*Run-up Details*

With the *"Details"* softkey you go to the **Run-up Details** menu with

- the current fore-vacuum pressure
- the speed of the turbo pump
- the current consumption of the turbo pump
- the status of emission
- the active filament

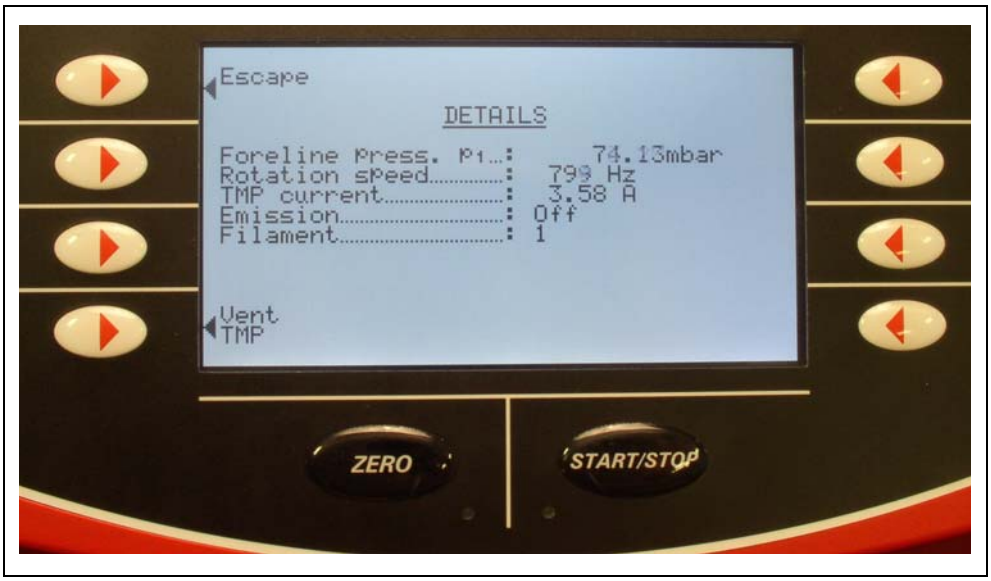



Fig. 6-4 Run-up Details

Press *"Escape"* to return to the Run-up display.
The *"Emission on"* is not established until after the filament test when $P_2$<10mbar and *"Speed Turbo ≥ 1450Hz"*. After the run-up, the display changes to **Ready to start** unless you have selected **Setup**.
The Softkey "Vent TMP" appears when the maintenance was enabled under "Access control ⇨ enable maintenance"

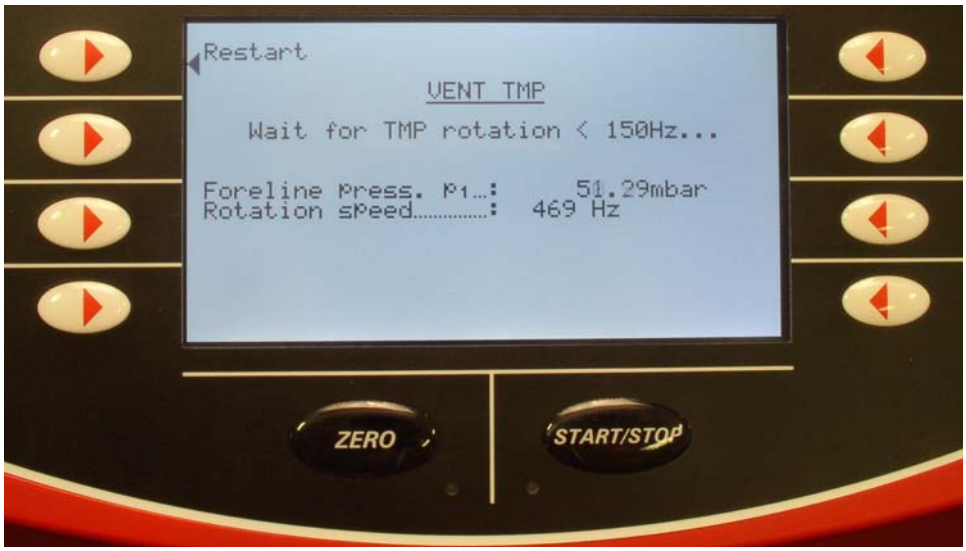



Fig. 6-5 Venting TMP 1

After confirming to Softkey "vent TMP" the TMP is switched off automatically and the leak detector waits until the frequency of the TMP has become smaller than 150 Hz.

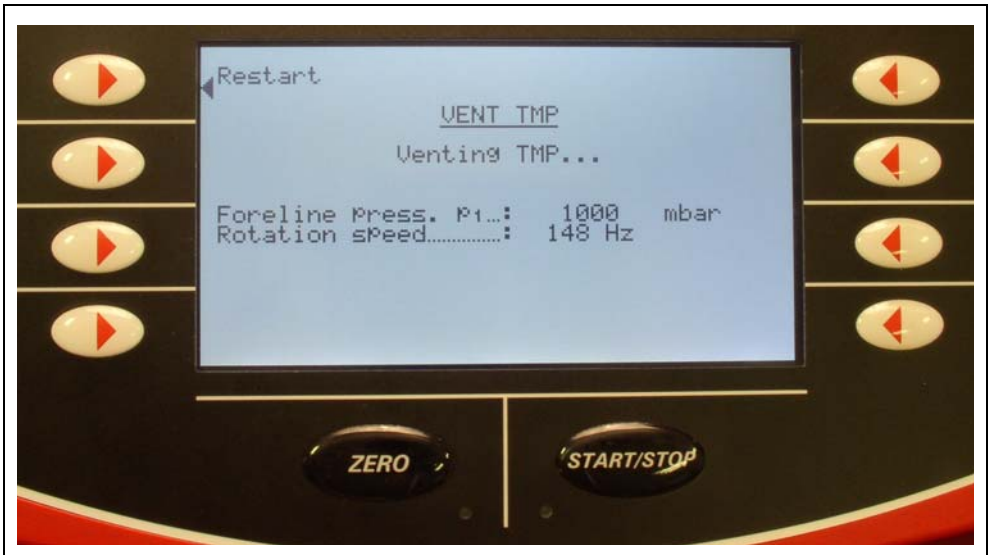



Fig. 6-6 Venting TMP 2

After that the TMP will be vented for 10 seconds.

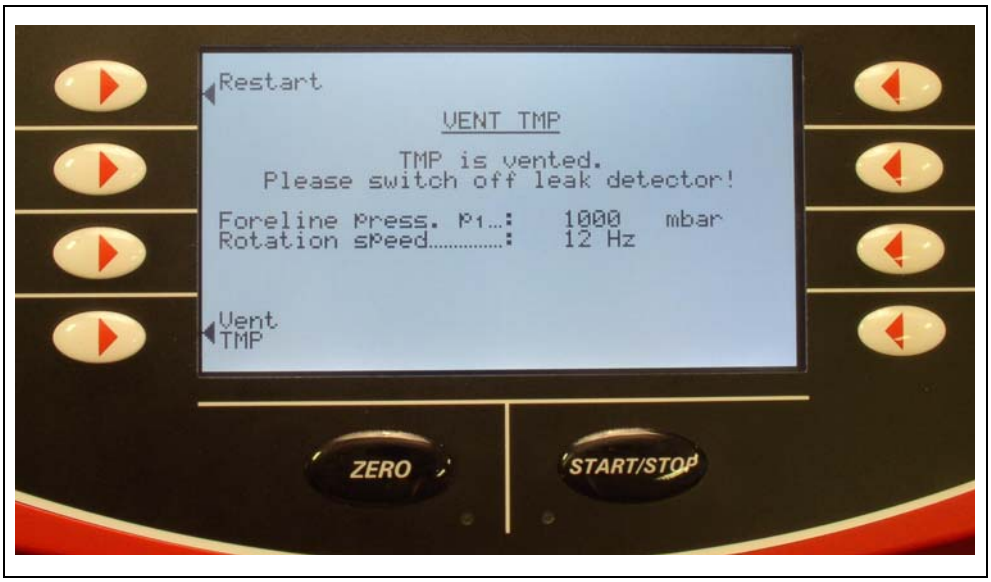



Fig. 6-7 Venting TMP 3

When this 10 seconds have passed the leak detector has to be switched off. The maintenance of the lubricant can be started now.
You can start the leak detector again with the softkey "start new".
You can vent the TMP again with the softkey "vent TMP".

## 6.2 Ready to start

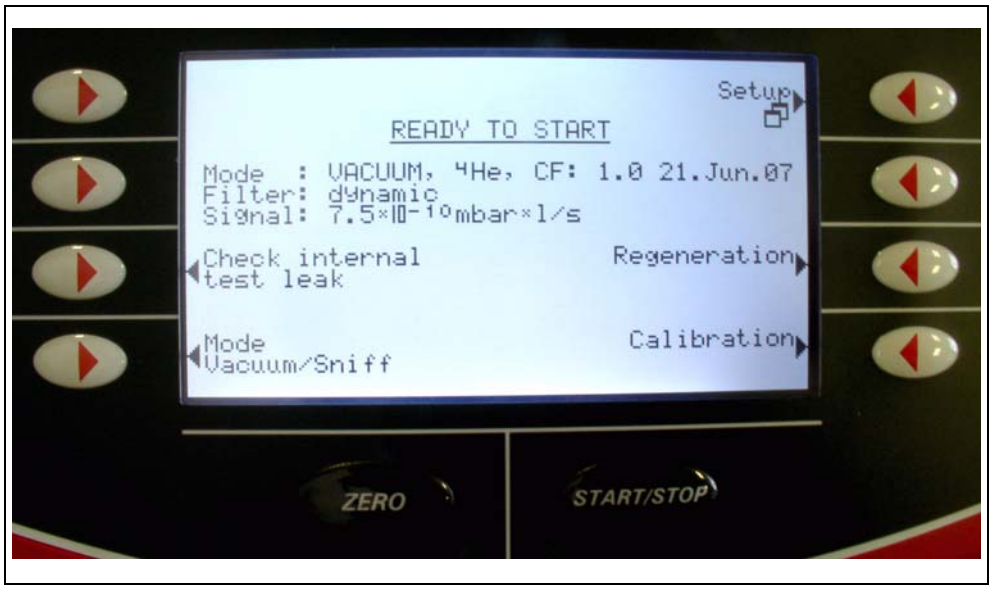



Fig. 6-8 Ready to start

The instrument now displays the following parameters:

| | |
|---|---|
| Mode | Operating mode (vacuum or sniffing) |
| Mass | Type of gas (He4, He3, H2) |
| Filter | Filter stage (without, dynamic, normal) |
| Last CF | Date and calibration factor of the last calibration of Twin-Flow™ high (Twin-Flow™ low for sniffing). |
| Reserve fil. active | Reserve filament active. Only appears if one of the two filaments is defective. This display persists until the filaments (ion sources) are changed. |
| Signal | Current background signal<br>Only appears if the appropriate option has been selected in the "Underground ready to start" menu.<br>(See Chapter 6.4.1.6) |

Softkey *"Vent"* is only active if in the *"Evacuation time & venting"* menu (see Chapter 6.4.4.6.5) venting has been set to **manual**.

In case of pending warning message a warning triangle appears at the position of softkey "Check internal test leak" in order to signalise the existent warning. The function enables to consider the previous acknowledged warning message again!

### 6.2.1 Regeneration

Select
Setup ⇨ Regeneration

The "Regeneration" is an automated Start-Stop - cycle intended for the reduction of a raised helium background.
This function can only be successful activated in the setting "Venting: with Stop".
You can deactivate the "Regeneration" in general with the STOP key or with STOP in the "Regeneration" menu.
An active Regeneration will be announced in the display.
The regeneration stops after 60 minutes automatically.

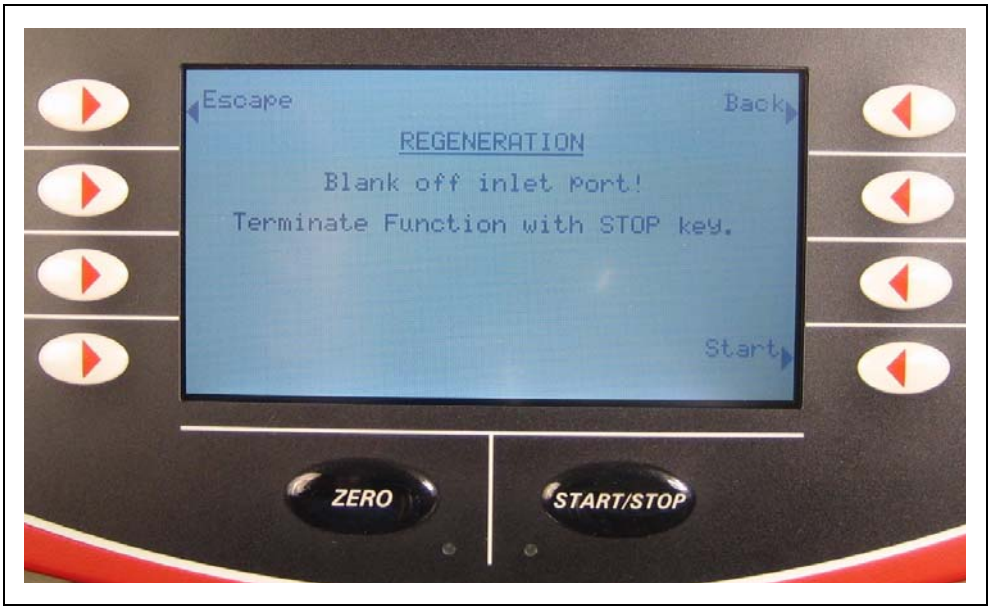



Fig. 6-9

With "Start" you start the following action:
Start, Stop with venting
Start, Stop with venting
and so on.

### 6.2.2 Check internal test leak

Select
Ready to Start Check internal test leak

This option commences the measuring of the internal test leak. See chapter 6.7
The function is only available in vacuum mode with mass 4.

### 6.2.3 Setup

Select
Ready to Start ⇨ Setup

This option leads to the Setup menu.
See chapter 6.4

### 6.2.4 Calibration

Select
Ready to Start ⇨ Calibration
This option commences the calibration routine. See chapter 6.5 or 6.6, respectively.

### 6.2.5 Measuring mode Vacuum / Sniffing

Select
Ready to Start ⇨ Measuring mode Vacuum / Sniffing

> **Note**
>
> Observe the detailed instructions for handling the keys in this and the following chapter. Thereafter only menus, parameters and the value tables are described.

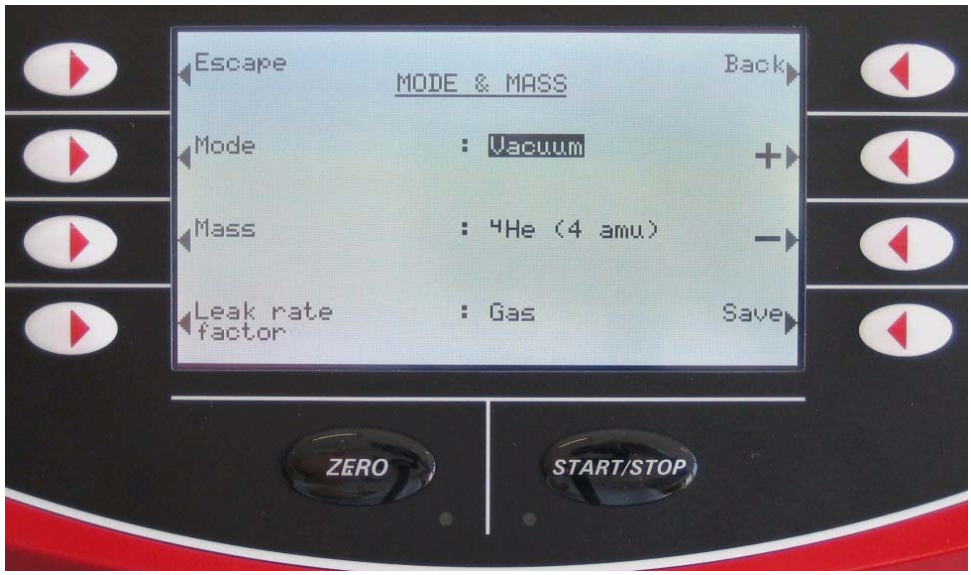



Fig. 6-10 View of the ”Mode & mass“ setting in the display

- Select the desired option with the softkeys on the right and left of the screen.
- Change the value with the "+" and "-" keys, prolonged pressing causes the parameters to be run through automatically.
- Save the new value with "Save" or
- Go back one level with "Back" or to the measured value or ready to start display with "Escape".

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Mode | Vacuum | Vacuum mode |
| | Sniffing | Sniffing mode[1)] |
| Mass | $H_2$ (2 amu) | detectable gas $H_2$ |
| | $^3H$ (3 amu) | detectable gas $^3H$ |
| | $^4He$ (4 amu) | detectable gas $^4He$ |
| Leak rate factor | Factor 1E-6 ... 1E+6 | Leak rate is converted with user-defined factor |
| | Gas | Leak rate gas equivalent |
| | Air | Leak rate air equivalent |

[1)] Connect sniffing line before pressing START.

**Leak rate factor** converts the measured leak rate ($^4He$, $^3He$ or $H_2$) into:

- an equivalent leak rate of another gas or
- into an equivalent leak rate ($^4He$, $^3He$ or $H_2$) under different flow conditions to those of the molecular flow.

Under molecular flow conditions the leak rate only depends on the mass of gas.

*Example*

We measure the test gas helium 4 and want to display the leak rate for air:

$$LR_{Air} = LR_{He} \times \sqrt{\frac{Mass_{He}}{Mass_{Air}}} = LR_{He} \times \sqrt{\frac{4}{28.964}} = LR_{He} \times 0.327$$

With **leak rate factor air** the leak rate is converted according to the equation with the mass of the test gas (4, 3 or 2) to an equivalent leak rate for air under molecular conditions.

Other gases:

Factors for other gases, e.g. R134a, are obtainable from Pfeiffer-Vacuum.

## 6.3 Measure

### 6.3.1 Measure with a test item

The instrument is ready to detect leaks as soon as it displays **Ready to start:**

- Select the desired measuring mode

  Mode: **Vacuum** or **Sniffing**
- Check whether the parameters displayed in the Start menu are applicable.

#### *6.3.1.1 Vacuum mode*

Remove the blank flange from the inlet port and connect the test item.
Press the START / STOP button of the operating unit to start the measurement.
The test item will be evacuated and the pressure displayed during the pumping process.
After achieving the pressure for the measurement the measured value display appears (chapter 6.3.1) and starting with an appropriate background signal (<1E-09 mbarl/s) the test item can be charged with helium.
The leak rate of the test item will be shown in the display.
Press the START / STOP button again to stop the measurement.
The SmartTest goes back into Ready to Start; the test item will be vented and can be removed from the inlet port.

#### *6.3.1.2 Sniffing mode*

Seal the inlet port with a blank flange and connect the optional sniffing probe LP 5xx. See chapter 5.3.1.
Press the START / STOP button of the operating unit to start the measurement.
The leak rate in the now shown measured value display should adjust to <5E-06 mbarl/s (helium fraction of the air).
The helium charged test item can now be leak checked with the sniffing probe.
The appropriate leak rate of the test item will be shown in the display.
Press the START/STOP button again to stop the measurement.
The SmartTest goes back into Ready to Start and the test item will be vented.

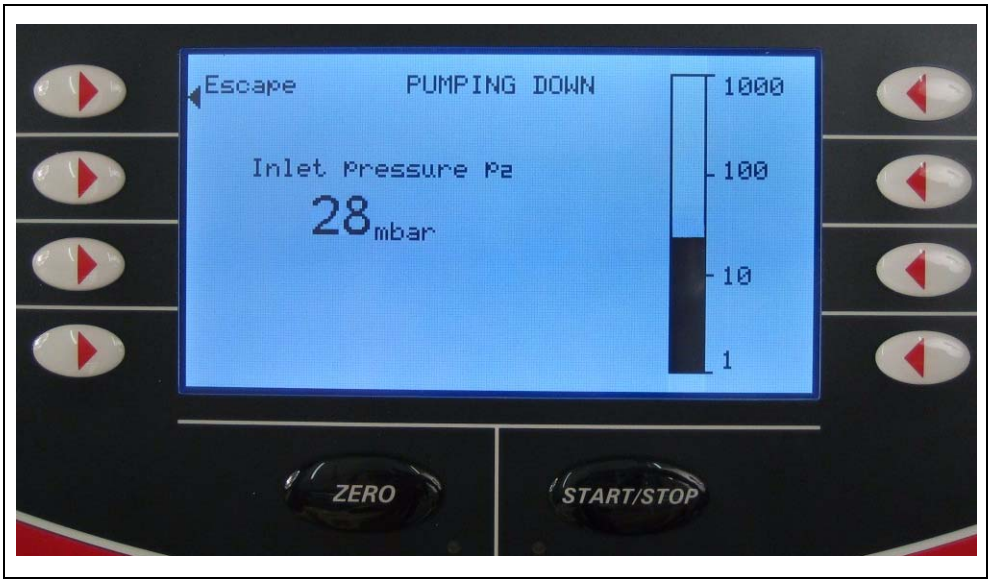



Fig. 6-11 Pump fore-vacuum

The pressure during the pump down process is displayed.

## 6.3.2 Measured Value Display

On reaching the measuring pressure, the measured value display appears with the display type last used:

- analog/digital with bar display and large numbers or
- graphically as a function of the measuring time or
- You can switch between analog/digital display and the graphic display with the softkey "Bottom right". This alternately bears the analog display or graphic display symbol.

*Analog / digital display*

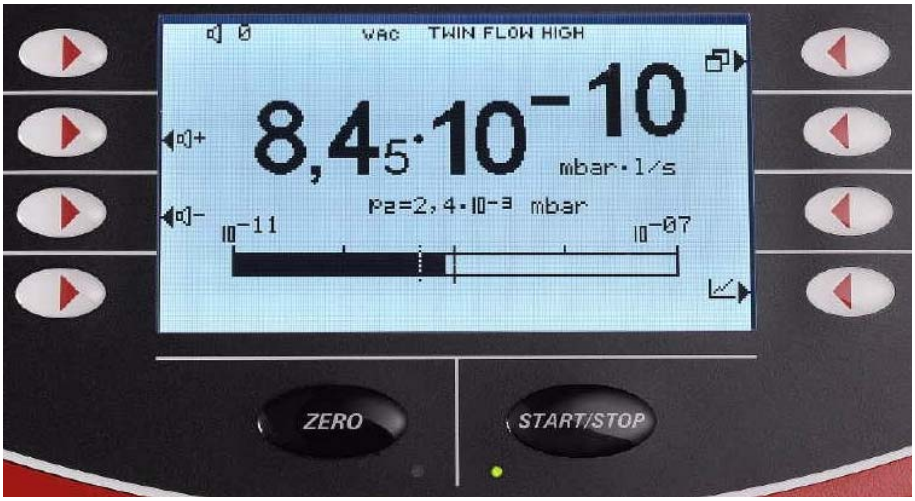



Fig. 6-12 Analogue Display / Digital Display (manual scaling)

*Graphic display*

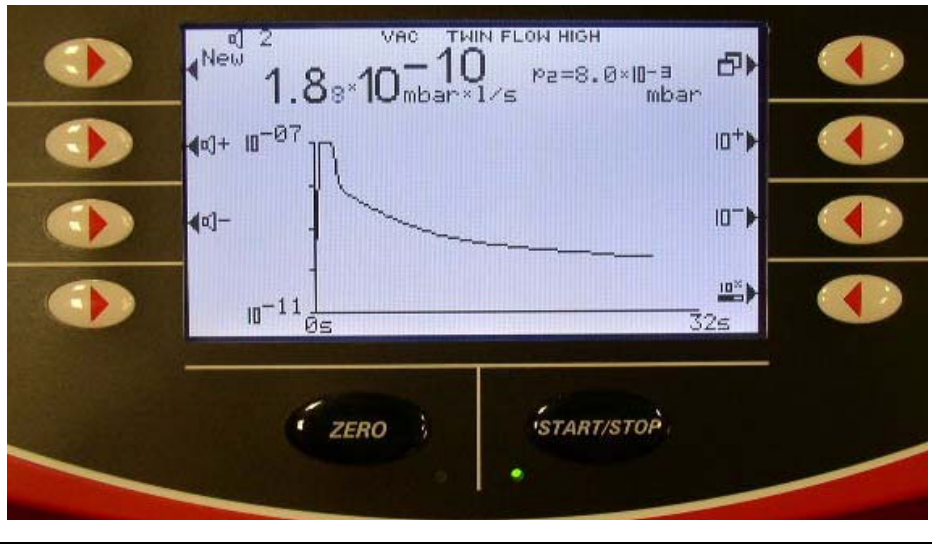



Fig. 6-13 Graphic display (automatical scaling)

You can restart the graph with the softkey **New**.

### 6.3.3 Display Range Settings

You can select the measuring range with the keys ″+″ and ″-″. Only appears if the **Range-manual** (See Chapter 6.4.1.4) option has been selected in the **Display range** menu.
In case of automatic range selection in the **Display range** menu, the measuring range is adapted to the measuring result by selecting the **Range-automatic** option, so that this is always in the display range. See Chapter 6.4.1.4.

### 6.3.4 Volume

Press the softkeys ″ **+**″ or ″ **-**″
Concern also to Chapter 6.4.4.6.3, Minimum Volume.

## 6.4 Setup

You can go to the **Setup** menu by pressing the "*Setup*" softkey in any menu which displays it.

**Note**

Observe the detailed instructions for handling the keys in this and the following two chapters. Thereafter only menus, parameters and value tables are described.


