



LEAK DETECTORS CATALOG

EDITION 2007



General

Applications and Accessories.	03
Leak Detection - Leak Testing	04
Leak Detection Methods	05
Operating Principles of the INFICON Helium Leak Detectors	07

Products

Modular System Leak Detectors for universal integration into industrial leak testing systems	
LDS2010	10
Modular Helium Leak Detectors for integration into medium automated test benches	
Modul1000	12
Helium Leak Detectors (vacuum)	
UL1000	14
UL1000 Fab	16
UL5000	18
Helium Sniffer Leak Detectors	
Protec P3000	20
Refrigerant Sniffer Leak Detectors	
Ecotec E3000 for Refrigerants and other gases.	22
Ecotec E3000A Multi-gas Leak Detector for Airbus airplanes	24
HLD5000 Refrigerant Sniffer Leak Detector.	26

Accessories

Calibrated Test Leaks	28
Calibrated Leaks for System Applications.	30
Sample Probes (Sniffers) and Accessories.	32
Connection Flanges and Components	34

Applications and Accessories

Leak Detectors Test Instruments	UL1000	UL1000 Fab	UL5000	LDS2010	Modul1000	Protec P3000	Ecotec E3000	Ecotec E3000A	HLD5000
Applications									
Semiconductor production		◆	◆				◆*)		
Metallurgy/furnaces							◆		
Automotive industry	◆			◆	◆	◆	◆		◆
Aircraft construction industry							◆		
Refrigeration	◆				◆	◆			
Air conditioning	◆			◆	◆	◆	◆		◆
Systems engineering	◆			◆	◆				

*) Gas panels

Leak Detection – Leak Testing

Whether a component or a system is leak-tight depends on the application and its acceptable leak rate. Absolutely leak-tight components and systems do not exist. A component is considered leak-tight if its leak rate remains below a value defined for that particular component. In order to provide a quantitative measure, the term “leak rate” with the symbol “ q_L ” was introduced.

In vacuum technology, mbar l/s is used as the unit for leak rates.

A leak rate of 1 mbar l/s exists in a closed vessel having a volume of 1 liter when the pressure increases by 1 mbar within one second, or in case of an overpressure it decreases by 1 mbar within one second.

$$q_L = \frac{V \cdot \Delta p}{\Delta t} \text{ (mbar l/s)}$$

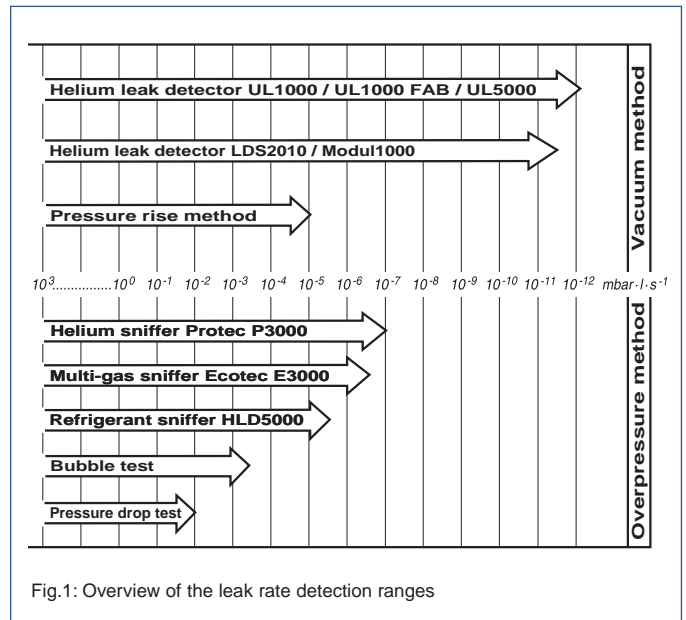
The wide range of leak rates from several 100 mbar l/s to below 10^{-11} mbar l/s as they occur in practice necessitates the use of different leak detection principles and hence leak detectors (see figure 1).

Besides the determination of the total leak tightness, it is usually important to locate the leak, quickly and precisely, in order to seal it. Instruments for local leak detection are called leak detectors. The leak detectors presented in this catalog can be used for the localization of leaks, and in addition some are suitable for determining the total leak rate of test objects.

Fig.2:

SPECIFICATIONS	mbar l/s *	atm cm ³ /s* cm ³ x s ⁻¹ *	torr l/s*	Pa m ³ /s	kg/h ⁻¹ air	g/a C ₂ H ₂ F ₄ (R134a)
1 mbar l/s (He)	1	0.99	0.75	0.1	4.3 x 10 ⁻³	2.28 x 10 ⁵
1 atm cm ³ /s = cm ³ (STP) s ⁻¹ *	1.01	1	0.76	0.101	4.3 x 10 ⁻³	2.3x 10 ⁵
1 torr l/s*	1.33	1.33	1	0.133	5.7 x 10 ⁻³	3.0 x 10 ⁵
Pa m ³ /s	10	9.87	7.5	1	4.28 x 10 ⁻²	2.28 x 10 ⁶
1 kg/h ⁻¹ air	234	234	175	23.4	1	-
1 g/a C ₂ H ₂ F ₄ (R134a)	7.58 x 10 ⁻⁶	6.3 x 10 ⁻⁶	4.8 x 10 ⁻⁶	6.41 x 10 ⁻⁷	-	1

* According to international system of units only Pa m³/s is permissible



Leak Detection Methods

There are two main groups of leak detection methods: Vacuum and overpressure. Many variations exist depending on the particular application.

