Operating Instructions

GA10218_0102

PhoeniXL^{300}

leak detector

catalog-numbers

PhoeniXL^{300} 250000, 251000
PhoeniXL$^{300\ dry}$ 250001, 251001
PhoeniXL$^{300\ Modul}$ 250002

Leybold
vacuum

Table of Contents

1 General Information

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

This Technisches Handbuch contains important informations on the functions, installation, start-up and operation of the PhoeniXL.

All the informations in this handbook are based for the PhoeniXL^{300} leak detector. Changes in the use for the Models PhoeniXL$^{300\ dry}$ and PhoeniXL$^{300\ Modul}$ are stated below the information for the PhoeniXL^{300}.

We reserve the right to modify the design and the specified data. The illustrations are not binding.

1.1 Notes on the Use of this Handbook

1.1.1 Safety Symbols

Important remarks concerning operational safety and protection are emphasised as follows:

Attention Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

Caution Information on preventing any kind of physical injury.

1.1.2 Indications

The references to diagrams consists of the figure number and the item number in this order. For example: Fig. 2/7 refers to item 7 in the figure 2.

1.1.3 Symbols of Vacuum Technology

Given in the following are some important vacuum symbols which are used in this manual.

Vacuum pump in general

Turbomolecular pump

Measuring instrument

Valve

1.1.4 Definiton of Terms

Autoranging

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

The autoranging feature of the PhoeniXL covers the entire range or leak rates depending on the selected operating mode. Not only the leak rate signal, but also the pressure in the test sample (inlet pressure P1) and the forevacuum pressure (P2) are used for control purposes. Range switching between the main ranges is performed via valves. Fine range switching within the main ranges is implemented by switching over the gain factor of the preamplifier.

Autotune
Mass alignment

This function automatically aligns the mass spectrometer so that a maximum leak rate is displayed. The control processor changes the voltage which erates the ions in the selected mass range until a maximum ion current is detected by the ion detector. During each calibration the mass alignment is run automatically.

Auto zero

Determination and automatic adaptation of the internal background.

Through this function, the internal zero level of the instrument is determined which is then substracted from the current leak rate signal. This fuction is run during the calibration process or when operating the start pushbutton, provided the PhoeniXL has been running previously for at least 20 seconds in the stanby or vent mode.

GROSS

GROSS is a measurement mode which allows high inlet pressure (15 to 0,2 mbar). The smallest detectable leak rate is $1 \cdot 10^{-7}$ mbar l / s.

FINE

FINE is a measurement mode with inlet pressure < 0.2 mbar. The minimum detectable leak rate is $\leq 5 \cdot 10^{-12}$ mbar l / s

PRECISION

Precision is a measurement mode for the PhoeniXL$^{300\ dry}$ only from an inlet pressure < 0,1 mbar. In this mode the PhoeniXL$^{300\ dry}$ has the highest sensitivity, the minimum detectable leak rate is $\leq 3 \cdot 10^{-11}$ mbar l / s.

Foreline pressure

Pressure in the foreline between Turbo pump and rotary vane pump.

Internal helium background

The existing helium partial pressure in the measurement system. The level of the internal helium background is measured in the Stand-by mode and subtracted from the measured signal.

Minimum detectable leak rate

The smallest leak rate the PhoeniXL is able to detect ($\leq 5 \cdot 10^{-12}$ mbar l / s) in vacuum mode.

Menu

The menu allows the user to program the PhoeniXL according to his requirements. The menu has a tree architecture.

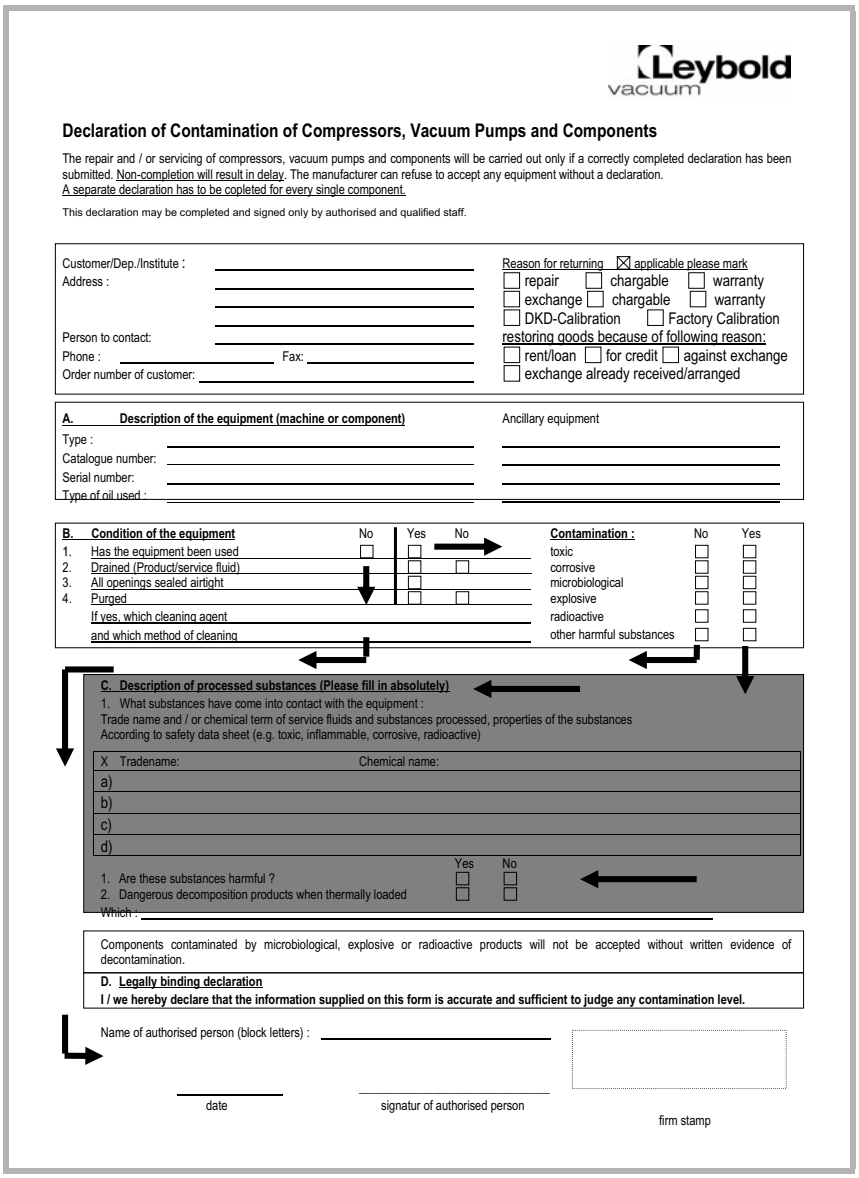
Measure
Measurement mode

The PhoeniXL measures the leak rate of the test sample.

Default

Status of the PhoeniXL when supplied by the factory.

1.2 Support from LEYBOLD Service



Leybold vacuum

Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, vacuum pumps and components will be carried out only if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer can refuse to accept any equipment without a declaration.
A separate declaration has to be copleted for every single component.

This declaration may be completed and signed only by authorised and qualified staff.

Customer/Dep./Institute :
Address :
Person to contact:
Phone : Fax:
Order number of customer:

Reason for returning ☒ applicable please mark
☐ repair ☐ chargable ☐ warranty
☐ exchange ☐ chargable ☐ warranty
☐ DKD-Calibration ☐ Factory Calibration
restoring goods because of following reason:
☐ rent/loan ☐ for credit ☐ against exchange
☐ exchange already received/arranged

A. Description of the equipment (machine or component)
Type :
Catalogue number:
Serial number:
Type of oil used :

Ancillary equipment

B. Condition of the equipment	No	Yes	No
1. Has the equipment been used	☐	☐	
2. Drained (Product/service fluid)		☐	☐
3. All openings sealed airtight		☐	
4. Purged		☐	☐
If yes, which cleaning agent			
and which method of cleaning			

Contamination :	No	Yes
toxic	☐	☐
corrosive	☐	☐
microbiological	☐	☐
explosive	☐	☐
radioactive	☐	☐
other harmful substances	☐	☐

C. Description of processed substances (Please fill in absolutely)
1. What substances have come into contact with the equipment :
Trade name and / or chemical term of service fluids and substances processed, properties of the substances
According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive)

X Tradename:	Chemical name:
a)	
b)	
c)	
d)	

	Yes	No
1. Are these substances harmful ?	☐	☐
2. Dangerous decomposition products when thermally loaded	☐	☐

Which :

Components contaminated by microbiological, explosive or radioactive products will not be accepted without written evidence of decontamination.

D. Legally binding declaration
I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorised person (block letters) :

date | signatur of authorised person | firm stamp

Fig. 1 Declaration of contamination form

If equipment is returned to Leybold, indicate whether the equipment is free of substances damaging to health or whether it is contaminated. If it is contaminated also indicate the nature of the hazard. For this you must use a form which has been prepared by us which we will provide upon request or you can take from the technical documentation folder. Also you will find this declaration on our homepage: www.leybold.com under „support & download“.

Please attach this form to the equipment or enclose it with the equipment.

This declaration of contamination is required to comply with legal requirements and to protect our personal. Leybold must return any equipment without a declaration of contamination to the sender’s adress.

Before shipping fit the yellow screw-on seals on to the connections EXHAUST Fig 3/2 and GAS BALLAST Fig 3/3.

1.3 Introduction

1.3.1 Purpose

The PhoeniXL is a leak detector for Helium or Hydrogen. This instrument may be used to detect the location and the size of leaks on objects under test in two different ways:

- when the test sample has been evacuated first and is sprayed with helium on the outside. It is required that a vacuum connection is provided between the PhoeniXL and the test sample (vacuum mode).

or

- when a helium overpressure is provided in the test sample and the test sample is searched from the outside with a sniffer probe which is attached to the inlet port (sniffer mode).

Caution

The PhoeniXL is to be used for leak detection only. It must not be used as a pumping system (esp. pumping aggressive or humid gases.)

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

The steam in the oil of the pump condeses when the water vapor rises over the acceptable value. So the attribute of the oil changes and danger of corrosion occures for the pump.

While using the leak detector with condensable gases and steams the oil of the fore pump has to be controlled regularly. So you can recognize a condensation of water vapor in the pump. Usually the oil is light and lucent. When water vapor is inside it gets blear and milky at operating state temperature.

When turning the pump off water vapor condensates and raises the part of water in the oil.

Caution

The leak detector must not directly be switched off after the process, in which condensable gases or steams are pumped, is finished. It must be running (at least 20 minutes) with opend gas ballast valve (see Chapter 5.3.1) until the oil of the pump is freed from detached steam.
When not taking care of this instruction there can be a corrosion within the pump, which will not be covered by our warranty.
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.

If the PhoeniXL will be used in an application with toxic materials please contact Leybold for appropriate decontamination rules. Should the unit will be in contact with dangerous gases, the declaration of contamination has to be filled in.

1.3.2 Technical Data PhoeniXL^{300}

1.3.2.1 Technical Data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
■ in vacuum mode	$\leq 5 \cdot 10^{-12}$ mbar l / s
■ in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
■ in vacuum mode	$\leq 1 \cdot 10^{-8}$ mbar l / s
■ in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Maximum Helium leak rate which can be displayed	0.1 mbar l / s
Measurement range	12 decades
Time constant of the leak rate signal (blanked off, 63% of the final value)	<1 s
Pumping speed (Helium) at the inlet	
– GROSS mode	0.4 l/s
– FINE mode	> 2.5 l/s
Detectable masses	2, 3 and 4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments; Iridium/Yttria-oxide
Inlet port	DN 25 KF
Run-up time (after starting)	≤ 2 min

To get down to the minimum detected leak rate range some conditions must be fulfilled:

- PhoeniXL has to run at least 20 minutes
- Ambient conditions must be stable (temperature, no vibration/accelerations.)
- The part under test has been evacuated long enough without using the zero function (background is no longer decreasing)
- ZERO must be active

1.3.2.2 Electrical Data

Power supply	230 V, +/- 5%, 50/ 60 Hz
	115 V, +/- 5%, 60 Hz
Power consumption	420 VA
Type of protection	IP40
Power cords (EU, USA, UK)	2.5 m

1.3.2.3 Other Data

Valves	solenoid
Dimensions (L × W × H) in mm	495 x 456 x 314
Weight in kg	40.0
Noise level dB (A)	< 54
max. Audio alarm dB (A)	90
Contamination level (to IEC 60664-1)	2
Overvoltage category (to IEC 60664-1)	II

1.3.2.4 Ambient Conditions

For use within buildings	
Permissible ambient temperature (during operation)	+10 °C … +40 °C
Permissible storage temperature	-10 °C … +60 °C
Max. rel. humidity	80% (up to 31°C) linear decreasing to 50% at 40°C
Max. permissible height above sea level (during operation)	2000 m

1.3.3 Technical Data PhoeniXL$^{300\ dry}$

1.3.3.1 Technical Data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
■ in vacuum mode	$\leq 3 \cdot 10^{-11}$ mbar l / s
■ in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
■ in vacuum mode	$\leq 1 \cdot 10^{-8}$ mbar l / s
■ in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Maximum Helium leak rate which can be displayed	0.1 mbar l / s
Measurement range	11 decades
Time constant of the leak rate signal (blanked off, 63% of the final value)	<1 s
Pumping speed (Helium) at the inlet	
– GROSS mode	0.02 l / s
– PRECISION mode	0,4 l / s
– FINE mode	> 2.5 l / s
Detectable masses	2, 3 and 4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments; Iridium/Yttria-oxide
Inlet port	DN 25 KF
Run-up time (after starting)	≤ 2 min

To get down to the minimum detected leak rate range some conditions must be fulfilled:

- PhoeniXL has to run at least 20 minutes
- Ambient conditions must be stable (temperature, no vibration/accelerations.)
- The part under test has been evacuated long enough without using the zero function (background is no longer decreasing)
- ZERO must be active

1.3.3.2 Electrical Data

Power supply	230 V, 50 Hz
	115 V, 60 Hz
Power consumption	350 VA
Type of protection	IP40
Power cords (EU, USA, UK)	2.5 m

1.3.3.3 Other Data

Valves	solenoid
Dimensions (L × W × H) in mm	495 x 456 x 314
Weight in kg	35.5
Noise level dB (A)	< 54
max. Audio alarm dB (A)	90
Contamination level (to IEC 60664-1)	2
Overvoltage category (to IEC 60664-1)	II

1.3.3.4 Ambient Conditions

For use within buildings	
Permissible ambient temperature (during operation)	+10 °C … +40 °C
Permissible storage temperature	-10 °C … +60 °C
Max. rel. humidity	80% (up to 31°C) linear decreasing to 50% at 40°C
Max. permissible height above sea level (during operation)	2000 m

1.3.4 Technical Data PhoeniXL 300 Modul

1.3.4.1 Technical Data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
■ in vacuum mode	
– with Scroll pump	$\leq 8 \cdot 10^{-12}$ mbar l / s
– with oil sealed pump	$\leq 5 \cdot 10^{-12}$ mbar l / s
■ in sniffer mode	$<1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
■ in vacuum mode	$\leq 1 \cdot 10^{-8}$ mbar l / s
■ in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Maximum Helium leak rate which can be displayed	0.1 mbar l / s
Measurement range	12 decades
Time constant of the leak rate signal (blanked off, 63% of the final value)	< 1 s
Pumping speed (Helium) at the inlet	
– GROSS mode	1,0 l / s
– FINE mode	> 2.5 l / s
Detectable masses	2, 3 and 4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments; Iridium/Yttria-oxide
Inlet port	DN 25 KF
Run-up time (after starting)	≤ 2 min

To get down to the minimum detected leak rate range some conditions must be fulfilled:

- PhoeniXL has to run at least 20 minutes
- Ambient conditions must be stable (temperature, no vibration/accelerations.)
- The part under test has been evacuated long enough without using the zero function (background is no longer decreasing)
- ZERO must be active

1.3.4.2 Electrical Data

Power supply	100V ...230 V, 50/60 HZ
Power consumption	350 VA
Type of protection	IP40
Power cords (EU, USA, UK)	2.5 m

1.3.4.3 Other Data

Valves	solenoid
Dimensions (L × W × H) in mm	495 x 456 x 314
Weight in kg	29.5
Noise level dB (A)	< 54
max. Audio alarm dB (A)	90
Contamination level (to IEC 60664-1)	2
Overvoltage category (to IEC 60664-1)	II

1.3.4.4 Ambient Conditions

For use within buildings	
Permissible ambient temperature (during operation)	+10 °C … +40 °C
Permissible storage temperature	-10 °C … +60 °C
Max. rel. humidity	80% (up to 31°C) linear decreasing to 50% at 40°C
Max. permissible height above sea level (during operation)	2000 m

1.4 Unpacking

Unpack the PhoeniXL immediately after delivery, even if it will be installed later on.

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

Check the PhoeniXL is complete (see Chapter 1.4.1 Supplied Equipment) and carefully examine the PhoeniXL visually.

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

Retain the packaging materials in the case of complaints about damage.

1.4.1 Supplied Equipment

- Leak Detector PhoeniXL
- Set of fuses
- Power cord
- Folder with documents
  - Operating unstructions PhoeniXL
  - Spare Parts List PhoeniXL
- 2 L-type screwed connections (hose connections)
- 1 hose nozzle

- Blank flange DN 25 KF
- Clamping ring DN 25 KF
- Centering ring DN 25 KF

1.4.2 Accessories and Options

The following parts can be ordered additionally:

■ Sniffer Line SL300	252003
■ Leak Ware (Software for data aquisation)	14090
■ Helium Sniffer QUICK-TEST QT100	15594
■ Remote Control Set consisting of – Remote control – Cable , 4 m – Mounting parts	252002
■ Extension Cable for remote control, 8 m	14022
■ Spray gun with hose	16555
■ Set of connection plugs	20028782
■ Partial flow system PhoeniXL^{300} only	14020 for EU-version
■ Partial flow system	14028 for US-version

1.4.2.1 Sniffer line SL300

By use of the sniffer line the PhoeniXL can easily be converted to a sniffer leak detector. The length of the sniffer line is 4m (i.e. 12 feet).

Installation:

The sniffer line is to be adapted to the KF 25 of the PhoeniXL with the small flange. Then the plug of the sniffer line is to be connected to the input „Options“ of the PhoeniXL.

Function:

The green LED is on when

– the PhoeniXL is ready for use and

– the selected trigger level is not exceeded

The red LED is on when

– the PhoeniXL is not ready for use or

– the selected trigger level is exceeded.

The pushbutton in the grip is for the zero function. When pushing the button the helium background will be suppressed. For cancelling the zero function push the button once more. (refer to Chapter 4.1.2.4)

Options for the sniffer line:

■ Sniffer tip rigid 120 mm	12213
■ Sniffer tip rigid 385 mm	12215
■ Sniffer tip flexible 120 mm	12214
■ Sniffer tip flexible 385 mm	12216
■ Capillary filter metal (for rough conditions)	12217

Spare parts for the sniffer line

■ Capillary filter plastic (5 pcs)	20003501
■ Sinter filter with seal (5 pcs)	20003500
■ Felt disc for capillary filter (50 pcs)	200001116

1.4.2.2 Remote control

The remote control is to operate the PhoeniXL from distance up to 30 m depending on the cable lenght. It provides the functions START, STOP/ VENT, ZERO and speaker volume, and displays leak rates in the bar-graph. (refer to Chapter 4.1.6 and 4.1.7)

1.4.2.3 Partial flow system (PhoeniXL^{300} only)

In the partial flow mode the test sample is additionally evacuated by an auxiliary pump. Using the optional partial flow pump set offers to the user the following advantages:

- faster response
- entry into the measurement mode already at an inlet pressure of 1000 mbar
- faster venting of large test objects

The partial flow system consists of the components partial flow valve block, right angle valve DN 25 KF, control cable and vacuum hose with flange connections.

The partial flow valve block with the right angle valve has to be connected to the inlet flange of the PhoeniXL^{300}. Connect the control cable to the Option port and the vacuum hose to the auxiliary pump. The PhoeniXL^{300} has to be configurated as described in chapter 6.6.1.4.

For further detailed information please refer to operating instructions GA 10.277 partial flow system.

2 Installation

2.1 Working Location

Danger of electrical shock. The PhoeniXL must not be operated while standing in water or when exposed to drip water. The same applies to all other kinds of liquids.

Caution

Avoid contact with bases, acids or solvents as well as exposure to extreme climatic conditions.

Attention

The PhoeniXL is designed for indoor use only.

Attention

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

Attention

It is recommended that you check all major helium sources in the vicinity of the PhoeniXL within a radius of about 10 m for the presence of any big leaks. You may use the sniffer probe for this.

Fig. 2: View of the PhoeniXL

1 inlet flange 2 control panel

2.2 Electrical Connections

2.2.1 Mains Power

Generally the local regulations for electrical connections must be observed.

Caution

Before connecting the PhoeniXL to the mains you must make sure that the mains voltage rating of the PhoeniXL coincides with the locally available mains voltage. The instrument must exclusively be connected to a single phase supply with fuses for installation (Circuit breaker 10A max. according to IEC/EN 60898 with tripping characteristic B).

Attention

Only 3-core mains cables having a protection ground conductor must be used. Operation of the PhoeniXL where the ground conductor has been left unconnected is not permissible. The PhoeniXL can be damaged when using the wrong voltage. The voltage must be in the range 230V (+/- 5%) or 115V (+/- 5%) depending on the version.

The mains voltage rating for the PhoeniXL can be read off from the name plate beneath the mains socket Fig. 3/4 at the side. This voltage is fixed and can not be changed.

