O P E R A T I N G M A N U A L

jina80e1-a (0611)

Catalog No.

550-300
550-310

from software version V 1.00

Modul1000

Modular Leak Detector

INFICON

0.1 Content

0.2 Imprint

INFICON GmbH
Bonner Straße 498
50958 Köln

Germany

0.3 About this Operating Manual

This operating manual was written for users of the Modul1000.

We want to enable you to install and use the leak detector easily. The structure of the operating manual allows you to read it from the beginning to the end. In case you already know the Modul1000 you can read the parts that are important for you only. In this case you can use the index at the end of the document.

0.4 Safety

0.4.1 Used Instructions and Safety Symbols

Danger

Indicates an impending danger. When you don't avoid the situation death or heaviest injuries (crippledness) can occur.

Warning

Indicates a possibly impending danger. When you don't avoid the situation you can be injured easily and death or heaviest injuries can occur.

Caution

Indicates an possibly impending danger. When you don't avoid the situation you can be hurt easily or fractionally.
This warning can also hint at a possible damage to property

Notice Information on special technical requirements that the user must comply with.

The references to diagrams consists of the chapter number, figure number and the item number in this order. For example: Fig. 2-4/7 refers to item 7 in the figure 4 of chapter 2.

0.4.2 Safety Instructions

Use

Caution

The Modul1000 will be damaged when it is used for pumping fluids or aggressiv and humid gases.

Use the Modul1000 for leak detection only.

Transport and Connection

Danger

You can be hit by a electric shock and be electrocuted.
Use 3-wire power lines that are conected with a earthing equipment conductor only.

Caution

Before connecting the Modul1000 to the mains you must make sure that the mains voltage rating of the Modul1000 coincides with the locally available mains voltage. The instrument must exclusively be connected to a single phase supply with fuses for installation (Circuit breaker 16A max. according to IEC/EN 60898 with tripping characteristic B).

Caution

The electronic of the device can be destroyed.

So just connect devices to the leak detector that are seperated from the mains. Just connect devices that don't excess 25V AC/ 1 Amp.

Caution

The leak detector possibly shows wrong measurement values when the vacuum system is contaminated.

So when cleaning it regard that you clean it in an clean environment and use clean tools.

Maintenance

Danger

You can be electrocuted!

Separate the Modul1000 from the mains when you are maintaining it.

Contamination and Vapours

Warning

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

Warning

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

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

The height of the oil of the pump has to be controlled regularly.

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

Danger

Dangerous gases pollute the machine.

So you must not use the machine for detecting toxical, acidity, microbiological, explosive, radioactive or other noxious matters.

Please contact the manufacturer when you want to use using the above mentioned matters.

Warning

Depending on the chamber the Modul1000 is attached to and the gas inside the chamber lethal gases can be spoiled into the air through the exhaust.

Caution

Condensable gases and steams can attain the inside of the leak detector and destruct the fore pump.

With the water vapor that is in the air - especially in humid areas or when using humid or wet test samples - the acceptable compatibility of water vapor or capacity of water vapor respectively can be exceeded.

0.5 Definitions

0.5.1 Used Terms

Autotune / Mass alignment

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

Autoranging

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

The autoranging feature of the Modul1000 covers the entire range or leak rates depending on the selected operating mode. Not only the leak rate signal, but also the pressure in the test sample (inlet pressure P1) and the forevacuum pressure (P2) are used for control purposes. Fine range switching within the main ranges is implemented by switching over the gain factor of the preamplifier.

Auto zero

Determination and automatic adaptation of the helium background.

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 pushbutton, provided the Modul1000 has been running previously for at least 20 seconds in the Stand-by or vent mode. If the helium background previously suppressed should drop so that for the duration of the zero time only the display limit will be displayed, the zero level is adapted automatically.

Foreline pressure

Pressure in the foreline between Turbo pump and roughing pump.

Internal helium background

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

Minimum detectable leak rate

The smallest leak rate the Modul1000 is able to detect certainly ($\leq 5 \times 10^{-12}$ mbar l/s).

Menu

The menu allows the user to program the Modul1000 according to his requirements. The menu has a tree architecture.

Measure measurement mode

The Modul1000 measures the leak rate of the test sample when the inlet pressure is less than 0.4 mbar.

Default

Status of the Modul1000 when supplied by the factory.

1 Using the Modul1000

1.1 Intended Use

The Modul1000 is a modular Helium leak detector that was designed for leak detection testing stations.

In a compact body there is a system of analysis with a turbo molecular pump and complete electronics. The measurment will be done automatically. Use, programming of the operating parameters, reading of the measured leak rate can also be done via a conectable operating unit, PLC signals or RS232 interfaces.

Multiface signal and control outputs allow you to integrate the the device in existing or new plants.

The adjusted operating parameters controlled by the user are saved in a speperate ram called I•Stick. This I•Stick can be exchanged easily.

All parameters and maintenance can be done without opening the device.

For producing the fore vacuum pressure that is needed when using the turbo pump and for pumping down conected test items a fore vacuum pump with a pumping speed of >2 m³/h can be conected. So a ultimate pressure of $<1x10^{-2}$ mbar can be achieved.

1.2 Technical Data

1.2.1 Physical Data

Max. inlet pressure	0.4 mbar
Minimum detectable Helium leak rate	$<5\times10^{-12}$ mbar l/s
in vacuum mode (ULTRA)	
limit of detection in sniffer mode	$<5\times10^{-8}$ 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	
ULTRA mode	2.5 l/s
Detectable masses	2.3 and 4
Mass spectrometer	180° magnetical sector field
Ion source	2 cathodes; Iridium/Yttria-oxide
Inlet port	DN 25 KF
Run up time (after starting)	≤ 3 min

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

- Modul1000 has warmed up
- Ambient conditions must be stable (temperature, no vibration/accelerations.)
- The part under test has been evacuated long enough (background is no longer decreasing)
- ZERO must be active

1.2.2 Electrical Data

Part no. 550 - 300 (fore vacuum version)	85-260V, 50-69 Hz
Part no. 550 - 310 (sniffer version)	85-260V, 50-69 Hz
Power consumption	<400 VA
Typoe of protection	IP20
Power cords (EU, USA)	3 m

1.2.3 Other Data

Valves	solenoid
Dimesions (L x W x H) incl. handle in mm	535 × 350 × 339
Weight in kg	approx. 30
Weight in lbs	approx. 80
Noise level dB (A)	<70
Noise level dB /A) 0.5m distance	<56
Audio alarm dB (A)	90
Contamination level (to IEC 60664-1)	2
Overvoltage category (to IEC 60664-1)	II

1.2.4 Environmental Conditions

For use within buildings	
Permissible ambient temperature (during operation)	+10 °C … +40 °C
Permissible storage temperature	0 °C … +60 °C
Max. rel. humidity	80% bei 31°C, linearly decreasing to 50% at 40°C
Max. permissible height above sea leavel (during operation)	2000 m

1.3 Supplied Equipment

- Helium Leak Detector, Modul1000
- Power cord
- Set of fuses
- Folder with documents
- Set of tools

2 Description of the Unit

2.1 Body of the Unit

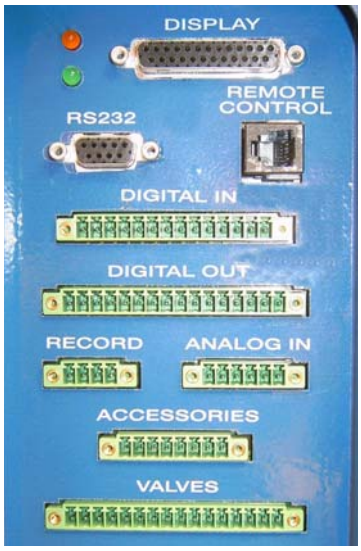
Fig. 2-1 Sight at the left side and front

Fig. 2-2 Sight at the right side and back

Pos.	Description
1	Inlet port
2	Speaker / air inlet
3	Air filter
4	Hole for unlocking the cover
5	Status LEDs
6	Recessed grip
7	Connection DN 25 KF for fore vacuum pump and sniffer line respectively

Pos.	Description
8	Electronical connectors
9	mains socket
10	Connection DN 25 KF for fore vacuum pump
11	Vent port, FESTO coupler for hose 8mm

2.2 Interfaces



The connections:

LED yellow and green
Display
RS232
Remote Control
Digital In
Digital Out
Record
Analog In
Accessories
Valves

Fig. 2-3

The 16 pole connectors for DIGITAL IN and VALVES are save of confusion. Code pins you will find at DIGITAL IN and at the contacts 1 and 16 and at VALVES at the contacts 2 and 15.

The coding plastic pin of the adequate mating plug have to be removed. At all Phoenix connectors the contact is always at the left side. The numbers of the contacts are increasing to the right side.

Description:	**Use:**
LED yellow, green	Status indications
Display	Connection of the display
RS232	Connection of the computer
Remote Control	Connection of the remote control
Digital in / Audio	Connection of the digital in
Digital out	Connection of the digital out
Recorder	Connection of the recorder
Analog in	Connection of the analog in
Accessories	Connection for accessories, i. e. LDs
Valves	Connection of valves for controling plants

2.3 Accessory

Description	Part number
• Display unit for table use	551-100
• Display unit, installation into rack	551-101
• Connection cable, 5 m	551-102
• Sniffer line SL200	140 05
• Hand set, consisting of:	
– Hand Set	200 99 022
– Connection cable, 4m	200 99 027
– Extension cable	140 22
• Test Chamber TC1000	551-005
• Set of connection plugs	551-110

2.3.1 Control Panel For Table Use

You can install the control panel at a plane work space so that it won't slip. Via this control panel all functions of the unit can be controlled or read.

This control panel can be put on a plane working place save of shifting. Via this control panel all functions can be programmed, controlled and read.

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

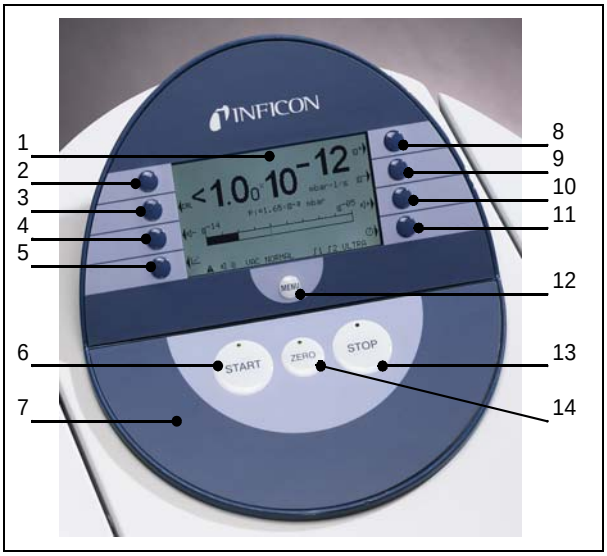


Fig. 2-4 Control Panel

Pos.	Description	Pos.	Description	Pos.	Description
1	LC Display	6	START Button	11	Soft Key no. 8
2	Soft Key no. 1	7	Control Panel	12	MENU Button
3	Soft Key no. 2	8	Soft Key no. 5	13	STOP Button
4	Soft Key no. 3	9	Soft Key no. 6	14	ZERO Button
5	Soft Key no. 4	10	Soft Key no. 7		

2.3.1.1 LC Display

The LC Display is the communication interface to the operator. It displays the leak rates, the status report of the machine, messages, warnings and errors.

2.3.1.2 START Button

Pushing the START Button enables the Standards to start the measure procedure. If the START button is pushed again in measurement mode, the maximum leak rate indicator („hold“ function) is acitvated. This indicator shows the maximum leak rate since „START“. By pressing the START-button again the „hold“ function will be started.

2.3.1.3 STOP Button

Pushing the STOP Button interupts the measure procedure. If the button is pressed longer the inlet is vented according to the conditions defined in the menu Vent delay.

2.3.1.4 ZERO Button

Pushing the ZERO Button enables the zero mode.

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

- 1×10^{-12} in *ULTRA*

To reverse the ZERO function please keep the button pressed for about 3 seconds.

After pressing ZERO the decreasing background is fitted to the course automatically. So it is possible to recognize leaks even when the signal is decreasing rapidly.

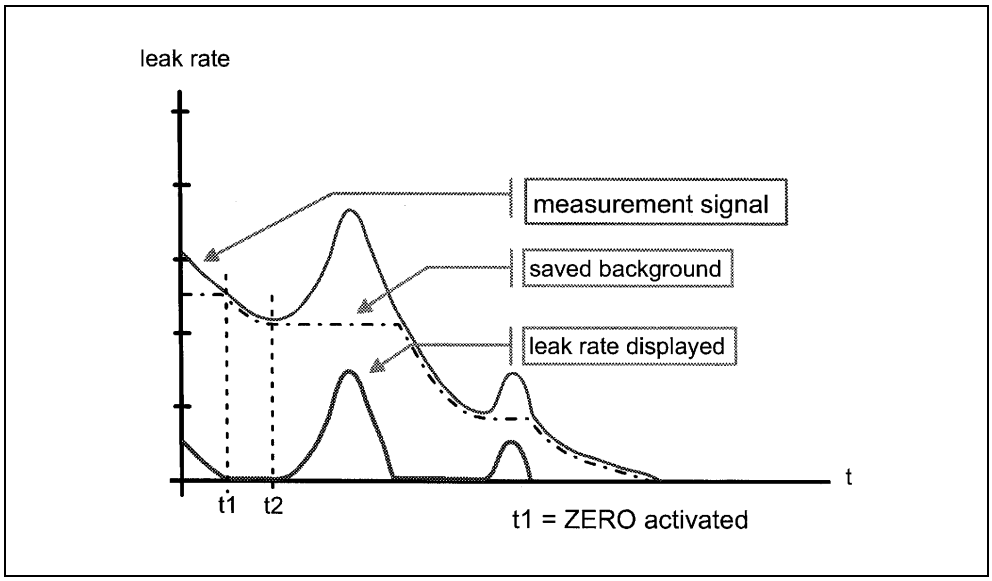


Fig. 2-5 Decreasing background

When the measurement signal declines below the saved underground value the background value will automatically be equated with the measurement signal. As soon as the measurement signal is increasing again the saved decreasing value remains constant. Increasings of the signal are displayed clearly as a leak.

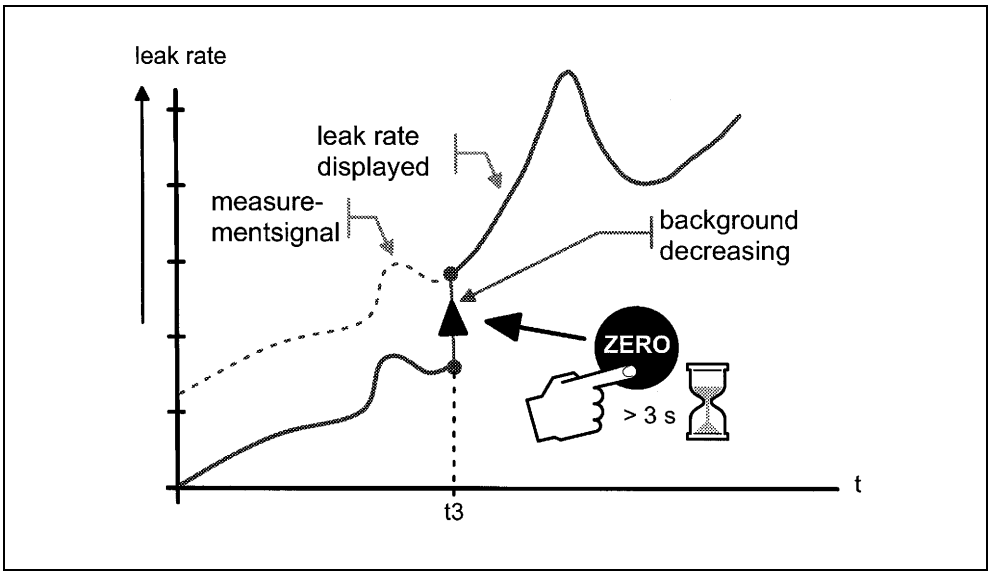


Fig. 2-6 Setting back zero position

When you want to see the measurement signal (including underground) please press the ZERO button about 3 seconds. The saved value will be reset to zero. The underground signal will not be suppressed anymore.

Notice The ZERO functions can be selected to a special mode that allows to use it only when the signal of the falling background becomes stable

2.3.1.5 MENU Button

When pressing the MENU button 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.

2.3.1.6 Soft Keys

The function of the eight Soft Keys depends on the current menu. Only key 1 and 8 very often have the functions *Back*/*Cancel* (Softkey no. 1) and *OK* (Softkey no. 8.).

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 Keys no. 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 Keys no. 8 is *OK*.

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

2.3.1.7 Numerical Entries

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

- If you don't want to change anything, press Soft Key no. 1 *Cancel*.
- The digit that can be changed is displayed inverted. With the arrows → (Soft Key no. 8) and ← (Soft Key no. 4) you can choose which digit you need to change.
- 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.

Having reached the last digit all corrections have to be confirmed by *OK* (Soft Key no. 8).

Example

Fig. 2-7: Numerical entry of Trigger level 1

To change the trigger level 1.0x10^{-7} mbar l/s to 3x 10^{-7} mbar l/s please press *2/3* (Soft Key no. 3). A submenu opens. There you can choose the favoured value 3.

2.3.2 Control Panel For Integration Into A Rack

This control panel can be installed in rack systems of 19 inch. It also can be integrated into cutouts of control panels.

You can see a drawing for the cutout in Appendix 6.

The use of the system is according to the use of the panel for the table.

2.3.3 Connection Cable, 5m

With this cable you can connect the control panel with the Modul1000.

2.3.4 Hand Set

With the hand set you can control the Modul1000 from a distance up to 30 meters. It has got magnets and can be attached to metalic surfaces. You can hang the head set at the side walls of the Modul1000.

