

# PHOENIX L300i

## Leak detector

Operating Manual 10218\_002\_A4

Part numbers

250000V01

250001V01

250002V01

251000V01

251001V01

251100V01

251101V01



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# Safety Information

## Important Safety Information

Indicates procedures that must be strictly observed to prevent hazards to persons.

Indicates procedures that must be strictly observed to prevent damage to, or destruction of the product.

Emphasizes additional application information and other useful information provided within these Operating Instructions.

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### Warning

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### Caution

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### Note

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The Oerlikon Leybold Vacuum PHOENIX L300i leak detector has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The PHOENIX L300i must only be operated in the proper condition and under the conditions described in the Operating Instructions. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

## Failure to observe the following precautions could result in serious personal injury!

### Electrical hazards

During all maintenance and connection work, make sure that the mains cable have been reliable disconnected and do not carry a mains voltage. The leak detector must only be used in with the hoods closed. The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1.

Avoid exposing any part of the human body to the vacuum. Only handle the leak detector when the pump is vented.

After a mains power failure the leak detector can run up automatically once more.

Before changing oil or fuses, make sure that the mains cable have been disconnected.

The leak detector is not suited for operation in explosion hazard areas.

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### Warning

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# Safety Information



During operation the pump can become so hot that there is a danger of burns (>70°C, 158°F). Provide protection against contact with the hot components.

Contaminated parts can be detrimental to health and environment. Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

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## Caution

### **Failure to observe the following precautions could result in damage to the pump!**

Unauthorized opening or modifications of the mechanical or electrical components of the leak detector void the warranty.

The leak detector must only be opened by such persons who have been authorised by Oerlikon Leybold Vacuum to do so.

The leak detector can be damaged when using the wrong voltage. The voltage must be in the range 230V (+/- 5%), 115V (+/- 5%) e.g. 100V (+/- 5%) depending on the leak detector version. Make sure that the mains voltage rating on the PHOENIX L300i coincides with the locally available mains voltage.

When the PHOENIX L300i is running in closed rooms the exhaust has to be put out of doors so that the oil vapor can not be breathed in.

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

The PHOENIX L300i is designed for indoor use only.

Operate the PHOENIX L300i only in the permitted temperature range between +10°C and +40°C.

Only Leybonol-LVO-310 (cat. no. L31001) must be used in the TIVAC D2,5E.

Pumping condensable gases and steams: When pumping test sample water vapour that is inside the test object can attain to the forepump. 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 condenses when the water vapor rises over the acceptable value. So the attribute of the oil changes and danger of corrosion occurs for the pump.

While using the leak detector with condensable gases and steams the oil of the forepump 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 blar and milky at operating state temperature.

# Safety Information

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

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 opened gas ballast valve 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 height of the oil of the pump has to be controlled regularly.

The normal intervals of changing the oil from the producer have to be taken care of. See instructions of the rotary vane pump.

The references to diagrams, e.g. (1/2) consist of the Fig. no. and the item No. in that order.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Retain the Operating instructions for further use.

Symbols of vacuum technology

Given in the following are some important symbols which are used in this Operating Instructions.



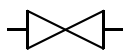
Vacuum pump in general



Turbo molecular pump



Measuring instrument



Valve

## Definition of Terms

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

### Auto ranging

The auto ranging feature of the PHOENIX L300i 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 fore vacuum 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.

# Safety Information

<b>Mass alignment</b>	<p>Mass alignment</p> <p>This function automatically aligns the mass spectrometer so that a maximum leak rate is displayed. The control processor changes the voltage which accelerates 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.</p>
<b>Auto Zero</b>	<p>Determination and automatic adaptation of the internal background.</p> <p>Through this function, the internal zero level of the instrument is determined which is then subtracted from the current leak rate signal. This function is run during the calibration process or when operating the start push button, provided the PHOENIX L300i has been running previously for at least 20 seconds in the standby or vent mode.</p>
<b>GROSS</b>	<p>GROSS is a measurement mode which allows high inlet pressure (15 to 0,2 mbar). The smallest detectable leak rate is <math>1 \cdot 10^{-7}</math> mbar l / s.</p>
<b>FINE</b>	<p>FINE is a measurement mode with inlet pressure <math>&lt; 0.2</math> mbar. The minimum detectable leak rate is <math>\leq 5 \cdot 10^{-12}</math> mbar l / s</p>
<b>PRECISION</b>	<p>Precision is a measurement mode for the PHOENIX L300i DRY only from an inlet pressure <math>&lt; 0,1</math> mbar. In this mode the PHOENIX L300i DRY has the highest sensitivity, the minimum detectable leak rate is <math>\leq 3 \cdot 10^{-11}</math> mbar l / s.</p>
<b>Fore-Vacuum Pressure</b>	<p>Pressure in the fore vacuum between turbo pump and rotary vane pump.</p>
<b>Internal helium background</b>	<p>The existing helium partial pressure in the measurement system. The level of the internal helium background is measured in the standby mode and subtracted from the measured signal.</p>
<b>Minimum detectable leak rate</b>	<p>The smallest leak rate the PHOENIX L300i is able to detect (<math>\leq 5 \cdot 10^{-12}</math> mbar l / s) in vacuum mode.</p>
<b>Menu</b>	<p>The menu allows the user to program the PHOENIX L300i according to his requirements. The menu has a tree architecture.</p>
<b>Measurement mode</b>	<p>The PHOENIX L300i measures the leak rate of the test sample.</p>
<b>Default</b>	<p>Status of the PHOENIX L300i when supplied by the factory.</p>



## 1 Description

The PHOENIX L300i 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 PHOENIX L300i 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).



Fig. 1 View of the PHOENIX L300i

1 inlet flange

2 control panel

### 1.1 Design and Function

The PHOENIX L300i 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 PHOENIX L300i. In addition the vacuum can be generated by pumps which are set up in parallel to the PHOENIX L300i.

The PHOENIX L300i MODUL needs a fore vacuum 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 PHOENIX L300i MODUL (Fig. 7).

# Description

Another operating mode of the PHOENIX L300i is the Sniffer mode which can only be used when a sniffer line (See Chapter 1.1.6) is hooked up.

## 1.1.1 Vacuum Diagram PHOENIX L300i

The vacuum diagram below shows the major components inside the PHOENIX L300i.

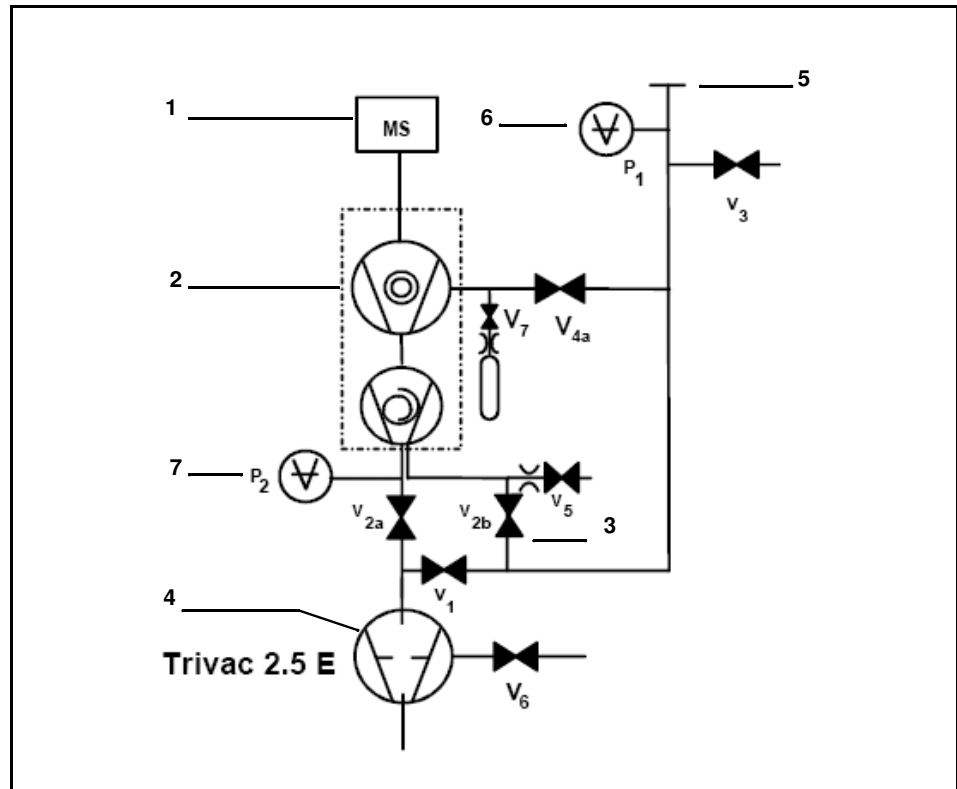


Fig. 2 Vacuum diagram PHOENIX L300i

Pos. Description

- 1 MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
- 2 Turbo molecular pump (TMP, provides high vacuum conditions in the MS)
- 3 Pirani gauge P2 (fore vacuum pressure)
- 4 Fore pressure pump (provides the fore vacuum pressure for the TMP and 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 an electri-

cal 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 turbo molecular 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.

## 1.1.2 Vacuum Diagram PHOENIX L300i DRY

The PHOENIX L300i DRY has a diaphragm pump as fore vacuum pump, making it suitable for applications where oil sealed systems can not be used. Furthermore the PHOENIX L300i DRY contains one more valve, the valve 4b. This valve opens step by step to regulate the inlet pressure into the turbo pump.

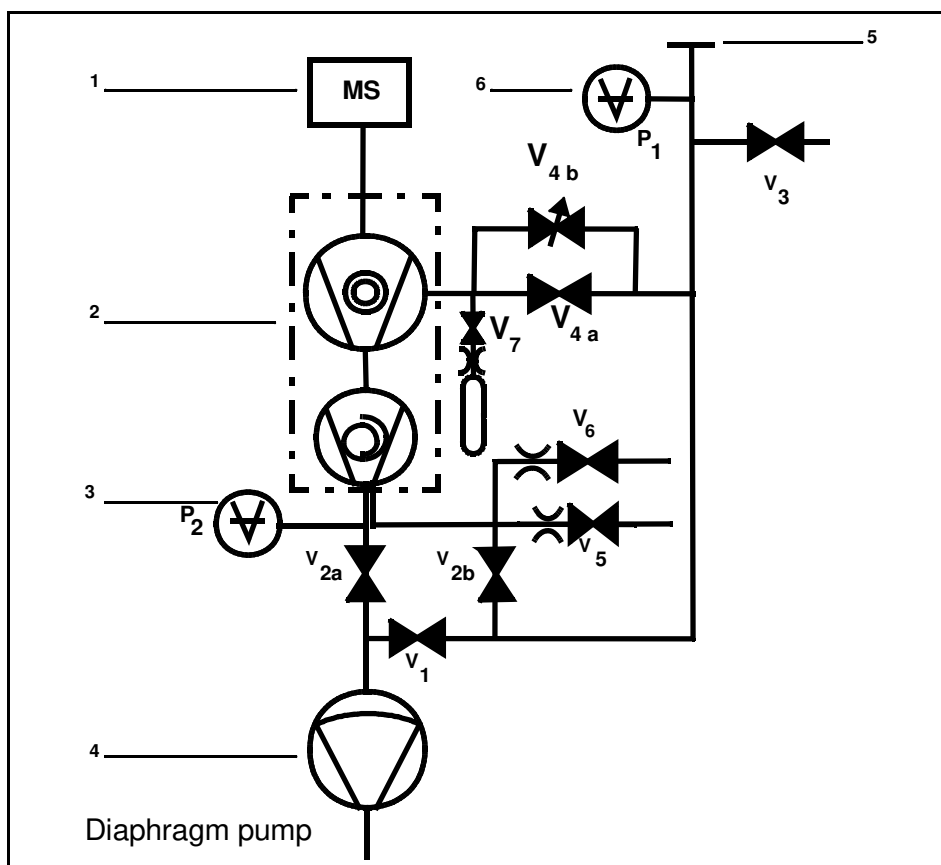


Fig. 3 Vacuum diagram PHOENIX L300i DRY

# Description

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Turbo molecular pump (TMP, provides high vacuum conditions in the MS)
3	Pirani gauge P2 (fore vacuum pressure)
4	Diaphragm pump (provides the fore vacuum pressure for the TMP and pumps down the parts under test)
5	Inlet Port
6	Pirani gauge P1 (inlet pressure)
V1 ... V7: Electromagnetic Valves to control the gas flows	

## 1.1.3 Vacuum Diagram PHOENIX L300i MODUL

The PHOENIX L300i 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<sup>3</sup>/h. This pump has to be connected to the DN25 KF at the side or under the bottom of the PHOENIX L300i MODUL.

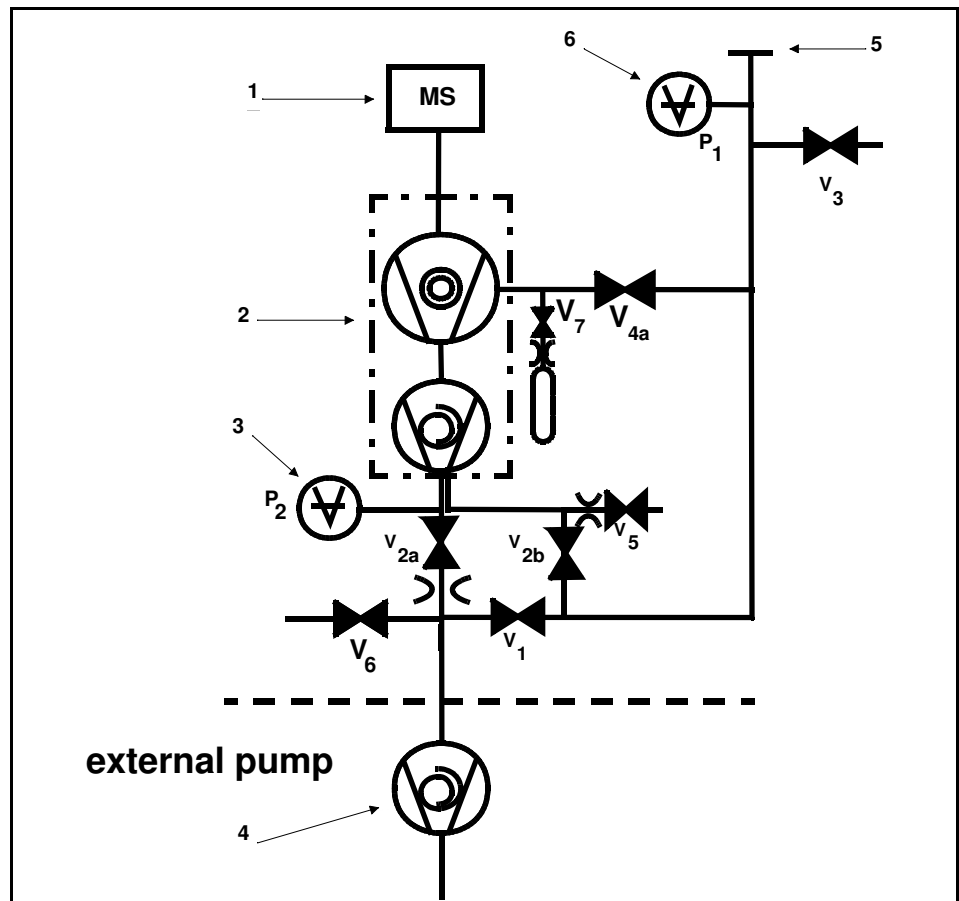


Fig. 4 Vacuum diagram PHOENIX L300i MODUL

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Turbo molecular pump (TMP, provides high vacuum conditions in the MS)
3	Pirani gauge P2 (fore vacuum pressure)
4	Fore pressure pump (provides the fore vacuum pressure for the TMP and pumps down the parts under test)
5	Inlet Port
6	Pirani gauge P1 (inlet pressure)
V1 ... V7: Electromagnetic Valves to control the gas flows	

## 1.1.4 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 PHOENIX L300i.

The test sample is evacuated - START button (Fig 16./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 opened 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 turbo molecular 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  $p_1$  has dropped  $<15$  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 turbo molecular pump into the mass spectrometer where it is detected. This measurement mode is called GROSS. In this mode, leak rates 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  $p_1 < 0.2$  mbar, the PHOENIX L300i will switch to the FINE mode, i.e. valve V1 and V2b closes and valve V4a opens so that the gas flow enters the turbo molecular pump at the side. This offers two advantages:

- A part of the high pumping speed of the turbo molecular pump remains available for further evacuation of the test sample. The response time is inversely proportional to pumping speed.).
- The advantages offered by the counter flow principle can still be utilized

In the FINE mode the full sensitivity of the PHOENIX L300i is reached.