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

The mains voltage is applied to the instrument via the detachable mains cable which is supplied with the instrument. A mains socket Fig. 3/4 is available for this purpose at the side of the instrument.

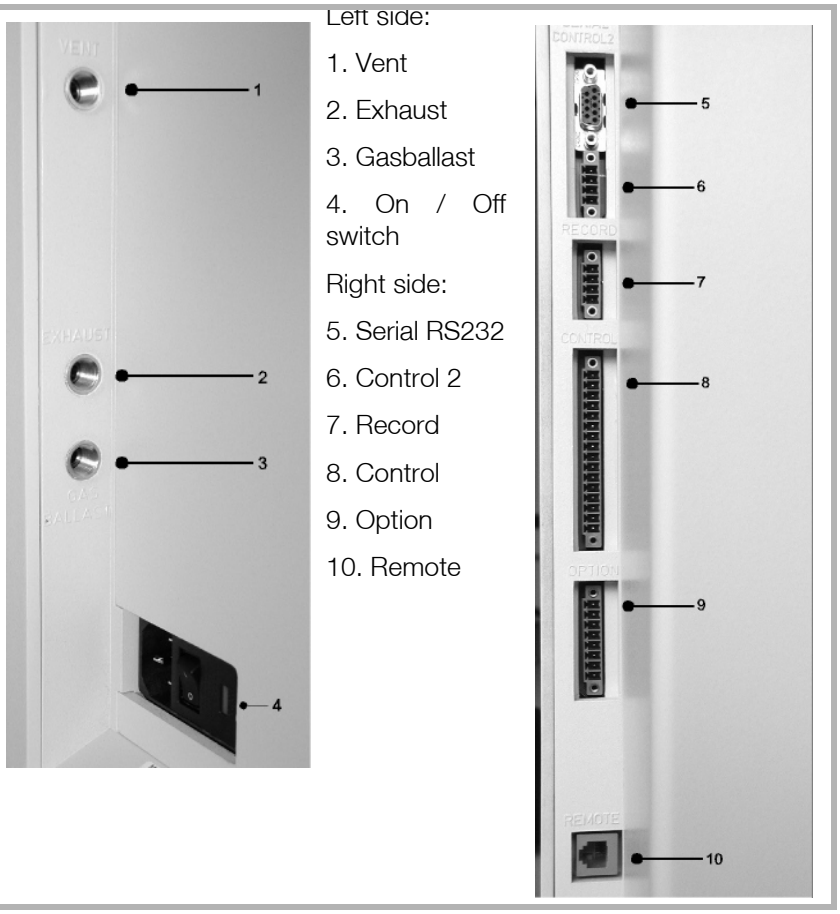


Fig. 3 Side views of the PhoeniXL

2.2.2 Connections for the Data Acquisition Systems

2.2.2.1 Option (Accessories)

The sniffer line SL300 or the partial flow system may be connected to the option port (Fig. 3/9):

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

Pin	Assignment
1	+24 V, constantly applied, power supply for the Leybold partial flow valve or sniffer line.
2	GND
3,	+24V switched by the PhoeniXL for an external venting valve
4, 5, 6, 7, 8	These pins are used in connection with accessories.

2.2.2.2 Digital Out (Control)

The following relay outputs Fig. 3/8 are available for further signal processing. The maximum rating for the relay contacts is 60V AC/1A.

The contacts are numbered from bottom to top.

Pin	Assignment
1	PLC in free selectable
2	PLC in free selectable
3	PLC in free selectable
4	GND
5 to 7	Digital out free selectable, 5 center contact, 6 normally open contact, 7 normally closed contact
8 to 10	Digital out free selectable
11 to 13	Digital out free selectable
14 to 16	Digital out free selectable

The pin assignment for contacts 8 to 16 follows the same order as for pins 5 to 7.

For further information see chapter 6.6.4.4

2.2.2.3 Digital In (Control 2)

These inputs can be used to control the PhoeniXL with a programmable logic control (PLC).

Pin	Assignment
1	PLC in free selectable
2	PLC in free selectable
3	PLC in free selectable
4	PLC GND

These inputs Fig. 3/6 are working only, if the correct location of control is chosen. See chapter 6.6.4.1

To avoid a mistake between the connection Control 2 and Record, pin 1 and 4 are blocked. When using the connectors the guiding nose for pin 1 and 4 must be removed.

For further information see chapter 6.6.4.5

2.2.2.4 Recorder

The recorder output Fig. 3/7 may be used to chart the leak rate, the inlet pressure and the forevacuum pressure. Both recorder activities can be adjusted individually for showing leak rates and pressures.

The measured values are provided by way of an analogue signal in the range of 0 V … 10 V. The resolution is limited to 10 mV. The instrument which is connected to the recorder output (e. g. X(t) chart recorder) should have an input resistance of no less than 2.5 kΩ. The measured values are available through pins 1 and 4. The reference potential (GND) is available at pins 2 and 3. The contacts are numbered from bottom to top.

The chart recorder outputs are electrically isolated from other plugs. If, in spite of this, hum interference is apparent it is recommended to operate the PhoeniXL and the chart recorder from the same mains phase. If this is not possible, you must make sure that the frame ground of both instruments is kept at the same potential.

Pin	Assignment
1	Analog 1, leak rate, inlet pressure P1 or forevacuum pressure P2
2	GND
3	GND
4	Analog 2, leak rate, inlet pressure P1 or forevacuum pressure P2

For further information see chapter 6.6.4.2 and 6.6.4.6.

2.2.2.5 RS232

This RS232 interface Fig. 3/5 is wired as data communication equipment (DCE) and permits the connection of a personal computer (PC) for monitoring and data logging. The connection is made through a 9 pin sub-D sokket. For more information refer to chapter 6.6.4.3 and the Interface Description.

Pin	Assignment
1	24 V switchable, default setting 0
2	TXD
3	RXD
4	GND 24V
5	GND
6	DSR
7	CTS
8	RTS
9	free

2.2.2.6 Remote Control

The remote control interface Fig. 3/10 is a serial interface to control the PhoeniXL by the remote control. The remote control can be connected via an extension cable with a RJ45 plug. Refer to the Interface Description for more information. The remote control does not belong to the standard equipment.

Pin	Assignment
2	+24V (fuse 0.8 A time lag)
3	0 V
4	RXD (intern. RS232)
5	TXD (intern. RS232)

2.3 Vaccum Connections

2.3.1 Inlet Port

The inlet port is located on the top of the PhoeniXL Fig. 2/1. The size of the flange is DN 25 KF.

A test object or a test chamber has to be connected to the inlet port if the vacuum mode is chosen (See Chapter 6.3).

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

2.3.2 Exhaust

The exhaust Fig. 3/2 flange is located on the side of the PhoeniXL.

There is a filter mounted in the exhaust that absorbs the oil steams occuring during the use of the rotary vane pump. The exhaust filter has to be cleaned when doing the maintenance.

Caution

When the Phoenix is running in closed rooms the exhaust has to be put out-of-doors using the provided adapter. So the oil steams that are harmful to health are lead off.

With the provided connection a hose line can be connected to the exhaust of the PhoeniXL and lead off.

2.3.3 Vent

Usually the parts under test are vented with ambient air when the test is finished. If it is required the parts can be vented with a different gas (i. e. fresh air, dry air, nitrogen, …) at atmospheric pressure. In this case a vent hose has to be connected to the hose coupling Fig. 3/1.

2.3.4 Gas ballast connection

For the mode gas ballast it is recommended to use helium-free gases at atmospheric pressure. Ambient air can be contaminated with helium due to spraying or charging. In this case a gas supply line (i. e. nitrogen, fresh air, …) should be connected to the hose coupling Fig. 3/3. The pressure

of these gas line must not exceed 1050 mbar.

The connector 1,2 and 3 in Fig. 3 are quick connectors for hose diameters of 8/6 mm.

2.3.5 Connection of an external pump (Only PhoeniXL$^{300\ Modul}$)

The PhoeniXL300 Modul offers two possibilities to connect the external forevacuum pump to the DN 25 KF flange. One on the side of the PhoeniXL or one in the bottom (measurements see appendix). As default setting the flange on the side is chosen. To change the connection proceed as follows:

1. Take of the mechanical hood, see chapter 9.1.2
2. Loose the flange with the connection piece on the side of the PhoeniXL
3. Disconnect the blind flange on the bottom, therefor the put the PhoeniXL carefully on the electronic hood.
4. Screw in the connection piece into the flange in the bottom.
5. Connect the hose for the forevacuum pump.
6. Connect the blind flange to the sidewise flange.
7. Put on the mechanical hood.

2.4 Default settings

The following parameters are set like shown when in the menu of the PhoeniXL under Settings → Parameters, Load → Save is chosen.

Scale	linear
Display range:	4 decades
Time axis:	32 seconds
LCD inverted	off
Background in stand by mode:	off
Calibration request:	off
Mass:	4 (helium)
Recorder:	leak rate
Volume:	2
Leak rate unit:	mbar l/s
Mode:	Vacuum
Trigger level 1:	1E-9 mbar l/s
Trigger level 2:	1E-8 mbar l/s
Trigger level 3:	1E-7 mbar l/s
Leak rate external test leak (vacuum):	1E-7 mbar l/s
Leak rate external test leak (sniffer):	1E-5 mbar l/s
Vent delay:	2 seconds
Automatic purge (PhoeniXL$^{300\ dry}$ and PhoeniXL$^{300\ Modul}$ only)	on

Pressure:	mbar
Minimum volume:	0
Beep:	on
Maximum evacuation time:	30 minutes
Audio Alarm Type:	Trigger Alarm
Max. pressure limit for sniff mode	0.15 mbar
Min. pressure limit for sniff mode	0.05 mbar
Control location	local
Alarm delay:	30 seconds
Leak rate filter:	auto
Zero:	enable
Vacuum ranges	normal
Upper display limit	1E-5 mbar l/s
Service message exhaust oil filter (PhoeniXL^{300} only)	on

3 First Operation Check

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

If anything unexpected happens during the initial operation or the leak detector acts in a strange way the PhoeniXL can be switched off by the mains switch at any time.

3.1 Needed Equipment

The following parts will be needed:

- A blind flange 25 KF (if not preassembled at the inlet port).
- A helium test leak with a DN 25 KF connection (optional).
- A forevacuum pump connected to the DN25 KF flange on the side or under the bottom (dry or wet version) for use with the PhoeniXL^{300} Modul

3.2 Description of the Initial Operation

Please proceed the following description step by step to start the initial operation. Refer to Chapter 5 for a more detailed description.

3.2.1 Startup and Measure

1. Unpack the PhoeniXL and inspect it for any external damage (refer to Chapter 1.4).
2. Connect the instrument to the mains power (Refer to Chapter 2.2.1). For the PhoeniXL$^{300\ Modul}$ connect the forevacuum pump and switch it on.
3. Switch on the PhoeniXL by using the mains switch Fig. 3/4.

Caution

Don't switch the PhoeniXL on when ambient temperature is below 10°C or above 40°C.

After power on a welcoming picture appears on the screen of the control panel Fig. 4/1, the status information on the speed of the turbo pump, the foreline pressure, the emission and the active filament are given.

The start up procedure takes less than 2 minutes and the end is indicated by a signal. The PhoeniXL is in Stand-by mode now.(Fig. 4)

4. Check if the inlet port is blanked off. If not, please mount a blind flange with o-ring on the inlet port.

5. Press the START Button Fig. 4/10. The inlet will be evacuated and if the inlet pressure drops below 15 mbar a measured leak rate will be displayed.

6. Press the STOP Button Fig. 4/12, the PhoeniXL will go to Stand-by. If you press STOP a few seconds the inlet of the PhoeniXL will be vented.

7. To finish the startup procedure please proceed with step 21. For calibration proceed with step 8.

Fig. 4 Control panel

Pos.	Description	Pos.	Description
1	Soft Key no. 1	8	Soft Key no. 8
2	Soft Key no. 2	9	LC Display
3	Soft Key no. 3	10	START
4	Soft Key no. 4	11	ZERO
5	Soft Key no. 5	12	STOP
6	Soft Key no. 6	13	MENU
7	Soft Key no. 7		

3.2.2 Internal Calibration

8. Proceed the internal calibration (Please refer to Chapter 7.2.1). For better quantitative measurements please let the unit warm up (15 … 20 minutes).

- Press Calibration (Soft Key no. 5 Fig. 4/5) to get into the calibration menu.
- Select internal (Soft Key no. 4, Fig. 23) to choose the internal calibration.

The internal calibration starts automatically and takes about 30 seconds. After a succesfull calibration a visual and audible signal comes up.

9. Press the STOP Button Fig. 4/12 until the message STAND-BY / VENTED appears on the display. The inlet is vented now.

3.2.3 Verification with an external test leak

To verify the accuracy please proceed through the following steps. A test leak is required. If a test leak is not available please continue with step 21.

10. Remove the blind flange from the inlet port and connect the open helium test leak to the inlet port.
11. Press the START Button Fig. 4/10. The inlet will be evacuated and the leak rate of the test leak will be measured and displayed.
12. Press the STOP Button Fig. 4/12 to stop the measurement. The PhoeniXL goes into Stand-by mode.
13. Press the STOP Button Fig. 4/12 again until the message STAND-BY / VENTED appears on the display. The inlet is vented now.
14. Remove the helium test leak from the inlet port and put a blind flange onto the inlet port again.

3.2.4 Measure with a test object

15. Remove the blind flange from the inlet port and connect the test object to the inlet port
16. Press the START Button Fig. 4/10. The test object will be evacuated.
17. Start spraying Helium onto the outside of the test object. The leak rate of the test object will be shown in the display.
18. Press the STOP Button Fig. 4/12 to stop the measurement. The PhoeniXL goes into Stand-by mode.
19. Press the STOP Button Fig. 4/12 again until the message STAND-BY / Vented appears on the display. The inlet is vented now.
20. Remove the test object and put on a blinf flange on the inlet port.

3.2.5 Switch off

21. Switch off the PhoeniXL if the unit is in STAND-BY or VENTED mode by using the mains switch Fig. 3/4.

4 Description and Working Principle

4.1 Introduction

The PhoeniXL basically is a helium leak detector for vacuum applications, i.e. the part under test is evacuated while the test is performed. The vacuum is achieved with a pumping system that is part of the PhoeniXL. In addition the vacuum can be generated by pumps which are set up in parallel to the PhoeniXL.

The PhoeniXL$^{300\ Modul}$ needs a forevacuum pump, dry or wet version, to be connected because this unit has no internal roughing pump. The connection (DN25 KF) is on the side or under the bottom of the PhoeniXL$^{300\ Modul}$.

Another operating mode of the PhoeniXL is the Sniffer mode which can only be used when a sniffer line (See Chapter 1.4.2) is hooked up.

4.1.1 Vacuum System PhoeniXL^{300}

The vacuum diagram below shows the major components inside the PhoeniXL^{300}:

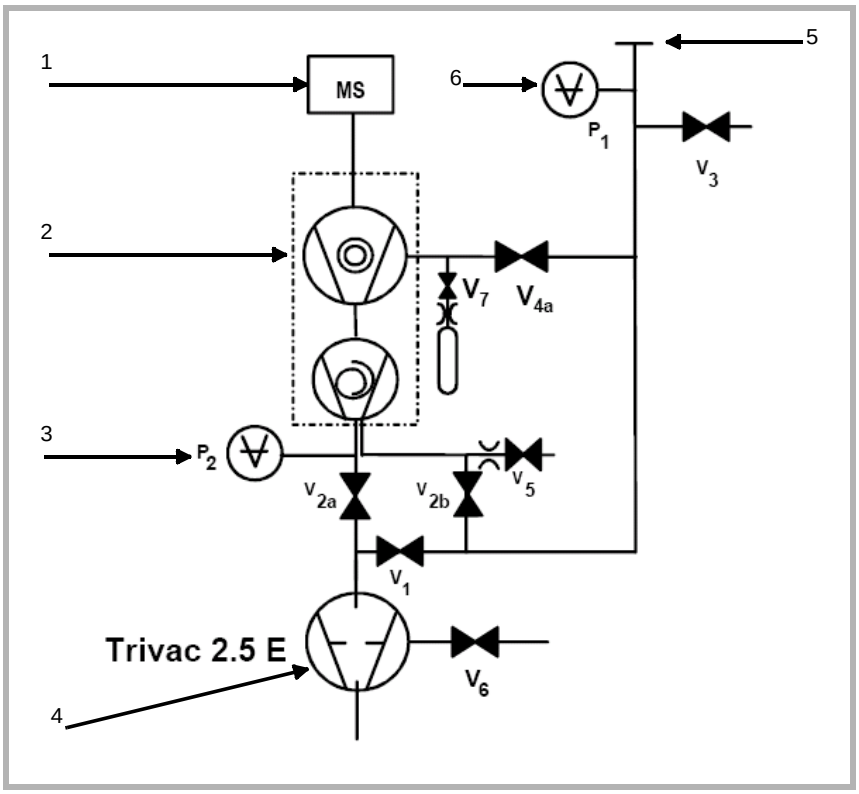


Fig. 5 Vacuum diagram PhoeniXL^{300}

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Turbomolecular Pump (TMP, provides high vacumm conditions in the MS)
3	Pirani gauge P2 (fore vacuum pressure)

Pos. Description

4 Fore pressure pump (provides the foreline pressure for the TMP und pumps down the parts under test)

5 Inlet Port

6 Pirani gauge P1 (inlet pressure)

V1 … V7: Electromagnetic Valves to control the gas flows

The mass spectrometer (MS) is mainly composed of the ion source with cathode, the magnetic separator and the ion collector.

Gas molecules getting into the mass spectrometer are ionized by the ion source. These positively charged particles are accelerated into the magnetic field following a circular path, the radius of which depends on the mass-to-charge ratio of the ions. When mass 4 is selected (Default setting) only helium ions can pass this filter and reach the ion collector where the stream of the ions is measured as a electrical current. When selected another mass than 4, only the corresponding ions can pass the filter.

For operation the mass spectrometer requires a vacuum level in the range of $1 \cdot 10^{-4}$ mbar and lower. This pressure is provided by the turbomolecular pump which in turn is backed up by a fore vacuum pump.

Besides maintaining the pressure in the mass spectrometer the pump system is used to evacuate the test parts. It is made sure that the pressure in the mass spectrometer is low enough under all circumstances. The valves V1, V2a, V2b, V4a control the gas flows when measuring. Valves V3 and V5 are used to vent the system and the Turbo pump, valve V6 controls the gas ballast function of the fore vacuum pump. Valve V7 opens and closes the internal test leak during calibration.

With the pressure in the test part being lower than ambient pressure sprayed helium (or Hydrogen as forming gas) can penetrate into the part in case of a leakage. As soon as the pressure conditions allow it one of the valves to the TMP opens. Now Helium can penetrate into the mass spectrometer contrary to the pumping direction of the TMP.

4.1.1.1 Vacuum System PhoeniXL$^{300\ dry}$

The PhoeniXL$^{300\ dry}$ has a diaphragm pump as forevacuum pump, making it suitable for applications where oil sealed systems can not be used. Furthermore the PhoeniXL$^{300\ dry}$ contains one more valve, the valve 4b. This valve opens step by step to regulate the inlet pressure into the turbo pump.

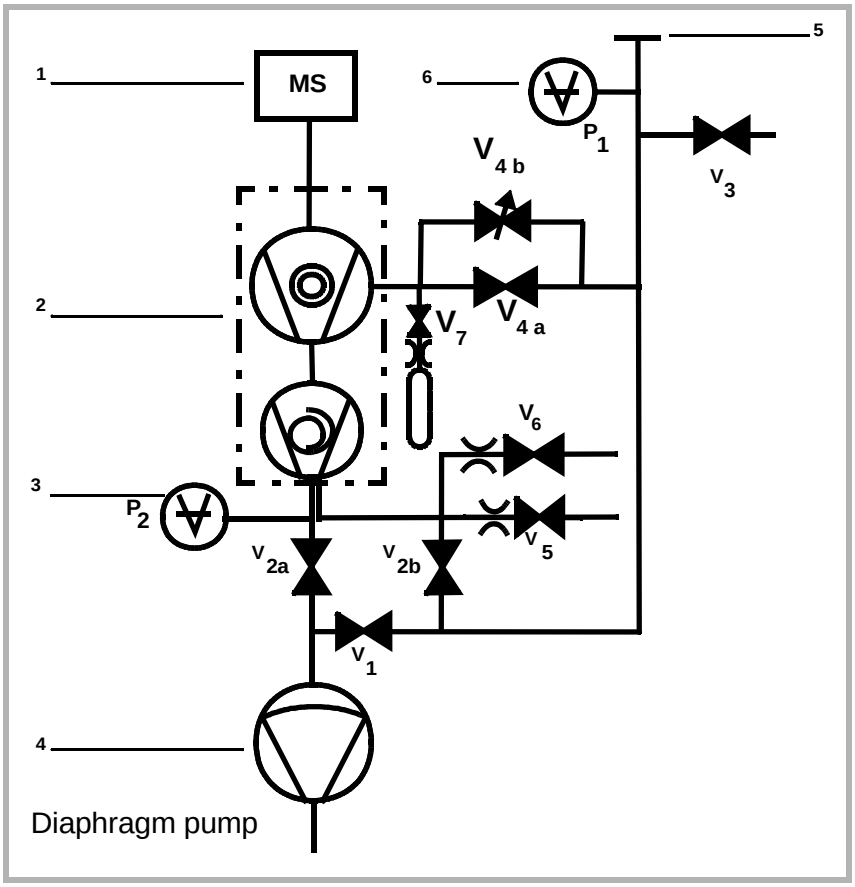


Fig. 6 Vacuum diagram PhoeniXL$^{300\ dry}$

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Turbomolecular Pump (TMP, provides high vacumm conditions in the MS)
3	Pirani gauge P2 (fore vacuum pressure)
4	Diaphragm pump (provides the foreline pressure for the TMP und pumps down the parts under test)
5	Inlet Port
6	Pirani gauge P1 (inlet pressure)

V1 … V7: Electromagnetic Valves to control the gas flows

4.1.1.2 Vacuum System PhoeniXL$^{300\ Modul}$

The PhoeniXL$^{300\ Modul}$ has no roughing pump integrated as the other models. Therefore it can be used with an external pump only. This pump can be oil sealed or a dry version with a roughing capacity between 2.5 and 65 m^3/h. This pump has to be connected to the DN25 KF at the side or under the bottom of the PhoeniXL$^{300\ Modul}$.