Fig. 6-14 View of the "Setup" extended setting in the display

- Select the desired option with the softkeys on the right and left of the screen.

## 6.4.1 View

Select
*Setup* ⇨ *View*


Fig. 6-15 View of the “View” setting in the display

- Select the desired option with the softkeys on the right and left of the screen.

### 6.4.1.1 Contrast

Select
*Setup* ⇨ *View* ⇨ *Contrast*


Fig. 6-16 View of the ″Contrast″ setting in the display

- Select the desired option with the softkeys on the right and left of the screen.
- Change its value with the ″+″ and ″-″keys, prolonged pressing causes the parameters to be run through automatically.
- Save the new value with ″*Save*″ or
- Go back one level with ″*Back*″ or to the measured value or ready to start display with ″*Escape*″.

| **Option** | **Value range (Min. / Max.)** | **Description** |
|---|---|---|
| Contrast | 0 ... 99 | Display contrast |
| Invert display | | Switchover display to representation |

### 6.4.1.2 Units

Select
*Setup* ⇨ *View* ⇨ *Units*

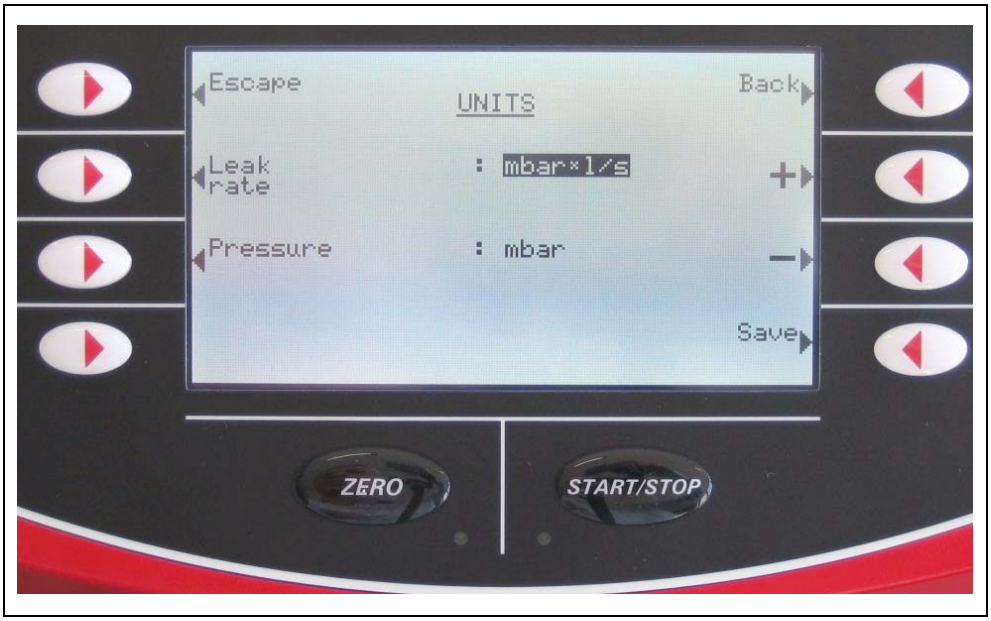



Fig. 6-17 View of the "Units" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Leak rate | mbar *l/s | |
| | Pa*m$^3$/s | |
| | Torr*l/s | |
| | sccm | |
| | sccs | |
| | atm*cc/s | |
| | ppm | (only selectable in "Sniffing" mode) |
| | g/a | (only selectable in "Sniffing" mode) |
| | oz/yr | (only selectable in "Sniffing" mode) |
| Pressure | mbar | |
| | Pa | |
| | atm | |
| | Torr | |

### 6.4.1.3 Time & Date

Select
*Setup* ⇨ *View* ⇨ *Time & Date*


Fig. 6-18 View of the "Time & Date" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Date | e.g. 25th Jan. 2011 | Date: Days 1 - 31<br>Month: Jan. - Dec.<br>Year: 1998 - 2097 |
| Time | e.g. 15:12 | Time: Minutes 00 - 59<br>Hours: 00 - 23 |

### 6.4.1.4 Display Range

Select
*Setup* ⇨ *View* ⇨ *Display Range*

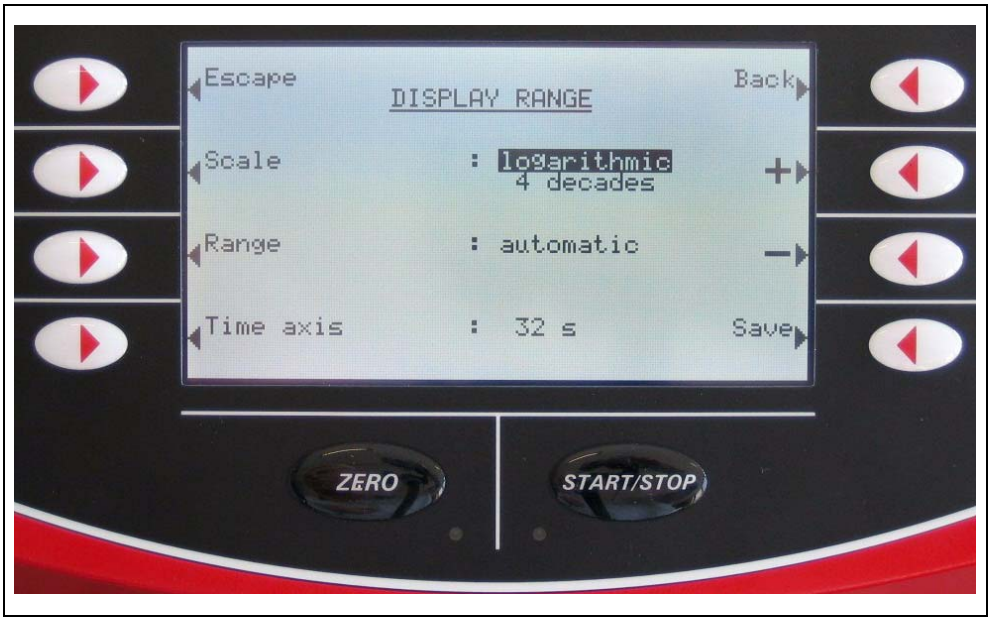



Fig. 6-19 View of the "Range" setting in the display

| **Option** | **Value range (Min. / Max.)** | **Description** |
|---|---|---|
| Scaling | linear | Display linear |
| | log | Display logarithmic |
| dec. | 2 ... 9 | Number of decades in log. display |
| Range | automatic | automatic range selection |
| | manual | manual range selection |
| Time axis | 16 ... 960 | Time axis, time scale in seconds |

### 6.4.1.5 Lower Display Limit

Select
*Setup* ⇨ *View* ⇨ *Display Limit*

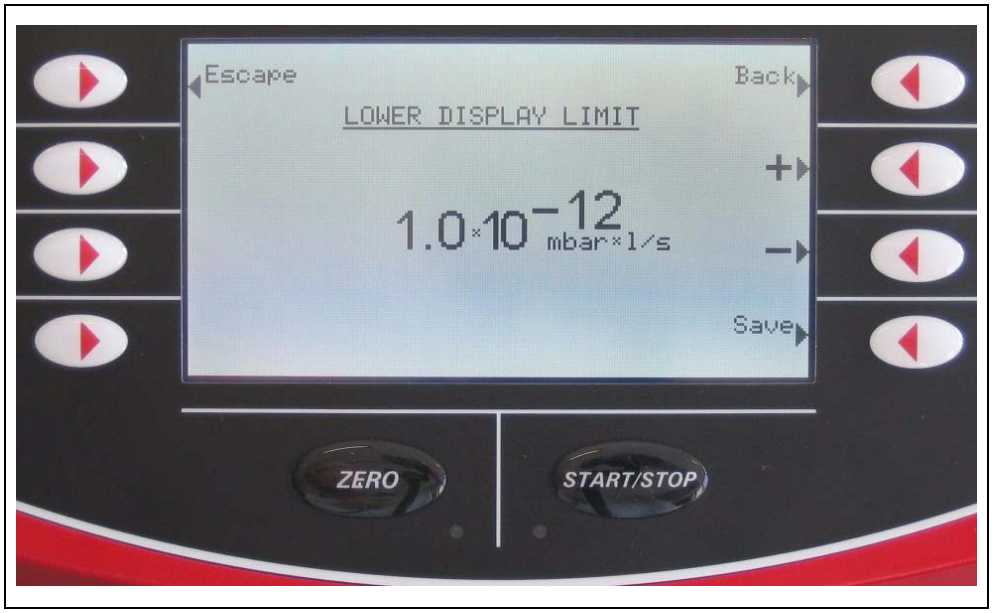



Fig. 6-20 View of the "Lower display limit" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Lower display limit | for unit mbar*l/s:<br>1E-12 mbar*l/s<br>1E-11 mbar*l/s<br>1E-10 mbar*l/s<br>1E-9 mbar*l/s | This setting limits the display of the leak rate downwards in measuring mode. It is only effective for the vacuum mode. |

#### 6.4.1.6 Background at “Ready to Start”

Select
*Setup ⇨ View ⇨ Background at “Ready to Start”*

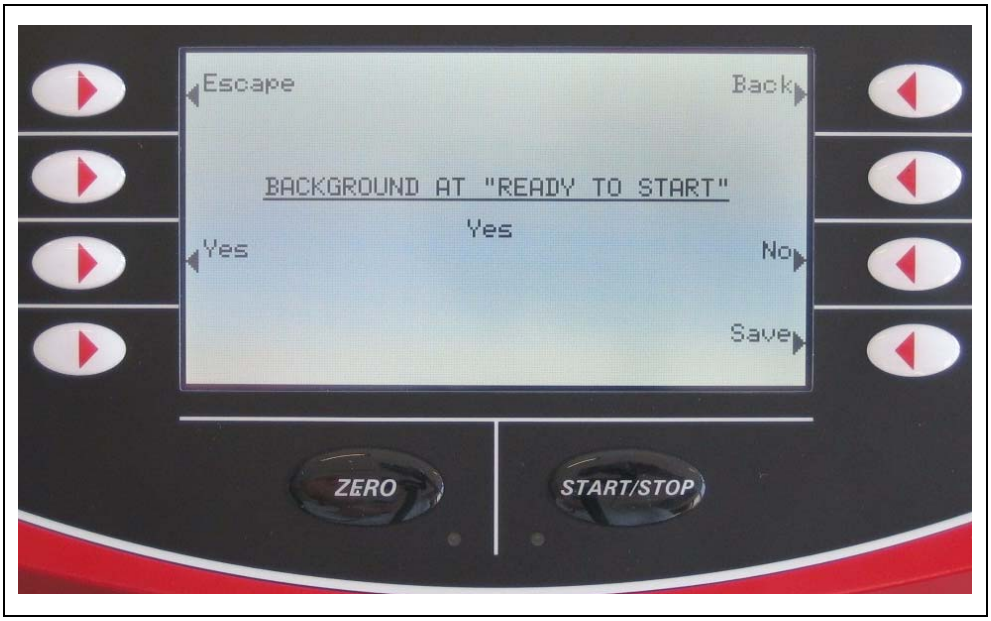



Fig. 6-21 View of the ”Ready to start” setting in the display

### 6.4.2 Access Control

Select
*Setup ⇨ Access Control*

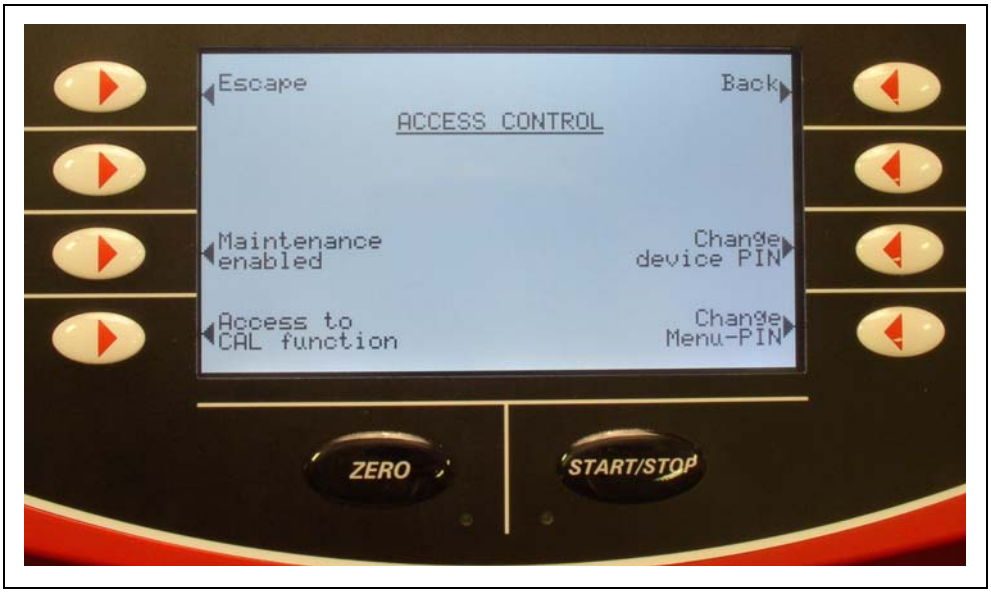



Fig. 6-22 View of the ”Access Control” setting in the display

### 6.4.2.1 Change Menu-PIN

Select
*Setup* ⇨ *Access Control* ⇨ *Change Menu PIN*

Confines / allows to access the software menu. Exception: The menu Information is always available (See Chapter 6.4.6).
Access to the menu can be restricted by entering or changing the personal identification number (PIN). When you leave the menu the access will be restricted after 2 minutes automatically. The PIN is not checked if it is set to 0000.
Remember the PIN you have entered well. When you have entered a wrong PIN the message “Wrong PIN” will appear. If you forget your PIN please contact Pfeiffer Vacuum.

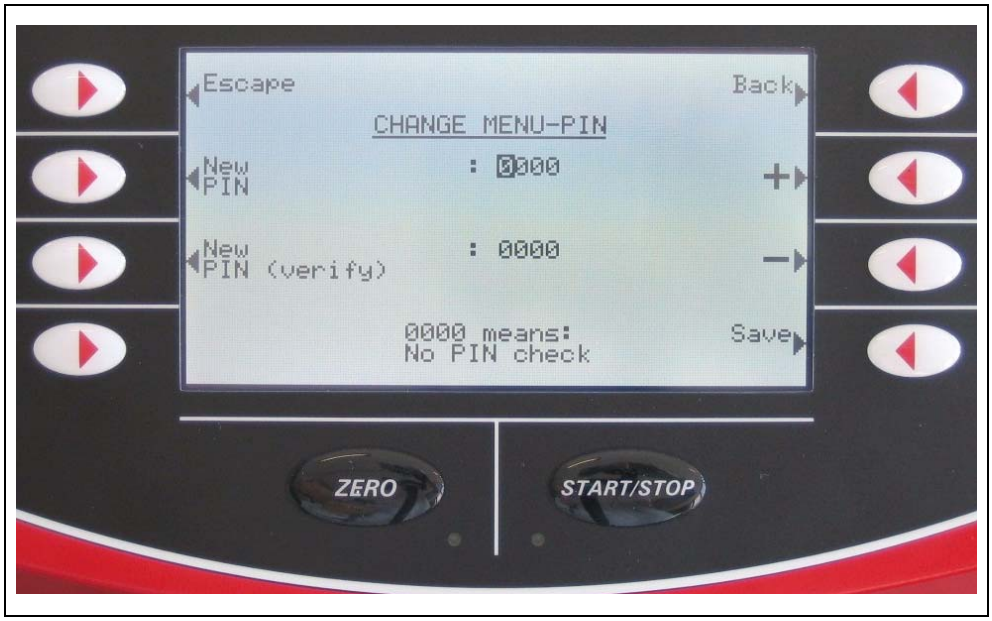



Fig. 6-23

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| New PIN | 0000 - 9999 | New menu PIN |
| New PIN (verify) | 0000 - 9999 | New menu PIN (repeat for confirmation) |

### 6.4.2.2 Change Device PIN

Select
*Setup* ⇨ *Access Control* ⇨ *Change Device PIN*

Confines / allows to use the leak detector.
Access to the leak detector can be restricted by entering or changing the personal identification number (PIN). If the instrument PIN is not 0000, the leak detector asks for the PIN immediately after being switched on. The leak detector cannot be used without entering the correct number.
Remember the PIN you have entered well.
When you have entered a wrong PIN the message “Wrong PIN” will appear. If you forget your PIN please contact Pfeiffer Vacuum

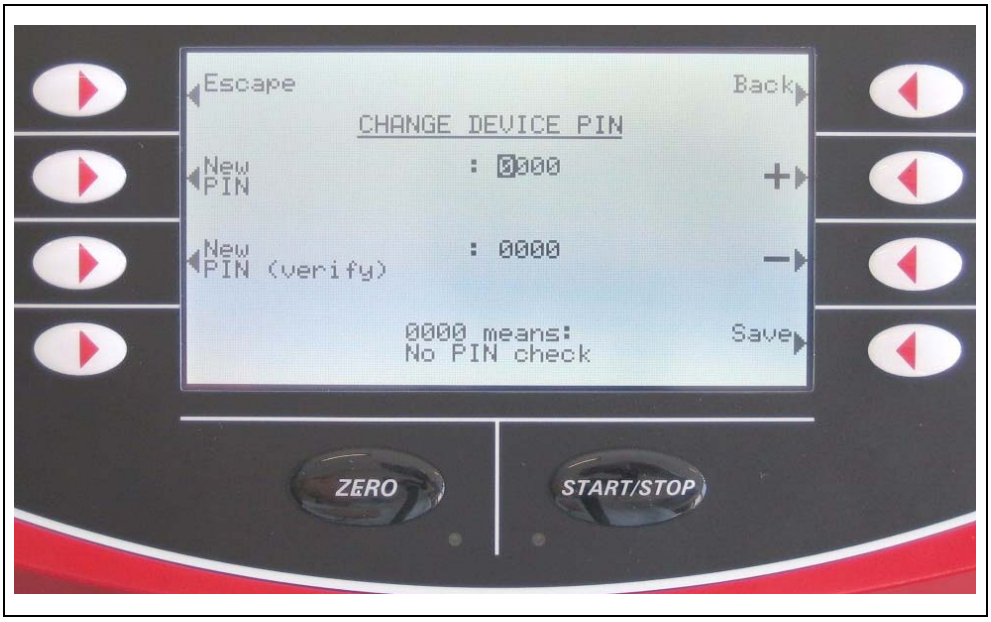



Fig. 6-24 View of the ”Change instrument PIN” setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| New PIN | 0000 - 9999 | New instrument PIN |
| New PIN (verify) | 0000 - 9999 | New instrument PIN (repeat for confirmation) |

### 6.4.2.3 Calibration Enabled

Select
*Setup* ⇨ *Access Control* ⇨ *Calibration Enabled*

Authorises for calibration of the leak detector.

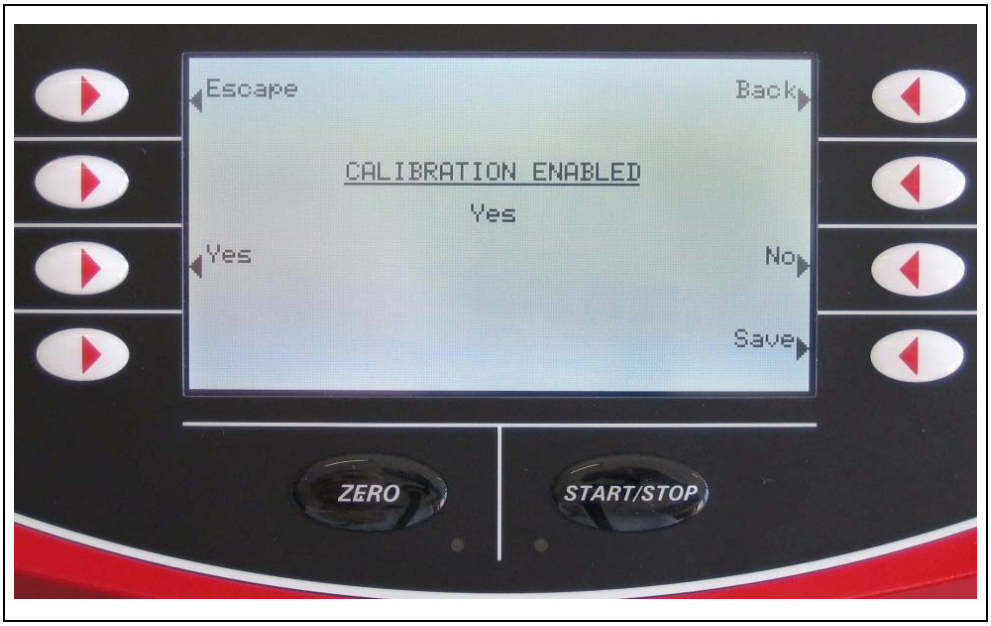



Fig. 6-25 View of the "Enable calibration" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Enable calibration | Yes | The calibration can be started from the *"Ready to start"* menu |
| | No | Calibration **cannot** be started from the instrument operating unit. |

### 6.4.2.4 Enable maintenance

Select
*Setup* ⇨ *Access Control* ⇨ *Enable maintenance*

Enables the user to use the maintenance menu and the venting of the TMP for changing the lubricant.

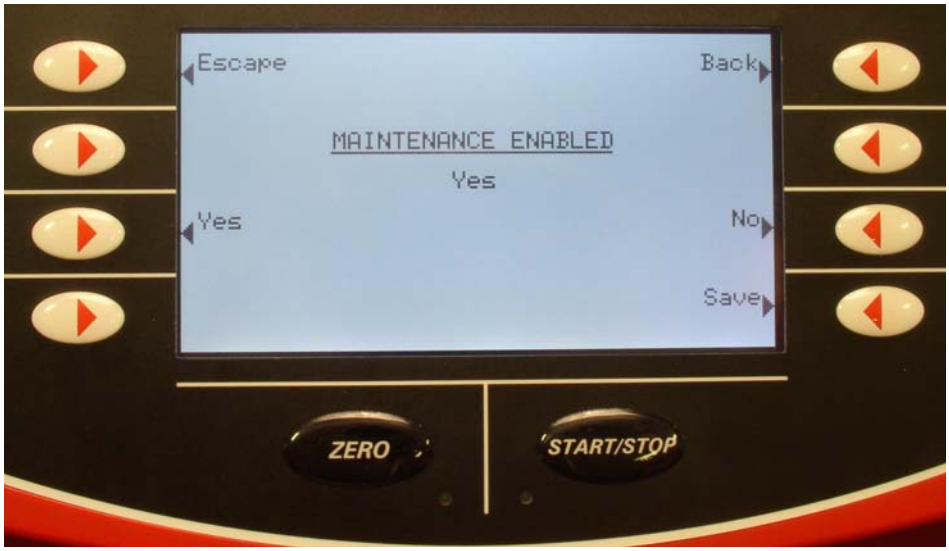



Fig. 6-26 Maintenance enabled

| | | |
|---|---|---|
| Enable maintenance | Yes | The menu page Maintenance & Service is enabled. When running-up the TMP can be vented. |
| | No | The menu page Maintenance & Service will be blanked. When running-up the TMP cannot be vented. |

## 6.4.3 Language

Select
*Setup* ⇨ *Language*

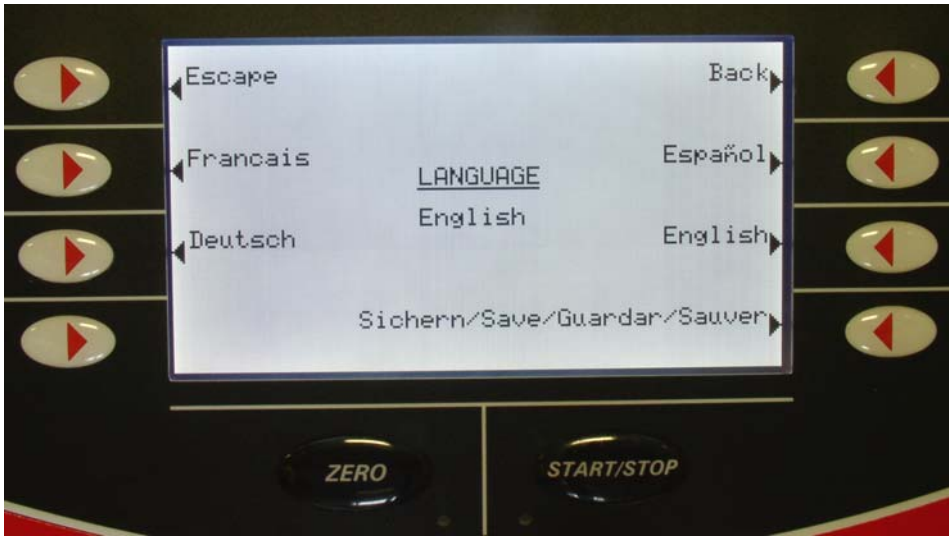



Fig. 6-27 View of the "Language" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Language | English | Operating language English |
| | German | Operating language German |
| | French | Operating language French |
| | Spanish | Operating language Spanish |