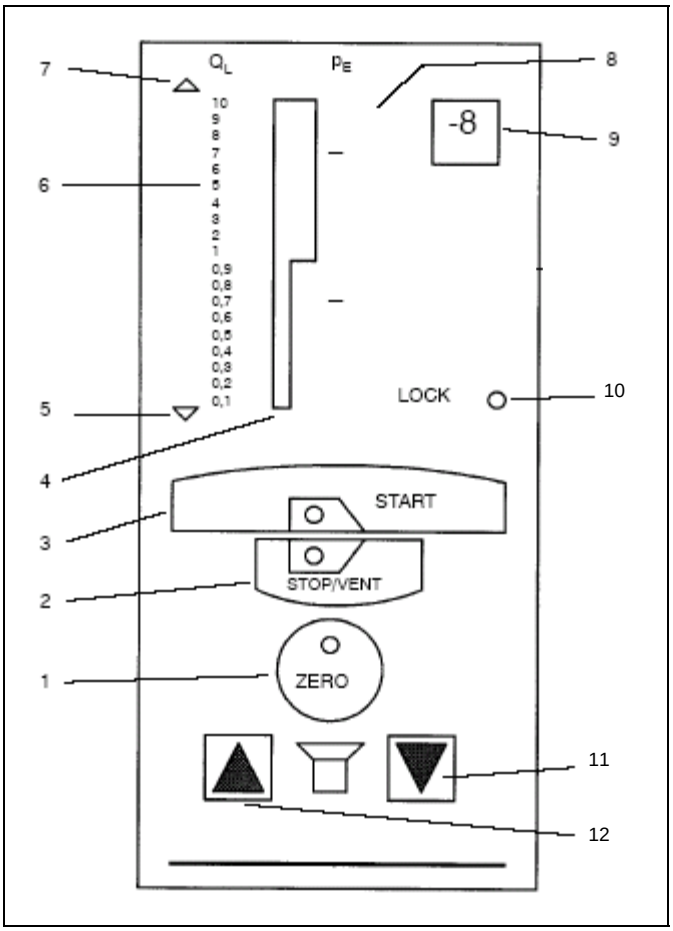


Fig. 2-8

Pos.	Description	Pos.	Description
1	ZERO Button	7	Overvlow display (over range)
2	STOP / VENT Button	8	Scale for the pressure in the test sample
3	START Button	9	Exponent
4	LED-Bargraph display	10	LED LOCK
5	Underflow display (under range)	11	Acoustic signal, quiter
6	Scale for the pressure in the test sample	12	Acoustic signal, louder

2.3.5 Sniffer Line SL200

By using a sniffer line the Modul1000 can quickly be changed into a sniffer leak detector. The length of the sniffer line is 4 m.

2.3.6 Test Chamber TC1000

By this test chamber you can use the Modul1000 for testing hermetically sealed parts

You can also test according to standard MIL-STD 843 easily, fast and accurate. The test will start automatically when closing the lid. Testparameters like measuring time and rejection rate can be adjusted in the menu AUTO LEAK TEST. The testing will be done automatically. The result will be shown by a red and a green LED that is fixed at the test chamber.

2.3.7 Connections

The set of connection plugs includes all phoenix connectors for connecting the electric interfaces.

2.4 Installation

2.4.1 Mechanical Installation

The Modul1000 is suited for mounting it beneath or above a table working place, integrating it into a rack system or into a control cabinet. When integrating it pay attention that there will be enough ventilation, especially the air inlet in the front and back of the Modul1000 have to be treat. For fastening the tap hole at the underpart can be used. After unscrewing of the rubber feet they are bare.

2.4.2 Electrical Connections

All connections for the controling of the Modul1000 are arranged clearly in a connector panel. For connecting the inputs and outputs a set of connectors should be used. Attend the maximum values for the connectors.

A scheme about the connections of the inputs and outputs you will find in chapter 6.

2.4.3 Fore Vacuum Pump

You can connect the fore vacuum pump that is needed for the operation with a hose connection.

- The connecting hose should have at least a diameter of 15 mm.
- The fore vacuum pump should have a pumping speed of > $2m^3$ and
- a reachable ultimate pressure of < $1x10^{-2}$ mbar.

For pumping down higher test volumes a bigger pump for the branch current is recommended. You can use oil-sealed vacuum pumps as well as dry fore vacuum pumps (preferably scroll pumps). When there is a gas ballast valve in the fore vacuum pump that is controlled by a magnet, it can be connected with the input VALVES.

2.4.4 Operating Unit

At the connection DISPLAY the operation unit can be connected. The operation unit can be integrated into a 19‘‘ rack system or into the adaption of the control board.

After connecting the operating unit the Modul1000 is ready for use.

2.4.5 PLC-Connection

An PLC-connection can be connected to the DIGITAL IN and DIGITAL OUT for controling the operating unit. The measured leak rate is available at the exit of the recorder as a 0 - 10 V signal. All inputs and ouputs as well as the recorder output can be adjusted individually concerning to the need of the controling devices.

2.4.6 PC-Connection

A computer can be connected directly via the RS232 interface. The connecting cable is wired 1:1.

The controling of the Modul1000 will be done by the instruction sets as described in the interface description.

3 Operation of the Modul1000

The Modul1000 is switched on by pushing the mains switch. After about 3 min the run-up procedure is finished; the unit is in Stand-by-mode and ready to measure.

Please connect the part to be tested to the inlet port and press *START*. The Modul1000 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 0.4 mbar (0.28 Torr or 40 Pa) is reached the unit switches to measurement mode. The corresponding leak rate is displayed.

The displayed leak rate corresponds to the helium background concentration in the part under test. Since the Modul1000 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 to search for possible leaks.

When you are finished please press *STOP* and hold the button a few seconds to vent the part under test.

3.1 Display

The display is used to either show leak rate signals or program specific set-ups and get information by means of the software menu. In addition messages and maintenance instructions are displayed on the screen.

3.1.1 Running up

In run-up mode (approximately 3 minutes) the display shows:

- Rotation speed of the turbo pump
- Foreline pressure
- State of emission
- Active filament
- A bar graph which shows the run-up progress

Notice If the display is too bright or too dark you can change the contrast. During run-up phase the menu button can be pushed to get to the selection menu.

While the unit is running up the MENU Button can be pressed to get into the Options MENU.

All operating conditions can be recognized by the status LEDs.:

Operating Condition	LED green	LED yellow
running up	alternately blinking	alternately blinking
Stand-by/Vent	on	off
evacuating	on	slowly blinking
measuring	on	on

Operating Condition	LED green	LED yellow
calibrating	synchronously blinking	synchronously blinking
mistake	off	fastly blinking

3.1.2 Measuring

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

- Numerically, combined with a bargraph

  The display shows the leak rate in big digital figures. 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.

  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. The programmed trigger levels are indicated at the bar by short vertical lines: a straight line for trigger 1 and a dotted line for trigger 2.

  In addition the inlet pressure is displayed in smaller figures above the bargraph.

- Trend mode (leak rate versus time)

  In trend mode the leak rates are displayed over time. In addition the actual leak rate and inlet pressure also are displayed digitally. The time axis can be defined in the menu. The intensity axis (y-axis) is defined the same way as the bargraph.

In the lower right corner of the display (next to the Soft Key no. 8) you will find a symbol that allows to switch between the display modes by pressing Soft Key no. 8.

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

Calibration

In all modes the Soft Key no. 5 is used to get to the calibration routine.

3.1.3 Zero

For repressing a helium background in measurement mode the Zero function can be evoked by pressing the ZERO Button.

3.1.4 Stand-by / Switching Off

When the unit is in measurement mode and the STOP Button is pressed the unit will switch to Stand-by mode.

Pressing the START button again the measurement can be continued. When pressing STOP from Stand-by mode the Modul1000 and the connected test item will be vented.

3.1.5 Gas Ballast

Every time when the Modul1000 changes into stand by mode it can start gas ballast automatically for 20 seconds. During this gas ballast the fore vacuum pump is flushed through gas ballast connection.

When the machine is in stand by mode this operation also can be activated manually (Key 7). By pressing the key again the gas ballast will be discontinued. By pressing START the activity will be discontinued, too.

3.1.6 Speaker Volume

On the left hand side two loud speaker symbols are shown, combined with the signs + and -. By pressing the corresponding softkeys (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).

3.1.7 Status Line in the Display

The status line at the bottom of the display informs about (reading from left to right):

Symbol of display	*Meaning*	*Explanation*
	• Volume level	Please refer to Chapter Refer to chapter *3.1.6 Speaker Volume*.
S1	• Trigger 1	If the trigger values are exceeded these signs are inverted. (White on black background.)
S2 / S3	• Trigger 2 / 3	see: Trigger 1
••	• Detected mass	Number of dots indicates the mass number (4 dots = Helium, 2 dots = Hydrogen)
	• Warning triangle	Please refer to Chapter Refer to chapter *8.1*
VAC	• Working mode	*VAC* or *SNIFF* indicate which working mode was selected (Please refer to Chapter Refer to chapter *6.3 Mode*).
ULTRA	• Vacuum range	Depending on the inlet pressure the Modul1000 may be in ULTRA, which is indicated here
ZERO	• ZERO	Indicates if ZERO-function is active.
COR	• corrected leak rate	Indicates if the leak rate is displayed as air equivalent.
Auto Leak Test	• Auto Leak Test	Indicates if this mode is active

3.2 RS232

The Modul1000 can completely be controlled via the RS232. The function of the separate controling commands is according to the controling commands of the operating unit. Via RS232 interface all operating parameters can be configured, warn- and errormessages can be read and the measured Helium leak rate also.

For further information see interface description.

3.3 PLC

The Modul1000 can also be controlled via PLC signals (Typ. 24 V DC).

The functions START, STOP, STAND-BY, VENT, ZERO, CAL, GAS BALLAST

are according to the functions of the control unit. The inputs and outputs of the Modul1000 can be occupied freely. The signal traits of the inputs and outputs can be inverted when needed.

3.4 Hand Set

With the hand set you can control the functions START, STOP / VENT, ZERO and the loudness and the leak rate display at the bar graph.

The use of the hand set is equivalent to the use of the display.

Acoustic Signal

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

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

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

3.5 Calibration

The Modul1000 can be calibrated in two different ways:

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

When the unit is used constantly the calibration should be performed at least once a day. Otherwise the frequency of calibration depends on the frequency of use.

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

- main menu
- Stand-by mode
- measurement mode

The access via Stand-by mode or measurement mode can possibly be not available. (Refer to chapter Access to CAL function). In this case there will be no inscription on the correspondingly Soft Key.

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

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

4 Description Of The Operating Mode

4.1 Construction Of The Equipment

4.1.1 Vacuum System

The vacuum diagram below shows the major components inside the Modul1000:

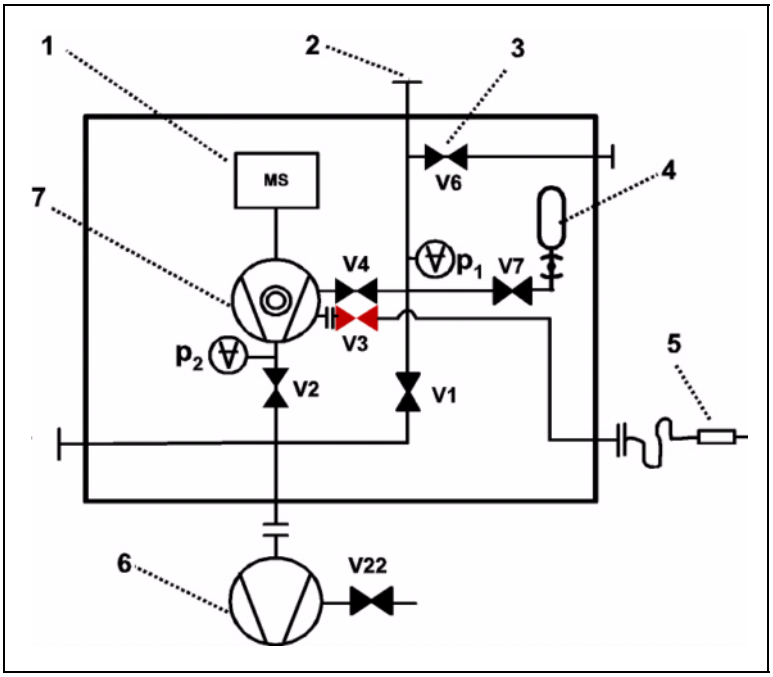


Fig. 4-1: Vacuum system of the Modul1000

Pos.	Description
1	MS: Mass Spectrometer, Helium sensor (180° magnetic field mass spectrometer)
2	Inlet port
3	V1 … V6: Electromagnetic Valves to control the gas flow
4	Internal test leak
5	Optional: sniffer line
6	External fore vacuum pump (provides the foreline pressure for the TMP und pumps down the parts under test) V22: external gas ballast valve
7	Turbomolecular Pump (TMP, provides high vacumm conditions in the MS)

The mass spectrometer is mainly composed of the ion source, 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. Only helium ions can pass this filter and reach the ion collector where the stream of the ions is measured as a electrical current.

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

Besides maintaining the pressure in the mass spectrometer the pump system is used to evacuate the test parts. It is made sure that the pressure in the mass spectrometer is low enough under all circumstances. The valves V1 and V2 control the gas flows when measuring. Valve V5 is used to vent the system. 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 can penetrate into the part in case of a leakage. As soon as the pressure conditions allow it one of the valves to the TMP opens. Now Helium can penetrate into the mass spectrometer contrary to the pumping direction of the TMP.

4.1.2 Electrical Components

All electrical components are supplied internal via the 24 V direct current. The direct current is provided by a switch mode power supply. The frequency converter for operating the turbo molecular pump is attached to the housing of the pump. The supply and controling of the mass spectrometer as well as the central processing unit (CPU) are combined in a protected box. On the wiring board there are all fuses and the exchangable parameter memory I•STICK. All electrical connections are on the I / O board. There are also the fuses of the inputs and outputs arranged easily accesible.

4.1.3 Electrical Connections

4.1.3.1 Electric Supply

Notice Generally the local regulations for electrical connections must be observed.

Warning

Before connecting the Modul1000 to the mains you must make sure that the mains voltage rating of the Modul1000 coincides with the locally available mains voltage. The instrument must exclusively be connected to a single phase supply with fuses for installation (Circuit breaker 16A max. according to IEC/EN 60898 with tripping characteristic B).

The mains voltage rating for the Modul1000 can be read off from the name plate at the back 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 (between 100 and 240V 50 / 60 Hz) is applied to the instrument via the detachable mains cable which is supplied with the instrument. A mains socket is available for this purpose at the back side of the instrument.

Danger

Only 3-core mains cables having a protection ground conductor must be used. Operation of the Modul1000 where the ground conductor has been left unconnected is not permissible.

4.1.3.2 Interfaces For Electical Connections

Display

25-pin Sub-D-connector

The control unit is available as a table or as a rack version. Both versions will be connected to a 5 m cable.

When not using a controling unit the socket shall be coverd. Only in this way a reliable electromagnetic compatibility can be assured.

Digital In

14-pin Phoenix connector

Danger

The strain may be 60V DC / 25 AC 1 A maximum per relais.

The numbering of the contacts is done from left to right.

You use this input when you want to use the Modul1000 with a programmable controller.

Contact	Signal	
1	24V protected with F4 at the interface card (1,6A, max. delivery of current at this contact together with contact 1 and the connections VALVES and ACCESSORIES	
2	GND	
3	freely configurable PLC-input	i.e. START
4	freely configurable PLC-input	i.e. STOP
5	freely configurable PLC-input	i.e. VENT
6	freely configurable PLC-input	i.e. CAL
7	freely configurable PLC-input	i.e. ZERO
8	freely configurable PLC-input	i.e. CLEAR
9	freely configurable PLC-input	i.e. GAS BALLAST
10	freely configurable PLC-input	
11	PLC GND	
12	free	
13	AUDIO_OUT	5V level, PWM-output
14	GND 24V	

Description of operation mode of the Digital In.

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

Start /Stop:
Change from low to high: activate START

Stop:
Change from low to high: activate STOP
When this inlet is longer high than anounced in chapter *Vent delay* then ventilate it additionaly.

Purge:
Change from low to high: activate purge
Change from high to low: deactivate purge

Clear:
Change from low to high: confirm error message

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

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

CAL EXT
Change from LOW to HIGH. Change external calibration.

Digital Out

16-pin Phoenix connector

Relais outputs, max. load 60V DC / 25V AC / 1A

Contact	**Signal**	
1	24V protected with F43 on the I/O board (1,6A, max. current supply at this contact together with contact 1 and the contacts VALVES and ACCESSORIES)	
2	GND	
3	Closes to contact 14	i.e. Ready To Start
4	Closes to contact 14	i.e. ZERO active
5	Closes to contact 14	i.e. Trigger 1
6	Closes to contact 14	i.e. Trigger 2
7	Closes to contact 14	i.e. CAL active
8	Closes to contact 14	i.e. CAL Request
9	Closes to contact 14	i.e. Error
10	Closes to contact 14	i.e. Warning
11	Closes to contact 14	i.e. Gasballast
12	Closes to contact 14	i.e. Measure

Contact	Signal	
13	Closes to contact 14	i.e. Recorder Strobe
14	Closes to contact 14	free
15	„COM_DIGOUT“ common ground for all outputs	
16	not allocated	

Description of the function of the digital out
The characteristic of the signals of the outputs can be set by signals function = open or funktion = close.

TRIGGER 1,2,3
Active when trigger level was exceeded or the device is not in measurement mode.

ZERO ACTIV
Active when ZERO function is switched on.

READY
Active when device is ready (emission on, no failure).

MEASURE
Active when device is ready to measure.

VENTED
Active when device is vented.

ERROR
Passive when there is an error.

WARNING
Passive, when a warning comes up.

CAL ACTIV
Active when the calibration routine is running.

CAL REQUEST
Passive when a calibration is requested.

REC STROBE
Active when the recorder output is invalid. Will only be used in case the recorder output is set to „leak rate“.

GAS BALLAST
Active when gas ballast function is in use.

Recorder

4-pin Phoenix connector

The recorder outputs can be used for recording the leak rate, the inlet pressure and the fore vacuum pressure. Both recorder outputs can be adjusted individually to give information about leak rate and pressures.

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

Notice 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 Modul1000 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	Signal
1	Analog 1
2	GND (ground)
3	GND (ground)
4	Analog 2

Accessories

6-pin phoenix connector

The contact 1 is protected via the fuse F2 (0,8A_T).

Contact	Signal
1	24V protected with F4 (1.6A_T) on the I/O board. The max. current supply at this contact together with contact 1 and the contacts DIGITAL OUT and VALVES.
2	GND
3	digital input 1 (Logic level)
4	Power output 24V (i. e. connection of a green light , light bulb max. 10W); is at the same time connected to output 7 LEDGOOD activ.
5	Power output 24V (e. g. connection of a red light, light bulb max. 10W); is at the same time connected to output 8 LEDBAD activ.
6	digital input 1 (logic level)
7	Current load 10mA - LEDGOOD
8	Current load 10mA - LEDBAD

Analog In

6-pin Phoenix connector

Contakt	Signal
1	24V protected with F3 on the I/O board. The max. current (0.8A) supply at this contact together with contact 1 and the contact DIGITAL IN.
2	GND
3	Input 1
4	GND to input 1
5	Input 2
6	GND to input 2

The inputs are configuarable by jumper for measuring voltage 0 … 10V or measuring current 4 … 20mA. At delivery status input 1 is configured for voltage measuring and input 2 for current measuring.

The jumper is at the I/O card and are reachable after opening the box of the Modul1000.