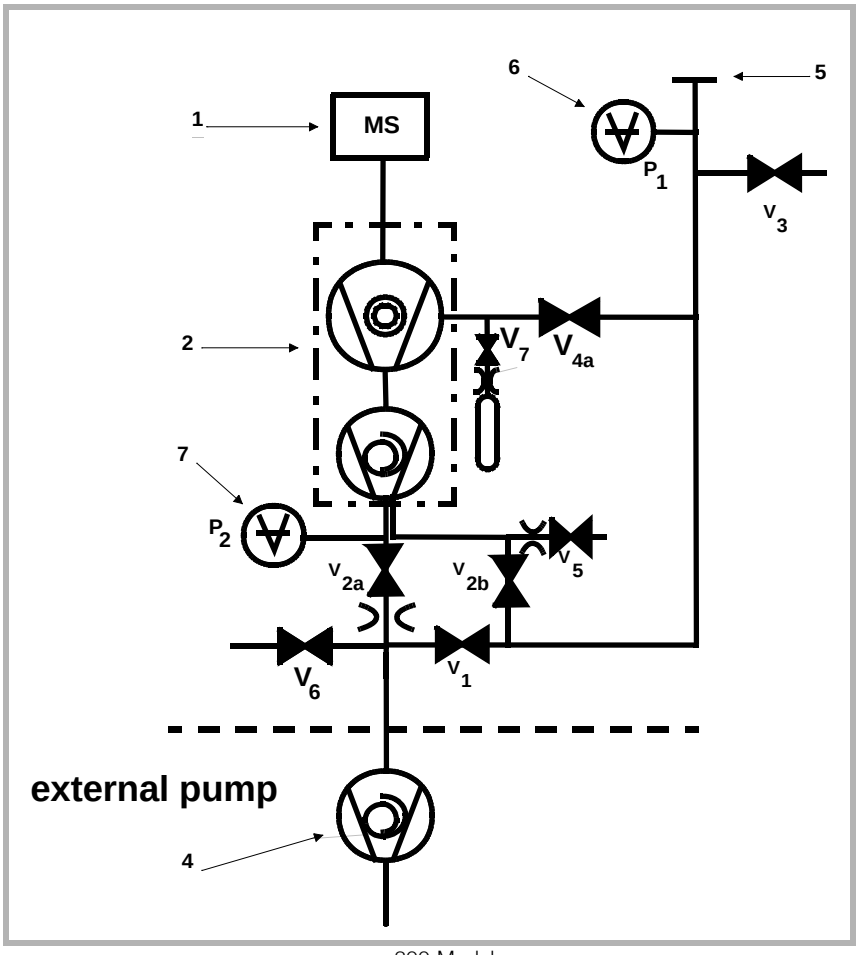


Fig. 7 Vacuum diagram PhoeniXL$^{300\ Modul}$

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Turbomolecular Pump (TMP, provides high vacumm conditions in the MS)
3	Pirani gauge P2 (forevacuum pressure)
4	Fore pressure pump (provides the foreline pressure for the TMP und pumps down the parts under test)
5	Inlet Port
6	Pirani gauge P1 (inlet pressure)

V1 … V7: Electromagnetic Valves to control the gas flows

4.1.2 Control Panel

The Control Panel Fig. 8 contains a liquid chrystal display (LC Display), the START, STOP, ZERO and MENU buttons and eight soft Keys for the different menus and inputs selections.

Fig. 8 Control Panel

Pos.	Description	Pos.	Description
1	Soft Key no. 1	8	Soft Key no. 8
2	Soft Key no. 2	9	LC Display
3	Soft Key no. 3	10	START
4	Soft Key no. 4	11	ZERO
5	Soft Key no. 5	12	STOP
6	Soft Key no. 6	13	MENU
7	Soft Key no. 7		

4.1.2.1 LC Display

The LC Display Fig. 8/1 is the communication interface to the operator. It displays the leak rates, the status report of the PhoeniXL, messages, warnings and errors. With the soft keys no.1 to no. 8 various functions which are shown in the display can be selected

4.1.2.2 START Button

Pushing the START Button Fig. 8/10 enables the PhoeniXL to start the measure procedure. The measured leak rate is shown in the display. If the START button is pushed again in measurement mode, the maximum leak rate indicator („hold“ function) is acitvated. This indicator shows the maximum leak rate since „START“. By pressing the START-button again the „hold“ function will be started again.

4.1.2.3 STOP Button

Pushing the STOP Button Fig. 8/12 interupts the measure procedure. If the button is pressed longer the inlet is vented acording to the conditions defined in the menu Vent delay. See Chapter 6.6.1.2 to select the time parameters of the venting.

4.1.2.4 ZERO Button

Pushing the ZERO Button Fig. 8/11 enables the zero mode. (see also Chapter 4.1.6)

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

- $1 \cdot 10^{-8}$ mbarl/s in GROSS
- $1 \cdot 10^{-12}$ mbarl/s in FINE

After pressing ZERO (Fig. 9, t=1) the decreasing background is fitted to the course (Fig. 9, t=2) automatically. When the measurement signal declines below the saved backgrond the underground value will automatically be equated with the measurement signal. As soon as the measurement signal is increasing again the saved decreasing value remains constant. Increasings of the signal are displayed clearly as a leak So it is possible to recognize leaks even when the signal is decreasing rapidly.

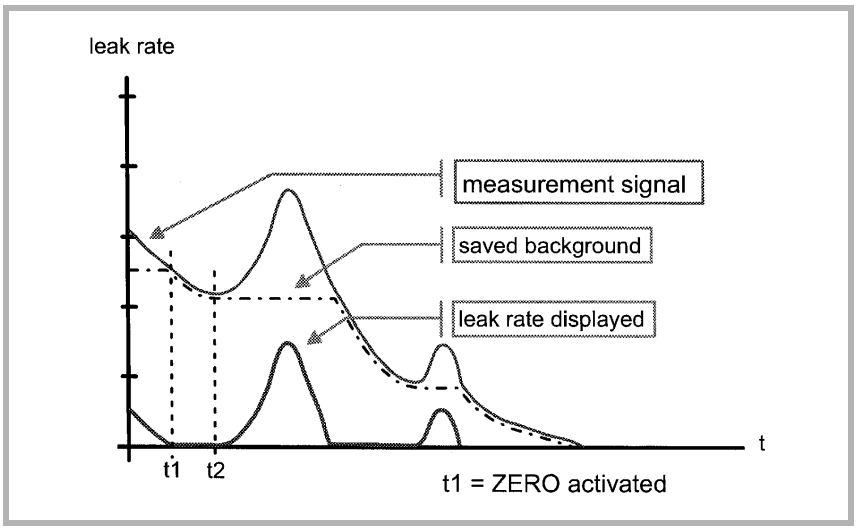


Fig. 9 Zero activation

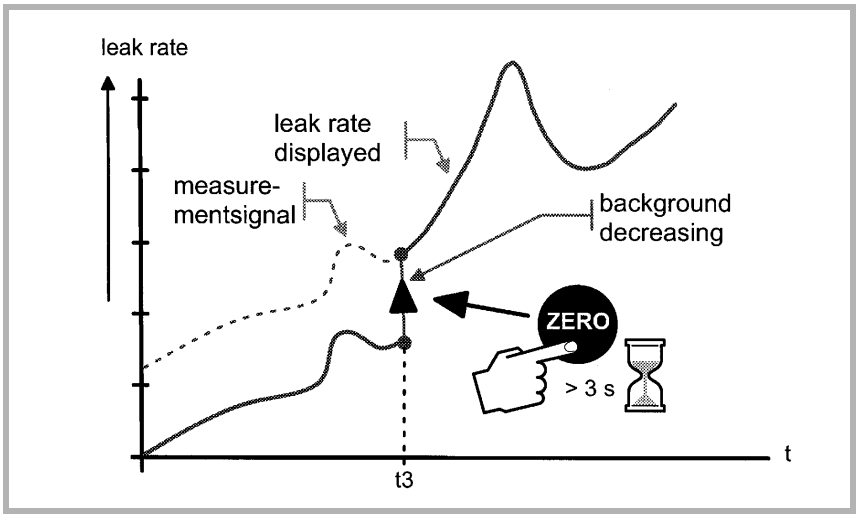


Fig. 10 Undo ZERO

When you want to see the measurement signal (including underground) please press the ZERO button again. The saved value will be reset to zero. The underground signal will not be suppressed anymore (Fig. 10).

4.1.2.5 MENU Button

When pressing the MENU button (Fig. 8/13) the selecting menu is shown at the display. This function is not depending on the operating mode when calibrating.

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

Pushing the MENU button again leads back to the screen of the previous working mode. The software shows the last screen that was used before.

4.1.2.6 Soft Keys

The function of the eight Soft Keys Fig. 8/1…8 depends on the current menu.

Special Functions

When inputs are allowed or when settings can be selected in a submenu two of the Soft Keys always have the same function:

- Soft Key no. 1 Fig. 8/1 is Cancel.
  It allows to escape from the submenu without any changes of the present settings and return to the previous menu page.
- Soft Key no. 8 Fig. 8/8 is OK.
  The selected settings or edited values will be stored and the previous menu page will be displayed again.

4.1.2.7 Numerical Entries

If you have opened a menu page where a digit can be changed please proceed in the following way:

- If you don't want to change anything, press Soft Key no. 1 Cancel.
- If you want to change the digit please proceed as follows:

1. The digit that can be changed is displayed inverted. With the arrows → (Soft Key no. 8) and ← (Soft Key no. 4) you can choose which digit you want to change.
2. To change a digit to a specific number press the corresponding pair of numbers. A submenu opens and the desired number can be selected. The submenu closes automatically and the next digit of the total number now is inverted.
3. Having reached the last digit all changes have to be confirmed by OK (Soft Key no. 8). To correct a wrong entry press Cancel (Softkey 1) or Softkey 4 ← and enter the desired value again.

Example

To change the trigger level $1.0 \cdot 10^{-7}$ mbar l/s to $3 \cdot 10^{-7}$ mbar l/s please press 2/3 (Soft Key no. 3) Fig. 11.

Fig. 11 Numerical entry of the Trigger Level, sample of the digit

In the submenu press 3 (Soft Key no. 4) Fig. 12

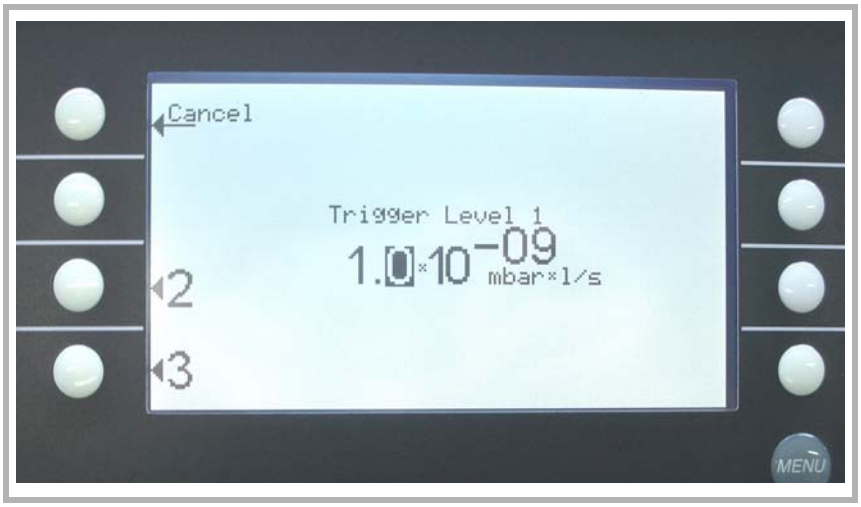


Fig. 12 Trigger Level, change of the first digit

4.1.3 Vacuum Method

For the purpose of leak detection on a test sample (vacuum method), the sample has to be evacuated so that Helium or Hydrogen which is sprayed on to the outside, can enter through any leaks due to the pressure differential for detection by the PhoeniXL.

The test sample is evacuated - START button (Fig 3-1/10) - by the backing pump or the external pump. In the case of larger test samples an additional external partial flow pump with a corresponding linking valve may be connected in parallel as required.

Inlet valve V1 is opend so that the evacuation can take place. At the same time all other valves are closed in order to prevent an unacceptable pressure increase in the mass spectrometer.

In this context (valve V2a closed) the turbomolecular pump is operated without being supported by the rotary vane pump. Since generally no gas is pumped out of the mass spectrometer, p_2 remains constant or increases only slowly.

The condition for the evacuation process described here is maintained until the inlet pressure p1 has droped ≤15 mbar. Now the valves V2a and V2b are opened additionally. Possibly present Helium or Hydrogen may now flow upstream against the pumping direction of the turbomolecular pump into the mass spectrometer where it is detected. This measurement mode is called GROSS. In this mode, leak reates down to 10^{-8} mbar l/s can be detected.

Since the rotary vane vacuum pump continues to evacuate the test sample via valves V2a, V2b and V1 the inlet pressure p_1 will continue to drop. When the pressure drops below p_E < 0.2 mbar, the PhoeniXL will switch to the FINE mode, i.e. valve V1and V2b closes and valve V4a opens so that the gas flow enters the turbomolecular pump at the side. This offer two advantages:

a) A part of the high pumping speed of the turbomolecular pump remains available for further evacuation of the test sample. The response time is inversely proportional to pumping speed.).
b) The advantages offered by the counterflow priniple can still be utzilized

In the FINE mode the full sensitivity of the PhoeniXL is reached.

Because of the higher base pressure of the diaphragm pump the switching from GROSS to FINE mode of the PhoeniXL$^{300\ dry}$ is done by the valve V4b. When the pressure drops below ≤3,5 mbar the valves V1 and V2b will be close and V4b opens step by step. When valve V4b is open completely, pressure < 0,1 mbar, V4a will open also to get the maximum pumping speed. In PRECISION mode the PhoeniXL$^{300\ dry}$ opens the valve V4b only, with the disadvantage of low pumping speed but with the highest sensitivity.

When the leak detection process is stopped – STOP-button – all valves exept valve V2a are closed.

Valve V3 is opened during venting of the inlet or test sample.

4.1.4 Partial Flow Method

In the partial flow mode the test sample is additionally evacuated by an auxiliary pump. Using the optional partial flow pump set offers to the user the following advantages (only possible for PhoeniXL^{300}):

- faster response
- entry into the measure mode already at an inlet pressure of 1000 mbar
- faster venting of large test objects

Alternatively to a partial flow pump set an external auxiliary pump may also be connected via a tee, this option is possible for the PhoeniXL300 dry and PhoeniXL300 Modul also. However, in such a case the PhoeniXL will not be able to make measurements already at an inlet pressure of 1000 mbar.

4.1.5 Sniffer Mode

The PhoeniXL may simply be converted into a sniffer leak detector via the rugged sniffer line (Cat. No. 252003)

For this the KF flange of the sniffer line is connected to the inlet flange and the sniffer mode is selected through menu mode. After pressing START, the inlet valve V4a opens. The sniffer lines have been designed in such a way that the PhoeniXL is operated in the FINE mode (as described in Chapter 4.1.3). If the forevacuum pressure P2 increases over 0,2 mbar respectively 0,1 mbar a warning sign and audio alarm comes up in the display

In the measurement mode the helium present in the ambient air is now indicated as the leak rate (about $2 \cdot 10^{-6}$ mbar l/s). Smaller leaks may be detected by pressing the ZERO-button. In sniffer mode the smallest detectable leak rate is $< 1 \cdot 10^{-7}$ mbarl/s.

4.1.6 Controls on the Remote Control (Optional)

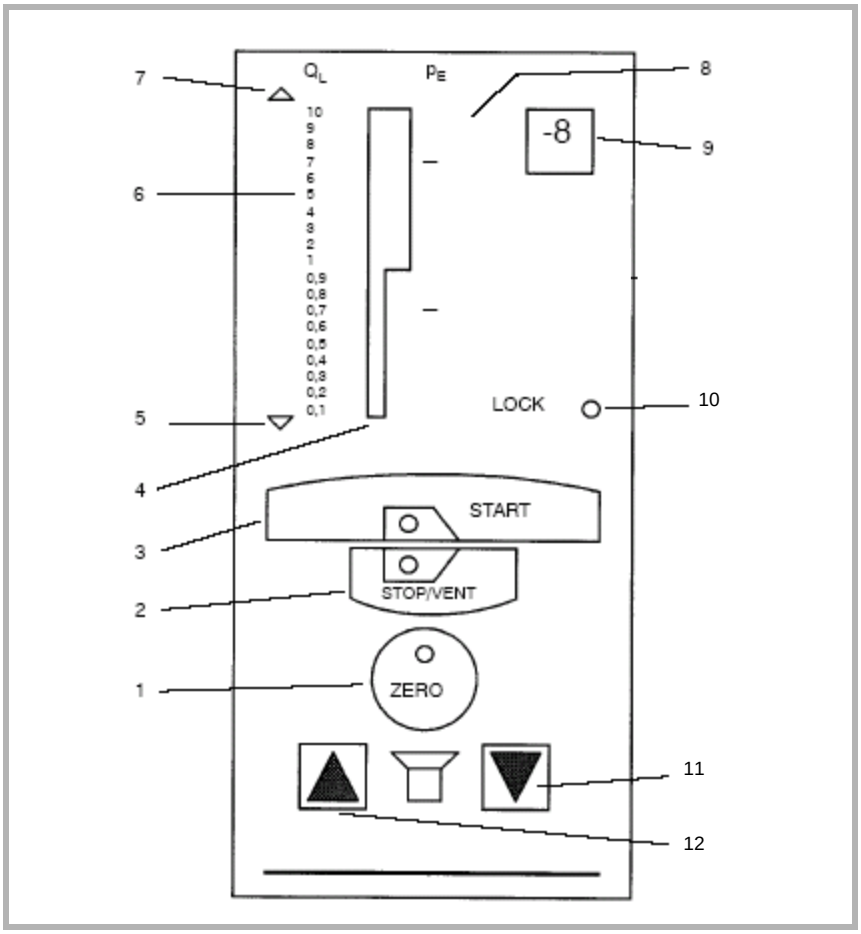


Fig. 13 View of remote control

1 ZERO button
2 STOP / VENT button
3 START button
4 LED Bargraph display
5 Underflow display (under range)
6 Leak rate scale
7 Overflow display (over range)
8 Scale for the pressure in the test sample
9 Exponent
10 LED Lock
11 Acoustic signal quiter
12 Acoustic signal louder

An overview of the controls on the remote control is given in Fig 13.

START-button Based on the operating modes Standby or Vent of the PhoeniXL, the START-button is used to start the measurement mode by evacuating the connected test sample. Here the PhoeniXL will operate either with automatic ranging or it will only display the measured values within a fixed range which has been selected by the operator.

The status of measurement readiness is indicated to the operator by a green LED at the START-button. During the pumpdown phase this LED flashes. As soon as the status of measurement readiness has been reached, this LED stays on continiously.

When pressing the START-button in the Standby mode, the internal Zero

level is taken over anew, provided the PhoeniXL has been running in the Standby or Vent status for at least 20s.

STOP / VENT-button

The STOP/VENT-button has two different fuctions, depending on how long it is pressed:

STOP function

Based on the measurement mode of the PhoeniXL, a brief press of the STOP-button interrupts the evacuation process of the test sample and the measurement mode is interrupted. The duration of this key press must be no longer than the time which is defined in the menu. The default time is 1.5 s. The PhoeniXL will return to the Standby mode, i.e. all valves except valve V2a are closed. This condition is indicated to the operator by the green LED in the START-button which is turned off.

After pressing the STOP/VENT-button the display will indicate the message “Standby Vacuum”.

VENT function

When pressing the STOP/VENT-button for a period of time which exceeds the time as defined in the menu, the connected test sample is vented as soon as this time has elapsed. This is done by opening of the venting valve V3. This operating mode is indicated to the operator by the green LED in the STOP/VENT-button which comes on.

The venting valve may be closed again by pressing the STOP/VENT-button briefly once more. The PhoeniXL will return to the Standby mode. The “Vent Vacuum” display is turned off.

ZERO-button

A constant leak rate reading may be suppressed by pressing the ZERO-button, i.e. a constant helium background within a test sample. This button is only active in the measurement mode. (see Chapter 4.1.2.4)

In AUTO mode and ZERO activated the indication limit is set to the highest sensitivity range, for. ex. 1E-12 mbar l/s

The exponent on the remote control is retained in the case of “Zero” when the leak rate display always remains at the upper decade of the bargraph display. If the leak rate is indicated in the lower decade, the exponent is decremented by one in the case of “Zero”. Thus the displayed leak rate can always be suppressed by at least one decade so as to increase resolution.

Example:

A leak rate of $4{,}1 \cdot 10^{-8}$ mbar l/s can be displayed in two ways on the remote control:

a) The exponent indicates -8 and the narrow part of the bargraph display is fully on the wider section is on up to number 4.
b) The exponent indicates -7 and only the lower narrow section of the bargraph display is on up to number 0.4.

In both cases the exponent -8 and the bargraph display is dark after pressing ZERO.