Because of the higher base pressure of the diaphragm pump the switching from GROSS to FINE mode of the PHOENIX L300i DRY is done by the valve V4b. When the pressure drops below 3,5 mbar the valves V1 and V2b will be closed and V4b

# Description

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 PHOENIX L300i 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 except valve V2a are closed.

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

## 1.1.5 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 (PHOENIX L300i and PHOENIX L300i MODUL:

- faster response time
- 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 PHOENIX L300i dry and PHOENIX L300i MODUL also. However, in such a case the PHOENIX L300i will not be able to make measurements already at an inlet pressure of 1000 mbar.

## 1.1.6 Sniffer Mode

The PHOENIX L300i 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 (Fig. 1/1) and the sniffer mode is selected through menu mode. After pressing START, the inlet valve V1 (Fig. 2) opens. The sniffer lines have been designed in such a way that the PHOENIX L300i is operated in the FINE mode. If the fore vacuum 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.

## 1.2 Supplied Equipment

The PHOENIX L300i will be shipped in a special cardboard packed separately in a plastic foil as protection against dust.

Supplied equipment includes:

- Leak Detector PHOENIX L300i
- Set of fuses
- Power cord
- Folder with documents (Operating instructions, Spare part list)
- 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

## 1.3 Technical Data

### 1.3.1 Technical Data PHOENIX L300i

#### Physical data

#### Physical data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
- in vacuum mode	$<5 \cdot 10^{-12}$ mbar l / s
- in sniffer mode	$<1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
- in vacuum mode	$<1 \cdot 10^{-8}$ 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/Yttrium-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:	
PHOENIX L300i 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	

# Description

## **Electrical data**    Electrical data

Power supply	230 V, +/- 5%, 50/60 Hz 115 V, +/- 5%, 60 Hz 100 V, +/- 5%, 50/60 Hz
Power consumption	420 VA
Type of protection	IP40

## **Other data**    Other data

Valves	solenoid
Dimensions (L x W x 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

## **Ambient conditions**    Ambient conditions

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



## 1.3.2 Technical Data PHOENIX L300i DRY

### Physical data

### Physical data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
- in vacuum mode	$< 3 \cdot 10^{-11}$ mbar l / s
- in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
- in vacuum mode	$< 1 \cdot 10^{-8}$ 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/Yttrium-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:

PHOENIX L300i 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

# Description

## **Electrical data**    Electrical data

Power supply	230 V, 50 Hz 115 V, 60 Hz 100 V, 50/60 Hz
Power consumption	350 VA
Type of protection	IP40

## **Other data**    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

## **Ambient conditions**    Ambient conditions

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

## 1.3.3 Technical Data PHOENIX L300i MDOUL

### Physical data

Physical data

Max. inlet pressure	15 mbar
Minimum detectable Helium leak rates	
in vacuum mode	
- with Scroll pump	$< 8 \cdot 10^{-12}$ mbar l / s
- with oil sealed pump	$< 5 \cdot 10^{-12}$ mbar l / s
in sniffer mode	$< 1 \cdot 10^{-7}$ mbar l / s
Minimum detectable Hydrogen leak rates	
- in vacuum mode	$< 1 \cdot 10^{-8}$ 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/Yttrium-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:

PHOENIX L300i 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

# Description

<b>Electrical data</b>	Electrical data	
	Power supply	100 V ... 230 V, 50/60 Hz
	Power consumption	350 VA
	Type of protection	IP40
	Power cords (EU, USA, UK)	2.5 m
	Other data	
<b>Other data</b>	Valves	solenoid
	Dimensions (L x W x 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
	Ambient conditions	
	For use within buildings	
<b>Ambient conditions</b>	Permissible ambient temperature (during operation)	+10 °C ... +40 °C
	Permissible storage temperature	-10 °C ... +60 °C
	Maximum relative humidity	80% (up to 31°C) lin- ear decreasing to 50% at 40°C
	Maximum permissible height above sea level (during operation)	2000 m

## 1.3.4 Dimensional Drawings

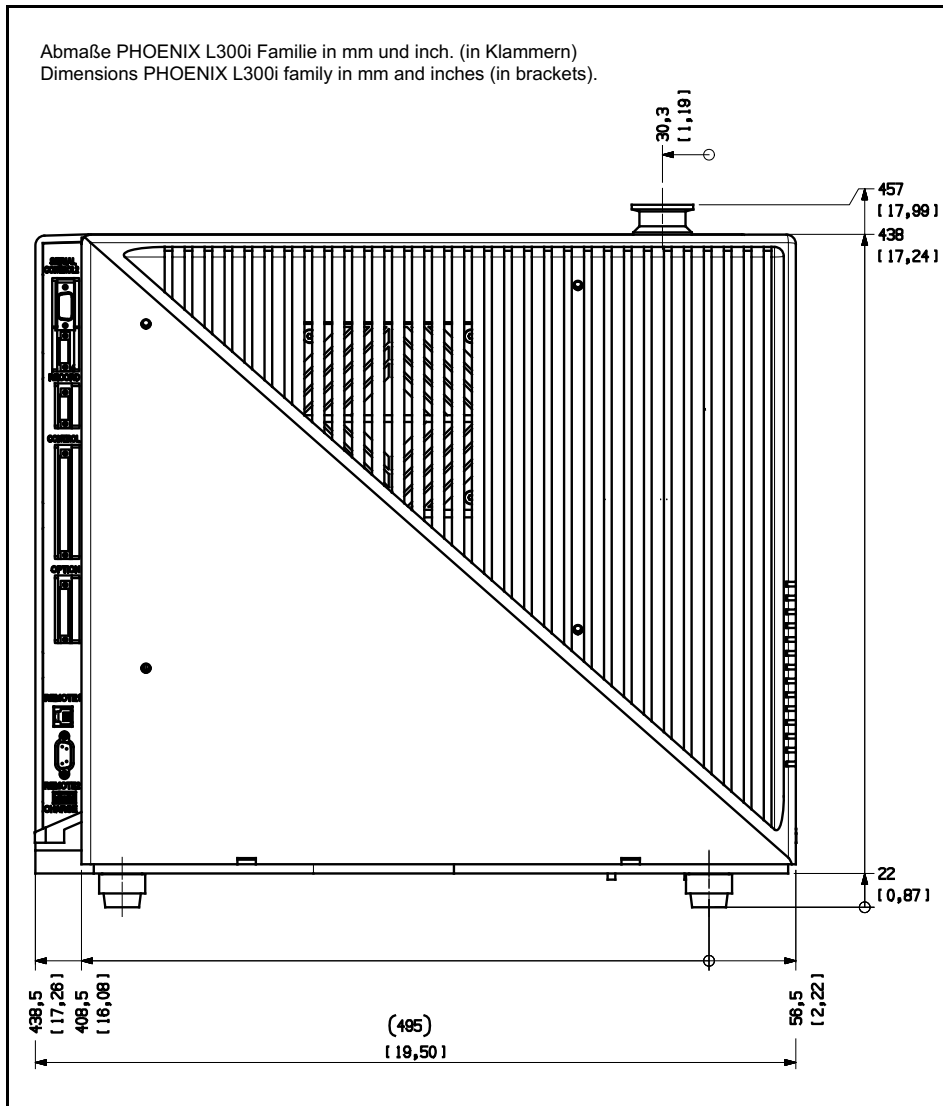


Fig. 5 Dimensions PHOENIX L300i

# Description

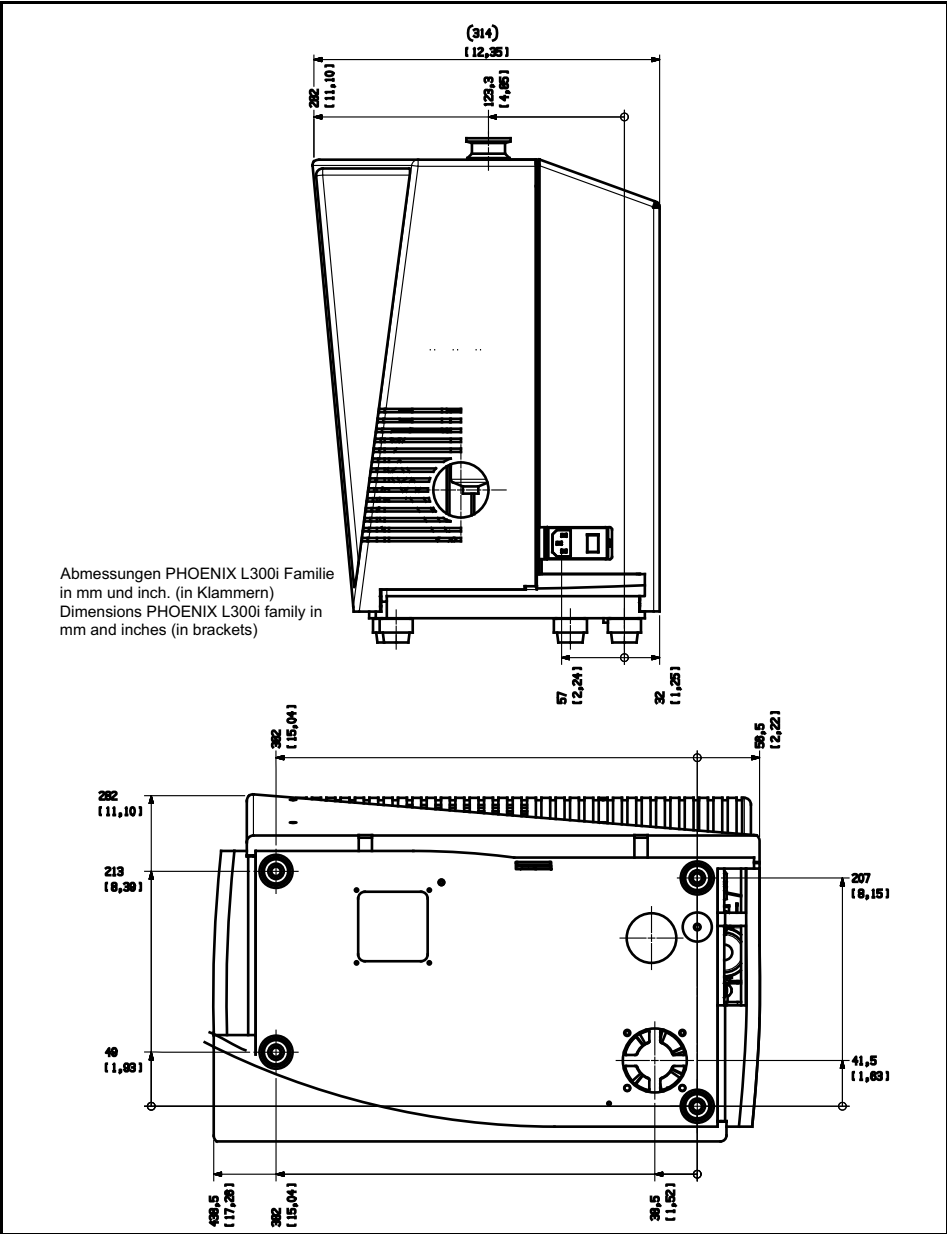


Fig. 6 Dimensions PHOENIX L300i side view

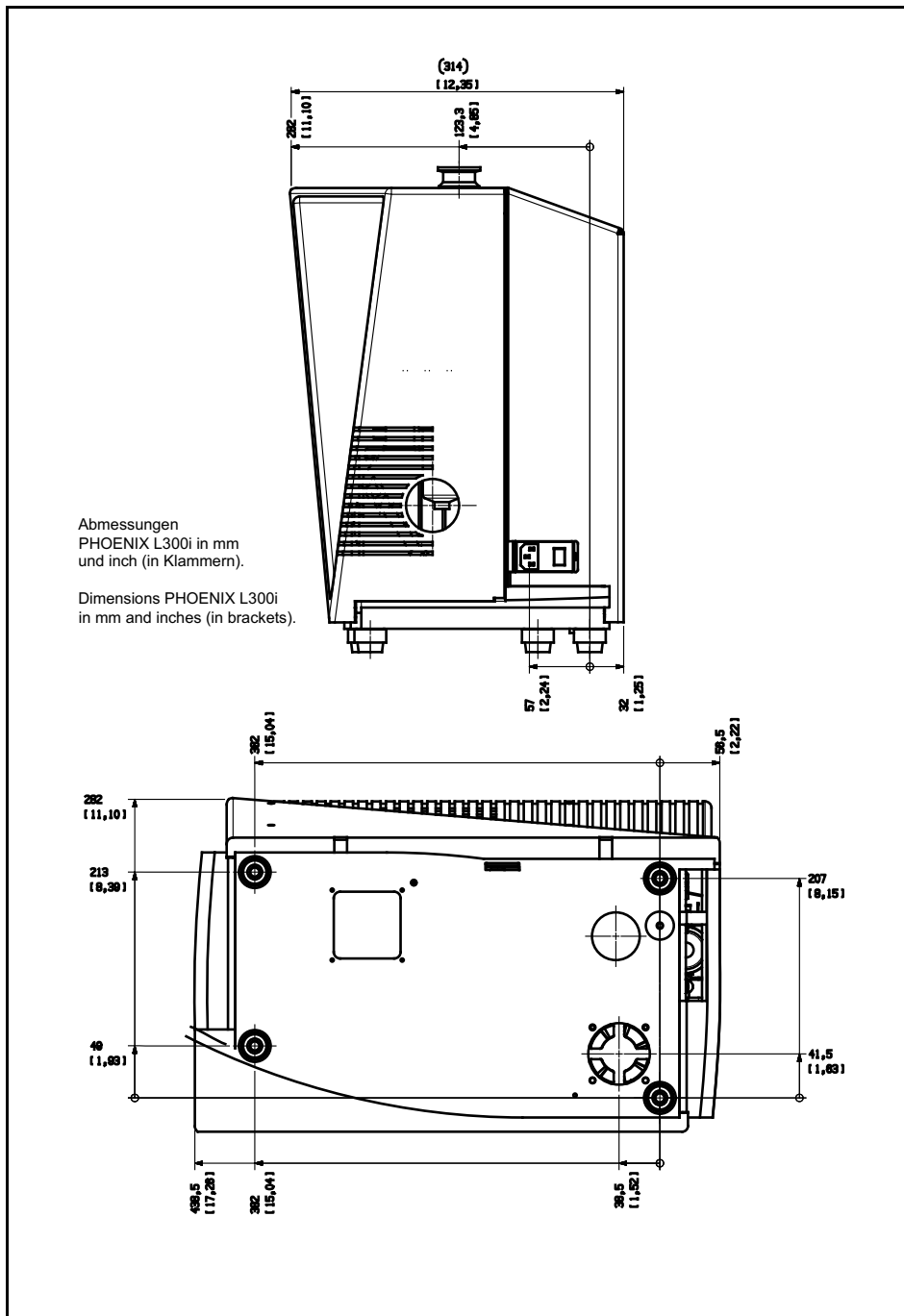


Fig. 7 Dimensions PHOENIX L300i MODUL

# Description

## 1.4 Ordering Information

PHOENIX L300i EU-Version	250000V01
PHOENIX L300i DRY EU-Version	250001V01
PHOENIX L300i MODUL	250002V01
PHOENIX L300i US-Version	251000V01
PHOENIX L300i DRY US-Version	251001V01
PHOENIX L300i JP-Version	251100V01
PHOENIX L300i JP-Version	251101V01

## 1.5 Accessories

The following parts can be ordered additionally:

Sniffer line SL300	252003
Leak Ware (Software for data acquisition)	14090
Helium Sniffer QUICK-TEST Qt 100	15594
Remote control set RC310C consisting of:	252013V01
- Remote control	
- cable 4 m	
- mounting parts	
Extension cable for remote control, 10m	14022
Remote control set RC310WL wireless consisting of:	252014V01
- Remote control	
- Radio transmitter	
- mounting parts	
Radio transmitter for remote control	252015V01
Spray gun with hose	16555
Set of connection plugs	20099024
Partial flow system (PHOENIX L300i and PHOENIX L300i MODUL)	14020
Adapter USB/RS232	800110V0103
iPad inclusive Software-APP & Protection Case (IP67) PHOENIX L300i	252005V01
WLAN Module iPad	252006V01
iPad holder PHOENIX L300i	252007V01
BARCODE Scanner iPad Phoenix L300i	252008V01
iPad table stand	252009V01
iPad theft protection	252010V01
iPad communication cable	252011V01



## Sniffer line SL300

## Sniffer line SL300

By use of the sniffer line the PHOENIX L300i 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 PHOENIX L300i (Fig. 1/1) with the small flange. The electrical plug of the sniffer line is to be connected to the input „Options“ (Fig. 9/9) of the PHOENIX L300i.