## 6.4.4 User Settings

Select
*Setup* ⇨ *User Settings*

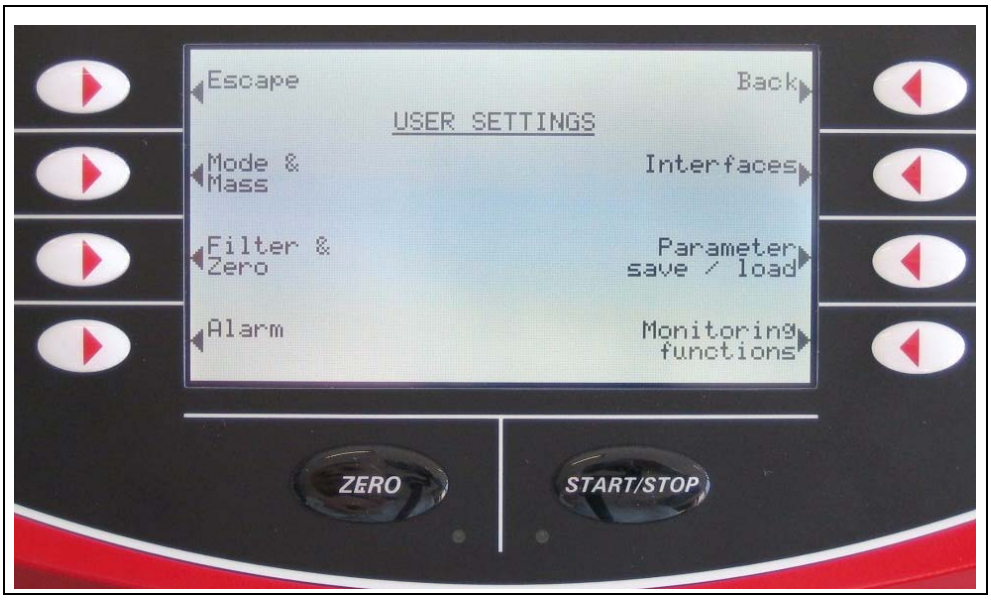



Fig. 6-28 View of the "User" setting in the display

### 6.4.4.1 Mode & Mass

Select
*Setup* ⇨ *User settings* ⇨ *Mode & Mass*

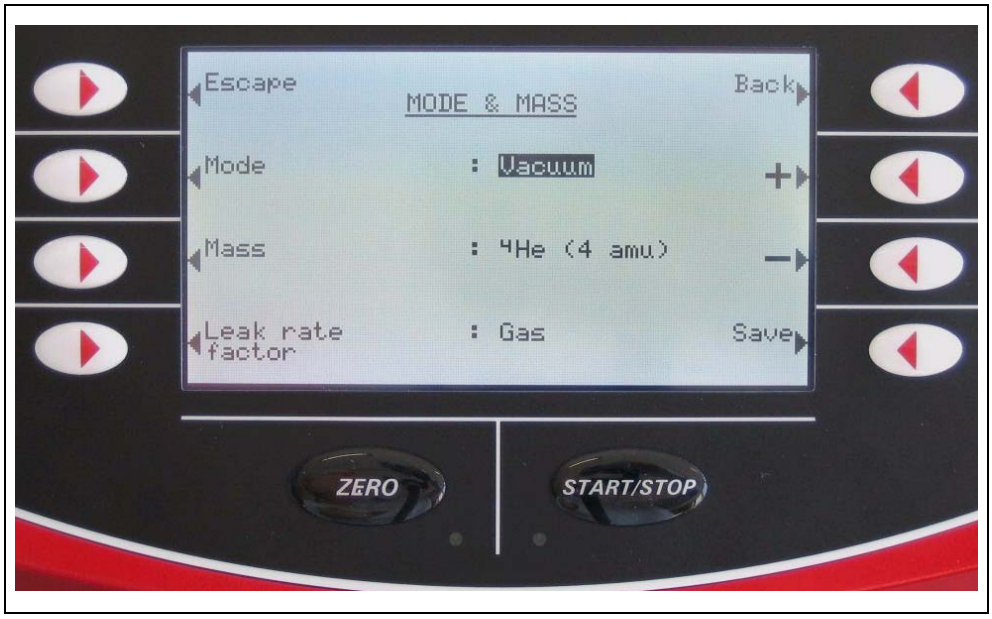



Fig. 6-29 View of the "Mode & mass" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Mode | Vacuum | Vacuum mode |
| | Sniffing | Sniffing mode[1)] |
| Mass | $H_2$ (2 amu) | detectable gas $H_2$ |
| | $^3H$ (3 amu) | detectable gas $^3H$ |
| | $^4He$ (4 amu) | detectable gas $^4He$ |
| Leak rate factor | Factor 1E-6 ... 1E+6 | Leak rate is converted with user-defined factor |
| | Gas | Leak rate gas equivalent |
| | Air | Leak rate air equivalent |

[1)] Connect sniffing line before pressing START.

**Leak rate factor** converts the measured leak rate ($^4He$, $^3He$ or $H_2$) into:

- an equivalent leak rate of another gas or
- into an equivalent leak rate ($^4He$, $^3He$ or $H_2$) under different flow conditions to those of the molecular flow.

Under molecular flow conditions the leak rate only depends on the mass of gas.

*Example*

We measure the test gas helium 4 and want to display the leak rate for air:

$$LR_{Air} = LR_{He} \times \sqrt{\frac{Mass_{He}}{Mass_{Air}}} = LR_{He} \times \sqrt{\frac{4}{28.964}} = LR_{He} \times 0.327$$

With **leak rate factor air** the leak rate is converted according to the equation with the mass of the test gas (4, 3 or 2) to an equivalent leak rate for air under molecular conditions.
Other gases:
Factors for other gases, e.g. R134a, are obtainable from Pfeiffer-Vacuum.

### 6.4.4.2 Filter & Zero

Select
*Setup ⇨ User settings ⇨ Filter & Zero*

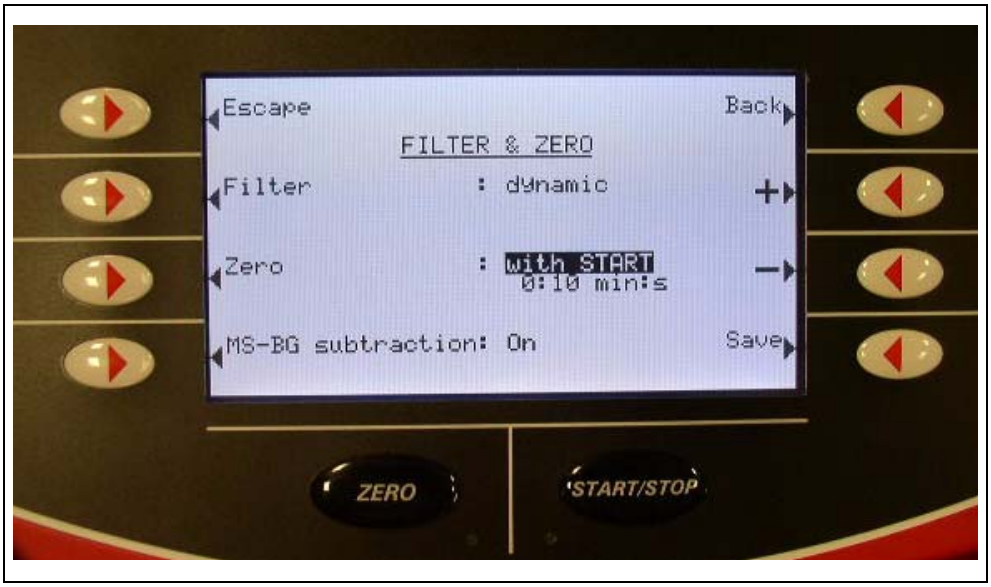



Fig. 6-30 View of the "Filter & Zero" setting in the display

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Filter | dynamic | Leak rate filter with dynamic adaptation of the time constant |
| | static | Leak rate filter with fixed time constant |
| | without | No leak rate filter |
| Zero | locked | Manual background suppression locked |
| | released | Manual background suppression released |
| | at START<br>min:sec<br>2 s / 5 min | When the sensitive and released measuring range is reached, ZERO is executed immediately after the specified time |
| | constant | Subtracts a zero value saved once by pressing the Zero key from the raw signal.<br>The automatic background suppression is locked.<br>The zero value is retained after pressing the Stop key.<br>Pressing the Zero key again overwrites the zero value.<br>The zero value is set to "0" at Power-Off, deactivation of the zero function by pressing the zero button more than 3 s or changing the zero function. |

| | | |
|---|---|---|
| MS-BG subtraction Not available in option “Zero constant” | on | The internal mass spectrometer background is subtracted at START.<br>The internal background is generated by residual gas (e. g. Helium) that has not been pumped away yet. Sources for residual gas are air or absorbed gases from the inner surfaces of the leak detector. This internal background will never disappear totally. Very clean systems which have been pumped for a long time will show a background in the $10^{-11}$ mbar l/s range. Under normal conditions the background level is in the $10^{-10}$ mbar l/s or low $10^{-9}$ mbar l/s range.<br>When pressing START the current internal background is subtracted from all further measured signals automatically. Thus it is made sure that only the net leak rate from the part under test is measured.<br>When switched to START / STOP mode again a new internal background is calculated after 25 s. |
| | off | The internal mass spectrometer background (MS-BG) is not subtracted at START.<br>See description “on”. |

**Warning**

Zero constant function:
The automatic background suppression is not active. The zero value is retained after pressing the Stop key. This may mean that some leaks may not be detected.

An active suppression of the underground will be displayed (Fig. 6-12/Fig. 6-13) in the status line as follows:

| | |
|---|---|
| ZERO | appears after pressing the zero button shortly in the zero option “released” or “with start” |
| ZERO START | appears after the provided time has passed in the zero option “with start” |
| ZERO CONSTANT | appears after pressing the zero button shortly in the zero option “constant” |

For further information on Zero constant function see Chapter 3.5.

### 6.4.4.3 Alarm

Select
*Setup ⇨ User Settings⇨ Alarm*

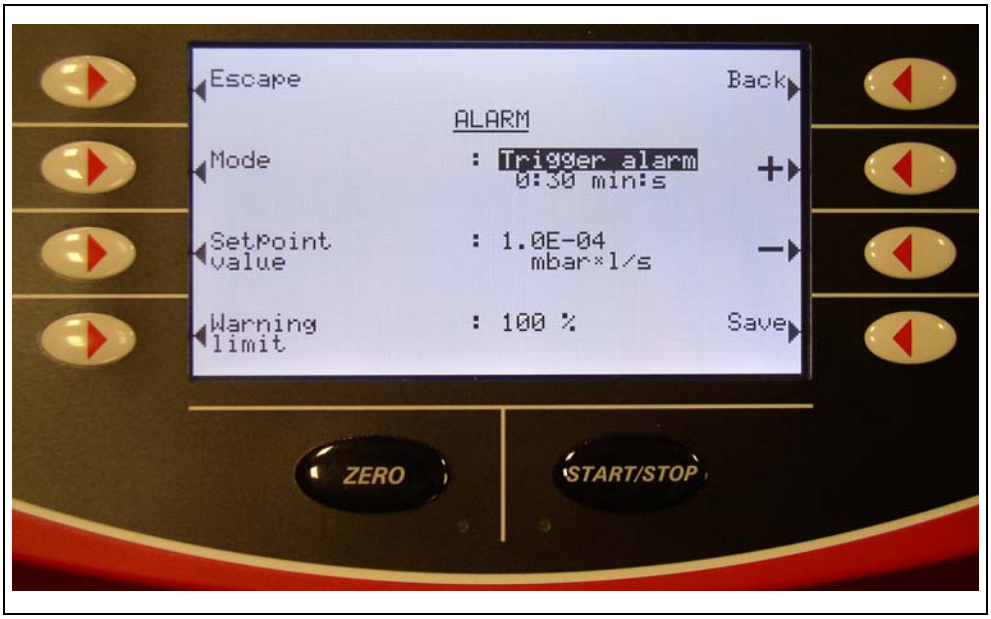



Fig. 6-31

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Mode | Prop. leak rate | The frequency of the acoustic signal is proportional to the bar display.<br>The frequency range is 300 Hz to 3300 Hz. |
| | Trigger Alarm<br>0 min / 4.5 min | No tone is emitted if the leak rate is smaller than the warning limit.<br>A continuous tone is emitted if the leak rate is greater than the warning limit and smaller than the setpoint value.<br>A multi-frequency signal is generated as soon as the leak rate exceeds the setpoint value. The signal remains even when the leak rate changes.<br>An alarm delay time can be entered additionally (see below). |
| | Setpoint<br>0 min / 4.5 min | No tone is emitted if the leak rate is smaller than the warning limit.<br>A continuous tone is emitted if the leak rate is greater than the warning limit.<br>A tone with a frequency proportional to the leak rate is emitted as soon as the leak rate exceeds the setpoint value.<br>A continuous tone is emitted if the leak rate is greater than 100*setpoint value.<br>An alarm delay time can be entered additionally (see below). |

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Mode | Pinpoint | The frequency of the acoustic signal is proportional to the leak rate between 0.1*setpoint value and 10*setpoint value.<br>A constant low tone is emitted if the leak rate is lower than 0.1*setpoint value.<br>A constant high tone is emitted if the leak rate is greater than 10*setpoint value. |
| Setpoint value | 1E-12...9.9E+2 mbar l/s | Alarm setpoint value |
| Warning limit | 1...100% | Warning limit as percentage of the setpoint value |

In some applications (for example during the pump down of a "test chamber system") it may be necessary to suppress an alarm for some time after pressing the START key.
After pressing the START key the acoustic signal can be activated: as soon as the leak rate is lower than the warning limit or when the alarm delay has proceeded or when the type of alarm "Prop. leak rate" i.e. "Pinpoint" or the sniffer mode is adjusted.

### 6.4.4.4 Interfaces

Select
*Setup* ⇨ *User Settings* ⇨ *Interfaces*
**Interfaces** enables selection of the displayed sub-menu.

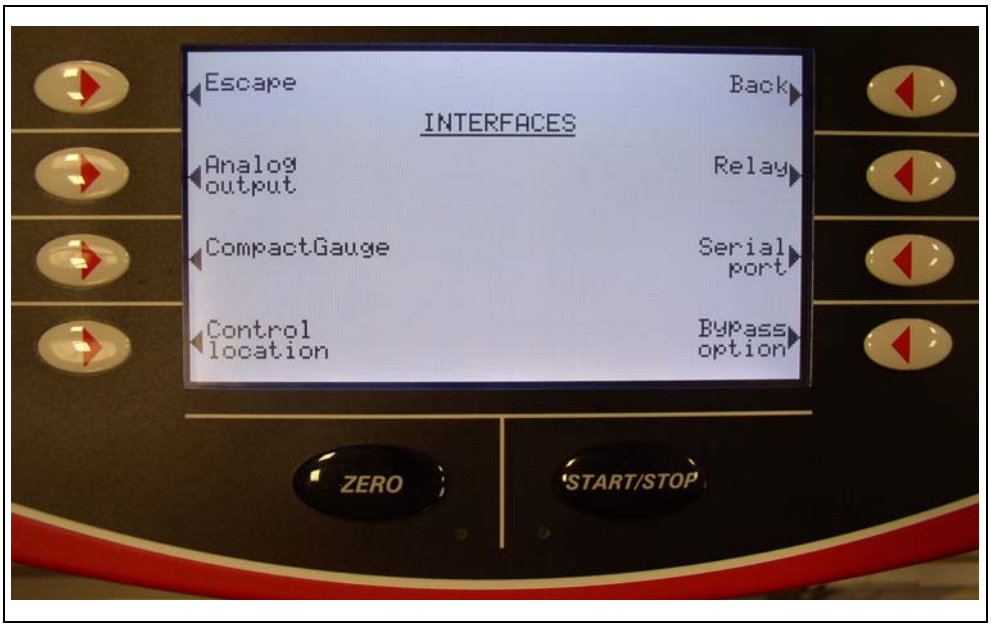



Fig. 6-32 Interfaces

### 6.4.4.4.1 Analog Output

*Select*
*Setup ⇨ User Settings ⇨ Interfaces ⇨ Analog Output*

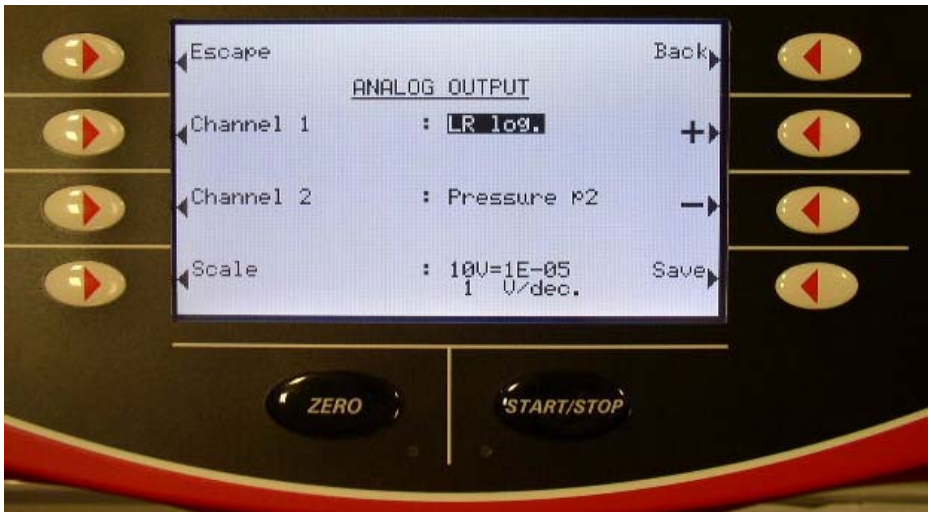



Fig. 6-33

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Channel 1 | Off | Channel 1 is switched off (0 V) |
| | Pressure p2 | The inlet pressure p2 is output on channel 1. (See pirani characteristic in appendix) |
| | Pressure p1 | The fore-vacuum pressure p1 is output on channel 1. (See pirani characteristic in attachment) |
| | LR mantissa | The leak rate mantissa is output linearly from 1…10 V (i.e. 5.4 x $10^{-7}$ mbar l/s is according to 5.4V) |
| | LR exponent | The exponent is output as a step function: U = 1…10 V in steps of 0.5 V per decade starting with 1 V = 1x$10^{-12}$ (i.e. 5.4 x $10^{-7}$ mbar l/s is according to 3.5V). |
| | LR linear | The leak rate is put out linearly from 0…10 V. 10 V are analogue to the “upper limit” in scaling. The upper limit (=10V) is forced through the adjustment “scalling → upper limit” (see below). Example: 5.4 x $10^{-7}$ mbar l/s and the upper limit are according to 5.4V. |

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Channel 1 | LR log. | The output voltages are scaled logarithmically. The output voltage is 0…10 V in adjustable steps of 0.5 V to 10 V per decade (see Scaling setting). The upper limit (=10V) is forced through the adjustment "scaling → upper limit" (see below). The pitch is forced through "scaling → V/decade". Example: 1 x $10^{-7}$ mbar l/s, upper limit 1 x $10^{-6}$ mbar l/s and 2V/decade is according to output voltage 8V. |
| | Pressure p(ext) | The voltage of the external gauge head is emitted. For converting the pressure of the pressure / voltage see Operating Instructions of the compact gauge head. |
| Channel 2 | see channel 1 | analog with channel 1 |
| Scale | upper limit: 1E-11 ... 1E+6 | upper limit (=10 V) for setting "LR log" and "LR linear". |
| | V/decade: 0,5, 1, 2, 2,5, 5, 10 | Volt per decade for setting "LR log". |

### 6.4.4.4.2 Compact Gauge

*Setup ⇨ User Settings ⇨ Interfaces ⇨ Compact Gauge*

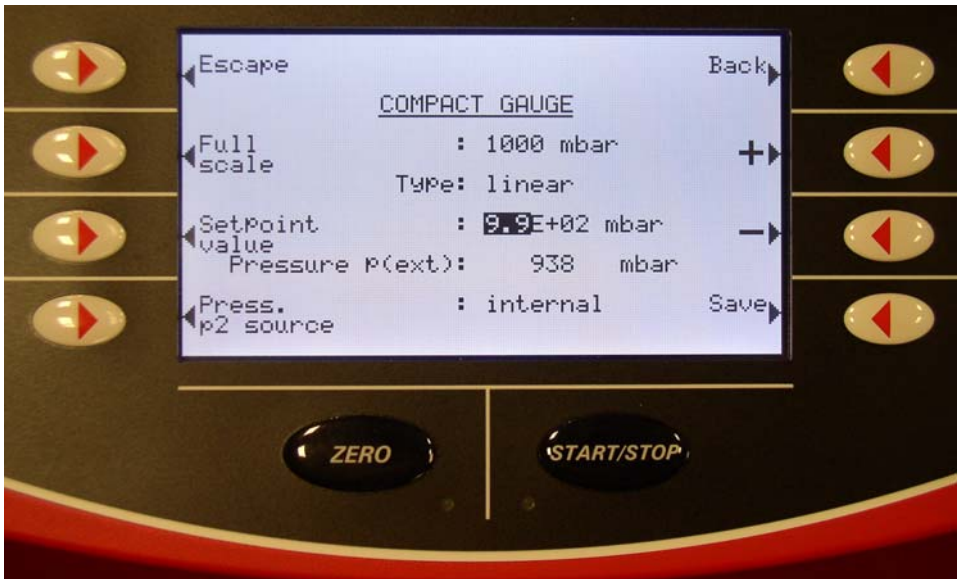



Fig. 6-34 Compact Gauge

| Option | Value range (Min. / Max.) | Description with variable time constant |
|---|---|---|
| Full deflection (only in linear gauge heads) | 0.1 mbar<br>1 mbar<br>10 mbar<br>100 mbar<br>1000 mbar<br>2000 mbar<br>5000 mbar<br>10000 mbar<br>50000 mbar | Set the full deflection value (F.S.) according to the rating plate of the gauge head. |
| Threshold value | 1E-10...9.9E+2 mbar | The threshold value for relay output |
| Pressure p2 source | external | The inlet pressure is determined by an external pressure measuring point. |
| | internal | The inlet pressure is determined by an internal pressure measuring point. |

In addition the type of the currently connected gauge head is displayed under "Type" and the measured value of the gauge head under "Pressure p(ext)".

The pressure value for the gauge head type TPR / PCR is only shown below 1000 mbar. Pressures of more than 1000 mbar are shown as >1000 mbar in the display.

Usable compact gauge heads, see appendix.

**Note**

PBR and IMR may **not** be connected because of the increased power requirement.

### 6.4.4.4.3 Control Location

Select
*Setup* ⇨ *User Settings* ⇨ *Interfaces* ⇨ *Control Location*

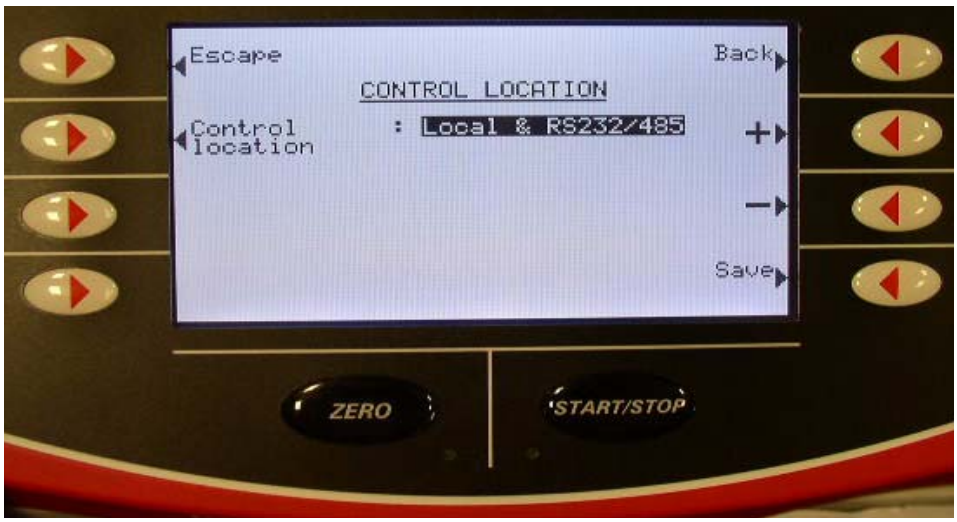



Fig. 6-35 View of the "Control location" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Control location | Local | The HLT5xx is controlled by the START, STOP and ZERO keys. |
| | Local and RS232 / RS485 | The HLT5xx is controlled both by the START / STOP and ZERO keys on the instrument and via the RS232 / RS485 interface. |
| | RS232 / RS485 | The HLT5xx is controlled via the RS232 / RS485 interface by an external computer. The START / STOP and ZERO keys on the instrument are deactivated. |
| Control location | All | The HLT5xx is controlled both by the START / STOP and ZERO keys on the instrument and also via the digital inputs and the RS232/RS485-Interfaces. |
| | PLC | The HLT5xx is controlled via the digital input. The START / STOP and ZERO keys on the instrument are deactivated. |

### 6.4.4.4.4 Relay

*Setup ⇨ User Settings ⇨ Interfaces ⇨ Relay*

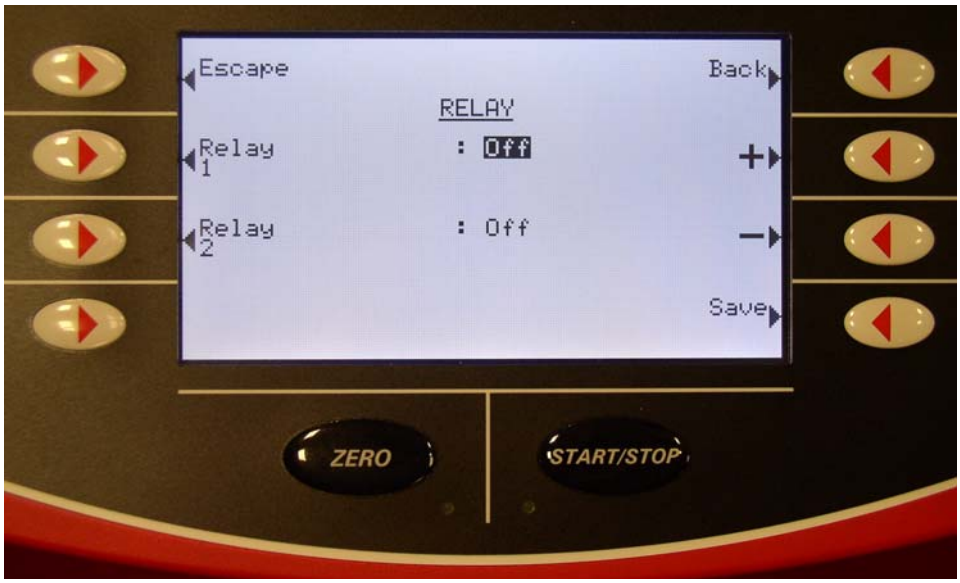



Fig. 6-36 Relay view of the "Relay" setting in the display
**Relay** allows independent settings for the two output relays.

| Parameter | Settings | Explanation |
|---|---|---|
| Relay 1 and Relay 2 | Off [1)] | Relay always dropped out |
| | Start | Relay activates when valve V2 opens and drops when valve V2 closes (→ Fig. 3-2). |
| | Stop | Relay activates when valve V6 opens and drops when valve V6 closes (→ Fig. 3-2). |
| | START / STOP | Relay activates at START and drops out at STOP. |
| | Ready | Relay activates when measuring |
| | Setpoint | Relay activates when the leak rate exceeds the setpoint value and drops out when it falls 10% below the threshold value (→ chapter 6.4.4.3). |
| | On [1)] | Relay always activated |
| | Warning limit LR | Relay activates when the leak rate exceeds the warning limit (→ chapter 6.4.4.3). |
| | Pressure setpoint | Relay pulls up when the pressure in the external gauge head is greater than its setpoint (→ chapter 6.4.4.4.2). |

[1)] The settings **off** and **on** are very suitable for checking the external relay switching. Connections → see appendix.