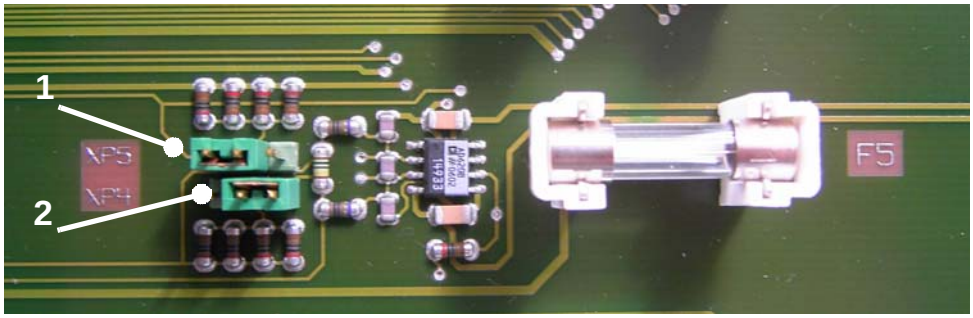


Fig. 4-2 Jumpers

For measuring the voltage the jumpers have to be plugged at the contacts 1 and 2, for measuring the current they have to be put at the contacts 2 and 3.

Examples for coupling you find in the attachment.

The pressure transmitter that has to be connected can be supplied by the contacts 1 and 2 from the Modul1000. When the supply comes from an external power supply you have to attend that the contacts 4 and 6 may only have a potential of max. ±5V advers to contact 2. Otherwise it might be disturbed.

Valves

16-pin Phoenix connector

Via this strip external valves are controlled.

They can be classified into two groups:

1 At the contacts 13, 14 and 15 there can three 24V valves be connected. Maximum current per output 1A. Common bench mark is contact 16 (GND).

2 At the contacts 5 to 10 there can be 6 valves connected. 2 more valves switches are exchangable. For more flexibility those switches are constructed potential-free.The user can also connect an external supply of direct current. It must have a save separation from the mains and may supply 30V maximum.

The 24V supply of the Modul1000 can be used for supplying the valves.

The output to the valves that are connected with the 24V supply at contact 3. Every switch of valves may be charged with 0.2 max.

Contact	Signal
1	24V protected with F4 (1.6A_T) on the I/O board. The max. current supply at this contact together with the taken current at contact 1 and the contact DIGITAL OUT and ACCESSORIES must be smaler that 1,6A..
2	GND
3	Supply external (24V / 30V max.)
4	free
5	Output 1 (V30)
6	Output 2 (V31)
7	Output 3 (V32)
8	Output 4 (V33)
9	Output 5 (V34)
10	Output 6 (V35)

Contact	Signal	
11	Output 7 (V36)	
12	Output 8 (V37)	*)
13	Output 9 (V20)	*)
14	Output 10 (V21)	*)
15	Output 11 (V22)	*) Contact gasballast valve, 24V / <1A
16	GND	

* When connecting electro magnetical valves a resistor 10k ± 5% (0.5W) must be used parallel to the valve.
Also used for external test leak valve 24V / <1A.

Remote Control

This interface of the remote control is constructed as an serial interface for controlling the Modul1000 via an hand set. The hand set can be connected by a connecting cable by a RJ45 plug.

RS232

The RS232 is designed as data communications equipment (DCE) and allows you to connect a computer for controlling and recording data. This connection comes via a 9-pin sub-d plug socket and standard interface cable.

Contact	Signal
1	24V is connectable to the pins. Max. current 0.3A. In delivery status pin 1 is not connected to other pins.
2	RxD
3	TxD
4	GND is connectable via pin. GND is not connected
5	GND RS232
6	not connected
7	not connected
8	not connected
9	not connected

4.1.4 Vacuum Connections

4.1.4.1 Inlet Port

The inlet is at the top of the Modul1000. It is an DN 25 KF inlet port.

Test item or vacuum chamber are to be connected to the inlet port.

Notice The maximum force to be applied onto the flange is 400 N.

4.1.4.2 Connection For The Fore Vacuum Pump

The connection for the fore vacuum pump is at the left side at the unit. Alternatively, when using the vacuum version of the Modul1000, you can also connect the pump at the left side underneath.

1. Screw out the connecting inlet port with a wrench SW17 connection and take out the gasket.
2. Screw out the plug of the connection you will use.
3. Screw it in with the gasket in the opening of the inlet flange.
4. Screw in the inlet port with the gasket.

Notice The sniffer version of the Modul1000 has got a connection for a pump underneath that can be used.

4.1.4.3 Vent Connection

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.

4.1.4.4 Connection For The Sniffer Line

The connection for the sniffer line is only avaliable with the sniffer version of the Modul1000. At this connection the sniffer line SL200 can be connected. The SL200 will be electrically connected via ACCESSORIES.

4.2 Modes

4.2.1 Vaccum Mode

As mentioned the sample has to be evacuated to allow Helium which is sprayed on the outside to enter through any leaks due to the pressure difference.

When pressing the START Button valve V1 open and the sample is pumped down by the roughing pump. At the same time valve V2 is closed to avoid an unacceptable pressure increase in the turbo pump and the mass spectrometer. With valve V2 being closed the turbomolecular pump is operated without being backed up by the fore vacuum pump. Since the mass spectrometer is already under vacuum no further gas is pumped. Thus the pressure p_2 remains constant or increases only slowly.

If the pressure p_2 even though increases (e.g because of a very long pumping down process), then the evacuation will be broken (V1 closed) at p_2 > 10 mbar and V2 will open shortly to restore an appropriate foreline (p_2 < 1 mbar).

The following diagrams show the gas flow during evacuation and during evacuation and during measurement.

In mode STAND-BY the valve V2 is open, V1, V4, V6, and V7 are closed.

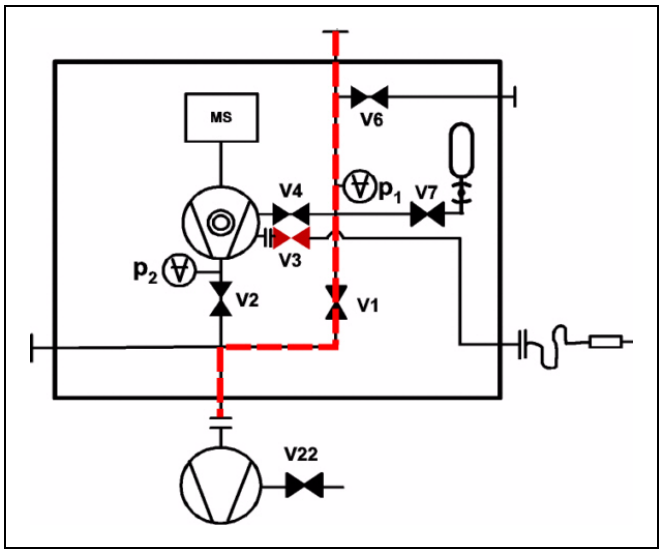


Fig. 4-3: Evacuation (no measurement)

The condition for the evacuation activity will remain until the inlet pressure p1 has fallen under 0.4 mbar. Now the valve V4 opens.

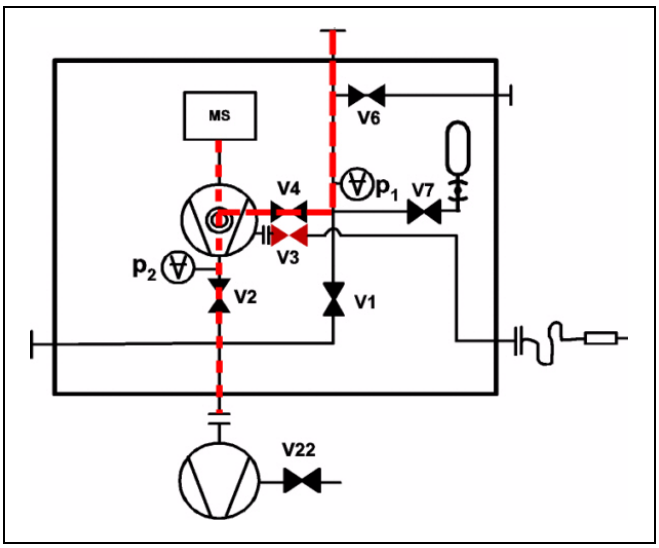


Fig. 4-4 Measurement mode (ULTRA mode)

Now the lower part of the turbo pump further evacuates the sample and after the pressure p_1 has reduced below 0.4 mbar the Modul1000 switches into ULTRA mode, i.e. V1a and V4a close and V4b opens. The inlet into the turbo pump is on a higher level now. The pumping speed at the inlet port is now 2.5 l/s, the detection limit is $<5\times10^{-12}$ mbar l/s.

4.2.2 Sniffer Mode

In sniff mode a sniffer line (preferably the INFICON standard sniffer line 14005) is connected to the inlet port. When pressing the START Button the system starts to pump air through the sniffer line. Due to the constant gas flow through the sniffer line the software will range directly into sniffer mode V3 will be opend and stay there. The inlet pressure will not drop further down. By measuring the inlet pressure the system software makes sure that the flow through the sniffer line is at the right level. Otherwise warning messages are generated. The detection limit in sniff mode is $<1\times10^{-7}$ mbar l/s.

4.3 Menu Structure

You will find an overview of the menu structure in the attachment.

You will reach the following functions via the main menu:

●	Back	**Main Menu**	CAL	●
●	View		Settings	●
●	Mode		Information	●
●	Trigger & Alarms		Access control	●

4.3.1 View

- Main Menu > View

●	Back	**View**	Contrast	●
●	Scale linear / logarithmic		Background in Stand-by	●
●	Display range auto / manual			●
●	Time axis		Lower display limit	●

4.3.1.1 Scale linear / logarithmic

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

The scale of the bargraph can either be linear or logarithmic. With the arrows (up and down) it can be determined how many decades the bargraph covers.

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

Softkey 2: Linear

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

Softkey 3: Arrow down (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: Arrow up (Number of decades)

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

4.3.1.2 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: Arrow down

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

Softkey 6: Automatic

The limit of the displayed range will be chosen automatically.

Softkey 7: Arrow up

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.

4.3.1.3 Time Axis

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

Softkey 3: Arrow down

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

The time slice is extended during the measurement mode. (Up to max. 960 s) It is displayed automatically during the AUTO mode.

Softkey 5: ?

Help

Softkey 7: Arrow up

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

4.3.1.4 Contrast

The contrast of the display can be changed. The changes are applied synchronously. The recommended value under regular conditions is 50 (or close to it).

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 Modul1000 and turn it on again. During the run-up phase press the key no. 3 or 7 so long until the display can be read properly again. This setting is saved

to the EPROM only after confirming this through the contrast menu. If this setting is not confirmed, the former setting will be appled after switching on the instrument on again.

Softkey 3: Arrow down

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

Softkey 4: Invert display

Invert the contrast of the screen.

Softkey 5: ?

Help

Softkey 7: Arrow up

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

4.3.1.5 Background In Stand-by

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

Softkey 3: Off

The background leak rate will not be shown.

Softkey 5: ?

Help

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 leak detector. This internal background will never disappear totally. Very clean systems which have been pumped for a long time will show a background in the 10^{-11} mbar l/s range. Under normal conditions the background level is in the 10^{-10} mbar l/s or low 10^{-9} mbar l/s range.

When pressing START the current internal background is subtracted from all further measured signals automatically. Thus it is made sure that only the net leak rate from the part under test is measured.

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

4.3.1.6 Lower Display Limit

This parameter defines the lower leak rate limit in the measurement ranges.This is valid for vacuum modes only.

Softkey 3, 7:
Changing of the lower detection limit between 1×10^{-5} and 1×10^{-11}

Softkey 5: ?
Help

4.3.2 Modes

- Main Menu > Mode

The menu MODES allows to choose different modes by a submenu.

Cancel			Auto leak test
Commander		**Mode**	
Sniff			Vacuum
			OK

Key No.	Name	Description
1	Cancel	Return to the main menu without any changes of the present settings.
3	Sniff	The normal vacuum mode will be used. Refer to Chapter 4.3.2, sniffer mode.
4		Not used in this menu.
5	Auto Leak Test	Refer to Chapter 4.3.3.
7	Vacuum	The normal vacuum mode is in use
8	OK	Save the settings and return to the previous menu.

4.3.3 Trigger & Alarms

- Main Menu > Trigger & Alarms

Back			Volume
Trigger level 1		**Trigger & Alarms**	Units
Trigger level 2			Alarm delay
Trigger level 3			Audio alarm type

4.3.3.1 Trigger Level 1 to 3

- Main Menu > Trigger & Alarms > Trigger level 1

The value of the first trigger level can be set.

Trigger 1, Trigger 2 and Trigger 3 are programmable switching thresholds. When these thresholds will be exceeded the Modul1000 reacts as follows:

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

Relais Output
The trigger-relais of the digital out switches.

Alarm / Loudspeakers
Additionally Trigger level 1 defines at which level the various alarm types react

4.3.3.2 Volume

- Main Menu > Trigger & Alarms > Volume

The minimum loudness and the regular 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: Arrow down

Decrease the minimum loudness. The minimum value is 0.

Softkey 3: Arrow down

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

Softkey 4: Beep off / Beep on

Softkey 5: ?

Help

Softkey 6: Arrow up

Increase the minimum volume. The maximum value is 15.

Softkey 7: Arrow up

Increase the regular volume. The maximum value is 15.

4.3.3.3 Units

- Main Menu > Trigger & Alarms > Units

The prefered leak rate unit can be selected. There is the choice of 4 (mbar, Pa, Torr, atm) pressure units and 5 leak rate units (mbar l/s, Pa m^3/s-1, Torr l/s, atm cc/s).

Notice In Sniff mode the following measuring units are electable: ppm, g/a eq (helium leak rate is equivalent with leak rate R134a), oz/gr eq (helium leak rate is equivalent with leak rate R134a).

Softkey 2: Arrow up

Scroll up to select a pressure unit.

Softkey 3: Arrow down

Scroll down to select a pressure unit.

Softkey 6: Arrow up

Scroll up to select a leak rate unit.

Softkey 7: Arrow down

Scroll down to select a leak rate unit.

4.3.3.4 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: Arrow down

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

Softkey 7: Arrow up

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.

4.3.3.5 Audio Alarm Type

- Main Menu > Trigger & Alarms > Audio Alarm Type

The trigger of the audio alarm can be switched on or off.

Softkey 2: Pinpoint

Use this function to localize a leak with a well-known size.

Softkey 3: Leak rate prop.

The sound will be proportional to the leak rate signal.

Softkey 5: ?

Help

Softkey 6: Setpoint

Please refer to Chapter 4.3.3.8

Softkey 7: Trigger alarm

An alarm sounds when the trigger 1 is exceeded.

4.3.3.6 Pinpoint

- Main Menu > Trigger & Alarms > Pinpoint

The tone of the acustical signal changes its frequency only in a LR-window 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 4×10^{-7} mbar l/s. So the window where the tone changes reaches from 4×10^{-8} mbar l/s up to 4×10^{-6} mbar l/s.

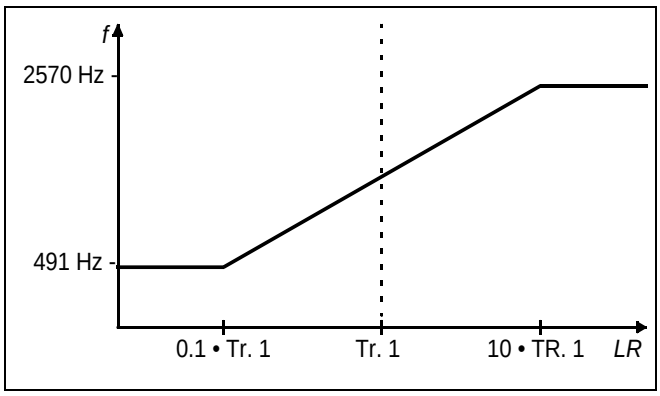


Fig. 4-5 Pinpoint

4.3.3.7 Leak Rate Proportional

- Main Menu > Trigger & Alarms > Leak Rate Proportional

The frequency of the accoustic output is proportional to the reading on the bargraph display. The frequency ranges from 300 Hz to 330 Hz.

4.3.3.8 Setpoint

- Main Menu > Trigger & Alarms > 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.

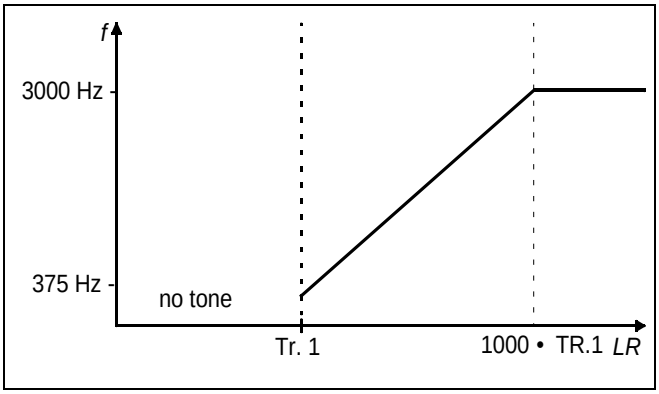


Fig. 4-6: Setpoint

4.3.4 Calibration

- Main Menu > Calibration

Cancel		
Please select the desired calibration type		
Internal automatic		External automatic
Internal automatic		External automatic

During calibration the mass spectrometer is adjusted to a max. Helium signal. This signal refers to the known leak rate of the internal or external test leak. Although the Modul1000 ist very stable a calibration is requested from time to time. So you can assure that changes in the temperature of the environment, contamination or other influences cannot affect the precision of measurements.

When using the leak detector constantly a calibration is requested at least once a day. In other cases the frequency of calibration depends on the capacity factor of the leak detector.

Notice For reaching optimal calibration let the leak detector run up at least 20 minutes.

When test leaks shall be calibrated the range should not be smaller that 5×10^{-9} mbar l/s to assure a stable calibration signal.

4.3.5 Internal Calibration

- Main Menu > Calibration > Internal Calibration

The Modul1000 can be calibrated in two different ways:

- Internal calibration by means of a built-in leak standard.

- External calibration by means of an additional leak standard 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 signal and this signal is referred to the known leak rate of the internal or external leak standard. Although the Modul1000 is a very stable instrument a calibration is recommended from time to time to make sure that ambient temperature changes or dirt or other impacts don't adulterate the measurements.

When the unit is used constantly the calibration should be performed at least once a day. Otherwise the frequency of calibration depends on the frequency of use.

Notice To get an optimized calibration the machine has to warm up at least 20 minutes before use.

4.3.5.1 Automatic Internal Calibration

- Main Menu > Calibration > Internal Calibration > Automatic Internal Calibration

Once this procedure is started the entire procedure is performed automatically. At the end (after about 25 s) a beep is released. Thereafter the unit is ready for further use.

