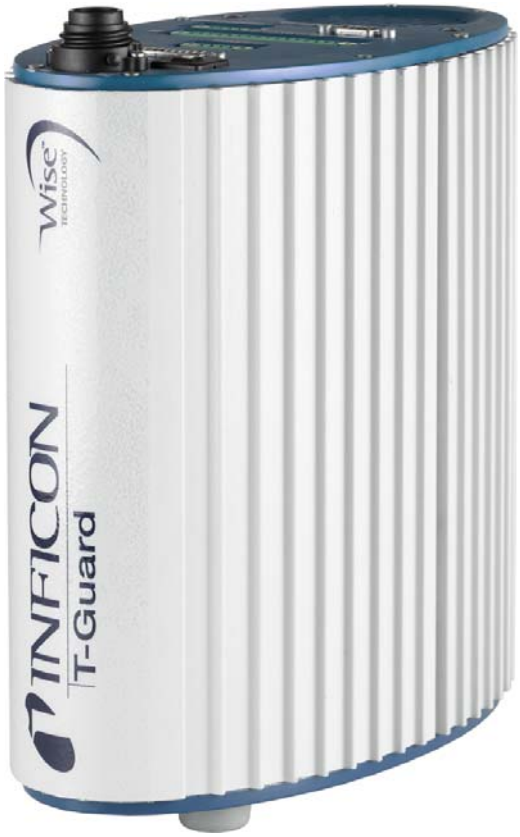
T E C H N I C A L H A N D B O O K

jina85e1-f (1112)



catalog no.
540-001
540-002

from software version 1.6

T-Guard™

Sensor for Leak Detection

INFICON

Printed in Germany

INFICON GmbH

Bonner Straße 498
50968 Cologne

Germany

(1112)

jina85e 0.fm

Content

(1112)

T-Guard EN_jina85IVZ.fm

1 Operating instructions

1.1 How to use this manual

- Please read this manual before using the T-Guard™ Leak Detection Sensor.
- Keep the manual in a way that you can use it at any time.

The INFICON T-Guard™ Leak Detection Sensor has been designed for safe and efficient operation when used properly and in accordance with this Technical Handbook. It is on the user's own responsibility carefully to read and strictly to observe all safety precautions described in this chapter and throughout this Technical Handbook. The T-Guard™ Leak Detection Sensor must only be operated under the conditions described in this Technical Handbook. It must be operated and maintained by trained personnel only. Consult local, state, and national authorities regarding specific requirements and regulations. In case you have any further queries on safety, operation and/or maintenance, please contact our office nearest to you.

1.2 Warning and danger symbols

Warning

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

Caution

Indicates procedures that must strictly be observed to prevent damage to, or destruction of T-Guard™ Leak Detection Sensor.

(1112)

jina85e 1.fm

1.3 Graphic conventions

Notice Points to very useful pieces of information.

1 Points to an operation that you have to perform.

⇒ Points to the result of an operation you accomplished.

→ Points to the button you have to press.

- Shows a listing.

1.4 Glossary

Sensitivity

Characterises the ratio of the helium signal to the measured signal.

I·Stick

Optional memory extension of the T-Guard™ Leak Detection Sensor.

Calibration

Equalisation of measured signal and leakage rate.

Measuring time

Time from the beginning of the measurement to the output of the results.

Parameter set

Group of parameters, e.g. measuring time, chamber volume, carrier gas, etc.

RS232

Interface standard for data communication between electronic devices.

Purge

Removal of excessive helium from the air.

T-Guard

Tracer (Gas) Guard

Carrier Gas

Large gas flow which transports a small gas flow.

Trigger

Limit value of the rejection leakage rate for the detection of leaks of the test sample.

Background

The air contains 5 ppm (0.0005%) of helium by nature. For good measurements with the T-Guard, the helium content in the air must be less than 10 ppm.

Zero

"Reset to Zero" is an automatic function of the T-Guard™ Leak Detection Sensor.

Cycle time

Time from the beginning of the measurement to the next possible measurement.

2 Safety

2.1 Intended use

The T-Guard™ Leak Detection Sensor is a helium leak detection sensor which does not need any vacuum chamber. It can find leaks in test samples and quantify them when they are filled with helium under pressure.

Using the T-Guard™ Leak Detection Sensor, the chamber with the test sample does not have to be evacuated.

Measured at atmospheric pressure, the minimum detectable leak rate is 1×10^{-6}mbar l/s. This depends on the chamber volume and the measuring time, the rejection leak rate will mostly be between $1\cdot10^{-4}$ and $1\cdot10^{-2}$ mbar l/s.

Do not let water penetrate into the body or hoses of the T-Guard™ Leak Detection Sensor. Do not forget to use the external filters.

Only use accessories and spare parts from INFICON.

2.2 Requirements to be fulfilled by the user

Skilled personnel

The T-Guard™ Leak Detection Sensor must only be started and operated by properly trained staff.

Get used to the functioning of the device. You may only use the device after reading and understanding the manual.

2.3 Restrictions of use

Disregarding the following precautions could result in serious injury:

Warning

For all contacts of the I/O port, a maximum voltage of 60 V DC or 25 V AC must not be exceeded or reached based on the protective conductor or the earthing devices. Please refer to the information given in the following chapters.

Warning

For maintenance work, disconnect the T-Guard™ Leak Detection Sensor from the power supply.

Warning

Before replacing the fuses, the T-Guard™ Leak Detection Sensor must be disconnected from the power supply.

Disregarding the following precautions could result in damage to the equipment.

Caution

The T-Guard™ Leak Detection Sensor must not be operated while standing in water or when exposed to drip water. The same applies to all other kinds of liquid.

The T-Guard™ Leak Detection Sensor should only be used inside rooms.

Caution

Avoid the T-Guard getting in contact with bases, acids, and solvents, as well as being exposed to extreme climatic conditions.

Caution

Do not suck up liquids into the T-Guard™.

3 Description

This chapter describes the exterior design of the T-Guard™ Leak Detection Sensor, its accessories and how to use it.

3.1 Housing

The housing of the unit consists of an oval cylinder. On top, there are several electrical connections and the ventilation opening. On the rear side, there are three hose connectors.

Fig. 4-1 Front view of the T-Guard™ Leak Detection Sensor

Fig. 4-2 Back view of the T-Guard™ Leak Detection Sensor

3.2 Interfaces

The T-Guard™ Leak Detection Sensor has 5 interfaces for control and information exchange.

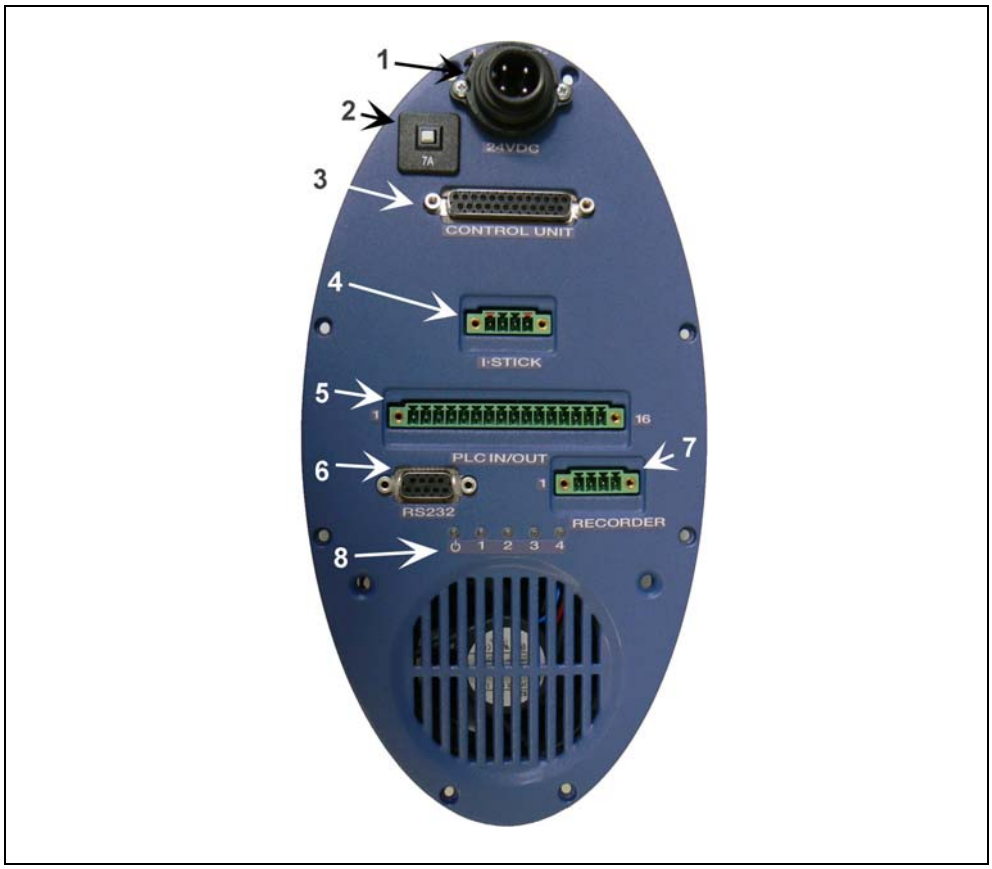


Fig. 4-3

Item	Description	Item	Description
1	Power supply connector	5	PLC-interface
2	Fuse	6	RS232 PC-interface
3	Interface for the control unit	7	Analog Recorder Output
4	I•Stick -connector	8	Status LEDs

Power Connector

Only two of the four pins are used for the power supply. The plus pole is marked with „1+“, the minus pole is marked with „2-“.

Fuse

The fuse reacts to reverse polarity and a current exceeding 7 A.

Interface for the control unit

Here, the INFICON control unit (Cat. No. 551-100 or 551-101) is connected via its connecting cable (Cat. No. 551-102 or 551-103) to control the T-Guard™ Leak Detection Sensor manually.

Notice The connection cable must only be plugged in or unplugged when the supply voltage of the T Guard™ is turned off or disconnected.

I•Stick -connector

You can store 25 parameter sets on the INFICON-I-Stick and also download them from there.

PLC-interface

The T-Guard™ Leak Detection Sensor has 6 configurable digital PLC-Inputs and 8 configurable digital PLC-outputs.
(Refer to 4.6.1 Selection of functions assigned to the PLC inputs. and 4.6.3 Selection of functions assigned to the PLC outputs..)

RS232 PC-interface

Connect any RS232 capable device here with an uncrossed RS232 cable in order to control the T-Guard™ Leak Detection Sensor or to read out information. The latter takes less than 100 ms.

Analog Recorder Output

The T-Guard™ Leak Detection Sensor has two separately configurable analog recorder outputs (0 - 10 V).

They have a resolution of 16 bit and a hardware limited refresh rate of about 2 Hz.

For a higher refresh rate, please use the RS232 interface.

For detailed Information on how to use the analog output refer to chapter 5.6.

Status LEDs

Certain operating conditions can be indicated by 5 status LEDs:

The first LED ⏻: lights up during operation

The four remaining LEDs indicate the status of the configurable digital outputs 1-4. LED No. 2 is red and in standard setting, it will light up to indicate an error or a warning. The desired output function can be set (refer to 4.6.3).

Fig. 4-4 Status LEDs

3.3 Vacuum diagram

On top of the vacuum diagram, there are the measurement inlet "IN" and the reference inlet "Ref". Both inlets are equipped with an external filter to protect T-Guard™ Leak Detection Sensor from sucking in dust or fluids. Three valves are integrated in the T Guard™ Leak Detection Sensor (see Fig. 4-5).
Valve V1 opens and closes the measurement inlet. Valve V3 opens and closes the reference inlet. Valve V2 opens and closes the connection between V1 and V3. These three valves are connected to two flow-restricted capillaries which lead to the Wise Technology™ Sensor.
The upper inlet of the Wise Technology™ Sensor is the fine inlet, the lower one is the gross inlet, which is less sensitive to helium than the fine inlet.
The Wise Technology™ Sensor detects the helium in the gas stream, which passes by. The total pressure, which is applied to the Wise Technology™ Sensor is detected by the Pressure Gauge p1.
The fore pump, which provides the gas stream inside T-Guard™ Leak Detection Sensor is also throttled to produce constant pressure and flow for the Wise Technology™ Sensor.

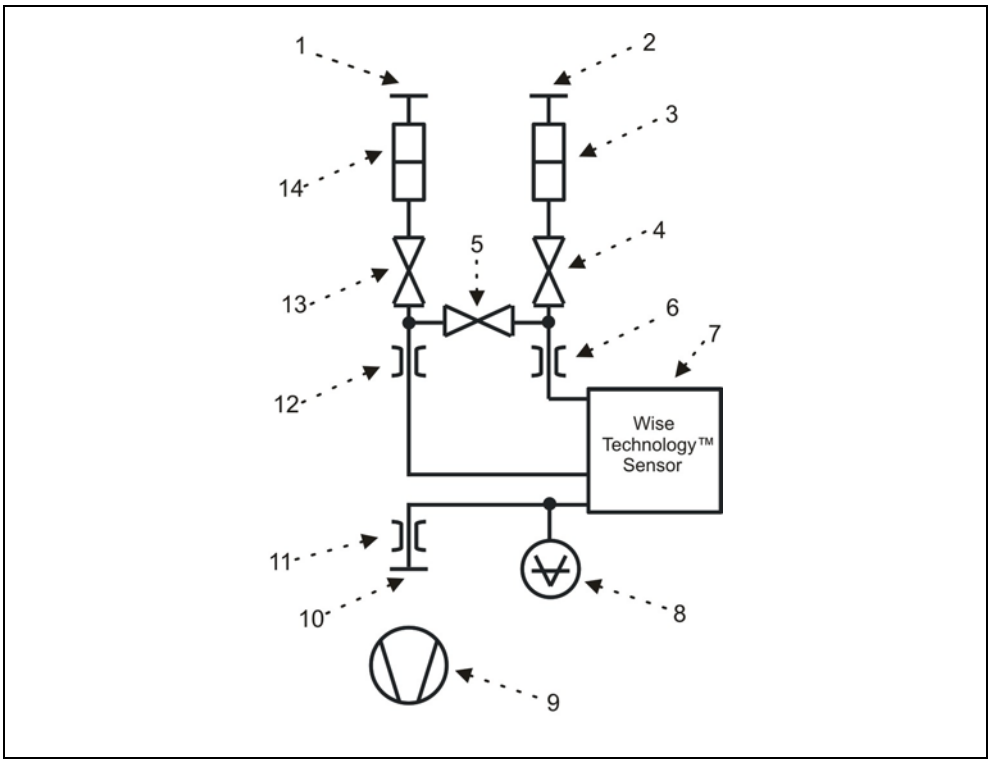


Fig. 4-5 Vacuum diagram of the T-Guard™ Leak Detection Sensor

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

When the T-Guard™ Leak Detection Sensor is not measuring at the moment or is READY , V2 and V3 are open, V1 is closed (refer to Fig. 4-6). Only gas from the reference inlet gets to the sensor.

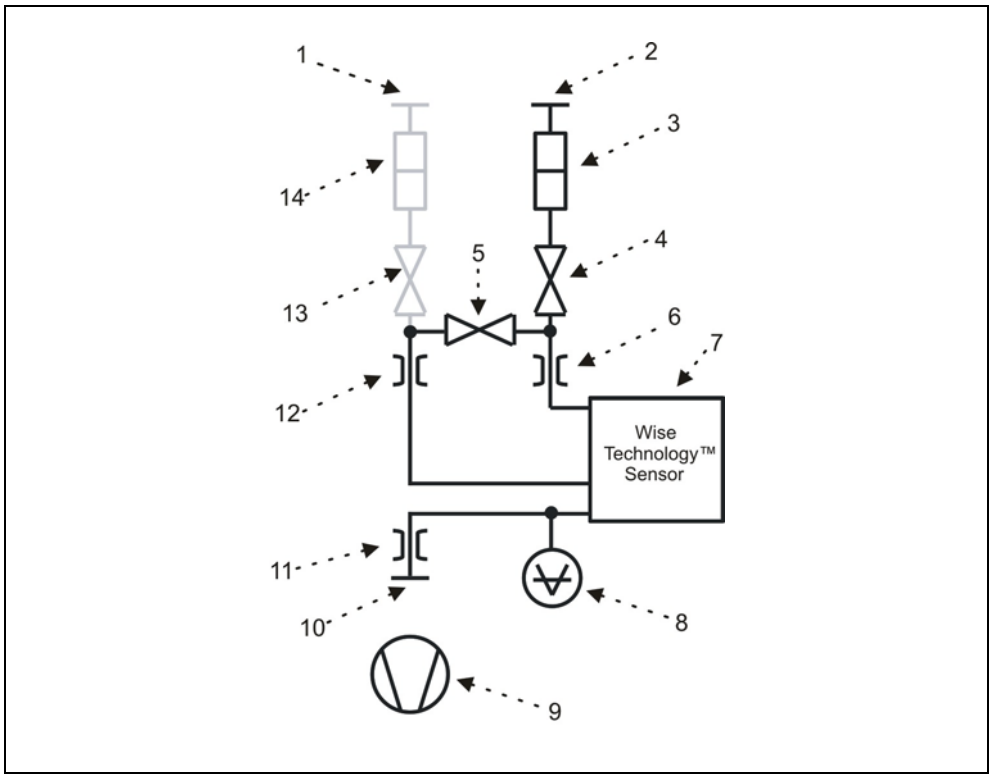


Fig. 4-6 Valve position in READY mode.

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

In Standby mode, all valves except V_2 are closed and the pressure before the Wise Technology™ Sensor is equal to the base pressure of the fore pump.
(refer to Fig. 4-7)

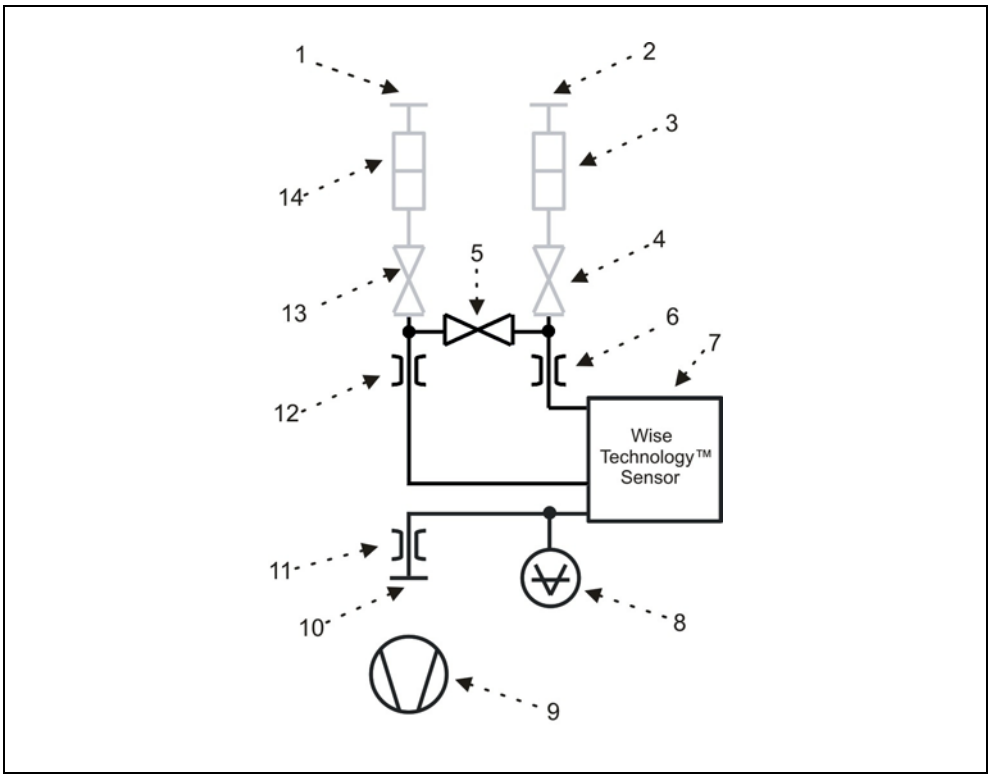


Fig. 4-7 Valve configuration in STANDBY mode.