### 6.4.4.4.5 Serial Port

Select
*Setup* ⇨ *User Settings* ⇨ *Interfaces* ⇨ *Serial Port*

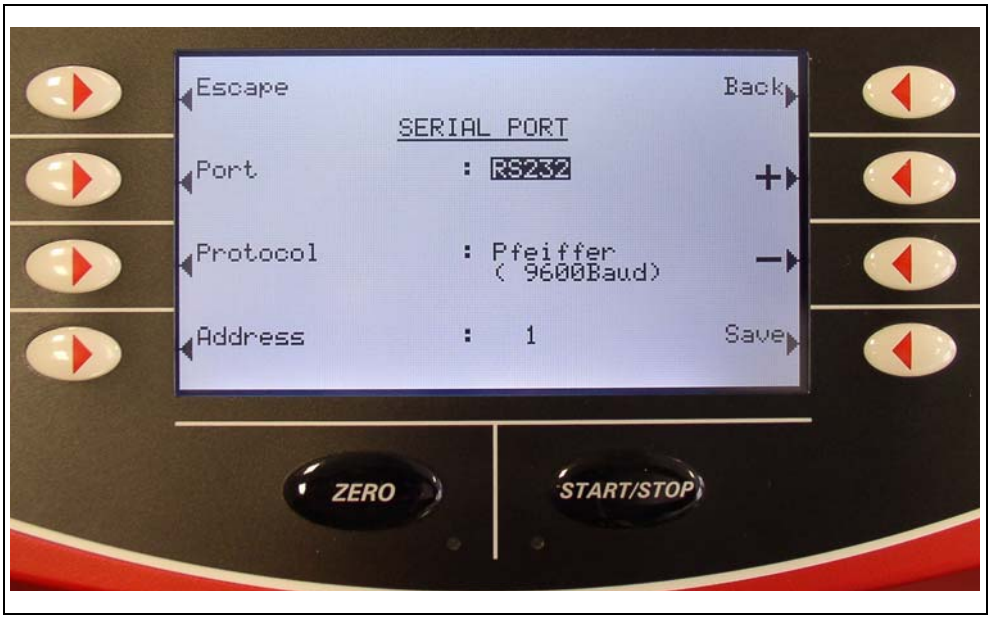



Fig. 6-37

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Interface | RS232 / RS485 | Selection whether the RS232 or the RS485 is to be used. |
| Protocol | HLT2xx | The interface protocol of the HLT2xx.<br>This protocol should only be used in applications in which the HLT5xx replaces a HLT2xx. This protocol only covers part of the functional scope of the HLT2xx so that no full compatibility between it and the HLT5xx is guaranteed. |
| Protocol | Pfeiffer | The Pfeiffer protocol |
| | Binary | The interface protocol for the instrument diagnosis. |
| Address<br>(only available in Pfeiffer Protocol) | 1 - 255 | Bus-address of the SmartTest in Pfeiffer-Protocol |
| Baudrate<br>(only available with HLT2xx protocoll) | 9600 or 19200 | Baudrate of SmartTest in HLT2xx protocoll. |

### 6.4.4.4.6 Bypass Option

Select
*Setup ⇨ User Settings ⇨ Interfaces ⇨ Bypass Option*

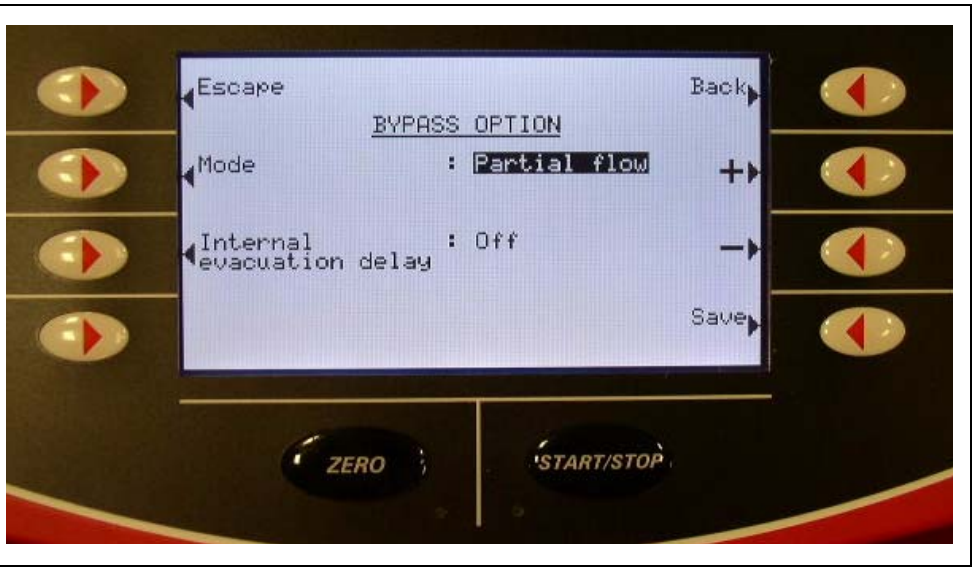



Fig. 6-38 View of the "Bypass option" setting in the display

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Mode | No bypass | see below |
| | Partial flow | see below |
| | Quick pump | see below |
| Internal pump-down delay | on | see below |
| | off | see below |

Explanations:

| Mode | Pump down without internal pump down delay | Measure without internal pump down delay | Pump down with internal pump down delay | Measure with internal pump down delay |
|---|---|---|---|---|
| No bypass | int. pump | int. pump | int. pump | int. pump |
| Quick pump | Partial flow pump + int. pump | int. pump | Partial flow pump | int. pump |
| Partial flow | Partial flow pump + int. pump | Partial flow pump + int. pump | Partial flow pump | Partial flow pump + int. pump |

### 6.4.4.5 Parameter save / load

Select
*Setup* ⇨ *User settings* ⇨ *Parameter save / load*

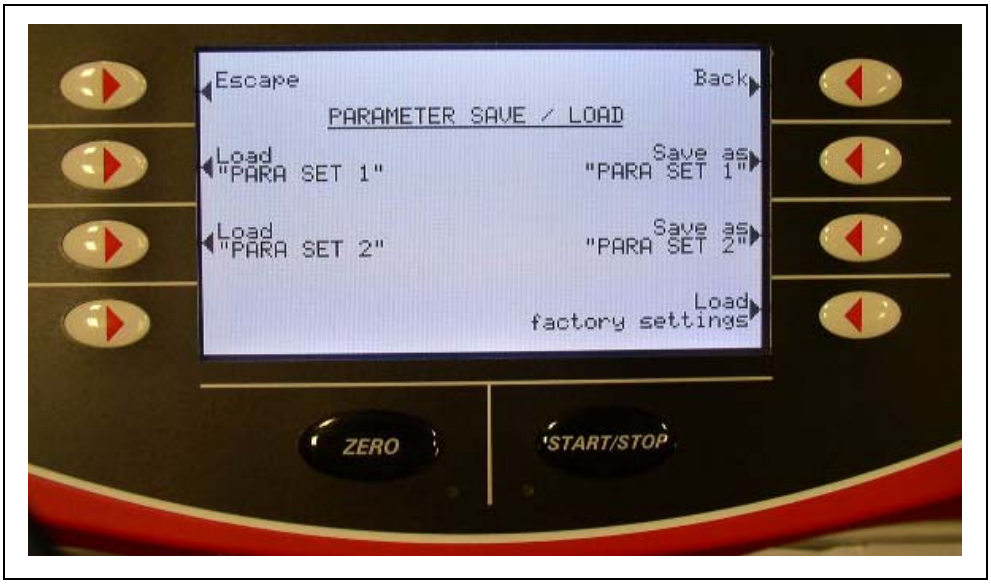



Fig. 6-39

### 6.4.4.5.1 Load PARA Set 1 / 2

Select
*Setup* ⇨ *User settings* ⇨ *Parameter save / load* ⇨
*Load PARA Set 1 / 2*

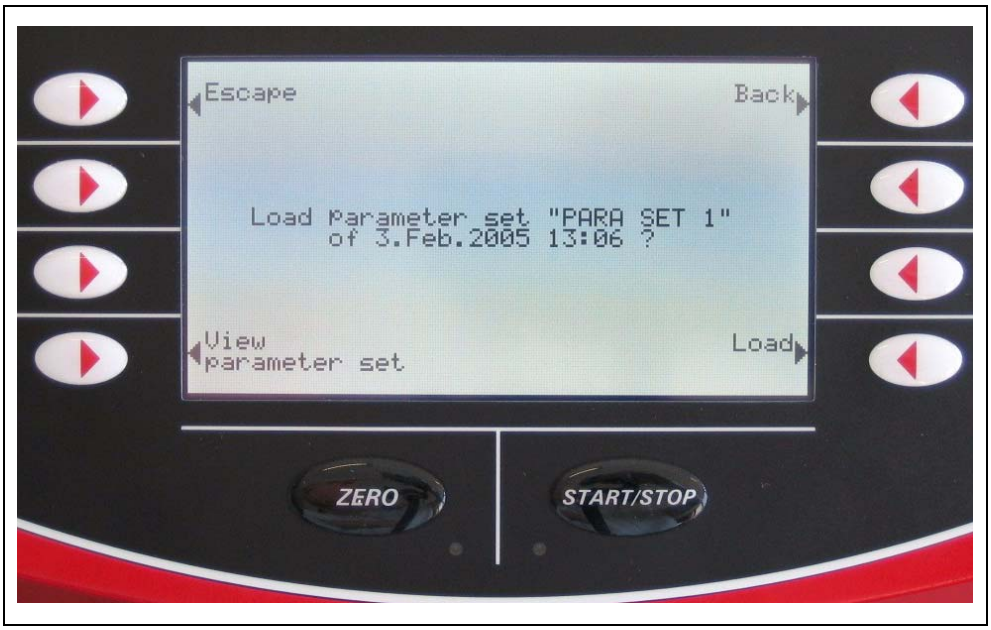



Fig. 6-40 Example Parameter set 1

The Softkey “View parameter set” leads to 4 more pages of parameter values of the parameter set.

### 6.4.4.5.2 Load Factory Settings

Select
*Setup ⇨ User Settings ⇨ Parameter save / load ⇨ Load Factory Settings*

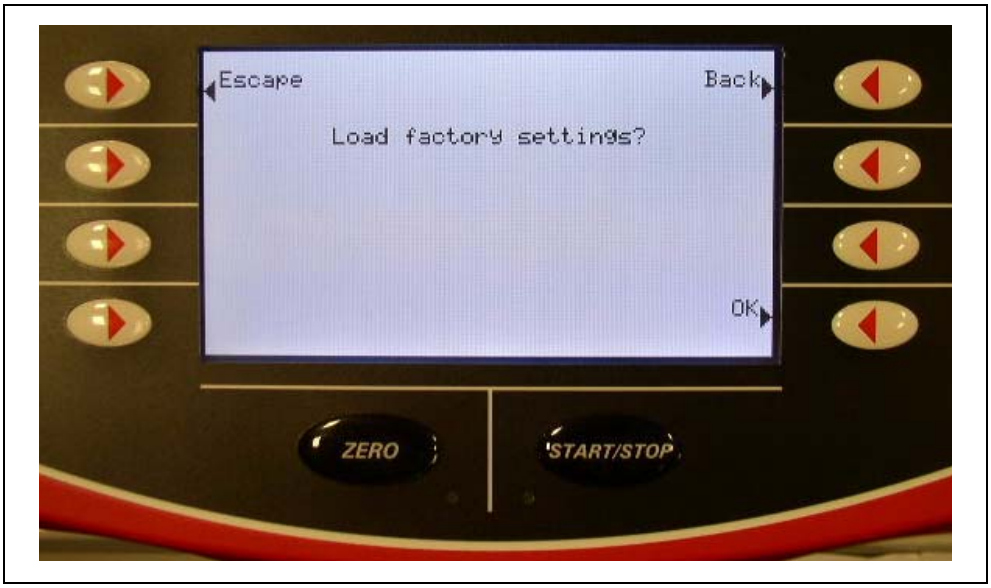



Fig. 6-41 Default parameter

List of default parameter see appendix.

### 6.4.4.5.3 Save PARA Set 1 / 2

Select
*Setup ⇨ User settings ⇨ Parameter save / load ⇨*
*Save PARA Set 1 / 2*

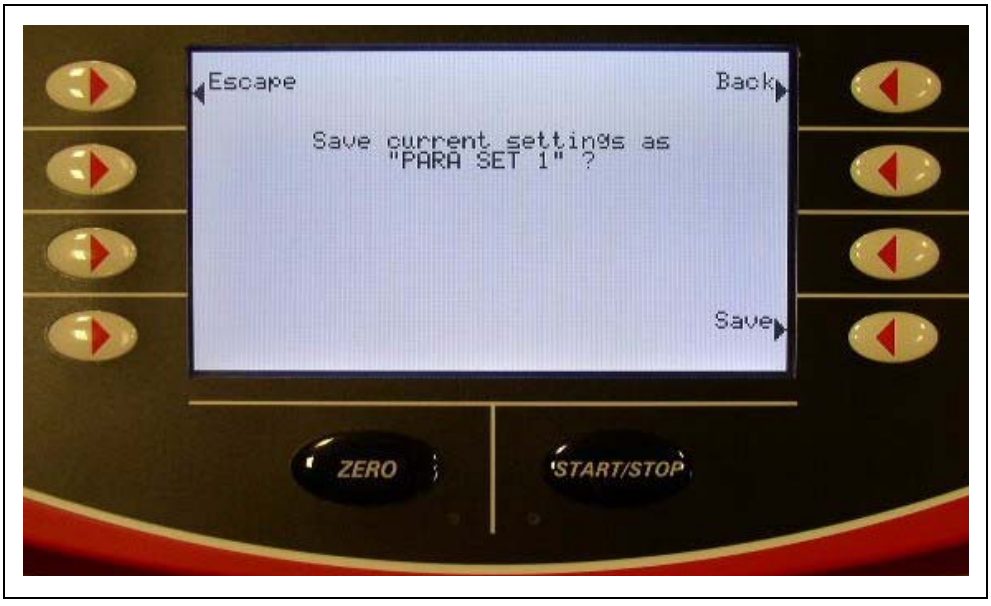



Fig. 6-42

The parameter set will be saved after pressing the button “Save”.

### 6.4.4.6 Monitoring functions

Select
*Setup* ⇨ *User Settings* ⇨ *Monitoring Functions*

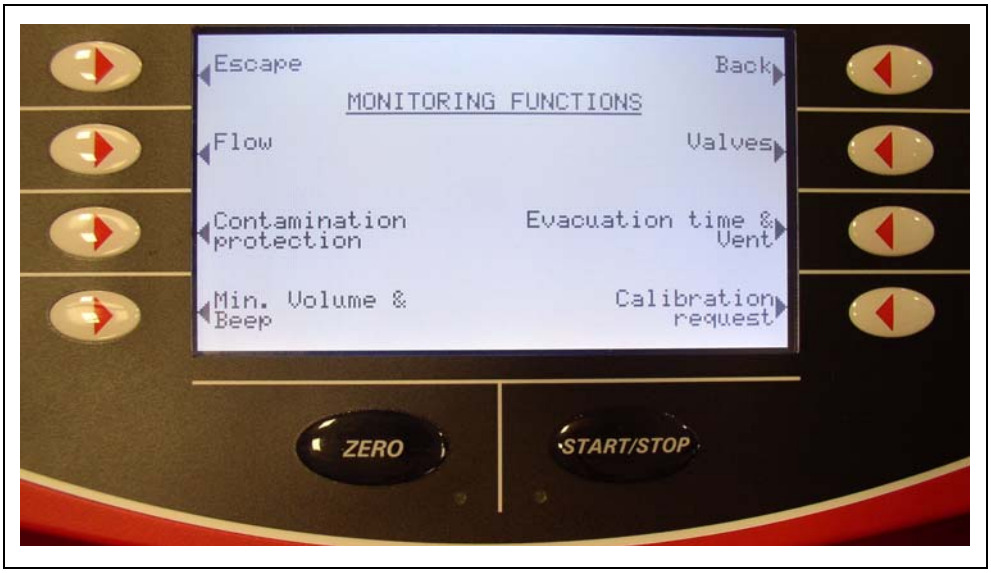



Fig. 6-43

### 6.4.4.6.1 Flow

Select
*Setup ⇨ User Settings⇨ Monitoring Functions ⇨ Flow*

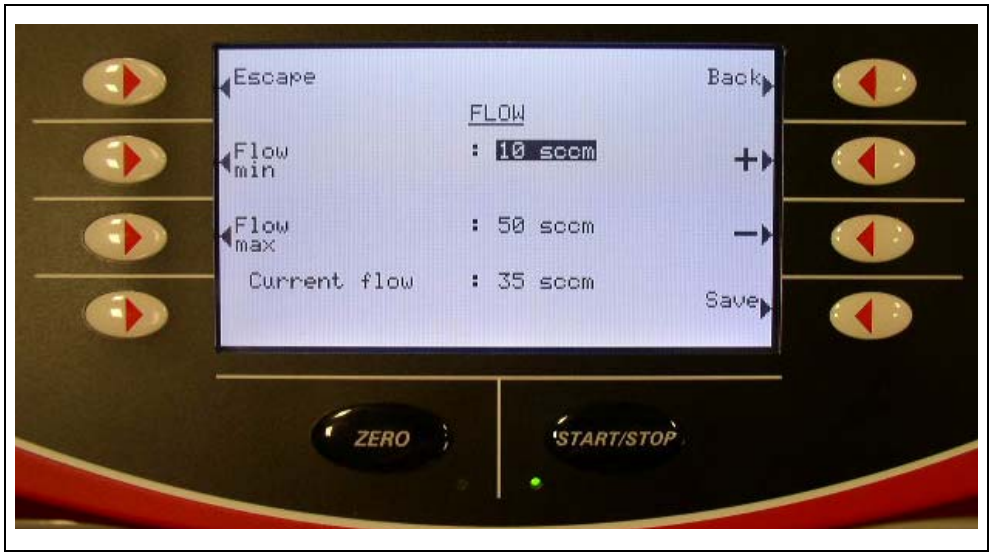



Fig. 6-44

| Option | Value range (Min. / Max.) | Explanation |
|---|---|---|
| Flow min. | 1...40 sccm | The warning "Flow too low" appears if the flow drops below this value during the measuring mode. |
| Flow max. | 10...50 sccm | The warning "Flow too high" appears if this value is exceeded during the measuring mode. |

The flow control only concerns the sniffing mode (mode: sniffing) and serves for monitoring the sniffing probe.
If menu "flow" is activated while measurement the current flow will be displayed.

### 6.4.4.6.2 Contamination Protection

Select
*Setup* ⇨ *User Settings* ⇨ *Monitoring Functions* ⇨ *Contamination Protection*

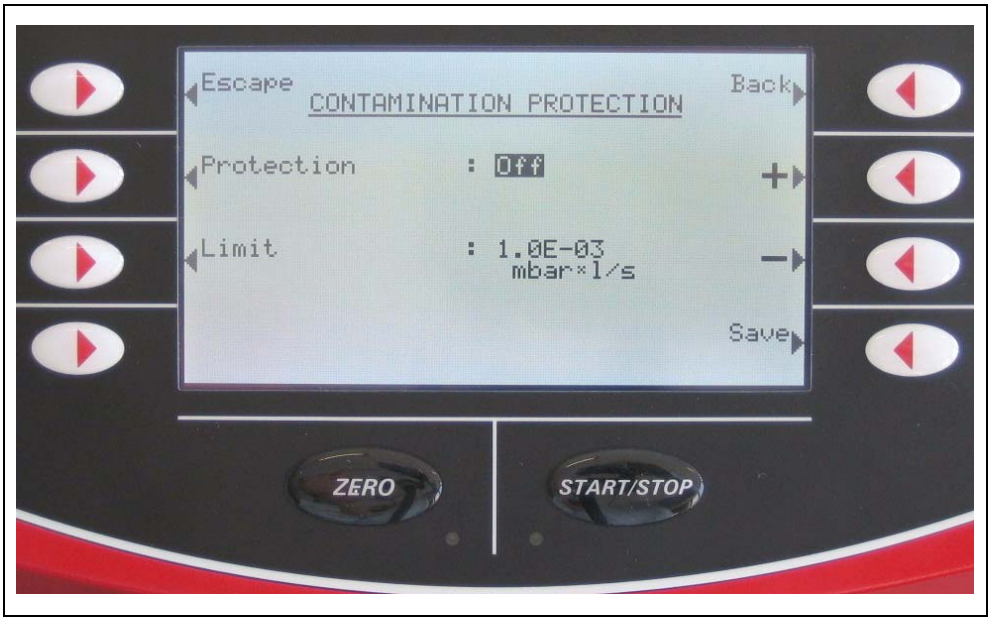



Fig. 6-45 View of the "Contamination protection" setting in the display

| Option | Value range (Min. / Max.) | Explanation |
|---|---|---|
| Protection | On | Contamination protection is switched on |
| | Off | Contamination protection is switched off |
| Limit | 1E-9 ...1E+3 mbar*l/s | Switch off limit value for the contamination protection function |

If the contamination protection is switched on, the SmartText closes all inlet valves as soon as the measured leak rate exceeds the limited value. Then only a small amount of helium gets into the mass spectrometer. Contamination of the leak detector by helium is avioded. The helium which gets into the sample can then be pumped off by an external pump. If no extra pump is available, we recommend venting the sample before continuing the measurements.