Notice The time to get a leak rate signal after opening / closing the test leak can be adjusted.
Please refer to 4.3.7.5, CAL setting time.

4.3.5.2 Manual Internal Calibration

- Main Menu > Calibration > Internal Calibration > Manual Internal Calibration

When MANUAL INTERNAL CALIBRATION is selected it is assumed that the Modul1000 is connected to a component under test (if not please go to AUTOMATIC INTERNAL CALIBRATION).

After starting the MANUAL INTERNAL CALIBRATION the Modul1000 pumps down the test part (if not already under vacuum) and opens the internal leak standard. Depending on the volume of the part it may take some time for the helium signal to stabilize. Therefore the user has to confirm that the signal has reached a stable level (Soft Key no. 8).

The unit now runs through the tuning process and closes the internal leak standard automatically. Again the volume of the test part determines how long it takes to pump down the helium and to reach a stable background level, which has to be confirmed by the user.

Thereafter the unit is calibrated.

4.3.6 External Calibration

- Main Menu > Calibration > External Calibration

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

The time to wait for a stable Helium signal after opening the test leak can be adjusted.

Notice The shown leak rate can diverge of the printed values of the external calibrated leak because of uncertainities and temperature coefficients.

After external calibration (Soft Key no. 8) has been chosen the following messages are displayed and the described actions are required.

4.3.6.1 Automatical External Calibration

- Main Menu > Calibration > External Calibration > Automatic External Calibration

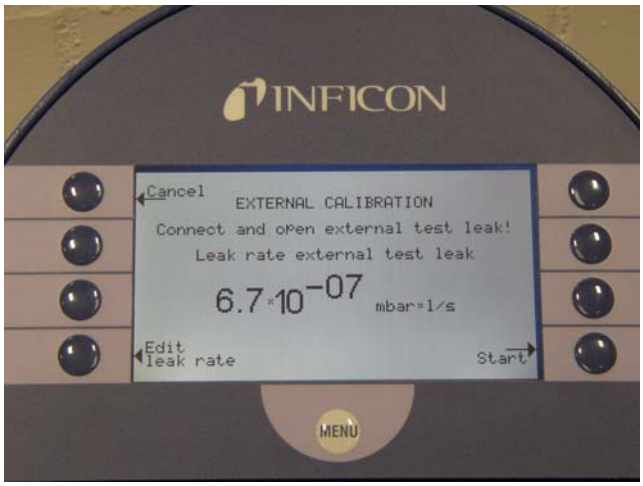
After choosing this calibration method the whole calibration runs automatically. At the end of the calibration (after about 25 s) a signal resounds. After that you can use the leak detector again.

When using a test leak with an electromagnetic valve, the valve can be connected to socket VALVES.

Notice The time to get a leak rate signal after opening / closing the test leak can be adjusted.
Please refer to 4.3.7.5, CAL setting time.

4.3.6.2 Manual External Calibration

- Main Menu > Calibration > External Calibration > Manual External Calibration



- 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. 4-1 Exteral Calibration, Step 1

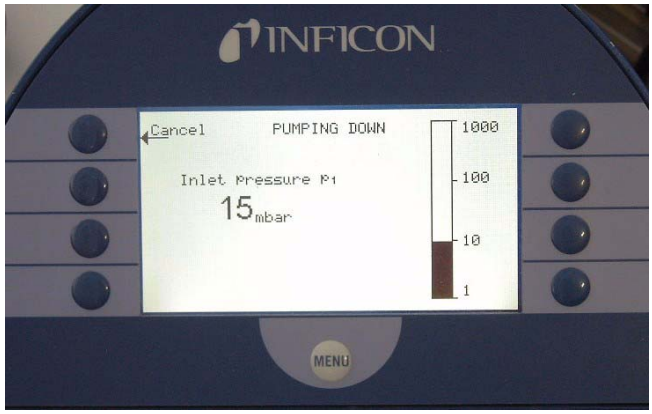
	• No action required.

Fig. 4-2 Exteral Calibration, Step 2

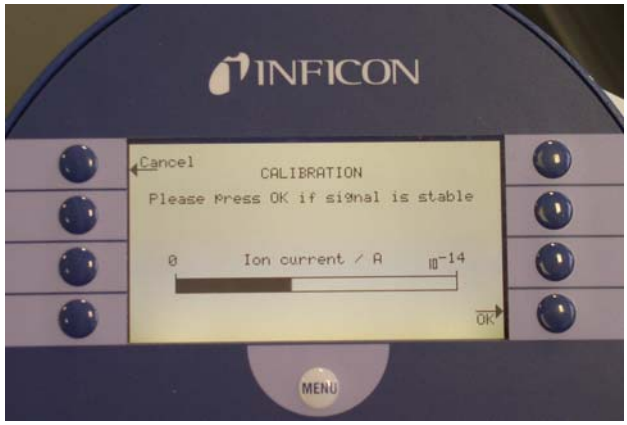
	• The bargraph display shows a signal which must not vary much. If so please press *OK* (Soft Key no. 8).

Fig. 4-3 Exteral Calibration, Step 3

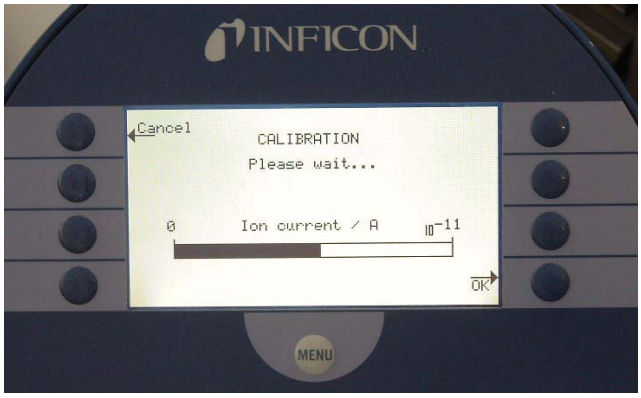
	• No action required.

Fig. 4-4 Exteral Calibration, Step 4

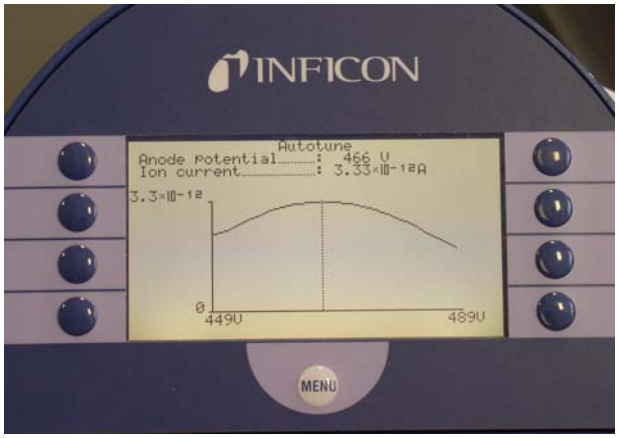
	• No action required.

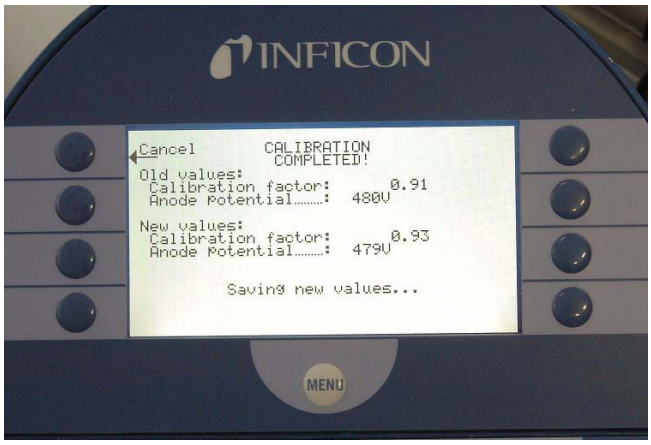
Fig. 4-5 Exteral Calibration, Step 5

	• Close the external leak standard and confirm with *OK* (Soft Key no. 8).

Fig. 4-6 Exteral Calibration, Step 6

	• 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. 4-7 Exteral Calibration, Step 7



- The Modul1000 displays the old and the calculated new calibration factor.

Fig. 4-8 Exteral Calibration, Step 8

4.3.7 Settings

- Main Menu > Settings

●	Back		Interfaces	●
●	Vacuum settings	**Settings**	Miscellaneous	●
●	Zero & Background		Parameter load / save	●
●	Mass		Monitoring functions	●

4.3.7.1 Vacuum Settings

- Main Menu > Settings > Vacuum Settings

●	Back		Auto Leak Test Settings	●
●	Automatic gas ballast	**Vacuum Settings**	Commander functions	●
●	Vent delay		Machine factor	●
●	Partial flow		Leak rate internal test leak	●

Automatic Gas Ballast

- Main Menu > Settings > Vacuum Settings > Automatic gas ballast

For purge modes it is recommended to use Helium-free gases at atmospheric pressure. Ambient air can be contaminated with Helium due to spraying or charging. In this case a gas supply line (i. e. nitrogen, fresh air, …) should be connected to the hose coupling. The pressure of these gas line must not exceed 1050 mbar.

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 Modul1000 will just change to Stand-by mode.

When the STOP button is pressed for a period of time which is longer than the delay time specified here, the Modul1000 will vent the inlet port.

Softkey 2: Immediately

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

Softkey 3: After 1 second

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

Softkey 4: After 1.5 seconds

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

Softkey 5: ?

Help

Softkey 6: after 2 seconds

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

Softkey 7: No vent

The inlet port cannot be vented with the STOP button.

Partial Flow

- Main Menu > Settings > Vacuum Settings > Partial Flow

At the connected partial flow pump the mode can be adjusted.

Soft Key no. 2 and 6:	Evacuation with or without partial flow pump
Soft Key no 3 and 7	Measurement mode with or without partial flow pump
Soft Key 8	OK

Saving of the adjusted parameters

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.

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

Machine Factor

- Main Menu > Settings > Vacuum Settings > Machine Factor

The machine factor takes into account that an additional external pump set is used. 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).

The machine factor can be estimated by taking into consideration the Helium absorbing capability of the Modul1000 and the external pump.

Exactly, this is the result of the measured leak rate of an external test leak on the test sample once with and then without the external pump. The difference between the two results is the machine factor.

Adjust the machine factor to the value 400 when using the helium sniffer QUICK TEST.

The machine factor can be used to correct the leak rate indication to an air equivalent reading. By using this setting the display reads the leak rate equivalent to air. (The machine factor for this correction is 3,7 x 10^{-1}). When using this setting the status is indicated on the display by COR.

Commander Functions

- Main Menu > Settings > Vacuum Settings > Commander Functions

Back		
Commander Timing	**Commander functions**	
Commander pressures		

Auto Leak Test Settings

- Main Menu > Settings > Vacuum Settings > Auto Leak Test Settings

Measuring time		Part number
Trigger level 1	**Auto leak test settings**	Reference measurement
Series error message		

Measuring time

The measuring time can be set from 1 second to 30 minutes

Settings:	**Interval:**
Time	
1 - 10 seconds	1 sec. steps
10 - 30 seconds	2 sec. steps
30 - 60 seconds	5 sec. steps
1 - 30 minutes	10 sec. steps
3 - 10 minutes	30 sec. steps
10 - 30 minutes	1 sec. steps

The duration of the test depends on the volume of the test chamber, the volume of the test item and the rejection rate.

Examples for time settings (the INFICON test chamber has to be used with a volume of 430 cm³):

Range of the rejection rate	Measuring time
10^{-5}	2 sec.
10^{-6}	2 sec
10^{-7}	2 sec
10^{-8}	>5 sec
10^{-9}	>10 sec*

* external calibration with a 10^{-9} test leak (e. g. TL 9) is requested.

Notice When the measuring time was changed a calibration is requested.

Trigger Level 1
The rejection leak rate for a component that shall be tested can lie in the range from 10^{-1} to 10^{-9} mbar l/s.

Serries Error Messages
The amount of the parts that failed the series measurement test can be set from 1 to 9. In mode DEACTIVATING this function can be switched off.

The the button OK was pressed a reference measuring can be done to clean the test chamber and to measure the Helium background. This output will be subtracted from the next result.

Part number
The number of the first part to be tested can be entred. The number will be counted up automatically until the next test cycle. In the mode DEACTIVATE this function is switched off.

Reference measurement
This mode can be used to clean the test chamber from Helium backgrounds or after a row of tests did fail. The chamber will be pumped dry and vented three times.

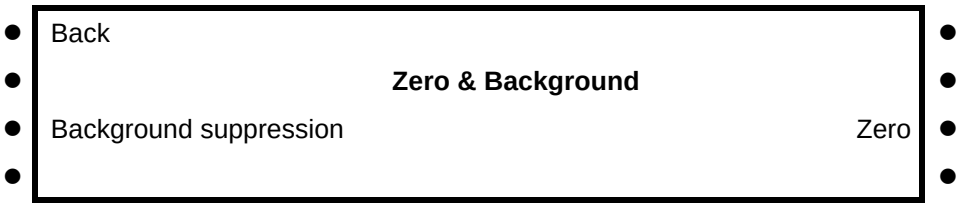
The reference measurement includes a calibration with the internal test leak TL of the Modul1000. After cleaning the current Helium background will be measured and subtracted from the result of the following measurement.

The new values of the measured background will be saved automatically.

Die neuen Werte des gemessenen Untergrundes werden automatisch gespeichert:

4.3.7.2 Zero and Background

- Main Menu > Settings > Zero & Background



Zero (with I•Zero)

- Main Menu > Settings > Zero (with I•Zero)

This setting activates (i. e. deactivates) the function at the Zero button on the operating unit.

The function I•ZERO allows set free the ZERO button only when the leak rate signal is stable. In this setting the increase of the falling background signal is measured. The leak rate signal has to be stable enough to find a leak in the size of the set leak rate of trigger 1. The I•ZERO function is disabled as long as the leak rate signal is not stable enough. (Increase of the falling background signal is set > 0,5 x trigger value 1.)

Soft Key no. 3: disabled

The ZERO button on the operating unit is disabled.

Soft Key no. 5 Help

Soft Key no. 6: I•Zero

Taste Nr. 7: enable

The ZERO function has to be activated with the ZERO button on the operating unit.

Background Suppression

- Main Menu > Settings > Zero & Background > Background Suppression

The Modul1000 stays clean after contact with Helium.

Soft Key 3: Off

The internal background suppression is switched off.

Soft Key 6: Inlet area

In this mode the Helium background will be subtracted every time when starting the measurement by pressing the START button.

Softkey 7 internal only

The internal background will be measured when pressing the START button and subtracted from the measuring signal.

4.3.7.3 Mass

- Main Menu > Settings > Mass

Back		
H^2	**Mass**	
He^3		He^4

The requested mass of the measured gas can be selected. The Modul1000 must be in Stand-by.

Softkey 2: H_2 (2 amu)

Hydrogen with the mass of 2 amu will be measured.

Softkey 3: ^3He (3 amu)

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

Softkey 7: ^4He (4 amu)

Helium with the mass of 4 amu will be measured.

4.3.7.4 Interfaces

Back		Define PLC outputs
Control location	**Interfaces**	Define PLC inputs
RS232 protocoll		Recorder output
External pressure gauge		Recorder scale

Control Location

- Main Menu > User Access > Interfaces > Control Location

Softkey 2: PLC

The Modul1000 is controlled via the Digital In connector (See Chapter Refer to chapter *2.3.2.3*). The START, STOP and ZERO buttons at the control panel are locked.

Softkey 3: RS232

The Modul1000 is controlled via RS232 interface by an external computer. In this mode the Modul1000 can not be controlled via keyboard. The START, STOP and ZERO button at the machine are deactivated.

Softkey 4: Not in use

Softkey 5: Local & PLC

The Modul1000 is controlled via the Digital In connector or the START, STOP and ZERO buttons at the control panel.

Softkey 6: Local & RS232

The Modul1000 is controlled via the Digital In connector or the START, STOP and ZERO buttons at the control panel.

Softkey 7: Local

The Modul1000 is controlled via the START, STOP and ZERO buttons at the control panel. The Digital In connector is not used.

RS232 Protocol

- Main Menu > User Access > Interfaces > RS232 Protocol

Softkey 3: Diagnostics

Gives the chance to read parameters, e.g. during maintenance.

Softkey 5: ?

Help

Softkey 6: UL2xx Leak Ware

Gives the chance to control and read measurement values when connecting to a computer.

Notice The calibration function of the Leak Ware is not appropriate to operate with the Modul1000.
Please execute the function „STORE DATE“ in the operating mode „Single Part Measurement“ for starting the record of the measured values.

Softkey 7: ASCII

Gives the chance to use the Modul1000 via a RS232 terminal.

Recorder Scale

- Main Menu > User Access > Interfaces > Recorder Scale

Here the scaling of the recorder output can be set. This setting is only valid for the setting “LR lin” or ”LR log” .

Softkey 2: Arrow up

Set decade of the upper limit value

Softkey No. 3: Arrow down

Scaling of the previously set value in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade. The complete voltage range is 10 V. (Only for signal “LRlog”)

Softkey No. 6: Arrow up

Set decade of the upper limit value

Softkey No. 7: Arrow down

Scaling of the previously set value in steps of 0.5, 1, 2, 2.5, 5, 10 Volt/decade. The complete voltage range is 10 V. (Only for signal “LRlog”)

Example:
Chart recorder output: “LRlog”
Upper limit value is set to 10^{-5} (= 10V)
Scaled to 5 V /decade
Lower limit value consequently is 10^{-7} (= 0 V)

Define PLC Outputs

- Main Menu > User Access > Interfaces > RS232 Protocol > Define PLC Outputs

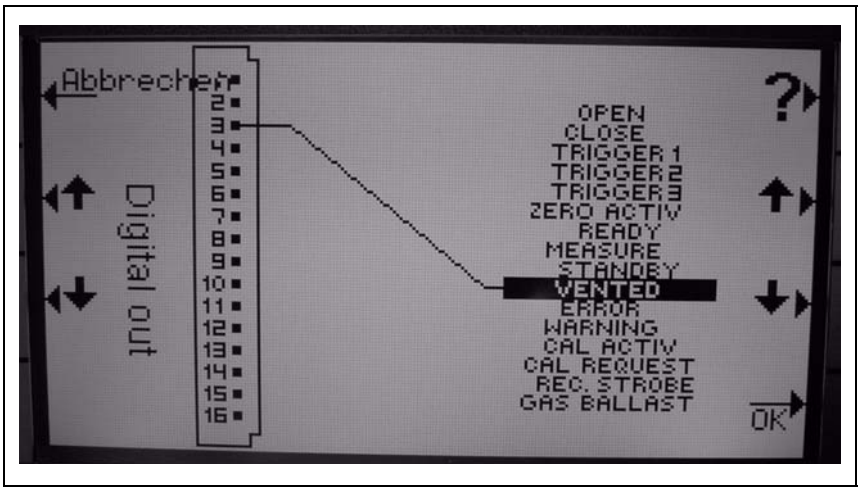


Fig. 4-9 Digital Out

In this submenu the connector pin assignment of the connector DIGITAL OUT can be configured to the status outputs. This characteristique of the relais contacts can be set. “function = contact closed” or “function = contact open”.