With the background set to off pressing the zero button saves the cur-

rently measured value as the “zero level”. However, the internal zero level setting as in use remains unchanged.

After operating the zero button, only that amount of the currently measured value is substracted so that the display limit is just reached. The displayed results of a leak rate measurement will be too high by an amunt which corresponds to the display limit. Thus also increases in the leak rate will be visible, which are less than the display limit. Here the internal zero level is not changed.

It is not possible to reduce the detection limit of the instrument by pressing the ZERO-button. The ZERO function is cancelled by pressing the ZERO-button once more. The ZERO function is also cancelled automatically as soon as the STOP/VENT-button is pressed.

The ZERO function has an effect on all output devices such as display, chart recorder, triggers and RS232 interface.

Acoustic signal

The acoustic signal is used to indicate the leak rate. An acoustic signal is also generated in the case of warning and error messages.

The volume of the acoustic signal can be increased by operating the button to the left of the loudspeaker. With the button to the right of the loudspeaker the volume of the acoustic signal may be reduced.

To check this, a signal will be output at the selected volume for 2 seconds after operating the button. At the same time the volume is indicated on the seven segment display on the hand unit (Fig. 13/4).

4.1.7 Displays on the Remote Control

Measurement range

Here the leak rate is indicated as a bar. In case of a range overflow, the upper arrow at the bargraph on the hand unit comes on and in the case of range underflow, the lower arrow at the bargraph on the hand unit comes on.

The corresponding exponent is indicated at the tip to the right of the bargraph display.

Two leak rate decades can be indicated by the bargraph display. The panel for the upper leak rate decade (1…10) is twice as wide as that for the lower decade (0.1…1).

LOCK LED

The LOCK LED comes on when the remote control has been locked.

5 Operation of the PhoeniXL

The PhoeniXL is switched on by pushing the mains switch (Please refer to Chapter 3.2.1). After about 2 minutes the run-up procedure is finished; the unit is in Stand-by-mode and ready to measure.

When using the PheoniXL$^{300\ Modul}$ an additional forevacuum pump (dry or wet version) has to be connected to the forevacuum connection (DN25 KF) on the side or the bottom.

Please connect the part to be tested to the inlet port and press START. The PhoeniXL starts to evacuate the part. The evacuation time depends on the volume of the test part. During evacuation the screen shows the inlet pressure online.

Once the pressure of 15 mbar (11 Torr or 1500 Pa) is reached the unit switches to measurement mode. The corresponding leak rate is displayed. For further explanations of the screen please refer to 5.4.

The displayed leak rate corresponds to the helium background concentration in the part under test. Since the PhoeniXL continues to pump down the part this background leak rate will further reduce. As soon as the leak rate is low enough in respect to your requirements you may start spraying Helium or Hydrogen to search for possible leaks.

When the measurement is finished please press STOP and hold the button a few seconds to vent the part under test.

5.1 Display

The display is used to either show leak rates or program specific set-ups and get information by means of the software menu (Please refer to Chapter 6). In addition messages and maintenance instructions are displayed on the screen (Please refer to Chapter 8).

5.2 The Screen in Run-Up Mode

In run-up mode the display shows:

- Speed of the turbomolecular pump
- Forevacuum pressure
- State of emission
- Active filament
- A bar graph which shows the run-up progress

If the display is too bright or too dark you can change the contrast. Please see Chapter 6.2.4. During run-up phase the menu button can be pushed (see Chapter 4.1.2.5) to get to the selection menu.

5.3 Display in stand-by mode

In stand by mode the conditions are shown in the upper edge of the display (see Chapter 5.4.3). Furthermore calibration (Please refer to Chapter 7) can also be started in stand by mode and purging, too (see Chapter 5.3.1)

5.3.1 Gas Ballast/Purge

In stand-by mode the gas ballast of the fore pump can be switched on/off manually or via softkey 7. The gas ballast is for abolishing a too huge helium background. Additionally a condensation of water vapour in the pump will be avoided. After 20 minutes the machine closes the gas ballast valve automatically to limit the loss of oil.

This function can be chosen automatically for the PhoeniXL300 dry and PhoeniXL300 Modul. Every time the unit changes into stand-by mode it can start automatically after 20 seconds. During this purge the membrane or sroll pump will be purged by the valve V6.

Attention In case there was a large quantum of water vapor pumped with the machine please activate the gas ballast for about 20 minutes before running the machine down.

5.4 The Screen in Measurement Mode

In measurement mode the leak rates can be displayed in two different modes:

- Numerically, combined with a bargraph Fig. 14
- As trend: numerically, combined with a diagram (leak rate versus time) Fig. 15

In the lower right corner of the display (next to the Soft Key no. 8, Fig. 14 and Fig. 15) you will find a symbol that allows to switch between the display modes by pressing Soft Key no. 8. See chapter 5.4.4 and 5.4.5 for explanations of the different display modes.

Access to calibration (Soft Key no. 5, Fig. 14 and Fig. 15) and access to the speaker volume (Soft Keys no. 2 and no. 3, Fig. 14 and Fig. 15) is the same in all modes. Also the status icons in the upper line are in common in both display modes.

Fig. 14 Display: Measurement Mode with bargraph

5.4.1 Call for Calibration

In all modes the Soft Key no. 5 is used to get to the calibration routine. Refer to Chapter 7 Calibration for further information regarding calibration.

5.4.2 Speaker Volume

On the left hand side two loud speaker symbols are shown, combined with the signs + and - (Fig. 14 & 15). By pressing the corresponding soft-keys (Soft Keys no. 2 and no. 3) the volume can be adjusted for convenient loudness. In the bottom line of the display another loud speaker symbol is shown, combined with a number. This number indicates the level of the current loudness (ranges from 0 to 15).

Refer to Chapter 6.4.5 Volume for information on loudness, alarms, and sound tracks.

5.4.3 Status Line in the Display

The status line at the top of the display (Fig. 14 and Fig. 15) informs about (reading from left to right):

Symbol of display	Meaning	Explanation
	Volume level	Please refer to Chapter 5.4.2 Speaker Volume.
S1	Trigger 1	If the trigger values are exceeded these signs are inverted. (White on black background.)
S2	Trigger 2	see: Trigger 1
S3	Trigger 3	see: Trigger 1
!	Warning triangle	Please refer to Chapter 8.1
VAC	Working mode	VAC or SNIFF indicate which working mode was selected
FINE	Vacuum area	Depending on the inlet pressure the Phoenix may be in GROSS, PRECISION (PhoeniXL$^{300\ dry}$ only) or FINE mode, which is indicated here (Chapter 4.1.3)

Symbol of display	Meaning	Explanation
ZERO	ZERO	Indicates if ZERO-function is active.

5.4.4 Measurement Mode with bargraph

The display shows the leak rate in big digital figures, see Fig. 14. The unit of the leak rate is shown, too. Underneath the leak rate the inlet pressure is displayed in smaller digits. The units of leak rate and pressure can be defined in the menu (See Chapter 6.4.4).

Below this the same leak rate is shown graphically as a bar. The scale of this bar, i.e. the number of decades included in this bar can be defined in the menu (Please refer to Chapter 6.2.2). The programmed trigger levels (Please refer to Chapters 6.4.1 and 6.4.2) are indicated at the bar by short vertical lines: a straight line for trigger 1 and a dotted line for trigger 2.

5.4.5 Measurement Mode with trend information

In trend mode the leak rates are displayed over time Fig. 15. In addition the actual leak rate and inlet pressure also are displayed digitally. The time axis can be defined in the menu (Please refer to Chapter 6.2.3 Time axis). The intensity axis (y-axis) is defined the same way as the bargraph (Please refer to Chapter 6.2.1 Scale linear/logarithmic).

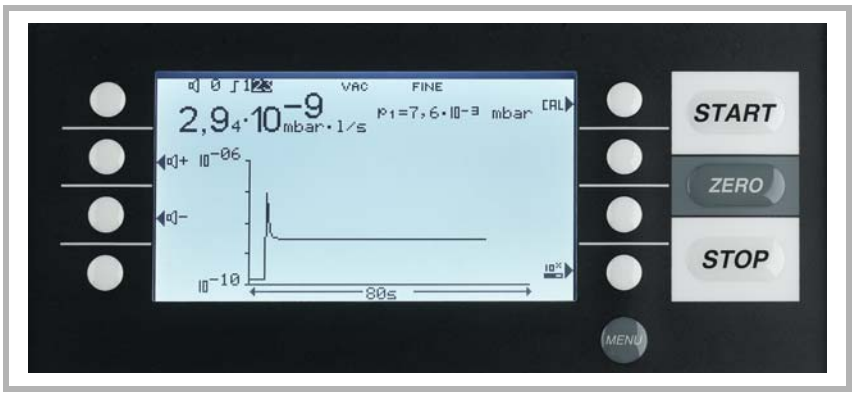


Fig. 15 Display: Measurement Mode with trend information

6 Description of the Menu

By pressing the MENU push button Fig. 8/13 the main menu will be displayed regardless of the current working mode or status of the PhoeniXL

The main menu Fig. 16 leads the operator to several submenus described in the following chapters. The main menu is identically for all PhoeniXL models.

The next page gives an overview of the entire menu architecture Fig. 17.

The overview of the menu architecture corresponds to the PhoeniXL^{300}, differing menu points or setting posibilities are described in the respective menu point.

6.1 Main menu

The main menu Fig. 16 shows 7 sub-menus. In these sub-menus groups of technical features are put together logically. From here the next levels of the menu tree can be reached Fig. 17.

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

Fig. 16 Display: Main Menu

Main menu	1. Level	2. Level	3. Level
	View	Scale linear/logarithmic	
		Display-range auto/manual	
		Time axis	
		Contrast	
		Background in Stand-by	
		Lower display limit	
	Mode	Sniff/Vacuum	
	Trigger & Alarms	Trigger Level 1	
		Trigger Level 2	
		Trigger Level 3	
		Units	
		Volume	
		Alarm delay	
		Audio alarm type	
	Calibration	internal	
		external	
	Settings	Vacuum settings	Vent delay
			Vacuum ranges
			Partial flow setup
			Sniff factor
			Machine factor
			Leak rate internal test leak
		Filter & Background	Background suppression
			Calculate inlet area background
			Leak rate filter
		Mass	
		Interfaces	Location of Control
			Define recorder output
			RS232
			Define PLC outputs
			Define PLC inputs
			Scaling Recorder Output
			Scaling Recorder Output
		Miscellaneous	Time&Date
			Language
			Calibration request
			Service interval fore pump
			Service interval exhaust oil filter
			Service message exhaust oil filter
		Parameter save / load	
		Monitoring functions	Pressure limits for sniff mode
			Maximum evacuation time
			Pressure limits for vacuum mode.
	Information	View settings	
		View internal data	
		Vacuum diagram	
		View error list	
		Calibration history	
		Calibration factors	
		Service	
	Access Control	Access to CAL function	
		Change Device-PIN	
		Change Menu-PIN	
		Zero	

Fig. 17 Menu structure overview

Explanation to figure 16:

Key No.	Name	Description
1	Back	Return to the previous screen.
2	View	Display settings like scaling, contrast, system background. Please refer to Chapter 6.2.
3	Mode	Selection of the working modes Vacuum or Sniff Please refer to Chapter 6.3.
4	Trigger & Alarms	Settings of units, trigger levels and alarms. Please refer to Chapter 6.4.
5	Calibration	Calibration of the PhoeniXL. Please refer to Chapter 6.5.
6	Settings	Settings of internal machine parameters. Please refer to Chapter 6.6.
7	Information	Information on the PhoeniXL (electrical and vacuum data) and service menu. Please refer to Chapter 6.7.
8	Access Control	Access restrictions. Please refer to Chapter 6.8.

6.2 View

- Main menu > View

In this menu Fig. 18 all features that influence the data display are put together.

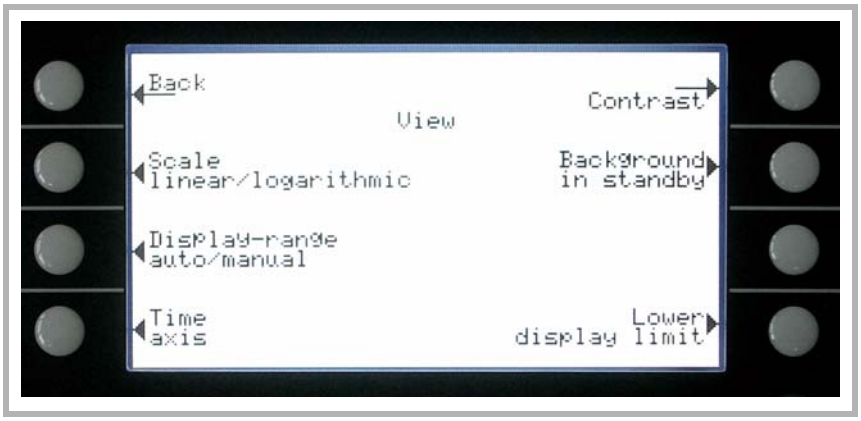


Fig. 18 Display: View Menu

Explanation to Fig. 18:

Key No.	Name	Description
1	Back	Return to the main menu.
2	Scale linear/logarithmic	Settings for bargraph and trend mode. Please refer to Chapter 6.2.1.
3	Display-range auto/ manual	Manual or automatic scaling. Please refer to Chapter 6.2.2
4	Time axis	Time axis in trend. Please refer to Chapter 6.2.3
5	Contrast	Display contrast. Please refer to Chapter 6.2.4
6	Background in Stand-by	Background displayed or not. Please refer to Chapter 6.2.5
8	Lower display limit	Setting of the display limit. Please refer to Chapter 6.2.6

6.2.1 Scale linear/logarithmic

- Main menu > View > Scale linear/logarithmic

These settings apply to the bargraph (= bar underneath the digital figures in the measurement mode) and Y-axis in the trend diagram.

The scale of the bargraph can either be linear or logarithmic. With the arrows (↑ and ↓) it can be determined how many decades the bargraph and Y-axis arecovering.

Usually a logarithmic scale is recommended because leak rates may change easily over several decades. Default setting is logarithmic with 4 decades.

Softkey 2: Linear

Pressing this key switches the display to a linear scale, starting at zero.

Softkey 3: ↓ (Number of decades)

Pressing this key reduces the number of displayed decades. The minimum value is 2 decades. Only available if log (softkey 6) was chosen.

Softkey 6: Logarithmic

The scaling will be displayed logarithmically.

Softkey 7: ↑ (Number of decades)

Increase the number of displayed decades. Maximum value is 9 decades. Only available if log (softkey 6) was chosen.

6.2.2 Display-range auto/manual

- Main menu > View > Display-range auto/manual

The upper limit of the displayed leak rate range can be set manually or automatically. These settings apply to the bargraph (= bar underneath the digital figures in the measurement mode and y-axis in the trend mode).

With the upper limit defined here the lower limit is set to a value based on the number of decades (See Chapter 6.2.1 Scale linear/logarithmic).

Softkey 2: Manual

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

Softkey 3: ↓

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

Softkey 5: ?

Help text

Softkey 6: Automatic

The limit of the displayed range will be chosen automatically.

Softkey 7: ↑

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

Softkey 8:

Save the settings and return to the previous menu.

If linear scale is selected, the lower limit is always zero. The upper limit is only a default value. You can change this on the measurement screen with the Soft Key 6 and 7 if you have chosen manual display ranging.

6.2.3 Time axis

- Main menu > View > Time axis

The length of the time axis in trend mode can be changed in given steps between 16 … 960 seconds.

Softkey 3: ↓

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

Softkey 5: ?

Help text

Softkey 7: ↑

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

6.2.4 Contrast

- Main menu > View > Contrast

The contrast of the display can be changed. The recommended value under regular conditions is about 50 (Default setting).

Softkey 3: ↓

Fade the contrast to dark. The minimum values is 0.

Softkey 4: Invert display

Invert the contrast of the screen, that means background dark and font bright.

Softkey 5: ?

Help text

Softkey 7: ↑

Fade the contrast to light. The maximum value is 99.

If by accident the display has been set too bright or too dark so that it can not be read off, this may be changed as follows:
Switch off the PhoeniXL and turn it on again. During the run-up phase press the key no. 3 or 7 so long until the display can be read properly again. This setting is saved to the EPROM only after confirming this through the contrast menu. If this setting is not confirmed, the former setting will be appled after switching on the instrument on again.

6.2.5 Background in Stand-by

- Main menu > View > Background in Stand-by

The internal background leak rate can be displayed in Stand-by mode or not.The default setting is OFF.

Softkey 3: Off

The background leak rate will not be shown.

Softkey 5: ?

Help text.

Softkey 7: ON

The background leak rate will be shown.

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 PhoeniXL. 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.

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.

When switched to Stand-by / Vent again a new internal background is calculated after 25 s. The updated value is underlined. This means that if you press START when the value is underlined, the actual background signal will be subtracted. If you press START when the value is not underlined, the old background signal from the last Stand-by will be subtracted.

6.2.6 Lower display limit

- Main menu > View > Lower display limit

This mode limits the lower detection limit of the measured leak rate. This is valid for vacuum mode only.

Softkey 3, 7: ↑ ↓

Changing of the lower detection limit between $1 \cdot 10^{-9}$ and $1 \cdot 10^{-12}$

The lower limit for the PhoeniXL$^{300\ dry}$ ranges between $1 \cdot 10^{-9}$ and $1 \cdot 10^{-11}$ mbarl/s.

Softkey 5: ?

Help text

6.3 Mode

- Main menu > Mode

The mode menu Fig. 19 enables the submenu to select the different working modes.

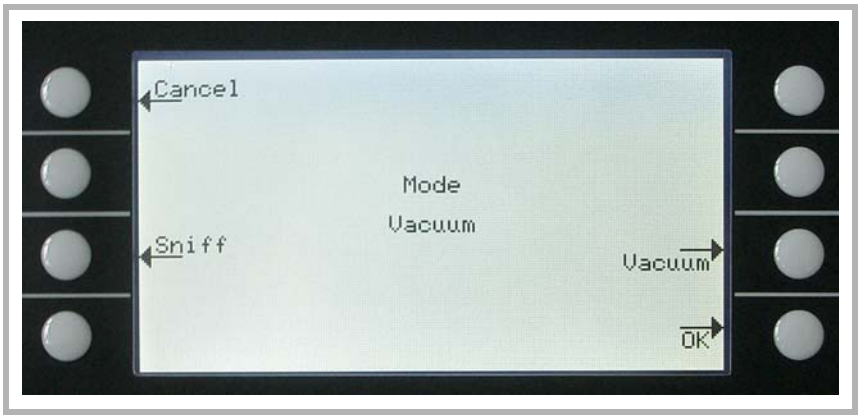


Fig. 19 Display: Mode Menu

Explanation to Fig. 19:

Key No.	Name	Description
1	Cancel	Return to the main menu without any changes of the present settings.
3	Sniff	The sniffer mode will be used.
7	Vacuum	The vacuum mode will be used.
8	OK	Save the settings and return to the previous menu.

6.4 Trigger & Alarms

- Main menu > Trigger & Alarms

The trigger levels, the volume of the loudspeaker and the units of leak rates and pressures can be set in this menu Fig. 20.

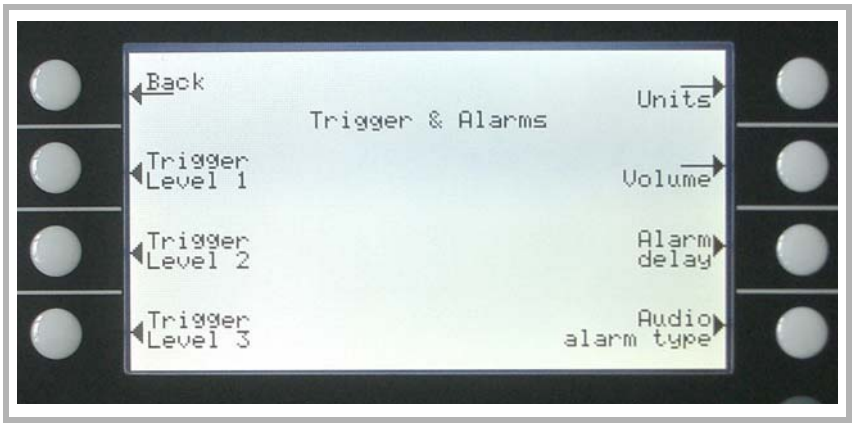


Fig. 20 Display: Trigger & Alarms Menu

Explanation for Fig. 20:

Key No.	Name	Description
1	Back	Return to the main menu.
2	Trigger Level 1	Definition of Trigger level 1. Chapter 6.4.1
3	Trigger Level 2	Definition of Trigger level 2. Chapter 6.4.2
4	Trigger Level 3	Definition of Trigger level 2. Chapter 6.4.3
5	Units	Selection of leak rate and pressure units. Refer to Chapter 6.4.4
6	Volume	Refer to Chapter 6.4.5
7	Alarm delay	Refer to Chapter 6.4.6
8	Audio alarm type	Choice of different alarm types. Refer to Chapter 6.4.7

6.4.1 Trigger Level 1

- Main menu > Trigger & Alarms > Trigger Level 1

The value of the first trigger level can be set. See Chapter 4.1.2.7 Numerical Entries for the description of the entry.

Trigger 1, 2 and Trigger 3 are programmable switching thresholds. When these thresholds will be exceeded the PhoeniXL reacts as follows:

Display

In the status line of the display the signs for Trigger 1, 2 and Trigger 3 are displayed inverted if the leak rate exceeds (becomes higher than) the programmed value. (see Fig. 14 &15)

Relay Output

The trigger-relais of the digital out switches. Please refer to Chapter 2.2.2.2, Digital out, for further details.