*Hinweis* Contamination protection will be activated not before alarm delay time is finished (see Chapter 6.4.4.3)

### 6.4.4.6.3 Volume & Beep

Select
*Setup ⇨ User Settings ⇨ Monitoring Functions ⇨ Volume & Beep*

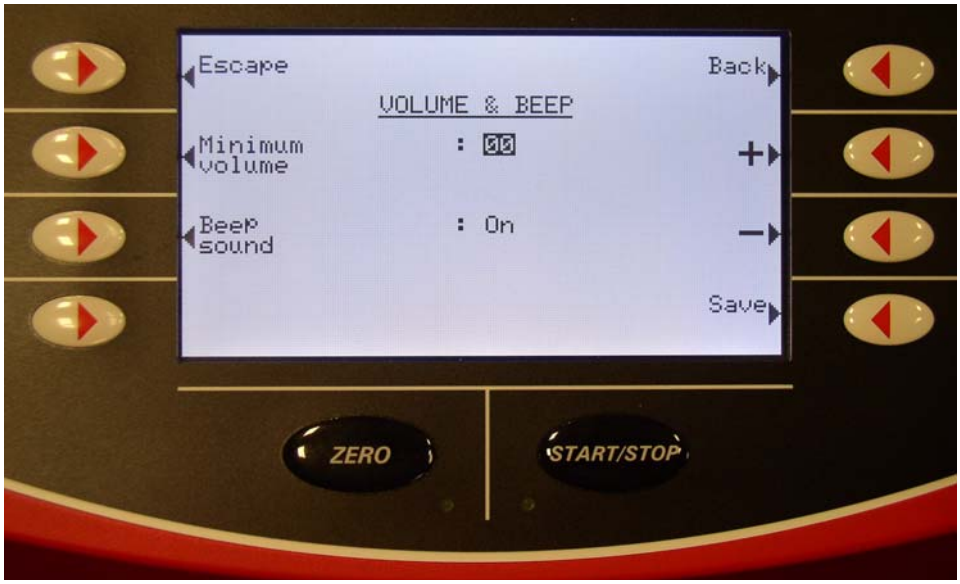



Fig. 6-46

| Option | Value range (Min. / Max.) | Explanation |
|---|---|---|
| Minimum volume | 0...15 | The minimum volume must be reached. This prevents the volume being accidentally set so quiet that you can no longer hear the alarm signal. |
| Beep sound | On / Off | The ”beep” tones can be switched on and off. ”Beep” tones signal a change in status for example. |

### 6.4.4.6.4 Valves

Select
*Setup* ⇨ *User Settings* ⇨ *Monitoring Functions* ⇨ *Valves*

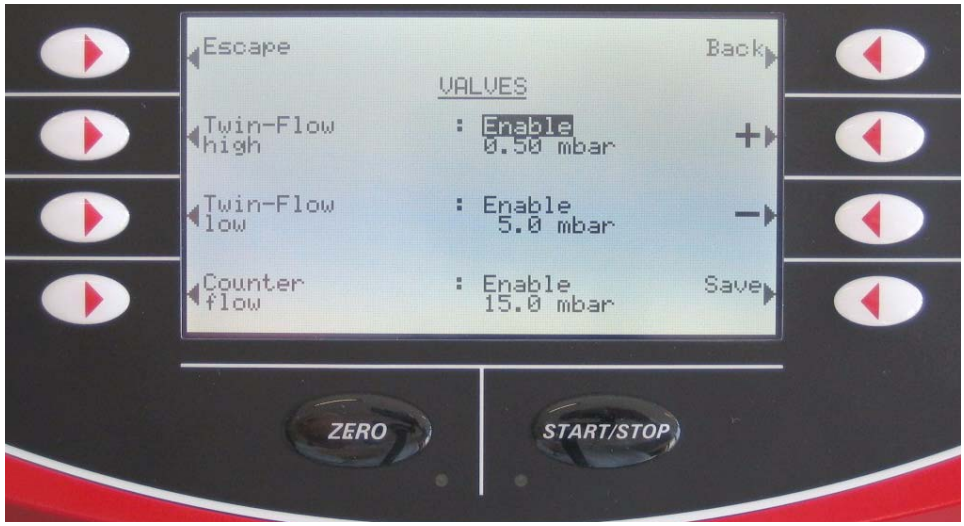



Fig. 6-47 View of the "Valves" setting in the display

| Option | Value range (Min. / Max.) | Explanation |
|---|---|---|
| Twin-Flow high | released | released |
| | locked | locked |
| | 0.01 ... 0.5 mbar | Pressure at which valve V4 opens |
| Twin-Flow low | released | released |
| | locked | locked |
| | 0.1 ... 5 mbar | Pressure at which valve V3 opens |
| Counterflow | released | released |
| | locked | locked |
| | 0.1 ... 25 mbar | Pressure at which valve V1 opens |

In sniffer mode the adjustments cannot be changed.

**Note**

The change in the illustrated standard settings can lead to a considerable reduction in the performance of the instrument.

**Note**

Counterflow operation at 15 ... 25 mbar represents a heavy strain for the turbo pump. We recommend that you do not use continuous operation in this pressure range.

### 6.4.4.6.5 Evacuation Time & Vent

Select
*Setup ⇨ User Settings ⇨ Monitoring Functions ⇨ Evacuation Time & Vent*

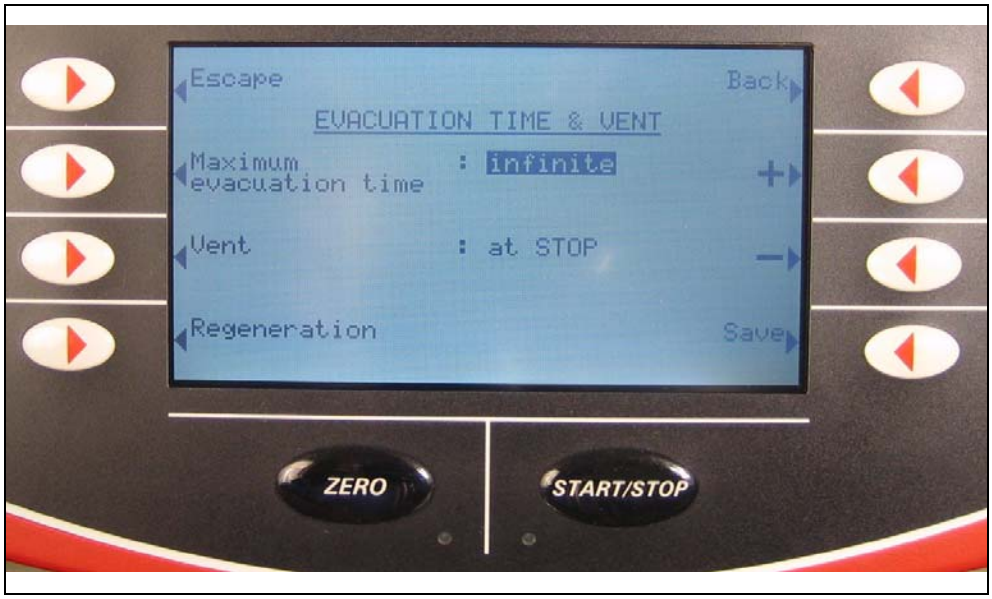



Fig. 6-48 View of the "Evacuation time & Venting" setting in the display

| Option | Value range (Min. / Max.) | Explanation |
|---|---|---|
| Maximum evacuation time | 1s ... 30 min<br>infintetly | If the sample has a strong leak it cannot be pumped down as quickly as if it had no leak. The maximum evacuation time defines the time which allows the sample to be pumped down to a pressure of 15 mbar. If this time is exceeded, the pump down process stops and an appropriate error message is displayed. |
| Venting | manual | Inlet can be vented in "Ready to start" mode by pressing the "Vent" softkey. |
| | with Stop | The inlet is vented automatically after STOP. |
| | no | Venting of the inlet is locked in the "Ready to start" mode. |
| Regeneration | | Start-Stop - cycle with short range. Intended for the reduction of a raised helium background |

**Note**

With “Venting: no” or “Venting manual” the unintentional venting of vacuum equipment connected to the test connection is prevented. In the case of the option “Venting: no” is the venting operation only available via a modification of the adjustment in menu “Evacuation Time & Vent”.
In the case of the option “Venting: manual” is the venting operation possible in the menu “Ready to Start” (→ see Chapter 6.1) with the *“Vent”* softkey.

### Regeneration

Select
*Setup* ⇨ *User Settings* ⇨ *Monitoring Functions* ⇨ *Evacuation Time & Vent* ⇨ *Regeneration*

The “Regeneration” is an automated Start-Stop - cycle intended for the reduction of a raised helium background. This function can only be successful activated in the setting “Venting: with STOP”.
You can deactivate the “Regeneration” in general with the STOP key or with STOP in the “Regeneration” menu.
An active regeneration will be announced in the display.
The regeneration stops after 60 minutes automatically.

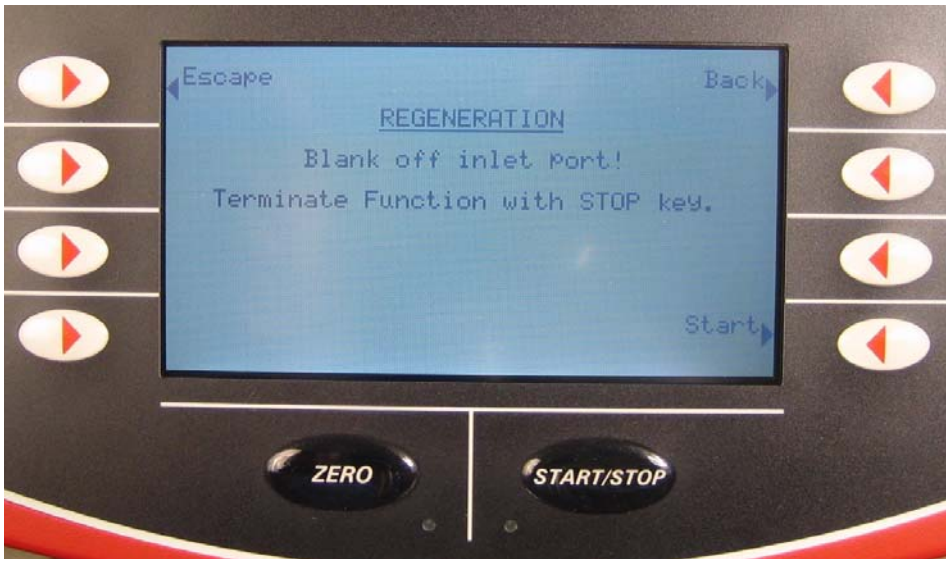



Fig. 6-49

With “Start” you start the following action:
Start, Stop with venting
Start, Stop with venting
and so on.

### 6.4.4.6.6 Calibration Request

Select
*Setup* ⇨ *User Settings* ⇨ *Monitoring Functions* ⇨ *Calibration Request*

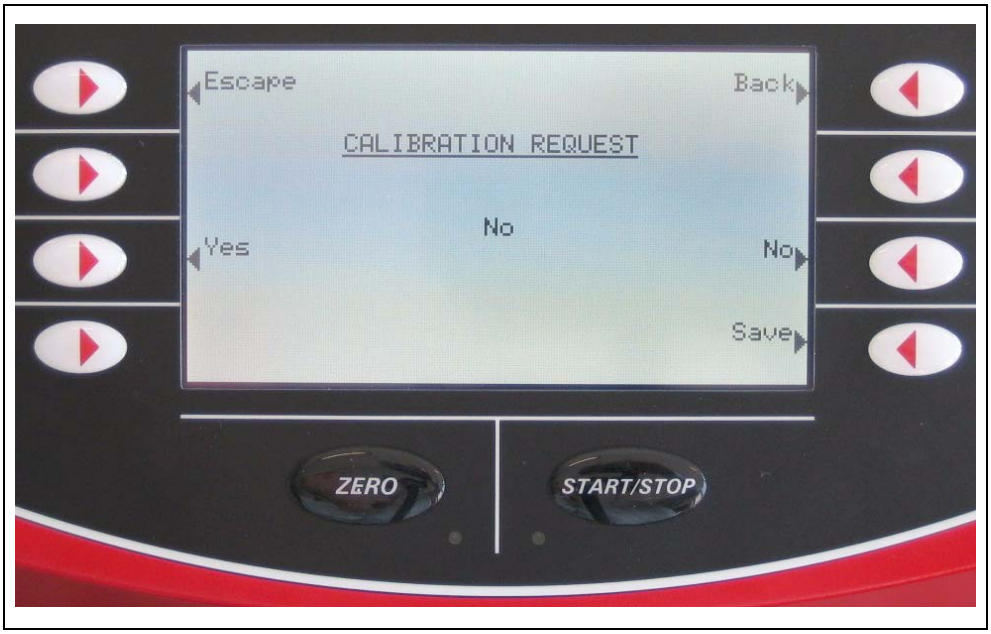



Fig. 6-50 View of the "Calibration request" setting in the display

- Select the desired option with the softkeys on the right and left of the screen.
- Save the new value with "*Save*" or
- Go back one level with "*Back*" or to the measured value or ready to start display with "*Escape*".

| Option | Description |
|---|---|
| yes | The calling for calibration comes up 30 minutes after switching the machine on or when the temperature of the leak detector has changed more than 5°C since it was calibrated the last time. |
| no | The calling for calibration does not come up. |

## 6.4.5 Calibration Settings

Select
*Setup* ⇨ *Calibration Settings*

In this parameter group settings for the calibration but not the calibration itself are made.

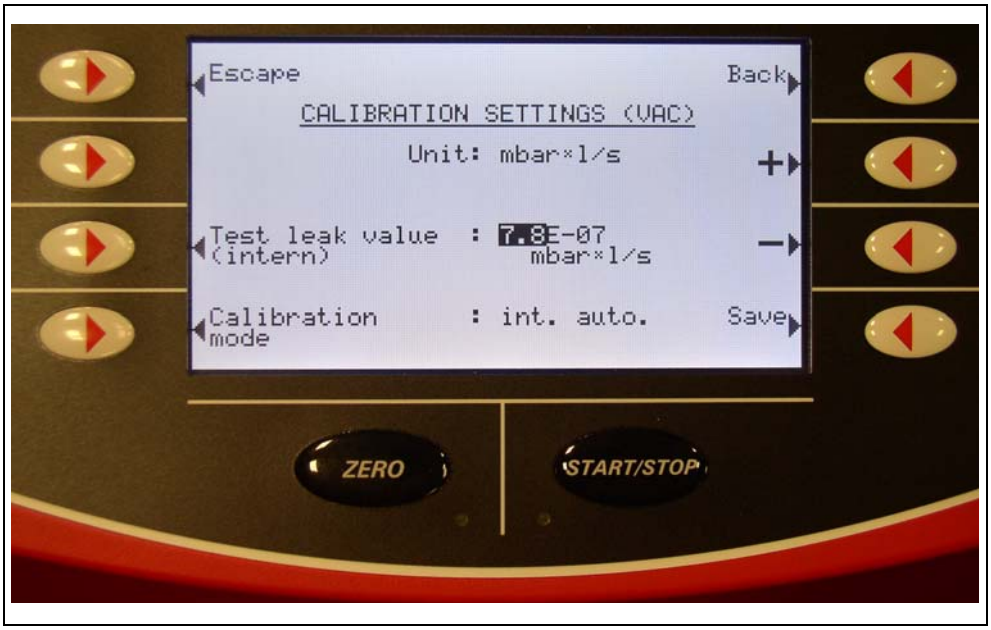



Fig. 6-51 Calibration settings

| Option | Value range (Min. / Max.) | Description |
|---|---|---|
| Unit | e.g. mbar*l/s | The unit for the test leak value. For internal test leak fixed at mbar*l/s. |
| Test leak value (internal/ external) | | Test leak value in selected unit. Depending on the selected calibration mode, this is either an external or an internal test leak. |
| Calibration mode | int. auto. | Internal automatic calibration mode |
| | int. man. | Internal manual calibration mode, i.e. the signal stability must be confirmed manually. |
| | external | External calibration mode |

## 6.4.6 Information

Select
*Setup* ⇨ *Information*

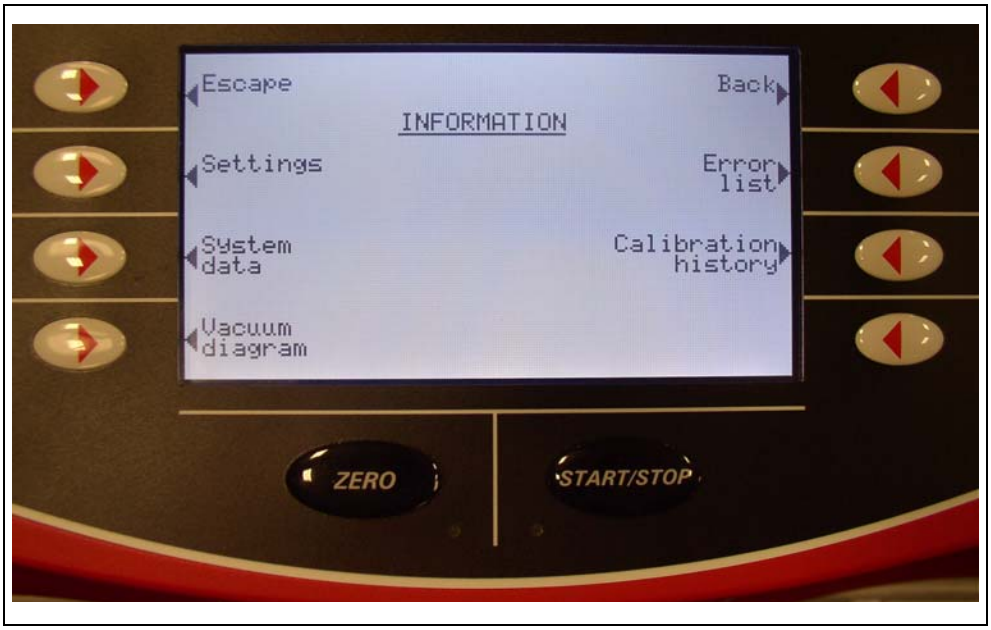



Fig. 6-52

### 6.4.6.1 Settings

Select
*Setup ⇨ Info ⇨ Settings*

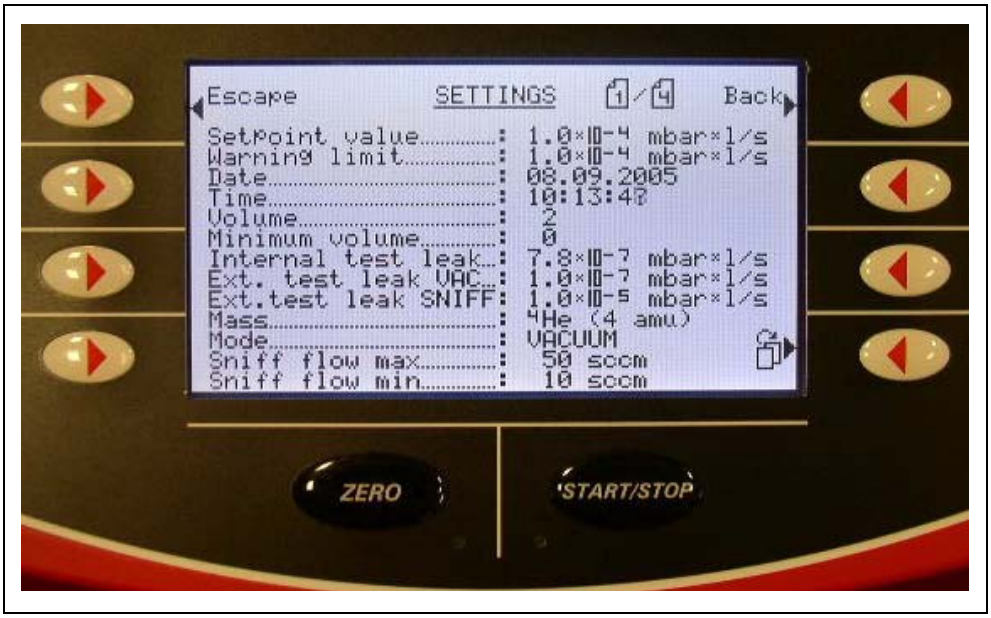



Fig. 6-53

### 6.4.6.2 System Data

Select
*Setup ⇨ Info ⇨ System Data*

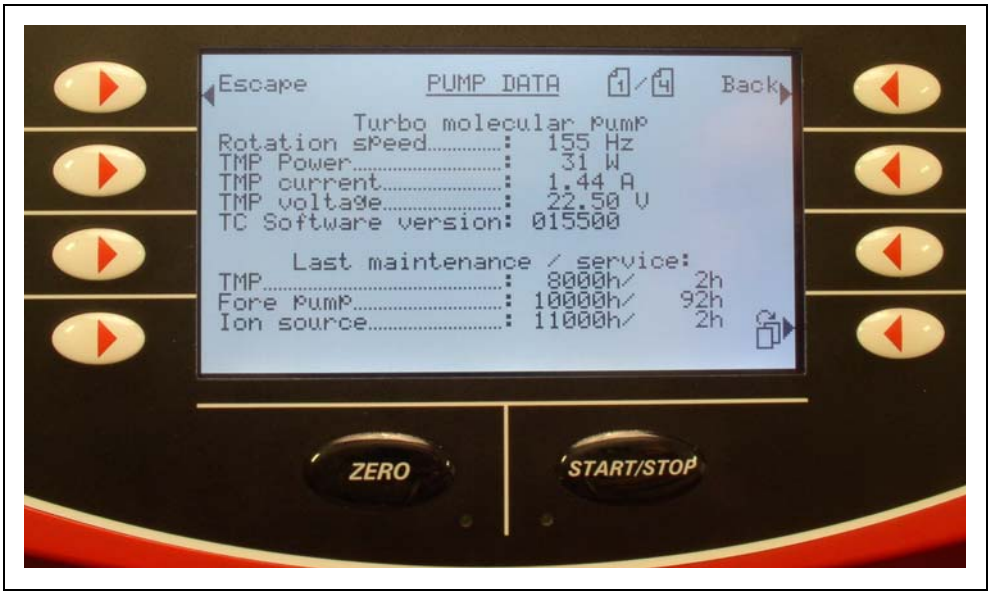



Fig. 6-54

### 6.4.6.3 Vacuum System

Select
*Setup* ⇨ *Info* ⇨ *Vacuum System*

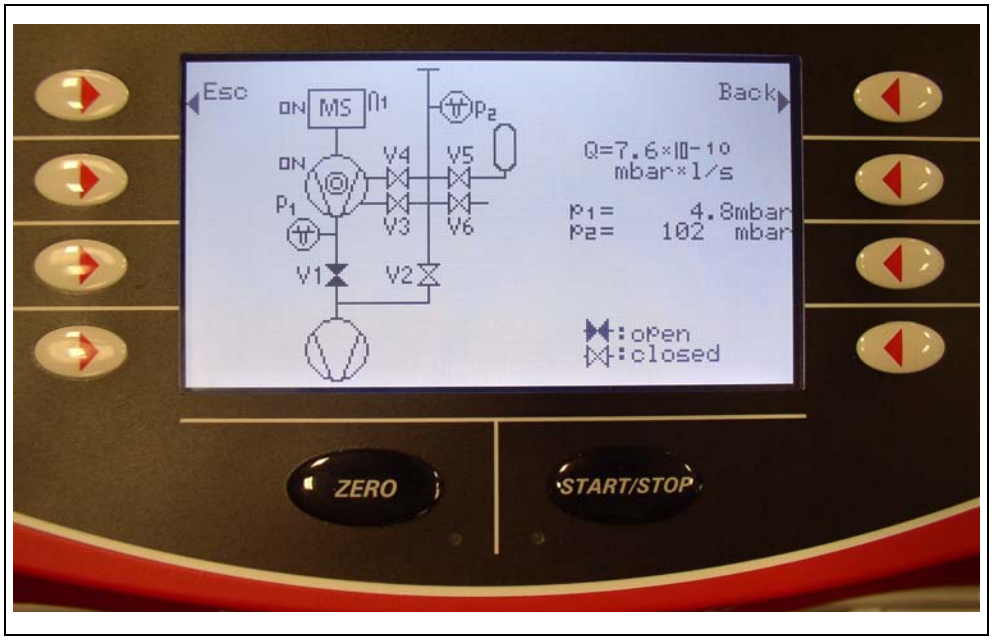



Fig. 6-55

### 6.4.6.4 Error List

Select
*Setup* ⇨ *Info* ⇨ *Error List*

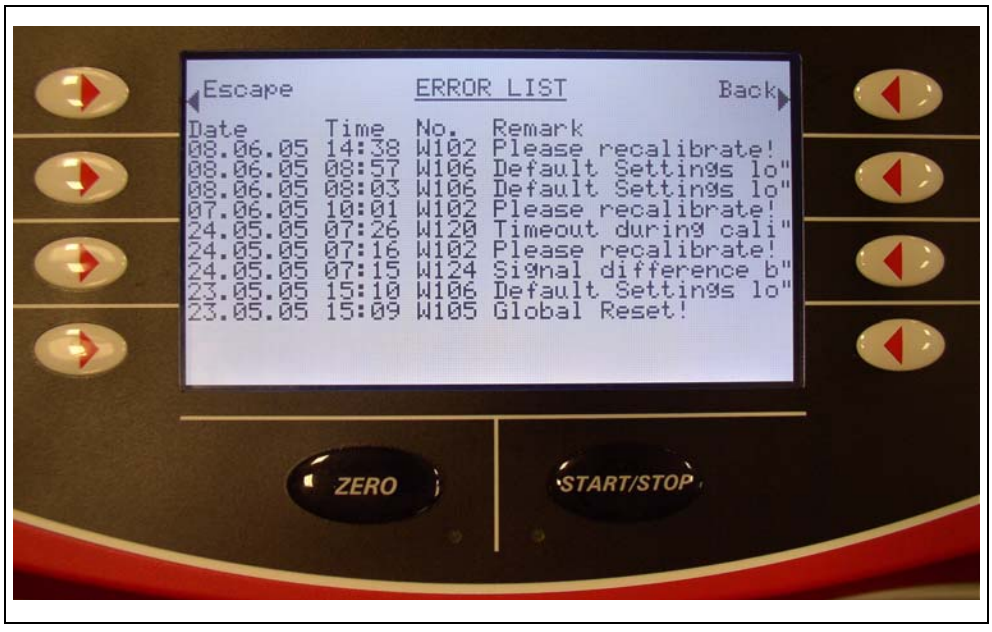



Fig. 6-56

### *6.4.6.5 Calibration History*

Select
*Setup ⇨ Info ⇨ Calibration History*

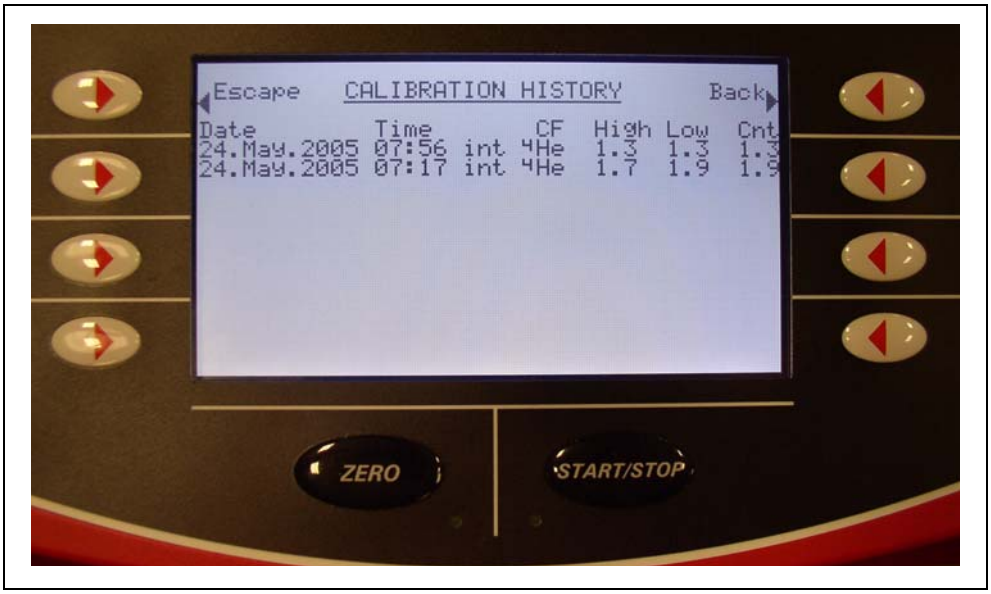



Fig. 6-57

## 6.4.7 Maintenance and Service

Select
*Setup ⇨ Maintenance & Service*

The maintenance menu can only be chosen when the maintenance was enabled under "setup - access control - enable maintenance".