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

In the rare event that the sensor is contaminated with helium, only the valve V3 to the reference inlet "Ref" is open, to purge the sensor. In this case, highly pure nitrogen or external air has to be led to the reference inlet to decontaminate the sensor as fast as possible.

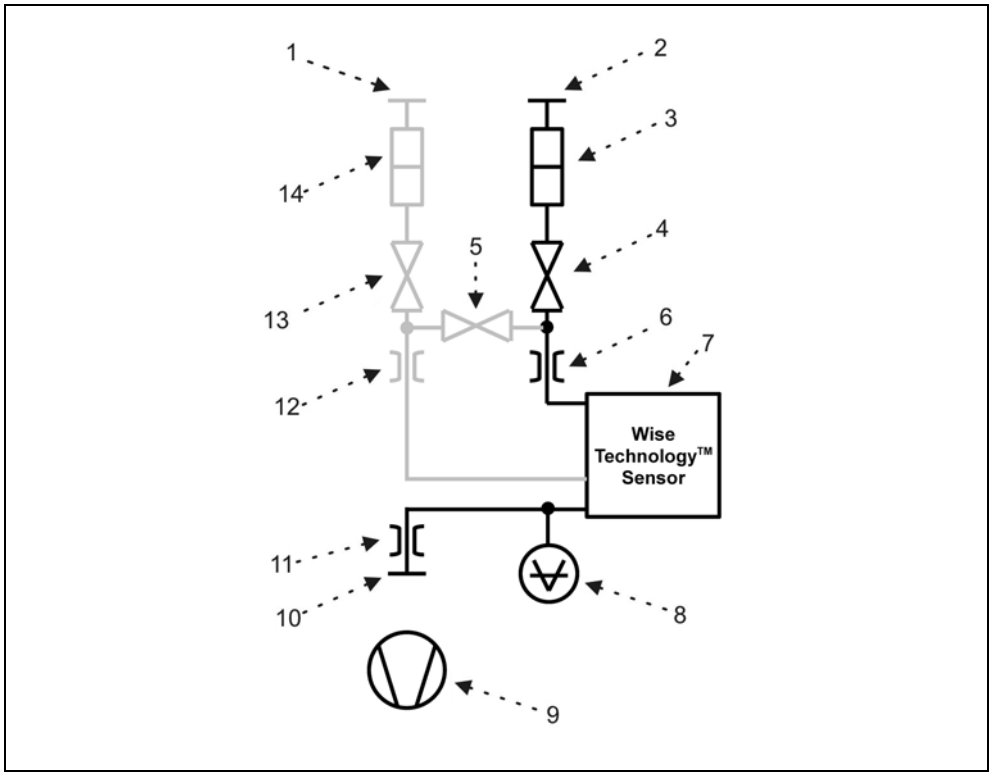


Fig. 4-8 Valve configuration during decontamination

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

(1112)

jina85e 3.fm

In FINE measurement mode, V1 and V2 are open, V3 is closed (see Fig. 4-9). The sensor receives only gas from the measurement inlet and shows the highest sensitivity to helium from the measurement line.

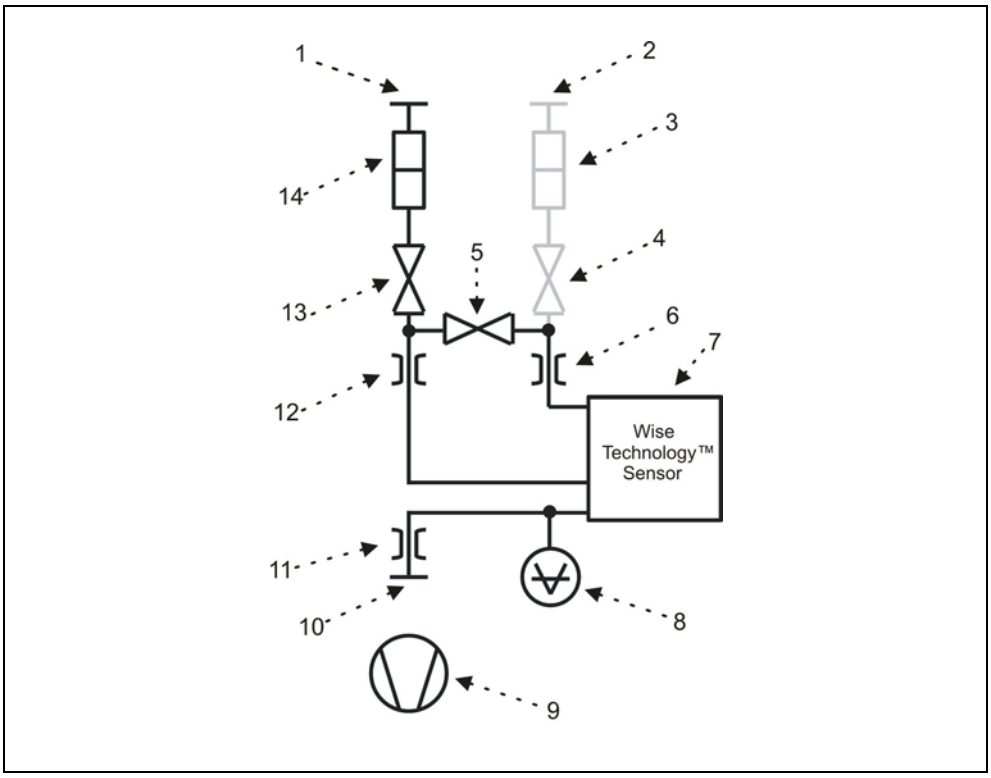


Fig. 4-9 Valve configuration in FINE mode

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

In GROSS measurement mode, V1 and V3 are open, V2 is closed (see Fig. 4-10). This way, the Wise Technology™ Sensor only receives little helium from the measurement line and normally even less helium from the reference line.

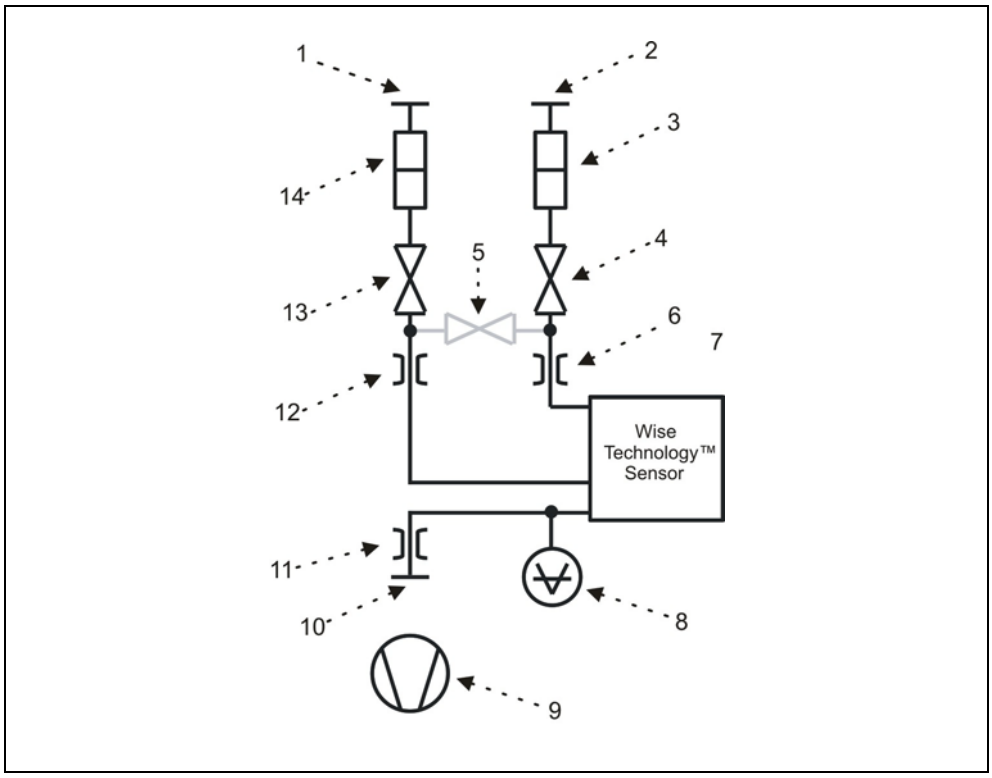


Fig. 4-10 Valve configuration in GROSS mode

Item	Description	Item	Description
1	Inlet “IN”	8	Pressure gauge p1
2	Reference “Ref”	9	Pump
3	Filter 2	10	Pump connector “OUT”
4	Valve V_3	11	Throttle 3
5	Valve V_2	12	Throttle 1
6	Throttle 2	13	Valve V_1
7	Wise Technology™ Sensor	14	Filter 1

Other valve configurations than described above are not used by the software and cannot be set by the user.

3.4 Wise Technology™ Sensor

The helium detector (Wise Technology™ Sensor) consists of a closed glass container with a measurement device for the precise determination of the pressure inside the glass housing and a membrane chip with a large number of small quartz windows.

The membrane is permeable only for helium; the membrane avoids all other components of air from entering the glass housing.

The quartz membrane is heated so that the permeation for helium is sufficiently high and fast.

Inside of the glass housing, the total pressure is measured precisely. As only helium can enter the glass housing, the total pressure is equal to the partial pressure of helium.

The determined total pressure inside the housing is proportional to the helium partial pressure outside the sensor.

3.5 Accessories

In addition to the main unit, two different types of the control panel and the corresponding connection cables are available.

3.5.1 Control unit for desktop operation

Install the control panel on a flat workbench to avoid slipping. It is used to control all functions and read all values of the T-Guard™ Leak Detection Sensor.

The control panel contains an LC Display, START, STOP, ZERO and MENU buttons and also 8 soft keys to navigate in the menu on the display and to enter values.

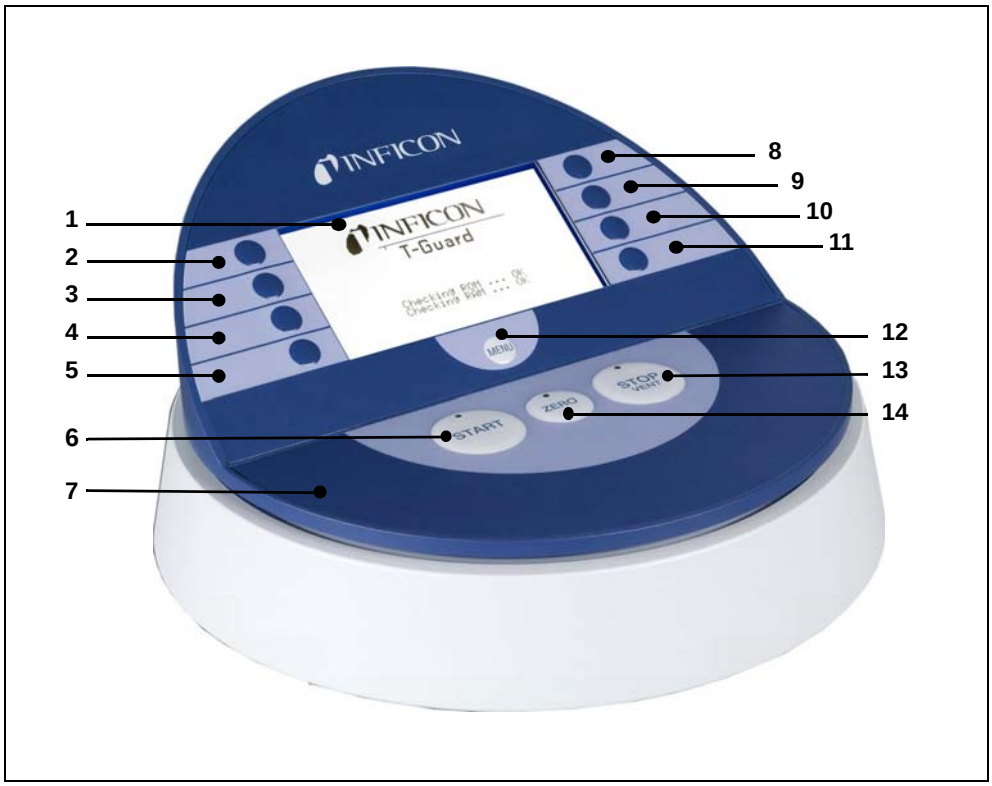


Fig. 4-11 Soft keys of the control unit

Item	Description	Item	Description
1	LC Display	8	Soft key No. 5
2	Soft key No. 1	9	Soft key No. 6
3	Soft key No. 2	10	Soft key No. 7
4	Soft key No. 3	11	Soft key No. 8
5	Soft key No. 4	12	MENU button
6	START button with LED	13	STOP / VENT button with LED
7	Control Unit	14	ZERO button with LED

Buttons

START button

Notice All 3 LEDs in the buttons are inactive with T-Guard™ Leak Detection Sensor.

Press the START button to start a measurement using the selected method. The measurement will then finish automatically.

STOP button

Press the STOP button to cancel the measurement immediately.

MENU button

In order to change the settings or to read information about T-Guard™ Leak Detection Sensor, open the menu by pressing the MENU button or the Soft Key (No.4) with the MENU symbol ( ).
You will go back to the position in the menu you left before.

By pressing the MENU button again you will get back to the measurement menu. By pressing the MENU button for two seconds you will get into the main menu.

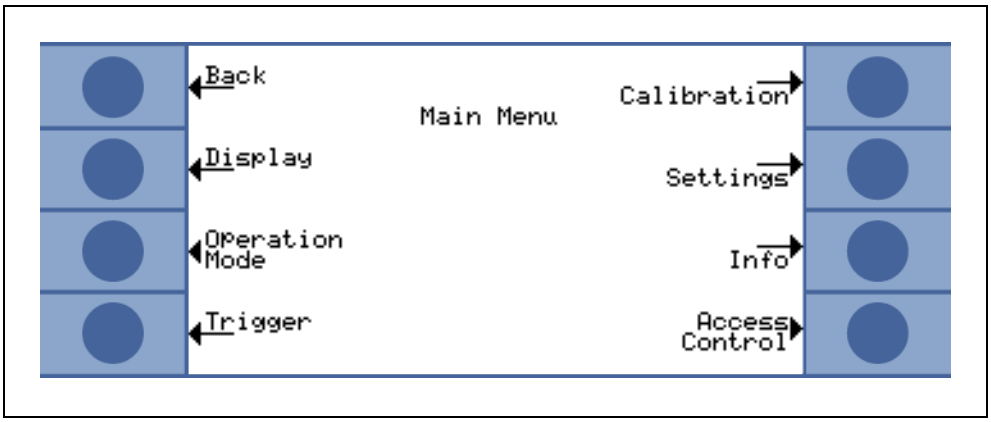


Fig. 4-12 Main Menu appearance

Soft Keys

The functions of the 8 soft keys depend on the currently opened menu.

Soft key No. 1	Description
1 and 8	very often have the functions BACK / ESC and OK, in this order,
4	often has the function to completely leave the menu ( )
MENU button	Enter/Leave the menu

Entering values and units

The numerical values are entered in the the MENU page as follows:

Soft key No. 1	Description
1 (ESC-button)	leave this menu page and return to the previous menu page. The value will not be changed.
2(↑)	increments the numerical value.
3(↓)	decrements the numerical value.
6 and 7(↑ and ↓)	changes the unit
8 (OK)	saves the entered value.

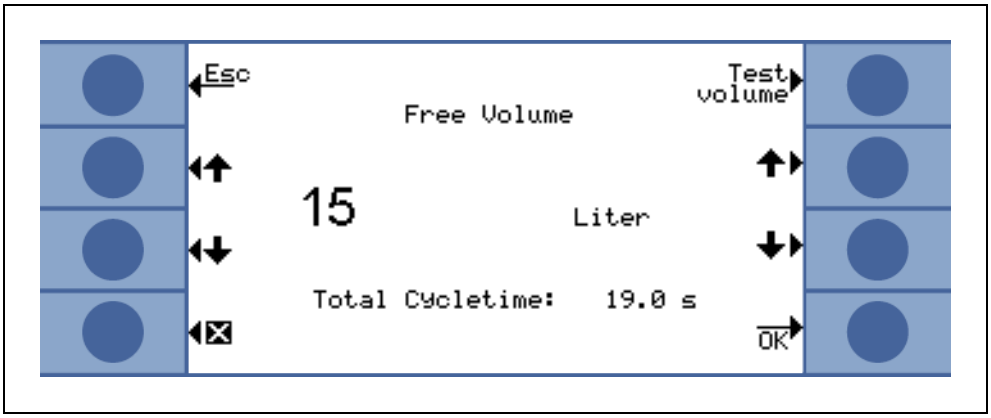


Fig. 4-13 You can change the value and the unit on this menu page

Entering the Menu-PIN

1. Press the ESC-button (soft key No.1) to leave this menu page and to return to the previous menu page. The Menu-PIN will then neither be changed nor be entered.
2. Pressing a number button opens a submenu where you can select one of these two numbers. After that, the cursor moves to the next digit to the right.
3. You can move the cursor to the left or to the right using the soft keys No. 4 and 8. (← and →).
4. OK appears for soft key No. 8 when the last digit has been reached.
5. Pressing OK causes the PIN to be stored.

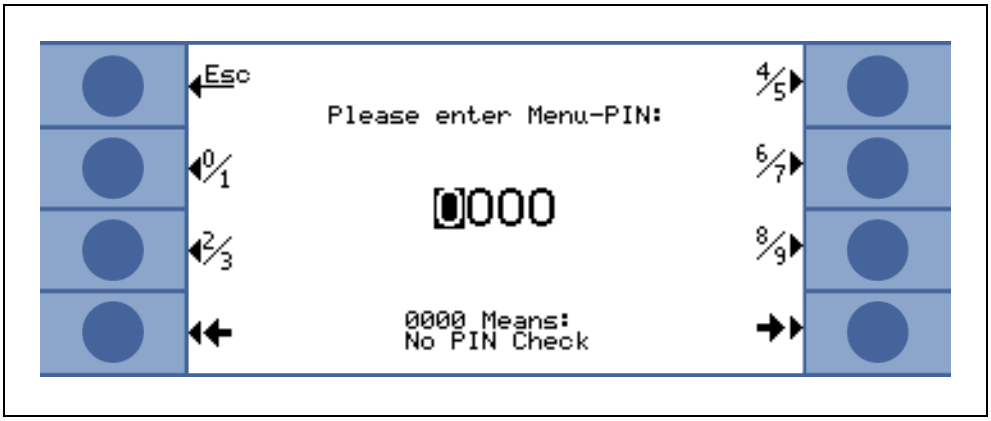


Fig. 4-14 Entering the Menu-PIN

Status Line in the Display

The lowest line of the display is the status line. It shows general information, for instance, the actual measurement mode.

3.5.2 19" control unit

You can insert this control unit in a 19'' rack or in a panel cut-out as shown in Section 8.5.

This control panel is used in the same way as it is for the desktop control unit, only the START, STOP and ZERO buttons are at other positions.

Fig. 4-15 Control unit for the installation in a 19"-rack

On its front side, the 19"-control unit refers to protection class IP40.

3.5.3 Connection Cable for Control Unit, 5 m

This cable connects the control unit and the T-Guard™ Leak Detection Sensor.

Fig. 4-16 Connection cable for control unit, cat. No. 551-102

3.5.4 Connector set

The connector set includes all Phoenix connectors for connecting the electrical interfaces.