### Function:

The green LED is on when

- the PHOENIX L300i is ready for use and
- the selected trigger level is not exceeded

The red LED is on when

- the PHOENIX L300i is not ready for use or
- the selected trigger level is exceeded.

The push button 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.

### 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

# Description

## Remote control

## Remote Control RC310WL Wireless and RC310C Wired



Fig. 8 Remote Control RC310WL wireless

For further information of the remote control RC310WL and RC310C see instruction manual with the document number 300306406\_002\_A1.

## Partial flow system

## Partial Flow System (PHOENIX L300i and PHOENIX L300i)

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 time
- 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 PHOENIX L300i. Connect the control cable to the Option port and the vacuum hose to the auxiliary pump. The PHOENIX L300i has to be configured as described in chapter.

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

### 1.6 Default Settings

The following parameters are set like shown when in the menu of the PHOENIX L300i under Settings > Parameters, Load / Save is chosen.

Scale	linear
Display range:	4 decades
Time axis:	32 seconds
LCD inverted	off
Background in standby mode:	off

# Description

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 (PHOENIX L300i DRY and PHOENIX L300i 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 (PHOENIX L300i only)	on
Contamination protection	Off
Switch-off limit for contamination protection: (Limits: 1E-6 mbar*l/s ... 1E+3 mbar*l/s)	1E-3 mbar*l/s

# Installation

## 2 Installation

### 2.1 Placement

Unpack the PHOENIX L300i 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 PHOENIX L300i is complete (see Chapter 1.2) and carefully examine the PHOENIX L300i 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.

### 2.2 Conforming Utilisation

The PHOENIX L300i 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 PHOENIX L300i 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).

The PHOENIX L300i is to be used for leak detection only. It must not be used as a pumping system (esp. pumping aggressive or humid gases.)

The leak detector is not suitable for

- pumping liquids or gases containing dust or particles
- pumping corrosive or reactive gases

### 2.3 Ambient Conditions

#### Ambient temperatures

The permissible ambient temperature is between +10°C (50°F) and +40°C (104°F).

The PHOENIX L300i must not be operated in explosive gas atmospheres.

Make sure to avoid dripping water.

Ensure a sufficient air cooling.

### 2.4 Electrical Connections

#### 2.4.1 Mains Power

Generally the local regulations for electrical connections must be observed.

Before connecting the PHOENIX L300i to the mains you must make sure that the mains voltage rating of the PHOENIX L300i 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).

---

#### Warning



# Installation

Only 3-core mains cables having a protection ground conductor must be used. Operation of the PHOENIX L300i where the ground conductor has been left unconnected is not permissible. The PHOENIX L300i can be damaged when using the wrong voltage. The voltage must be in the range 230V (+/- 5%), 115V (+/- 5%) or 100V (+/- 5%) depending on the version.

The mains voltage rating for the PHOENIX L300i can be read off from the name plate beneath the mains socket Fig. 9/4 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. 9/4 is available for this purpose at the side of the instrument.

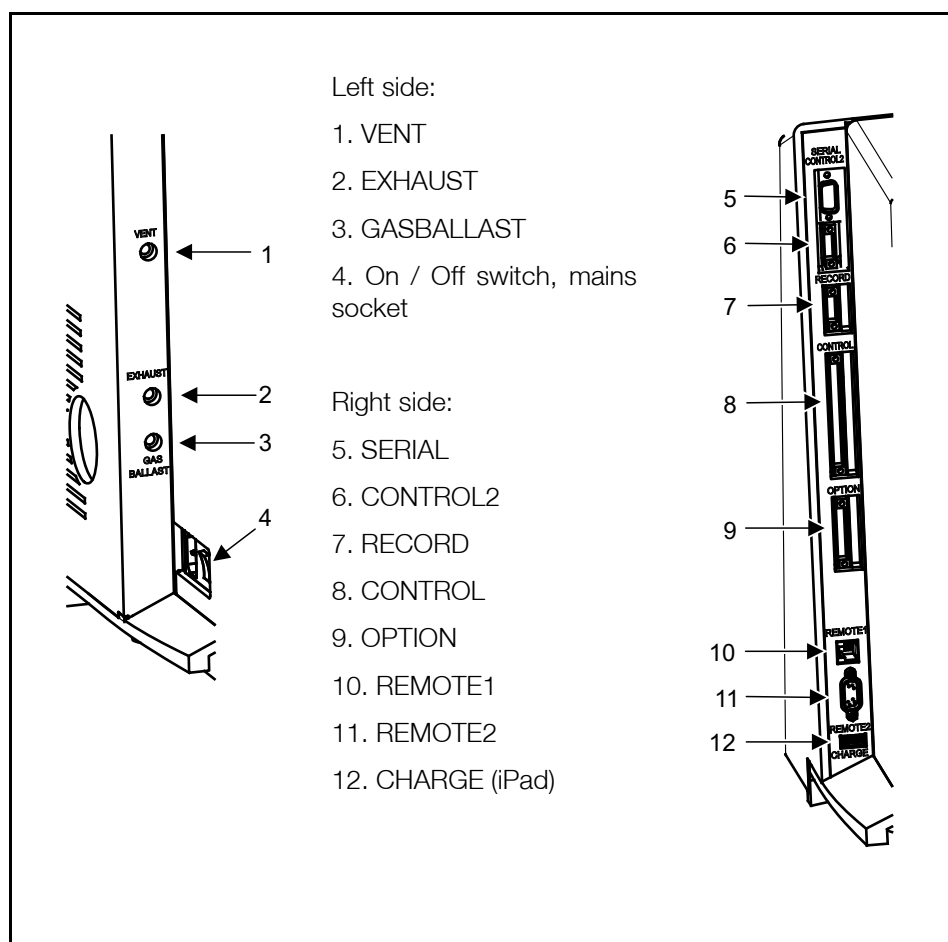


Fig. 9 Side views of the PHOENIX L300i

# Installation

## 2.4.2 Connection for the Controller Signal and Accessories

### OPTION

Option (Accessories)

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

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 PHOENIX L300i for an external venting valve
4, 5, 6, 7, 8	These pins are used in connection with accessories.

### Digital out (CONTROL)

Digital Out (CONTROL)

The following relay outputs Fig. 9/8 are available for further signal processing. The maximum rating for the relay contacts is 60V AC/1A.

### Caution

All pins of digital I/O, digital out and recorder must not be connected with voltages higher than 60V DC/25V AC (to grounding equipment conductor) or reach this threshold.

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 3.5.

## Digital In (Control 2)

These inputs can be used to control the PHOENIX L300i with a programmable logic control (PLC).

The contacts are numbered from bottom to top.

Maximum input voltage 35V.

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

These inputs Fig. 9/6 are working only, if the correct location of control is chosen. See chapter 3.5.

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.

## Recorder/RECORD

The recorder output Fig. 9/7 may be used to chart the leak rate, the inlet pressure and the fore vacuum 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 kW. 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 PHOENIX L300i 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 fore vacuum pressure P2
2	GND
3	GND
4	Analog 2, leak rate, inlet pressure P1 or fore vacuum pressure P2

For further information see chapter 3.5.

## Digital In (CONTROL2)

### Caution

## Recorder/RECORD

# Installation

## SERIAL/RS 232

### SERIAL/RS232

This RS232 interface Fig. 9/5 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 socket. For more information refer to chapter 3.5 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

## Remote control REMOTE1

### Remote Control (REMOTE1)

The remote control interface Fig. 9/10 is a serial interface to control the PHOENIX L300i 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. If the remote control is connected via a cable, wireless communication over REMOTE2 is excluded.

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

## Remote control REMOTE2

### REMOTE2

Through this interface the PHOENIX L300i is controlled wirelessly via Bluetooth or WLAN. The Bluetooth transmitter connects to the remote control RC310 WL. The WLAN module provides the connection to Apple I-Pad or other handheld devices. Is the remote control RC310 WL connected via a cable to REMOTE1 REMOTE2 can not be used. The Bluetooth transmitter and the WLAN module are not included PHOENIX L300i delivery.



Pin	Assignment
1	free
2	RxD
3	TxD
4	connected to pins 6 and 7
5	GND
6	connected to pins 4 and 7
7	connected to pins 4 and 6
8	free
9	7.5V

## CHARGE

The USB interface can be charged an Apple iPad only. The USB port does not allow data exchange.

## CHARGE

### 2.4.3 Vacuum Connections

#### Inlet Port

The inlet port is located on the top of the PHOENIX L300i Fig. 1/1. 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 3.7).

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

#### Inlet port

#### Exhaust

The exhaust Fig. 9/2 flange is located on the side of the PHOENIX L300i.

There is a filter mounted in the exhaust that absorbs the oil steams occur i ng during the use of the rotary vane pump. The exhaust filter has to be cleaned when doing the maintenance (see Chapter.4.4.6).

When the PHOENIX L300i 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 PHOENIX L300i and lead off.



## Exhaust

#### 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. 9/1. The pressure in the venting line must nor exceed 1050 mbar.

## Vent

#### Gas ballast connection

For the mode gas ballast it is recommended to use helium-free gases at atmo-

## Gas ballast connection

# Installation

spheric 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. 9/3. The pressure of these gas line must not exceed 1050 mbar.

The connectors 1,2 and 3 in Fig. 9 are quick connectors for hose diameters of 8/6 mm.

## Connection of external pumps

Connection of an external pump (only PHOENIX L300i MODUL)

The PHOENIX L300i MODUL offers two possibilities to connect the external fore vacuum pump to the DN 25 KF flange. One on the side of the PHOENIX L300i or one in the bottom (measurements see Fig. 5 - Fig. 7). 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 4.4.1.
2. Loose the flange with the connection piece on the side of the PHOENIX L300i.
3. Disconnect the blind flange on the bottom, therefore lay the PHOENIX L300i carefully on the electronic hood.
4. Screw in the connection piece into the flange in the bottom.
5. Connect the hose for the fore vacuum pump.
6. Connect the blind flange to the sidewise flange.
7. Put on the mechanical hood.

## 3 Operation

### 3.1 Media Compatibility/Purge Gas

#### Purge gas/Gas ballast

The PHOENIX L300i is a leak detector for helium and hydrogen. Only air and clean gases must be used with the PHOENIX L300i.

The leak detector is not suitable for

- pumping liquids or gases containing dust
- pumping reactive or corrosive gases

As purge gas all gases can be used that

- does not contain helium
- are dry, clean and dust free
- generate no corrosion.

For venting or gas ballast a helium free gas at atmospheric pressure should be used. Ambient air can be contaminated with helium due to spraying or charging, so it is recommended to connect a hose to the vent- and fore vacuum port. The pressure in this hose must not exceed 1050 mbar.

### 3.2 Start-Up

The PHOENIX L300i is switched on by pushing the mains switch (Please refer to Chapter 2.4.1). After about 2 minutes the run-up procedure is finished; the unit is in standby-mode and ready to measure.

When using the PHOENIX L300i MODUL an additional fore vacuum pump (dry or wet version) has to be connected to the fore vacuum connection (DN25 KF) on the side or the bottom.

Please connect the part to be tested to the inlet port and press START. The PHOENIX L300i 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 Chapter 3.2.5.

The displayed leak rate corresponds to the helium background concentration in the part under test. Since the PHOENIX L300i 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.

#### 3.2.1 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 3.6.1). In addition messages and maintenance instructions are displayed on the screen (Please refer to Chapter 5).

### 3.2.2 The Display in Run-Up Mode

In run-up mode the display shows:

Speed of the turbomolecular pump

Fore-vacuum 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 3.4.6. During run-up phase the menu button can be pushed to get to the selection menu.

### 3.2.3 The Display in Standby Mode

In standby mode the conditions are shown in the upper edge of the display (Fig. 12). Furthermore calibration (Please refer to Chapter 3.13) can also be started in standby mode and purging, too (Fig. 1/1)

### 3.2.4 Gas Ballast/Purge

In standby mode the gas ballast of the forepump can be switched on/off manually or via soft key 7. The gas ballast is for abolishing a too huge helium background. Additionally a condensation of water vapor 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 PHOENIX L300i MODUL. Every time the unit changes into standby mode the purge starts automatically for 20 seconds. During this time the scroll pump will be purged by the valve V6.

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.

### 3.2.5 The Display in Measurement Mode

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

- Numerically, combined with a bargraph 10. Fig. 10.
- As trend: numerically, combined with a diagram (leak rate versus time) Fig. 11.

In the lower right corner of the display (next to the Soft Key no. 8, Fig. 10 and Fig. 11) you will find a symbol that allows to switch between the display modes by pressing Soft Key no. 8. See chapter 3.2.9 and 3.2.10 for explanations of the different display modes.

Access to calibration (Soft Key no. 5, Fig. 10 and Fig. 11) and access to the speaker volume (Soft Keys no. 2 and no. 3, Fig. 10 and Fig. 11) is the same in all modes. Also the status icons in the upper line are in common in both display modes.

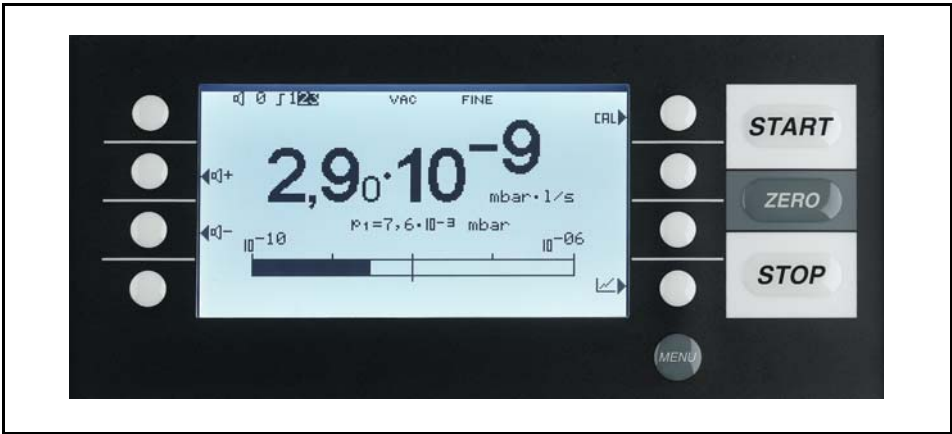


Fig. 10 Display: Measurement mode with bargraph

### 3.2.6 Call for Calibration

In all modes the soft key no.5 is used to get to the calibration routine. Refer to Chapter. 3.13for further information regarding calibration.


### 3.2.7 Speaker Volume

On the left hand side two loud speaker symbols are shown, combined with the signs + and - (Fig. 10 and Fig. 11). 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 3.8 Volume for information on loudness, alarms, and sound tracks.

### 3.2.8 Status Line in the Display

The status line at the top of the display (Fig. 10 and Fig. 11) informs about (reading from left to right):

Symbol of display	Meaning	Explanation
	Volume level	Please refer to Chapter 3.8 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 5
VAC	Working mode	VAC or SNIFF indicate which working mode was selected

# Operation

Symbol of display	Meaning	Explanation
FINE	Vacuum area	Depending on the inlet pressure the PHOENIX L300i may be in GROSS, PRECISION (PHOENIX L300i DRY only) or FINE mode, which is indicated here (Chapter 3.10.1)
ZERO	ZERO	Indicates if ZERO-function is active.