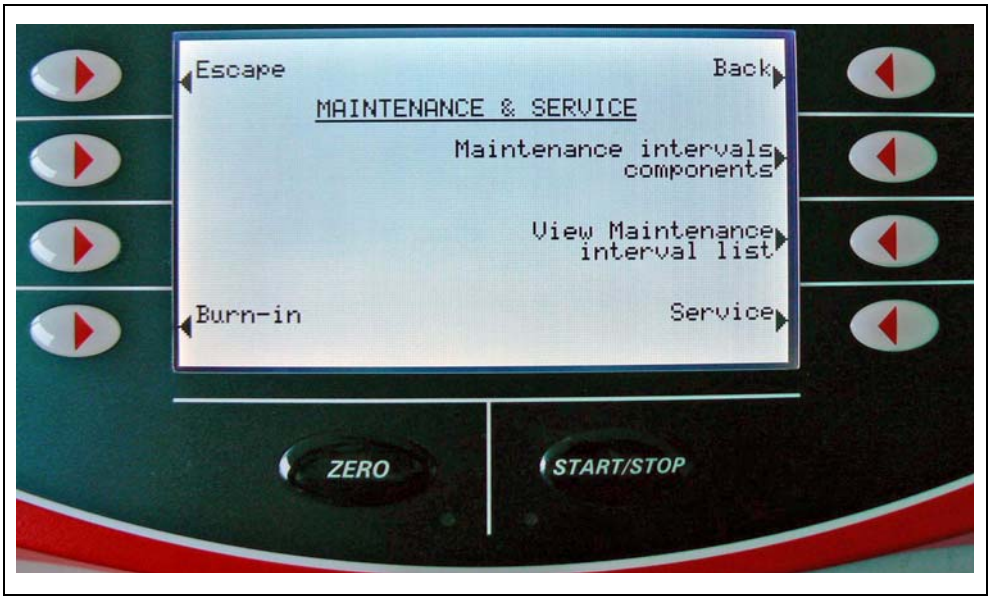



Fig. 6-58 Maintenance

### 6.4.7.1 Burn In

Select
*Setup* ⇨ *Maintenance & Service* ⇨ *Burn-In*

The “Burn-in” is an automated Start-Stop - cycle.
This function can only be successful activated in the setting “Venting: with Stop”. See Chapter 6.4.4.6.5.
An active “Burn-in” will be announced in the display. You can deactivate the “Burn-in” with STOP in the “Burn-in” menu or with the STOP key.

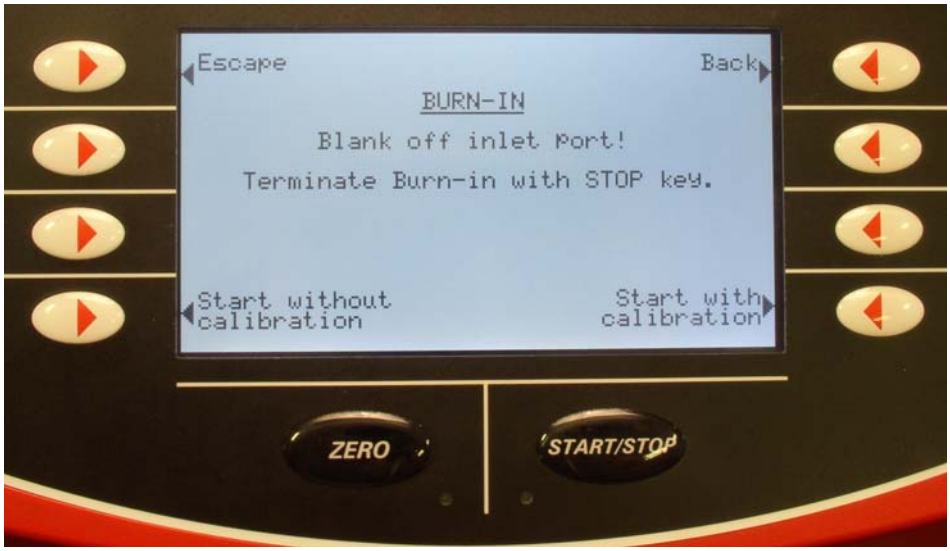



Fig. 6-59

| | |
|---|---|
| Start with calibration | Starts the following operation:<br>Calibrate, start, stop<br>Vent, start, stop<br>Vent, start, stop<br>Vent, start, stop<br>Vent, start, stop<br>Calibrate, start, stop<br>etc. |
| Start without calibration | Starts the following operation:<br>Vent, start, stop<br>etc. |

### 6.4.7.2 Maintenance Interval Components

Select
*Setup* ⇨ *Maintenance & Service* ⇨ *Maintenance Interval Components*

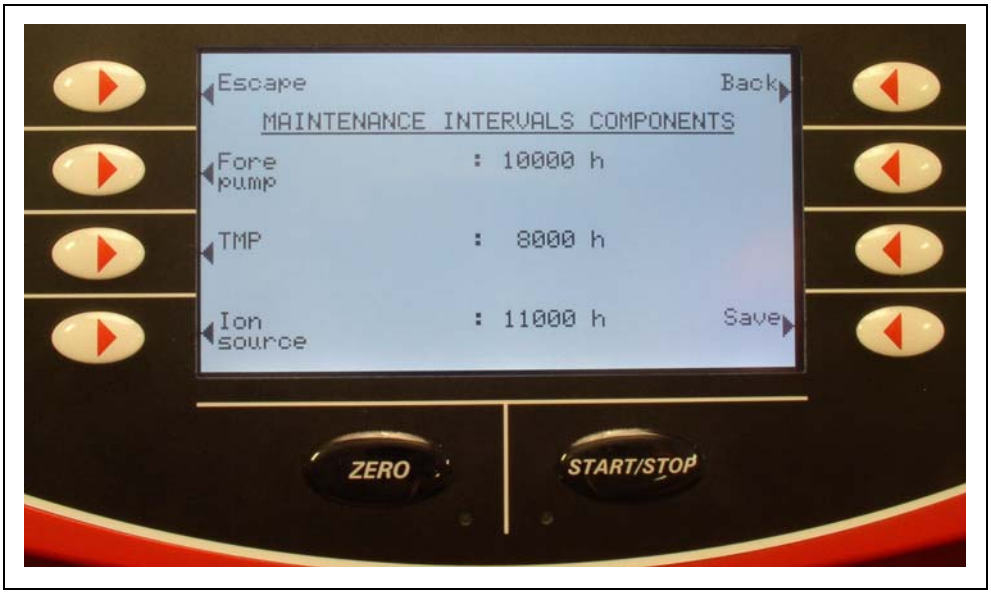



Fig. 6-60

Under "components of maintenance intervals" the current operating hours of the components fore pump, turbo pump and ion source are shown since the last maintenance was accomplished. After each maintenance the counter can be reset. This leads to a new entry in the list of maintenance intervals.

### 6.4.7.3 Maintenance List

Select
*Setup* ⇨ *Maintenance & Service* ⇨ *Maintenance List*

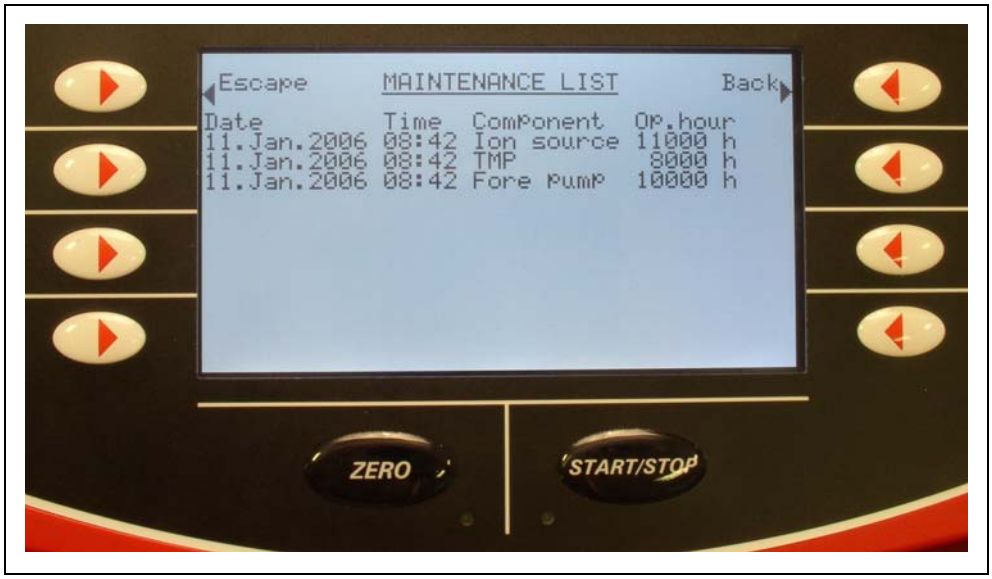



Fig. 6-61 Maintenance list

Date and time of the maintenance are shown under "show list of maintenance intervals". So are the operating hours of the components. This data are collected from one maintenance to the next.

### 6.4.7.4 Service

Select
*Setup* ⇨ *Maintenance & Service* ⇨ *Service*

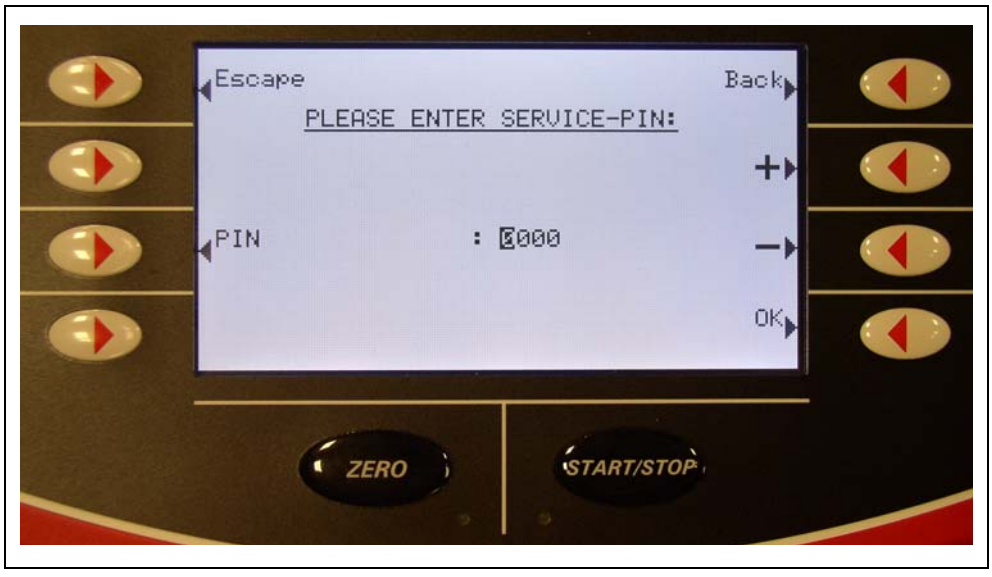



Fig. 6-62

The access to the menu ”Maintenance and Service” is only possible with a Service-PIN. Please enter the Service-PIN.

## 6.5 Calibration Vacuum Method

**Note**

The instrument must have warmed up for at least 20 minutes for optimum calibration.
Please observe the recommended test interval of the used test leak!
See quality test certificate: Test leak

In the vacuum mode the calibration of the SmartTest can be carried out with an internal or external test leak. The internal calibration is only possible with mass 4.

*Internal test leak*

The calibration with the internal test leak can be carried out in two ways (see also chapter 6.4.5):

- **Automatic internal**:
  Serves for calibration with the internal test leak without volume at test connection. The test connection must have a blind flange for this.
- **Manual internal:**
  Serves for calibration with the internal test leak with presence of volume at the test connection.
  A stable measuring signal must be confirmed with the "Signal stable" softkey.

*External test leak*

At **test leak: external** (see Chapter 6.4.5) the prompt appears:

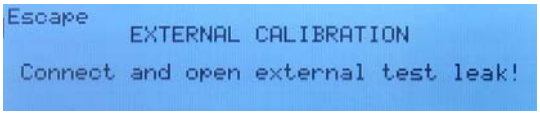
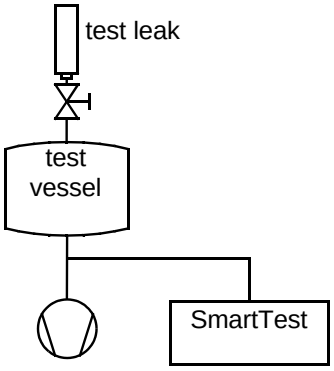



Fig. 6-63

- Is the displayed value equal to the value on the test leak rating plate? Change if necessary! (if not see Chapter 6.4.5)
- Connect the test leak.
- The valve of the test leak must be open.
- Confirm with OK.

Fig. 6-64




**Note**

Partial flow arrangement:
When connecting the SmartText to a vacuum system with its own pump, the test leak must be connected to its test vessel.

Fig. 6-65

*Calibration run*

The calibration runs through the following sequence:

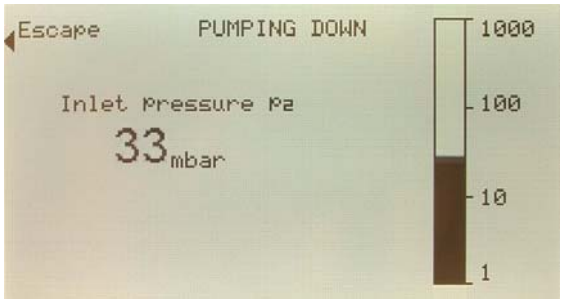



Fig. 6-66

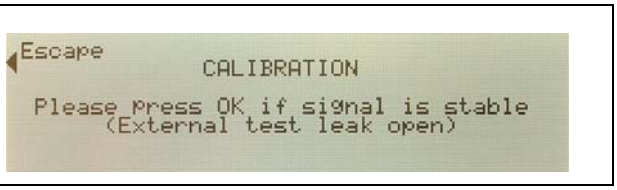



Fig. 6-67

In calibration with an external test leak or an internal test leak in the "Manual internal" mode, the stability of the signal must be confirmed with the "OK" softkey.

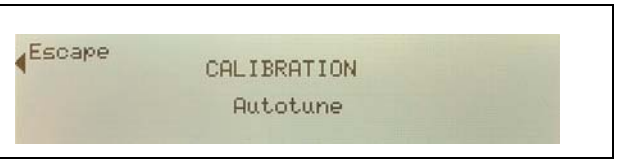



Fig. 6-68

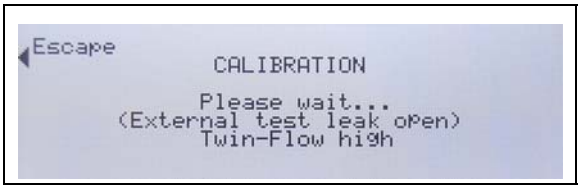



Fig. 6-69

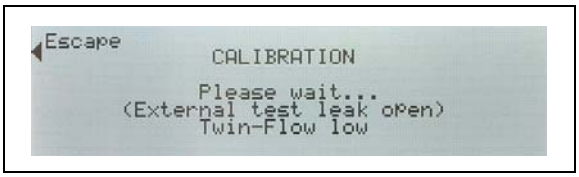



Fig. 6-70

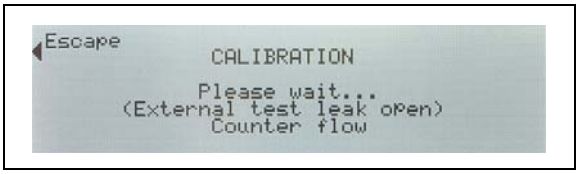



Fig. 6-71

In calibration with an external test leak the prompt appears:

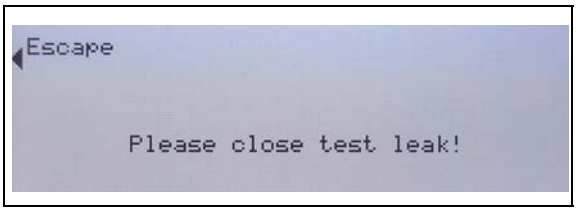



Fig. 6-72

- Close test leak valve

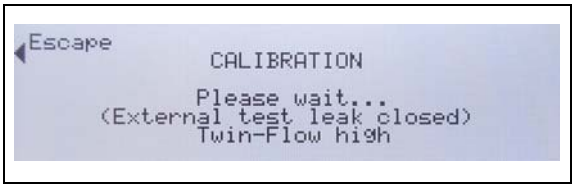



Fig. 6-73

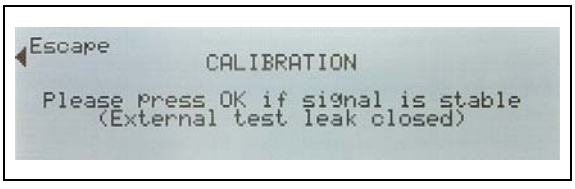



Fig. 6-74

- Wait 5 minutes with test gas $H_2$
- Confirm with OK

In calibration with an external or internal test leak in the ”Manual internal” mode,

the stability of the signal must be confirmed with the ”ok” softkey.

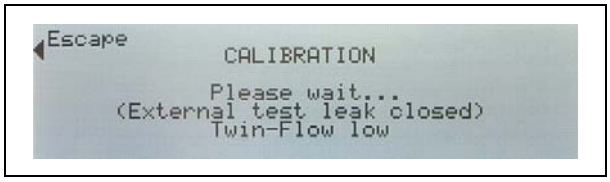



Fig. 6-75

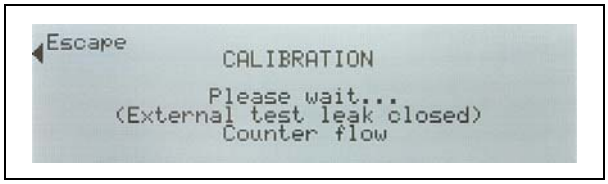



Fig. 6-76

The result is displayed at the end of the calibration process.


Fig. 6-77

| | | |
|---|---|---|
| Usual values calibration factor for $^4$He: | Twin-Flow™ | 0.1 ... 10 |
| | Counter Flow | 0.5 ... 30 |

Values between 0.1 and 100 are possible. A factor inside of brackets means that the value of the test leak is too low for this measurement range. The factor was calculated with an intermediate factor from the next sensitive measurement range.

If you:

- accept the result, press ”*Save*” to save the new calibration values
- do not accept the result, press ”*Escape*” to keep the old values.

**Note**

If the usual values cannot be achieved despite several attempts, please contact your nearest Pfeiffer-Vacuum service point.

## 6.6 Calibration Sniffing Method

**Note**

The instrument must have warmed up for at least 30 minutes for optimum calibration.
Please observe the recommended test interval of the used test leak!
See quality test certificate: Test leak

Press "Calibration" in the **Ready to start** menu to start calibration.
The prompt appears:

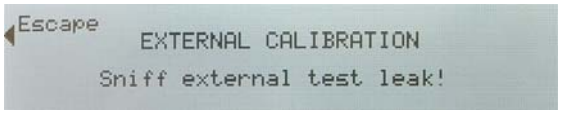



Fig. 6-78


- Is the value equal to the value on the test leak rating plate? Change if necessary! See Chapter 6.4.5.
- Hold the sniffing probe against the test leak.
- Confirm this with START or with the key on the probe.

Fig. 6-79

*Calibration run*

The calibration runs through the following sequences:

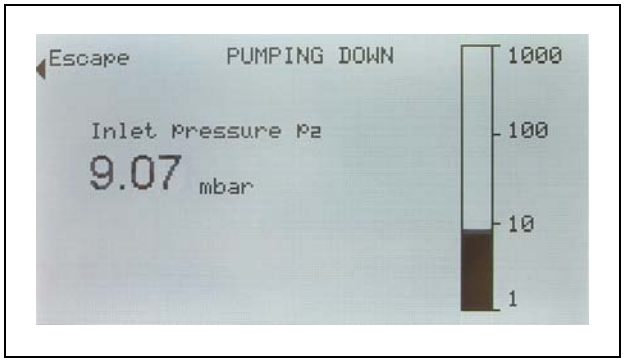



Fig. 6-80

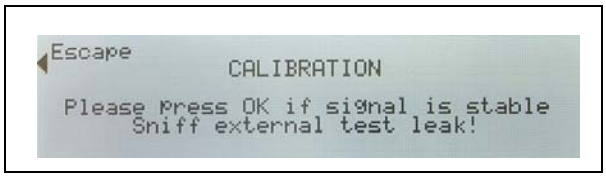



Fig. 6-81

The stability of the signal must be confirmed with the "OK" softkey.

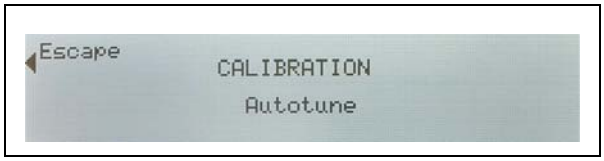



Fig. 6-82

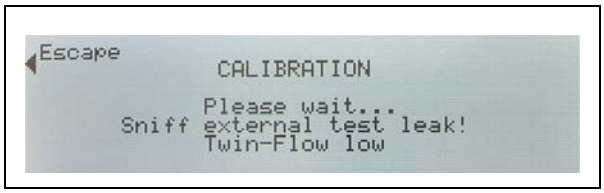



Fig. 6-83

The prompt now appears:

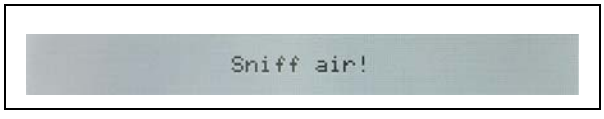



Fig. 6-84

- Remove the sniffing probe from the test leak.
- Confirm with OK or with the key on the probe.

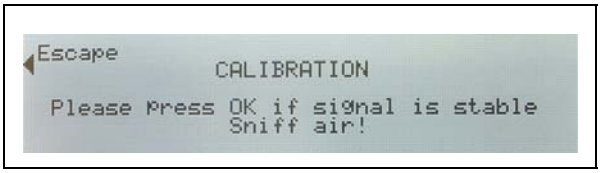



Fig. 6-85

The result is displayed at the end of the calibration process.

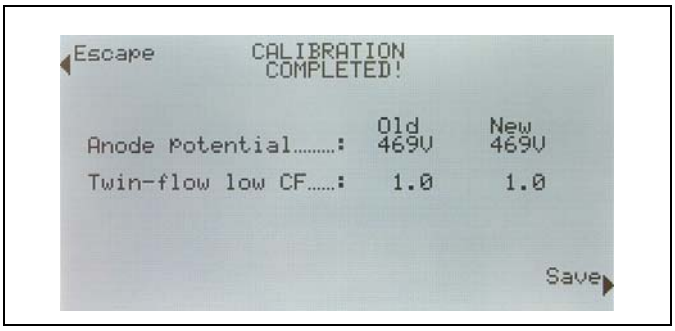



Fig. 6-86
The usual value calibration factor CF for $^4$He is: 0.1 ... 10.
If you:

- accept the result, press "*Save*" to save the new calibration values
- do not accept the result, press "*Escape*" to keep the old values.

**Note**

If the usual values cannot be achieved despite several attempts, please contact your nearest Pfeiffer-Vacuum service point.

## 6.7 Measuring the Internal Test Leak

This function is only available in the vacuum mode with mass 4.
After running up the instrument the display changes to Ready to start!

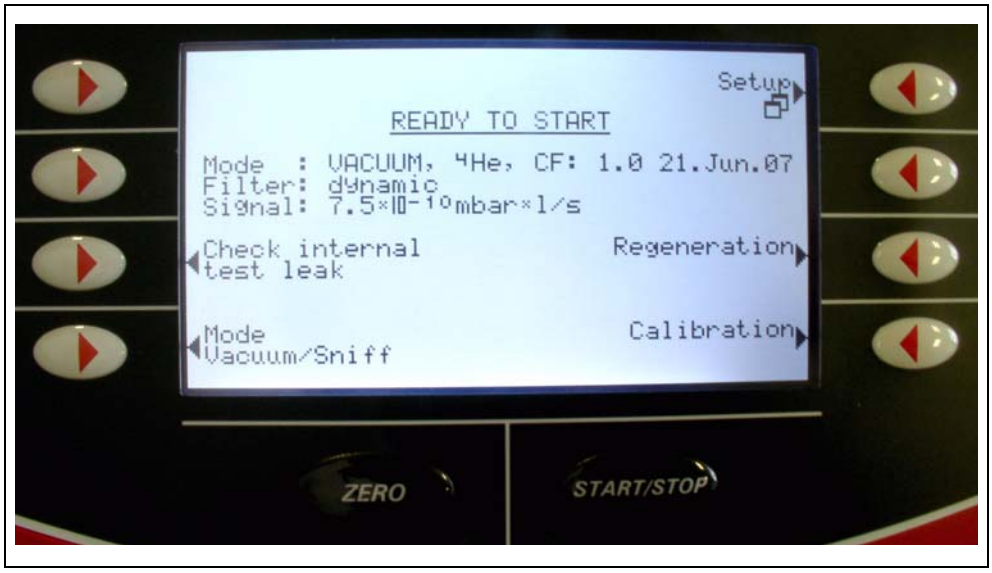



Fig. 6-87 Ready to start

Softkey "Test internal leak" leads to sub-menu:

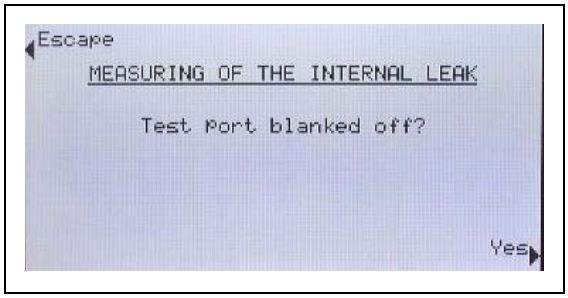



Fig. 6-88

The test connection must have a blank flange!
Confirm with "Yes".