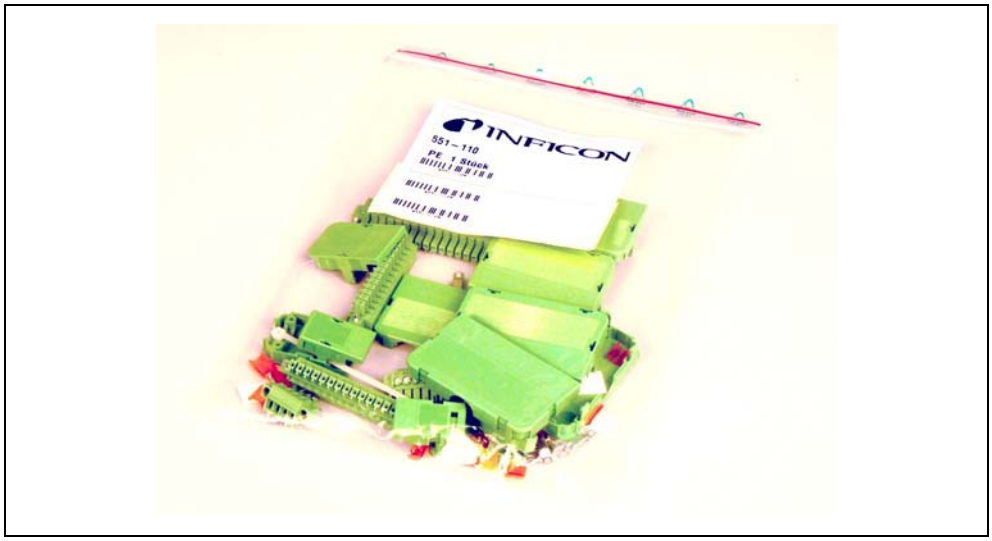


Fig. 4-17 Connector set, cat. No. 551-110

3.5.5 Fore Pump

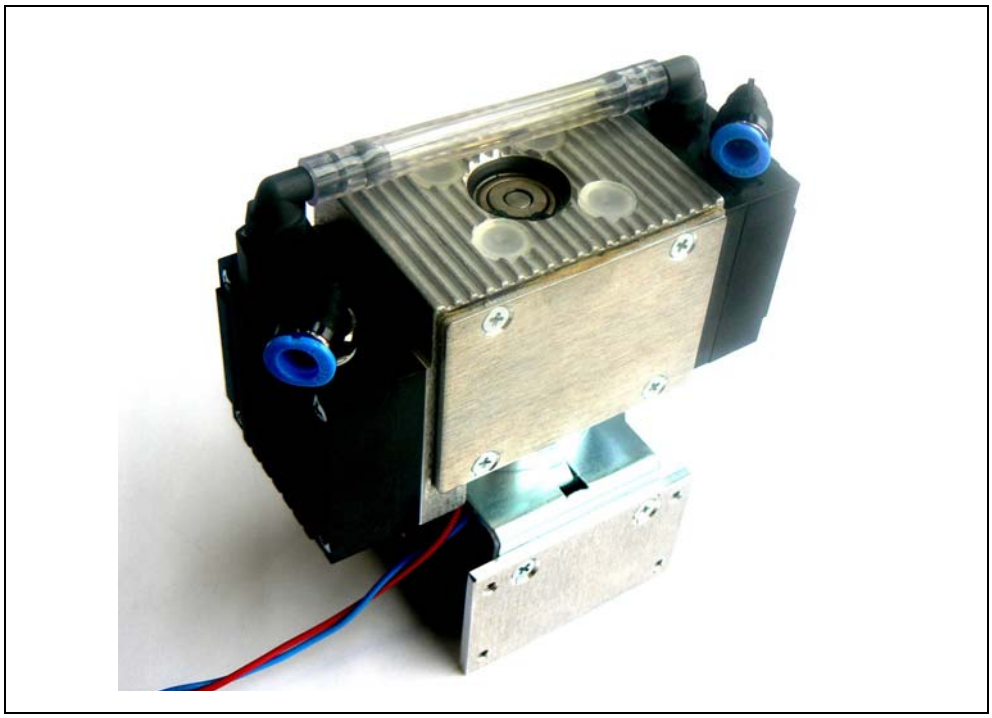


Fig. 4-18 Fore pump, cat No. 200 002 929

This fore pump has two stages, is brushless and runs with a supply voltage of 24 V DC.

3.5.6 2m line

Fig. 4-19 2m line, cat. No. 200 002 793

In case your chamber is more than 50 cm away from the T-Guard, you must use these 2m lines and shorten them if necessary. Both lines must have the same length. Lines longer than 2m cause measurement errors.

3.5.7 I•Stick

Fig. 4-20 I Stick, cat. No. 200 001 997

Chapter 5.7 describes how to use the I Stick.

3.5.8 Set of filters

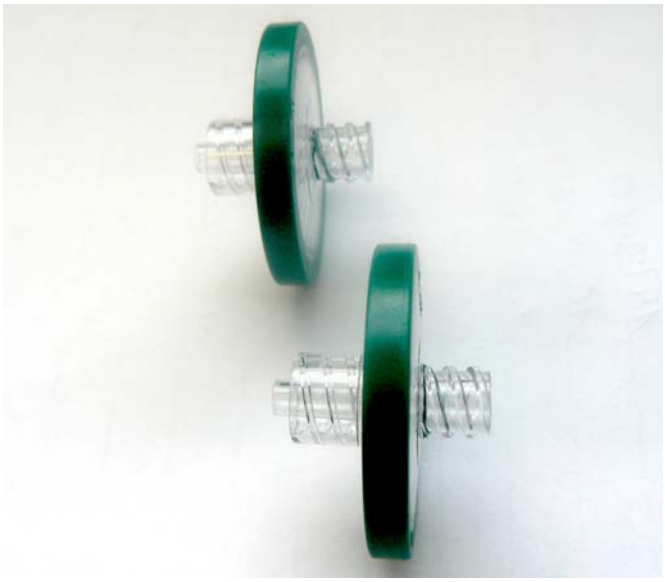


Fig. 4-21 Filter set, cat. No. 200 001 680

Plugged filters cause pressure warnings. Check the filters every 6 months and replace them no later than every 2 years.

3.6 Scope of delivery

- Main unit of the T-Guard™ Leak Detection Sensor
- Reference and measurement line with filters

Fig. 4-22 Reference and measurement line with filters

3.7 Ordering Information

Description	Cat. no.
T-Guard™ Leak Detection Sensor	540-001
T-Guard™ Leak Detection Sensor, version profibus	540-002
Control Unit for Desktop Operation	551-100
Control unit for the installation in a 19"-Rack	551-101
Connecting cable for the control unit, 5 m	551-102
Connecting cable for the control unit, 1 m	551-103
Set of connectors	551-110
I•Stick	200 001 997
Set of fuses	200 002 489
Set of filters	200 001 680
I/O test box	200 002 490
Power supply connection	200 002 496
Chamber connector	200 002 615
Measuring line 210 x 2 x 2 m	200 002 793
Fore pump, 24 V, two-step, brushless	200 002 929

4 Installation

4.1 Unpacking

Unpack the T-Guard™ Leak Detection Sensor immediately after receipt even if it is to be put into operation at some later date.
Examine the shipping container for any external damage.
Completely remove all packaging materials.

Notice The three hose connectors are protected by plugs. Please only remove the plugs when you connect the hoses to the T-Guard™.

Notice Retain the shipping container and the packaging materials. Perhaps it will be required in the event of claims for compensation.

Check if the T-Guard™ Leak Detection Sensor is complete (see Section 3.6) and carefully subject it to a visual inspection. If any damage is discovered, please immediately inform the forwarding agent and the insurers. If it is necessary to exchange the damaged part, please contact our orders department.

After unpacking T-Guard™ Leak Detection Sensor, you have to care for a proper installation:

4.2 Installing Mechanically

Caution

Ensure sufficient ventilation.
In order to ensure adequate ventilation of the T-Guard™ Leak Detection Sensor, a gap of at least 20 cm must be provided on top. Avoid heat sources being in the vicinity of the T-Guard™ Leak Detection Sensor.

Caution

Do not block the ventilation inlets and outlets of the T-Guard™. Doing so could damage the device.

Caution

Do not forget to attach the filters on the ends of the test and reference lines. They protect the hoses from clogging and the sensor from dust contamination.

Notice T-Guard™ Leak Detection Sensor must be isolated from any vibration. Vibration may lead to false measurement results!

The T-Guard™ Leak Detection Sensor can be used in each orientation. You can unscrew the rubber feet and use these holes to fasten the main unit.
Please only remove the plugs when you connect the hoses to the T-Guard™. At the time of delivery, the T-Guard is filled with helium-free nitrogen. This avoids helium to penetrate into the sensor.

The T-Guard™ Leak Detection Sensor must be installed near the test chamber, since the standard measuring line is only 50 cm long (measuring line 2m length see 3.5.6).

Notice Changing the length or inner diameter of the test line affects the measurement speed and results.

Notice Apply grease to the outside of the ends of the green measurement lines in a thin film to be able to slide them into the connections until they snap in. Otherwise it can happen that they are not deep enough in the connector and measuring errors can appear.

4.3 Choosing a Fore Pump

Caution

The T-Guard™ Leak Detection Sensor stops working when oil penetrates into it from one of the fore pumps.
Arrange the pumps with oil seal below the T-Guard™ Leak Detection Sensor.

You can use any vacuum pump with a gas flow of more than 200 sccm at a base pressure of less than 50 mbar.
Connect the vacuum pump with a 6 mm tube to the tube connector labelled with "OUT" .

4.4 Installing Electrically

The T-Guard requires a 24 V DC power supply (tolerance ± 10 %).
A wrong polarity triggers the fuse.
The power supply should be able to supply a current of maximum 6 A. Typically, the T-Guard needs 70W.

The following maximum cable lengths have to be met:

0.75 mm²	8.5 m
AWG 18	10 m
1 mm²	10 m
AWG 16	15 m
1.5 mm²	17.5 m
AWG 14	25 m

Notice Do not power up the power supply before having attached all other cables you need!

Power Connector

Only two of the four pins are used for the power supply. The plus pole is marked with „1+“, the minus pole is marked with „2-“.

4.5 Connecting the control unit

Caution

The CONTROL UNIT output of the T-Guard™ can be damaged when the cable is disconnected or connected during operation.

Only plug or pull the cables when the T-Guard™ is switched off.

Attach one end of the control unit cable to the connector CONTROL UNIT of the T-Guard™ Leak Detection Sensor and the other end to the control unit itself. Now T-Guard™ Leak Detection Sensor can be operated via the control unit.

4.6 Connecting a PLC

4.6.1 Selection of functions assigned to the PLC inputs.

Select the PLC inputs as follows:

Main Menu → Settings → Interfaces → Select PLC Inputs.

In the sub-menu SELECT PLC INPUTS, you can set which pin of the I/O-connector (suitable for PLC-inputs) shall be assigned to which command.

Please find a complete list of the input commands and their meanings below:

Command	Explanation
START	Starts a measuring cycle. If the T-Guard™ Leak Detection Sensor was in STANDBY the start will be delayed by some seconds.
STOP	Stops a measurement cycle. You will not get a valid leak rate.
START/STOP	Starts and stops a measurement cycle if switched to HIGH or LOW , respectively.
CAL	Starts a calibration. A successful calibration changes the calibration factor.
PROOF	Starts checking the calibration with the proof leak rate.
CLEAR	Clears errors and warnings. T-Guard™ Leak Detection Sensor restarts in case of an error.
READY	Wakes up the T-Guard™ Leak Detection Sensor from Standby mode.
STANDBY	Puts the T-Guard™ Leak Detection Sensor on Standby mode. This enlarges the sensor lifetime.
GROSS / FINE	Switches between GROSS and FINE measurement. Only available in Continuous Mode.
PURGE	Purges the measurement line as long as input is high. The helium sensor signal will be ignored. Only available if auto-purge is off.
INV START	electrically inverted START command
INV STOP	electrically inverted STOP command
STOP/START	Stops and starts a measurement cycle, if switched to HIGH and LOW, respectively.
INV CAL	electrically inverted CAL command
INV PROOF	electrically inverted PROOF command
INV CLEAR	electrically inverted CLEAR command
INV READY	electrically inverted READY command
INV STANDBY	electrically inverted STANDBY command
FINE / GROSS	Switches between FINE and GROSS. Only available in Continuous Mode.
INV PURGE	electrically inverted PURGE command

To change the commands assigned to the input-pins, select the appropriate pin using the UP and DOWN arrows on the left side of the display.
Then select the desired command from the list of commands using the UP and

DOWN buttons on the right side of the display.
Press OK to save your settings. A screen with all selected settings will be displayed for your reference.
Confirm with OK again.

Notice Most PLC functions are activated when the input signal rises. Having a High-signal when starting the T-Guard™ Leak Detection Sensor is not enough.

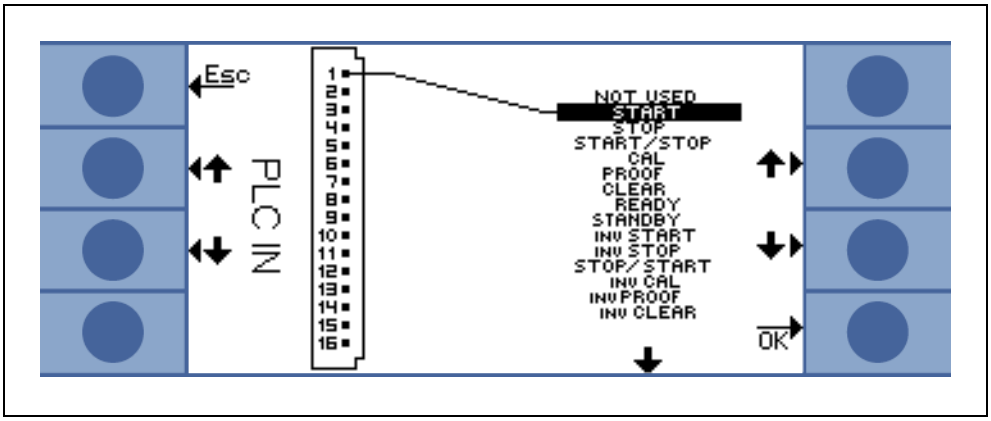


Fig. 5-1 Selecting the PLC Inputs

4.6.2 Electrical connection of the PLC inputs

The default setting is as follows:

Pin	Command	Explanation
1	Start	
2	Stop	
3	Cal	
4	Proof	
5	Clear:	
6	Standby	
7	Common	Common negative pole for all PLC inputs. Connect to the negative pole of the power supply.

Caution

Max. permissible input voltage of the digital inputs: 28 V.

Signal level:

24 V (low-resistance) means High,

0 V (high-resistance) means Low,

Change from LOW to HIGH:

The programmed command for the input is enabled (edge controlled).

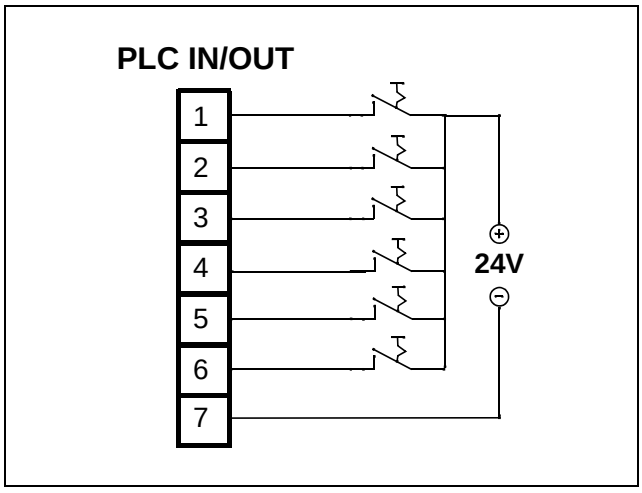


Fig. 5-2 Electrical connection of the PLC inputs

4.6.3 Selection of functions assigned to the PLC outputs.

Main menu → Settings → Interfaces → Define PLC outputs

In the sub-menu DEFINE PLC OUTPUTS, you can set which pin of the I/O connector (suitable for PLC outputs) shall be assigned to which command.

Signal	Explanation
OPEN	low-resistance, for testing purposes
CLOSE:	high-resistance, for testing purposes
TRIGGER 1	low-resistance means Trigger 1 was exceeded
TRIGGER 2	low-resistance means Trigger 2 was exceeded
READY	low-resistance means the T-Guard™ is ready for the next measurement. In Continuous Measurement mode, the T-Guard measures the reference line.
CYCLE ACTIVE	low-resistance means the T-Guard™ Leak Detection Sensor is just performing a measurement cycle This includes automatic purging and reference measurement in Carrier Gas mode. There is no measuring cycle in Continuous Measurement mode. That is the reason why the output is always high-resistive.
STANDBY	low-resistance means that the T-Guard™ Leak Detection Sensor is just in Standby mode
ERROR	low-resistance means an error has occurred
WARNING	low resistance means there is an outstanding warning
ERROR / WARN	low-resistance means an error has occurred or there is an outstanding warning
CAL ACTIVE	low-resistance means a calibration is running right now
REC. STROBE	low-resistance means the recorder output is invalid for 300 ms because of changing the decade of LR Mantissa and LR Exponent.
MEASURE	low-resistance means that the T-Guard™ Leak Detection Sensor is just measuring. The leak rate of the last measurement is on when this output and also the REC STROBE output are high-resistive.
GROSS / FINE	low-resistance means that the T-Guard™ Leak Detection Sensor is just in GROSS mode
GROSSLEAK	low-resistance means the highest trigger value was exceeded by at least the factor 5.
CONTAMINATED	low-resistance means the sensor was contaminated with too much helium. In this case, immediately purge the reference line with external air or nitrogen to decontaminate the sensor.
INV TRIGGER 1	high-resistance means Trigger1 was exceeded
INV TRIGGER 2	high resistance means Trigger2 was exceeded
INV READY	high-resistance means the T-Guard™ is ready for the next measurement. In Continuous Measurement mode, the T-Guard measures the reference line.

Signal	Explanation
INV CYCLE ACTIVE	high-resistance means that the T-Guard™ Leak Detection Sensor is performing a measurement cycle. This includes automatic purging and reference measurement in Carrier Gas mode. There is no measuring cycle in Continuous Measurement mode. That is the reason why the output is always high-resistive.
INV STANDBY	high-resistance means that the T-Guard™ Leak Detection Sensor is just in Standby mode
INV ERROR	high-resistance means an error has occurred
INV WARNING	high resistance means there is an outstanding warning
INV ERROR / WARN	high-resistance means an error has occurred or there is an outstanding warning
INV CAL ACTIVE	high-resistance means a calibration is running right now
INV REC. STROBE	high-resistance means the recorder output is invalid for 300 ms because of changing the decade of LR Mantissa and LR Exponent.
INV MEASURE	high-resistance means that the T-Guard™ Leak Detection Sensor is just measuring. The leak rate of the last measurement is on when this output and also the REC STROBE output are high-resistive.
FINE / GROSS	high-resistance means that the T-Guard™ Leak Detection Sensor is just in GROSS mode
INV GROSS LEAK	high-resistance means the highest trigger value was exceeded by at least the factor 5.
INV CONTAMINATED	high-resistance means the sensor was contaminated with too much helium. In this case, immediately purge the reference line with external air or nitrogen to decontaminate the sensor.

To change these settings, select the appropriate pin with the UP and DOWN arrows on the left side of the display.
Then select the desired setting from the list of settings with the UP and DOWN buttons on the right side of the display. Press OK to save your settings.
A graphic with all selected settings will be displayed for your reference.
Confirm with OK again.

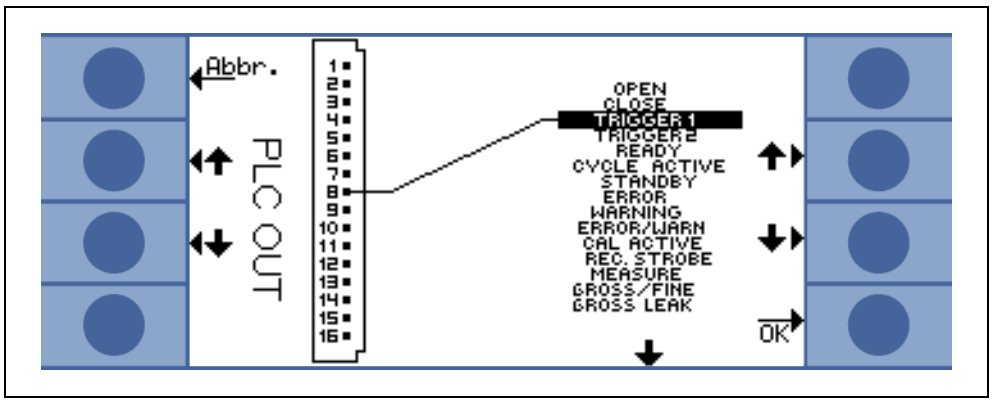


Fig. 5-3 Selecting the PLC Outputs

4.6.4 Electrical connection of the PLC outputs

The default setting is as follows:

Pin	Command	Explanation
8	Trigger 1	
9	Error/Warning	
10	Ready	
11	Measure	
12	Standby	
13	Rec. Strobe	
14	Warning	
15	Cal active	
16	Common	Common connection for all PLC outputs. This contact can be used as the positive or the negative pole.