### 3.2.9 Measurement Mode with Bargraph

The display shows the leak rate in big digital figures, see Fig. 10. 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 3.8.4).

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 3.6.4). The programmed trigger levels (Please refer to Chapters 3.8.1 and 3.8.2) are indicated at the bar by short vertical lines: a straight line for trigger 1 and a dotted line for trigger 2.

### 3.2.10 Measurement Mode with Trend Information

In trend mode the leak rates are displayed over time Fig.11. 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 3.6.5). The intensity axis (y-axis) is defined the same way as the bargraph (Please refer to Chapter 3.6.4).

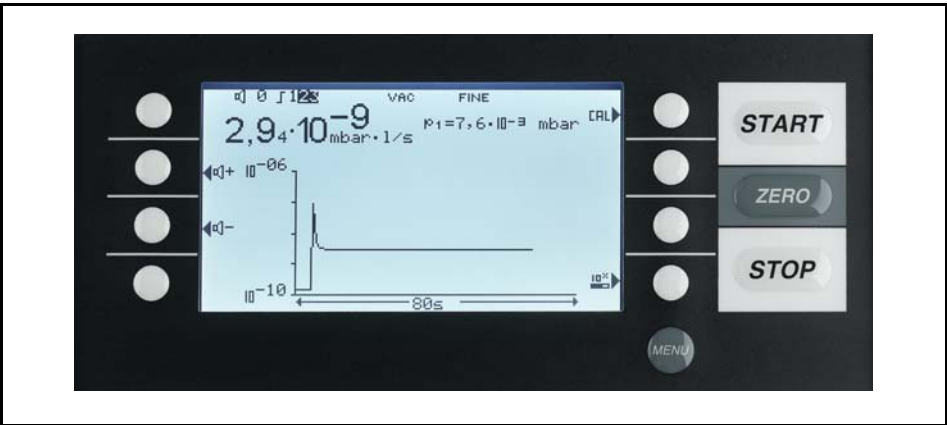


Fig. 11 Display: Measurement mode with bargraph

### First operation check 3.3 First Operation Check

The steps for an initial operation are described here. It is explained how to switch on the PHOENIX L300i, 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 PHOENIX L300i can be switched off by the mains switch at any time.

## Needed Equipment

The following parts will be needed:

- A blind flange 25 KF (if not assembled at the inlet port).
- A helium test leak with a DN 25 KF connection (optional).
- A fore vacuum pump connected to the DN25 KF flange on the side or under the bottom (dry or wet version) for use with the PHOENIX L300i MODUL

## Startup and Measure

1. Unpack the PHOENIX L300i and inspect it for any external damage (refer to Chapter 2.1).
2. Connect the instrument to the mains power (refer to Chapter 2.4). For the PHOENIX L300i MODUL connect the fore vacuum pump and switch it on.
3. Switch on the PHOENIX L300i by using the mains switch.

Don't switch the PHOENIX L300i 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. 12, the status information on the speed of the turbo pump, the fore vacuum 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 PHOENIX L300i is in standby mode now.(Fig. 12)

4. Check if the inlet port (Fig. 1/1) is blanked off. If not, please mount a blind flange with o-ring on the inlet port.
5. Press the START button. 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, the PHOENIX L300i will go to standby. If you press STOP a few seconds the inlet of the PHOENIX L300i will be vented.
7. To finish the startup procedure please proceed with step 21. For calibration proceed with step 8.

## Internal Calibration

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

Press Calibration (Soft Key no. 5 Fig. 12 /5) to get into the calibration menu.

Select internal (Soft Key no. 4, Fig. 12 /4) to choose the internal calibration.

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

9. Press the STOP button Fig. 12 /12 until the message STANDBY/VENTED appears on the display. The inlet is vented now.

## 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.

## Needed equipment

## Startup and measure

---

## Caution

## Internal calibration

## Verification with external test leak

# Operation

11. Press the START button Fig. 12 /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. 12 /12 to stop the measurement. The PHOENIX L300i goes into standby mode.
13. Press the STOP button Fig. 12 /12 again until the message STANDBY/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.

## Measure with a test object

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. 12 /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. 12 /12 to stop the measurement. The PHOENIX L300i goes into standby mode.
19. Press the STOP button Fig. 12 /12 again until the message STANDBY/Vented appears on the display. The inlet is vented now.
20. Remove the test object and put on a blind flange on the inlet port.

## Switch off

Switch off

21. Switch off the PHOENIX L300i if the unit is in STANDBY or VENTED mode by using the mains switch Fig. 9/4.

## 3.4 Control Panel

The Control panel Fig. 12 contains a liquid crystal display (LC Display), the START, STOP, ZERO and MENU buttons and eight soft Keys for the different menus and inputs selections.



Fig. 12 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		

## LC Display

The LC Display Fig. 12 /9 is the communication interface to the operator. It displays the leak rates, the status report of the PHOENIX L300i, messages, warnings and errors. With the soft keys no.1 to no. 8 various functions which are shown in the display can be selected

## LC-display

## START Button

Pushing the START Button Fig. 12/10 enables the PHOENIX L300i 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 activated. This indicator shows the maximum leak rate since „START“. By pressing the START-button again the „hold“ function will be started again.

## Start button

## STOP Button

Pushing the STOP Button Fig. 12/12 interrupts the measure procedure. If the button is pressed longer the inlet is vented according to the conditions defined in the menu Vent delay. See Chapter 3.10.1 to select the time parameters of the venting.

## Stop button

## ZERO Button

Pushing the ZERO button Fig. 12/11 enables the zero mode. (see also Chapter 3.10.2)

## Zero button

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. 13, t=1) the decreasing background is fitted to the course (Fig. 13, t=2) automatically. When the measurement signal declines below the saved background 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. Increasing of the signal are displayed clearly as a leak So it is possible to recognize leaks even when the signal is decreasing rapidly.

# Operation

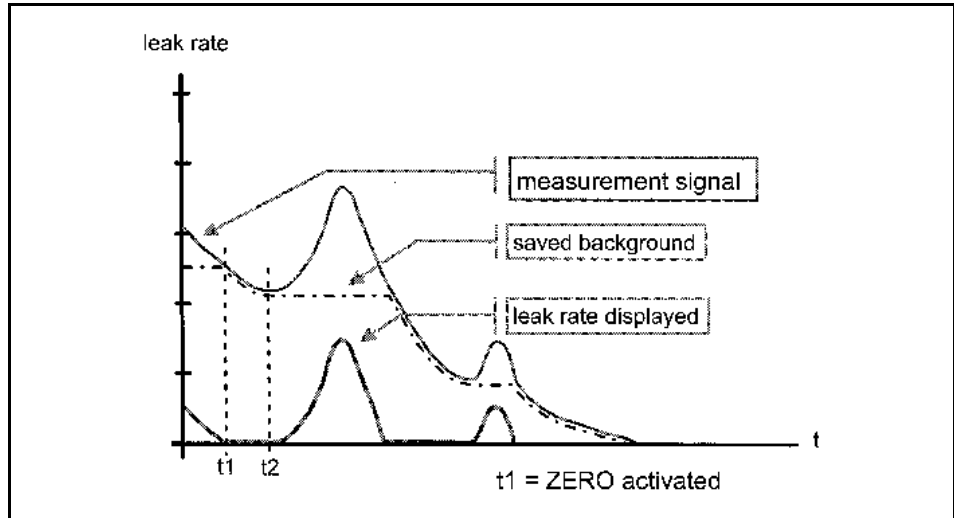


Fig. 13 Zero activation

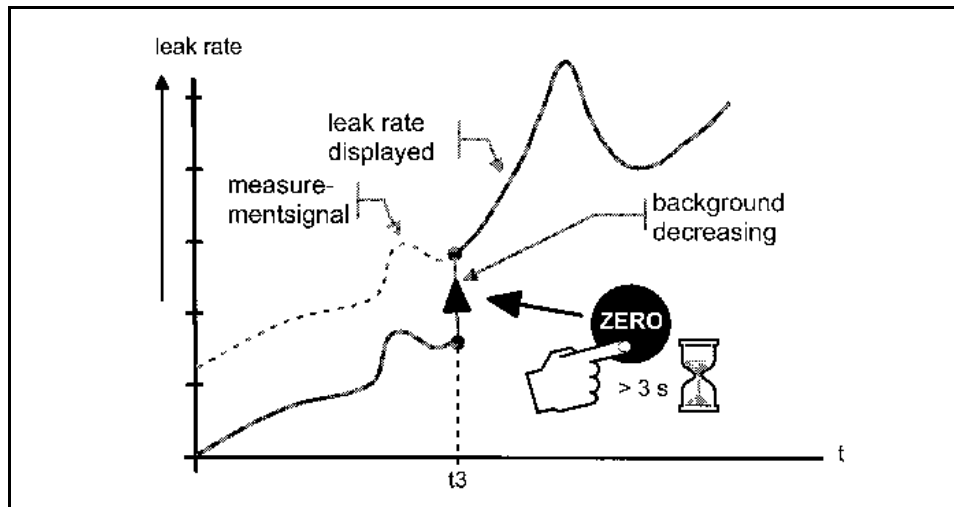


Fig. 14 Undo zero

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. 14).

## Menu button

### MENU Button

When pressing the MENU button (Fig. 12/13) 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.

## Soft Keys

The function of the eight Soft Keys Fig.12/1...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. 12/1 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. 12/8 is OK.

The selected settings or edited values will be stored and the previous menu page will be displayed again.

## 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  $\rightarrow$  (Soft Key no. 8) and  $\leftarrow$  (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 (softkey no. 8). To correct a wrong entry press Cancel (softkey 1) or soft key 4  $\leftarrow$  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. 16) . Please consider that the first digit is displayed inverted. If not please change the digit with  $\rightarrow$  (softkey no. 8) or  $\leftarrow$  (softkey no. 4). With the soft key no. 4 (Fig. 12) the chosen value can be selected.

## Softkeys

## Special functions

## Numerical entries

## Example change trigger

# Operation

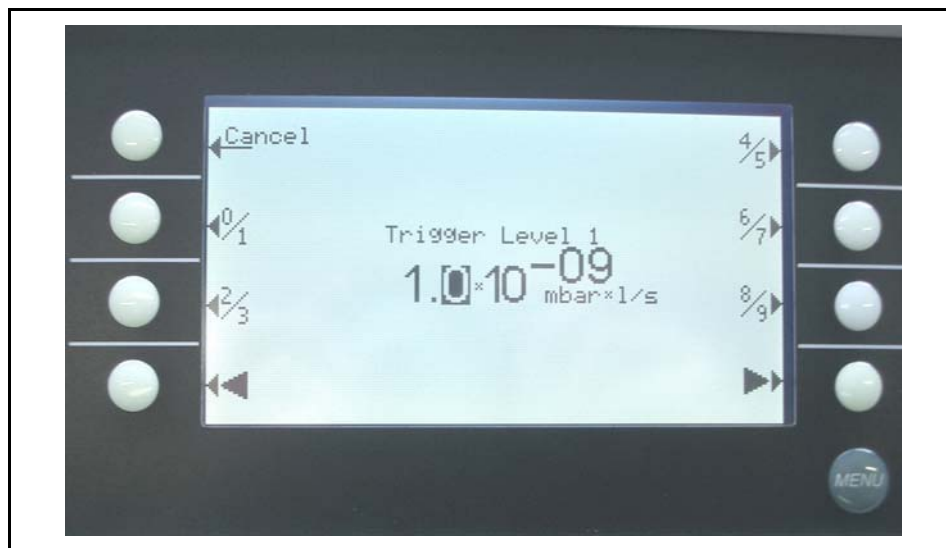


Fig. 15 Numerical entry of the trigger level, sample of the digit  
In the submenu press 3 (soft key no.4) Fig. 16



Fig. 16 Trigger level, change of the first digit

## 3.5 Interfaces

Under Main menu > Settings > Interfaces the parameters for the interface can be set.

Softkey 2: Location of control

The location of control for the leak detector can be defined

Softkey 3: Define recorder output

Customer defined selection for the recorder output

Softkey 4: RS232

Selection for the RS232

Softkey 5: Define PLC outputs (Control, digital out)

Customer defined selection for PLC outputs

Softkey 6: Define PLC inputs (Control 2, Digital in)

Customer defined selection for PLC inputs

Softkey 7: Scaling recorder outputs

Selection for the scaling of the recorder output

Softkey 8: PLC sample rate

Selection of the PLC sample rate

# Operation

## Location of control

Location of Control  
Main menu > Settings > Interfaces > Location of control

Softkey 2: PLC  
The PHOENIX L300i is controlled via the Digital In connector. The START, STOP and ZERO buttons at the control panel and remote control are locked.

Softkey 3: RS232  
The PHOENIX L300i is controlled via RS232 interface by an external computer. In this mode the PHOENIX L300i can not be controlled via keyboard. The START, STOP and ZERO button at the machine are deactivated.

Softkey 4: All  
The PHOENIX L300i is controlled via all possible controls, e.g. PLC, RS232, Local.

Softkey 5: Local & PLC  
The PHOENIX L300i 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 PHOENIX L300i 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 PHOENIX L300i is controlled via the START, STOP and ZERO buttons at the control panel or remote control. This is the default setting.

## Define recorder output

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. 18)

## Recorder output pirani P1/P2

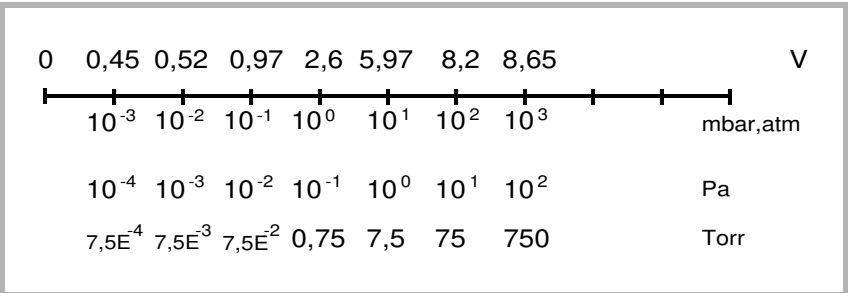


Fig. 17 Recorder output: Pirani PHOENIX L300i, P1 and P2. The complete characteristic Pirani line is shown in the appendix.

The following functions can be selected:

Off

The recorder output is switched off

P1 Pirani PHOENIX L300i

The inlet pressure P1 of the PHOENIX L300i will be shown logarithmic. Fig. 17

P2 Pirani PHOENIX L300i

The fore vacuum pressure P2 of the PHOENIX L300i will be shown logarithmic. Fig. 17

P1 (L200)

The setting for the inlet pressure P1 is identical with those of the L200, i.e. 1000 mbar comply 4V with 0.5V/decade logarithmic scale. Users can exchange their L200 for a PHOENIX L300i without changing pin assignment. Fig. 18

P2 (L200)

The setting for the fore vacuum pressure P2 is identical with those of the L200, i.e. 1000 mbar comply 4V with 0.5V/decade logarithmic scale. Users can exchange their L200 for a PHOENIX L300i without changing pin assignment. Fig. 18

LR mantissa

The leak rate mantissa is recorded linearly from 1...10V. Fig. 20

LR exponent

The exponent is recorded as step function:  $U = 1 \dots 10V$  with steps of 0,5V per decade, starting with  $1V = 1 \cdot 10^{-12}$  mbar/s. Fig. 19

LR linear

The fundamental output voltage is scaled linear. The fundamental voltage is 0...10V in scalable steps from 0,5/1/2/2,5/5 to 10 volts per decade.