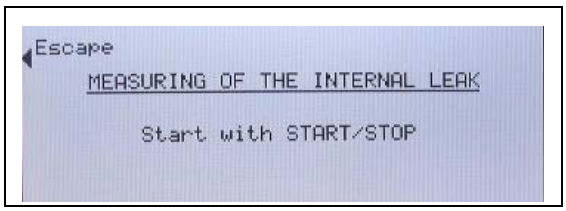



Fig. 6-89

Activating the "Start key" leads to evacuation and starting of the test leak measurement.

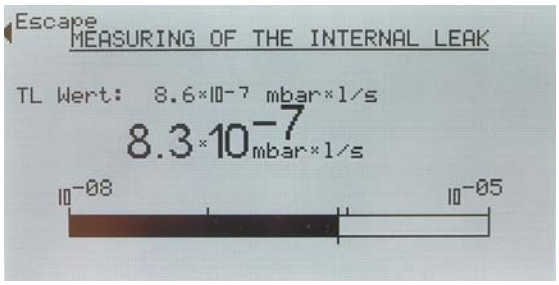



Fig. 6-90

The display also shows the default value of the internal test leak in addition to the measured test leak value: e.g.: TL: 8.6E-07 mbarl/s.
Softkey "*Escape*" always returns you to the menu: Ready to start

**Note**

Matching of the measured value of the internal test leak and the default value of the internal test leak does not mean that the measuring system is absolutely accurate if the internal test leak was used for calibrating the leak detector.
The display of the internal test leak may only be used as a reference! Accurate measurements require calibration with an external test leak. See Chapter 6.5.

# 7 Errors

Errors are displayed by warnings and malfunction messages. Warnings point at a problem but you usually still can measure during that time. Measuring is no longer possible when malfunction messages are displayed.
Warnings and malfunction messages are signalized by an audible alarm. It's frequency is changing between 500Hz and 1200Hz every 400ms. Additionally one of the following messages is displayed:

## 7.1 Malfunction Messages

| Malfunction messages no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| E21 | E128 | Command variable suppressor voltage too great. | • Suppressor voltage affected by a short-circuit.<br>• MSV is defective. |
| E22 | E133 | Command variable anode potential too great. | • Brief increase in pressure in the mass spectrometer.<br>• Valve contaminations cause high mass spectrometer pressure.<br>• The anode voltage is short circuited.<br>• The nominal value for the anode voltage is too high. The anode voltage is limited to 1,200 V. |
| E24 | E125 | 24 V voltage of MSV card is too low! | • Fuse F1 on the MSV card is blown.<br>• MSV card defective<br>• 24 V supply voltage from main power supply unit too heavily stressed or faulty. |
| E25 | E134 | Filament current is too high! MSV Cat-Heater I>>I | • MSV card defective. |
| E26 | E135 | Filament current is too low! | • MSV card defective<br>• Defective ion source connector or cable. |
| E27 | E145 | Emission faulty | • Air in rush<br>• Valves contaminated<br>• Failure of a filament during measurement |
| E28 | E138 | Emission cannot be switched on on both filaments! | • Both filaments defective. Replace ion source.<br>• Defective ion source connector.<br>• MSV card defective |
| E29 | E131 | The anode potential exceeds the nominal value by more than 10%. | • MSV is defective.<br>• MC 68 defective |

| Malfunction messages no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| E30 | E132 | The anode potential drops below the nominal value by more than 10%. | • Brief increase in pressure in the mass spectrometer.<br>• MSV is defective.<br>• MC 68 defective |
| E31 | E126 | Anode-cathode voltage is too high! | Anode-cathode voltage is greater than U > 130 V.<br>• MSV is defective. |
| E32 | E127 | Anode-cathode voltage is too low! | Anode-cathode voltage is less than U < 30 V.<br>• Fuse F4 MSV card defective<br>• MSV is defective. |
| E33 | E129 | Suppressor potential too high. | Suppressor potential is greater than 363V.<br>• MSV is defective. |
| E34 | E130 | Suppressor potential too low. | Suppressor potential is less than U < 297 V.<br>• Short-circuit in the suppressor line.<br>• MSV is defective.<br>• High ohmic short-circuit in the ion catcher. |
| E35 | E159 | 24V for ext. outputs INPUT/OUTPUT; RS485; GAUGE HEAD too high | The voltage 24 V for the external outputs I/O; RS 485; Gauge Head is too high. (U> 30 V)<br>• Check the external feed of the 24 V outputs.<br>• Power supply unit defective |
| E36 | E120 | 24V for ext. outputs INPUT/OUTPUT; RS485; GAUGE HEAD too low | The voltage 24 V for the external outputs I/O; RS 485; Gauge Head is too low. (U< 20 V)<br>• Fuse F1 on I/O card defective.<br>• Power supply unit defective |
| E37 | E122 | 24V for ext. outputs RC; fan1+2 too low | The voltage 24 V for the external outputs RC; fan 1+2 are too low. (U< 20 V)<br>• Fuse F2 on I/O card defective.<br>• Power supply unit defective |
| E39 | E044 | Temperature on the electronic module is too high! (>60°C) | • The ambient temperature is too high.<br>• Unfavourable position of leak detector. (heat build-up)<br>• Fan failed.<br>• Air filter too heavily contaminated.<br>• Temperature sensor defective. |
| E41 | E141 | Turbo pump frequency too low! | The nominal speed (1450 Hz) of the turbo molecular pump TMH 071 was not reached within 5 min.<br>• Fore pressure of the TMH 071 is too high.<br>• Turbo molecular pump TMH 071 is defective.<br>• Drive electronics TC 600 is defective. |
| E42 | E148 | Emission "Off" | • Air in rush<br>• Valve V1 leaking. |

| Malfunction messages no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| E 43 | E 149 | Emission "Off" | The emission is switched off during normal operation of the leak detector when:<br>• in CF P2 > (pressure limit CF + 5 mbar) or<br>• in TFL P2 > (pressure limit TFL + 1 mbar) or<br>• in TFH P2 > (pressure limit TFH + 0,1 mbar) |
| E49 | E166 | Output voltage of the ext. pressure measuring point too great | • Sensor of the pressure measuring point defective<br>• Electronics pressure measuring point defective |
| E50 | E160 | Output voltage of the ext. pressure measuring point too low | • Check cable to ext. gauge<br>• Sensor of the pressure measuring point ground connection<br>• Electronics pressure measuring point defective |
| E51 | E161 | Rated resistance of the ext. pressure measuring point too low | The rated resistance of the ext. pressure measuring point too low.<br>• Check cable to ext. gauge<br>• Wrong ext. pressure measuring point used<br>• Electronic pressure measuring point defective<br>• Input short-circuited |
| E52 | E162 | Pressure measuring point P2 defective | The output voltage of the pressure measuring point P2 is too low.<br>• Cable to Pirani sensor broken<br>• Pirani sensor defective<br>• Sensor electronics I/O card defective |
| E54 | E163 | Pressure measuring point P1 defective | The output voltage of the pressure measuring point P1 is too low<br>• Cable to Pirani senor<br>• Pirani sensor defective<br>• Sensor electronics I/O card defective |
| E56 | E165 | Fore-vacuum pressure P1 > 10 mbar after run up | The fore-vacuum pressure P1 after 5 min. in run up is > 10 mbar<br>• Backing pump defective<br>• Leaks in the vacuum system<br>• Valve V1 does not open |
| E60 | E001 | TMP error: Rated speed exceeded by more than 10% | Rated speed of 1500 Hz exceeded by 10%.<br>• Check connecting cable, restart leak detector<br>• TC 600 defective |
| E61 | E002 | TMP power supply unit error | Error detected in the power supply unit TC 600.<br>• Power supply unit defective |

| Malfunction messages no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| E62 | E006 | TMP start-up time error | Speed of the TMH 071 is 15 min. after starting below the speed switching point < 1200 Hz.<br>• Turbo pump bearing damage<br>• TC 600 defective |
| E63 | E008 | TMP error | TMP connection between TC 600 and TMH 071 defective<br>• Check proper assembly of TC 600 on TMH 071<br>• TC 600 defective |
| E64 | E015 | TMP error TC 600 defective | TMP controller TC 600 detected as defective.<br>• Exchange TC 600 |
| E65 | E021 | TMP error pump resistance defective. | TMP controller detects wrong pump rated resistance<br>• Exchange TMH 071 |
| E66 | E037 | TMP error motor control defective | The control of the TMH 071 motor is defective.<br>• Exchange TMH 071<br>• Exchange TC 600 |
| E68 | E140 | TMP error no communication TMH071 TC 600 | No communication via the RS 485 between TC 600 and MC 68 control card<br>• Connection faulty or not plugged TC 600 – wiring plane<br>• TC 600 defective<br>• MC 68 defective |
| E69 | E167 | TMP Reserve | |
| E70 | E123 | The offset voltage of the pre-amplifier is too high. (>5mV) | • The pre-amplifier is defective.<br>• Defective supply voltage pre-amplifier |

## 7.2 Warnings

| Warnings no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| W101 | W064 | RTC Reset | Realtime clock reset. Please re-enter the date and time.<br>• Battery on MC 68 control circuit board discharged or defective<br>• MC 68 changed |
| W102 | W088 | Please re-calibrate the instrument! | The automatic calibration prompt is activated and one of the following conditions is fulfilled.<br>• 30 minutes have expired since switching on the leak detector.<br>• The pre-amplifier temperature has changed by more than 5°C since the last calibration.<br>• The mass setting has changed.<br>• The filament has been switched over.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W103 | W062 | Flow through capillary too low! | • Filter is filter tip blocked<br>• Sinter filter in filter tip soiled.<br>• Capillaries blocked by dirt.<br>• Lower flow limit set incorrectly.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W104 | W065 | Flow through capillary too high! | The flow of the sniffer pipe is monitored in the sniffing mode. If the flow exceeds the set maximum, the gas flow through the capillaries is too high. The maximum flow can be set by the menu within certain limits. The factory setting is 40 sccm.<br>• Capillary broken or torn<br>• Upper flow limit set incorrectly<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W105 | W066 | Global Reset | A global reset has been performed. |
| W106 | W067 | Factory settings loaded | The factory settings have been loaded by the instrument software. |

| Warnings no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| W107 | W090 | Service interval 5,000 hrs reached | • Perform service backing pump<br>• Perform service TMH 071.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W108 | W091 | ”Zero” locked | The ”Zero” function has been locked in the setting menu but was operated via the PLC input. |
| W109 | W068 | Pre-amplifier signal too great | The pre-amplifier signal is overmodulated in the most insensitive measuring range.<br>• Pre-amplifier defective<br>• Mass spectrometer heavily soiled |
| W120 | W069 | Time exceeded during calibration | Pressure threshold for following measuring range is not reached within the set time limit. The time limit is specified by the set maximum evacuation time in the menu. |
| W121 | W070 | Test leak signal too low | • The test leak used for the calibration is too small.<br>• The external test leak valve is not open or defective.<br>• Internal test leak defective. |
| W122 | W092 | Measuring signal is unstable during calibration. | • Leak rate signal too small and noisy<br>• Internal test leak defective<br>• Backing pump with heavily unstable end pressure |
| W123 | W071 | Signal maximum is outside the mass adjustment range! | • Leak rate signal was unstable during the mass adjustment. Re-calibrate.<br>• Check internal test leak and repeat the calibration with an external test leak. |
| W124 | W072 | The signal difference between the open and closed test leak is too small. | • Internal test leak defective.<br>• The external test leak valve is defective or not closed.<br>• The external test leak value is too small. |
| W125 | W073 | Calibration factor too small | The calculated calibration factor is outside the permissible range (< 0.1). The old factor is retained.<br>• The test leak is defective.<br>• The entered leak rate value for the test leak is much too small.<br>• The conditions necessary for calibration have not been satisfied. |
| W126 | W074 | Calibration factor too great! | The calculated calibration factor is outside the permissible range (> 100). The old factor is retained.<br>• The test leak is defective or empty.<br>• The entered test leak value for the test leak is too great.<br>• Mass spectrometer soiled and insensitive.<br>• The conditions necessary for calibration have not been satisfied. |

| Warnings no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| W130 | W060 | Pre-amplifier temperature too low. (<2 °C) | • The ambient temperature is too low.<br>• The temperature sensor in the pre-amplifier is defective.<br>• Cable pre-amplifier is defective.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W131 | W075 | Pre-amplifier temperature is too high. (>60 °C) | • The ambient temperature is too high.<br>• The air filter is soiled.<br>• Heat build-up due to unfavourable position.<br>• Temperature sensor in the pre-amplifier defective.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W132 | W063 | Temperature on the electronic module is too low (<2 °C). | • Ambient temperature too low<br>• Temperature sensor defective.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W133 | W076 | Temperature on the electronic module is too high! (>55 °C) | • The ambient temperature is too high.<br>• Unfavourable position of leak detector. (heat build-up)<br>• Fan failed.<br>• Air filter too heavily contaminated.<br>• Temperature sensor defective.<br>After the confirmation of this warning a “warning triangle” remains in the “Ready to start” menu, which signalises the existence of this interruption. See Chapter 6.2. The “warning triangle” disappears as recently as this interruption will be corrected. |
| W135 | W077 | Emission of the filament 1 cannot be switched on. | • Filament 1 defective<br>• Defective ion source connector or cable.<br>• MSV card defective. |
| W136 | W078 | Emission of filament 2 cannot be switched on! | • Filament 2 defective<br>• Defective ion source connector or cable.<br>• MSV card defective. |

| Warnings no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| W140 | W079 | Time exceeded for E-EPROM write command | The write command from the MC 68 to the EEPROM was not acknowledged.<br>• E-EPROM defective.<br>• Error on wiring board<br>• MC 68 defective. |
| W141 | W080 | Overflow of the EEPROM parameter queue | Software problem. Please contact Pfeiffer Service! |
| W142 | W081 | All EEPROM parameters lost! Please check the settings! | EEPROM on wiring plane is empty and was initialised with default values. All parameters must be re-entered or determined.<br>• If the warning occurs again after switching back the leak detector, the EEPROM on the wiring plane is probably defective.<br>• Wrong EEPROM type used.<br>• New EEPROM is used. |
| W143 | W082 | One EEPROM parameter initialised | Missing or invalid value of parameters in the EEPROM after switching on the leak detector.<br>• EEPROM cannot be described. EEPROM defective.<br>• MC 68 control circuit board defective<br>• Line connection to the EEPROM broken<br>• Wrong EEPROM type used |
| W145 | W083 | EEPROM parameter initialised after software update | Missing or changed parameter in the EEPROM and new software version number determined.<br>• A software update has been performed and one or more new parameters determined. The message can be acknowledged in this case. The parameter(s) is (are) automatically initialized. |
| W151 | W084 | Connection partial current valve broken | • Connection partial current valve removed<br>• Partial current valve selected in the menu but not connected. |
| W152 | W085 | No ext. pressure sensor | No external pressure sensor has been detected.<br>• Ext. gauge head selected in the menu but not connected or cable broken<br>• Ext. pressure sensor defective. Rated resistance not detected. |
| W160 | W086 | Leak rate too high! It has switched to „Ready to start“ mode to avoid HE contamination! | The monitor function ”Contamination protection” is activated and a leak rate above the set limit value has been detected.<br>• Serious leak.<br>• Switch off limit value too low.<br>• Alarm delay set too short. |

| Warnings no. | | Displayed message | Description and possible remedy of cause |
|---|---|---|---|
| Display | Pfeiffer Protocoll | | |
| W161 | W087 | Maximum ”evacuation time” exceeded. | Within the set evacuation time the „measure“ mode has not been reached.<br>• Evacuation time is adapted incorrectly to the sample volume.<br>• Sample has a serious leak.<br>• Pressure set point are wrong selected. |

By pressing OK you affirm a warning or a malfunction message which then will be adopted to the error list.

**Note**

If a error should occur which cannot be repaired, please contact your nearest Pfeiffer-Vacuum service point.

## 7.3 Changing Mains Fuses

1. Switch off the instrument and disconnect from the mains.
2. Pull out the mains plug.
3. Lever open and lift the cover of the fuse holder.

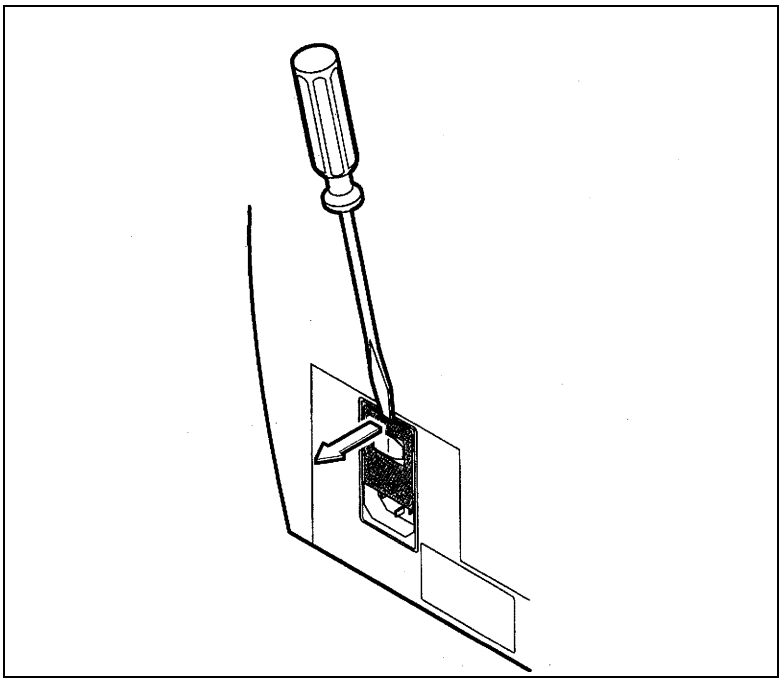


Fig. 7-91 Change the mains fuses (1)

4. Remove both fuse holders and replace defective fuses (10.0 A slow blow, 250 V, Ø5 x 20 mm).

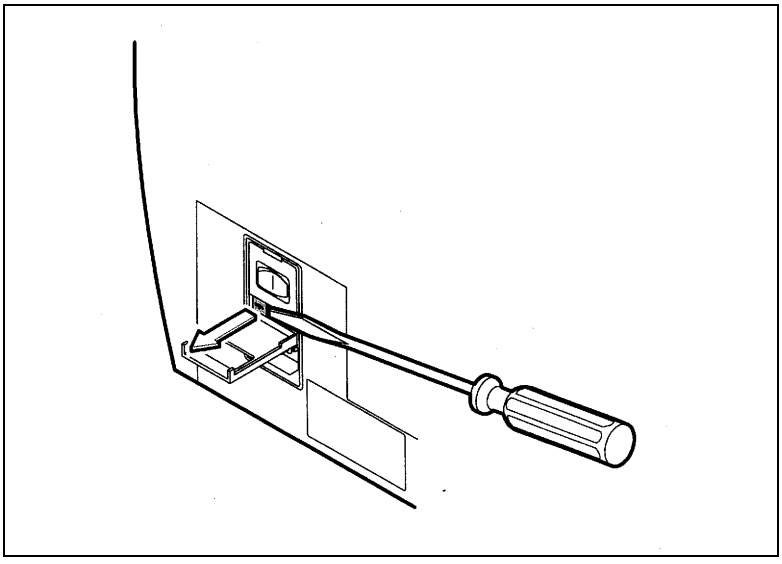


Fig. 7-92

**Danger**

Caution: Mains voltage
Incorrectly fused products may be fatal.
Only use fuses with the values specified above!

5 Snap the fuse holder back together.

6 Close the cover.

7 Reconnect the power cable.

**Note**

Please make use of our service!
In the unlikely event of a error in your leak detector there are various ways to maintain the availability of your plant.

- Have the leak detector repaired on site by the PFEIFFER Service.
- Send the leak detector to the parent company for repair.
- Replace the leak detector with a new one.

Please contact your PFEIFFER representative for details.

# 8 Disposal

**Danger**

Caution: Contaminated parts
Contaminated parts can cause damage to health and the environment.
Find out about possible contamination before starting work. Observe the pertinent regulations and safety precautions when handling contaminated parts.

**Warning**

Caution: Materials which are harmful to the environment
Products or parts (mechanical and electrical components, operating fluids etc.) can be harmful to the environment.
Dispose of such harmful materials according to local regulations.

**Division of the components**
After dismantling the product, the components must be divided into the following categories for disposal:

*Contaminated components*

Contaminated components (radioactive, toxic, caustic, microbiological, etc.) must be decontaminated according to national regulations, separated and disposed of according to their type of material.

*Uncontaminated components*

These components must be separated according to their type of material and recycled.

*Operating fluids*

Operating fluids of the backing pump and high vacuum pumps must be disposed of according to the local regulations.

# 9 Accessories and Consumer Materials

*Basic instrument*

| | Order number |
|---|---|
| Filter mats (5 pieces) | B 8199 999 EG |
| Carriage for SmartTest, prepared for fore pump<br>230 V~, 50 Hz<br>100 … 120 V~, 50 … 60 Hz | <br>PT 445 415<br>PT 445 416 |
| Transport case for SmartTest | PT 445403 |
| Scratch guard for SmartTest<br>PU mat | <br>PT 445 404 |
| Screw-in flange DN 25 ISO-KF<br>for external backing pump | <br>PT 445 417 |

*Remote control*[1)]

| | Order number |
|---|---|
| Remote control | PT 445 400 |
| Connecting cable remote control 4m | PT 445 401 |
| Extension cable 8m (cascadable up to a maximum 30 m) | PT 445 402 |

[1)] technical data see appendix

*Sniffing probes*

| | Order number |
|---|---|
| Sniffing line with standard tip TP 312 (rigid, 120 mm)<br>LP 503, 3 m<br>LP 505, 5 m<br>LP 510, 10 m | <br>BG 449 207 -T<br>BG 449 208 -T<br>BG 449 209 -T |
| Sniffing tips<br>TP 385 (385 mm, rigid)<br>TF 312 (120 mm, flexible)<br>TF 385 (385 mm, flexible) | <br>BG 449 216 -T<br>BG 449 217 -T<br>BG 449 218 -T |

*Bypass-option*

| | Order number |
|---|---|
| With main cable and German plug | PT 445 410 -T |
| With main cable, VL | PT 445 412 -T |

*Signal tower*

| | Order number |
|---|---|
| Signal tower (lamp) green / red for optical leak indication | B 4681 891 KC |

*External test leaks*

| | | Order number |
|---|---|---|
| Calibrated helium vacuum test leak | | |
| CT 408 ≈ $10^{-8}$ mbar l/s | | B 8116 557 |
| CT 446 $10^{-4}$ … $10^{-6}$ mbar l/s, adjustable | | B 8115 580 |
| Calibrated helium sniffing test leak | | |
| CL 004 | $10^{-4}$ mbar l/s | BG 447 704 -T |
| | $10^{-5}$ mbar l/s | BG 447 705 -T |
| | $10^{-6}$ mbar l/s | BG 447 706 -T |
| Calibrated $H_2$+He (5%/95%) sniff test leak | | |
| CL 002A | $10^{-4}$ mbar l/s (total leak rate) | BG 449 025A |
| | $10^{-6}$ mbar l/s ($H_2$ leak rate) | |
| Helium pistol | | BG 512 125 -T |

# Appendix

## A Remote Control

Like the instrument operating unit the remote control is a display, operation and control element.
It offers the advantage of simple operation of the leak detector from a distance of up to 30 m.
The following instrument features are provided.

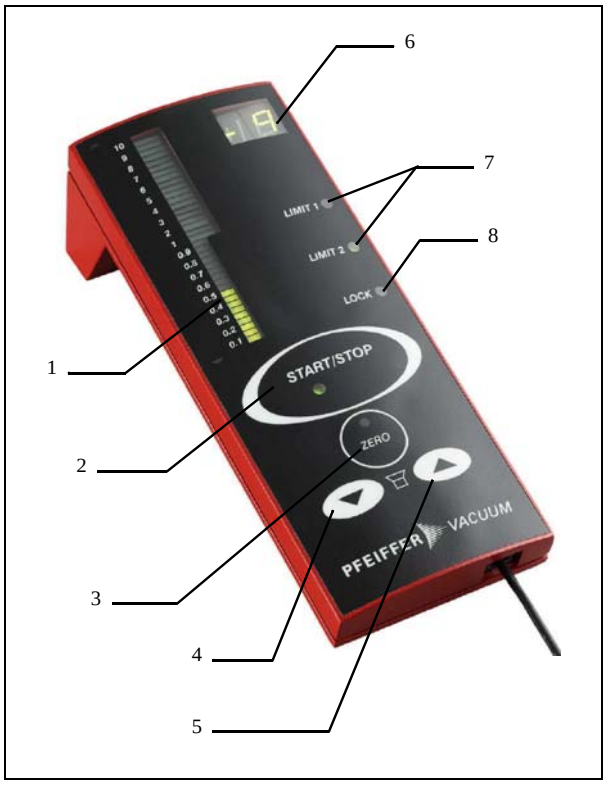



Fig. 10-1

***1*** LED bar display
Display of leak rate mantissa in selected unit

***2*** START/STOP key
The measuring process is started and stopped with the START/STOP key

***3*** ZERO key
ZERO activates the background suppression in measurement mode. When you press the key longer than 3 seconds you will deactivate the underground suppression.