Caution

The maximum permissible voltage for the output signals is 28 V.
The maximum total current for the output pins 8 - 11 is 0.75 A.
The maximum total current for the output pins 12 - 15 is also 0,75 A.

Permissible output current	Max. 125 mA per output
Load resistance of outputs	Min. 130 ohm per output
Supply voltage of outputs	24 V DC

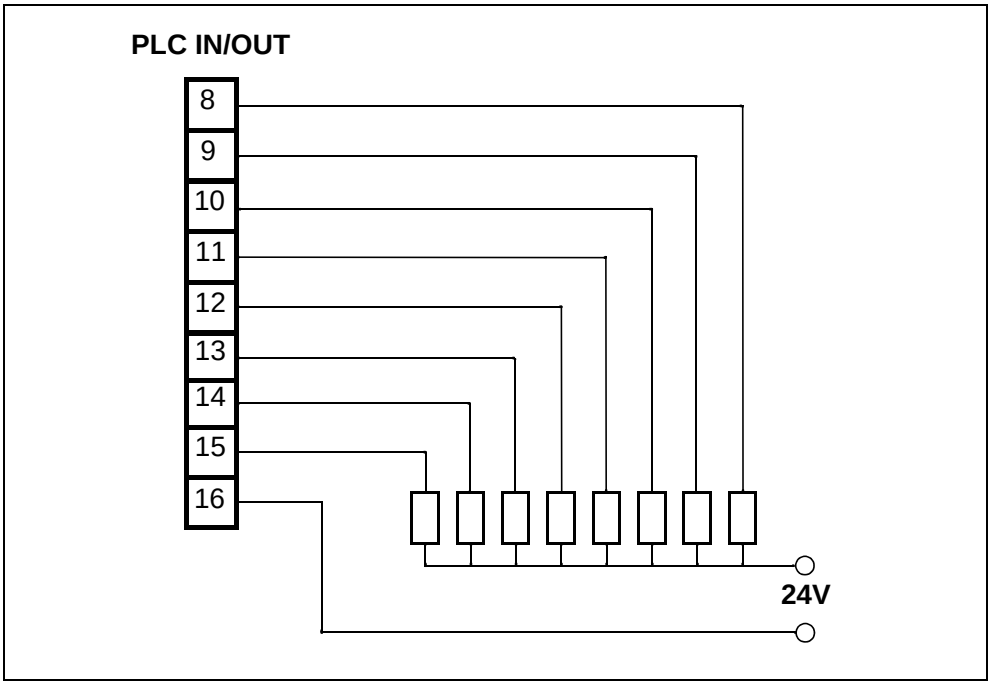


Fig. 5-4 Electrical connection of the PLC outputs

4.6.5 Overview of all settings

This screen shows the actual selected set-up of all input and output signals

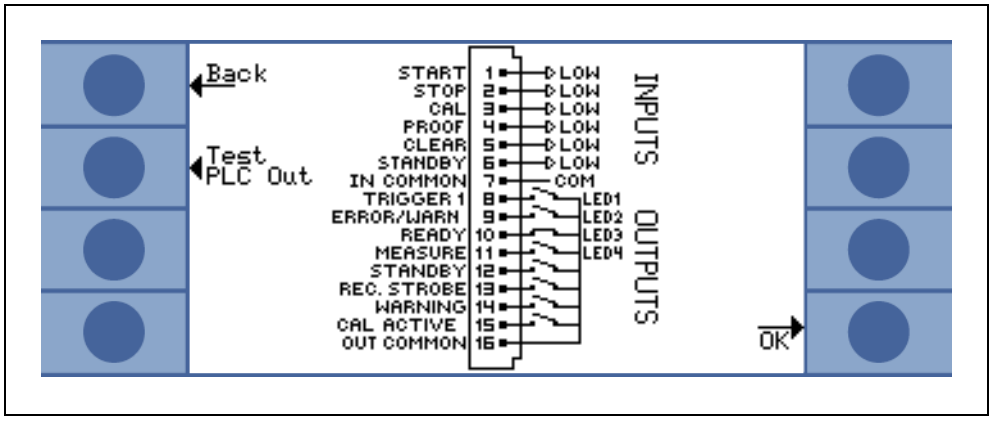


Fig. 5-5 Overview of Inputs and Outputs

4.7 Connecting a PC

A computer can control the T-Guard™ Leak Detection Sensor via a standard RS232 cable (not a null modem cable) connected with the RS232 connector. The Interface Description document (iins85e1-a) explains how to do this in detail.

5 Operation

In order to work with the T-Guard™ Leak Detection Sensor, you need at least:

- Main unit with 3 hoses and two dust filters
- Fore pump
- Power supply unit 24 V / 6A
- Control unit with cabling (INFICON control unit, PC or PLC)
- Chamber
- Fan
- Test sample which has been filled with helium under pressure

Caution

To avoid early ageing of the sensor, prevent the reference line from the ingress of helium!
If possible, lead external air to the reference line.

5.1 Running up

After switching on the T-Guard™ Leak Detection Sensor, the following display will appear:

Fig. 6-1 Start screen

The T-Guard™ Leak Detection Sensor will start up when 24 V are applied to the power supply connector.

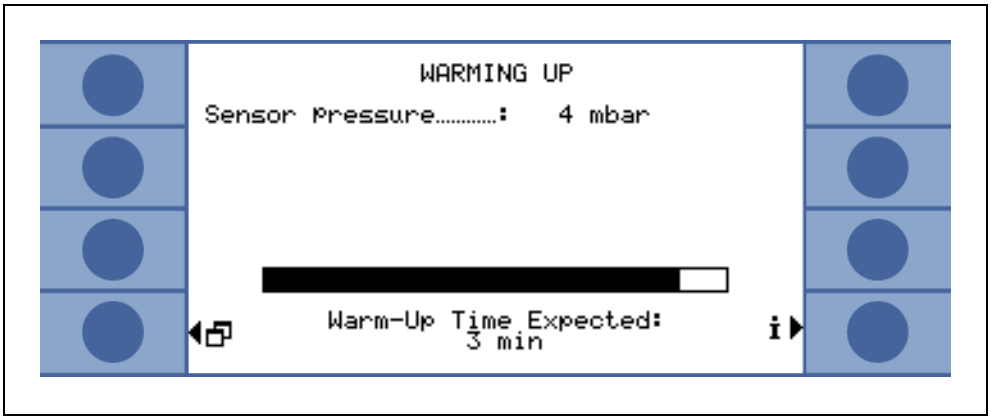


Fig. 6-2 Estimated remaining time of the run-up period

The run-up process takes longer than 3 minutes if the device was turned off for a long time. Once the T-Guard™ is ready for the measurement, the current measured value of the leakage rate is displayed on the screen. Otherwise the device is activated with a warning after 30 minutes at the latest.

The name of the current parameter set is displayed in the top line of the Leak Rate screen. If the parameter set is changed later, there will be an asterisk before the name of the parameter set.

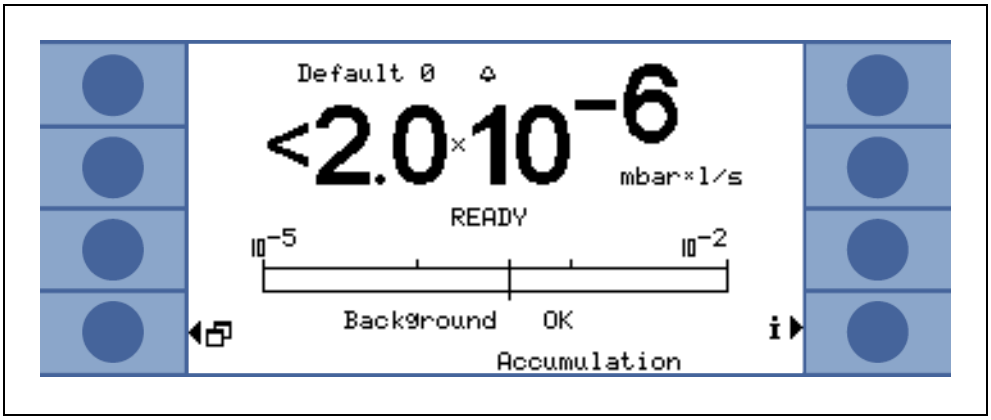


Fig. 6-3 The T-Guard™ is now ready for measurement.

Notice If the T-Guard™ Leak Detection Sensor has been switched off for several days, the initial sensor current may be too high to measure with the highest sensitivity. In this case, apply external air to the reference inlet and wait for two hours.
Then, the T-Guard™ Leak Detection Sensor will meet its specification. Using external air, the unit will display "Background OK".

Changing Contrast

You can change the image contrast of the display during the run-up phase by pressing *Menu* → *Display* → *Contrast*.

(The default value is 30)

5.2 Calibrating

Before you measure, you should set-up the unit according to your measuring arrangement and calibrate it. This ensures that the unit will really be able to measure what you want to.

5.2.1 Preparing Calibration

Before calibrating the T-Guard™, you should follow these steps in the described order:

For the Carrier Gas mode:

1. Input the carrier gas flow (e.g from the mass flow controller, 30,000 sccm in *Settings→ Measurement Settings → Carrier Gas Flow*)
2. Change Trigger 1
3. Change the measuring time, when required (a shorter measuring time causes a lower repeatability).
4. Enter the Calibration Leak Rate (must be higher than half of the trigger level)
5. Place the calibrated leak inside the chamber.
6. Close the chamber
7. Wait for a certain time which is calculated by:

$$\frac{\text{3 x chamber volume (in ccm)}}{\text{Carrier gas flow (in ccm per seconds)}}$$

8. Start the calibration (refer to Chapter 5.2.2)

For the Accumulation mode:

1. Enter the net volume (chamber volume minus sample volume)
2. Set Trigger 1
3. Change the measuring time, when required (a shorter measuring time causes a lower repeatability).
4. Enter the Calibration Leak Rate (must be higher than half the trigger level)
5. Place the calibrated leak inside the chamber.
6. Close the chamber
7. Start the calibration (refer to Chapter 5.2.2)

Notice You can also view and edit all settings on one page in:

Main menu → Info → View/Edit settings

Most important settings are on top, least important settings are on the bottom of this table.

5.2.2 Start Calibration

You can calibrate the T-Guard™ Leak Detection Sensor by selecting the following submenu:

Main Menu → Calibration → Start Calibration.

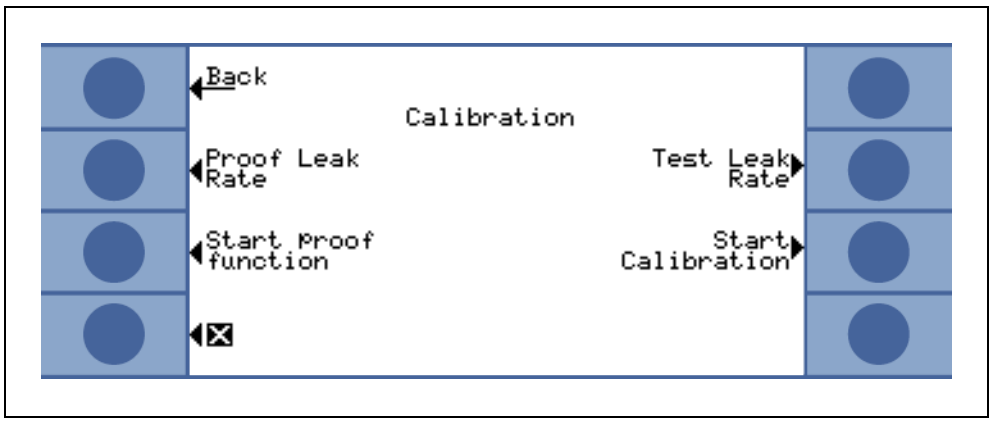


Fig. 6-4 MAIN MENU Calibration

After the calibration routine, you can accept the new calibration factor by pressing OK or cancel the calibration by pressing Esc. A calibration factor of less than 0.2 or more than 5 will result in a warning instead of a successful calibration. Refer to Chapter 9for possible causes of errors and warnings.
The ideal calibration factor you can get is 1. If the calibration factor is smaller than 0.5 or greater than 2, you can confirm but you will receive a warning as hint that you can improve your measuring arrangement.

Notice You have to recalibrate for every change of free volume in accumulation mode and for every change of the carrier gas flow in Carrier Gas Mode. This ensures a reliable measurement.

5.3 Measuring

Each measurement is started by the START button. A progress bar is displayed during the measurement. When the measurement has finished, the display shows the leak rate or an error message. The measurement can be cancelled at any time by pressing STOP-button. The then displayed leak rate is a provisional value.

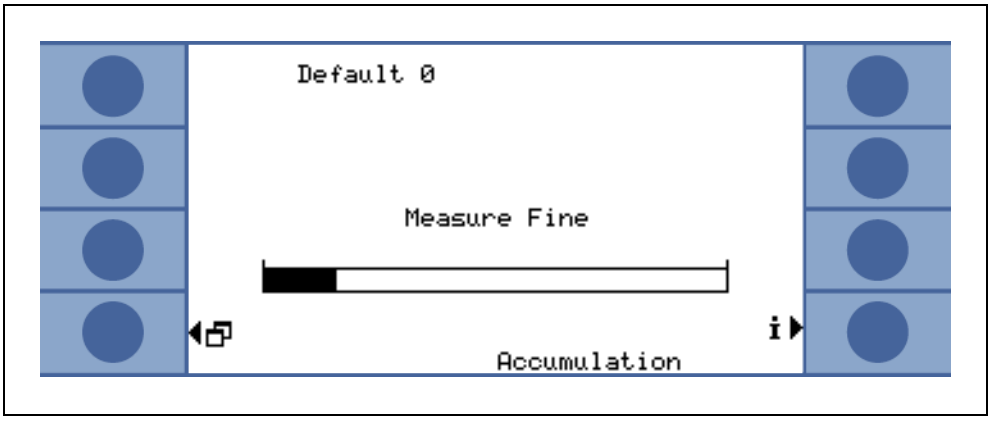


Fig. 6-5 Fine measurement, progress bar

5.3.1 Accumulation Mode

When you put a leak test sample filled with helium under pressure in an enclosed chamber, the helium level in this chamber will rise over time. This is called "accumulation " (of helium). The difference of the helium levels at two different times reflects the leak rate.

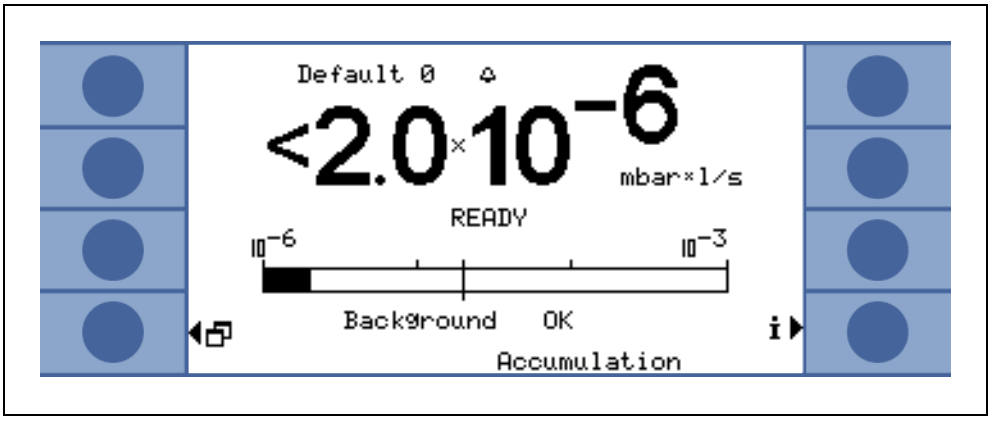


Fig. 6-6 Display of leak rate in Accumulation mode with information on the helium background of the sensor and the environment.

Accumulation Measurement

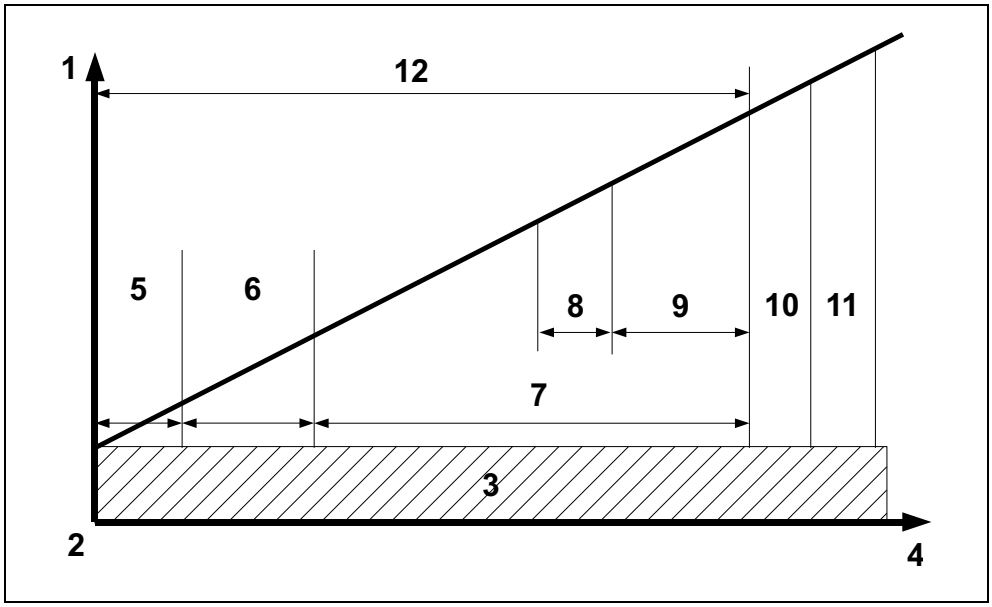


Fig. 6-7 Typical helium concentration in an enclosed chamber with a leaky test sample over time. Due to ambient helium, the helium level is never zero. The helium level rises linearly with time. The T-Guard™ Leak Detection Sensor measures the helium concentration in the chamber four times.

Item	Description	Item	Description
1	Helium concentration	7	Accumulation time
2	Start	8	Second gross measurement
3	Ambient helium	9	Second fine measurement
4	Time	10	Wait time purge
5	First gross measurement	11	Purge time
6	First fine measurement	12	Measuring time

In Accumulation mode, the T-Guard™ Leak Detection Sensor starts with the GROSS leak test. If, at the beginning of the test, the helium concentration in the chamber is much higher (approx. 1000 ppm) than in the environment, the test sample has a gross leak.
In this case, the T-Guard™ stops the measurement cycle and displays a leak rate of a hundred times the highest trigger value.

If the test sample passes the GROSS -leak test, the T-Guard™ Leak Detection Sensor takes an air sample from the chamber and measures it in FINE-mode.

If, during this first FINE measurement, the T-Guard™ detects that the helium concentration rises too fast, it will stop the measurement and report a leakage rate of five times the highest trigger level.

After the first FINE-measurement, it will wait for a certain time. Then, the second GROSS measurement will be carried out to check if the test sample has exploded.

After that, it takes the next air sample in FINE-mode. From the difference of the two FINE-measurements, the T-Guard™ Leak Detection Sensor calculates the leak rate.

Notice If the trigger value is higher than $1x10^{-3}$mbar l/s per litre of the net volume, both test samples will be measured in GROSS-mode. Then you must use outside air to purge the chamber. The helium background on the reference line must be really stable for GROSS-mode. If this is not possible, a bigger chamber or diluted helium has to be used to measure in FINE-mode.