LR log

The fundamental output voltage is scaled logarithmic and can be freely chosen. The voltage output ranges from 1 to 10 V with adjustable steps of 0,5/1/2/2,5/5 to 10 V per decade (Fig. 21 shows the default setting)

## Selection recorder outputs

## Recorder output P1/P2 L200

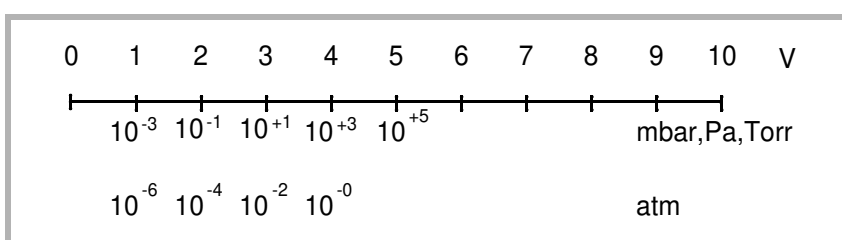


Fig. 18 Recorder output: P1 and P2 L200

# Operation

## Recorder output leak rate exponent

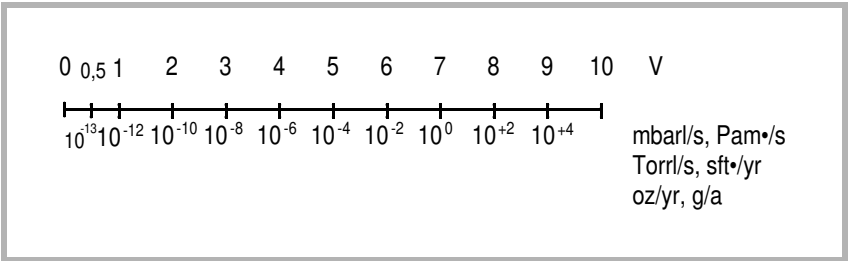


Fig. 19 Recorder output: Leak rate exponent

## Recorder output leak rate mantissa

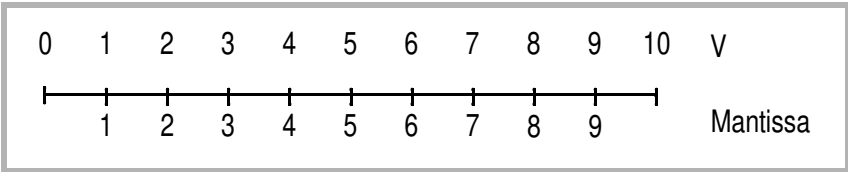


Fig. 20 Recorder output: Leak rate mantissa

## Recorder output leak rate logarithmic

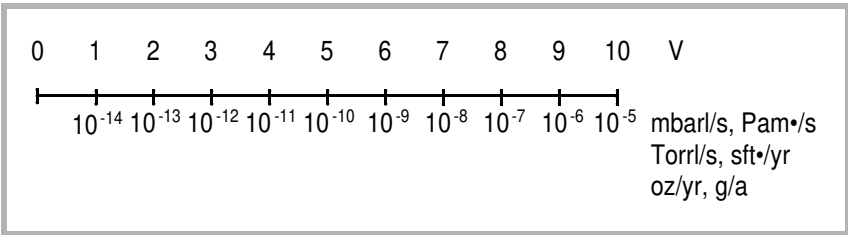


Fig. 21 Recorder output: Leak rate logarithmic, default setting



## RS232

### 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 chosen between: L200 size, Diagnostic, L200 Leak Ware and ASCII code.

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

### Define PLC outputs

### 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.

All pins of digital I/O, digital out and recorder must not be connected with voltages higher than 60V DC/25V AC (to grounding equipment conductor) or reach this threshold.

### Caution

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 assignment 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; Trigger 2 and 3 analog Trigger 1

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

# Operation

measuring.

Zero active:

Is closed in case Zero function is running.

Ready:

Is closed in case machine is in measurement mode (Emission on, no error).

CAL active

Closed when machine is in calibrating routine.

CAL Request

Is opened 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“.

Pump down

Open when machine is evacuating the test object.

Standby

Open when machine is in Standby or Vent mode.

Vented

Open when machine is in Vent mode.

Emission on

Open when emission is on.

## Define PLC inputs

Define PLC inputs

Main menu > Settings > Interfaces > Define PLC inputs

These inputs can be used to control the PHOENIX L300i with a programmable logic control (PLC).

Maximum input voltage 35V.

## Caution

Pin	Assignment
1	PLC in free selectable
2	PLC in free selectable

Pin	Assignment
3	PLC in free selectable
4	PLC GND

Description of operation mode of the Digital In.

The contacts are numbered from bottom to top.

The PLC inputs are working only if the correct location of control has been set.

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 then ventilate it additionally.

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 standby 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:

Change from low to high: The Machine starts an internal calibration independent from the mode the machine is running in.

CAL extern:

Change from low to high: The Machine starts an external calibration independent from the mode the machine is running in.

Change from high to low: approve that external test leak is closed and leak rate signal is stable.

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

# Operation

## Scaling recorder output

### Scaling Recorder Output

Main menu > Settings > Interfaces > Scaling recorder output

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

Softkey 2:      ↓

The decade of the upper leak rate can be decreased

Softkey 3:      ↓

Decrease 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.

Softkey 5:      ?

Help text.

Softkey 6:      ↑

The decade of the upper leak rate can be increased

Softkey 7:      ↑

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  $10^{-7}$  (= 0 V)

PLC Sample Rate

Main menu > Settings > Interfaces > PLC Sample rate

Softkey 2:      ↓

Decreasing the PLC sample rate down to the minimum of 10 ms. This might be necessary if exchanging an L200 to the PHOENIX L300i to stay compatible.

Softkey 3:      ↑

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

## 3.6 Operation

By pressing the MENU push button Fig. 12/13 the main menu will be displayed regardless of the current working mode or status of the PHOENIX L300i.

The main menu Fig. 23 leads the operator to several submenus described in the following chapters. The main menu is identically for all PHOENIX L300i models.

The next page gives an overview of the entire menu architecture Fig. 23.

The overview of the menu architecture corresponds to the PHOENIX L300i, differing menu points or setting possibilities for the PHOENIX L300i DRY and PHOENIX L300i MODUL are described in the respective menu point.

## 3.6.1 Main Menu

The main menu Fig.23 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.

All following chapters show the path to get to the described menu line right underneath the headline.

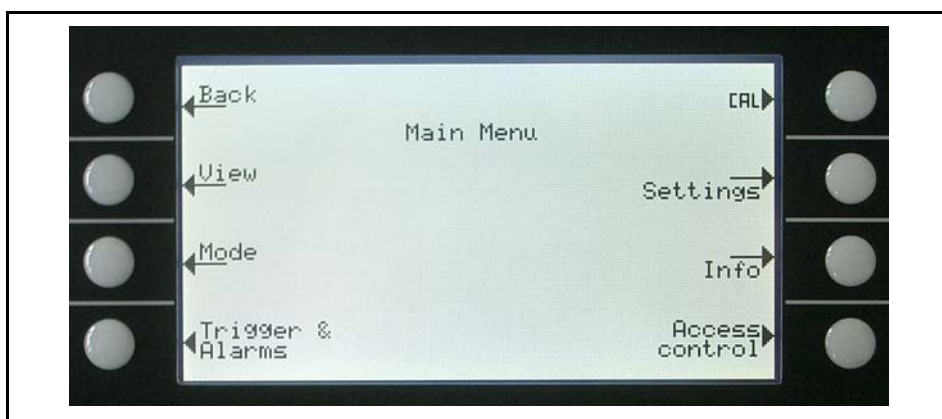


Fig. 22 Display: Main menu

Explanation to Fig.22:

Key No.	Name	Description
1	Back	Return to the previous screen.
2	View	Display settings like scaling, contrast, system background. Please refer to Chapter 3.6.2.
3	Mode	Selection of the working modes Vacuum or Sniff Please refer to Chapter 3.7.
4	Trigger & Alarms	Settings of units, trigger levels and alarms. Please refer to Chapter 3.7.
5	Calibration	Calibration of the PHOENIX L300i. Please refer to Chapter 3.13.
6	Settings	Settings of internal machine parameters. Please refer to Chapter 3.10.
7	Information	Information on the PHOENIX L300i (electrical and vacuum data) and service menu. Please refer to Chapter 3.11.
8	Access Control	Access restrictions. Please refer to Chapter 3.12.

# Operation

	1. Level	2. Level	3. Level
Main Menu	View	Scale linear / logarithmic	
		Display range	
		Time axis	
		Contrast	
		Background in standby	
		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/pump setup
			Sniffer factor
			Machine factor
			Leak rate internal test leak
			Purge in measurement
		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
			PLC sample rate
		Miscellaneous	Time & Date
			Language
			Calibration request
			Service internal forepump
			Service internal exhaust oil filter
			Service message exhaust oil filter
		Parameter save / load	Load parameter set
		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. 23 Overview menu structure

## 3.6.2 View

Main menu > View

In this menu Fig.24 all features that influence the data display are put together.



Fig. 24 Display: View Menu

Explanation to Fig.24:

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 3.6.3
3	Display range auto/manual	Manual or automatic scaling. Please refer to Chapter 3.6.4
4	Time axis	Time axis in trend. Please refer to Chapter 3.6.5
5	Contrast	Display contrast. Please refer to Chapter 3.6.6
6	Background in standby	Background displayed or not. Please refer to Chapter 3.6.7
8	Lower display limit	Setting of the display limit. Please refer to Chapter 3.6.8

## 3.6.3 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 are covered. 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.

### 3.6.4 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.

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.



## 3.6.5 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.

## 3.6.6 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 PHOENIX L300i 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 applied after switching on the instrument on again.

### 3.6.7 Background in standby

Main menu > View > Background in standby

The internal background leak rate can be displayed in standby 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 PHOENIX L300i. 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 standby / 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 standby will be subtracted.

### 3.6.8 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:  $\uparrow \downarrow$

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

The lower limit for the PHOENIX L300i DRY ranges between  $1 \cdot 10^{-9}$  and  $1 \cdot 10^{-11}$  mbarl/s.

Softkey 5: ?

Help text

## 3.7 Mode

Main menu > Mode

The mode menu Fig.25 enables the submenu to select the different working modes.

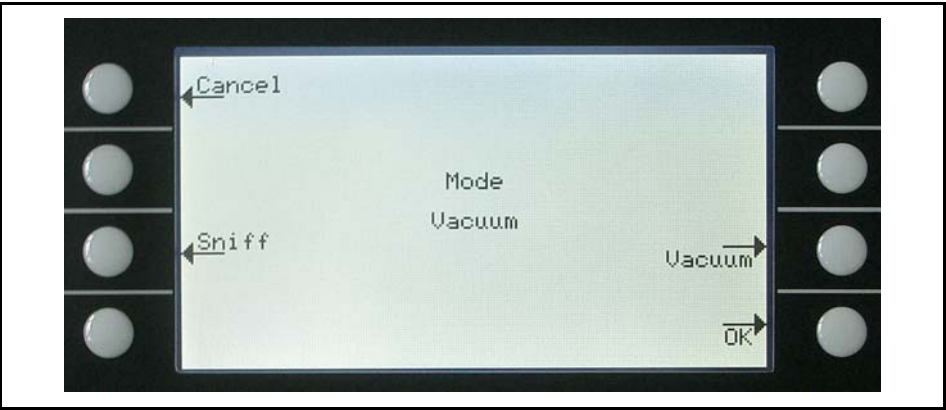


Fig. 25 Display: Mode menu

Explanation to Fig.25:

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.

## 3.8 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.26.

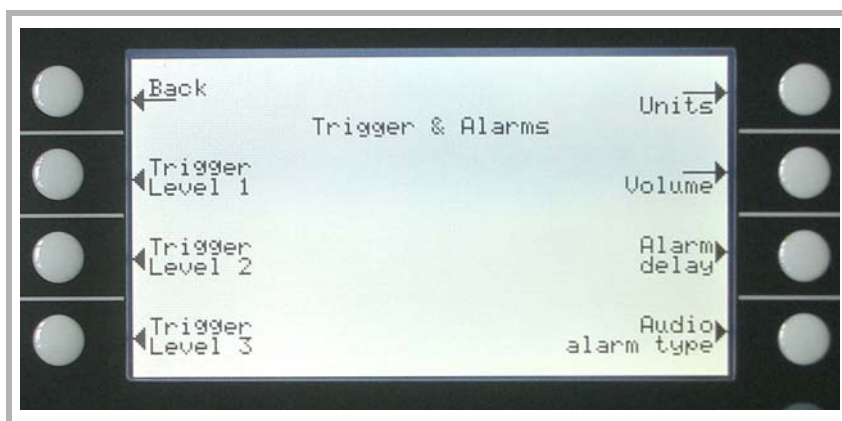


Fig. 26 Display: Trigger & Alarms Menu

Explanation for Fig.26:

Key No.	Name	Description
1	Back	Return to the main menu.
2	Trigger level 1	Definition of Trigger level 1. Chapter 3.8.1
3	Trigger level 2	Definition of Trigger level 2. Chapter 3.8.2
4	Trigger level 3	Definition of Trigger level 2. Chapter 3.8.3
5	Units	Selection of leak rate and pressure units. Refer to Chapter 3.8.4
6	Volume	Refer to Chapter 3.8.5
7	Alarm delay	Refer to Chapter 3.8.6
8	Audio alarm type	Choice of different alarm types. Refer to Chapter 3.8.7

### 3.8.1 Trigger Level 1

Main menu > Trigger & Alarms > Trigger level 1

The value of the first trigger level can be set. See 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 PHOENIX L300i 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. 10)

## Relay Output

The trigger-relais of the digital out switches. Please refer to Chapter 3.5 Digital out, for further details.

## Alarm/Loudspeaker

Additionally Trigger level 1 defines at which level the various alarm types react (See Chapter 3.8.7)

### 3.8.2 Trigger Level 2

Main menu > Trigger & Alarms > Trigger level 2

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

If Trigger 2 is exceeded the corresponding relay will switch. This is also indicated at the display (see Chapter 3.8.1).

### 3.8.3 Trigger Level 3

Main menu > Trigger & Alarms > Trigger level 3

The value of the third trigger level can be set. Please refer to Numerical entries for the description of the entry.

If Trigger 3 is exceeded the corresponding relay will switch. This is also indicated at the display (see Chapter.3.8.1).

### 3.8.4 Units

Main menu > Trigger & Alarms > Units

The preferred 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<sup>3</sup>/s, Torr l/s, atm cc/s, s ft<sup>3</sup>/yr).

In Sniff mode the following measuring units are selectable: 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.

## 3.8.5 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.

## 3.8.6 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 3.8.7).

## 3.8.7 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.

Softkey 3: Leak rate prop.

The sound will be proportional to the leak rate signal.

Softkey 5: ?

Help text

Softkey 6: Setpoint

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

Softkey 7: Trigger alarm

An alarm sounds when the trigger 1 is exceeded.

Pinpoint

The tone of the acoustical signal changes its frequency only in a leak rate-window Fig. 27 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.

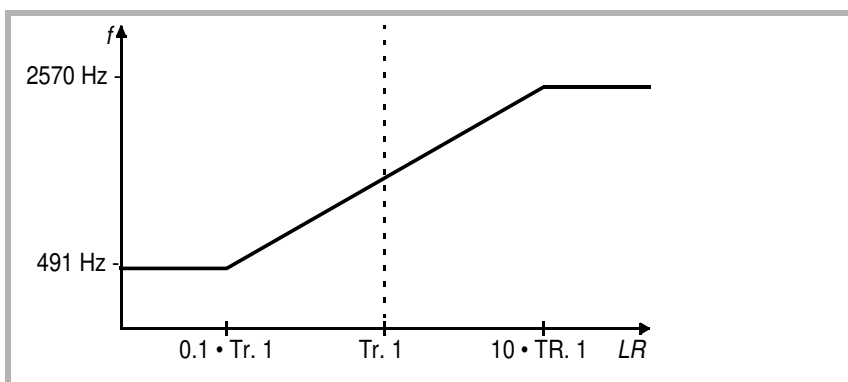


Fig. 27 Pinpoint: Change of the frequency in the leak rate window ( $TR1=Triggerlevel 1$ )

Leak rate prop.

The frequency of the acoustic output is proportional to the reading on the bargraph display. The frequency ranges from 300 Hz to 3300 Hz. Please refer to Chapter 3.6.3 for the definition of the number of decades.

**Pinpoint**

**Leak rate prop.**

# Operation

## Setpoint

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. 28.