***4*** Volume key – loudspeaker down
Reduces the volume of the alarm signals (see Chapter 6.4.4.3)

***5*** Volume key – loudspeaker up
Increases the volume of the alarm signals (see Chapter 6.4.4.3)

***6*** Exponent
Display of leak rate exponents in selected unit

**7** LED Limit
Signals an exceeding of the alarm threshold (Limit 1) or the warning limit (Limit 2) to the alarm threshold value (see Chapter 6.4.4.3). After pressing the START key you can activate the “LIMIT 1” and “LIMIT 2” when the warning limit falls or the alarm delay is over or the alarm “Prop. leak rate” i.e. “Pinpoint” or the sniffer mode is enabled.

**8** LED Lock
Signals the assignment / authorisation for controlling the leak detector. When the LED Lock lights up, the remote control cannot be used to control the instrument. The instrument status or leak rate can be displayed regardless of this (see Chapter 6.4.4.4.3).

The remote control is an optional accessory and is therefore not included in the standard delivery scope. It can be ordered separately if required with the appropriate connecting and extension cables (see Chapter 9).

# B Interfaces

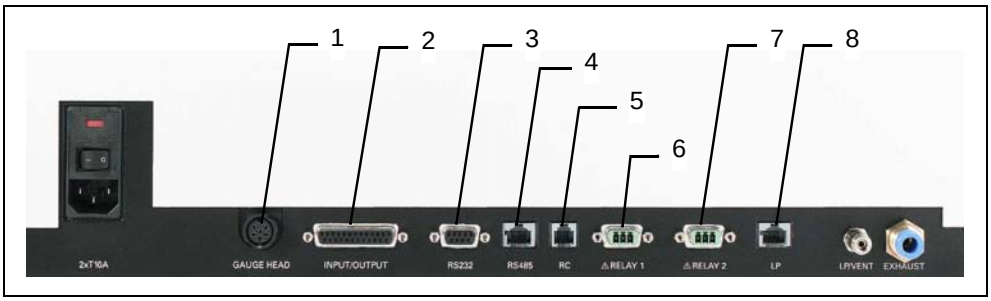



Fig. 10-2

**1** GAUGE HEAD: Connection for compact gauge heads

**2** INPUT/OUTPUT: control and output signals

**3** RS232: connection for computer

**4** RS485: connection for computer

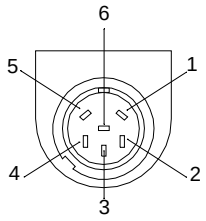
**5** RC: remote control

**6** RELAY 1: relay contact

**7** RELAY 2: relay contact

**8** LP: connection for sniffing probe LP 503, LP 505 or LP 510

*Notice* All plugs are illustrated looking at the SmartTest from the outside.




| Pin | Signal |
|---|---|
| 1 | Identification |
| 2 | DGND (0 V) |
| 3 | Measuring signal |
| 4 | Measuring signal |
| 5 | Screening |
| 6 | +24 V (fuse 0.8 A slow blow) |

Fig. 10-3

Usable compact gauge heads

| Linear gauge heads | Display Operating unit | Gauge head designation |
|---|---|---|
| Compact Capacitance Gauges | linear | CMR 261, CMR 262, CMR 263, CMR 264, CMR 271, CMR 272, CMR 273, CMR 274 CMR 275 |
| Compact Piezo Gauges | linear | APR 250, APR 260, APR 262, APR 265, APR 266, APR 267 |

| Logarithmic gauge heads | Display Operating unit | Gauge head designation |
|---|---|---|
| Compact Pirani Gauges | TPR[1] | TPR 280 |
| Compact Pirani / Capacitance Gauges | PCR 260 | PCR 260 |
| Compact FullRange™ CC Gauges | PKR | PKR 251, PKR 261 |

[1)] The pressure value for the gauge head type TPR / PCR is only shown until 1000 mbar. Pressures above 1000 mbar are shown as >1000 mbar.
See Fig. 10-2/1.

Input and output signals, 25-pole, D-Sub, sockets

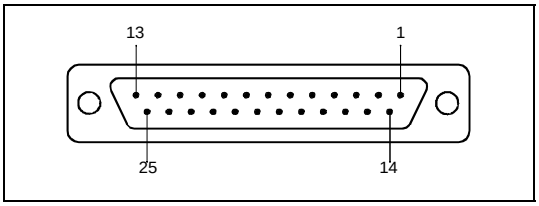



Fig. 10-4

| Pin | Signal | Explanation |
|---|---|---|
| 1 | CHANNEL 1 | Analog output 0 … 10 V, Ri 3 Ω, function. See 6.3.4.4.1. |
| 2 | CHANNEL 2 | Analog output, data as above. See 6.3.4.4.1. |
| 3 | AGND | Reference potential analog outputs, galvanically isolated |
| 4 | | Audio output (headphones or active speaker) |
| 5 | | Reference potential to audio output |
| 6 … 13 | DI 1 … 8 | Digital inputs, +18 … 30 V (approx. 5 mA). The functions are activated with the positive edge. Equal rights with the operating unit |
| 6 | Start/Stop | Starts or stops the measurement |
| 7 | Vent | Venting at valve settings **Vent** no see Operating Instructions IG 0100 BE. |
| 8 | Zero | Function same as ZERO key.<br>ZERO is cancelled if applied longer than 3s. |
| 9 | Calibrate | Starts calibration or to confirm "Calibration Acknowledge" (PIN 19) |
| 11 | Bypass | Response "Bypass option available" |
| 14 | DGND | Reference potential of the digital inputs, galvanically isolated |
| 15 … … 22 | DO1 … 8 | Digital outputs (not separated galvanically), active 24 V ± 10%, passive at DGND (0 V) maximum permissible current: 800 mA for all outputs together<br>All outputs are active for approx. 1 s when switching on |
| 15 | Ready to start | Active when SmartTest is ready to pump off the test volume |
| 16 | Ready to measure | Active when SmartTest measures, i.e. in the state counter flow, Twin-Flow™ low and Twin-Flow™ high |
| 17 | Leak | Active when the alarm threshold is enabled and was exceeded, passive below 90% of this value |
| 18 | Error | Active in error state |
| 19 | Calibrate Acknowledge | Active when SmartTest waits for confirmation during calibration: internal calibration:<br>- transfer factors?<br>external calibration:<br>- test leak opend and signal stable?<br>- test leak closed and signal stable?<br>- transfer factors? |
| 21 | Bypass Valve | Active when bypass valve is open (activation bypass option) |
| 23 | DGND (0 V) | Reference potential of the digital outputs, not galvanically isolated |
| 25 | +24 V | +24 V e.g. for activating the digital inputs<br>Fuse 0.8 A slow blow |

See Fig. 10-2/2.

*Example of digital inputs:*

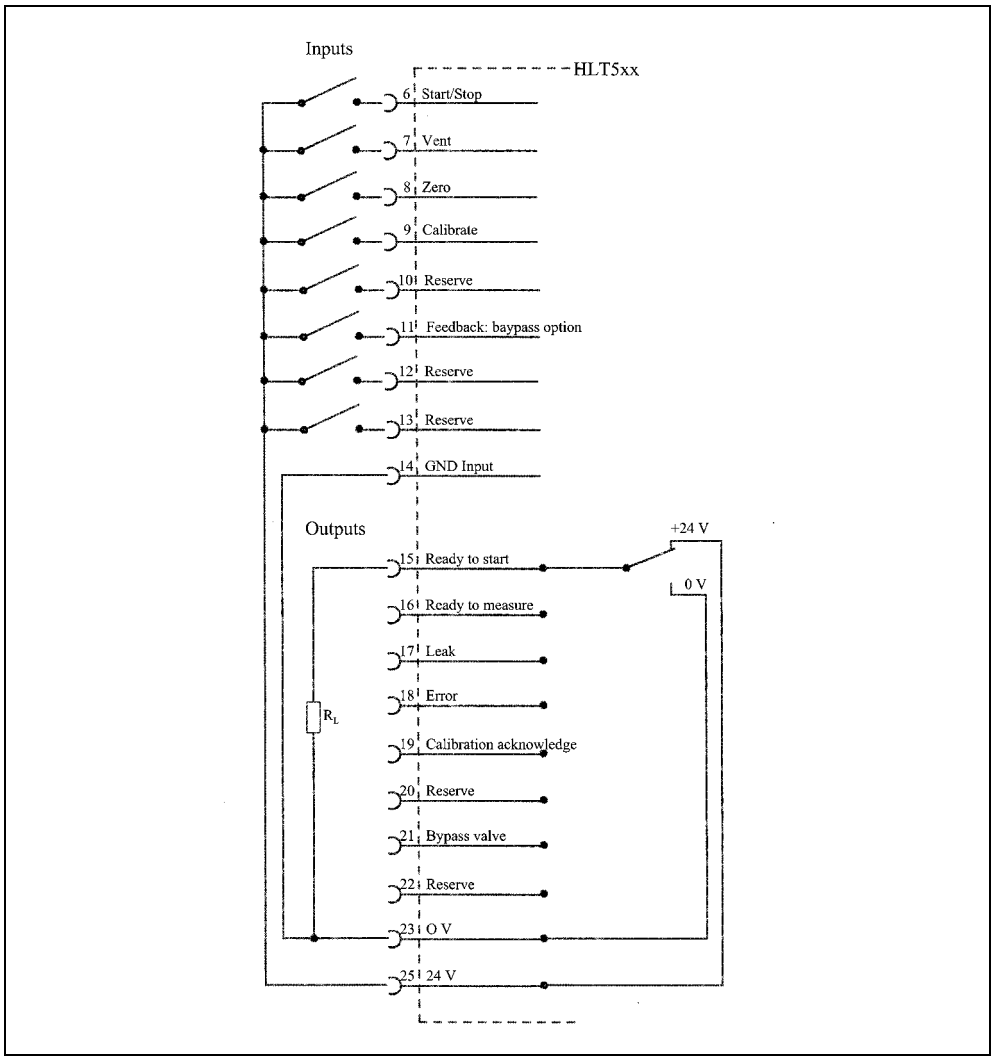



Fig. 10-5 Example of digital inputs

When accessing via +24V of the leak detector a connection between PIN14 and PIN23 has to exist.

*Signal tower*

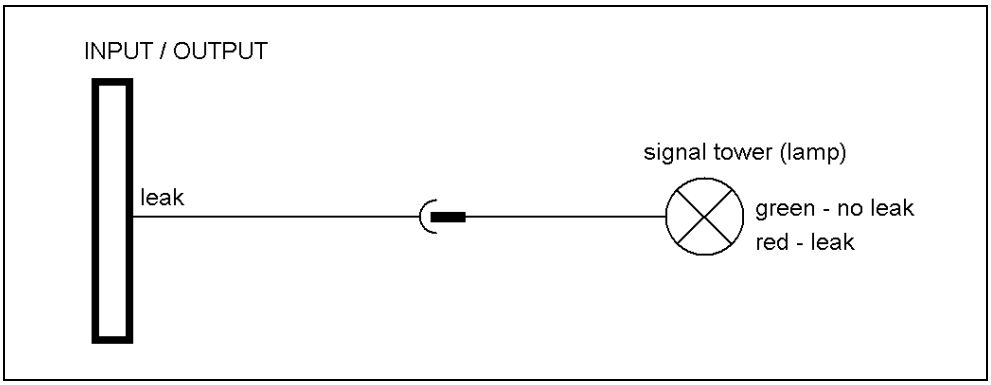


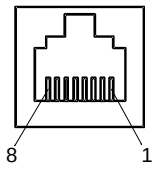

Fig. 10-6 Signal tower

*Remote control*

The remote control interface is designed as a serial interface for controlling the SmartTest by remote control. The remote control can be connected by a connecting cable with an RJ45 plug (Fig. 10-1/5). The remote control is not included in the normal scope off delivery of the SmartTest.

| Pin | Signal |
|---|---|
| 2 | +24 V (fuse 0.8 A slow blow) |
| 3 | 0 V DGND (0 V) |
| 4 | RxD (internal RS232) |
| 5 | TxD (internal RS232) |

The connection of the SmartTest to a computer can be made through the serial interface RS485.




| Pin | |
|---|---|
| 1 | free |
| 2 | +24 V (for supplying the field bus converter; fuse 0.8 A slow blow) |
| 3 | free |
| 4 | free |
| 5 | D+ (galvanically isolated) |
| 6 | DGND (0 V) |
| 7 | D- galvanically isolated) |
| 8 | free |

Fig. 10-7

Plug: RS485 (8-pole)

See also Fig. 10-2/4.

PIN 1 free
PIN 2 +24 V (for supplying the field bus converter; fuse 0.8 A slow blow)
PIN 3 free
PIN 4 free
PIN 5 D+ (galvanically isolated)
PIN 6 DGND (0 V)
PIN 7 D- (galvanically isolated)
PIN 8 free

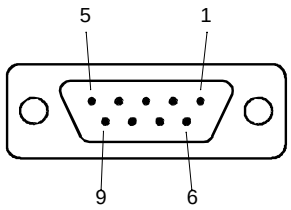
**Note**

Connector propably will not work if you do change this connector with the connector “LP”.

With the RS485 interface up to 32 instruments can be connected with each other by two lines whereby never more than one instrument may transmit at once.

*RS232*

Connection for computer 9-pole, D-Sub sockets, RS232 (option RS485)




| Pin | Signal | |
|---|---|---|
| 2 | TXD | Transmit data (galvanically isolated) |
| 3 | RXD | Receive data (galvanically isolated) |
| 5 | GGND | Reference potential (galvanically isolated) |

Fig. 10-8 RS232 interface

See RS232 Fig. 10-2/3.

*Relay 1, Relay 2*

Relay contact 230 V~, 3 A
Plug SmartTest Power Subcon, 3-pole

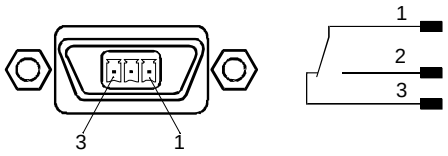



Fig. 10-9

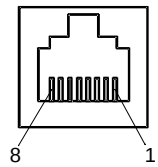
See Fig. 10-2/6 or Fig. 10-2/7.

*LP*

Connection for sniffing probe LP 503, LP 505, LP 510
RJ-45, 8-pole

**Warning**

Be aware that you do not change this connector with the connector “RS485”.




| Pin | Signal |
|---|---|
| 3 | zero |
| 4 | (LED red) |
| 5 | (LED green) |
| 6 | +24 V (fuse 0.8 A slow blow) |

Fig. 10-10

LED green: Leak detector ready for measurement.
LED red: Threshold exceeded.
See Fig. 10-2/8.

# C List of Default Values

| Parameter | Default Values | Setting back to VORGABEWERT when loading default values | Included in set of parameters |
|---|---|---|---|
| contrast | 50 | no | no |
| invert display | off | yes | yes |
| leak rate unit | mbarl/s | yes | yes |
| pressure unit | mbar | yes | yes |
| scaling | log | yes | yes |
| decades at scaling log. | 4 | yes | yes |
| display unit | automatisch | yes | yes |
| time axis | 32 Sekunden | yes | yes |
| lower display limit | 1E-12mbarl/s | yes | yes |
| background in ready to start | ein | yes | yes |
| menu PIN | 0 | yes | no |
| instrument PIN | 0 | yes | no |
| calibration enabled | ein | yes | yes |
| language | Englisch | yes | no |
| mode | Vakuum | yes | yes |
| mass | Masse 4 | yes | yes |
| leak rate factor | Gas | yes | no |
| leak rate filter | dynamisch | yes | yes |
| zero | freigegeben | yes | yes |
| time for start after zero | 10 Sekunden | yes | yes |
| BG subtraction at START | ein | yes | yes |
| alarm mode | Trigger Alarm | yes | yes |
| alarm delay | 30 Sekunden | yes | yes |
| LR setpoint value | 1E-4 mbarl/s | yes | yes |
| warning limit | 100% | yes | yes |

| Parameter | Default Values | Setting back to VORGABEWERT when loading default values | Included in set of parameters |
|---|---|---|---|
| analog output channal 1 | LR mantissa | yes | yes |
| analog output channal 2 | LR exponent | yes | yes |
| analog scaling (upper limit) | -5 | yes | no |
| analog scaling (V/decade) | 1V per decade | yes | no |
| full scale (lin. gauge head) | 1000 mbar | yes | no |
| setpoint value for ext. gauge heads | 1E-1 mbar | yes | no |
| pressure P2 source | internal | no | no |
| control location | local, RS232/RS485 | yes | yes |
| mode relay 1 | off | yes | no |
| mode relay 2 | off | yes | no |
| interface | RS232 | yes | no |
| serial port | Pfeiffer | yes | yes |
| bypass modus | no bypass | yes | yes |
| venting delay internal | off | yes | yes |
| flow max. | 50sccm | yes | yes |
| flow min. | 10sccm | yes | yes |
| contamination protection | off | yes | yes |
| limit contamination protection | 1E-3 mbarl/s | yes | yes |
| minimum volume | 0 | yes | yes |
| volume | 2 | yes | yes |
| TwinFlow high | set free | yes | yes |
| Change over threshhold TwinFlow high | 0,5mbar | yes | yes |
| TwinFlow low | set free | yes | yes |
| Change over threshhold TwinFlow low | 5 mbar | yes | yes |
| counterflow | set free | yes | yes |
| Change over threshhold counterflow | 15 mbar | yes | yes |

| Parameter | Default Values | Setting back to VORGABEWERT when loading default values | Included in set of parameters |
|---|---|---|---|
| maximum evacuation time | 30 minutes | yes | yes |
| venting | with stop | yes | yes |
| calibratoin request | off | yes | yes |
| int. test leak | 1E-6 mbarl/s | no | no |
| ext. test leak (vacuum) | 1E-7 mbarl/s | yes | yes |
| ext. test leak (sniffing) | 1E-5 mbarl/s | yes | yes |
| calibration mode | int. auto | yes | yes |

# D Pirani-Characteristic

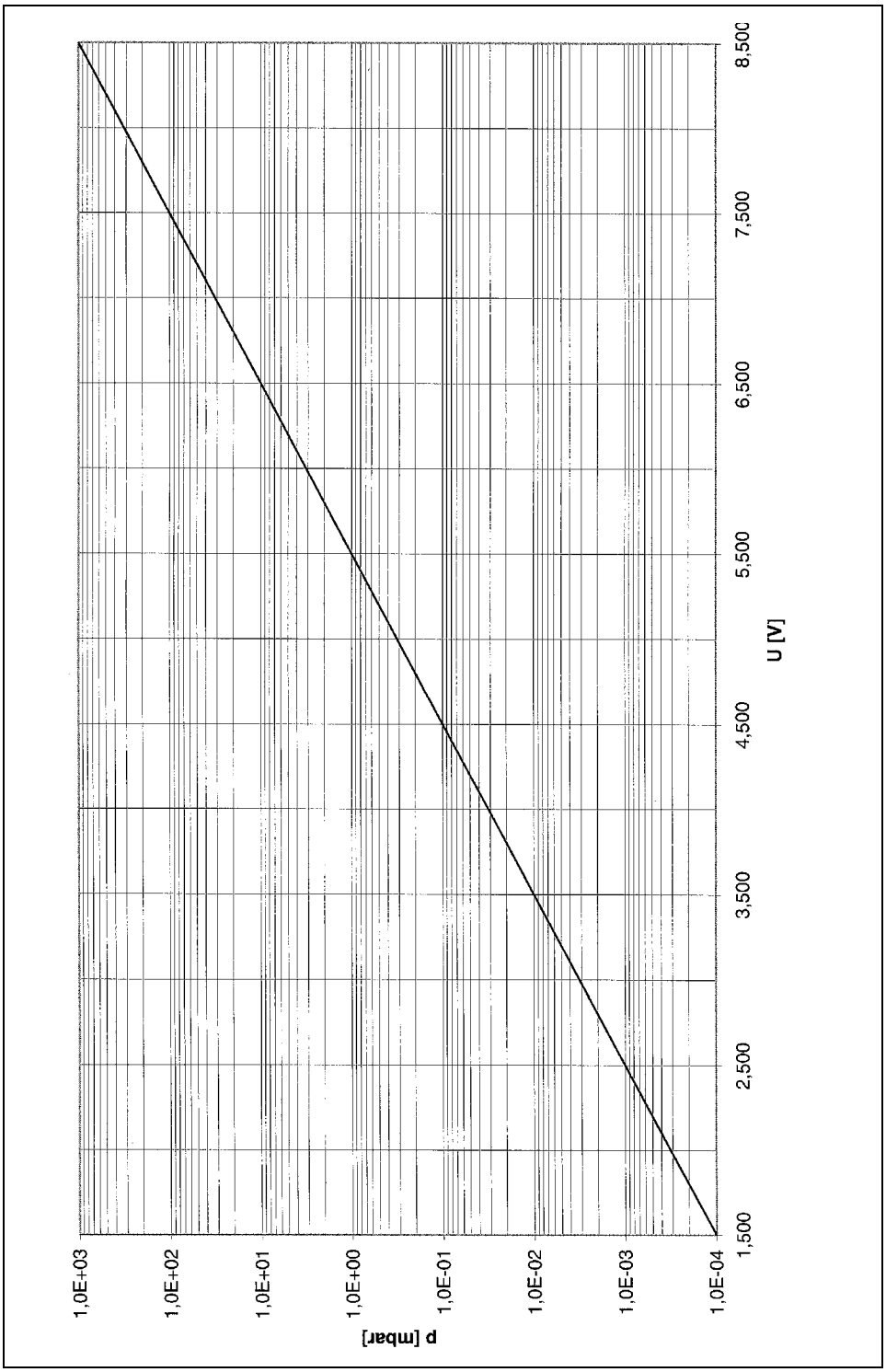



Fig. 10-11

# E List of literature


Operating manual
Sniffer Probe LP 503, LP 505, LP 510
BG 805 268 BE

Operating manual
Bypass-Option
PL0002 BN

Operating manual Cart for SmartTest
IG 0110 BE

Communication Protocol SmartTest
IG 0105 BE

Maintenance Instructions SmartTest
IG 0108 BE

# F Contamination Declaration

PFEIFFER VACUUM

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.

This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

**1 Description of product**

Type _____

Part number _____

Serial number _____

**2 Reason for return**

_____

_____

_____

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

_____

**4 Used in copper process**

no ❑ yes ❑ → Seal product in plastic bag and mark it with a corresponding label.

**5 Process related contamination of product:**

| | | |
|---|---|---|
| toxic | no ❑ 1) | yes ❑ |
| caustic | no ❑ 1) | yes ❑ |
| biological hazard | no ❑ | yes ❑ 2) |
| explosive | no ❑ | yes ❑ 2) |
| radioactive | no ❑ | yes ❑ 2) |
| other harmful substances | no ❑ 1) | yes ❑ |

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

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

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

**6 Harmful substances, gases and/or by-products**

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

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

**7 Legally binding declaration:**

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

Organization/company _____

Address _____ Post code, place _____

Phone _____ Fax _____

Email _____

Name _____

Date and legally binding signature

_____

Company stamp

This form can be downloaded from our website.

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

Fig. 10-12

# G Declaration of Conformity

## Declaration of Conformity

Product

**Smart Test**

Helium Leak detector

HLT 550
HLT 560
HLT 570

| | | |
|---|---|---|
| PT L02 000 | PT L02 010 | PT L02 020 |
| PT L02 001 | PT L02 011 | |
| PT L02 002 | PT L02 012 | |

Declaration of conformity in accordance with the listed EU guidelines

We herewith declare that the aforementioned products conform to the regulations in the subsequently listed EU guidelines.

- **EEC Directive on Low Voltages (73/23/EWG and subsequent 93/68/EWG)**
- **EEC Directive on Electromagnetic Compatibility (89/336/EWG and subsequent 93/31/EWG)**

**Applied harmonized standars:**

| | |
|---|---|
| EN 61010-1 : 2001 | |
| EN 61000-6-4 : 2002 Part | EN 55011 Class B |
| EN 61000-6-3 : 2002 Part | EN 61000-4-2 |
| EN 61000-6-2 : 2000 Parts | EN 61000-4-2 |
| | EN 61000-4-3 |
| | EN 61000-4-4 |
| | EN 61000-4-5 |
| | EN 61000-4-6 |
| | EN 61000-4-11 |

Signatures

Asslar, 1st of July 2007

| | |
|---|---|
| Manfred Bender | Dr. Matthias Wiemer |
| Managing director | Managing director |

Fig. 10-13

## Vacuum is nothing, but everything to us!

**Turbo Pumps**

**Rotary Vane Vacuum Pumps**

**Roots Pumps**

**Dry Vacuum Pumps**

**Leak Test Units**

**Valves**

**Flanges, Feedthroughs**


**Vacuum Measurement**

**Gas Analysis**

**System Technology**

**Service**

PFEIFFER VACUUM

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