Notice If the T-Guard™stops the measurement due to a too high signal in GROSS mode, it reports a leakage rate of a hundred times the highest trigger level. If it stops in FINE mode for the same reason, it reports five times the highest trigger level.
In both cases, the PLC output "GROSSLEAK" is active.

After each accumulation measurement and waiting for a certain time, the chamber will be purged. You can generally turn this automatic purge process off; it must then be initiated with a control command every time.

5.3.1.1 Hints for a good measurement:

- Use fans inside the chamber to have a perfect mixture of helium and air everywhere inside the chamber! The gas flow of the fans should be at least once the chamber volume per second!
- Purge the test chamber before measurement!
  An insufficient chamber purge is indicated with the warning W45.
- For best and repeatable results you must apply outside air to the reference inlet. In order to have a more stable background on the reference inlet, put it loosely into a tightly closed buffer volume. This buffer volume reduces the helium background variations.
- Apply external air on the measurement line during the purge time in order to clean it.
- You should purge the chamber after every measurement, then purge the measurement line for at least 4 s, then wait for 2 s before performing the next measurement. This removes the residual helium, which could affect the following measurements, from the measurement system.
- The chamber must have neither slots nor holes. It must be sealed with rubber gaskets. Only then are the measurements free from external influences.

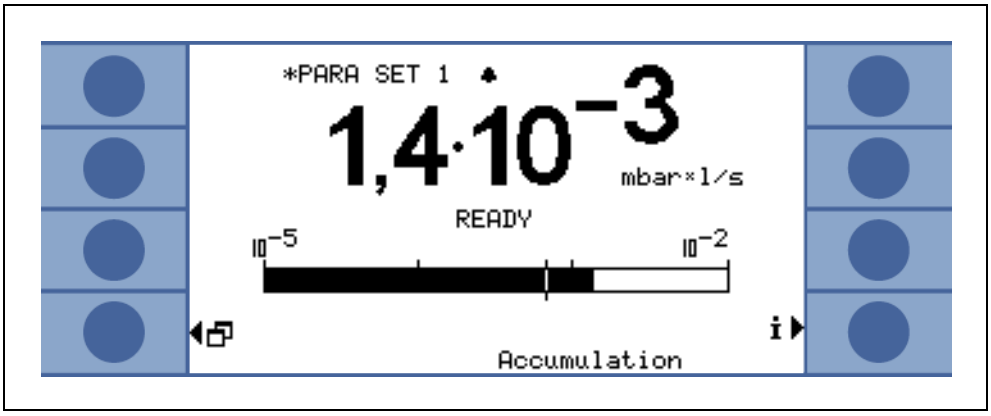


Fig. 6-8 Display after finished measurement in Accumulation mode

INFICON recommends this kind of set-up for Accumulation mode:

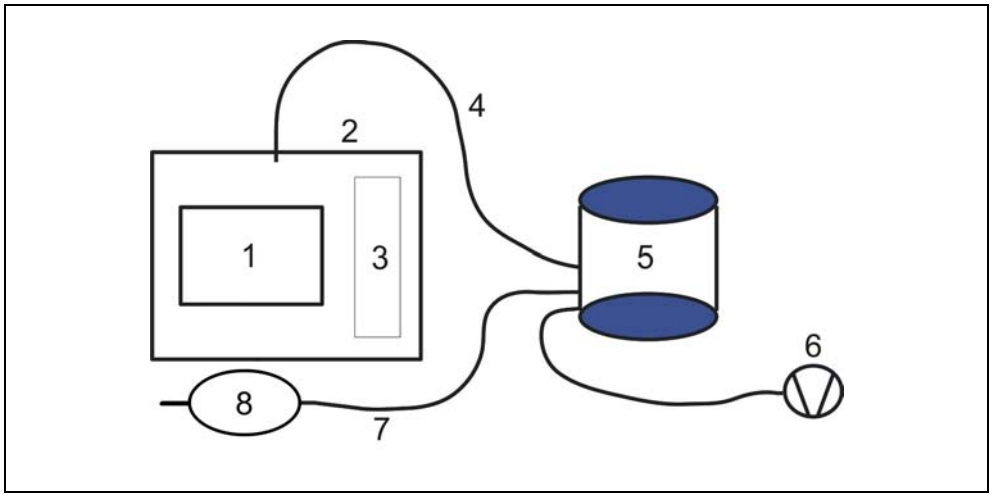


Fig. 6-9 Recommended settings for Accumulation mode

Item	Description	Item	Description
1	Test sample	5	T-Guard™ Leak Detection Sensor
2	Testing chamber	6	Fore pump exhaust air far apart from the chamber
3	Fan		
4	Measuring line connected to the chamber	7	Reference line
		8	Buffer volume > 4 litres

5.3.2 Carrier Gas Mode

In addition to the gas flow, which the T-Guard™ Leak Detection Sensor takes out of a chamber, more air can be sucked through the chamber using a fan or a pump.

This additional gas flow quickly carries the helium from the leak to T-Guard™ Leak Detection Sensor. This way of leak detection is called Carrier Gas mode.

In Carrier Gas mode, the T-Guard™ Leak Detection Sensor measures the helium content in the gas stream for a certain time. The helium signal from the end of the measurement will be used in order to calculate the leak rate.

Carrier Gas mode can be used to detect bigger leaks faster than in Accumulation mode.

The Carrier Gas mode is very sensitive to fluctuations of the helium background. An elevated helium background is usually not stable.

Carrier Gas Measurement

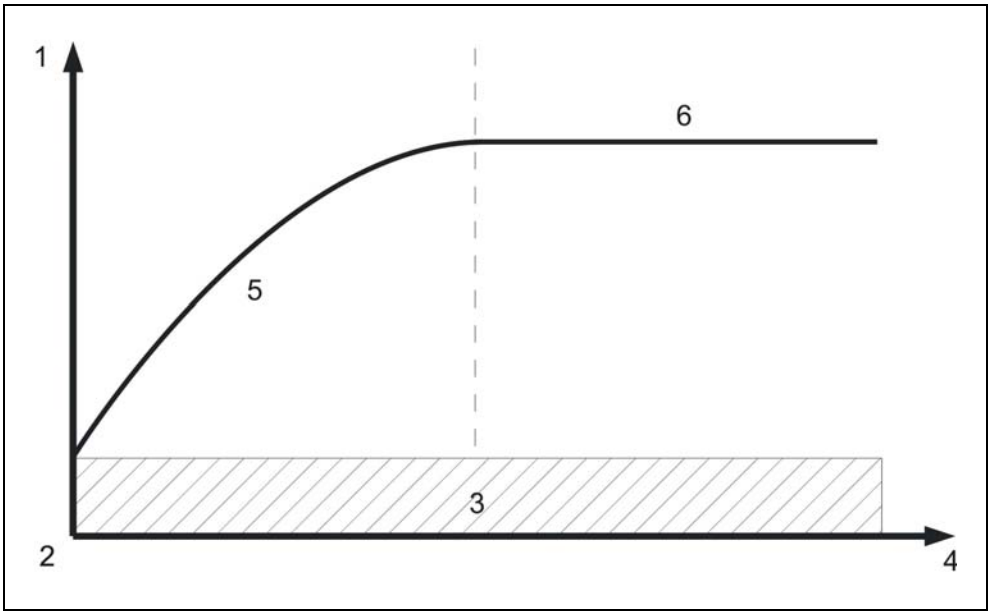


Fig. 6-10 Typical helium concentration in an enclosed chamber with a leaky test sample over time.

Item	Description	Item	Description
1	Helium signal	4	Time
2	Start	5	Rising signal
3	Ambient helium	6	Stable signal, final value

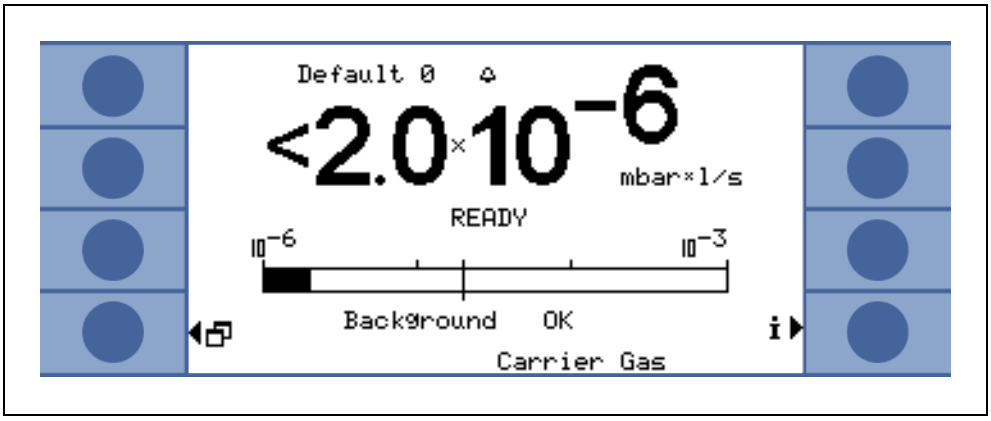


Fig. 6-11 Display of leak rate in Carrier Gas mode with information on the helium background of the sensor and the environment.

The bigger the chamber and the smaller the total gas flow through it, the longer it takes for the signal to reach its final value.

The time you need to get a constant signal in Carrier Gas mode depends on the total gas flow and the volume of the chamber. The time it takes to see 63 % of the signal is the volume of the chamber divided by the total gas flow.

For example: With a volume of 2 litres and a total gas flow of 20 l/s, you see 63 % of the signal after 0.1 seconds. After waiting three times as long, you see 95 % of the signal (0.3 s in this example). After five times as long, you will see 99 % of the signal

(0.5 seconds in this example). By increasing the total gas flow, the measurement will be quicker but for the price of a lower sensitivity. The smallest displayable leakage rate increases when the total gas flow is increased.

In order to save time, you can calibrate and measure with a shorter time than needed for the final leak rate value. But then the completely identical timing for calibration and each measurement is very important. This method is called Dynamic Measurement.

Like in the Accumulation mode, a GROSS measurement will be done before the FINE measurement of the leak rate to avoid helium contamination of the Wise Technology™ Sensor.

5.3.2.1 Hints for a good measurement:

- Minimize the chamber volume but do not let the test sample touch the walls.
- Place the inlet for external air in the chamber opposite the connection of T-Guard™ Leak Detection Sensor.
- Use fans inside the chamber to have a good mixture of helium and air everywhere.
- Do not make the outside air inlet too big. Helium must not leave the chamber there.
- Lead the same ambient air into the chamber and the reference line.
- For a trigger leak rate of $1 \cdot 10^{-5}$ mbar l/s, do not use a total flow higher than 3000 sccm. For a trigger leak rate of $1 \cdot 10^{-4}$ mbar l/s, do not use a total flow higher than 30,000 sccm. For a trigger leak rate of $1 \cdot 10^{-3}$ mbar l/s, do not use a total flow higher than 300,000 sccm.
- After closing the chamber and applying helium to the test object, wait for a certain time, which amounts to:

$$\frac{\text{3 x chamber volume (in ccm)}}{\text{Carrier gas flow (in ccm per seconds)}}$$

INFICON strongly recommends this kind of set-up for Carrier Gas Measurement:

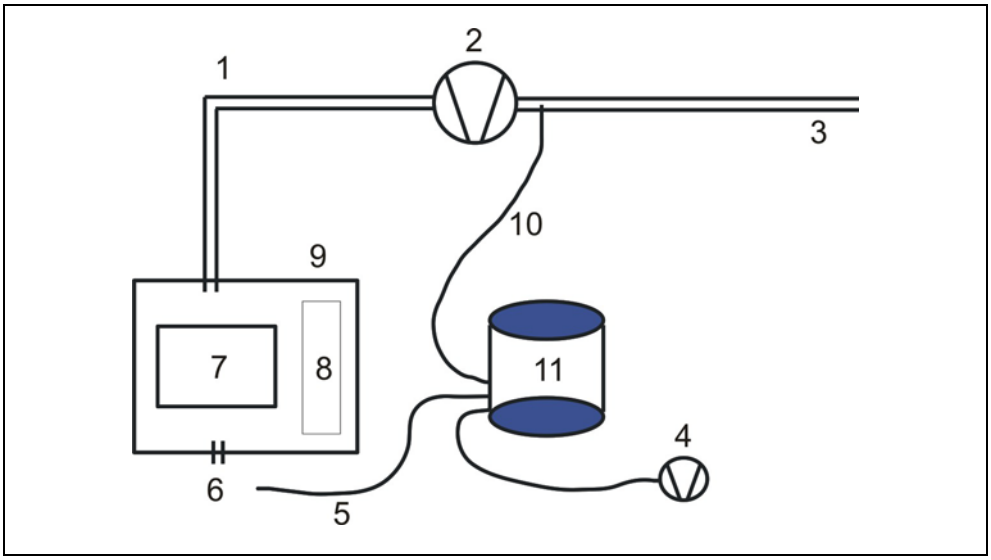


Fig. 6-12 Recommended set-up for Carrier Gas mode

Item	Description	Item	Description
1	1,000 - 100,000 sccm	6	Air inlet, outside air
2	Dry pump or Flow controlled fan	7	Test sample
		8	Fan
3	Pump exhaust far away from chamber	9	Testing chamber
4	Fore pump exhaust air far away from the chamber	10	Measuring hose connected to pump outlet
5	Reference line	11	T-Guard™
			Leak Detection Sensor

5.3.3 Continuous Mode

The Continuous mode is only developed for experts in the field of helium leak detection.

Notice Use the STOP switch or even Standby mode when you do not need a measurement signal from T-Guard™ Leak Detection Sensor. Standby mode will further clean up the Wise Technology™ Sensor and enlarge its lifetime.

In Continuous mode, you are able to get a continuous signal from the Wise Technology™ Sensor after pressing START. Pressing STOP switches the valves in a way that the reference line will be measured. GROSS and FINE modes can and must be selected by the user. The T-Guard™ Leak Detection Sensor will not deliver a leak rate signal in this mode. Therefore, it will not be possible to set trigger values in Continuous mode.

It is in the duty of the user to interpret the current signal. The sensor current changes by 1.5 x 10^{-7} A per mbar of helium before the sensor.

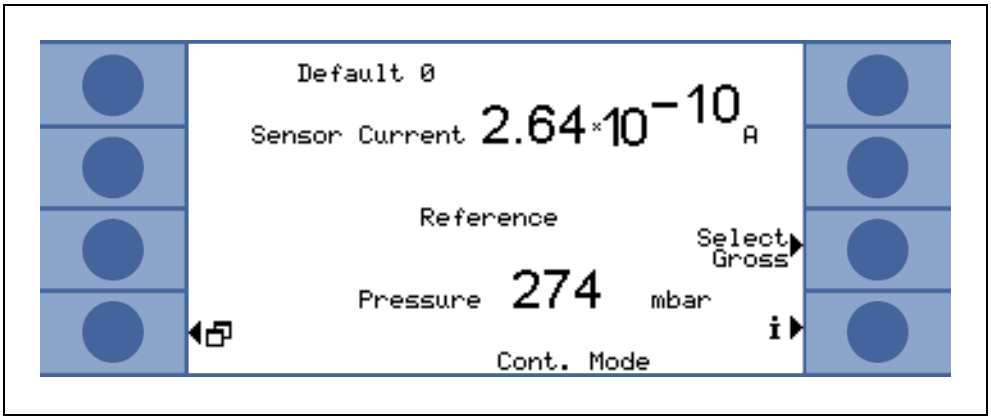


Fig. 6-13 Display of the reference value in Continuous mode.

5.3.4 Switching Off

Caution

Do not switch off the power supply when the T-Guard™ Leak Detection Sensor is contaminated with helium. This would reduce the sensor lifetime and increase the time of the next run-up. Please wait until the T-Guard is in Standby mode or ready to measure (leak rate is displayed) before switching off the power supply.

You do not need to actively switch off the T-Guard™ Leak Detection Sensor. Just switch off the power supply after usage.

5.3.5 Standby

The T-Guard™ Leak Detection Sensor will switch to standby mode automatically after an adjustable time when it is not used. In addition to that, it is possible to switch to standby mode manually via control unit, RS232 or digital input.

5.3.6 Helium contamination

By default, the T-Guard™ Leak Detection Sensor uses its GROSS mode before each measurement. Every time, when the T-Guard™recognises that the measured leak rate exceeds five times the highest trigger value, it will stop the measurement cycle instantly.

Due to these two facts, it is extremely unlikely that the sensor is contaminated with helium.
If, nevertheless, the T-Guard™ should be contaminated, highly-pure nitrogen or external air has to be pumped into the reference inlet to recover the sensor as fast as possible.
The recovery time depends on the helium content of the air provided on the reference inlet and the limit value of contamination. The lower the limit value of contamination the faster the T.Guard will be ready for measurement again.

Notice When using the continuous measurement mode, a trigger level cannot be set. That is why you have to stop the measurement yourself as soon as you see that the sensor current gets too high. In Continuous mode, the T-Guard™ Leak Detection Sensor switches over to the reference line when the sensor flow is greater than $1x10^{-8}$ A.

5.4 Controlling via PLC

Basic functions and values of T-Guard™ Leak Detection Sensor can be controlled and read by a PLC. Refer to chapter 4.6 for a detailed listing of all PLC commands and signals.

Select **PLC inputs** in:

Main Menu →Settings →Interfaces →Select PLC Inputs.

Select **PLC outputs** in:

Main Menu → Settings → Interfaces → Define PLC-outputs

PLC outputs 1 - 4 are connected to the LEDs 1 - 4.

The measured leak rate is available at the RECORDER output.

5.4.1 How to execute an accumulation measurement

You can start the measurement when READY is low-resistive.

During the measurement, the MEASURE output is low-resistive.

After the measurement, the MEASURE output is high-resistive. When the REC. STROBE output will be high-resistive again, you can read the analog outputs. This will happen after about 300 ms.

If the AUTOMATIC PURGING is enabled. READY will be low-resistive after purging. Only then, the next measurements can be started.

5.4.2 How to execute a carrier gas measurement

You can start the measurement when READY is low-resistive.

During the measurement, the MEASURE output is low-resistive.

After the measurement, the MEASURE output is high-resistive. When the REC. STROBE output will be high-resistive again, you can read the analog outputs. This will happen after about 300 ms.

After the reference measurement, the READY output will be low-resistive again. This takes as long as the FINE-measurement time. Only after the cycle has been finished, the next measurement can be started.

5.5 Controlling via RS-232

Nearly everything that can be done with the control unit can also be done via the RS232 connection to a PC.

The Interface Description document explains how to do this (iins85e1-a).

5.6 Configuring analog output

You can configure the analog output in the menu screen

Main Menu → *Settings* → *Interfaces*

in Analog Output and Analog Scale

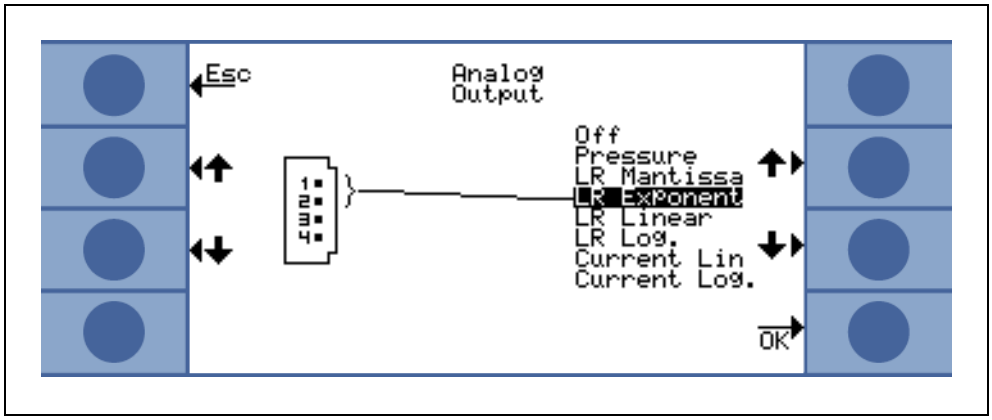


Fig. 6-14 Configuration of analog outputs.