Soft Key 1 Cancel

Soft Key 2 Off
Choose connection of the connection pin of the DIGITAL OUT

Soft Key 3 Down
Choose connector pin of DIGITAL OUT

Soft Key 6 Up
Choose function

Soft Key 7 Down
Choose function

Soft Key 8 OK
Saving of the set parameter

1 Choose the connection pin with button 1 or 2 first,

2 then put with the buttons 6 or 7 the corresponding functions to this pin.

3 Choose next pin after that an set the corresponding function.

After setting all functions save with button 8.

Define PLC Inputs

- Main Menu > User Access > Interfaces > RS232 Protocol > PLC Outputs

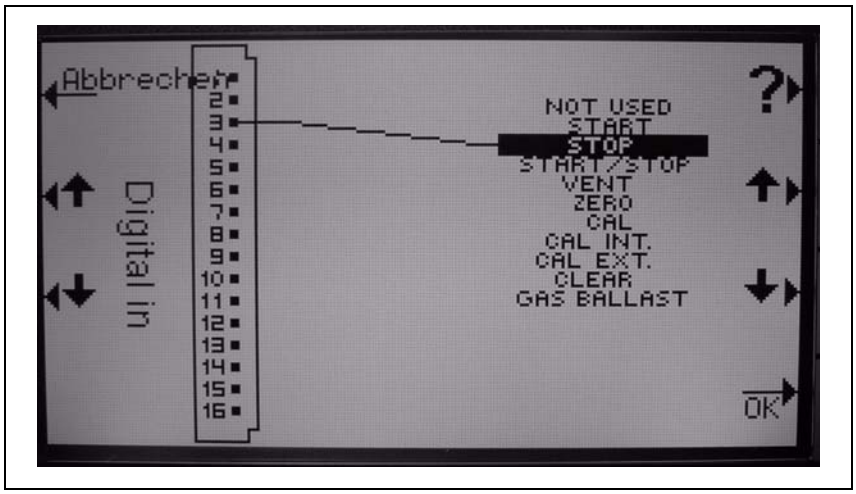


Fig. 4-10 Digital In

Soft Key 1 Cancel

Soft Key 2 Up
Choose connection pin of DIGITAL IN

Soft Key 3 Down
Choose connection pin of DIGITAL IN

Soft Key 6 Up
Choose function

Soft Key 7 Down
Choose function

Soft Key 8 OK
Save set parameter

1 Choose connection pin with button 1 or 2 first,

2 then put corresponding function with buttons 6 or 7 at this pin.

3 Choose next pin and set function.

After setting all functions save with button 8.

Recorder Output

The signals to be recorded can be selected in this submenu.

Softkey 1: Cancel
Return to the previous menu without any changes of the present settings.

Softkey 2: Arrow up
Adress recorder output 1 or 2

Softkey 3: Arrow down
Adress recorder output 1 or 2

Softkey 5: Help

Softkey 6: Arrow up
Behaviour recorder output. For further information see keywords below.

Softkey 7: Arrow down
Behaviour recorder output. For further information see keywords below.

Softkey 8: OK
Saving off chosen parameters

Fig. 4-11

Off

The recorder output is switched off.

p_1 / p_2

The fundamental output voltage is scaled logarithmic. The inlet pressure p_1 or the forevacuum pressure p_2 can be recorded.

The signals p_1 and p_2 have the characteristics of the Pirani gauge TPR265 (see chart in appendix).

LR lin

The leak rate output voltage is scaled linear. The fundamental voltage is 0-10 V in scalable steps from 0.5 to 10 volts per decade.

LR log

The leakrate is recorded on a logarithmic scale. The voltage output ranges from 1 … 10 V with steps of 0.5 V per decade.

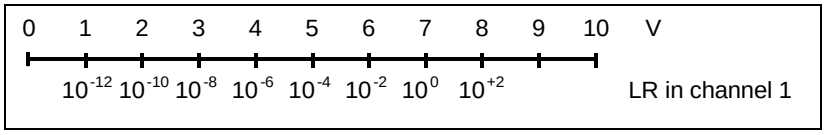


Fig. 4-12 Example of range of leak rate, log, 0.5 V/decade

LR mantissa

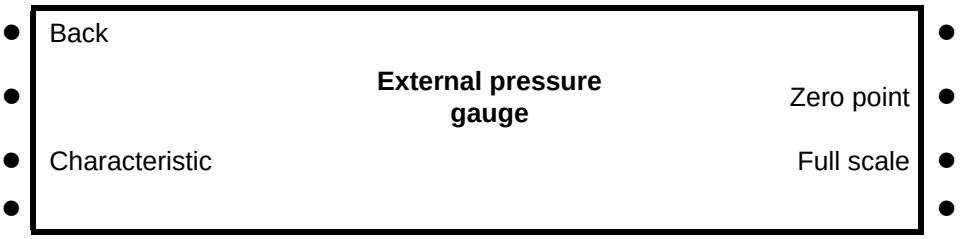
The leak rate mantissa is recorded linearly from 1 … 10 V.

LR exponent

The exponent is recorded. Step function: U = 1 … 10 V with steps of 0.5 V per decade, starting with 1 V = 1×10^{-12}.

External Pressure Gauge (ANALOG IN)

- Main Menu > Settings > Interfaces > External Pressure Gague



Characteristic
The characteristik can be entered: logarithmic or linear.

Zero
Zero (pressure value) of the connected sensor can be allocated to the corresponding current or working voltage.

Off Scale Reading
The off scale reading (pressure value) of the connected sensor can be allocated to the corresponding current or working voltage.

Save the allocation with button 8.

4.3.7.5 Miscellaneous

Date / Time

- Main Menu > Settings > Miscellaneous > Date / Time

Date and time can be changed on two subsequent pages.

Language

- Main Menu > Settings > Miscellaneous > Language

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

Leak Rate Filter

- Main Menu > Settings > Miscellaneous > Leak Rate Filter

The kind of the leak rate filter can be chosen. The default value is I•CAL.

Softkey 3: Fixed

A filter with a fixed time constant will be used.

Softkey 5: ?

Help

Softkey 7: I•CAL

I•CAL makes sure that the averaging time is optimal based on the leak rate level.

I•CAL stands for Intelligent Calculation Algorithm of leak rates. It makes sure that the signals are averaged in optimized time intervals, based on the leak rate intensity. I•CAL also eliminates noise peaks which are not related to leak rate signals and provides unexpected short response times for low leak rate signals.

The algorithm used provide excellent sensitivity and response time and is there for the recommended setting.

Service Interval Exhaust Filter

Here you can enter the service intervall of the exhaust filter.

Softkey 3: Down

Decrease of the service intervall steps of within 500 hours.

Softkey 5: ?

Help

Softkey 7: Up

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

Service Message Exhaust Filter

The exhaust filter must be maintained at regular intervals to ensure the correct function of the Modul1000. If the service message is activated, the Modul1000 reminds you of the required maintenance.

Softkey 3: Off

Softkey 5: Help

Softkey 7: On

Warning

If the service messages are ignored and the exhaust is not replaced a risk for overheating the Modul1000 exists.

Part number

- Main Menu > Settings > Miscellaneous > Part number

Automatic counting of testing items can be set.

CAL Settling Time

- Main Menu > Settings > Miscellaneous > CAL Settling Time

This is the time that runs when performing an automatic calibration (internal or external) from opening or closing the test leak valve until measure of the leak rate signal.

The CAL settling time can be set from 5 seconds to 5 minutes to get a stable signal for the calibration.

When performing internal automatic calibration the CAL settling time can be set to 5 seconds.

When performing an automatic calibration with an attached volume the time should be set >5 seconds, depending on the size of the test volume.

4.3.7.6 Parameter save / load

Back	**Parameter save / load**	Load default
Save as PARA SET 1		Load PARA SET 1
Save as PARA SET 2		Load PARA SET 2
Save as PARA SET 3		Load PARA SET 3

Allows the saving and loading of individual settings or setting back to default settings.

Soft Key no 2 to 4: The current settings can be saved under a free choosable name. The saving of 3 different sets is possible.

See Chapter

Soft Key no. 5: Load default values

Default values loaded again.

Soft Key no 6 to 8: One of 3 saved parameter sets can be loaded.

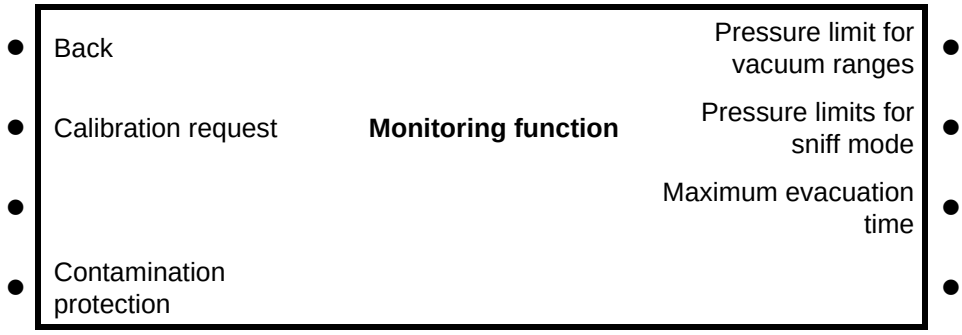
See Chapter

Load Parameters 1 to 3
By pressing the buttons 2,3 or 4 the saving of the current parameter starts. For this the set of parameters has to get a name. In case the proposed name shall be changed you can do this with button no. 4 „Save as PARA SET 3“. Otherwise press button 8 for saving.

Save Parameters 1 to 3
By pressing the buttons 2,3 or 4 the saving of the current parameters is set. For this the set of parameters is given a new name. When the proposed name shall be changed you can do this with “Changing name”. Otherwise press button 8 “saving”.

4.3.7.7 Monitoring functions

- Main Menu > Einstellungen > Diverses



Calibration Request

- Main menu > Settings > Monitoring functions > Calibration request

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

Softkey 3: Off

The calibration request will be switched off.

Softkey 7: ON

The calibration request will be switched on.

If the calibration request is switched on, a corresponding message will appear when 30 minutes have elapsed after power on or if the temperature of the Modul1000 has changed by more than 5 °C (9 °F) since the last calibration.

Contamination Protection

- Main menu > Settings > Monitoring functions > Contamination protection

If this mode is switched on the Modul1000 closes all inlet valves as soon as the measured leak rate exceeds the programmed leak rate. Thus no more Helium gets into the mass spectrometer. Helium that has gotten into the tool under test can be pumped away by the tool pump. If no extra pump is available it is recommended to vent the part before the test is continued.

Softkey 3: Off

Softkey 4: edit the limit value

Edit the limit value for switching off

Softkey 5: Help

Softkey 7: ON

Softkey 8: OK

Pressure Limits For Vacuum Ranges

- Main menu > Settings > Vacuum Settings > Pressure Limits For Vacuum Ranges

In this menu the factory set cross can be set from evacuating to measuring ULTRA. This can be necessary when other gases than air is pumped. The pressure signal of the inlet pressure display (Pirani) can show other switching values of the processing. By changing the switching point it can be balanced.

Soft Key no 3 and 7: Switching threshold EVAC-ULTRA

0,4 - 0,1 mbar (default value 0,4 mbar)

Soft Key no. 4 Settings for Argon

By pressing the button again default value for air appears

Soft Key no. 5 Help

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. The upper limit is 2 mbar, the lower limit is 0.02 mbar. 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 3 and 6: Setting of the maximal pressure: upper limit 2 mbar

Softkey 4 and 7: Setting of the minimal pressure: lower limit 0.02 mba

Softkey 5: Help

Maximum Evacuation Time

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

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

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

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

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

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

Softkey No. 2: ↓

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

Softkey No. 3: ↓

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

Softkey No. 5: ?

Help text

Softkey No. 6: ↑

Increasing maximum evacuation time until p1 < 100 mbar

Softkey No. 7 ↑

Increasing maximum time until measurement.

4.3.8 Information

- Main Menu > Information

4.3.8.1 View Settings

The current settings will be displayed on 4 pages, e.g. trigger levels, test leak mass, date and time.

4.3.8.2 View Internal Data

Information on measured internal data is provided on 4 screens.

4.3.8.3 Vacuum Diagram

The vacuum diagram of the Modul1000 is shown. Here you can see which valves are opend or closed momentarily and more.

4.3.8.4 Interfaces

The Interfaces DIGITAL IN, DIGITAL OUT, ACCESS, REMOTE, VALVES, RS232 can be read here.

4.3.8.5 Logged Data

- Main Menu > Interfaces > Logged Data

View Error List

Appearing errors of the machine are shown.

Servicelist

Time and date of the last maintenance is shown.

Calibration History

Contains the data of the calibrations done.

Test Log

Test logs are displayed.

Clear Test Log

Test log protocolls can be delected.

4.3.8.6 Calibration Factors

Soft Key no. 7

The calibration factors for the different masses and the machine factors are shown.

4.3.8.7 Service

Via the SERVICE MENU speciall functions can be used (i. e. manuall switching of the valves). The access to the SERVICE MENU is saved by a PIN. This PIN is not advised when the device is delivered but after a special service training. You will get further information in the Operating Instructions of the Service Menu.

4.3.9 Access Control

- Main Menu > Access Control

With this menu you can deny or allow access to specific functions of the Modul1000.

Fig. 4-13: The Access control menu

Softkey 4: Access to CAL function

Please refer to Chapter 4.3.9.1

Softkey 7: Change device PIN

Please refer to Chapter 4.3.9.3

Softkey 8: Change menu PIN

Please refer to Chapter 4.3.9.2

4.3.9.1 Access to CAL Function

- Main Menu > Access Control > Access to CAL function

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

Softkey 3: Off

The calibration function is only available at the main menu. If the Menu-PIN is activated you need this PIN to start a calibration.

Softkey 5: ?

Help

Softkey 7: ON

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

Softkey 8: OK

Save the settings and return to the previous menu.

4.3.9.2 Change Menu PIN

- Main Menu > Access Control > Change Menu PIN

The access to the Modul1000 can be restricted by a Device-PIN. If the Device-PIN is not 0000 the Modul1000 will ask for this PIN directly after power on. Without device-PIN the Modul1000 foes not even switch on the pumps.

Notice Under all circumstances memorize the PINs! The PIN can only be reset by INFICON's service organization.

4.3.9.3 Change Device PIN

- Main Menu > Access Control > Access to CAL function

The access to the Modul1000 can be constricted by entering or changing the device PIN. When the PIN differs from 0000 the Modul1000 requests the current PIN right after switching the device on. Without entering the device PIN you cannot use the Modul1000.

Notice Memorize the PINs by all means! The PIN can only be reset by INFICON's service organisation.

Notice Sich unter allen Umständen die PINs merken. Nur der INFICON Service ist in der Lage, die PINs zurückzusetzen.

4.4 Diagnosis Functions

4.4.1 Advices To Device Functions

The Modul1000 is equipped with a comprehensive self-diagnostic facilities. If an error or warning condition is detected it is indicated via the LC display to the operator.

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

Error and warning messages are logged and can also be displayed at a later time through the menu information.

Warning Messages

Warnings will be indicated

- when the Modul1000 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 Modul1000 will indicate a message on the LC display and will remain in the Stand-by or the measurement mode.

Warning messages will remain on the LC display until the warning has been acknowledged by pressing „OK“ (Key no. 8). After that the Modul1000 can be used again (possibly with some restrictions). As long as a warning status exists the status line shows a warning triangle.

The warning messages can be displayed in STAND-BY by pressing the button ⚠ (shows up when warning message occured).

Error Messages

Errors are events which force the Modul1000 to interrupt its measurement operations. In this case the Modul1000 closes all valves (Stand-by mode).

Error messages remain on the LC display until the message has been acknowledged by pressing „Restart“ (key no. 8). After that, the Modul1000 restarts with a new run-up procedure. In some cases it may be helpful to check some settings or measured values before the Modul1000 restarts. Therefore it is also possible to press „Menu“ (key no. 4 or Menu key) to enter the Modul1000 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 Modul1000. This watchdog will cause the Modul1000 to restart. After having done so, the instrument will be running in the Stand-by mode. No error message will be output.

4.4.2 Errors and Warnings

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

No.	Displayed Message	Description and possible solutions
W6	TMP frequency too high	
W7	TMP power supply faulty	
W8	TMP acceleration time too high	
W9	TMP connection TC to pump faulty	
W10	TMP controller faulty	
W11	TMP wrong resistor	
W12	TMP motor control faulty	
W13	Unknown TMP-Error	
W15	Leakrae is too high! Machine switched into stand-by to prevent contamination.	The survey function „contamination“ is activated. A leak rate higher than the set value was detected. • Gross leak • Switch off limit is set too low • Alarm delay time too short
W16	Turbo molecular pump service interval expired!	The service intervall for the turbo molecular pump is expired.
W17	Forepump service interval expired!	The service intervall for the fore pump is expired.
W18	Exhaust filter service interval expired!	The service intervall for the exhaust filter is expired.
W21	EEPROM write time out	EEPROM defective MC 68 defective
W22	EEPROM parameter queue overflow	EEPROM defective MC 68 defective

No.	Displayed Message	Description and possible solutions
E23	24V of the OPTION socket is too high	The tension 24V at socket OPTION is too high.
E24	24V at socket OPTION is too low.	• Fuse F2 on the I/O board has blown
E25	Receded valve voltage too low (< 7V).	• I/O board is faulty.
E26	External supply voltage (24V) too low	• Fuse F3 on interface board has blown
E27	External supply voltage (24V) too low	• Fuse F4 on interface 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 ist 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 preamplifier is too high (> 5mV).	• The preamplifier is faulty.
W32	Preamplifier temperatur is too high (> 60°C).	• Ambient temperature is too high. • Air filter dirty.
W33	Preamplifier temperature is too low (< 2°C).	• Ambient temperature is too low. • Temperature sensor is faulty.
E34	24V voltage at MSV board is too low!	Signal MVPZN on the MSV board is active. 24 V signal voltage is too low, U < 18.3 V. • Fuse F1 on the MSV board has blown. • 24 V power supply voltage is missing. *Switch off the Modul1000!* The missing voltage will cause the exhaust valve on the scroll pump to close which in turn can lead to a contamination of the vacuum system. • Reference voltage UREF on the MSV board XT7/1 is too high, U > 5 V.
E35	Anode-cathode voltage is too high!	• MSV board is faulty. • Anode-cathode voltage is higher than 130 V.
E36	Anode-cathode voltage is too low.	• MSV board is faulty. • Anode-cathode voltage is lower than 130 V.
E37	Suppressor voltage reference value too high!	Signal MFSZH on MSV board is active. Suppressor signal command variable is too high. • Suppressor voltage has a short circuit. • MSV is faulty.
E38	Suppressor potential too high!	Suppressor potential is higher than 363V. • MSV board is faulty.
E39	Suppressor potential is too low.	Supressor potential is lower than 297V. • MSV board is faulty.