Alarm/Loudspeaker

Additionally Trigger level 1 defines at which level the various alarm types react (See Chapter 6.4.7, Audio alarm type)

6.4.2 Trigger Level 2

- Main menu > Trigger & Alarms > Trigger Level 2

The value of the second trigger level can be set. Please refer to Chapter 4.1.2.7 Numerical Entries for the description of the entry.

If Trigger 2 is exceeded the corrensponding relay will switch. This is also indicated at the display (see 6.4.1).

6.4.3 Trigger Level 3

- Main menu > Trigger & Alarms > Trigger Level 3

The value of the second trigger level can be set. Please refer to Chapter 4.1.2.7 Numerical Entries for the description of the entry.

If Trigger 3 is exceeded the corrensponding relay will switch. This is also indicated at the display (see 6.4.1).

6.4.4 Units

- Main menu > Trigger & Alarms > Units

The prefered leak rate unit can be selected. There is the choice of 4 (mbar, Pa, Torr, atm) pressure units and 5 leak rate units (mbar l/s, Pa m^3/s, Torr l/s, atm cc/s, s ft^3/yr).

In Sniff mode the following measuring units are selectable (Refer to chapter 6.3): ppm, g/a eq (helium leak rate is equivalent with leak rate R134a), oz/yr eq (helium leak rate is equivalent with leak rate R134a).

Softkey 2: ↑

Scroll up to select a pressure unit.

Softkey 3: ↓

Scroll down to select a pressure unit.

Softkey 6: ↑

Scroll up to select a leak rate unit.

Softkey 7: ↓

Scroll down to select a leak rate unit.

6.4.5 Volume

- Main menu > Trigger & Alarms > Volume

The minimum loudness and the actual volume of the loudspeaker can be adjusted.

The minimum loudness is the minimum speaker volume that cannot be exceeded to even lower values. Thus it is avoided that the actual volume is accidentally adjusted to a value that is below the noise level of the environment.

The actual volume can be adjusted between 15 (maximum) and the value defined as minimum loudness.

Softkey 2: ↓

Decrease the minimum loudness. The minimum value is 0.

Softkey 3: ↓

Decrease the actual volume. The minimum value is limited by the minimum volume.

Softkey 4: Beep off / Beep on

Softkey 5: ?

Help text.

Softkey 6: ↑

Increase the minimum volume. The maximum value is 15.

Softkey 7: ↑

Increase the regular volume. The maximum value is 15.

6.4.6 Alarm delay

- Main menu > Trigger & Alarms > Alarm delay

In some applications (for instance during pump down in a „chamber test system“) it might be necessary to block an alarm for some time after pressing START.

This delay time of the alarm can be changed.

Softkey 3: ↓

Decrease the delay time. The minimum value is 0 seconds.

Softkey 5: ?

Help text.

Softkey 7: ↑

Increase the delay time. The maximum value is 10 minutes up to infinity.

After pressing START the loudspeaker is activated as soon as the leak rate drops below trigger level 1 or after the entered alarm delay time has elapsed. This setting is only active for the audio alarm types SETPOINT and TRIGGER ALARM (See Chapter 6.4.7).

6.4.7 Audio alarm type

- Main menu > Trigger & Alarms > Audio alarm type

The audio alarm type can be chosen.

Softkey 2: Pinpoint

This function is for localization of a known leak rate value. Details see chapter 6.4.7.1

Softkey 3: Leak rate prop.

The sound will be proportional to the leak rate signal. Details see chapter 6.4.7.2

Softkey 5: ?

Help text

Softkey 6: Setpoint

The sound will be proportional to the leak rate signal only if trigger 1 is exceeded. Details see chapter 6.4.7.3.

Softkey 7: Trigger alarm

An alarm sounds when the trigger 1 is exceeded. Details see chapter 6.4.7.4.

6.4.7.1 Pinpoint

The tone of the acustical signal changes its frequency only in a Leakrate-window Fig. 21 which ranges from one decade below the Trigger level 1 up to one decade above the Trigger level 1. Below the window the tone is constantly low, above the window it is constantly high.

Example: The Trigger level 1 is $4 \cdot 10^{-7}$ mbar l/s. So the window where the tone changes reaches from $4 \cdot 10^{-8}$ mbar l/s up to $4 \cdot 10^{-6}$ mbar l/s.

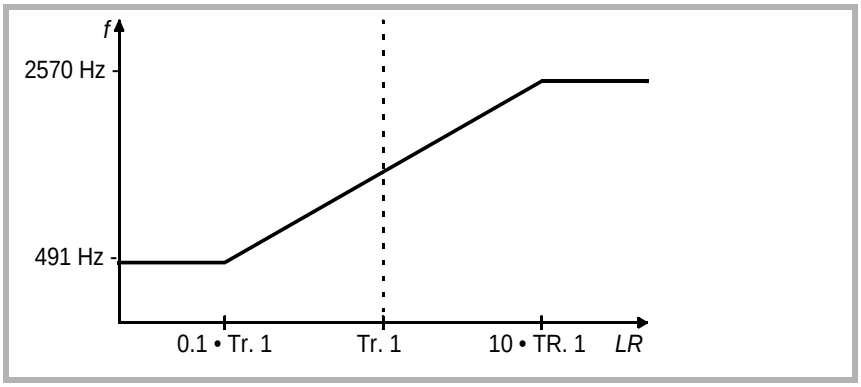


Fig. 21 Pinpoint: Change of the frequency in the leak rate window (TR1=Triggerlevel 1)

6.4.7.2 Leak rate prop.

The frequency of the accoustic output is proportional to the reading on the bargraph display. The frequency ranges from 300 Hz to 3300 Hz. Please refer to Chapter 6.2.1 Scale linear/logarithmic for the definition of the number of decades.

6.4.7.3 Setpoint

The tone is off as long as the leak rate is below the Trigger level 1. Above Trigger 1 the tone varies proportional to the leak rate Fig. 22.

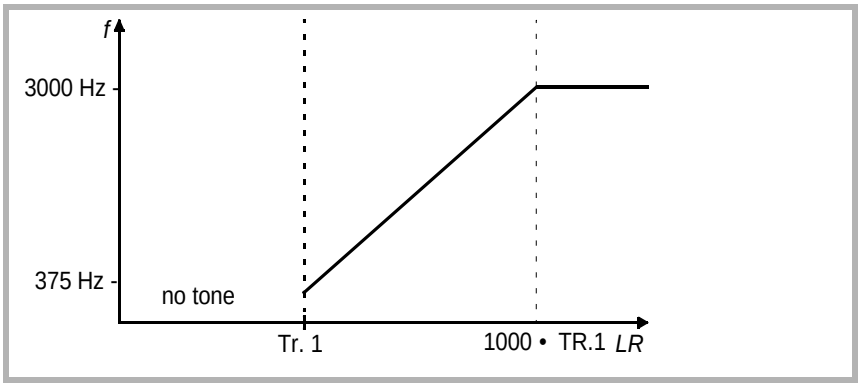


Fig. 22 Setpoint: Change of the frequency above the triggerlevel 1 (TR1= Triggerlevel 1)

6.4.7.4 Trigger alarm

As soon as the leak rate increases above trigger level 1, a multi-tone signal is generated. The tone does not vary with the leak rate.

6.5 Calibration

- Main menu > Calibration

In the menu Calibration Fig. 23 the selection between internal and external calibration can be chosen.

Please refer to Chapter 7 Calibration for a detailed description of the calibration.

Fig. 23 Display: Calibration Menu

6.6 Settings

- Main menu > Settings

This menu Fig. 24 allows to observe and to change the adjustment of the internal machine settings.

Fig. 24 Display: Settings Menu

Explanation for Fig. 24:

Key No.	Name	Description
1	Back	Return to the main menu.
2	Vacuum settings	Settings of vacuum system related functions. See chapter 6.6.1
3	Filter & Background	See Chapter 6.6.2
4	Mass	Switching between Helium and Hydrogen. See Chapter 6.6.3
5	Interfaces	Settings for electrical communication and selection for control location See Chapter 6.6.4
6	Miscellaneous	Settings like date or time. See Chapter 6.6.5
7	Parameter save / load	Store and load sets of parameters. See Chapter 6.6.6
8	Monitoring functions	Choose functions of protection of the PhoeniXL in this mode. See Chapter 6.6.7

6.6.1 Vacuum settings

- Main menu > Settings > Vacuum settings

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

Softkey 3: Vent delay
Refer to chapter 6.6.1.2

Softkey 4: Vacuum ranges
Refer to chapter 6.6.1.3

Softkey 5: Partial flow setup
Refer to chapter 6.6.1.4

Softkey 6: Sniffer factor
Refer to chapter 6.6.1.5

Softkey 7: Machine factor
Refer to chapter 6.6.1.6

Softkey 8: Leak rate internal test leak
Refer to chapter 6.6.1.7

The menu for the PhoeniXL$^{300\ dry}$ version allows the following vacuum settings which varies to the PhoeniXL^{300}:

Softkey 2: Automatic purge
Refer to chapter 6.6.1.1

Softkey 3: Vent delay
Refer to chapter 6.6.1.2

Softkey 4: Vacuum ranges
Refer to chapter 6.6.1.3

Softkey 6: Sniffer factor
Refer to chapter 6.6.1.5

Softkey 7: Machine factor
Refer to chapter 6.6.1.6

Softkey 8: Leak rate internal test leak
Refer to chapter 6.6.1.7

The menu for the PhoeniXL$^{300\ Modul}$ version allows the following vacuum settings which varies to the PhoeniXL^{300}:

Softkey 2: Automatic purge
Refer to chapter 6.6.1.1

Softkey 3: Vent delay
Refer to chapter 6.6.1.2

Softkey 4: Vacuum ranges
Refer to chapter 6.6.1.3

Softkey 5: Forepump set up
Refer to chapter 6.6.1.4

Softkey 6: Sniffer factor
Refer to chapter 6.6.1.5

Softkey 7: Machine factor
Refer to chapter 6.6.1.6

Softkey 8: Leak rate internal test leak
Refer to chapter 6.6.1.7

6.6.1.1 Automatic purge

- Main menu > Settings > Vacuum settings > Automatic purge

Through this menu is it possible to start automatic purge for 20 seconds automatically.

This setting is only possible for the PhoeniXL$^{300\ dry}$ and PhoeniXL$^{300\ Modul}$ (refer to Chapter 5.3.1)

Softkey 3: Off
The function automatic purge is off.

Softkey 6: ON
The function automatic purge is on. When changing from measure to stand-by the forevacuum pump will be purged automatically for 20 seconds.

6.6.1.2 Vent delay

- Main menu > Settings > Vacuum settings > Vent delay

Through this menu item it is possible to define the delay time until the inlet port is vented when operating the STOP botton. When the STOP button is pressed for a period of time which is shorter than the delay time specified here, the PhoeniXL will just change to Stand-by mode.

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

Softkey 2: Immediately

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

Softkey 3: After 1 second

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

Softkey 4: After 1.5 seconds

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

Softkey 5: ?

Help

Softkey 6: after 2 seconds

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

Softkey 7: No venting

The inlet port cannot be vented with the STOP button.

6.6.1.3 Vacuum ranges

- Main menu > Settings > Vacuum settings > Vacuum ranges

With this menu you can adjust different modes concerning the activity of leak detection. This setting is only active in mode vacuum (see Chapter 6.3).

Softkey No. 2: GROSS only

In this mode the PhoeniXL remains at the inlet flange after falling below 15 mbar. When the pressure is increasing over 15 mbar the PhoeniXL switches automatically into evacuation mode. The smallest detactable leak rate is $1 \cdot 10^{-8}$ mbarl/s.

Softkey No. 3: FINE only

In this mode the PhoeniXL remains after falling below 0,2 mbar at the inlet flange . Valve V1 will be closed. When the pressure at the inlet flange is increasing > 0.2 mbar the PhoeniXL switches immediately into evacuation mode. The advantage of FINE only is that while this mode is running no valve will switch and the PhoeniXL has a high pumping speed.

Taste No. 5: ?

Help text

Softkey No.6 Partial flow

Mode for use with a partial flow system

Softkey No. 7: Normal (default settings)

This is the default setting. The activity runs as explained in Chapter 4.1.3.

The PhoeniXL$^{300\ dry}$ allows the vacuum ranges as follows:

Softkey No. 2: GROSS only

In this mode the PhoeniXL$^{300\ dry}$ remains at the inlet flange after falling below 15 mbar. When the pressure is increasing over 15 mbar the PhoeniXL$^{300\ dry}$ switches automatically into evacuation mode. The smallest detactable leak rate is $1 \cdot 10^{-8}$ mbarl/s.

Softkey No. 3: FINE only

In this mode the PhoeniXL$^{300\ dry}$ remains after falling below 0,1 mbar at the inlet flange . Valve V1 will be closed. When the pressure at the inlet flange is increasing > 0.1 mbar the PhoeniXL$^{300\ dry}$ switches immediately into evacuation mode. The advantage of FINE only is that while this mode is running no valve will switch and the leak detector has a high pumping speed.

Taste No. 5: ?

Help text

Softkey No. 6: Precision

In this mode the PhoeniXL$^{300\ dry}$ dry achieves the maximum sensitivity.

Softkey No. 7: Normal (default settings)

This is the default setting. The activity runs through the vacuum ranges from GROSS to FINE.

6.6.1.4 Partial flow setup

- Main menu > Settings > Vacuum settings > Partial flow setup

Through this menu item the settings for a use of a partial flow system can be set. In the partial flow mode the test sample is additionally evacuated by an auxiliary pump, which offers the advantageof measuring from 1000 mbar on.

This setting is not possible for the PhoeniXL$^{300\ dry}$ version.

The PhoeniXL$^{300\ Modul}$ allows additionally the settings for the forepump (oil sealed or dry) and selectable pumping speed for the forepump.

Partial flow setup for the PhoeniXL^{300}.

Softkey 2: ↓

The entry of the nominal pumping speed of the partial flow pump can be decreased. The minimum pumping speed is 4m^3/h.

Softkey 3: ↓

Decrease Quick-pump time. The quick-pump time defines whether and how long valve V10 of the partial flow block is opened. (For detailed descriptions please refer to the operating instructions “GA 10.277” of the partial flow sytem.)

At T_Q = 0 seconds valve V10 will not be open for the time being. This selection is recommended for large volumes and dirty objects.

At T_Q = endless valve V10 will open when pressing start. At an inlet pressure p1 < 15 mbar the PhoeniXL switches to measurement mode and display leak rates. This is recommended if it is acceptable to wait for a while until measurement mode is reached and leak rate reading at high inlet pressures are not needed.

With times between 0 and endless V10 is opened and the leak detector tries to reach a inlet pressure of less than 15 mbar within this time T_Q. When T_Q has gone by V10 is closed and the PhoeniXL switches to measurement mode (Helium/Hydrogen comes through the orifice of the partial flow valve block).

Softkey 4: Changing behavior of the valve V8 of the partial flow system

Closed: In partial flow mode valve V8 (see GA.10.277 partial flow system) switches dependent on the inlet pressure

Open: Valve V8 stays open, even whwn the inlet pressure is low enough

Softkey 5: ?

Help text.

Softkey 6: ↑

Increase the pumping speed of the partial flow pump. The entry of the nominal pumping speed of the partial flow pump can be increased. The maximum pumping speed is 80 m^3/h. Default setting 25 m^3/h

Softkey 7: ↑

Increase of the quick-pump time up to the maximum.

The PhoeniXL$^{300\ Modul}$ allows additionally the settings for the forepump (oil sealed or dry) and selectable pumping speed for the forepump.

Fore pump for the PhoeniXL$^{300\ Modul}$:

Softkey 2: ↓

The entry of the nominal pumping speed of the partial flow pump can be decreased. The minimum pumping speed is 4 m^3/h.

Softkey 3: Fore pump type

The PhoeniXL$^{300\ Modul}$ can be operated with a dry fore pump (for ex. Scroll pump) or a wet fore (oil sealed) pump.

This key is for choosing a dry (Sroll, piston) fore vacuum pump.

Softkey 5: ?

Help text

Softkey 6: ↑

The entry of the nominal pumping speed of the partial flow pump can be increased. The maximum pumping speed is 80m^3/h.

Softkey 7: Fore pump type

The PhoeniXL$^{300\ Modul}$ can be operated with a dry (for ex. Scroll pump) fore pump or a wet (oil sealed) pump.

This key is for choosing a wet (oil sealed) fore vacuum pump.

6.6.1.5 Sniffer factor

- Main menu > Settings > Vacuum settings > Sniffer factor

The sniffer factor takes into account, after an internal calibration, an external partial flow ratio, for example the Quicktest or a auxiliary pump with sniffer line connected via teepeace to the leak detector.

During an internal calibration the internal sensitivity of the PhoeniXL is calibrated. The calculated number is multiplied with the sniffer factor and the result is the sniffer factor for this application.

Softkey 4: Set default value

Setting between the default value 1 for the sniffer line SL300 or the correction factor (1000) for the use of the Quicktest.

6.6.1.6 Machine factor

- Main menu > Settings > Vacuum settings > Machine factor

The machine factor takes into account, after an internal calibration, the ratio between the effective helium pumping rate of the PhoeniXL and the pumps in the pump system in measurement mode as well as the measurement mode used (GROSS/FINE).Based on an internal calibration only, all measured leak rate would be measured too small. The measured leak rate is multiplied with the machine factor and the result is displayed. This factor is only used for vacuum measurement modes (not for sniff mode). See Chapter 4.1.2.7 Numerical Entries for the description of the entry.

Since the effective pumping rates are usually not known due to the conductances of the vacuum connections, we recommend the following indirect measurement:

1. Set up the PhoeniXL for operation
2. First an internal calibration must be performed with machine factor = 1 (Refer to Chapter 7)
3. Connect an external calibrated leak (for example $2.0 \cdot 10^{-6}$ mbar l/s) to the test chamber
4. Measure leak rate of the external test leak, for example $5.0 \cdot 10^{-8}$ mbar l/ s
5. The machine factor is the quotient of the desired value and the actual value. Desired value: $2.0 \cdot 10^{-6}$ mbar l/ s / $5.0 \cdot 10^{-8}$ mbar l/ s = machine factor 40
6. Set the acquired value in the menu point
7. Calibrate again internally so that the machine factor is taken over
8. All signals that are measured in further measurements are multiplied by factor 40 and then shown in the display

6.6.1.7 Leak rate internal test leak

- Main menu > Settings > Vacuum settings > Leak rate internal test leak

The value of the internal test leak can be set. See Chapter 4.1.2.7 Numerical Entries for the description of the entry.

Normally there is no reason to edit the leak rate of the internal test leak besides after a change or a recertification of the internal test leak. A wrong leak rate of the internal test leak will lead to wrong leak rate readings!

6.6.2 Filter & Background

- Main Menu > Settings > Filter & Background

The type of leak rate filters and background condition can be chosen. The default setting for the leak rate filter is auto.

Softkey 2: Calculate inlet area background

This function is for assignation of the background in the inlet area. See chapter 6.6.2.1

Softkey 3: Background suppression

Setting of the internal condition for the background. See chapter 6.6.2.2

Softkey 7: Leak rate filter

The type of leak rate filter can be chosen. See chapter 6.6.2.3

6.6.2.1 Calculate inlet area background

- Main menu > Settings > Filter & Background > Calculate inlet area background

This function calculates the background of the inlet area. The PhoeniXL has to be in the following conditions:

1. Mode vacuum
2. Stand-by mode (min. 25 seconds)
3. Inlet port blanked off
4. Minimum 20 minutes since power on

After starting this function the leak detector starts with evacuating the inlet area. Earliest two minutes after start the measured value can be accepted as „Background inlet area“. This value will be saved.

6.6.2.2 Background suppression

- Main menu > Settings > Filter & Background > Background suppression

Softkey 3: Off

Deactivation of the offset function. Under certain circumstances a positive leak rate can be displayed. This setting should be used by experienced users only because of the high possibilities of measuring wrong leak rates.

Softkey 6: inlet area

Additionally to the internal offset (background) the offset of the inlet area will be subtracted. This function for the inlet area is only possible in stand-by mode, therefore this value has to be determined with the menu point „Calculate inlet area background“.

Softkey 7: internal only (default)

With start the PhoeniXL defines the internal offset (background) and subtracts this value from the leak rate signal, so that just the leak rate is shown in the display. This setting should be used as standard setting for the PhoeniXL.

6.6.2.3 Leak rate filter

Main menu > Settings > Filter & Background > Leak rate filter

Softkey 3: Fixed

A leak rate filter with a fixed time constant is used

Softkey 6: Auto

Auto makes sure, that the signals are averaged in optimized time intervals, based on the leak rate intensity. Auto also eliminates noise peaks that are not related to leak rate signals and provides extraordinary short response times for low leak rate signals. This setting should be used for the PhoeniXL.

6.6.3 Mass

- Main menu > Settings > Mass

The requested mass of the measured gas can be selected. The PhoeniXL must be in stand-by for changing to another mass.

Softkey 2: H_2 (2 amu)
Hydrogen with the mass of 2 amu will be measured.

Softkey 3: ^3He (3 amu)
Isotop of helium with the mass of 3 amu will be measured.

Softkey 7: ^4He (4 amu)
Helium with the mass of 4 amu will be measured. Default setting

After changing the mass a calibration for the selected mass should be done. See chapter 7.

6.6.4 Interfaces

- Main menu > Settings > Interfaces

The parameters of the interface can be set.

Softkey 2: Location of Control

Softkey 3: Define recorder output

Softkey 4: RS232

Softkey 5: Define PLC outputs

Softkey 6: Define PLC inputs

Softkey 7: Scaling Recorder Output

Softkey 8: PLC sample rate

6.6.4.1 Location of Control

- Main menu > Settings > Interfaces > Location of Control

Softkey 2: PLC

The PhoeniXL is controlled via the Digital In connector (See Chapter 6.6.4.1). The START, STOP and ZERO buttons at the control panel and remote control are locked.