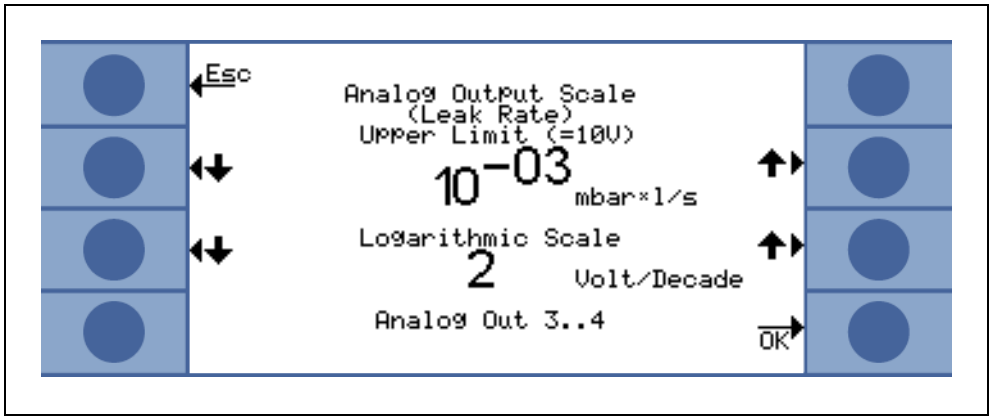


Fig. 6-15 Configuration of the scale of the analog outputs.

- In the setting "LR Exponent", the exponent results from the voltage as follows:

  Exponent = (voltage x 2) -14

For example: A voltage of 4.5 V results in an exponent of (4.5 x 2) - 14 = -5.

- In the setting "LR Log.", the leak rate is calculated as follows:

  Leak rate = final value x (10^((U - 10)/(volts/decade)))

For example: With a final value of 10^{-1} mbar l/s and 2 V per decade, a voltage of 3.7 V results in a leak rate of 10^{-1} mbar l/s x 10^((3.7-10)/2) = 10^{-1} mbar l/s x $10^{-3,15}$ = 10^{-1} mbar l/s x 7,08x10^{-4} = 7,08x10^{-5} mbar l/s.

For "Current Log.", it is similar for current instead of leak rate.

- In the setting "LR Linear", the leak rate is calculated as follows:

  Leak rate = final value/10x voltage

For example: 10 V refer to the final value, e.g. 10^{-3} mbar l/s, then, 3.7 V refer to, e.g. $3.7x10^{-4}$ mbar l/s.

For "Current Lin.", it is similar for current instead of leak rate.

The final value and the increase (volts/decade) have to be set separately in the

Main Menu → Settings → Interfaces → Analog Scale

for the outputs 1..2 and 3..4.

The increase volts/ decade does not apply for linear values.

5.7 Using the I-Stick and the parameter sets

The I•Stick (Cat-No. 200001997) can be used to save up to 25 parameter sets and to be able to copy them easily from one device to the other.
A parameter set comprises all settings except the language and the RS232 protocol.
Copying takes place as follows:

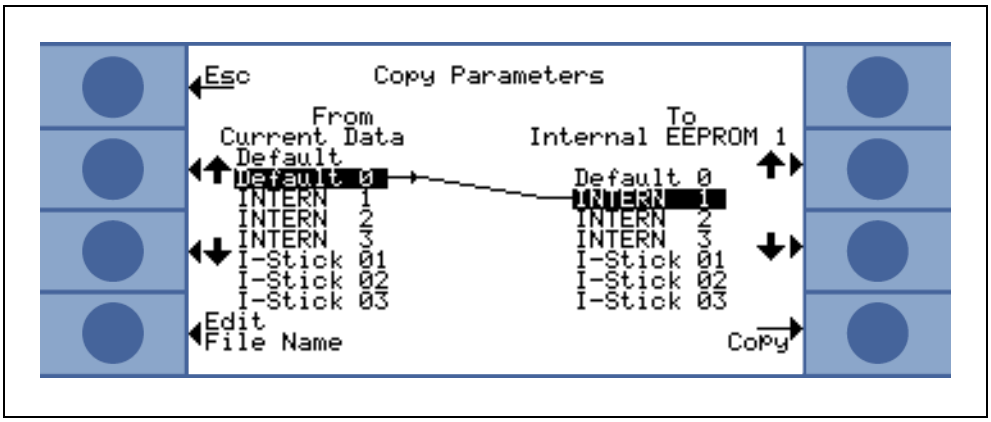


Fig. 6-16 Menu screen "Copy Parameters"

1. Go to *Main Menu → Settings → Copy Parameters*
2. On the left side, select your required parameter set . You can select between the options Default Parameter Set, Current Parameter Set, three internal parameter sets and up to 25 parameter sets on the I•Stick. If no I•Stick is connected, Copy does not work. If the memory on the I•Stick is empty, the default parameter set will be copied.
3. On the right side, select the destination which the parameter set is to be copied to.
4. Now use "Copy" for copying the parameter set or "Edit name" to copy the parameter set with a new name to the right side.
5. Before copying, the differences of the parameter sets are displayed from the right and the left side for confirmation.
6. If copying was successful, you will return to the "Settings" menu, if not, you will receive an error message and the "Copy Parameter" menu will be displayed again.

7 The name of the current parameter set is displayed in the top line of the leak rate screen. If the parameter set is being changed later, a star will be written before the name of the parameter set.

Notice Only insert or disconnect the I•Stick when the device is switched off. If the I•Stick is connected or disconnected during operation, the devices cannot recognize it.

Notice With the first use, the I•Stick is initialized. Switch the T-Guard off and on again to be able to use the I•Stick

5.8 Settings

All Settings referring the configuration of the T-Guard™ Leak Detection Sensor are provided in the menu structure.

5.8.1 Menu Structure Diagram

Starting in the Main Menu, all menu screens are arranged like a tree structure.

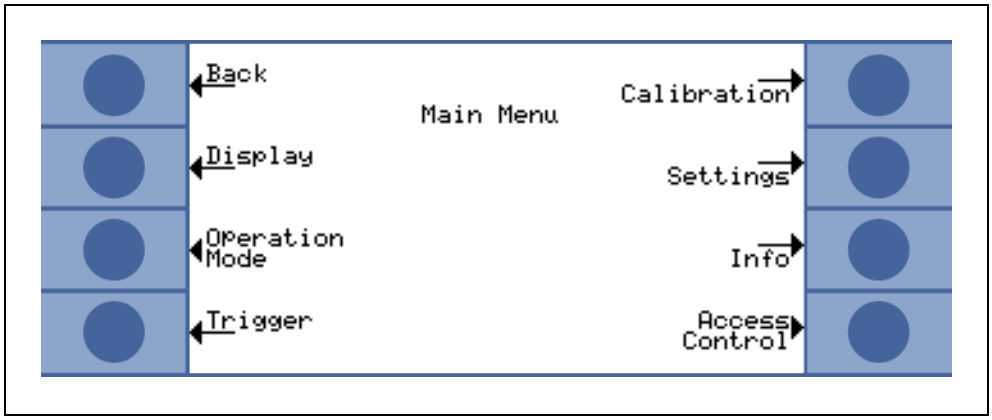


Fig. 6-1 Main Menu

Please find the menu structure of the T-Guard™ Leak Detection Sensor on the following page.

In this diagram, all operations are listed.
Please find the descriptions of the individual menu items on the following pages.

Menu Structure T-Guard™

Main menu T-Guard™ Leak Detection Sensor	Back			
	Display	Contrast	Invert display	
		Displayed limit		
	Operating Mode	Accumulation		
		Carrier gas		
		Continuous Mode		
		Standby		
	Trigger	Trigger level 1		
		Trigger level 2	Enabled	
	Calibration	Leak rate ext. Proof leak		
		Start Proof Function		
		Proof Leak Rate		
		Start Calibration		
	Settings	Miscellaneous	Language	
			Time & date	
		Interfaces	Control location	PLC
				RS232
				All
				Local and PLC
				Local and RS232
				Local
			RS232 Protocol	ASCII
				Binary
				Print automatically
				Baud rate
			Select PLC Inputs	
			Define PLC Outputs	
			Analog Output	
			Analog Scale	Analogue Output 1 .. 2
				Analogue Output 3 .. 4
		Measurement Settings	He concentration	
			Standby time	
			Flow of Carrier Gas	Test Flow
			Line length	
			Set Times	Set Times Automatic
				Measuring time
				Wait Time Purge
				Purge time (+ on/off)
			Accumulation Volume	Test Volume
			Pressure Unit	
		Copy Parameters	Change name	
			Copy	
		Monitoring	Contamination Limit	High
				Normal
				Low
			Pressure Limits	
	Info	View / Change Settings		
		Internal Data		
		Vacuum diagram		
		Interfaces		
		History & Maintenance	Measurement list	
			Display error list	
			Maintenance History	
			Calibration History	
		Cal Factor	Set to 1	
		Service		
	Access control	Access to CAL Function	On	
			Off	
		Change Menu PIN		

5.8.2 Explanation of Menu Items

The menu items the explanation refers to are written in bold letters.

Main Menu →

Back

Returns to the previous page, does not alter any setting.

Main menu → Display →

Contrast

Here, you can change the image contrast of the display.

Possible values: 0 to 99.
Default setting: 25.

Contrast → ***Invert display***

Inverts dark characters and light background to light characters and dark background.

Lower Limit

Raises the lowest leak rate displayed.
Increase by factor 1 to 100 possible. Default setting: 2

Main menu → Operating mode →

Accumulation

Chooses Accumulation as operation mode after confirming it with OK.

Carrier gas

Chooses Carrier Gas mode for operation after confirming it with OK.

Continuous Mode

Chooses Continuous mode for operation after confirming it with OK.

Standby

Elongates sensor life time. Press START to restart.

Main menu → Trigger →

Trigger level 1

Enter the reject leak rate here.

This setting determines the measuring time and decides between gross and fine measurement.

Possible values: 5E-6 mbar l/s to 9.9E-2 mbar l/s.
Default setting: 2E-5 mbar l/s.

Trigger level 2

Enter an additional trigger leak rate.

This setting strongly influences the measurement, if enabled. For instance, you can extend the displayed range upwards by setting the trigger limit 2 to the five-fold value of the trigger limit 1.

Possible values: 5E-6 mbar l/s to 9.9E-2 mbar l/s.
Default setting: 2E-5 mbar l/s.

Trigger level 2→ ***Enabled***

Enables the use of the additional reject leak rate.
Default setting: Disabled.

Main menu → ***Calibration*** →

Leak rate ext. Proof leak

Enter the leak rate for verifying the calibration.

Possible values: 5E-6 mbar l/s to 9.9E-2 mbar l/s.
Default setting: 2E-5 mbar l/s.

Start Test Function

Connect a leak with the proof leak rate to check the calibration. In this procedure, the calibration factor is only checked but not written newly. The proof leak rate may deviate from the test leak rate and therefore, it has to be input separately.

Test Leak Rate

Enter the leak rate for checking the calibration.

Possible values: 5E-6 mbar l/s to 9.9E-2 mbar l/s.
Default setting: 2E-5 mbar l/s.

Start Calibration

Use a leak with a calibration leak rate and start the calibration. For a successful calibration, the determined calibration factor must be between 0.2 and 5. If the calibration factor is between 0.2 and 0.5, or 2 and 5, a warning will be output, however, also after the confirmed calibration.

Main menu → ***Settings*** →

Measurement settings → ***He concentration***

Here, you can set the helium concentration in the test sample which is applied for filling. T-Guard™ changes the automatic measuring time accordingly and displays the real leak rate of the leakage.

Possible values: 10% to 100%.
Default setting: 100%.

Measurement settings → ***Standby time***

If the T-Guard™ Leak Detection Sensor is not in use within this time frame, it will switch to Standby mode automatically.

Possible values: 10 s, 30 s, 1 min, 2 min, 5 min, 10 min, 30 min, 60 min, disabled.
Default setting: 10 min .

Measurement Settings → ***Carrier gas flow***

This item is only available in Carrier Gas mode.

Enter the total gas flow in Carrier Gas mode here. T-Guard™ Leak Detection Sensor itself uses a probe gas flow of 180 sccm in Fine mode and 90 sccm in Gross mode.

Possible values: 60 sccm to 1000000 sccm.
Default setting: 1000 sccm

Measurement settings → *Carrier gas flow* → ***Flow test***

This item is only available in Carrier Gas mode.

The T-Guard™ Leak Detection Sensor can measure the total flow in Carrier Gas mode if the proof leak rate is applied during setting.

Measurement settings → ***Line length***
Here, you can set the length of the measuring line between 50 and 250.
For lengths longer than 50 cm, a set-up time of up to one second is set before the real measurement starts.
This ensures that, for the gross test, the measuring signal is already on the sensor.
The the default value is 50 cm.

Measurement Settings→***Set Times***

Here, you can enter several time values for the measurement.

Measurement Settings→*Set Times*→***Set Times Automatic***

Depending on the smallest trigger value and the total gas flow/accumulation volume, the T-Guard™ Leak Detection Sensor selects reasonable times for measurement.

Measurement times → *Σετ Τιμεσ* → ***Measuring time***

Enter the total measuring time here. The cycle time of the T-Guard™ Leak detection Sensor is longer than the total measurement time.

Possible values: 9 s to 300 s (accumulation), 3 s to 66.7 s (carrier gas). Default setting: automatic measuring time.

Measurement settings → *Set times* → ***Waiting time Purge***

This item is only available in Accumulation mode.

After every accumulation measurement, the chamber will be purged after a certain time after the measurement. Enter this waiting time here.

Possible values: 0.1 s to 300 s.
Default setting: 4 s.

Measurement settings → *Set time* → ***Purge time***

This item is only available in Accumulation mode.

Enter here, how long the purge will take after the accumulation measurement The automatic purging can be switched automatically in this screen. Only then, it is possible to start purging by a command.

Possible values: 1 s to 50 s.
Default setting: 4 s.

Measurement settings → ***Accumulation vol.*** → ***Test Volume***

This item is only available in Accumulation mode.

T-Guard™ Leak Detection Sensor can measure the accumulation volume in Accumulation mode when the test leak rate is applied during setting up.

Measurement Settings → *Accumulation Volume* → ***Volume***

This item is only available in Accumulation mode.

Enter the net chamber volume (chamber volume minus test sample volume) here.

Possible values: 0.01 l to 10000 l.
Default setting: 1 l.

Measurement settings → ***Pressure unit***

Choose your favourite pressure unit.

Possible values: atm, Torr, PSI, Pa, mbar.
Default setting: mbar.

Main menu → ***Settings*** →

Interfaces → ***Control location***

Select how the T-Guard™ Leak Detection Sensor shall be controlled.

Possible values: PLC, RS232, all, local and PLC, local and RS232, local.
Default setting: All.

"**Local**" (control unit) means that neither the PLC nor the RS232 may start or stop a device.

"**RS232**" means that neither the control unit nor the PLC may start or stop a device.

"**PLC**" means that neither the control unit nor the RS232 may start or stop a device.

The operating unit is always allowed to be configured.
Use the Menu PIN to avoid it.
(Access control → Edit Menu PIN)

RS232 is always allowed to read values.

The PLC outputs are always active.

Interfaces → ***RS232 Protocol*** → ***ASCII***

The ASCII protocol can be used to communicate with the T-Guard™ Leak Detection Sensor by typing commands in a terminal program like Microsoft Hyperterm and getting a human readable answer.
This record is pre-set as standard.

Interfaces → RS232 Protocol → ***Binary***

The binary protocol can be used to communicate with T-Guard™ Leak Detection Sensor by software, written by a programmer. This method of communication is very fast. It is, for example, the fastest way to read a leak rate from the T-Guard™ Leak Detection Sensor.

Interfaces → RS232 Protocol → ***Printer Auto***

After each measurement, the T-Guard™ Leak Detection Sensor sends data via RS232.

Date, Time, Parameter set name, Measurement mode, Leak rate, Trigger 1, [Trigger 2].

Interfaces → ***Select PLC inputs***

In this screen, you can select which functions can be called from the 6 inputs.

For default settings refer to section 4.6.2.

Interfaces → ***Select PLC-outputs***

In this screen you can choose which information will be present on the 8 outputs.

For default settings refer to section 4.6.4.

Interfaces → ***Scaling Analog Output → Analog Output 1 .. 2***

In this screen, you can set the upper limit and the volts/decade for the output on Pin 1 and 2.

Interfaces → Scaling Analog Output → ***Analog Output 3 .. 4***

In this screen, you can set the upper limit and the volts/decade for the output on Pin 3 and 4.

Interfaces→ ***Analog Output***

In this screen you can choose which information will be present on the two analog outputs.

Possible values: Off, Pressure, LR Mant, LR Exp, LR Lin, LR Log., Current Lin, Current Log.
Default setting: 1..2: LR Exp, 3..4: LR Log.

Interfaces → ***Scaling Analog Output***

In this screen, you can select how the voltage signal of the analog output has to be interpreted, when "LR Log." or "Current Log." have been selected.

Main menu → Settings →

Miscellaneous → Language

Choose your favourite language.

Possible languages: English, German, French, Italian, Portuguese, Spanish, Japanese (Katakana).
Default setting: English

Miscellaneous→ ***Time&Date***

Set time and date, if necessary.

Main menu → Settings →

Copy Parameters

In this screen, you can copy parameter sets from the left side to the right side and rename, if necessary.

Main menu → Settings →

Monitoring → Contamination limit

Set the contamination limit to "High" in order to be able to measure a high helium content in the test gas. Set it to "Low" in order to protect the sensor from receiving too much helium, which reduces the lifetime of the sensor. The default setting is "Normal".
"Low" stops the measurement after 30 s at 40 ppm, "Normal" after 30 s at 75 ppm, "High" after 30 s at 200 ppm, or in case of higher concentration after the relevant shorter time (e.g. double concentration after the half time).

Monitoring → ***Pressure limits***

Enter a permitted pressure range for the Wise Technology™ sensor here. Exceeding the pressure limits will give a warning. Use this setting to be warned in case of clogged filters or wrong test settings.
Possible values: Low limit: 10 mbar to 350 mbar, High limit: 250 mbar to 800 mbar.
Default settings: 180 mbar and 350 mbar. The high limit must be 100 mbar higher than the low limit.

Main menu → Info →

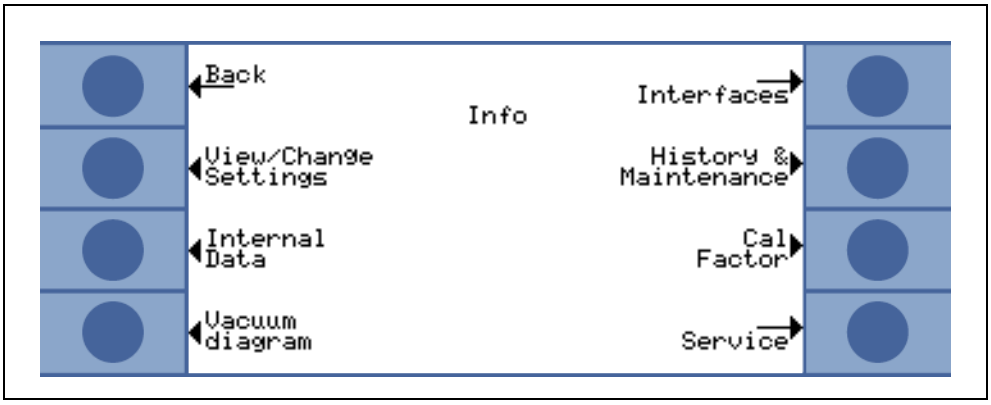


Fig. 6-1 Info menu

View / Change Settings

In this screen, you can see the most important measurement settings and you can also edit them, when allowed.