No.	Displayed Message	Description and possible solutions
E40	The anode potential exceeds its norminal value by over 10%!	The actual anode potential exceeds its nominal value by 10%. The nominal value can be displayed in the service menu. • MSV is faulty.
E41	The anode potential has dropped below its nominal value by over 10%!	The actual anode potential has dropped below its nominal value by 10%. The nominal value can be displayed in the service menu. • Air inrush. • MSV is faulty.
E42	Nominal value of the anode potential is too high!	Signal MFAZH on MSV board is active. • Anode voltage has been short circuited. • Nominal value of the anode voltage is too high. Anode voltage is limited to about 1,200 V.
E43	Cathode current is too high!	• Signal MPKZH on MSV board is active. Cathode current is too high, I > 3.6 A. • MSV is faulty.
E44	Cathode current is too low!	• Signal MPKZN on MSV board is active. Cathode current is too low, I > 0.2 A. • MSV is faulty.
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. Modul1000 switches to cathode 2. Plesae order a new ion source.
W46	Emission for cathode 2 can can not be switched.	Signal MSIBE on MSV board is not active. Emission for cathode 2 can not be switched on. Modul1000 switches to cathode 1. Order a new ion source.
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.
E48	Anode heater is faulty!	Signal MSAFD on MSV board is active. Anode heater fuse has blown. Replace fuse F2 on the MSV board.
E49	Several test items in series failed! Please perform reference measurement!	Underground signal had risen
E50	No communication with turbo pump.	Clock from the frequency converter has failed. No communication to the frequency converter.
E52	TMP frequency is too low!	• TMP frequency is too low! • Frequency converter is faulty. • Turbomolecular pump is faulty.
W53	Temperature at electronic unit is too high (>55°C)	• Ambient temperature too high. • Ventilation failure. • Air filter dirty and have to be changed.
E54	Temperatur at electronic unit is too high (>60°C).	• Ambient temperature is too high. • Internal ventilation has failed. • Air filters are dirty and must be exchanged.

No.	Displayed Message	Description and possible solutions
W55	Temperature at electronic unit is too low (< 2°C)	• The temperature sensor on the wiring plane indicates T < 2 °C. Run-up time for the forevacuum pump will be longer. • Temperature sensor is faulty.
E56	Inlet pressure p1 too low!	U < 0,27 V; Cathode faulty. Change thermovac-sensor that measures p1.
E58	Foreline pressure p2 too low!	U < 0,27 V; Cathode faulty. Change thermovac-sensor that measures p2.
E60	p2 > 10 mbar after 5 minutes since power on	PV > 3.8 mbar after t > 5 minutes since switching on. Run-up time of the forevacuum pump is too long. • Forepump is faulty. • Valve V2 does not open.
E61	Emission fail.	Emission should be switched on. MSV subassembly indicates a fault. MENB emission current not within range.
W62	Flow through capillary to low.	In the sniffer mode the intake pressure of the sniffer line is controlled. If the pressure falls below the minimum limit, the flow through the capillary is too low (contamination) or the capillary is blocked (foreign objects, particles). The minimum limit can be set by the menu. Default value is 0.1 mbar. .
W63	Capillary broken	In the sniffer mode the intake pressure of the sniffer line is controlled. If the pressure exceeds the maximum limit, the flow through the capillary is too high (no leak tightness, broken capillary). The maximum limit can be set by the menu. Default value is 1.0 mbar. .
E64	Amplifier signal too high	
E68	TMP frequency is too low!	Sniffer not connected Sniffer leaky Frequency converter is faulty
E70	+/-15V supply voltage too low	DC/DC converter at MSV is faulty
E71	+/-15V supply voltage too high	DC/DC converter at MSV is faulty
E72	Emission off (p1 too high)	Air inrush
E73	Emission off (p2 too high)	PV >> 0.2 or 3 mbar due to an inrush, e. g. The Modul1000 will again try to resume the measurement mode.
E75	Maximum evacuation time exceeded!	Gross leak at test object.
W76	Maximum of evacuation time was exeeded.	• Test sample has got a GROSS leak. • False settings of the max. time of evacuation.
W77	Peak not in Range	The signal maximum has shifted to mass range alignment limits. • Signal of leak rate was instable during mass setting. Calibrate again. • Check the basic setting for the anode voltage through the service menu. • Check calibrated leak.
W78	Differences of signal between test leak open and closed is too low.	The amplifier voltage difference between opened and closed calibrated leak is less than 10 mV. Calibrated leak has not been closed properly.

No.	Displayed Message	Description and possible solutions
W79	Signal of test leak is too small	Calibrated leak is too small or has not been opened. Preamplifier voltage < 10 mV.
W80	Please calibrate machine newly	The automatic request of calibration is activated (Refer to chapter *7.2.1.1*) and has fullfilled at least one of the conditions: • 30 minutes are passed since energizing. • Temperature of the pre-amplifier has changed more than 5°C since the last calibration. • Mass settings were changed.
W81	CAL Factor too low	The calculated factor falls out of the valid range (< 0,1). The old factor is retained. Possible fault cause: • The conditions for calibration have not been maintained. • The leak rate of the internal calibrated leak which was entered is much too small. • The internal test leak is defect.
W82	CAL Factor too high	The calculated factor is out of the valid range (> 10). The old factor is retained. Possible fault cause: • The conditions for calibration have not been maintained. • The leak rate of the internal calibrated leak which was entered is much too high or much too small. • The internal test leak is defect or empty.
W83	All EEPROM parameter lost. Please check your settings.	• EEPROM on back plane is empty and was initialized with default valves. Enter all parameters again. • The EEPROM might be faulty when warning comes up again after power up.
E84	EEPROM parameter initialised! Please check your settings!	• Software update
W85	Lost EEPROM parameter! Please check your settings!	• Writting access was interrupted. Please check all settings. • An update of software was done. In this case the notice can be ignored. • When warning comes up again after powering up the EEPROM might be faulty.
E86	All I•Stick parameter lost! Please check you settings!	• I•Stick not connected. • I•Stick is empty. • I•Stick is faulty.
E87	I•Stick parameter initialised! Please check your settings!	Software update
E88	I•Stick parameter lost! Please check your settings!	I•Stick write access was interrupted I•Stick is faulty
E89	External supply voltage (24V) too low	Fuse F5 on interface board has blown

5 Technical Documents

5.1 Service And Maintenance At INFICON

If equipment is returned to INFICON, indicate whether the equipment is free of substances damaging on health or whether it is contaminated. If it is contaminated also indicate the nature of the hazard. For this you must use a *Declaration of Contamination* form which has been prepared by us which we will provide upon request or you may copy the form which has been reproduced on the next to the last page of this handbook.

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

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

5.2 Service-Centers

In case you urgently need assistance please get in touch with the local INFICON Service in your country or the service hotline in Cologne, Germany:

Country	Company	City	Phone	Fax	E-Mail
Brazil	PV Prest Vácuo Ltda.	Santana de Parnaíba	+55.11.870.2665	+55.11.870.2665	pv@prestvacuo.com.br
China	INFICON LTD	Hongkong	+852.2520.2880	+852.2865.6883	reach.china@inficon.com
		Beijing	+86.10.6590.0164	+86.10.6590.0521	
		Guangzhou	+86.20.8723.6889	+86.20.8723.6003	
		Shanghai	+86.21.6209.3094	+86.21.6295.2852	
France	INFICON	Vif	+33.4.7672.5215	+33.4.7672.5235	
Germany	INFICON GmbH	Cologne	+49.221.3474.2222	+49.221.3474.2221	leakdetection.service@inficon.com
Israel	Mark Technologies Ltd.	Kiriat Ono	+972.3.534.6822	+972.3.534.2589	
Japan	INFICON Co. Ltd.	Ibariki-ken	+81.298.89.2741	+81.298.89.2838	reach.japan@inficon.com
Korea	INFICON Ltd.	Seoul	+82.31.206.0237	+82.31.206.0239	reach.korea@inficon.com
Singapore	INFICON PTE LTD.	Singapore	+65.6890.6250	+65.6890.6266	reach.singapore@inficon.com
Taiwan	INFICON Company Limited	Chupei City, HsinChu Hsien	+886.3.5525.828	+886.3.5525.829	Susan.Chang@inficon.com
United Kingdom	INFICON Ltd.	Bolton	+44 1204 46 9930	+44 12 04 69 07 10	reach.unitedkingdom@inficon.com
United States	Inficon Inc.	East Syracuse, NY	+1.315.434.1167	+1.315.434.2551	service.usa@inficon.com
		Santa Clara, CA	+1.408.361.1200	+1.408.362.1556	
		Austin, TX	+1.512.448.0488	+1.512.448.0398	
Country	Company	City	Phone	Fax	E-Mail
Brazil	PV Prest Vácuo Ltda.	Santana de Parnaíba	+55.11.870.2665	+55.11.870.2665	pv@prestvacuo.com.br
China	INFICON LTD	Hongkong	+852.2520.2880	+852.2865.6883	reach.china@inficon.com

5.3 Maintenance

5.3.1 Basical Hints For Maintenance Work

Maintenance works of level II and III at the Modul1000 should be performed exclusively by an person authorized from INFICON GmbH in Cologne .

Key for the correspondingly repair level:

- I Repair level I Customer
- II Repair level II Customer with technical training
- III Repair level III INFICON service engineer

Caution

Please observe the security remark in this chapter.

Caution

Make sure the tools and the vicinity by working on vacuum systems are kept clean.

Danger

For all maintenance on the Modul1000 the mains power must be disconnect first.

Notice Maintenance work must be performed as described in the following maintenance plan. If the maintenance rates will not be followed the Modul1000 will loose the warranty

A maintenance contract is recommended.

When it is time to maintenance the machine after 1500/4000/8000 hours it will be shown as a warning message at the display of the Modul1000. The message will be displayed until the maintenance rate is met.

The 1500 hours maintenance can vary depending on the application of the leak detector.

5.3.2 Key for Maintenance Schedule

I	Repair level I	Customer
II	Repair level II	Customer with technical training
III	Repair level III	INFICON service engineer
X	Perform maintenance work after operating hours	
X_1	only operating hours, no limit of time	
1	depends on environment and application	
2	depends on application	

5.3.3 Maintenance Plan

Assembly	Required maintenance Modul1000	Operation hours/Years 1500	4000	8000	16000	Repair level	Part no.
		1/4	1	2			
Vacuum system							
Valve bloc	Clean the valves, replace seals for valves		2	X		III	200000594
	Take apart the valve bloc and clean it			2	X	III	200000593
	Replace filters for vent- and purge line		1	X_1		I, II ,III	200000683
	Adjust the Pirani			X		III	
Electric							
Fans assembly	Clean fans at chassis plate and side wall e.g by pressurized air	1	X_1			I	
	Exchange spare filter cell for fans chassis plate	1	X_1			I	200001552

5.3.4 Maintenance Groups

The maintenance plan for the Modul1000 can be subdivided in 4 maintenance groups.

- 1500 hours maintenance
- 4000 hours maintenance
- 8000 hours maintenance

1500 Hours Maintenance

The 1500 hours maintenance can be performed by an operator or a maintenance person.

The filter cell in front of the fans should be checked and replaced if dirty. By operating under worth conditions, the maintenance rates can be appropriatly reduced.

Work to be performed	Required materials	P/N
Check and / or replace filters	Spare filter cell for the fans	200001552

4000 Hours Maintenance

The 4000 hours maintenance should be performed by an INFICON service technician or another authorised person at least yearly.

Independently of 4000 working hours the lubricant reservoir of the Turbomolecular pump and the oil in the Fore pump should be replaced at least yearly.

Notice The internal Helium standard leak certificate is valid for one year after delivery. The annual refurbishing of the internal Helium standard leak is recommended and an other certificate will be delivered. The internal Helium standard leak can be refurbished at INFICON GmbH in Cologne exclusively.

Work to be performed	Required materials	P/N
Replace the Lubricant Reservoir of the Turbomolecular Pump TMH 071	Lubricant Reservoir for TMH 071	200000577
Check and / or replace filters	Spare filter cell for the fans	200001552
Functional check and adjustement		

The maintenance work will take approximately 1 hour.

8000 Hours Maintenance

The 8000 hours maintenance should be performed by an INFICON service technician or an other authorized person.

Work to be performed	Required materials	P/N
Restore the Lubricant Reservoir TMH 071	Lubricant Reservoir for TMH 071	200000577
Replace the seals for valves	Set of seals for valves	200000594
Check and / or replace filters	Spare Filter Cell for the fans Spare Filter for venting and purge line	200001552 200000683
Functional check and adjustement		

The maintenance work will take approximately 2 hours.

5.4 Description Of The Maintenance Work

Only trained specialist staff can performe more changes at the Modul1000 than the normally maintenance work.

Danger

The protective conductor screw at the chassis plate should not be loosened. The operator is not protected against electric shock by working without a protective conductor line.

5.4.1 Opening the Modul1000

Pull the mains plug before opening the unit!

For opening the box two closures have to be loosend.

- So take an 8 mm hexagon socket key,
- put it into the hole and
- turn it right.

Fig. 5-1 Closing and opening

Pos.	Description	Pos.	Description
1	Opening	2	Closing

Than pull the screw upwards away from the chassis.

Attend when putting the box onto the chassis that it is not scourig and clamping.

5.4.2 Check / Replace The Filter Cell

The filter cell in front of the fans should be checked every three months (under worth conditions mothly). If the filters cells are dirty then you should replced them. They allow to reduce the cooling power of the turbo pump and the leak detector.

Required material

Spare Filter cell P/N 200001552

Danger

Unplug the power cord from the Modul1000 before opening one of the side covers.

- Catch the filter cell by using your two fingers and pull it out of the guide plate. You can also press the filter to the front with an appropriate tool throw the ejection drilling located at the back side.

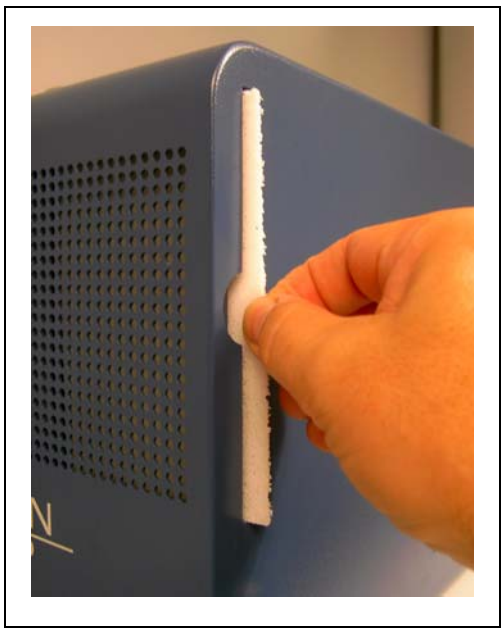


Fig. 5-2 Replacing the filter cell

5.4.3 Turbomolecular Pump TMH071

The turbomolecular pump requires a maintenance annually or every 4000 working hours. Please refer to the PFEIFFER operating instructions PM 800 504 BN/F and PT 0017 BN/B for more detailled informations. The maintenance work should be performed by the INFICON service or an authorized INFICON service partner.

5.4.3.1 Changing Of The Lubricant Reservoir

There is a lubricant reservoir in the TMH072 for greasing the lower stock. It has to be changed after 4000 operating hours or at least after one year.

Needed tools:
Special key for opening the lid of the TMH071.

Needed material:
Operating Lubricant Reservoir (Best Nr. 200 000 577)

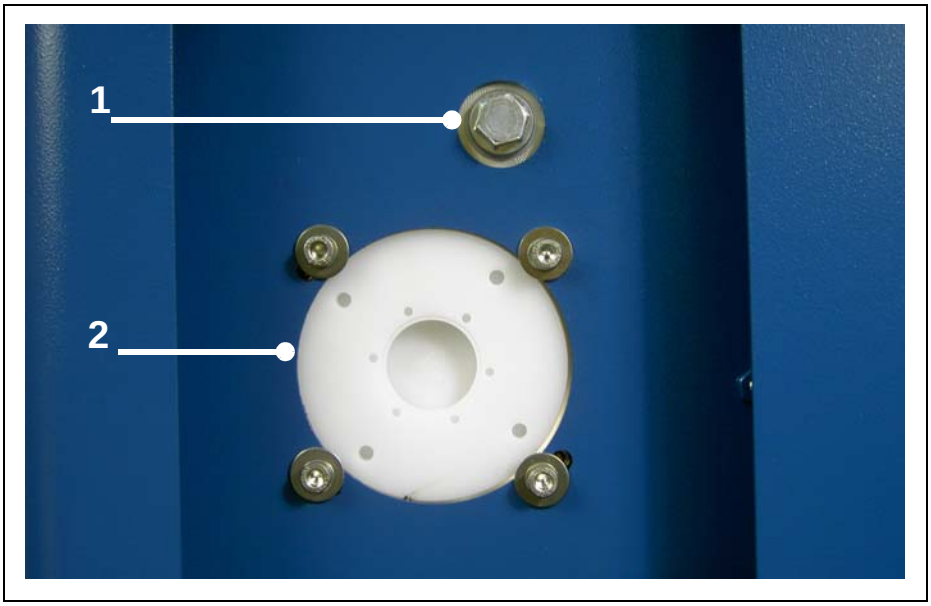


Fig. 5-3 Opening at the bottom

Pos.	Description
1	Connection of the fore vacuum pump
2	Lid of the turbo pump

Notice Before opening the lid the mass spectrometer and the turbo pump have to be vented.

Switch the Modul1000 in the service mode and open the valves V2 and V4.

1. Swich off Modul1000
2. Disconnect the mains plug
3. Screw off the lid with special tool
4. Take out the lubricant reservoir
5. Put in new lubricant reservoir
6. Put lid on again
7. Put the Modul1000 in operation again.

5.4.4 Changing Of Fuses

More functions than the main fuses are secured individually. Change the fuses as follows:

1. Switch off Modul1000,
2. Pull off mains,
3. Take off box,
4. Change fuses,
5. After that put the box on the chassis again and lock it.