Softkey 3: RS232

The PhoeniXL is controlled via RS232 interface by an external computer. In this mode the PhoeniXL can not be controlled via keyboard. The START, STOP and ZERO button at the machine are deactivated.

Softkey 5: Local & PLC

The PhoeniXL is controlled via the Digital In connector or/and the START, STOP and ZERO buttons at the control panel and remote control.

Softkey 6: Local & RS232

The PhoeniXL is controlled via the Digital In connector or/and the START, STOP and ZERO buttons at the control panel and remote control.

Softkey 7: Local

The PhoeniXL is controlled via the START, STOP and ZERO buttons at the control panel or remote control. This is the default setting.

6.6.4.2 Define recorder output

- Main menu > Settings > Interfaces > Define recorder output

The signals to be recorded can be selected in this submenu. With the left keys the pin can be selected, with the right keys a function is assigned to the selected pin. The recorder output has 2 channels (Fig. 25)

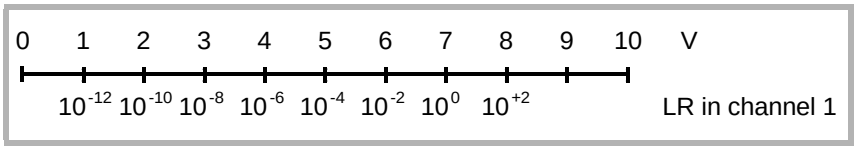


Fig. 25 Range of leak rate in channel 1 (LR= leak rate)

The following functions can be selected:

Off

The recorder output is switched off

P1 (L200)

The setting for the inlet pressure P1 is identical with those of the L200. Users can exchange their L200 for a PhoeniXL without changing pin assignement.

P1 (Pirani)

The inlet pressure P1 of the PhoeniXL will be shown logarithmic.

P2 (L200)

The setting for the forevacuum pressure P2 is identical with those of the L200. Users can exchange their L200 for a PhoeniXL without changing pin assignement.

P2 (Pirani)

The forevacuum pressure P2 of the PhoeniXL will be shown logarithmic.

LR mantisse

The leak rate mantissa is recorded lenearly from 1 ... 10V.

LR exponent

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

LR linear

The fundamental output voltage is scaled linear. The fundamental voltage is 0 ... 10V in scalable steps from 0,5 to 10 volts per decade.

LR log

The fundamental output voltage is scaled logarithmic. The voltage output ranges from 1 to 10 V with adjustable steps of 0,5 to 10 V per decade (Fig. 26)

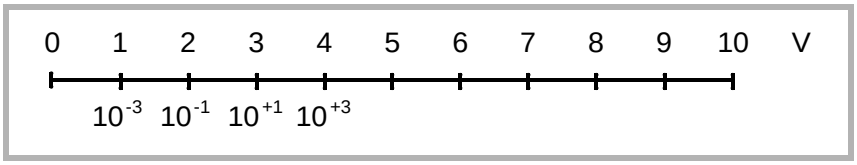


Fig. 26 Example of range of leak rate, log. 0.5 V/decade

6.6.4.3 RS232

- Main menu > Settings > Interfaces > RS232

Softkey 2: Baudrate and end sign

Settings for the baudrate selectable between 1200 and 19200, as well as endsign between CR+LF, CR or LF.

Softkey 3: Data, Parity, Stop bits

The settings for Data (7 or 8), Parity (Even, Odd, None) and Stop bits (1 or 2) can be selected

Softkey 7: RS 232 Protocol

The protocol from the RS 232 can be choosen between: L200 size, Diagnostic, L200 Leakware and ASCII code.

The calibration function of Leak Ware is not suitable with the use of a Phoenix.

6.6.4.4 Define PLC outputs

- Main menu > Settings > Interfaces > Define PLC outputs

The following relay outputs are available for further signal processing. The maximum rating for the relay contacts is 60V AC/1A.

The contacts are numbered from bottom to top.

Pin	Assignment
1	PLC in free selectable
2	PLC in free selectable
3	PLC in free selectable
4	GND
5 to 7	Digital out free selectable, 5 center contact, 6 normally open contact, 7 normally closed contact
8 to 10	Digital out free selectable
11 to 13	Digital out free selectable
14 to 16	Digital out free selectable

Description of the operation mode of the Digital Out. The pin assignement for contacts 8 to 16 follows the same order as for pins 5 to 7.

The actual pin setting can be seen under Info/View internal data/page 7.

The following digital out signals are selectable.

Trigger 1:
Is open in case Trigger Level 1 is exceeded or the machine is not in condition of measuring.

Trigger 2:
Trigger Level 2 analog Trigger 1.

Trigger 3:
Triggerlevel 3 analog Trigger 1

Zero active:
Is closed in case Zero function is running.

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

CAL active
Closed when machine is in calibrating routine.

CAL Request
Is opend in case of calibration request. During external calibration a open output indicates that the external calibrated leak has to be closed.

Fail
Open when a error is shown.

Warning
Open when a warning is shown.

Gas ballast
Closed when gas ballast is active.

Open
Open all time.

Close
Closed all time.

Recorder Strobe
Closed in case recorder output is invalid. Only used when record output is set on „leak rate“.

6.6.4.5 Define PLC inputs

- Main menu > Settings > Interfaces > Define PLC inputs

These inputs can be used to control the PhoeniXL with a programmable logic control (PLC).

Pin	Assignment
1	PLC in free selectable
2	PLC in free selectable
3	PLC in free selectable
4	PLC GND

Description of operation mode of the Digital In.

The PLC inputs are working only if the correct location of control has been set (see 6.6.4.1)

The actual pin setting can be seen under Info/View internal data/page8.

Zero:
Change from low to high: activate zero
Change from high to low: deactivate zero

Start:
Change from low to high: activate START

Stop:
Change from low to high: activate STOP
When this inlet is longer high than chosen in chap. 6.6.1.2 then ventilate it additionaly.

Purge/gas ballast:
Change from low to high: activate purge/gas ballast
Change from high to low: deactivate purge/gas ballast

Clear:
Change from low to high: confirm error message

CAL:
Change from low to high:
When machine is in stand-by mode: start internal calibration. In case machine is measurement mode: start external calibration. (Premise: external calibration test leak has to be open and leak rate signal is stable)
Change from high to low:
External calibration: approve that external test leak is closed and leak rate signal is stable.
High means: U > 13V(approximately 7mA)
Low means: U < 7V
The level of the logic signals must not exceed 35V.

CAL intern:
The Machine starts an internal calibration independent from the mode the machine is running in.

CAL extern:
The Machine starts an external calibration independent from the mode the machine is running in.

Signals at these inputs are only accepted if the location of control is set to „PLC“ or „Local and PLC“. Refer to Chapter 6.6.4.1

6.6.4.6 Scaling Recorder Output

- Main menu > Settings > Interfaces > Scaling Recorder Output

Here the scaling of the recorder output can be adjusted. This adjustment is possible with only when the signal LR lin or LR log is chosen.

Softkey 2: Decrease the decade

The decade of the upper leakrate can be decreased

Softkey 3: Decrease scaling

Decrease scaling of the previously adjusted value in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade. The complete array is covers 10 V.

Softkey 5: ?

Help text.

DSoftkey 6: Increase decade

The decade of the upper leakrate can be increased

Softkey 7: Increase scaling

Increase scaling of the previously adjusted value in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade. The complete array covers 10 V.

Example:
Upper limit value is adjusted to 10^{-5} (= 10V)
Scaled to 5 V /decade
Lower limit value consequently is 10^{-3} (= 0 V)

6.6.4.7 PLC Sample Rate

- Main menu > Settings > Interfaces > PLC Sample rate

Softkey 2: Decrease the PLC sample rate of the PLC control

Decreasing the PLC sample rate down to the minimum of 10 ms. This might be necessary if exchanging an L200 to the PhoeniXL to stay compatible.

Softkey 3: Increase the PLC sample rate of the PLC control

Increasing the PLC sample rate to the maximum of 100 ms.

6.6.5 Miscellaneous

- Main menu > Settings > Miscellaneous

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

Softkey 2: Time&Date
See chapter 6.6.5.1

Softkey 3: Language
See chapter 6.6.5.2

Softkey 4: Calibration request
See chapter 6.6.5.3

Softkey 5 Service interval fore pump
See chapter 6.6.5.4

Softkey 7: Service interval oil filter
See chapter 6.6.5.5

Softkey 8: Service message oil filter
See chapter 6.6.5.6

6.6.5.1 Time&Date

- Main menu > Settings > Miscellaneous > Time&Date

Date and time can be changed on two subsequent pages. Please refer to Chapter 4.1.2.7 Numerical Entries for the description of the entry.

6.6.5.2 Language

- Main menu > Settings > Miscellaneous > Language

The prefered language can be selected. The default setting is english.

Softkey 3: German
The german language will be displayed.

Softkey 7: English
The english language will be displayed.

6.6.5.3 Calibration request

- Main menu > Settings > Miscellaneous > Calibration request

It can be selected whether the operator is reminded of the fact that a calibration may has become necessary or not. The default value is off.

Softkey 3: Off

The calibration request will be switched off.

Softkey 5: ?

Helptext

Softkey 7: ON

The calibration request will be switched on.

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

6.6.5.4 Service interval fore pump

- Main menu > Settings > Miscellaneous > Service interval fore pump

Setting for the service interval of the fore pump. This setting depends on the use of the PhoeniXL but latest after 4000 running hours or one year the oil in the pump should be controlled. See also manual for the Trivac D2,5E which is included in the document folder. See chapter 9.1.1 also.

This setting is possible for the PhoeniXL^{300} only.

Softkey 3: ↓

The time for the service interval can be decreased in steps of 500 hours.

Softkey 7: ↑

The time for the service interval can be increased in steps of 500 hours to the upper limit of 4000 hours.

6.6.5.5 Service interval exhaust oil filter

- Main menu > Settings > Miscellaneous > Service Interval exhaust oil filter

Here you can enter the service intervall for the oil filter. This setting is only possible for the PhoeniXL^{300}. This setting depends on the use and application of your PhoeniXL and therefor no recommendations can be given (see 9.1.1).

Softkey 3: ↓

Decrease of the service intervall steps of within 500 hours. The limit is 1000 hours

Softkey 5: ?

Help text

Softkey 7: ↑

Increase of the service intervall within steps of 500 hours. The limit is 4000 hours.

6.6.5.6 Service message exhaust oil filter

- Main menu > Settings > Miscellaneous > Service message exhaust oil filter

The exhaust oil filter must be maintained at regular intervals to ensure the correct function of the PhoeniXL. If the service message is activated, the PhoeniXL reminds you of the required maintenance.

This setting is only possible for the PhoeniXL^{300}.

Attention

If the service messages are ignored and the exhaust is not replaced a risk for overheating the pump motor exists.

Softkey 3: ↓

The service message for the oil filter can be reduced to the min. 1000 hours

Softkey 7: ↑

The service message for the oil filter can be increased up to the max. 4000 hours.

6.6.6 Parameter save / load

- Main menu > Settings > Parameter save / load >

Enables to save and load individual settings or reload the default settings.

Softkey 2 to 4: The names of the current values can be saved under a free selectable name. The saving of 3 different sets is possible.

Softkey 5: load default values

The factory settings will be loaded again.

Softkey 6 to 8: One of three saved parameter sets can be loaded.

6.6.6.1 Load parameter set

- Main menu > Settings > Parameter save / load > Load Para set

Save the current parameter settings.

Softkey 4: Edit a file name

Rename the parameter set.

Softkey 8: Sav

Save the edited parameter set.

6.6.6.2 Save parameter set

- Main menu > Settings > Parameter save / load > Save as

The settings of the selected saved parameter set will be displayed and can be reloaded.

Softkey 6: ↑

Upward to the previous screen.

Softkey 7: ↓

Downward to the next screen.

6.6.7 Monitoring functions

- Main menu > Settings > Monitoring functions

Softkey No. 6: Pressure limit for vacuum mode

See chapter 6.6.7.1

Softkey No. 7: Pressure limit for sniffer mode

See chapter 6.6.7.2

Softkey No. 8: Maximum evacuation time

See chapter 6.6.7.3

6.6.7.1 Pressure limits for vacuum mode.

- Main menu > Settings > Monitoring functions > Pressure limits vacuum mode

With this function the default settings for the pressure limits EVAC - GROSS and FINE can be changed.

This might be necessary if other gases than air will be pumped by the PhoeniXL. The pressure signal from the gas dependant inlet pressure (P1) will dump false signals. With changing the pressure limits this preformance will be adjusted.

Softkey No. 2: ↓

Decrease change over threshold EVAC-GROSS

Chosable between15-3 mbar (Default value 15 mbar)

Softkey No. 3: ↓

Decrease change over threshold GROSS-FINE

Chosable between 0,2-0,05 mbar (Default value0, 2 mbar).

Softkey No. 4 Adjustment for ARGON

Selection between air or Argon

Softkey No. 5: ?

Help text

Softkey No. 6: ↑

Increase change over threshold EVAC-GROSS

Chosable between 3 - 15 mbar

Softkey No. 7: ↑

Increase change over threshold GROSS-FINE

Chosable between 0,05 - 0,2 mbar

6.6.7.2 Pressure limits for sniff mode

- Main menu > Settings > Monitoring functions > Pressure limits sniff mode

This function is automatically activated in sniff mode. The pressure limits define an upper and lower limit of the inlet pressure P1. If the pressure is not in this range error messages are generated:

P > upper limit: Capillary broken

P < lower limit: Flow through capillary too low (Capillary blocked)

Softkey No. 2: ↓

Decreasing the maximum pressure, Upper limit is 0,15 mbar (default)

Softkey No. 3: ↓

Decreasing the minimum pressure

Softkey No. 4: Setting for Quicktest

Setting for use with the Quicktest

Softkey No. 6 ↑

Increasing the maximum pressure

Softkey No. 7: ↑

Increase the minimum pressure

Lower limit is 0,05 mbar (default)

6.6.7.3 Maximum evacuation time

- Main menu > Settings > Monitoring functions > Maximum evacuation time

This menu item is used to define when the gross leak message is to occur. The gross leak detection process operates in two steps and the limits can be adapted as required.

This menu item is particularly useful in series testing under the same conditions at all times.

After pressing the start button the test sample is evacuated. If the pressure conditions (p1 < 100 mbar) are not attained, or if the pressure does not drop low enough within the periods of time specified here, the pump-down process is terminated and the display will indicate a message (see 8.2, W75 and W76).

The periods which are selected in each case depend firstly on the desired reaction time for the gross leak message, and secondly on the volume of the test sample and the effective pumping speed.

Caution: If the evacuation time was set to endless, the oil level of the mechanical pump should be checked more often.

Softkey No. 2: ↓

Decreasing maximum evacuation time until p1 < 100 mbar. Within this period of time the inlet pressure at the test flange must have dropped below 100 mbar. The duration may be selected freely between 1 second and 9 minutes or can be set to endless. The default is 30 seconds.

Softkey No. 3: ↓

Decreasing maximum time until measurement Within the period of this time the status of measurement readiness must have been attained, i.e. the inlet pressure must have dropped below 15 mbar. The duration may be freely selected between 5 seconds and 30 minutes or can be set to endless.

Softkey No. 5: ?

Help text

Softkey No. 6: ↑

Increasing maximum evacuation time until p1 < 100 mbar

Softkey No. 7 ↑

Increasing maximum time until measurement.

6.7 Information

- Main menu > Information

The Information Menu Fig. 27 enables submenus to select different kinds of information belonging to the PhoeniXL.

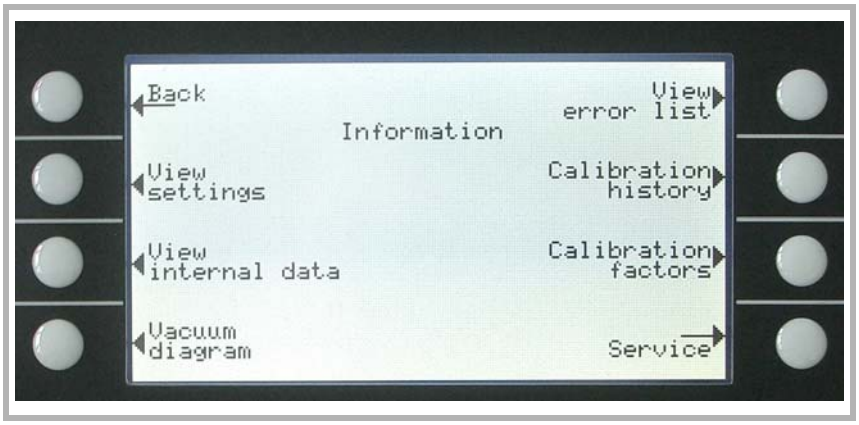


Fig. 27 Display: Information Menu

Softkey 2: View settings

The current settings will be displayed on 5 pages, e.g. trigger levels, test leak mass, date and time.

Softkey 3: View internal data

Information on measured internal data is provided on 10 screens.

Softkey 4: Vacuum diagram

The vacuum diagram of the PhoeniXL is shown. Here you can see which valves are opend or closed momentarily. See chapter 4.1.1

Softkey 5: View error list

The list of occured errors and warnings will be displayed. See chapter 8.2.

Softkey 6: Calibration history

The carried out calibrations will be listed.

Softkey 7: Calibration factors

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

Softkey 8: Service

6.7.1 Service

- Main menu > Information > Service

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

6.8 Access Control

- Main menu > Access Control

With this menu you can deny or allow access to specific functions of the PhoeniXL^{300}.

Fig. 28 Display: Access Control Menu

Softkey 3 Access to Zero function

See chapter 6.8.1

Softkey 4: Access to CAL function

See chapter 6.8.2

Softkey 8: Change Menu-PIN

See chapter 6.8.3

6.8.1 Access to CAL function

- Main menu > Access Control > Access to CAL function

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

Softkey 3: Off

The calibration function is only available at the main menu. If the Menu-PIN (See Chapter 6.8.2) is activated you need this PIN to start a calibration. Default setting.

Softkey 5: ?

Help text

Softkey 7: ON

The calibration function is available at the main menu and in Stand-by and the measure mode. See Chapter 7.2

6.8.2 Change Menu-PIN

- Main menu > Access Control > Change Menu-PIN

The access to the menu can be restricted by entering or changing the personal identification number (PIN). No PIN will be checked if 0000 is entered.

The default setting for the Pin is 0013.

Please refer to Chapter 4.1.2.7 Numerical Entries for the description of the entry.

6.8.3 Zero

- Main menu > Access Control > Zero

This setting enables (respectively disables) the ZERO button at the control panel. With „Zero at FINE“ (See Chapter 6.3), the ZERO functions executes automatically as soon as the measuring range FINE is reached for the first time after START. In this mode the ZERO function also can be executed manually via the ZERO button.

Softkey 3: closed

ZERO button disabled

Softkey 5: ?

Help text

Softkey 6: Zero at FINE

When reaching the FINE mode the ZERO function is started automatically.

Softkey 7: free

Softkey ZERO is selectable. Default setting.

7 Calibration

7.1 Introduction

The PhoeniXL can be calibrated in two different ways:

- Internal calibration by means of a built-in test leak.
- External calibration by means of an additional test leak which then is attached to the inlet port or the component under test.

During the calibration procedure the mass spectrometer is tuned to the maximum helium or hydrogen signal and this signal is referred to the known leak rate of the internal or external test leak. Although the PhoeniXL is a very stable instrument a calibration is recommended every day with heavy use, or before using the PhoeniXL from time to time, to make sure that ambient temperature changes or dirt or other impacts don't adulterate the measurements.

To get an optimized calibration the machine has to warm up at least 20 minutes before use, otherwise a warning will come up which might be ignored.

7.2 The calibration routines

The calibration routines can be started by pressing button CAL (Softkey 5) via 3 different locations:

- main menu (Fig. 16)
- Stand-by mode (Fig. 8)
- measurement mode (Fig. 14 & 15)

The access via Stand-by mode or measurement mode can possibly be blocked (see Chapter 6.8.1). In this case the softkey is not labeled. Default: Access on.

Once the calibration mode is activated the user must choose between an internal and an external calibration. Please press the corresponding Soft Key Fig. 23.

A calibration may be terminated at any time by pressing the STOP Button or using the Soft Key no. 1 (Cancel) Fig. 29.

7.2.1 Internal Calibration

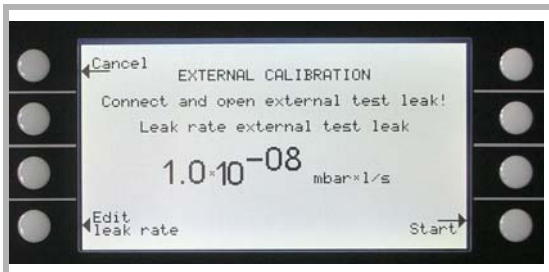
Mass 4 must be selected (Default setting)

Press Softkey nr. 4 Fig. 29 to start the calibration. Once this procedure is started the entire procedure is performed automatically. At the end (after about 25 s) a visual and audio signal is released. Thereafter the unit is ready for further use.

7.2.2 External Calibration

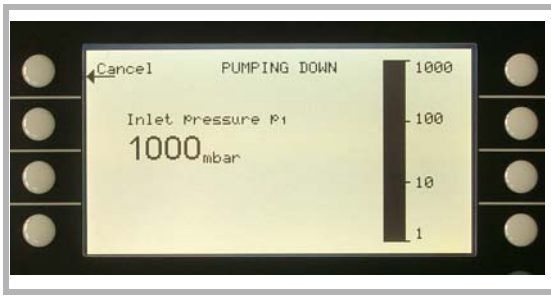
For an external calibration a test leak has to be attached to the part under test or the inlet port directly depending on the application.