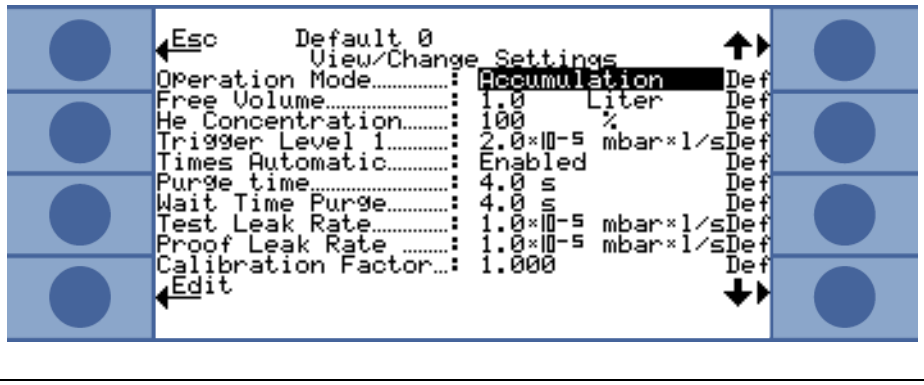


Fig. 6-1 View/Change settings menu

Internal Data

This menu item spans across several pages to show all kinds of internal data.

Vacuum diagram

This screen shows the vacuum diagram of the T-Guard™ Leak Detection Sensor with its valve configuration.
Also sensor pressure, sensor current and an estimated helium concentration in ppm are displayed.

Interfaces

This screen gives information about the settings of the interfaces.

History & Maintenance → Measurement list

In this screen, you can see the last 12 measured values.

History & Maintenance → ***Display Error list***

In this screen, you can examine the last 12 errors and warnings.

History & Maintenance → ***Display Service list***

In this screen, you can see the last 12 maintenance events.

History & Maintenance → ***Calibration list***

In this screen, you can examine the last 12 calibrations.

Main menu → Info →

Cal Factor

This screen shows the actual calibration factor and its global limits. The calibration factor should be near 1 for a good setting of the automatic times.

Possible values: 0.2 to 5.
Default setting: 1.

Service

This menu item is for authorized INFICON service personnel only.

Main menu → Access control →

Access to CAL function

Here, you can lock and unlock the access to the calibration function.

Change Menu PIN

Here, you can set or change a 4 digit PIN to prevent access to the menu via the control unit. A Menu PIN of "0000" means, that no Menu PIN is assigned.

5.9 F.A.Q. - Frequently asked questions

Q: Why can the measurements not be reproduced?

A1: It is less possible to reproduce measurements when the T-Guard indicates "moderate background" or "bad background".

Remedial measures: Decrease the background by checking the helium supply for leaks. If possible, place the helium supply far away from the T-Guard. Evacuate the test sample after the measurement in order to dispose of the helium.
Purge the measurement chamber with ambient air. Carrier gas mode only works if you have a constant pressure of 5 ppm of helium in the air.

A2: Measurements are less reproducible if the chamber has little slots or holes. A calibration factor of 1.3 or more indicates that he chamber volume was entered correctly.

A3: Measurements are less reproducible if the trigger level is a lot higher than the measured leakage rate. The trigger level should be equal to the leakage rate to be measured.

A4: Measurements are less reproducible if the measurement time was reduced too much. This has the same effect as a trigger level that is too high.

A5: Measurements are less reproducible if the chamber fan is too weak. The fan should circulate the chamber volume twice per second.

A6: Measurements are less reproducible if they are carried out in Only GROSS mode. If this is the case, the T-Guard displays "Only GROSS" when changing the trigger level.

Remedial measures: Avoid an Only GROSS measurement by using diluted helium (and setting this) or by using a larger chamber.

A7: Measurements are less reproducible if you do not use the green measuring hoses from INFICON. Hoses with an inside diameter of more than 1 mm cannot be used.

A8: Measurements are less reproducible if the green hoses have not been inserted completely into the couplings.
Apply a very thin grease film to the ends of the hoses in order to be able to insert them completely. You notice this by the hose sliding into the coupling a second time.

Q: Why does the measured leak rate get smaller and smaller when I do not purge the chamber in between measurements?

A: Check the chamber for thin slots and small holes. Helium may escape there. This leads to smaller leakage rates over time.

Remedial measures: Seal your chamber. Use the rubber gaskets for the chamber lid.

Q: Why does the calibration not work?

A1: Enter the correct chamber volume and adjust the trigger level and the test leakage rate to the used leakage rate.
If you use diluted helium, you must enter this in the device.

A2: Check all answers to the first question: "Why can the measurements not be reproduced?"

Q: Why do I receive a warning after confirming the new calibration factor?

A: Your measurement set-up can and should be improved.

Remedial measures: Check the chamber volume, the chamber for slots and holes, as well as the test leakage rate, the trigger level, the measuring time and the fan.

Q: Why does the measured leakage rate increase over time?

A1: If the T-Guard has not been used for a long time, the sensor drifts a little downwards. This drift becomes increasingly smaller, so that the measured leakage rate may rise a little. The measurement should be stable after two hours.

A2: The test leak could take some time to stabilise.

Remedial measures: Use leaks from INFICON.

A3: The helium and air mixture takes a long time in your test sample.

Remedial measures: Evacuate the test sample as far as possible before filling it with helium.

Q: Why does the follow-up measurement after a gross leakage return a leakage rate that is too small?

A: Especially after measuring a gross leak, you should purge the measurement line for at least 4 s with low-helium air, then wait for 1 s before performing the next measurement.
This removes the residual helium, which could otherwise affect the following measurements, from the measurement system.

6 Maintenance

Warning

For maintenance work, disconnect the T-Guard™ Leak Detection Sensor from the power supply.

6.1 Replacing the Inlet Filters

The T-Guard™ Leak Detection Sensor has two inlet filters.

Caution

The inlet filters should be checked for contamination at least every 6 months and should be replaced no later than every 2 years.

Notice Always change both filters even if only one is clogged.

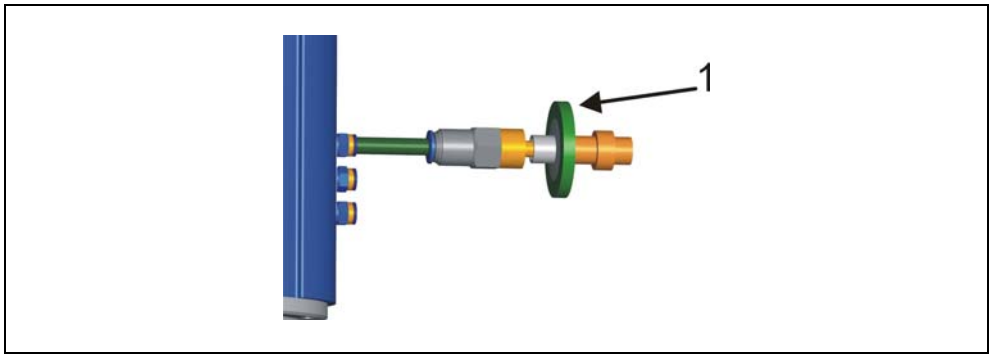


Fig. 7-1 Inlet filter attached

Item	Description
1	Inlet Filter

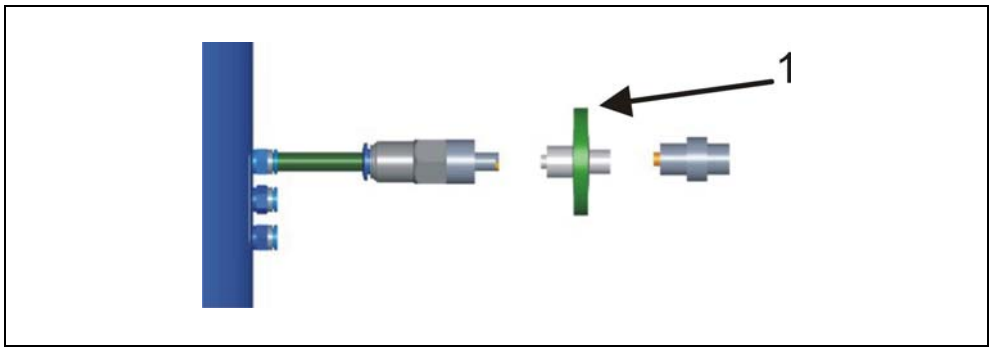


Fig. 7-2 Inlet filter removed

Item	Description
1	Inlet Filter

6.2 Replacing Hoses

Notice Measurement hose and reference hose must have the same length.

Notice Apply grease to the outside of the ends of the green measurement lines in a thin film to be able to slide them into the connections until they snap in. Otherwise it can happen that they are not deep enough in the connector and measuring errors can appear.

1 Push on the ring of the connection and pull the hose out.

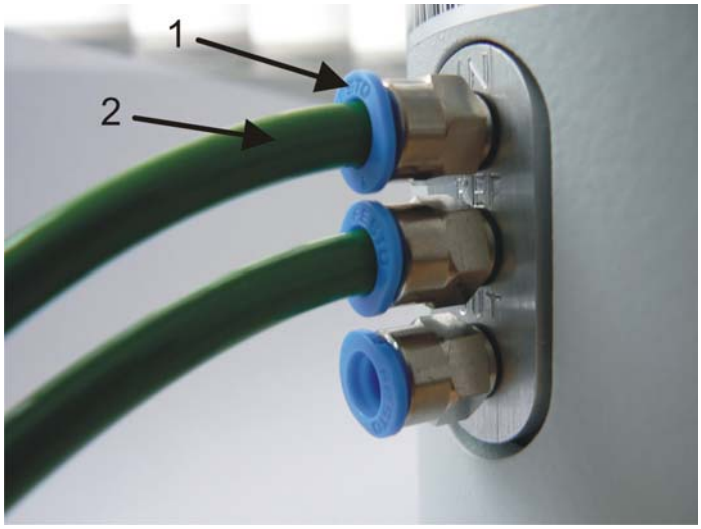


Fig. 7-3 Hose connections of the T-Guard™ Leak Detection Sensor

Item	Description	Item	Description
1	Ring of connector	2	Hose

2 Insert the new hose into the connection.

6.3 Replacing the Internal Fuses

Caution

Before opening the housing to replace a fuse, disconnect the T-Guard™ Leak Detection Sensor from the power supply.

Tools : 3 mm Torx screw driver

Open the housing:

1 Remove 4 screws from the bottom.

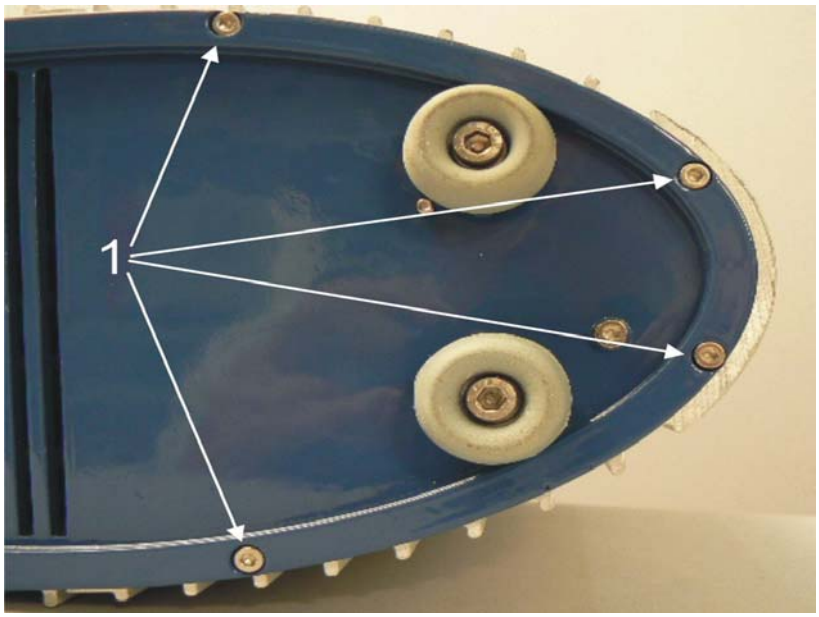


Fig. 7-4 Bottom view of the T-Guard™ Leak Detection Sensor

Item	Description
1	Screws on bottom

2 Remove 4 screws from the top.

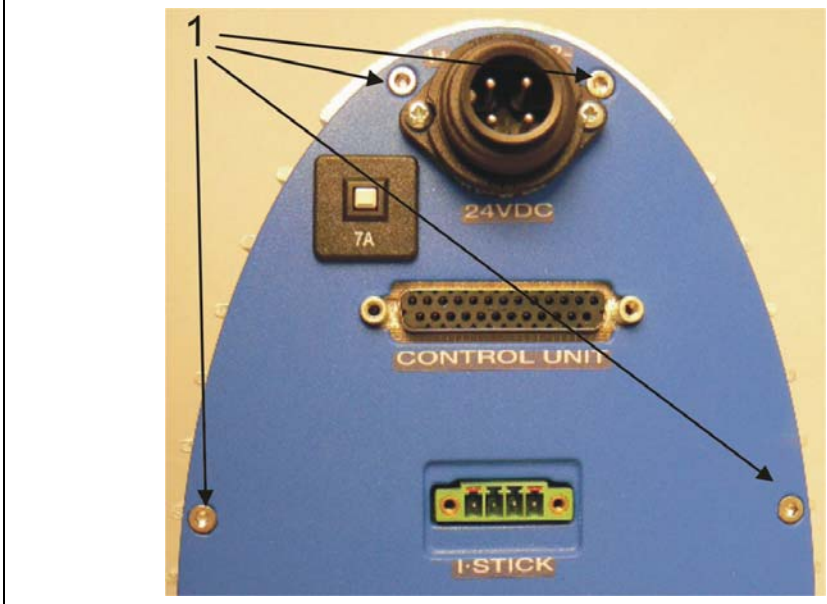


Fig. 7-5 Top view of the T-Guard™ Leak Detection Sensor

Item	Description
1	Screws on top

3 Remove the front cover of the housing.

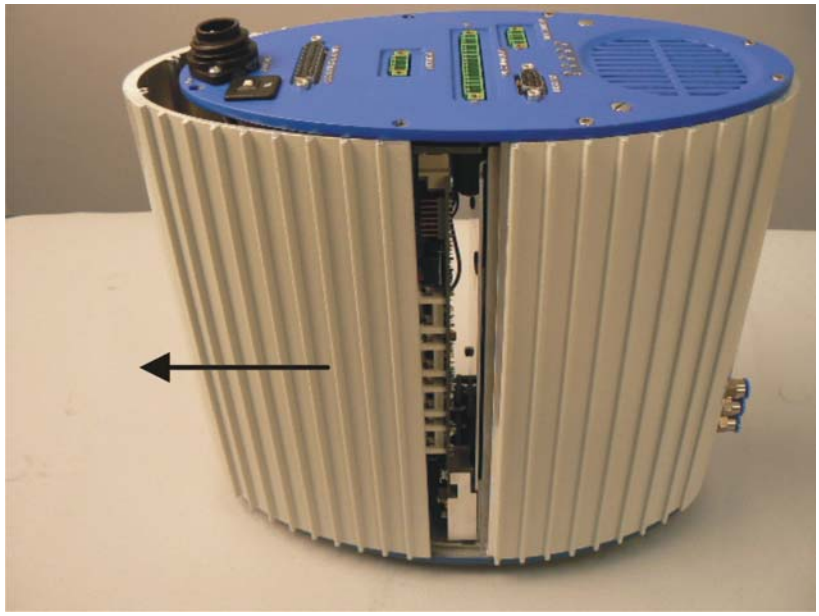
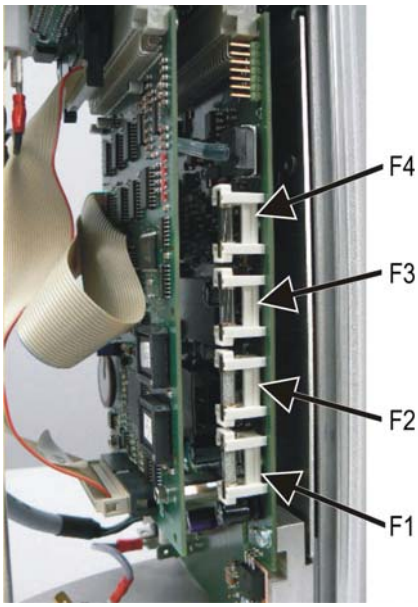


Fig. 7-6 Open the front part of the housing like the arrow indicates

Now you can see the fuses inside the T-Guard™ Leak Detection Sensor.



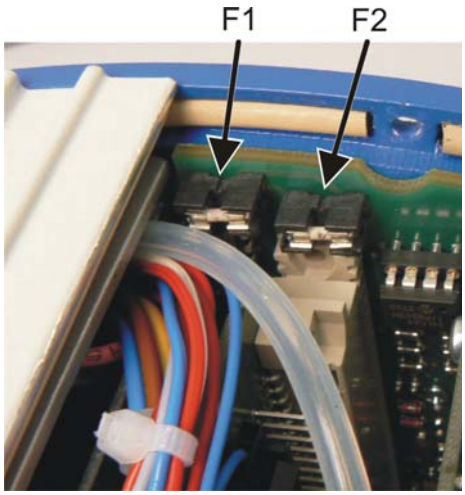


Fig. 7-7 Location of the fuses Digital I/O

7 Product Handling

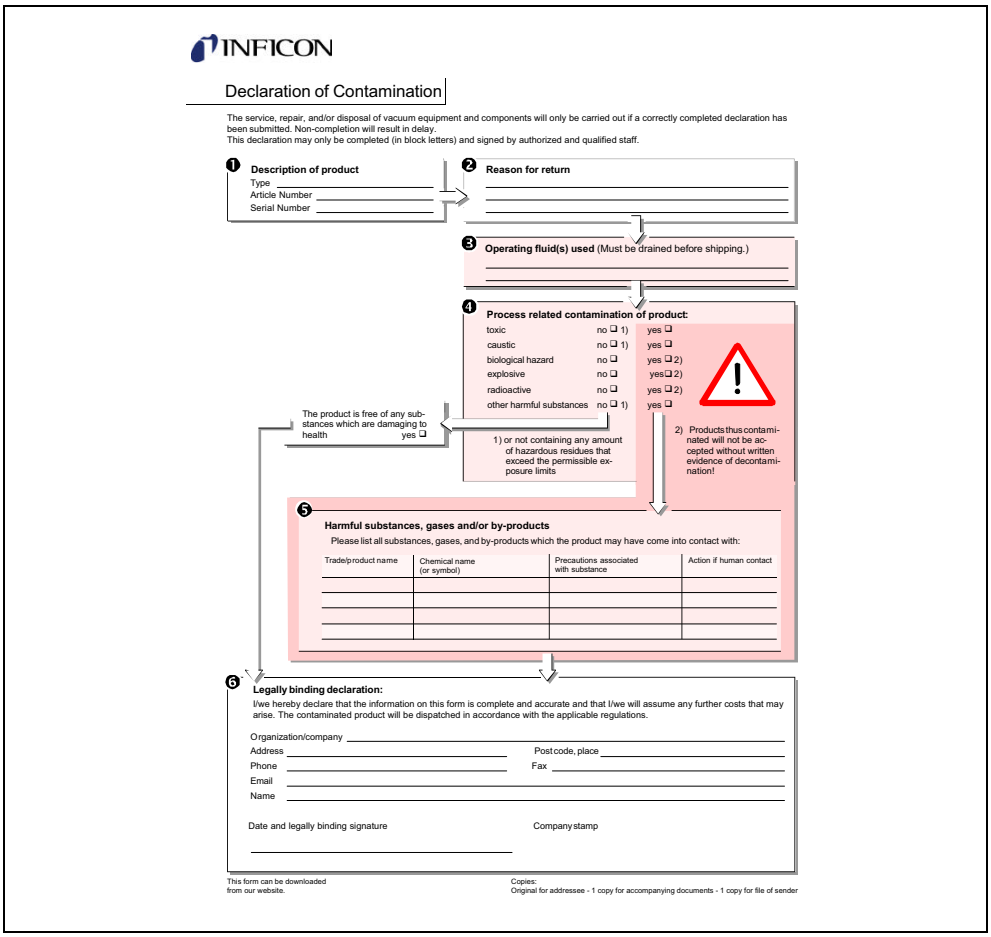
7.1 Transporting

When transporting the T-Guard™ Leak Detection Sensor, always use the original box in which it was shipped to you.