The following fuses are on the I/O board

F1,	1 AT,	Control panel
F2,	1 AT,	RS232 interface
F3,	0,8 AT,	Supply ANALOG IN
F4,	1,6 AT,	Supply VALVES
F5,	1 AT,	Supply V30 ... V33
F6	1 AT,	Supply V34 ... V37

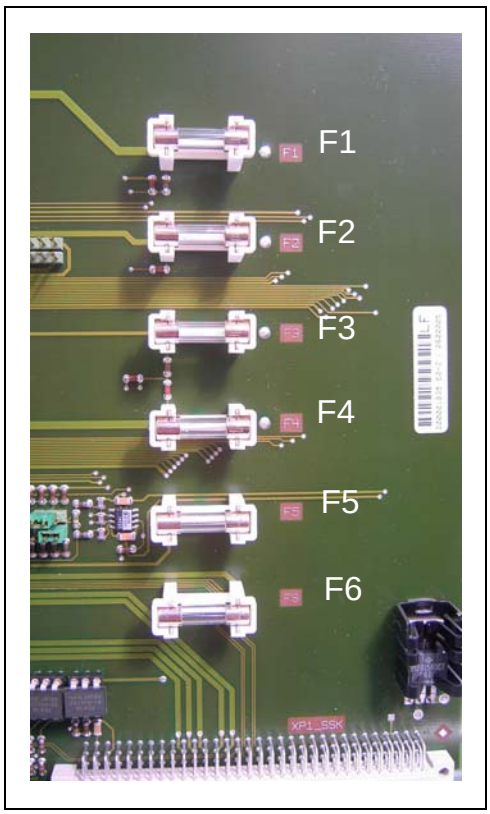


Fig. 5-4 Fuses

5.4.5 Change Parameter Memory I•Stick

The parameter memory is on the base of the card. Before taking out take off the box first (e. g. when you change the Modul1000). The I•STICK is secured with two screws. Loosen this screws and pull out the I•STICK out of the base.

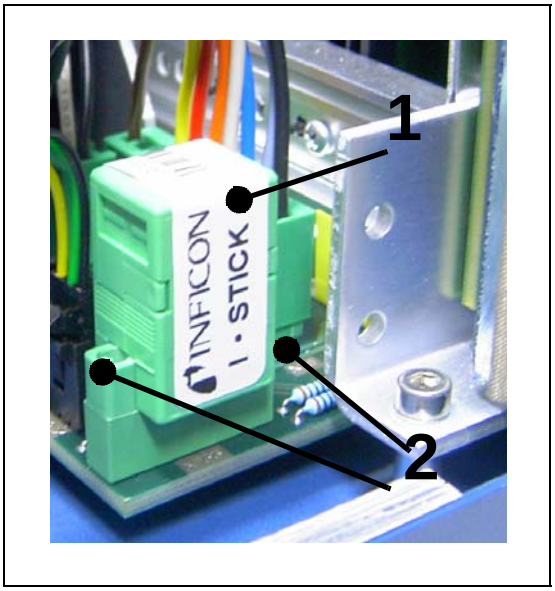


Fig. 5-5 Exchanging of the parameter memory

Pos.	Description
1	I•STICK
2	Fastening screw

5.4.6 Integrated Test Leak TL7

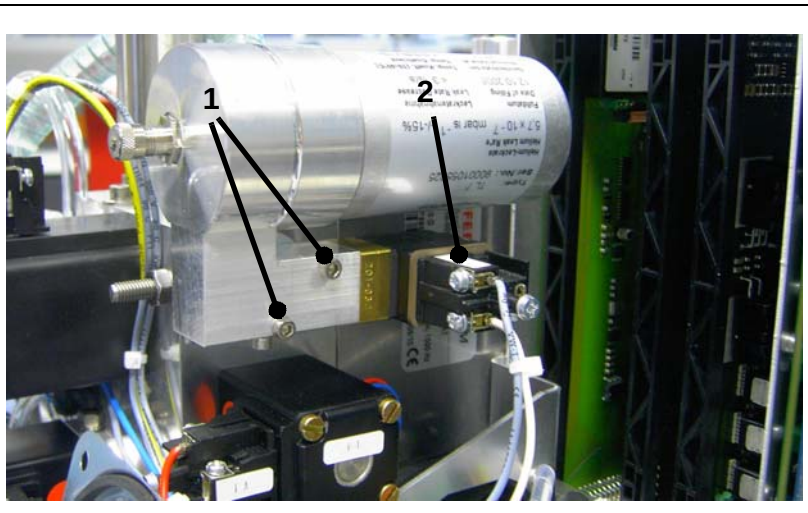


Fig. 5-6

Pos.	Description
1	Fatening screws
2	Plug for electrical connection

The integrated test leak with Helium storage can be used for easily adjusting the integrated mass spectrometer as well as for calibrating the leak rate display.

It is equipped with electromagnetic valve that is controlled via the Modul1000. To remove the TL7 (i.e. for recalibration) disconnect the plug and remove the 2 screws.

It is recommendet to recalibrate the test leak every year.

6 Attachment

6.1 Declaration Of Decontamination

INFICON

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product
Type _____
Article Number _____
Serial Number _____

2 Reason for return
_____

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

4 Process related contamination of product:

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

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

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

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

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

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

6 Legally binding declaration:
I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____
Address _____ Postcode, place _____
Phone _____ Fax _____
Email _____
Name _____

Date and legally binding signature _____ Company stamp

This form can be downloaded from our website.

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

INFICON GmbH
Bonner Str. 498,50968 Cologne, Germany
Tel: +49 221 3474 2222 Fax: +49 221 3474 2221
www.inficon.com leakdetection.service@inficon.com

zisa01e1-a

Fig. 6-1

6.2 Declaration of Conformity

INFICON

CE

EEC Declaration of Conformity

We – INFICON GmbH - herewith declare that the products defined below meet the basic requirements regarding safety and health of the relevant EEC directives by design, type and the versions which are brought in to circulation by us.

In case of any products changes made without our approval, this declaration will be void.

The products meet the requirements of the following directives:

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

Designation of the products:
Modular Leak Detector

Model: Modul 1000

Catalogue numbers:
550-300
550-310

Applied harmonized standards:

- EN 61010 - 1 : 2001
- EN 61000-6-4 : 2001 Part EN 55011 Class A
- EN 61000-6-2 : 2005 Parts EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11

Cologne, November 13, 2006

Dr. Döbler, Manager

Cologne, November 13, 2006

Finke, Research and Development

modul1000.13.11.2006.engl.doc

INFICON GmbH
Bonner Strasse 498 (Bayenthal)
D-50968 Köln
Tel.: (0221) 3474-0
Fax: (0221) 3474-1429
http://www.inficon.com
e-mail:LeakDetection@inficon.com

Fig. 6-2

6.3 Connector Pin Assignment

6.3.1 Digital In

All inputs are accomplished as an optocoupler.

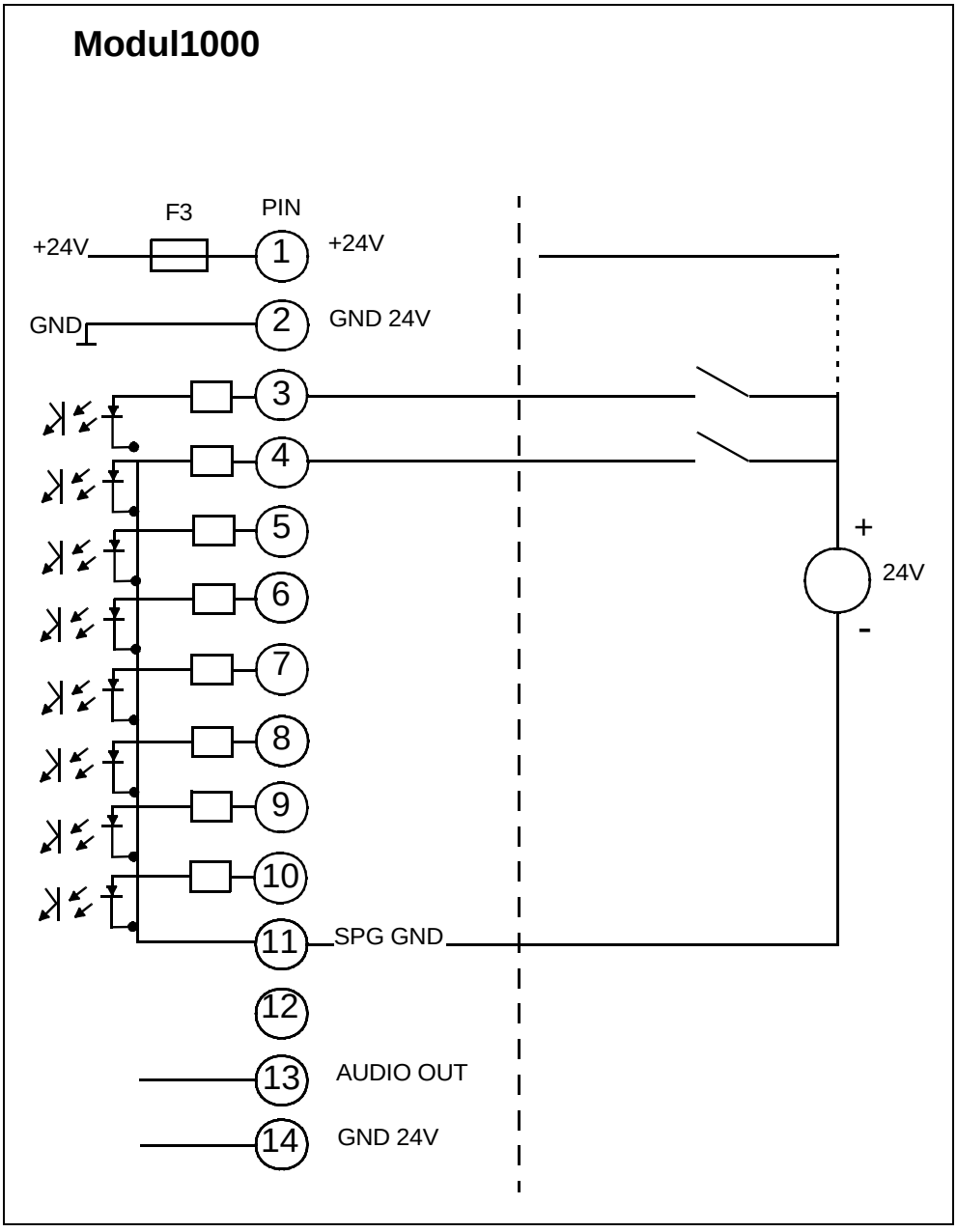


Fig. 6-3 External circuit, e. g. PLC

6.3.2 Digital Out

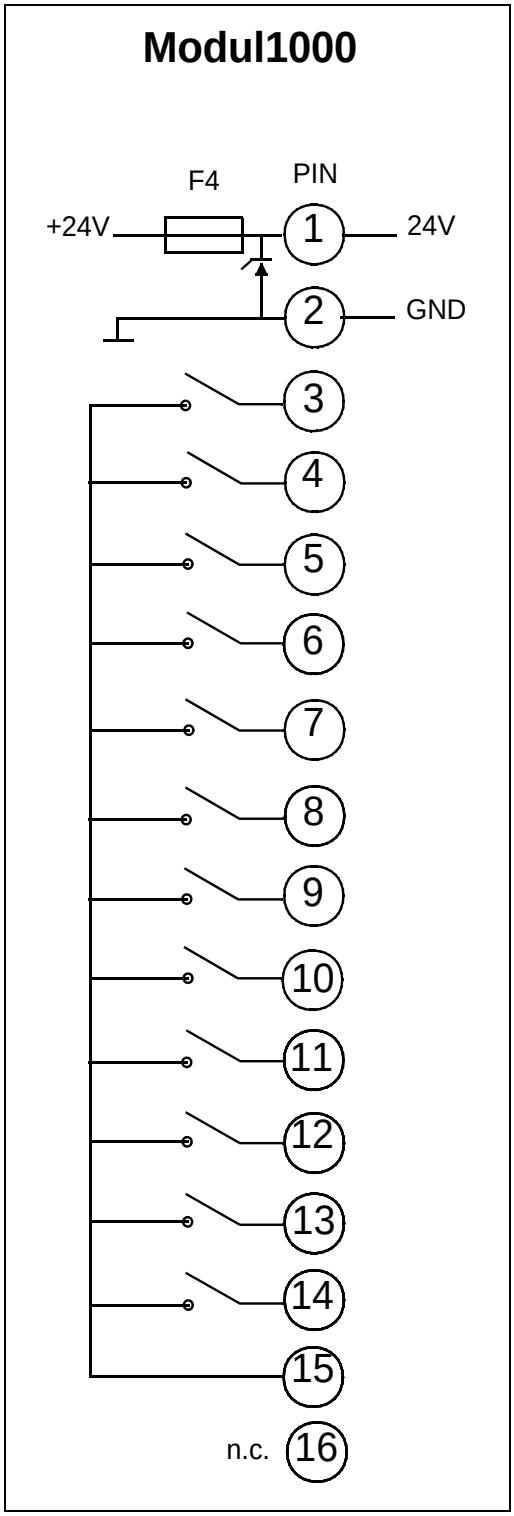


Fig. 6-4 DIGITAL OUT

PIN 3 - 12: Relais contact, max. 60V DC / 25V AC / 1A

PIN 13, 14: Semiconductor relais

6.3.3 Analog In

Connection of sensor with 4 … 20mA signal (set the jumpers on the I/O board appropriate to it).