After External Calibration (Fig. 23, Soft Key no. 8) has been chosen the following messages are displayed and the described actions are required:



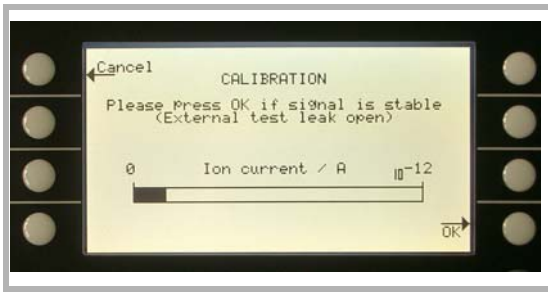
- Make sure that the correct mass is selected.
- Make sure that the test leak is connected and opened.
- Check the leak rate printed on the test leak and compare it with the leak rate at the display. If the leak rates are not identical press Edit leak rate (Soft Key no. 4) and correct the value.
- If the leak rates are okay press START (Soft Key no. 8).

Fig. 29 Display: External Calibration, Step 1



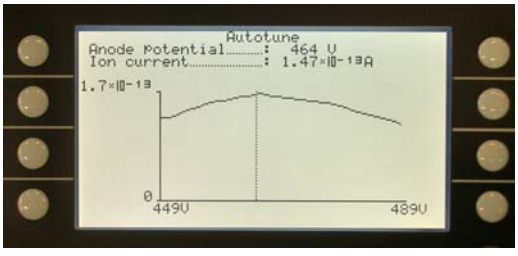
- No action required.

Fig. 30 Display: External Calibration, Step 2



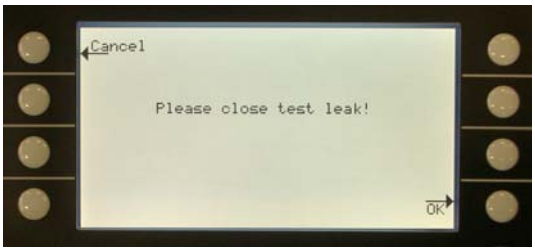
- The bargraph display shows a signal which must not vary much. If so please press OK (Soft Key no. 8).

Fig. 31 Display: External Calibration, Step 3



- No action required.

Fig. 32 Display: External Calibration, Step 4



- The bargraph display shows a signal which must not decrease any more. There might be a small fluctuation which is okay. If so please press OK (Soft Key no. 8).

Fig. 33 Display: External Calibration, Step 5

- When signal is stable confirm with o.k.

Fig. 34 Display: External Calibration, Step 6

- The PhoeniXL shows the old and new calculated calibration factor (see chapter 7.3).

Fig. 35 Display: External Calibration, Step 7

7.3 Factor of Calibration – Range of Values

To avoid a faulty calibration the factor of calibration is tested for plausibility at the end of the calibration routine:

When the new factor of calibration is not considerably higher or lower (< factor 2) than the previous factor of calibration the new factor will be accepted automatically. When the new factor of calibration diverges stronger from the previous factor the user can decide if he wants to accept it anyway (e. g. after changing the system configuration) or not (e. g. because of a maloperation).

When calibration is started via SPS or RS232 no testing for plausibility is occuring.

When calibrating internal it is also monitored if the newly calculated factor of calibration is higher than 10 or lower than 0.1. In this case a warning (see W81 resp. W82 in Chapter 8.2) is displayed and the calibration will be interrupted.

8 Error And Warning Messages

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

An audio signal is generated when an error or warning occurs. The frequency changes every 400 ms from 500 Hz to 1200 Hz and vice versa so that the signal stands out well from ambient noises normally encountered.

Error and warning messages are logged and can also be displayed at a later time through the menu information (Please refer to Chapter 6.7)

8.1 Hints

Warning Messages

Warnings will be indicated

- when the PhoeniXL detects an abnormal condition or
- when it wants to remind the operator of something (e.g. a request for calibration or a service timer has expired).

The PhoeniXL will indicate a message on the LC display and will remain in the Stand-by or the measurement mode.

Warning messages will remain on the LC display until the warning has been acknowledged by pressing „OK“ (Key no. 8). After that the PhoeniXL can be used again (possibly with some restrictions). As long as a warning status exists the status line shows a warning triangle (5.4.3).

Error Messages

Errors are events which force the PhoeniXL to interrupt its measurement operations. In this case the PhoeniXL closes all valves exept valve 2a (Stand-by mode).

Error messages remain on the LC display until the message has been acknowledged by pressing „Restart“ (key no. 8). After that, the PhoeniXL restarts with a new run-up procedure. In some cases it may be helpful to check some settings or measured values before the PhoeniXL restarts. Therefore it is also possible to press „Menu“ (key no. 4 or Menu key) to enter the PhoeniXL menu. After leaving the menu the same error message will be displayed again.

Under extrem conditions (unknown software errors, excessively high electromagnetic interference levels) the built-in „watchdog“ circuit will prevent uncontrolled operation of the PhoeniXL. This watchdog will cause the PhoeniXL to restart. After having done so, the instrument will be running in the Stand-by mode. No error message will be output.

8.2 List of Errors & Warnings

The following pages contain a list of all errors and warnings displayed at the control panel. Warning messages are indicated by numbers with a leading W. Error messages are indicated by numbers with a leading E.

No.	Displayed Message	Description and possible solutions
W14	Exhaust oil filter service interval expired	The chosen service interval for the exhaust oil filter is expired. Control and/or replace the exhaust filter insert.

No.	Displayed Message	Description and possible solutions
W17	Forepump service interval expired!	The service intervall for the fore pump is expired. Service the fore pump
W21	EEPROM write time out	EEPROM defective MC 68 defective
W22	EEPROM parameter queue overflow	Software problrem, please contact Leybold service.
E23	24V for external output 1 is too high.	The 24 V voltage for the external output 1 is too high Check if an external voltage has been applied to the 24V output..
E24	24V for external output 1 is too low.	The 24 V voltage for the external output 1 is too low. Fuse F2 on the wiring backplane has blown
E25	Receded valve voltage too low (< 7V).	I/O board is faulty. MC 68 defective.
E26	24V for external output 2 is too low.	The 24 V voltage for the external output 2 (RS232) is too low. Fuse F2 on the I/O board has blown
E27	24V for external output 3 is too low.	The 24 V voltage for the external output 3 (optional) is too low. Fuse F1 on the I/O board has blown
W28	Real time clock reset! Please enter date and time!	Battery at MC68 is discharged or faulty. MC68 had been replaced.
E29	24V supply for fans is too low (< 20V).	Fuse F1 on wiring backplane has blown.
E30	24 V of the remote control is too low (< 20V).	Fuse F1 on the I/O-board has blown.
W31	The offset voltage of the pre-amplifier is too high (> 5mV).	The preamplifier is faulty.
W32	Preamplifier temperatur is too high (> 60°C).	Ambient temperature is too high. Air filter dirty.
W33	Preamplifier temperature is too low (< 2°C).	Ambient temperature is too low. Temperature sensor is faulty.
E34	24V voltage at MSV board is too low!	Signal MVPZN on the MSV board is active. 24 V signal voltage is too low, U < 18.3 V. – Fuse F1 on the MSV board has blown. – Reference voltage UREF on the MSV board XT7/1 is too high, U > 5 V. – DC/DC converter on the MSV board is defective. – 24V power supply voltage of the main power supply is defective or stressed to much.
E35	Anode-cathod voltage is too high!	Anode-cathod voltage is > 130 V MSV board is faulty.

No.	Displayed Message	Description and possible solutions
E36	Anode-cathode voltage is too low.	Anode-cathode voltage is < 30 V. MSV board is faulty. Fuse F4 on MSV board has blown.
E37	Suppressor voltage reference value too high!	Signal MFSZH on MSV board is active. Suppressor signal command variable is too high. – Suppressor voltage has a short circuit. – MSV is faulty.
E38	Suppressor potential too high!	Suppressor potential is higher than 363V. MSV board is faulty.
E39	Suppressor potential is too low.	Supressor potential is lower than 297V. MSV board is faulty.
E40	The anode potential exceeds its norminal value by over 10%!	The actual anode potential exceeds its nominal value by 10%. The nominal value can be displayed in the service menu. MSV is faulty. MC 68 is faulty
E41	The anode potential has dropped below its nominal value by over 10%!	The actual anode potential has dropped below its nominal value by 10%. The nominal value can be displayed in the service menu. MSV is faulty. MC 68 is faulty.
E42	Nominal value of the anode potential is too high!	Signal MFAZH on MSV board is active. Anode voltage has been short circuited. Nominal value of the anode voltage is too high. Anode voltage is limited to about 1,200 V.
E43	Cathode current is too high! MSV Cat-Heater >>	Signal MPKZH on MSV board is active. Cathode current is too high, I > 3.6 A. MSV is faulty.
E44	Cathode current is too low!	Signal MPKZN on MSV board is active. Cathode current is too low, I < 0.2 A. MSV is faulty. Faulty ion source connector or cable.
W45	Emission for cathode 1 can not be switched on!	Signal MSIBE on MSV board is not active. Emission for cathode 1 can not be switched on. PhoeniXL switches to cathode 2. Plesae order a new ion source. Cathode 1 is defective MSV board is defective
W46	Emission for cathode 2 can can not be switched.	Signal MSIBE on MSV board is not active. Emission for cathode 2 can not be switched on. PhoeniXL switches to cathode 1. Order a new ion source. Cathode 2 is defective. MSV board is defective.

No.	Displayed Message	Description and possible solutions
E47	Emission for both cathodes can not be switched on!	Signal MSIBE on MSV board is not active. Emission can not be switched on. Exchange the cathode by changing the ion source. After having exchanged the ion source it must be possible to switch on both cathodes manually via the service menu. Replace ion source. MSV board is defective.
E48	Anode heater is faulty!	Signal MSAFD on MSV board is active. Anode heater fuse has blown. Replace fuse F2 on the MSV board.
E50	No communication with turbo pump converter.	Clock from the frequency converter has failed. No communication to the frequency converter. Fuse F4 on the wiring backplane has blown. Drive electronics Turbo Drive S is defective.
E51	Unknown TMP error	The frequency converter Turbo Drive S indicates an unknown error code. Inform Leybold service
E52	TMP frequency is too low!	TMP frequency is too low! Frequency converter is faulty. Turbomolecular pump is faulty.
W53	Temperature at electronic unit is too high (>55°C)	Ambient temperature too high. Ventilation failure. Air filter dirty and have to be changed.
E54	Temperatur at electronic unit is too high (>60°C).	Ambient temperature is too high. Internal ventilation has failed. Air filters are dirty and must be exchanged.
W55	Temperature at electronic unit is too low (< 2°C)	The temperature sensor on the wiring plane indicates T < 2 °C. Run-up time for the forevacuum pump will be longer. Temperature sensor is faulty. Ambient temperature is too low.
E56	Inlet pressure p1 too low!	Output voltage Pirani P1 U < 0,27 V. Pirani sensor P1 is defective. Pirani electronics on the I/O board is defective.
E58	Foreline pressure p2 too low!	Output voltage Pirani P2 U < 0,27 V. Pirani sensor P2 is defective. Pirani electronics on the I/O board is defective.
E60	p2>10mbar after 5 minutes since power on	Run-up time of the forevacuum pump is too long. Forepump is faulty. Valve V2 does not open. Leak in the high vacuum system.

No.	Displayed Message	Description and possible solutions
E61	Emission fail.	Emission could not be switched on. MSV subassembly indicates a fault. MENB emission current not within range. MSV board is defective. Both cathodes are defective, replace ion source.
W62	Flow through capillary to low.	In the sniffer mode the intake pressure of the sniffer line is controlled. If the pressure falls below the minimum limit, the flow through the capillary is too low (contamination) or the capillary is blocked (foreign objects, particles). The minimum limit can be set by the menu. Default value is 0.05 mbar. 6.6.1.7. Filter in the tip is clogged.
W63	Capillary broken	In the sniffer mode the intake pressure of the sniffer line is controlled. If the pressure exceeds the maximum limit, the flow through the capillary is too high (no leak tightness, broken capillary). The maximum limit can be set by the menu. Default value is 0,15 mbar. 6.6.1.7. The capillary is broken or has been torn off.
E64	TMP error: Nomimal speed has been exceeded by over 10%	Nominal speed of the pump has been exceeded by over 10% EMC problems: Check connecting cable, insert it properly. Switch the power supply voltage off and then on again. Turbo.Drive S faulty: Inform Leybold Service
E65	TMP error: Pass through time exceeded	Max. time for passing through the critical frequencies has been exceeded. Forevacuum or high-vacuum pressure to high: see chapter 6.6.7.1 to reduce the inlet pressure of the PhoeniXL Bearing defective: Inform Leybold service for repair
E66	TMP error: Bearing temperature too high (>67°C)	Max. bearing temperature has been exceeded Forevacuum or high-vacuum pressure to high: see chapter 6.6.7.1 to reduce the inlet pressure of the PhoeniXL Fan defective: Replace the fan Ambient temperature too high: Feed cooler air to the PhoeniXL Bearing defective: Inform Leybold service for repair
E67	TMP error: Short circuit in TMP-motor or connecting cable	Short circuit in the pump's motor or the connecting cable Check to see if the connecting cable is undamaged, exchange if required. Inform Leybold service in case of short circuit in TMP motor
E68	TMP error: temperature converter too high (>75°C)	Maximum temperature for the converter has been exceeded. Ambient temperature too high: Feed cooler air to the PhoeniXL Fan defective: Replace the fan Forevacuum or high-vacuum pressure to high: see chapter 6.6.7.1 to reduce the inlet pressure of the PhoeniXL

No.	Displayed Message	Description and possible solutions
E69	TMP error: Runup timeout	Max. time after which the pump must enter its normal operation mode has been exceeded. Forevacuum or high-vacuum pressure to high: see chapter 6.6.7.1 to reduce the inlet pressure of the PhoeniXL Bearing defective: Inform Leybold service for repair
E70	TMP error: TMP motor temperature too high (>90°C)	Max. motor temperature has been exceeded. Forevacuum or high-vacuum pressure to high: see chapter 6.6.7.1 to reduce the inlet pressure of the PhoeniXL Fan defective: Replace the fan Ambient temperature too high: Feed cooler air to the PhoeniXL Bearing defective: Inform Leybold service for repair
E71	TMP error: TMP could not be indentified	Pump could not be identified or no pump is connected. Pump not connected to Turbo.Drive S: Check connecting cable
E73	Emission off (p2 too high)	The emission is switched off as soon as the pressure P2 > 0.2 mbar or 1,5 mbar in the measurement mode. If after closing the inlet valve the pressure drops again, the leak detector will revert to the standby mode. Air incrush in the measurement mode.
W76	Maximum of evacuation time was exeeded.	Within the pre set evacuation time the pressure threshold of 100 mbar was not reached. Test sample has got a GROSS leak. Wrong setting (too short) of the max. time of evacuation.
W77	Peak not in Range	The signal maximum has shifted to mass range alignment limits. Signal of leak rate was instable during mass adjustment. Calibrate again. Check the basic setting for the anode voltage through the service menu. Check calibrated leak.
W78	Differences of signal between test leak open and closed is too low.	The amplifier voltage difference between opened and closed calibrated leak is less than 10 mV. Calibrated leak has not been closed properly.
W79	Signal of test leak is too small	Calibrated leak is too small or has not been opened. Preamplifier voltage < 10 mV.
W80	Please calibrate machine newly	The automatic request of calibration is activated (7.2.1) and has fullfilled at least one of the conditions: 30 minutes are passed since power on. Temperature of the pre-amplifier has changed more than 5°C since the last calibration. Massadjustments were changed.

No.	Displayed Message	Description and possible solutions
W81	CAL Factor too low	The calculated factor falls out of the valid range (<0,1). The old factor is retained. Possible fault cause: The conditions for calibration have not been maintained. The leak rate of the internal calibrated leak which was entered is much too small. The internal test leak is defect.
W82	CAL Factor too high	The calculated factor is out of the valid range (>10). The old factor is retained. Possible fault cause: The conditions for calibration have not been maintained. The leak rate of the internal calibrated leak which was entered is much too high or much too small.
W83	All EEPROM parameter lost. Please check your settings.	EEPROM on back plane is empty and was initialized with default valves. Enter all parameters again. The EEPROM might be faulty when warning comes up again after power up.
W84	EEPROM parameter initialized. Please check your settings	Software update has been installed
W85	Lost EEPROM parameter! Please check your settings!	Writing access was interrupted. Please check all adjustments. An software update was done. In this case the notice can be ignored. When warning comes up again after powering up the EEPROM might be faulty.

9 Maintenance

9.1 LEYBOLD Service

If equipment is returned to Leybold, indicate whether the equipment is free of substances damaging on health or whether it is contaminated. If it is contaminated also indicate the nature of the hazard. For this you must use a Declaration of Contamination form Fig. 1 which has been prepared by us which we will provide upon request or you may copy the form which is attached in the folder of documents. As well you can download this form from our homepage: www.leybold.com under „Support & Download“.

Please attach this form to the equipment or enclose it with the equipment.

This Declaration of Contamination is required to meet German Law and to protect our personnel. LEYBOLD must return any equipment without a Declaration of Contamination to the sender’s address.

Before shipping fir the yellow screw-on seals on to the connections EXHAUST and GAS BALLAST.

9.1.1 Maintenance Plan

Maintenance work should be done on the PhoeniXL as required. This work will normally be limited to exchanging the oil in the Trivac D2,5E rotary vane pump and the built in air and oil filters.

As a preventive measure it is recommended that you check the rotary vane pump once a month. Here note schould be taken of the oil level and the colour of the oil.

Attention Only Arctic oil (Cat. no. 20028181) must be used in the TRIVAC D2,5E in the PhoeniXL.

The monthly interval for the check is just a nominal period. If the PhoeniXL is used heavily, in particular in sniffer mode, then this check should be performed more frequently. The rotary vane pump is located on the side of the mechanical section at the bottom of the leak detector.

9.1.2 Opening the PhoeniXL

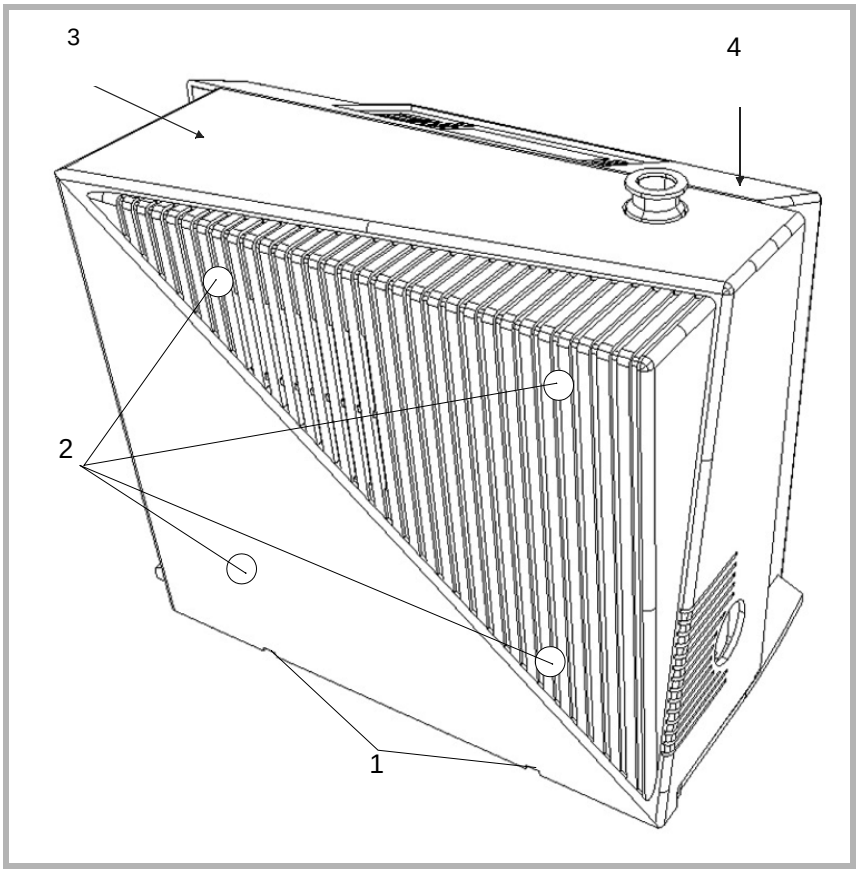


Fig. 36 Backview of PhoeniXL

1: Openings for removal of the cover for the mechanical section

2: Four screws for loosening the cover for the electronics section.

3: Mechanical cover

4: Electronic cover

1. Switch the PhoeniXL off.
2. Pull the mains cord on the PhoeniXL.

Caution

You can get an electric shock!

3. Separate the PhoeniXL from other vacuum components at the test port.
4. Turn the PhoeniXL so that it is orientated in the same way as shown in Fig 36.
5. Use two flat blade screwdrivers and insert these into the openings (Fig. 36/1) and lever the cover for the mechanical section out at the bottom.
6. In doing so, the cover should be moved somewhat to the front by the downward motion of the screwdrivers. The cover may be lifted up by the upwards motion of the srewdrivers so that the cover is disengaged completely.
7. Then pull the cover off the mechanical section up to its stop and

remove it to the front.

8. Removing the cover for the electronics section by removing the four Phillips screws (see Fig. 36/2).
9. Pull the cover over the electronics section back to the rear and place it aside.
10. After completion of all maintenance work put the electronic cover back in place and screw it tighten. The cover of the mechanical section must engage properly in the openings at the bottom.