7.1.1 Transporting after Contamination

If equipment is returned to INFICON or an authorized INFICON representative, indicate whether the equipment is free of substances damaging to health or whether it is contaminated. If it is contaminated, also indicate the nature of the hazard. INFICON must return any equipment without a Declaration of Contamination to the sender's address.

You will find an example of the form below. The appropriate form is attached to the T-Guard folder.



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.

❶ **Description of product**
Type
Article Number
Serial Number

❷ **Reason for return**

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

❹ **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!

❺ **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

❻ **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

Fig. 8-1 Sample of form for declaring contamination

7.2 Disposal

When disposing of the T-Guard™ Leak Detection Sensor, consider your federal law concerning the disposal of electronic devices.

8 Technical Data

8.1 Power supply

Supply voltage	24 V DC / 6 A
Typical power consumption	< 100 VA
Type of protection	IP40

8.2 Weight / dimensions

Dimensions (L x W x H)	258 x 130 x 272 mm 10.2“ x 5.1“ x 10.7“
Weight	4.5 kg / 10 lbs
Noise level dB(A)	< 56
Noise level dB (A) 0.5 m distance	< 56
Contamination level (to IEC 60664-1)	2
Overvoltage category (to IEC 60664-1)	II

8.3 Characteristics

Max. inlet pressure	2000 mbar
Minimum detectable helium leak rate	< 1×10^{-6} mbar l/s
Max. carrier gas flow	1,000,000 sccm
Maximum helium leak rate which can be displayed	0.1 mbar l/s
Measurement range	5 decades
Time constant of the leak rate signal (63% of the final value)	< 1 s
gas flow	180 sccm
Gas flow in GROSS mode	90 sccm
Detectable gas	Helium
Helium sensor	Wise Technology™
Hose connectors	6 mm
Run up time (after starting)	3 - 30 min
Valves	Solenoid
Screw thread IN / REF-line	1 / 8’’ M-NPT
Screw threads bottom	M 5

(1112)

jina85e 8.fm

8.4 Environmental Conditions

For use within buildings	
Permissible ambient temperature (during operation)	+10° C … +50° C 50° F … 122° F
Permissible storage temperature	0° C … +60° C 32° F … 140° F
Maximum relative humidity	80% at 31°C / 88°F, linearly decreasing to 50 % at 40 °C / 104 °F
Max. permissible height above sea level (during operation)	2000 m

8.5 Assembly Drawing for built-in Control Unit

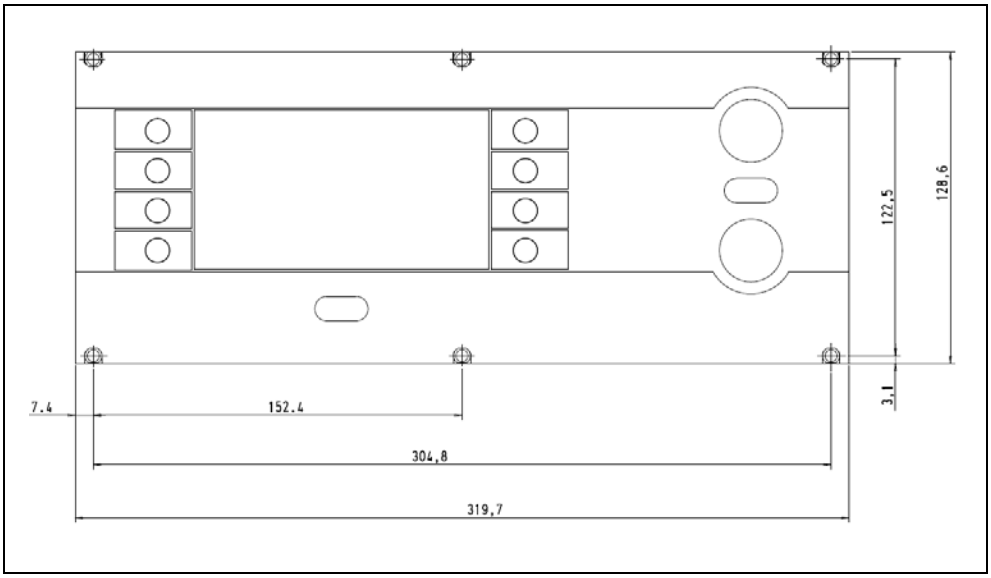


Fig. 9-2

9 Errors and Warnings

Error No.	Plain text message	Possible reason	Recommendation
E1	24 V of the MC50 is too low	Fuse F1 on the DC/DC board has blown or power supply unit too weak	Replace the Fuse F1 on the DC/DC board or use a controlled power supply unit.
E2	24 V of sensor heating too low	Fuse F2 on the DC/DC board has blown or power supply unit too weak	Replace the Fuse F2 on the DC/DC board or use a controlled power supply unit.
E3	24 V II too low	Fuse F3 on the DC/DC board has blown or power supply unit too weak	Replace the Fuse F3 on the DC/DC board or use a controlled power supply unit.
W4	24 V at socket OPTION is too low	Fuse F4 on the DC/DC board has blown or power supply unit too weak	Replace the Fuse F4 on the DC/DC board or use a controlled power supply unit.
E7	-15 V of the MC50 is too low	DC/DC board defective	Call nearest INFICON service representative
E8	15 V of the MC50 is too low	DC/DC board defective	Call nearest INFICON service representative
E9	High Voltage error	Problem in sensor electronics	Call nearest INFICON service representative
W11	Wise-current unstable	T-Guard™ Leak Detection Sensor possibly not being used for several days, sensor current should stabilize after longer run-time. The helium background is higher than 20 ppm.	Get the T-Guard™ run for 2 hours. Reduce the helium background in the room.
E12	Wise Sensor not ignited	Current from Wise Technology sensor too low for more than 10 min after power on. (>5E-11 A).	Restart the T-Guard™ Leak Detection Sensor, if problem persists, call nearest INFICON service representative
E13	Problem in Heater Control	Heater control for Wise Technology sensor defective.	Restart the T-Guard™ Leak Detection Sensor, if problem persists, call nearest INFICON service representative
E14	Discharge gone out	Sensitivity problem of Wise Technology sensor or No ambient helium present (e.g. inlets purged with nitrogen)	Restart with inlets connected to external air If problem persists, call nearest INFICON service representative
E19	No communication with Wise ADC	Wise Technology sensor defective or CPU-board defective	Call nearest INFICON service representative!
E20	Temperature at electronic unit is too high (>60°)	Ambient temperature too high	Cool down environment, place the T-Guard™ Leak Detection Sensor in cooler area.
E20	Temperature at electronic unit is too high (>60°)	Ventilation failure	Check if fan is (check for air flow through inlet of the housing)

Error No.	Plain text message	Possible reason	Recommendation
W28	Real time clock reset! Please enter date and time!	CPU-board has been replaced	Please enter date and time
		Battery on CPU-board faulty	Replace CPU-board*
E32	Wise current too high	Wise Technology sensor current exceeds threshold value	**Do not switch off the T-Guard™ Leak Detection Sensor** Supply external air through the sniffer line quickly, restart the T-Guard™ Leak Detection Sensor and wait to allow the T-Guard™ Leak Detection Sensor to recover! If problem persists, call nearest INFICON service representative.
E38	Pump defect	Sensor pressure higher than 800 mbar Fore pump defect, not switched on or pump hose defect	Please check the fore pump.
W39	Valve block error!	Cannot recognize valve block version during self-test	Call nearest INFICON service representative
W41	Pressure difference too high	Pressure difference between measuring inlet /air inlet ±10% Pressure difference between READY and FINE	Check inlet filters
W43	Pressure too low	Pressure below the lower limit. Reference line plugged	Check the lower pressure limit Check the reference line
W44	Pressure too high	Pressure above the upper limit Wrong fore pump Pump hose defect	Check the upper pressure limit Please check the fore pump and the pump hose
W45	Too high helium concentration	During the purging process, too much helium is before or in the measuring line. T-Guard stops the purging process too early to protect the sensor The test chamber was not purged sufficiently before the measurement.	Purge the chamber with external air and start a new purging process of the sensor via the PLC or the RS232 command, Purge the test chamber more thoroughly before measurements.
W50	No I·Stick present.	I·Stick was not connected during running-up. I·Stick defect	Switch the T-Guard off and on again with the I•Stick connected.
W52	Lost I·Stick parameters! Please check the settings!	I·Stick disconnected during operation I·Stick defect	Please check all your settings. Switch the T-Guard off and on again with the I•Stick connected.
W59	EEPROM parameter queue overflow!	May occur when the software has been updated to an older version.	Restart the T-Guard™ Leak Detection Sensor, if problem persists, call nearest INFICON service representative
W60	All EEPROM parameters are lost! Please check your settings!	New EEPROM has been installed, EEPROM on motherboard is virgin	All settings in software menu are reset to default! Please enter your settings again
		If message comes up repeatedly during start-up, EEPROM on motherboard is faulty	Replace EEPROM*

Error No.	Plain text message	Possible reason	Recommendation
W61	EEPROM parameter initialized!	Software update performed and new parameters have been introduced Newly introduced parameters are listed below warning	Acknowledge warning
		If message comes up repeatedly during start-up, EEPROM on motherboard is faulty	Replace EEPROM*
W62	Lost EEPROM parameters!	Parameter has been modified during software update and reset to default value Affected parameters are listed below warning	Check setting of modified parameters in corresponding software menu and set to desired value
		If message comes up repeatedly during start-up, EEPROM on motherboard is faulty	Replace EEPROM*
W64	There are outstanding warnings!	Acknowledged but still valid warnings will be repeated every 2 hours or on each new power on	Please double-check the warnings
W81	Calibration factor too low!	If the calibration factor was measured with 0.2, calibration was not successful. If the calibration factor was confirmed between 0.2 and 0.5, a warning will be output, however, also after the confirmation of the successful calibration.	
		The leak rate of the test leaks is higher than entered.	Check correct setting of test leak value
		If the calibration factor was measured to be higher than 5, calibration was not successful. If the calibration factor was confirmed between 2 and 5, a warning will be output, however, also after the confirmation of the successful calibration.	Check the settings of the chamber volume or the gas flow.
W82	Calibration factor too high!	Calibration factor during calibration determined to be > 10	
		The leak rate of the test leaks is smaller than entered.	Check correct setting of test leak value
		Chamber volume or gas flow are greater than entered.	Check the settings of the chamber volume or the gas flow.
W84	Test leak signal too small	Test leak faulty	Please check all your settings.
		Trigger value(s) too high	Check the trigger
		Settings of volume/flow too low	Check the free volume/the carrier gas flow
		Test chamber leaky	Check the chamber for tightness

Error No.	Plain text message	Possible reason	Recommendation
W89	Over range!	The T-Guard™ Leak Detection Sensor is contaminated with helium.	**Do not switch off the T-Guard™ Leak Detection Sensor** Keep the T-Guard™ Leak Detection Sensor running while providing external air into inlets until the warning disappears. If the warning occurs frequently, increase the contamination limit.
			Check the helium background, refer to Info page 2.
		Test leak value too high during external calibration!	Use a smaller test leak for external calibration
W90	Calibration conditions not met		

10 Service Centers World Wide

Algeria	jhj@agramkow.dk	**India**	asdash@hotmail.com
Agramkow	Tel.: +45 741 236 36	Dashpute	Tel.: +91 22 888 0324
Sonderborg	Fax: +45 744 336 46	Mumbai	Fax: +91 22 888 0324
Belarus	leakdetection.service@inficon.com	**Ireland**	reach.unitedkingdom@inficon.com
INFICON GmbH	Tel.: +49 221 56788 112	INFICON Ltd.	Tel.: +44 1254 678 250
Cologne	Fax: +49 221 56788 9112	Blackburn	Fax: +44 1254 698 577
Belgium	leakdetection.service@inficon.com	**Israel**	urimark@mark-tec.co.il
INFICON GmbH	Tel.: +49 221 56788 112	Mark Technologies Ltd.	Tel.: +972 35 34 68 22
Cologne	Fax: +49 221 56788 9112	Kiriat Ono	Fax: +972 35 34 25 89
Brazil	fernandoz@prestvacuo.com.br	**Italy**	reach.italy@inficon.com
PV Pest Vácuo Ltda.	Tel.: +55 114 154 4888	INFICON GmbH	Tel.: +39 045 6 40 25 56
Santa de Parnaíba	Fax: +55 114 154 4888	Castelnuovo	Fax: +39 045 6 40 24 21
Bulgaria	leakdetection.service@inficon.com	**Japan**	reach.japan@inficon.com
INFICON GmbH	Tel.: +49 221 56788 112	INFICON Co. Ltd.	Tel.: +8145.471.3396
Cologne	Fax: +49 221 56788 9112	Yokohama	Fax: +81.45.471.3387
China	reach.china@inficon.com	**Canada**	reachus@vpcinc.ca
INFICON LTD	Tel.: +8522862.8863	Vacuum Products Canada Inc.	Fax: +1 905 672 7704
Hong Kong	Fax: +852.2865.6883	Ontario	Fax: +1 905 672 2249
INFICON LTD	Tel.: +86.10.6590.0164	**Korea**	reach.korea@inficon.com
Beijing	Fax: +86.10.6590.0521		
INFICON LTD	Tel.: +8620.8723.6889	INFICON Ltd.	Tel.: +82 312 062 890
Guangzhou	Fax: +86.20.8723.6003	Sungnam	Fax: +82 312 063 058
INFICON LTD	Tel.: +8621.6209.3094	INFICON Ltd.	Tel.: +82 312 062 890
Shanghai	Fax: +86.21.6295.2852	Suwon City	Fax: +82 312 063 058
Denmark	jhj@agramkow.dk	INFICON Ltd.	Tel.: +82 312 062 890
		Cheonan City	Fax: +82 312 063 058
Agramkow	Tel.: +45 741 236 36		
Sonderborg	Fax: +45 744 336 46		
Germany	leakdetection.service@inficon.com	**Latvia**	leakdetection.service@inficon.com
INFICON GmbH	Tel.: +49 221 56788 112	INFICON GmbH	Tel.: +49 221 56788 112
Cologne	Fax: +49 221 56788 9112	Cologne	Fax: +49 221 56788 9112
Estonia	leakdetection.service@inficon.com	**Lithuania**	leakdetection.service@inficon.com
INFICON GmbH	Tel.: +49 221 56788 112	INFICON GmbH	Tel.: +49 221 56788 112
Cologne	Fax: +49 221 56788 9112	Cologne	Fax: +49 221 56788 9112
Finland	jhj@agramkow.dk	**Mexico**	infoqro@meisa.com
Agramkow	Tel.: +45 741 236 36	MEISA S.a. de C.V.	Tel.: +52 442 225 42 80
Sonderborg	Fax: +45 744 336 46	Querètaro	Fax: +52 442 225 41 57
France	Christophe.Zaffanella@oerlikon.com	**Central America**	infoqro@meisa.com
OLV France	Tel.: +33 476 351 584	MEISA S.a. de C.V.	Tel.: +52 442 225 42 80
Orsay	Fax: +33 476 351 584	Querètaro	Fax: +52 442 225 41 57
Great Britain and Northern Ireland	reach.unitedkingdom@inficon.com	**Netherlands**	leakdetection.service@inficon.com
INFICON Ltd.	Tel.: +44 1254 678 250	INFICON GmbH	Tel.: +49 221 56788 112
Blackburn	Fax: +44 1254 698 577	Cologne	Fax: +49 221 56788 9112

Norway	jhj@agramkow.dk	**Syria**	leakdetection.service@inficon.com
Agramkow	Tel.: +45 741 236 36	INFICON GmbH	Tel.: +49 221 56788 112
Sonderborg	Fax: +45 744 336 46	Cologne	Fax: +49 221 56788 9112
Poland	kamola@vakpol.com	**Taiwan**	reach.taiwan@inficon.com
VAK-POL & GAZ Sp. z	Tel.: +48 602 315 212	INFICON Company Limited	Tel.: +8863.5525.828
Pulawy	Fax: +48 602 315 212	Chupei City, HsinChu Hsien	Fax: +886.3.5525.829
Portugal	leakdetection.service@inficon.com	**Czech Republic**	filip.lisec@inficon.com
INFICON GmbH Cologne	Tel.: +49 221 56788 112 Fax: +49 221 56788 9112	INFICON GmbH Pilsen	Tel.: +420 734 331 758 Fax: +420 604 203 037
Republic of South Africa	vacuquip@hotmail.com	**Turkey**	jhj@agramkow.dk
Vacuquip	Tel.: +27 731 578 355	Agramkow	Tel.: +45 741 236 36
Randburg		Sonderborg	Fax: +45 744 336 46
Russia	leakdetection.service@inficon.com	**Tunisia**	leakdetection.service@inficon.com
INFICON GmbH	Tel.: +49 221 56788 112	INFICON GmbH	Tel.: +49 221 56788 112
Cologne	Fax: +49 221 56788 9112	Cologne	Fax: +49 221 56788 9112
Sweden	jhj@agramkow.dk	**USA**	service.usa@inficon.com
Agramkow	Tel.: +45 741 236 36	Inficon Inc.	Tel.: +1,315,434.1167
Sonderborg	Fax: +45 744 336 46	East Syracuse, NY	Fax: +1.315.434.2551
Singapore	reach.singapore@inficon.com	Inficon Inc.	Tel.: +1.408.361.1200
		San Jose, CA	Fax: +1.408.362.1556
INFICON PTE LTD.	Tel.: +65,890.6250	Inficon Inc.	Tel.: +1,512,448.0488
Singapore	Fax: +65,890.6266	Austin, TX	Fax: +1,512,448.0398
Slovakia	filip.lisec@inficon.com	**Ukraine**	leakdetection.service@inficon.com
INFICON GmbH Pilsen	Tel.: +420 734 331 758 Fax: +420 604 203 037	INFICON GmbH	Tel.: +49 221 56788 112
		Cologne	Fax: +49 221 56788 9112
Slovenia	medivak@siol.net	**Hungary**	adam.lovic@kon-trade.hu
Medivac	Tel.: +386 15 63 91 50	Kon-trade + KFT	Tel.: +36 23 50 38 80
Ljubljana	Fax: +386 17 22 04 51	Budaörs	Fax: +36 23 50 38 96
Spain	jordi.poza@leyboldoptics.com	**United Arab Emirates**	leakdetection.service@inficon.com
Leybold Optics Ibérica	Tel.: +34 93 66 60 778	INFICON GmbH	Tel.: +49 221 56788 112
Barcelona	Fax: +34 93 66 64 612	Cologne	Fax: +49 221 56788 9112
South America except Brazil	infoqro@meisa.com	**Belarus**	leakdetection.service@inficon.com
MEISA S.a. de C.V.	Tel.: +52 44 22 25 42 80	INFICON GmbH	Tel.: +49 221 56788 112
Mexico	Fax: +52 44 22 25 41 57	Cologne	Fax: +49 221 56788 9112

10.1 Ordering Information

Description	Cat. no.
T-Guard™ Leak Detection Sensor	540-001
T-Guard™ Leak Detection Sensor, version Profibus	540-002
Control Unit for Desktop Operation	551-100
Control unit for the installation in a 19"-Rack	551-101
Connecting cable for the control unit, 5 m	551-102
Connecting cable for the control unit, 1 m	551-103
Set of connectors	551-110
I•Stick	200 001 997
Set of fuses	200 002 489
Set of filters	200 001 680
I/O test box	200 002 490
Power supply connection	200 002 496
Chamber connector	200 002 615
Measuring line 210 x 2 x 2 m	200 002 793
Fore pump, 24 V, two-step, brushless	200 002 929

(1112)

jina85e 10.fm

Index

INFICON GmbH, Bonner Strasse 498, D-50968 Cologne, Germany

UNITED STATES TAIWAN JAPAN KOREA SINGAPORE GERMANY FRANCE UNITED KINGDOM HONG KONG
Visit our website for contact information and other sales offices worldwide. **www.inficon.com**

Dokument: jina85e1-f (1112)