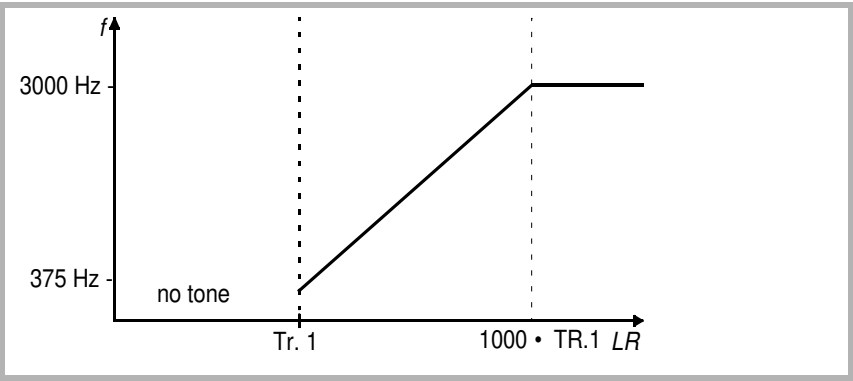


Fig. 28 Setpoint: Change of the frequency above the trigger level 1 (TR1= Trigger level 1)

## Trigger Alarm

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.

## 3.9 Calibration

Main menu > Calibration

In the menu Calibration Fig. 29 the selection between internal and external calibration can be chosen.

Please refer to Chapter 3.13 Calibration for a detailed description of the calibration.



Fig. 29 Display: Calibration menu



## 3.10 Settings

Main menu > Settings

This menu Fig. 30 allows to observe and to change the adjustment of the internal machine settings.

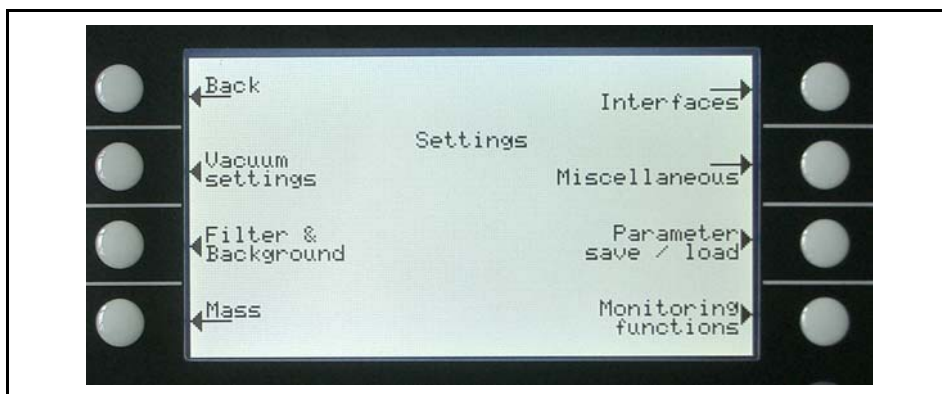


Fig. 30 Display: Settings menu

Explanation for Fig.30:

Key No.	Name	Description
1	Back	Return to the main menu.
2	Vacuum settings	Settings of vacuum system related functions. See chapter 3.10.1
3	Filter & Background	See Chapter 3.10.2
4	Mass	Switching between Helium and Hydrogen. See Chapter 3.10.3
5	Interfases	Settings for electrical communication and selection for control location See Chapter 3.5 for detailed information.
6	Miscellaneous	Settings like date or time. See Chapter 3.10.4
7	Parameter save / load	Store and load sets of parameters. See Chapter 3.10.5
8	Monitoring functions	Choose functions of protection of the PHOENIX L300i in this mode. See Chapter 3.10.6

## **Vacuum settings PHOENIX L300i**

### **3.10.1 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

Definition of delay time until the PHOENIX L300i is vented

Softkey 4: Vacuum ranges

Selection of the vacuum working modes

Softkey 5: Partial flow setup/Forepump setup

Selection of partial flow mode and forepump type

Softkey 6: Sniffer factor

Setting for the sniffer factor

Softkey 7: Machine factor

Setting for the machine factor

Softkey 8: Leak rate internal test leak

Setting for the internal test leak

## **Vacuum settings PHOENIX L300i DRY**

The menu for the PHOENIX L300i DRY version allows the following vacuum settings which varies to the PHOENIX L300i:

Softkey 2: Automatic purge

Definition of automatic purge function in standby

Softkey 3: Vent delay

Definition of delay time until the PHOENIX L300i is vented

Softkey 4: Vacuum ranges

Selection of the vacuum working modes

Softkey 6: Sniffer factor

Setting for the sniffer factor

Softkey 7: Machine factor

Setting for the machine factor

Softkey 8: Leak rate internal test leak

Setting for the internal test leak

The menu for the PHOENIX L300i MODUL version allows the following vacuum settings which varies to the PHOENIX L300i:

## **Vacuum settings PHOENIX L300i DRY MODUL**

Softkey 2: Automatic purge

Definition of automatic purge function in standby

Softkey 3: Vent delay

Definition of delay time until the PHOENIX L300i is vented

Softkey 4: Vacuum ranges

Selection of the vacuum working modes

Softkey 5: Partial flow setup/Forepump setup

Selection of partial flow mode and forepump type

Softkey 6: Sniffer factor

Setting for the sniffer factor

Softkey 7: Machine factor

Setting for the machine factor

Softkey 8: Leak rate internal test leak

Setting for the internal test leak

Automatic purge

## **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 PHOENIX L300i MODUL (refer to vacuum settings PHOENIX L300i MODUL)

Softkey 3: Off

The function automatic purge is off.

Softkey 6: ON

The function automatic purge is on. When changing from measure to standby the forevacuum pump will be purged automatically for 20 seconds.

Vent delay

## **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 button. When the STOP button is pressed for a period of time which is shorter than the delay time specified here, the PHOENIX L300i will just change to standby mode.

When the STOP button is pressed for a period of time which is longer than the delay time specified here, the PHOENIX L300i will vent the inlet port.

# Operation

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.

## **Vacuum ranges PHOENIX L300i DRY/PHOENIX L300i MODUL**

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 vacuum mode (see Chapter 3.5).

Softkey No. 2: GROSS only

In this mode the PHOENIX L300i remains at the inlet flange after falling below 15 mbar. When the pressure is increasing over 15 mbar the PHOENIX L300i switches automatically into evacuation mode. The smallest detectable leak rate is  $1 \cdot 10^{-8}$  mbarl/s.

Softkey No. 3: FINE only

In this mode the PHOENIX L300i 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 PHOENIX L300i switches immediately into evacuation mode. The advantage of FINE only is that while this mode is running no valve will switch and the PHOENIX L300i has a high pumping speed.

Softkey No. 4: GROSS only 920 Hz

In this mode the turbo pump of the PHOENIX L300i works at reduced speed. Therefore the smallest detectable leak rate is  $3 \cdot 10^{-9}$  mbarl/s. This function can be used to replace the L200 in Gross only mode equivalent

Taste No. 5: ?

Help text

Softkey No.6 Partial flow enable

If the PHOENIX L300i or the PHOENIX L300i MODUL is used with a partial flow system this vacuum mode must be enabled before. The setup for the partial flow mode is described in partial flow setup

Softkey No. 7: Normal (default settings)

This is the default setting. The activity runs as explained in Chapter 1.1.1.

The PHOENIX L300i DRY allows the vacuum ranges as follows:

## **Vacuum ranges PHOENIX L300i DRY**

Softkey No. 2: GROSS only

In this mode the PHOENIX L300i DRY remains at the inlet flange after falling below 15 mbar. When the pressure is increasing over 15 mbar the PHOENIX L300i DRY switches automatically into evacuation mode. The smallest detectable leak rate is  $1 \cdot 10^{-8}$  mbarl/s.

Softkey No. 3: FINE only

In this mode the PHOENIX L300i 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 PHOENIX L300i 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.

Softkey No. 4: GROSS only 920 Hz

In this mode the turbo pump of the PHOENIX L300i works at reduced speed. Therefore the smallest detectable leak rate is  $3 \cdot 10^{-9}$  mbarl/s. This function can be used to replace the L200 in Gross only mode equivalent

Taste No. 5: ?

Help text

Softkey No. 6: Precision

In this mode the PHOENIX L300i 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.

Partial flow setup/pump setup

Main menu > Settings > Vacuum settings > Partial flow setup/pump 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 advantage of measuring from 1000 mbar on.

Before setting up the parameters the partial flow mode has to be enabled in the main menu under Settings > Vacuum settings > Vacuum ranges with softkey no. 6 partial flow enable and confirm with the soft key OK.

This setting is not possible for the PHOENIX L300i DRY version.

## **Partial flow setup/Pump setup**

## **Enable partial flow mode**

# Operation

## Partial flow setup PHOENIX L300i

The PHOENIX L300i MODUL allows additionally the settings for the forepump (oil sealed or dry) and selectable pumping speed for the forepump.

Partial flow setup for the PHOENIX L300i.

Softkey 2: ↓

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

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 system.)

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  $T_Q = \text{endless}$  valve V10 will open when pressing start. At an inlet pressure  $p_1 < 15$  mbar the PHOENIX L300i DRY 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 PHOENIX L300i 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 when 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  $80\text{m}^3/\text{h}$ . Default setting is  $25\text{m}^3/\text{h}$ .

Softkey 7: ↑

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

Partial flow setup/pump configuration for the PHOENIX L300i MODUL:

## **Partial flow setup PHOENIX L300i MODUL**

Before setting up the parameters the partial flow mode has to be enabled in the main menu under Settings > Vacuum settings > Vacuum ranges with softkey no. 6 partial flow enable and confirm with the soft key OK.

Softkey 2: Pump setup

Setting for the forepump if the PHOENIX L300i MODUL is operated with a partial flow system.

Softkey 7: Partial flow setup

Options for setting up the partial flow system.

Forepump setup for PHOENIX L300i MODUL

## **Vacuum settings PHOENIX L300i DRY 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<sup>3</sup>/h.

Softkey 3: Forepump type

The PHOENIX L300i MODUL with partial flow system can be operated with a dry forepump (for ex. Scroll pump) or a wet forepump (oil sealed).

This key is for choosing a dry (Scroll, 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<sup>3</sup>/h.

Softkey 7: Forepump type

The PHOENIX L300i MODUL with partial flow system can be operated with a dry (for ex. Scroll pump) forepump or a wet pump (oil sealed).

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

# Operation

## Partial flow setup PHOENIX L300i MODUL

Partial flow setup for the PHOENIX L300i MODUL

Softkey 2: ↓

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

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 system.)

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  $T_Q = \text{endless}$  valve V10 will open when pressing start. At an inlet pressure  $p_1 < 15$  mbar the PHOENIX L300i 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 PHOENIX L300i 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 when 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  $80\text{m}^3/\text{h}$ . Default setting is  $25\text{m}^3/\text{h}$ .

Softkey 7: ↑

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

## Sniffer factor

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 T-peace to the leak detector.

During an internal calibration the internal sensitivity of the PHOENIX L300i 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.

For the use of a PHOENIX L300i with a Quicktest the setting for the Quicktest under Main menu > Settings > Monitoring functions > Pressure limits for sniff mode has to be chosen.

## Quicktest setting

Machine factor

## 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 PHOENIX L300i 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 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 PHOENIX L300i 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

## Leak rate internal test leak

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 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!

## Purge in measurement

Purge in measurement

Main menu > Settings > Vacuum settings > Purge in measurement

# Operation

This function is only possible for the PHOENIX L300i DRY. In vacuum mode the fore vacuum pump is purged constantly to avoid helium accumulation. If the use of the PHOENIX L300i DRY needs the possibility to shut off this function, for ex. because of a high helium background in the ambient and no option to connect a hose line with fresh air to the gas ballast port, this function can be shut off here.

If you disable the purge mode in measurement some specifications as minimum detectable leak rate, internal background or time constant may degrade.

Softkey 3: Disable

The fore vacuum pump is purged constantly during the measurement mode to avoid helium accumulation. This setting is the preferred setting and should be used.

Softkey 7: Enable

This setting enables the purging during measuring mode, all disadvantages listed above may occur. It is recommended to use this setting only in special applications.

## 3.10.2 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.

Softkey 3: Background suppression

Setting of the internal condition for the background.

Softkey 7: Leak rate filter

The type of leak rate filter can be chosen.

The PHOENIX L300i DRY allows the following settings

Softkey 3: Background suppression

Setting of the internal condition for the background.

Softkey 7: Leak rate filter

The type of leak rate filter can be chosen.

### Calculate inlet area background

Calculate inlet area background

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

This function calculates the background of the inlet area. The PHOENIX L300i has to be in the following conditions:

1. Mode vacuum
2. Mode VENTED (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.

## 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 standby mode, therefore this value has to be determined with the menu point „Calculate inlet area background“.

Softkey 7: internal only (default)

With start the PHOENIX L300i 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 PHOENIX L300i.

## Background suppression

## 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 PHOENIX L300i.

## Leak rate filter

### 3.10.3 Mass

Main menu > Settings > Mass

The requested mass of the measured gas can be selected. The PHOENIX L300i must be in standby mode for changing to another mass.

Softkey 2: H<sub>2</sub> (2 amu)

Hydrogen with the mass of 2 amu will be measured.

Softkey 3: <sup>3</sup>He (3 amu)

Isotope of helium with the mass of 3 amu will be measured.

Softkey 7: <sup>4</sup>He (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 3.13.

### 3.10.4 Miscellaneous (Language, Calibration request, Service interval...)

Main menu > Settings > Miscellaneous

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

Softkey 2: Time & Date

Setting of time and date

Softkey 3: Language

Selection of the language

Softkey 4: Calibration request

Setting if the PHOENIX L300i should remind for a calibration

Softkey 5: Service interval forepump

Setting service time interval forepump

Softkey 7: Service interval exhaust oil filter

Setting service time interval exhaust oil filter

Softkey 8: Service message exhaust oil filter

Setting service message exhaust oil filter

### Time & Date

Time & Date

Main menu > Settings > Miscellaneous > Time & Date

Time and date can be changed on two subsequent pages. Please refer to Numerical entries for the description of the entry.

## Language

Main menu > Settings > Miscellaneous > Language

The preferred language can be selected. The default setting is english. The following languages can be chosen: English, German, French, Italian, Spanish, Chinese, Japanese, Polish, Russian

Softkey 3: ↓

Scrolling down to select the language. Press OK to confirm the selected language.

Softkey 7: ↑

Scrolling up to select the language. Press OK to confirm the selected language.

## Language

## Calibration request

Main menu > Settings > Miscellaneous > Calibration request

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

Softkey 3: Off

The calibration request will be switched off.

Softkey 5: ?

Help text

Softkey 7: ON

The calibration request will be switched on.

## Calibration request

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 PHOENIX L300i has changed by more than 5 °C (9 °F) since the last calibration.

## Service interval forepump

Main menu > Settings > Miscellaneous > Service interval forepump

Setting for the service interval of the forepump. This setting depends on the use of the PHOENIX L300i 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 4.4.3 also.

This setting is possible for the PHOENIX L300i DRY only.

Softkey 3: Ø

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.

## Service interval forepump

# Operation

## **Service interval exhaust oil filter**

Service interval exhaust oil filter

Main menu > Settings > Miscellaneous > Service interval exhaust oil filter

Here you can enter the service interval for the exhaust oil filter. This setting is only possible for the PHOENIX L300i. This setting depends on the use and application of your PHOENIX L300i and therefore no recommendations can be given (see chap. maintenance).

Softkey 3: ↓

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

Softkey 5: ?

Help text

Softkey 7: ↑

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

## **Service message exhaust oil filter**

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 PHOENIX L300i. If the service message is activated, the PHOENIX L300i reminds you of the required maintenance.

This setting is only possible for the PHOENIX L300i.

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.

## 3.10.5 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.

Load parameter set

Main menu > Settings > Parameter save load > Load parameter set

Save the current parameter settings.

Softkey 4: Edit a file name

Rename the parameter set.

Softkey 8: Save

Save the edited parameter set.

### Load parameter set

Save parameter set

Main menu > Settings > Parameter save load > Save parameter set

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.

### Save parameter set

## 3.10.6 Monitoring Functions

Main menu > Settings > Monitoring functions

This Submenu explains the monitoring functions.