9.1.3 Exchanging the filter mats

The filter mats have been built in to filter the dust out the air which is taken in. In order to ensure that the filter mats will not throttle the air flow and so that sufficient cooling is possible at all times, the filter mats should be cleaned or exchanged as soon as these have attained a dark grey colour.

Filter mats are used at three places within the PhoeniXL:

a) at the ventilation slit of the electronic cover (only partly visible from the outside)

b) on the face side on the back (only partly visible from the outside)

c) at the fan of the turbomolecular pump (only partly visible from the outside)

To exchange the filter mats remove the covers as described above.

Filter mat a.) these filter mats are srewed to the electronic cover. Unscrew the screws and exchange the filter mats. (Cat. no. 20099025)

Filter mat b.) This filter mat is located on the side together with a further metal grid an a recess. It can be exchanged without having to use any tools. (Cat. no. 20099025)

Filter mat c) This filtermat is fixed before the fan with a plastic bracket. Take of the bracket and remove the filter, put on the bracket and fix it properly. (Cat. no. 200001366)

Under certain circumstances a dirty mat may be cleaned by shaking the dust out or by using a vacuum cleaner so that the filter mat can be used again.

9.1.4 Exchanging the oil

Remove the cover of the mechanical section as described in Chapter 9.1.2.

Caution

Before starting with any disassembly work on the pumps, pull the mains plug first. When the pump has been pumping hazardous substances, dertermind the kind of hazard first and ensure that suitable safety precautions are taken.

Observe all safety regulations

Attention When disposing of waste oil you must observe the applicable

regulations for the safety of the environment.

The oil change procedure are described in the corresponding Operating Instructions GA 01.601 and these must be foolowed closely.

As already stated in Chapter 9.1.1 only Arctic oil must be used for the Trivac D 2,5E pump in the PhoeniXL.

After completion of all maintenance work the cover of the mechanical section must engage properly in the openings at the bottom.

9.1.5 Cleaning

The housing of the PhoeniXL is made of painted plastic parts. Thus for the purpose of cleaning, only such agents should be used which are generally also used for other painted or plasctic surfaces (mild household cleaning agents, for example). Normally a moistened peace of cloth will do. Never use any solvents which are capable of dissolving paint (like acetone, toluol, etc.).

A soft brush or a vacuum cleaner is recommended for cleaning the ventilation slits.

9.1.6 Exchanging the fuses

Caution

Before exchanging the fuses you must disconnect the mains cord.

1. Switch the PhoeniXL off.
2. Pull the mains cord off the PhoeniXL.
3. Use a screwdriver to fold out the lid of the mains socket from the right (the mains switch is not affected by this).
4. The fuses can be removed by pulling the drawers out which are marked by the arrows. When reinsering these make sur that the arrows point downwards.
5. In any cases two fuses of the same rating must be inserted. The required mains fuses are: T 10A slow blow (20x5mm dia.) for 100V...230V.
6. After having exchanged the fuse(s) press the lid of the mains socket firmly back on.
7. Insert the mains cord into the PhoeniXL and switch the instrument on.

Beside these mains fuses several internal circuits are fused separately. These fuses are listed in the following table. See also Fig 37.

In order to exchange these fuses you must proceed as follows:

1. Switch the PhoeniXL off
2. Pull the mains cord on the PhoeniXL
3. Remove the cover for the mechanical and electronics section according to Chapter 9.1.2.

4. Exchange fuses

As can be seen in Fig 37, fuses 1, 2, 3 and 4 are located on the MSV board, fuses 5 and 6 on the I/O board and the fuses 7, 8, 9 and 10 are located on the wiring backplane under the MSV board.

5. Finally re-install the covers for the electronics and mechanical section in the reverse order.

Nr. 1 F1 on MSV Fuse rating: T 2A	24 V system voltage of the mass spectrometer supply. Loosen control panel (two Phillips screws). Loosen the panel which holds the MSV board in place (two Phillips screws). Pull the MSV board (the board at the back) up to the top. For this insert a screwdriver into the two recesses at the sides (top) one after the other and lever the MSV board out by resting the screwdriver on the STE board.
Nr. 2 F2 on MSV	Not in use.
Nr. 3 F3 on MSV Fuse rating: T 1A	For generating 24 V for DCDC-converter (+/- 15V / 5 V)
Nr. 4 F4 on MSV Fuse rating: M 0,032A	Fuse for the anode voltage
Nr. 5 F1 on I/O board Fuse rating: T 0,8A	Protects the 24 V supply carried by the option socket
Nr. 6 F2 on I/O board Fuse rating: T 0,2A	Protects the selectable 24 V for RS 232 Interface.
Nr. 7 F 1 on MB Fuse rating: T 0,8A	Supply voltage for the remote control
Nr. 8 F 2 on MB Fuse rating: T 4A	Supply voltage 24 V for I/O board.
Nr. 9 F 3 on MB Fuse rating: T 0,8A	Supply voltage 24 V for fans and motorrelay.
Nr. 10 F 4 on MD Fuse rating: T 8A	Protection for the forevacuum pump.

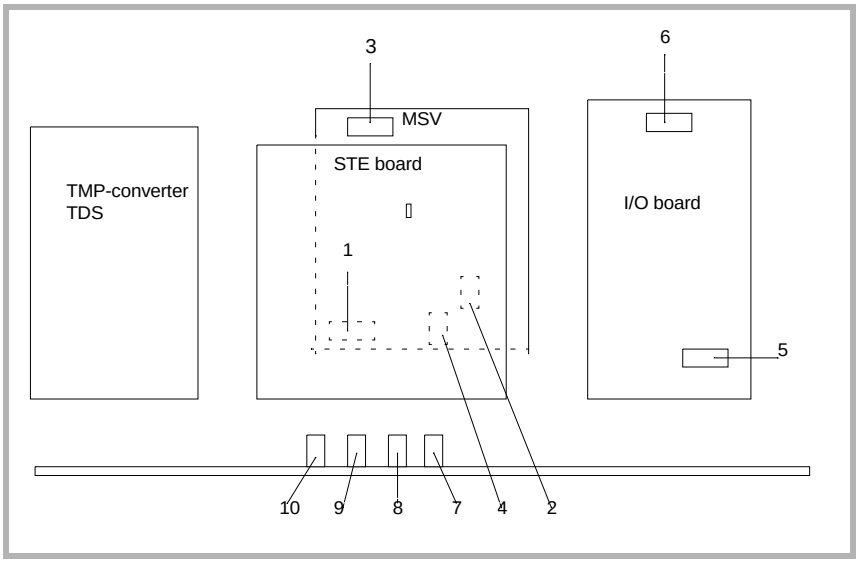


Fig. 37 assembly fuses

9.1.7 Exhaust Oil filter

After using the machine for a longer time there can be oil accumulated from the pump. In this case please do the following:

1. Switch off the PhoeniXL.
2. Remove the mechanical cover according to Chapter 9.1.2
3. The oil filter is located besides the rotary vane pump.
4. Unscrew the plexiglas cabinet (direction is shown by an arrow on the filter).
5. Clean or replace the filter (cat-no. 20028656)
6. Screw back the plexiglas cabinet hand tight.
7. Check the oil level of the rotary vane pump and fill it up when necessary (see instructions for rotary vane pump).
8. Finally re-install the cover for the mechanical section.

9.2 Turbo molecular pump

For the Leybold turbo molecular pump TW 70 LS it is recommended to change the bearings after 20.000 running hours. For details please refer to the corresponding manual of the turbo pump (GA 05156.0101) or contact your local Leybold service.

9.3 Calibrated leak TL7

The Calibrated leak TL7 with the helium reservoir is used for alignement of the mass spectrometer in the PhoeniXL as well as for calibration the leak rate indication.

It is equipped with a solenoid valve which is actuated via the control electronics of the PhoeniXL.

9.3.1 Tecnical Data

Nominal calibration range	10^{-7} mbarl / s
Tolerance of nominal calibration range	+/- 15 %
Temperature coefficient	< 0,5 % / °C
Leak type	Kapillare
Filling	Helium

9.3.2 Factory Inspection

Calibrated leaks are not subject to wear and the Helium loss of the calibrated leak TL7, being less than 2 % per year, is negligible. Nevertheless, the leak rate may change over years due to external influences. A factory inspection is, therefore, advisable once a year.

A test certificate, if required for the Helium calibrated leak, can be obtained from our Cologne Works. In that case, the calibrated leak should be forwarded to us and will be returned inspected and recertified with the test certificate against charge.

The helium flow stated on the main label is the actual leak rate of the calibrated leak.

Appendix

Abmaße PhoeniXL Familie in mm und inch. (in Klammern)
Dimensions PhoeniXL family in mm and inches (in brackets)..

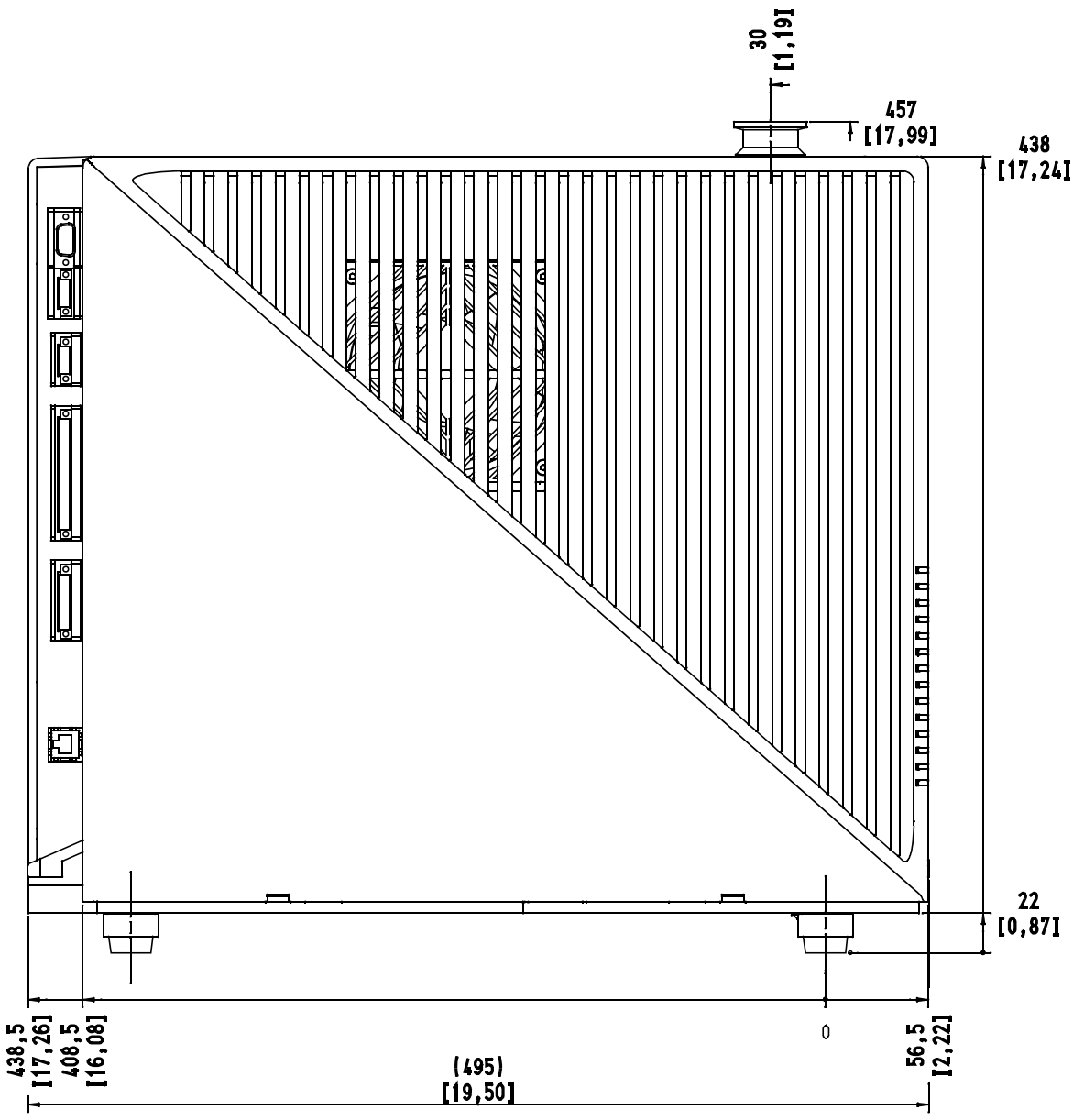


Fig. 1 Dimensons Side View

Abmessungen PhoeniXL Familie
in mm und inch. (in Klammern)
Dimensions PhoeniXL family in
mm and inches (in brackets)

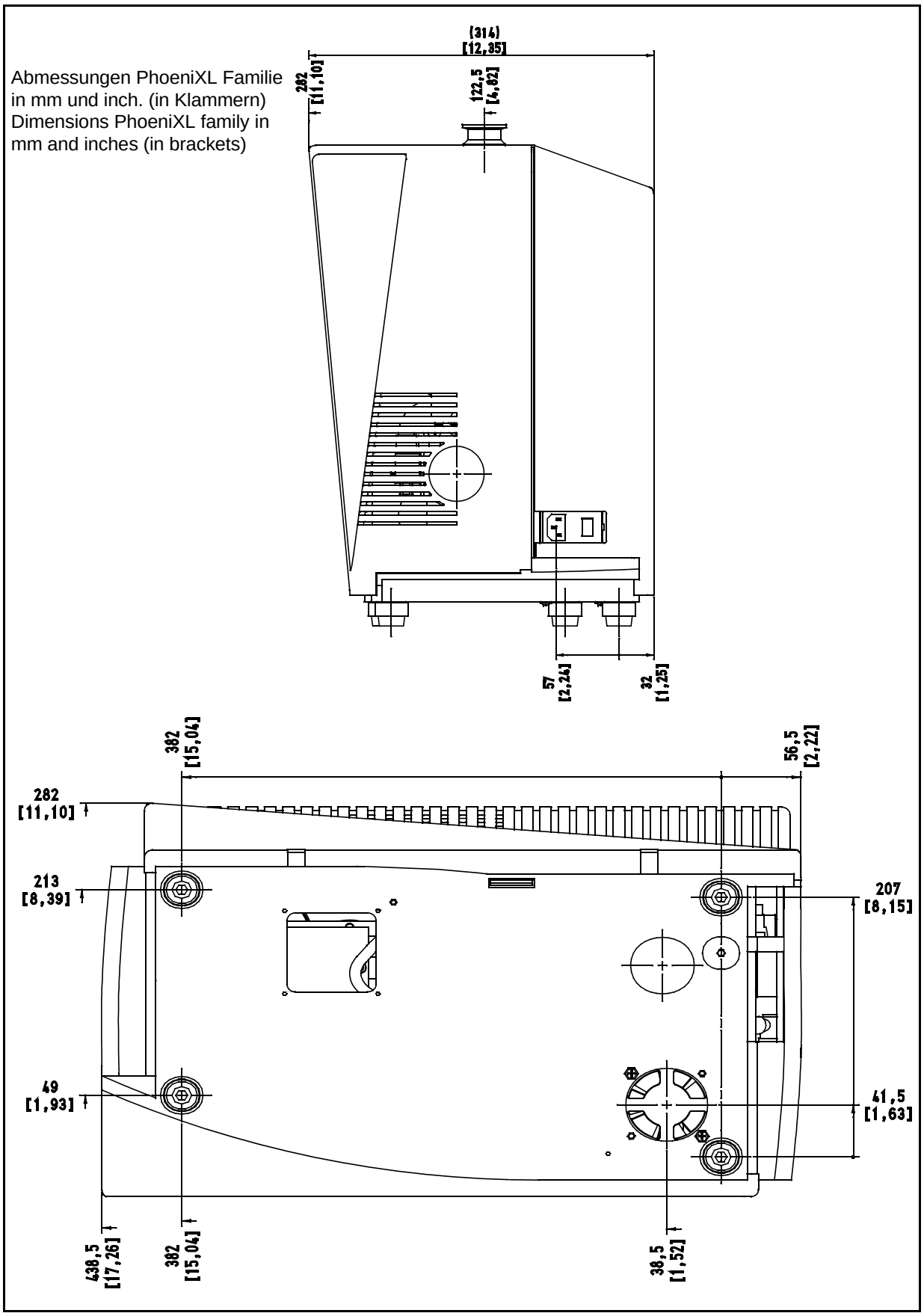


Fig. 2 Dimensions Side View

Abmessungen PhoeniXL 300 Modul in mm und inch (in Klammern).

Dimensions PhoeniXL 300 Modul in mm and inches (in brackets).

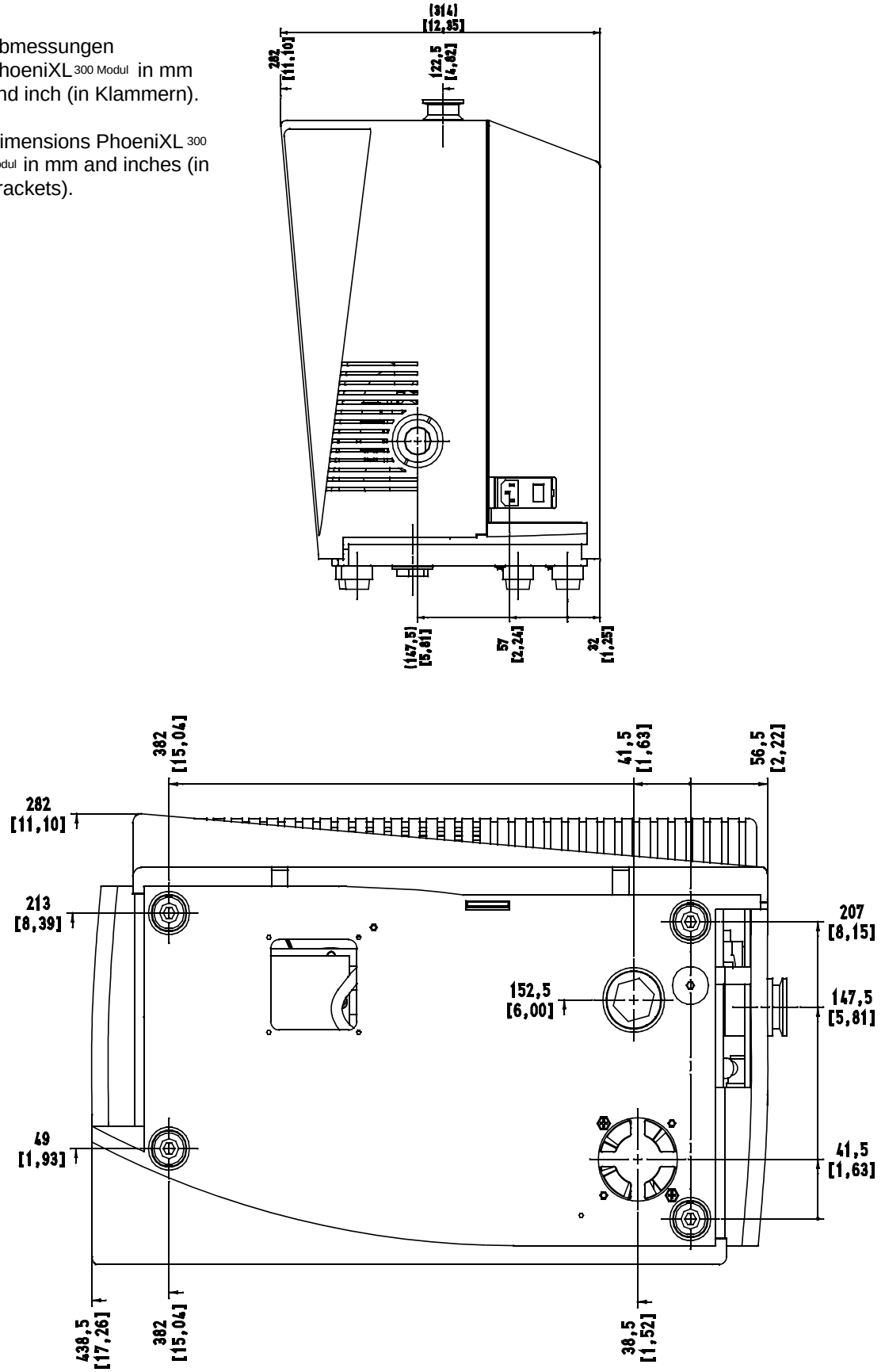


Fig. 3 Dimensions PhoeniXL Modul

EC-Conformance Declaration

We, the Leybold Vacuum GmbH, declare herewith that the products listed below, in the embodiment which we
have placed on the market, comply with the applicable EC guidelines.
This declaration becomes invalid if modifications are made to the product without consultation with us.
Maintaining the EMC guideline assumes an EMC adapted installation of component within the plant or machine.
Test were run using a typical construction in a test assembly that conforms with the standards.

Designation of the products:	Helium-Leakdetector
Model:	PhoeniXL^{300}; PhoeniXL$^{300\ Dry}$; PhoeniXL$^{300\ Modul}$
Part No.	250000; 250001; 250002; 251000; 251001

The products comply to the following guidelines:

- EC Low-Voltage Equipment Guidelines 73/23/EWG and 93/68/EG
- EC Directive on Electromagnetic Compatibility 89/336/EWG, 91/263/EWG, 92/31/EWG and 93/68/EWG

Related, harmonized standards:

- EN 61010 - 1 2001
- EN 61000-6-4 2001
- EN 61000-6-3 2001
- EN 61000-6-2 2001

Cologne, Nov. 08, 2004

Marcus Eisenhuth
Vice-President
Head of Product Development

Cologne, Nov. 08, 2004

Helmut Krebs

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Fig. 4 Declaration of Conformance