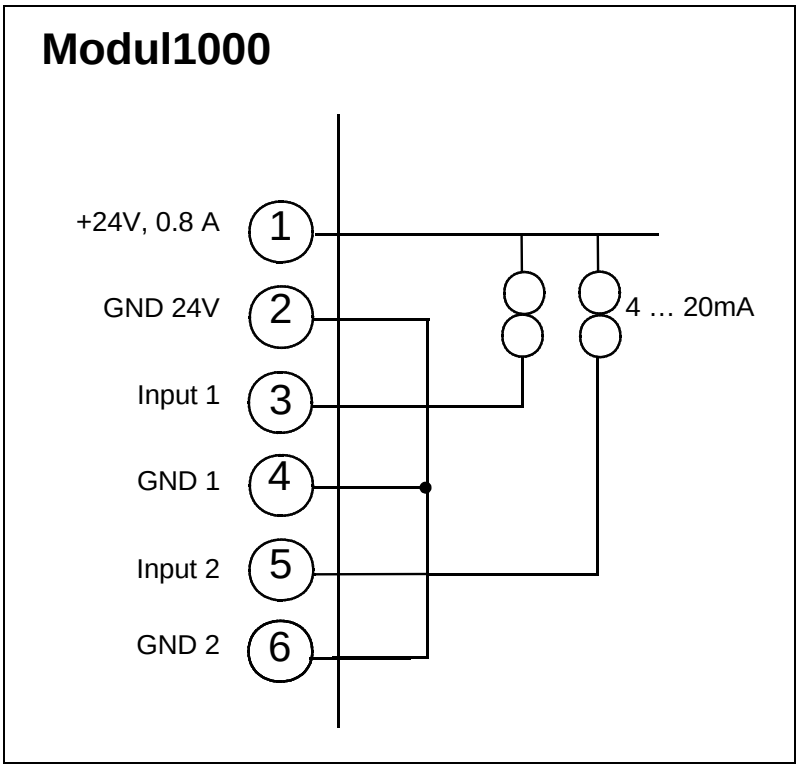


Fig. 6-5 Internal supply +24V

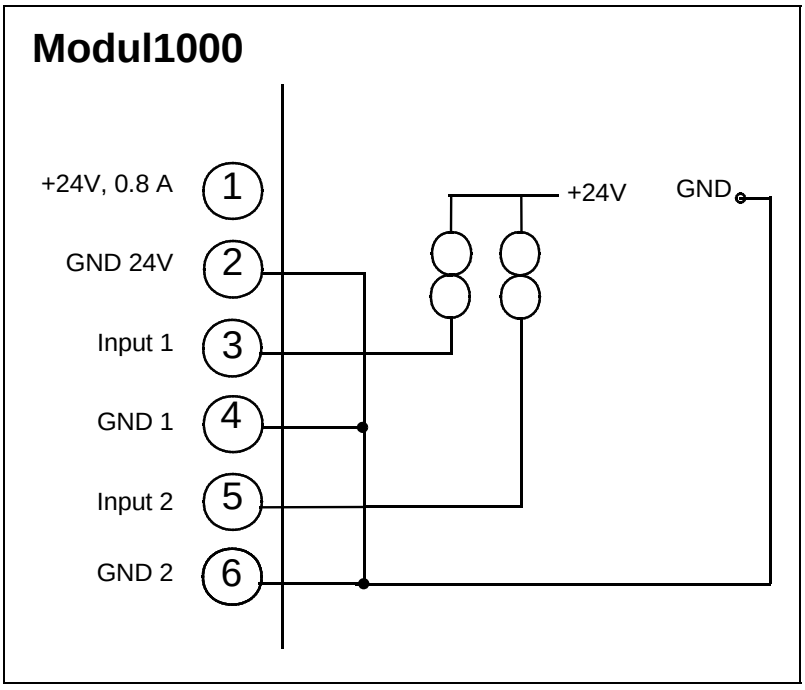


Fig. 6-6 External supply 24V with common GND

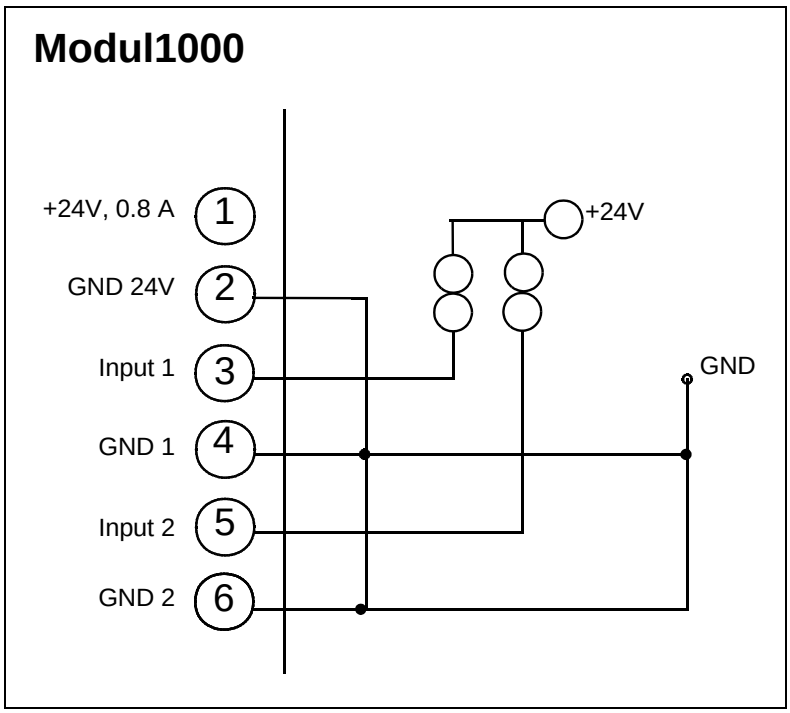


Fig. 6-7 External sensor supply 24V with seperated ground

Connection of sensor with 0 … 10V signal

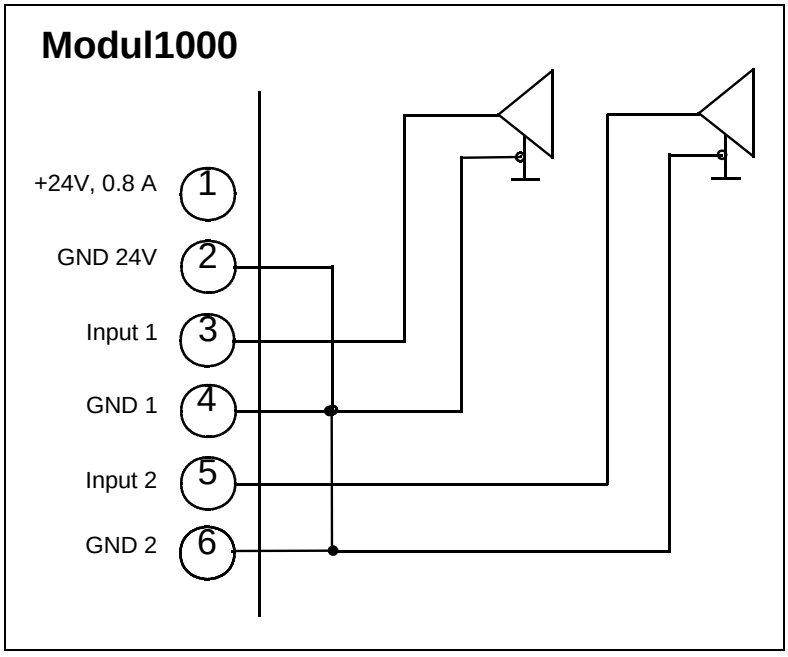


Fig. 6-8 Connection with common ground

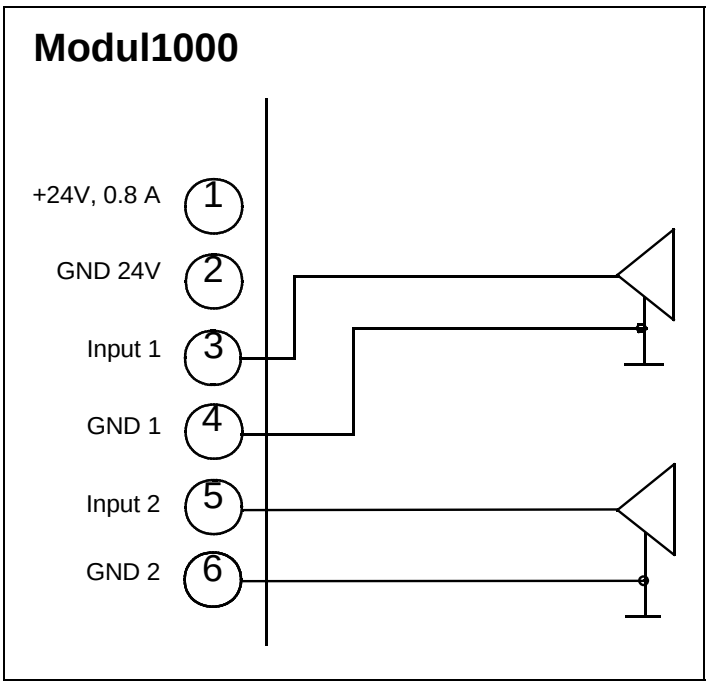


Fig. 6-9 Connection with separated ground

The difference of the voltage between PIN 2 and PIN 4 / 6 may maximally be ±5V.

6.3.4 Valves

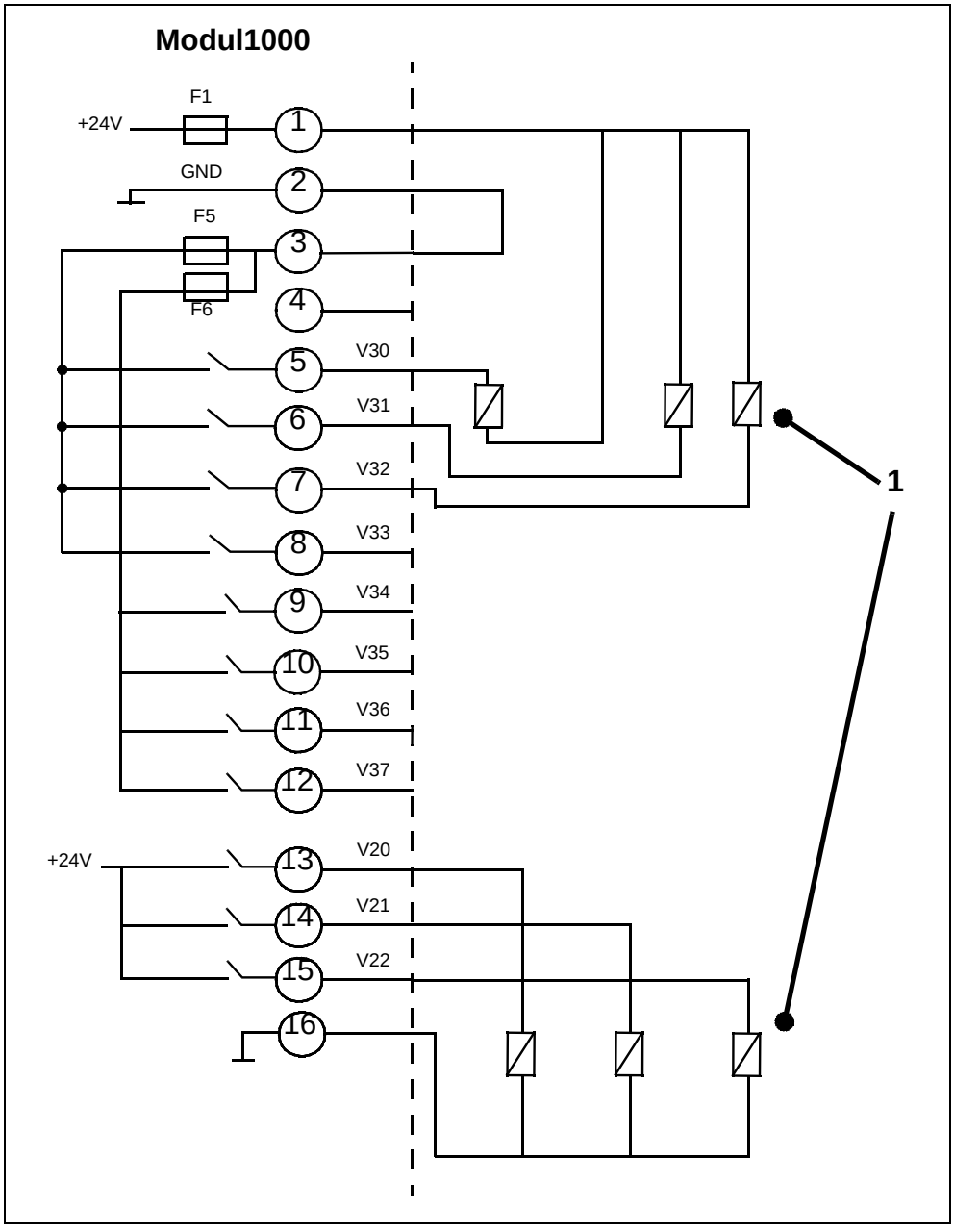


Fig. 6-10 Example for connections

Pos.	Description
1	Valves

6.3.5 Recorder

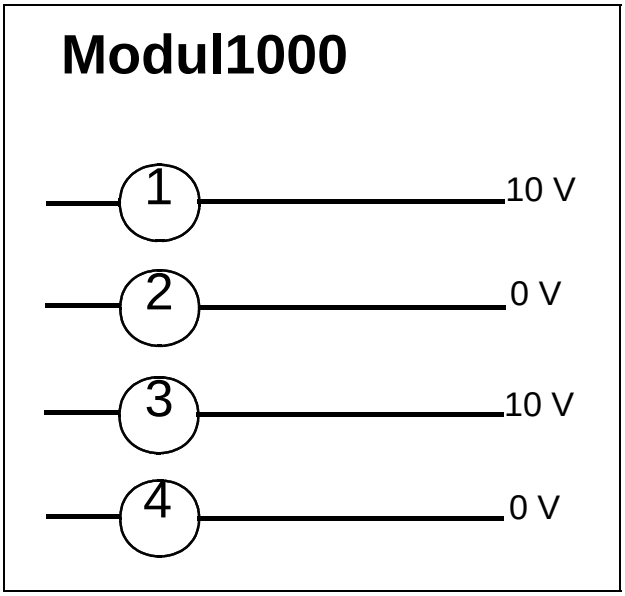


Fig. 6-11 Recorder output

6.4 Assembly Drawing For Display Unit

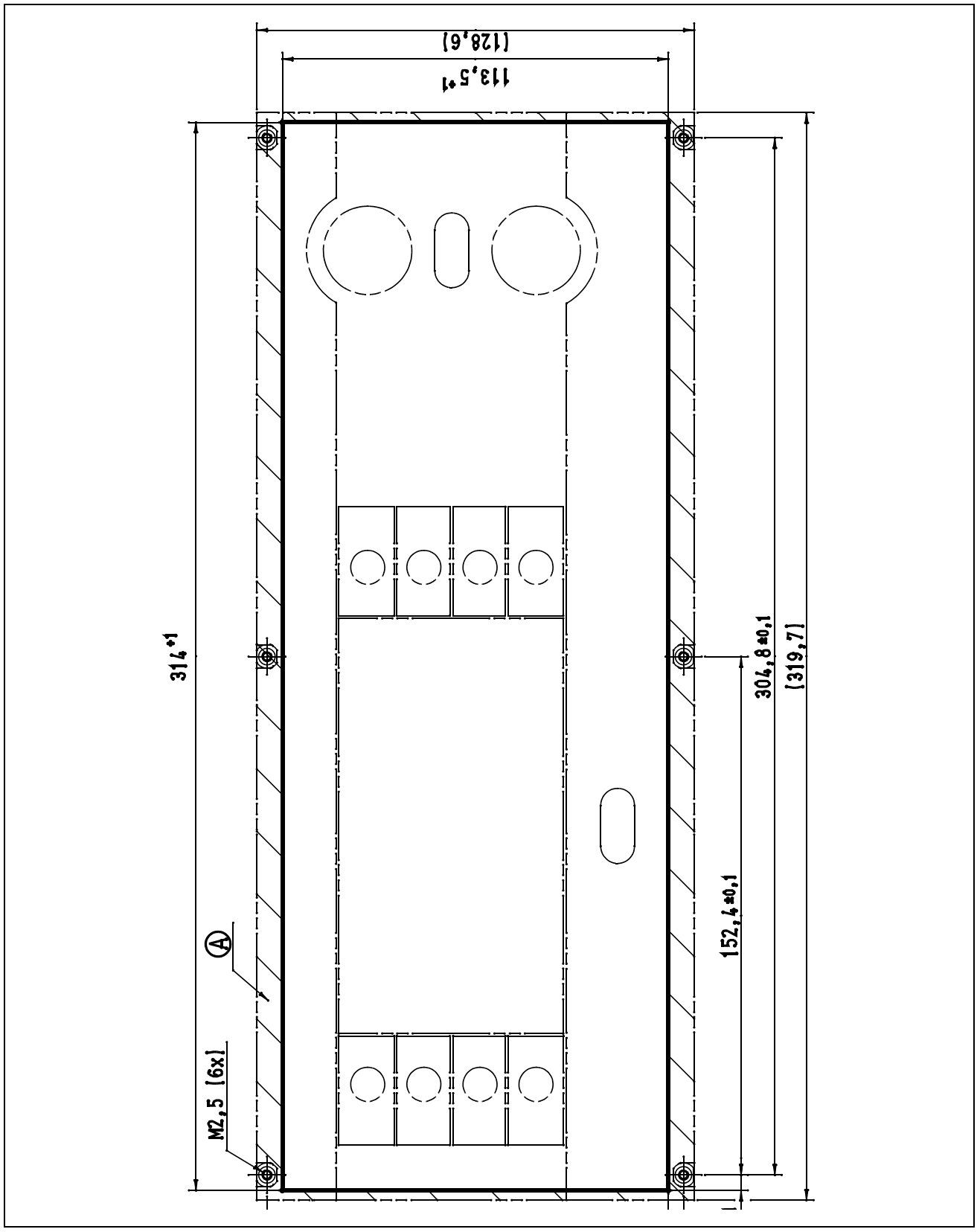


Fig. 6-12 Cut out drawing for 19'' rack display unit

6.5 Menu Structure

Main Menu Modul1000				
	View	Skale linear / logarithmic		
		Display range auto / manual		
		Time axis		
		Contrast		
		Background in stand-by		
		Lower display limit		
	Mode	Commander		
		Sniff		
		Auto leak test		
		Vacuum		
	Trigger & Alarms	Trigger level 1		
		Trigger level 2		
		Trigger level 3		
		Volume		
		Units		
		Alarm delay		
		Audio alarm type		
	Calibration	Internal automatic		
		Internal manual		
		External automatic		
		External manual		
	Settings	Vacuum settings	Automatic gas ballast	
			Vent delay	
			Partial flow	
			Leak rate internal test leak	
			Commander functions	
			Machine factor	
			Auto leak test settings	Measuring time
				Trigger level 1
				Series error messages
				Part number
				Reference measurement
		Zero & Background	Background suppression	
			Zero (with I•Zero)	
		Mass		
		Interfaces	Control location	
			RS232 protocoll	
			External pressure gauge	
			Define PLC outputs	
			Define PLC inputs	
			Recorder output	
			Recorder scale	
		Miscellaneous	Time / date	
			Language	
			Leak rate filter	
			Service intervall exhaust filter	
			Service messge exhaust filter	
			CAL setting time	
			part number	
		Parameter save / load	Save as PARA SET 1	
			Save as PARA SET 2	
			Save as PARA SET 3	
			Load default	
			Save as PARA SET 1	
			Save as PARA SET	
			Save as PARA SET 3	
		Monitoring functions	Calibration request	
			Contamination protection	
			Pressure limits for vacuum ranges	
			Pressure limits for sniff mode	
			Maximum evacuation time	
	Information	View settings		
		View internal data		
		Vacuum diagram		
		Interfaces		
		Logged data		
		Calibration factors		
		Services		
	Access Control	Access to CAL function		
		Change device PIN		
		Change menu PIN		

6.6 Output Characteristics Pirani Gauge

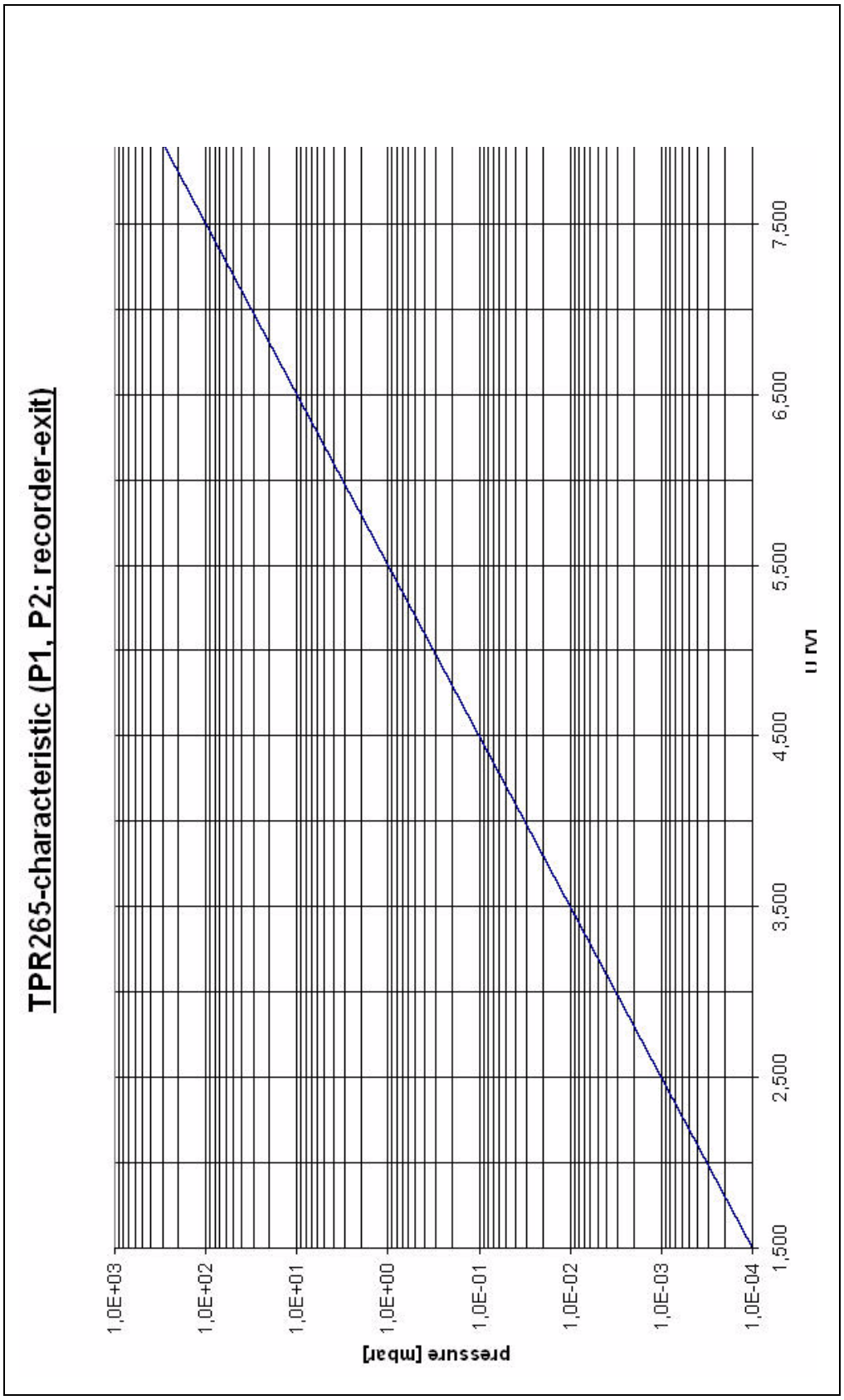


Fig. 6-13 TPR265-characteristics

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INFICON GmbH, Bonner Strasse 498, D-50968 Cologne, Germany
Phone: +49 (0)221 347-40 Fax: +49 (0)221 347-41429 E-mail: leakdetection@inficon.com

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