Softkey No. 3: Maximum evacuation time

Settings for the gross leak measurement

Softkey No. 4: Contamination protection

Set the switch off limit and enable the function

Softkey No. 6: Pressure limits for vacuum mode

Setting for the pressure limits between evacuation, Gross and Fine mode.

# Operation

Softkey No. 7: Pressure limits for sniff mode

Definition of the upper and lower limit of the sniffer pressure

## Maximum evacuation time

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 ( $p_1 < 100$  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 Ch. Trouble shooting, 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.

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  $p_1 < 100$  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  $p_1 < 100$  mbar

Softkey No. 7: ↑

Increasing maximum time until measurement.

## Contamination Protection

Contamination Protection

Main menu > Settings > Surveillance > Contamination Protection

If enabled, this mode will cause the PHOENIX to close all inlet valves as soon as the measured leak rate exceeds the programmed limit. Once the START key is pressed, the value must drop below the limit once as the function will otherwise be



triggered when the alarm delay time has elapsed. This will prevent an excess amount of helium from entering the mass spectrometer. Consequently, the leak detection unit is prevented from becoming contaminated by helium. The helium entering the specimen can be pumped out using an external pump. If no pump is available, we recommend that you ventilate the specimen before continuing with the measurements.

Softkey No. 1: Back

Softkey No. 3: Off

Softkey No. 4 Enter limit value  
Selection between air or Argon

Softkey No. 5: ?  
Help text

Softkey No. 6: On

Softkey No. 7: Off

Pressure limits for vacuum mode.

Main menu > Settings > Monitoring functions > Pressure limits for 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 PHOENIX L300i. The pressure signal from the gas dependent inlet pressure (P1) will dump false signals. With changing the pressure limits this performance will be adjusted.

Softkey No. 2: ↓  
Decrease change over threshold EVAC-GROSS  
Selectable between 15-3 mbar (Default value 15 mbar)

Softkey No. 3: ↓  
Decrease change over threshold GROSS-FINE  
Selectable between 0,2-0,05 mbar (Default value 0,2 mbar). For the PHOENIX L300i DRY and the PHOENIX L300i MODUL the changeover is between 0,1-0,05 mbar (Default value 0,2 mbar).

Softkey No. 4 Adjustment for ARGON  
Selection between air or Argon

Softkey No. 5: ?  
Help text

## Pressure limits for vacuum mode

# Operation

Softkey No. 6:     ↑

Increase change over threshold EVAC-GROSS

Selectable between 3 - 15 mbar

Softkey No. 7:     ↑

Increase change over threshold GROSS-FINE

Selectable between 0,05 - 0,2 mbar, respectively 0,05 - 0,1 mbar for PHOENIX L300i DRY and PHOENIX L300i MODUL

## **Pressure limits for sniff mode**

Pressure limits for sniff mode

Main menu > Settings > Monitoring functions > Pressure limits for 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, upper limit is 0,05 mbar, lower limit 0 mbar.

Pushing the button again for default setting.

Softkey No. 6       ↑

Increasing the maximum pressure

Softkey No. 7:     ↑

Increase the minimum pressure, Lower limit is 0,05 mbar (default)

## 3.11 Information

Main menu > Information

The Information Menu Fig.31 enables submenus to select different kinds of information belonging to the PHOENIX L300i.

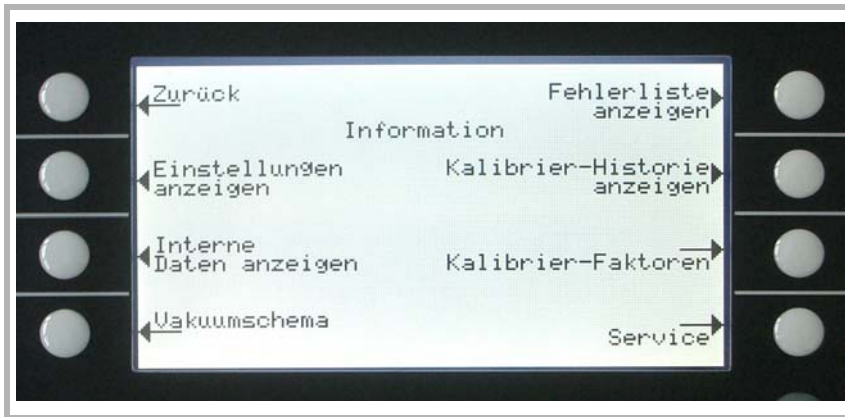


Fig. 31 Display: Information Menu

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 PHOENIX L300i is shown. Here you can see which valves are opened or closed momentarily. See chapter 4.1.1

Softkey 5: View error list

The list of occurred 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

### 3.11.1 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.

## 3.12 Access Control

Main menu > Access control

With this menu you can deny or allow access to specific functions of the PHOENIX L300i.



Fig. 32 Display: Access Control Menu

Softkey 3 Zero

Settings of the zero function

Softkey 4: Access to CAL function

Settings for restriction of the CAL function

Softkey 8: Change Menu-Pin

Access to menu pin can be restricted

### 3.12.1 Zero

Main menu > Access control > Zero

This setting enables (respectively disables) the ZERO button at the control panel. With „Zero at FINE“, the ZERO function 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.

### 3.12.2 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 3.12.3) 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 standby and the measure mode.

### 3.12.3 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 Numerical entries for the description of the entry.

## 3.13 Calibration

### 3.13.1 Introduction

The PHOENIX L300i can be calibrated in two different ways:

Internal calibration by means of a built-in test leak  
or

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 PHOENIX L300i is a very stable instrument a calibration is recommended every day with heavy use, or before using the PHOENIX L300i 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.

### **3.13.2 The calibration Routines**

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

main menu (Fig. 23)

standby mode (Fig. 12)

measurement mode (Fig. 10)

The access via standby mode or measurement mode can possibly be blocked (see Chapter 3.12.2). 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. 29).

A calibration may be terminated at any time by pressing the Stop button or using the Soft Key no. 1 (Cancel) Fig. 34.

### **3.13.3 Internal Calibration**

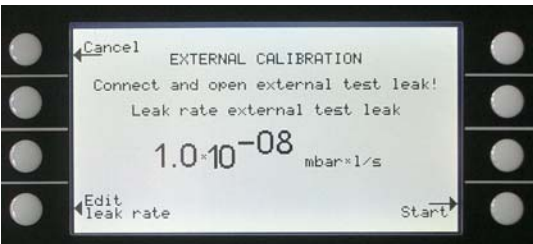
Mass 4 must be selected (Default setting)

Press Softkey no 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.

## 3.13.4 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. 29, 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.

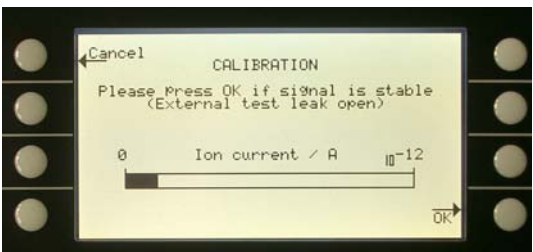
Check the leak rate printed on the test leak and compare it with the leak rate at the display. If the leak rates are not identical press Edit leak rate (Soft Key no. 4) and correct the value.  
If the leak rates are okay press START (Soft Key no. 8).

Fig. 33 Display: External Calibration, Step 1



No action required.

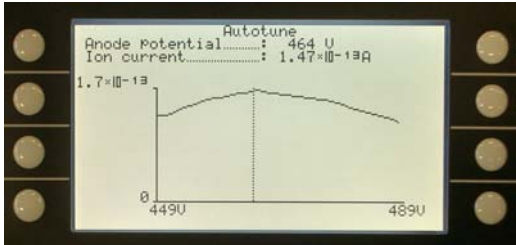
Fig. 34 Display: External Calibration, Step 2



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

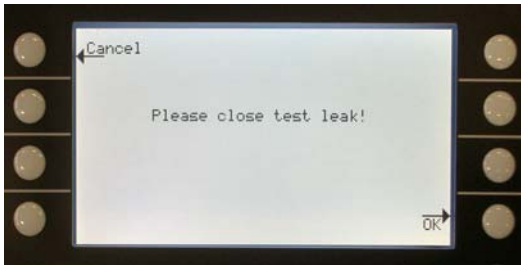
Fig. 35 Display: External Calibration, Step 3

# Operation



No action required.

Fig. 36 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. 37 Display: External Calibration, Step 5



When the signal is stable confirm with o.k.

Fig. 38 Display: External Calibration, Step 6



The PHOENIX L300i shows the old and the new calculated calibration factor.

Fig. 39 Display: External Calibration, Step 7



Factor of calibration - Range of values

**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 considerable higher or lower ( $< \text{factor } 2$ ) 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 maloperation).

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

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 5.2.) is displayed and the calibration will be interrupted.

### **3.14 Switching Off/Shutting Down**

The PHOENIX L300i can be switched off any time by using the mains switch. The turbo pump will be decelerated automatically. It is recommended to put the leak detector into standby and vented mode. Approximately after 30 seconds the turbo pump is decelerated sufficient to move the PHOENIX L300i.

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## Caution



## Contamination

## Form

## 4 Maintenance

### 4.1 Safety Information

Electrical hazards

During all maintenance and connection work, make sure that the mains cable have been reliable disconnected and do not carry a mains voltage. The leak detector must only be used in with the hoods closed. The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1.

### 4.2 Maintenance Intervals

Maintenance work should be done on the PHOENIX L300i 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 should be taken of the oil level and the color of the oil.

Only Leybonol LVO 310 (Cat. no. L31001) must be used in the TRIVAC D2,5E in the PHOENIX L300i.

The monthly interval for the check is just a nominal period. If the PHOENIX L300i 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.

### 4.3 Oerlikon Leybold Vacuum Service

Whenever you send us in equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

A copy of this form has been reproduced at the end of these Operating Instructions: Declaration of contamination for Compressors, Vacuum pumps and Components. Another suitable form is available from [www.oerlikon.com](http://www.oerlikon.com) - Oerlikon Leybold Vacuum Systems - Documentation - Download Documents.

Attach the form to the equipment or enclose it with the equipment.

This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We must return to the sender any equipment which is not accompanied by a contamination statement.

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

## 4.4 Maintenance Work

### 4.4.1 Opening of the PHOENIX L300i

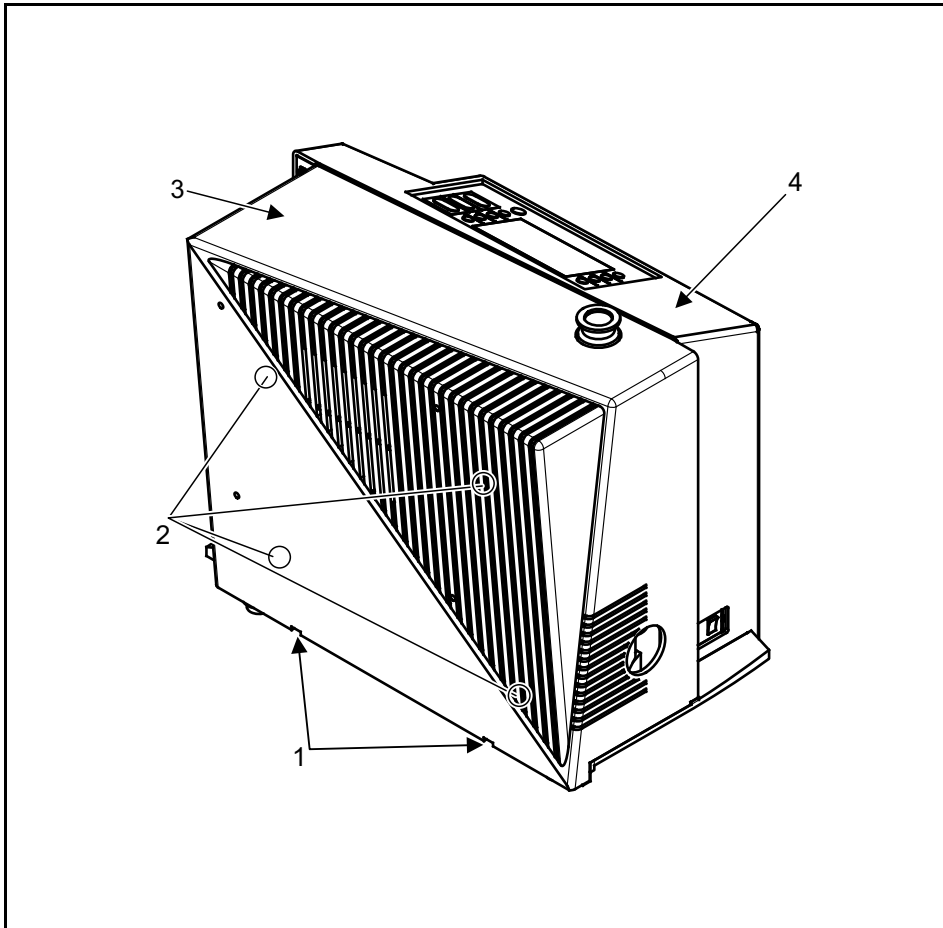


Fig. 40 Back view of the PHOENIX L300i

- 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

To open the PHOENIX L300i please follow the next steps:

1. Switch the PHOENIX L300i off.
2. Pull the mains cord on the PHOENIX L300i.
3. Separate the PHOENIX L300i from other vacuum components at the test port.

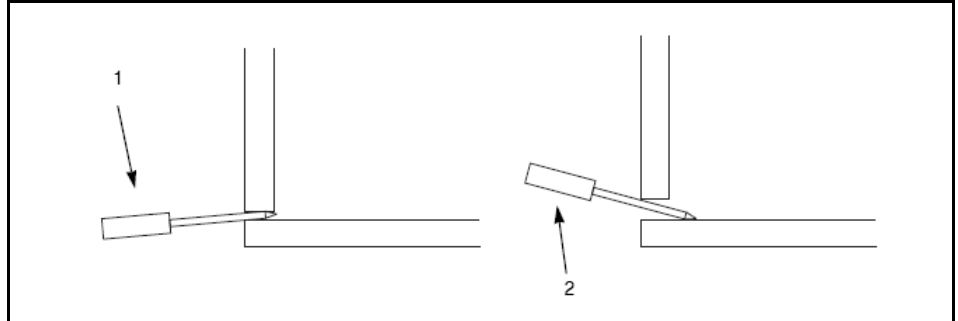


Fig. 41 Opening of the mechanical hood

4. Turn the PHOENIX L300i so that it is orientated in the same way as shown in Fig.
5. Use two flat blade screw drivers and insert these into the openings (Fig. 41) 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 screw drivers 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 (Fig. 40/2).
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.

## 4.4.2 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 color.

Filter mats are used at two places within the PHOENIX L300i:

- a) at the ventilation slit of the electronic cover (only partly visible from the outside)
- b) at the fan of the turbo molecular 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 screwed to the electronic cover. Unscrew the screws and exchange the filter mats. (Cat. no. 20099026)

Filter mat b) This filter mat is fixed before the fan with a plastic bracket. Take off 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.

In the ventilation line is a dust filter installed. This filter has to be cleaned or changed when using in dirty environment (cat.-no. 200000683).

### 4.4.3 Exchanging the Oil

Remove the cover of the mechanical section as described in Chapter 4.4.1.

#### Electrical hazards

During all maintenance and connection work, make sure that the mains cable have been reliable disconnected and do not carry a mains voltage. The leak detector must only be used in with the hoods closed. The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1.

When the pump has been pumping hazardous substances, determined the kind of hazard first and ensure that suitable safety precautions are taken.

Observe all safety regulations

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 followed closely.

As already stated before only Leybonol LVO (Cat. no. L31001) must be used for the Trivac D 2,5E pump in the PHOENIX L300i.

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

### 4.4.4 Cleaning

The housing of the PHOENIX L300i 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 plastic surfaces (mild household cleaning agents, for example). Normally a moistened piece 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.

### 4.4.5 Exchanging the Fuses

Before exchanging the fuses you must disconnect the mains cord.

1. Switch the PHOENIX L300i off.
2. Pull the mains cord off the PHOENIX L300i.
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 reinserting these make sure 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 dial.) for 100V...230V.

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#### Caution



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#### Caution



# Maintenance

6. After having exchanged the fuse (s) press the lid of the mains socket firmly back on.
7. Insert the mains cord into the PHOENIX L300i 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. 42](#).

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

1. Switch the PHOENIX L300i off
2. Pull the mains cord on the PHOENIX L300i
3. Remove the cover for the mechanical and electronics section according to Chapter.
4. Exchange fuses

As can be seen in [Fig. 42](#), 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.

No 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.
No 2 F2 on MSV	Not in use.
No 3 F3 on MSV Fuse rating: T 1A	For generating 24 V for DCDC-converter (+/- 15V / 5 V)
No 4 F4 on MSV Fuse rating: M 0,032A	Fuse for the anode voltage
No 5 F1 on I/O board Fuse rating: T 0,8A	Protects the 24 V supply carried by the option socket
No 6 F2 on I/O board Fuse rating: T 0,2A	Protects the selectable 24 V for RS 232 Interface.
No 7 F 1 on MB Fuse rating: T 0,8A	Supply voltage for the remote control
No 8 F 2 on MB Fuse rating: T 4A	Supply voltage 24 V for I/O board.

---

No 9 F 3 on MB	Supply voltage 24 V for fans and motor relay.
Fuse rating: T 0,8A	

---

No. F 4 on MD	Protection for the fore vacuum pump.
10 Fuse rating: T 8A	

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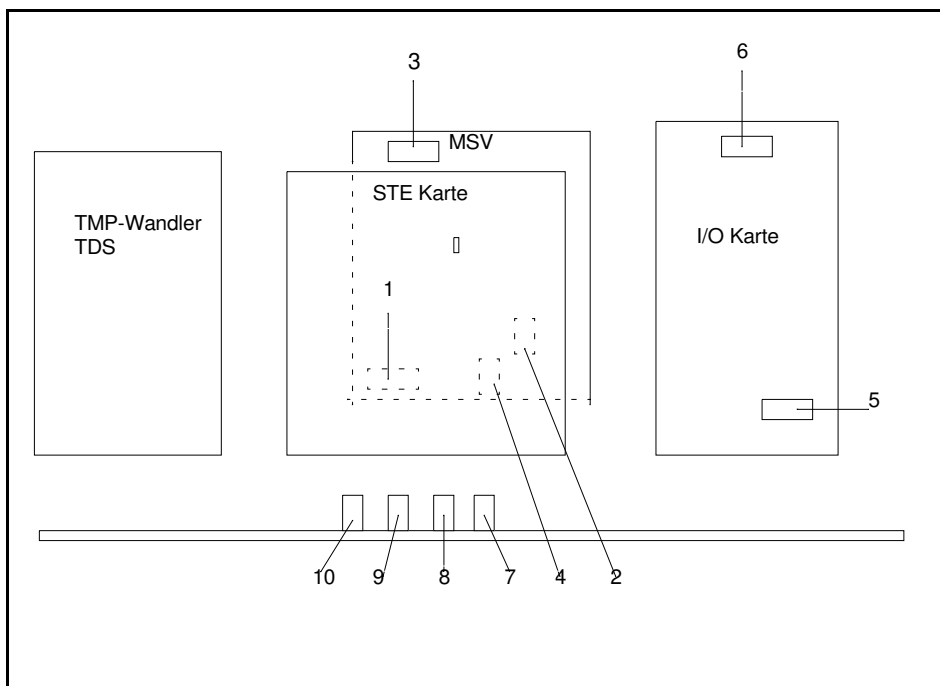


Fig. 42 Assembly fuses

## 4.4.6 Exhaust Oil Filter

After using the PHOENIX L300i for a longer time there can be oil accumulated from the pump. In this case please do the following:

1. Switch off the PHOENIX L300i.
2. Remove the mechanical cover according to Chapter 4.4.1.
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.

## 4.4.7 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.

## **4.5 Calibrated Leak TL7**

The Calibrated leak TL7 with the helium reservoir is used for alignment of the mass spectrometer in the PHOENIX L300i 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 PHOENIX L300i.

### **4.5.1 Technical Data**

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

### **4.5.2 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.



## 5 Troubleshooting

The PHOENIX L300i is equipped with 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 3.11.)

### 5.1 Hints for Troubleshooting

Warnings will be indicated

- when the PHOENIX L300i 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 PHOENIX L300i will indicate a message on the LC display and will remain in the standby 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 PHOENIX L300i can be used again (possibly with some restrictions). As long as a warning status exists the status line shows a warning triangle.

Errors are events which force the PHOENIX L300i to interrupt its measurement operations. In this case the PHOENIX L300i closes all valves except valve 2a (standby mode).

Error messages remain on the LC display until the message has been acknowledged by pressing „Restart“ (key no. 8). After that, the PHOENIX L300i restarts with a new run-up procedure. In some cases it may be helpful to check some settings or measured values before the PHOENIX L300i restarts. Therefore it is also possible to press „Menu“ (key no. 4 or Menu key) to enter the PHOENIX L300i menu. After leaving the menu the same error message will be displayed again.

Under extreme conditions (unknown software errors, excessively high electromagnetic interference levels) the built-in „watchdog“ circuit will prevent uncontrolled operation of the PHOENIX L300i. This watchdog will cause the PHOENIX L300i to restart. After having done so, the instrument will be running in the standby mode. No error message will be output.

### 5.2 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.

# Troubleshooting

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.
W17	Fore pump service interval expired!	The service interval 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 problem, 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	Lowered 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 temperature is too high (> 65°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.

# Troubleshooting

No.	Displayed Message	Description and possible solutions
E34	24V voltage at MSV board is too low!	<p>Signal MVPZN on the MSV board is active. 24 V signal voltage is too low, <math>U &lt; 18.3 \text{ V}</math>.</p> <ul style="list-style-type: none"> <li>– Fuse F1 on the MSV board has blown.</li> <li>– Reference voltage UREF on the MSV board XT7/1 is too high, <math>U &gt; 5 \text{ V}</math>.</li> <li>– DC/DC converter on the MSV board is defective.</li> <li>– 24V power supply voltage of the main power supply is defective or stressed to much.</li> </ul>
E35	Anode-cathode voltage is too high!	<p>Anode-cathode voltage is <math>&gt; 130 \text{ V}</math></p> <p>MSV board is faulty.</p>
E36	Anode-cathode voltage is too low.	<p>Anode-cathode voltage is <math>&lt; 30 \text{ V}</math>.</p> <p>MSV board is faulty.</p> <p>Fuse F4 on MSV board has blown.</p>
E37	Suppressor voltage reference value too high!	<p>Signal MFSZH on MSV board is active. Suppressor signal command variable is too high.</p> <ul style="list-style-type: none"> <li>– Suppressor voltage has a short circuit.</li> <li>– MSV is faulty.</li> </ul>
E38	Suppressor potential too high!	<p>Suppressor potential is higher than 363V.</p> <p>MSV board is faulty.</p>
E39	Suppressor potential is too low.	<p>Suppressor potential is lower than 297V.</p> <p>MSV board is faulty.</p>
E40	The anode potential exceeds its nominal value by over 10%!	<p>The actual anode potential exceeds its nominal value by 10%. The nominal value can be displayed in the service menu.</p> <p>MSV is faulty.</p> <p>MC 68 is faulty</p>
E41	The anode potential has dropped below its nominal value by over 10%!	<p>The actual anode potential has dropped below its nominal value by 10%. The nominal value can be displayed in the service menu.</p> <p>MSV is faulty.</p> <p>MC 68 is faulty.</p>
E42	Nominal value of the anode potential is too high!	<p>Signal MFAZH on MSV board is active.</p> <p>Anode voltage has been short circuited.</p> <p>Nominal value of the anode voltage is too high. Anode voltage is limited to about 1,200 V.</p>
E43	Cathode current is too high! MSV Cat-Heater >>	<p>Signal MPKZH on MSV board is active. Cathode current is too high, <math>I &gt; 3.6 \text{ A}</math>.</p> <p>MSV is faulty.</p>

# Troubleshooting

No.	Displayed Message	Description and possible solutions
E44	Cathode current is too low!	Signal MPKZN on MSV board is active. Cathode current is too low, $I < 0.2 \text{ A}$ . 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. PHOENIX L300i switches to cathode 2. Please order a new ion source. Cathode 1 is defective MSV board is defective
W46	Emission for cathode 2 can not be switched.	Signal MSIBE on MSV board is not active. Emission for cathode 2 can not be switched on. PHOENIX L300i switches to cathode 1. Order a new ion source. Cathode 2 is defective. MSV board is defective.
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. Turbo molecular pump is faulty.
W53	Temperature at electronic unit is too high ( $>59^{\circ}\text{C}$ )	Ambient temperature too high. Ventilation failure. Air filter dirty and have to be changed.
E54	Temperature at electronic unit is too high ( $>60^{\circ}\text{C}$ ).	Ambient temperature is too high. Internal ventilation has failed. Air filters are dirty and must be exchanged.

# Troubleshooting

No.	Displayed Message	Description and possible solutions
W55	Temperature at electronic unit is too low (< 2°C)	<p>The temperature sensor on the wiring plane indicates <math>T &lt; 2\text{ °C}</math>. Run-up time for the fore vacuum pump will be longer.</p> <p>Temperature sensor is faulty.</p> <p>Ambient temperature is too low.</p>
E56	Inlet pressure p1 too low!	<p>Output voltage Pirani P1 <math>U &lt; 0,27\text{ V}</math>.</p> <p>Pirani sensor P1 is defective.</p> <p>Pirani electronics on the I/O board is defective.</p>
E58	fore vacuum pressure p2 too low!	<p>Output voltage Pirani P2 <math>U &lt; 0,27\text{ V}</math>.</p> <p>Pirani sensor P2 is defective.</p> <p>Pirani electronics on the I/O board is defective.</p>
E60	p2>10mbar after 5 minutes since power on	<p>Run-up time of the fore vacuum pump is too long.</p> <p>Fore pump is faulty.</p> <p>Valve V2 does not open.</p> <p>Leak in the high vacuum system.</p>
E61	Emission fail.	<p>Emission could not be switched on. MSV subassembly indicates a fault. MENB emission current not within range.</p> <p>MSV board is defective.</p> <p>Both cathodes are defective, replace ion source.</p>
W62	Flow through capillary to low.	<p>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).</p> <p>The minimum limit can be set by the menu. Default value is 0.05 mbar.</p> <p>Filter in the tip is clogged.</p>
W63	Capillary broken	<p>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).</p> <p>The maximum limit can be set by the menu. Default value is 0,15 mbar.</p> <p>The capillary is broken or has been torn off.</p>
E64	TMP error: Nominal speed has been exceeded by over 10%	<p>Nominal speed of the pump has been exceeded by over 10%</p> <p>EMC problems: Check connecting cable, insert it properly. Switch the power supply voltage off and then on again.</p> <p>Turbo.Drive S faulty: Inform Leybold Service</p>

# Troubleshooting

No.	Displayed Message	Description and possible solutions
E65	TMP error: Pass through time exceeded	<p>Max. time for passing through the critical frequencies has been exceeded.</p> <p>Fore vacuum or high-vacuum pressure too high: Reduce the inlet pressure of the PHOENIX L300i</p> <p>Bearing defective: Inform Leybold service for repair</p>
E66	TMP error: Bearing temperature too high (>67°C)	<p>Max. bearing temperature has been exceeded</p> <p>Fore vacuum or high-vacuum pressure too high: Reduce the inlet pressure of the PHOENIX L300i</p> <p>Fan defective: Replace the fan</p> <p>Ambient temperature too high: Feed cooler air to the PHOENIX L300i</p> <p>Bearing defective: Inform Leybold service for repair</p>
E67	TMP error: Short circuit in TMP-motor or connecting cable	<p>Short circuit in the pump's motor or the connecting cable</p> <p>Check to see if the connecting cable is undamaged, exchange if required.</p> <p>Inform Leybold service in case of short circuit in TMP motor</p>
E68	TMP error: temperature converter too high (>75°C)	<p>Maximum temperature for the converter has been exceeded.</p> <p>Ambient temperature too high: Feed cooler air to the PHOENIX L300i</p> <p>Fan defective: Replace the fan</p> <p>Fore vacuum or high-vacuum pressure too high: reduce the inlet pressure of the PHOENIX L300i</p>
E69	TMP error: Run-up time out	<p>Max. time after which the pump must enter its normal operation mode has been exceeded.</p> <p>Fore vacuum or high-vacuum pressure too high: Reduce the inlet pressure of the PHOENIX L300i</p> <p>Bearing defective: Inform Leybold service for repair</p>
E70	TMP error: TMP motor temperature too high (>90°C)	<p>Max. motor temperature has been exceeded.</p> <p>Fore vacuum or high-vacuum pressure too high: Reduce the inlet pressure of the PHOENIX L300i</p> <p>Fan defective: Replace the fan</p> <p>Ambient temperature too high: Feed cooler air to the PHOENIX L300i.</p> <p>Bearing defective: Inform Leybold service for repair</p>
E71	TMP error: TMP could not be identified	<p>Pump could not be identified or no pump is connected.</p> <p>Pump not connected to Turbo.Drive S: Check connecting cable</p>
E72	Emission off (P1 too high)	Air inrush

# Trouble shooting

No.	Displayed Message	Description and possible solutions
E73	Emission off (p2 too high)	<p>The emission is switched off as soon as the pressure <math>P_2 &gt; 0.2</math> 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.</p> <p>Air inrush in the measurement mode.</p>
W74	Error proportional valve	<p>Proportional valve is faulty.</p> <p>I/O board is faulty.</p>
W75	Maximum evacuation time exceeded Within the pre set evacuation time the pressure of 100 mbar was not reached.	"Test sample has got a GROSS leak." and "Wrong setting (too short) of max. time of evacuation."
W76	Maximum evacuation time until measurement exceeded Within the pre set evacuation time measurement mode was not reached.	"Test sample has got a GROSS leak." and "Wrong setting (too short) of max. time of evacuation."
W77	Peak not in Range	<p>The signal maximum has shifted to mass range alignment limits.</p> <p>Signal of leak rate was instable during mass adjustment. Calibrate again.</p> <p>Check the basic setting for the anode voltage through the service menu.</p> <p>Check calibrated leak.</p>
W78	Differences of signal between test leak open and closed is too low.	<p>The amplifier voltage difference between opened and closed calibrated leak is less than 10 mV.</p> <p>Calibrated leak has not been closed properly.</p>
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	<p>The automatic request of calibration is activated and has fulfilled at least one of the conditions:</p> <p>30 minutes are passed since power on.</p> <p>Temperature of the pre-amplifier has changed more than 5°C since the last calibration.</p> <p>Mass adjustments were changed.</p> <p>Change of TMP speed to 920 Hz, Gross only mode</p>

# Troubleshooting

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



## **6 Waste Disposal**

The equipment may have been contaminated by the process or by environmental influences. In this case the equipment must be decontaminated in accordance with the relevant regulations. We offer this service at fixed prices.

Further details are available on request.

Contaminated parts can be detrimental to health and environment. Before beginning any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separate clean components according to their materials, and dispose of these accordingly. We offer this service. Further details are available on request.

When sending us any equipment, observe the regulations given in Section 4.3 Oerlikon Leybold Vacuum Service.



## EC Declaration of Conformity

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herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EC Council Directives. This declaration becomes invalid if modifications are made to the product without agreement of Oerlikon Leybold Vacuum GmbH. Compliance with the EMC Directives requires that the components are installed within a system or machine in a manner adapted to EMC requirements.

**Product designation:** Leak Detector

**Type designation:** PHOENIX L300i, PHOENIX L300i Dry, PHOENIX L300i Modul

**Catalogue No.:** 250000V01, 250001V01, 250002V01, 251000V01, 251001V01, 251100V01, 251101V01

**The product complies to the following European Council Directive:**

- Directive on Electrical Equipment (2006/95/EC)
- Directive on Electromagnetic Compatibility (2004/108/EC)
- Directive on Machinery (2006/42/EC)

**The following harmonised standard has been applied:**

- EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
- EN 61326-1 Klasse A Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
- DIN EN ISO 12100 Machinery Safety

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