Vacuum Methods

The equipment to be tested is evacuated. The pressure ratio between inside and outside is 0:1.

Overpressure Methods

The equipment to be tested is pressurized with a search gas or a search gas mixture. The pressure ratio between inside and outside is over 1:1.

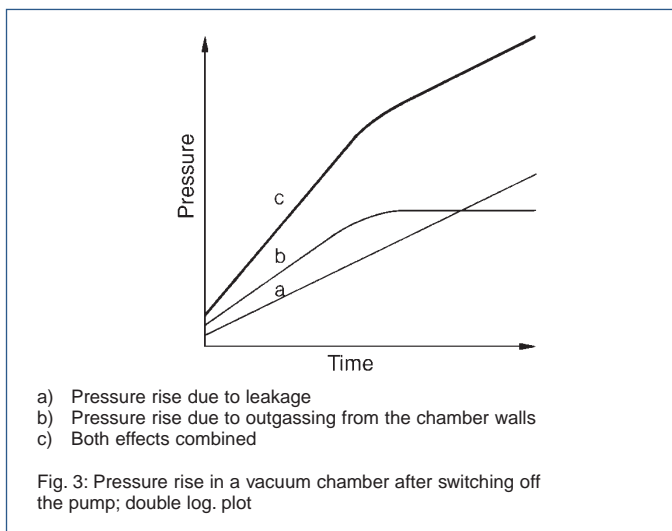
General Notes

1. The lowest leak rates can only be measured by employing the vacuum method, whereby the following applies: The lower the leak rate, the higher the requirements are concerning cleanliness and ultimate vacuum.
2. If possible the test objects should be tested under the same conditions that will be used in their final application. That is parts for vacuum operation should be tested according to the vacuum method and parts for overpressure operation should be tested using the overpressure method.

Leak Testing Based on Vacuum Methods

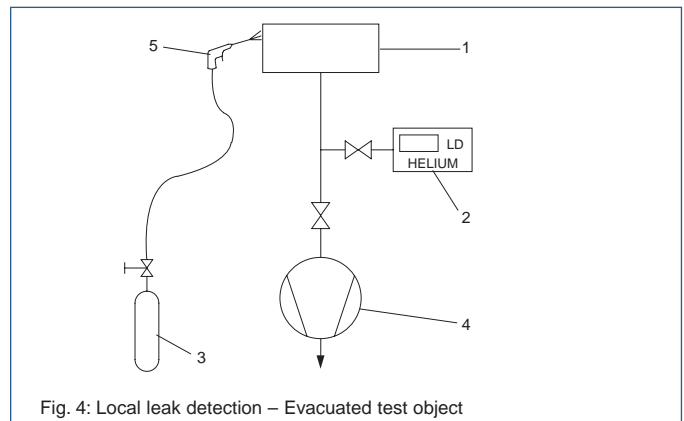
Pressure Rise Method

With this method it is only possible to determine the total leak rate. The test object is evacuated with a vacuum pump or a vacuum pump system. A valve is used to isolate the test object from the vacuum pump. The pressure will then rise as a function of time (see fig. 3).



Curve (a) shows the theoretical pressure rise if there is only a leak. Curve (b) shows the pressure rise due to outgassing from the surfaces of the test object. This pressure rise tends to tail off in the direction of a saturation level. If in such a case the time allowed for monitoring the pressure rise is too short, a leak will be indicated which in reality does not exist. If one waits long enough for the pressure to rise, i.e. after the bend of curve (b), the outgassing process can then be disregarded. The leak rate can be determined from the known volume of the test object and the measured pressure rise over a fixed rise time (see equation on page 4). Curve (c) shows the pressure rise as it occurs in practice, where outgassing and leak rate combine. The detectable leak rate depends on the volume of the test object, the obtained ultimate pressure and the outgassing from the test object. In connection with very large test objects this method is time consuming if extremely low leak rates are to be determined in the fine and rough vacuum range.

Local Leak Detection

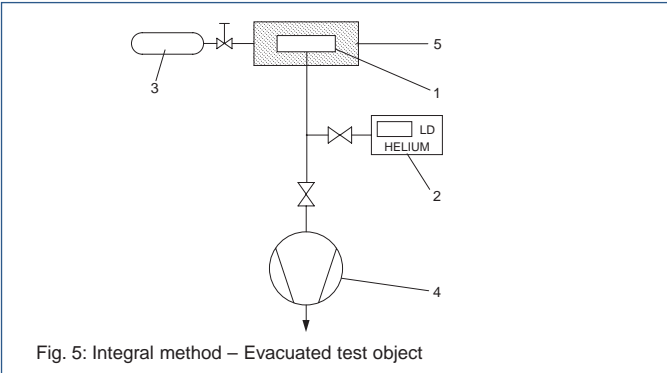


Key to Figure

- 1 Test object, 2 Leak detector, 3 Search gas cylinder, 4 Vacuum pump, 5 Spray gun for search gas

The test object is evacuated by a vacuum pump (auxiliary pump) until the pressure is low enough for the leak detector to operate (refer to fig.4). When using a helium leak detector, its own pump system will take care of further evacuation. Suspicious spots on the test object will then be sprayed with a fine jet of search gas. Search gas entering through leaks into the test object is pumped out by the vacuum pump and is converted by the leak detector into an electrical signal which is then displayed. This permits rapid detection and determination of the size of even the smallest leaks.

Integral Method



Key to Figure
 1 Test object, 2 Leak detector, 3 Search gas cylinder, 4 Vacuum pump, 5 Hood

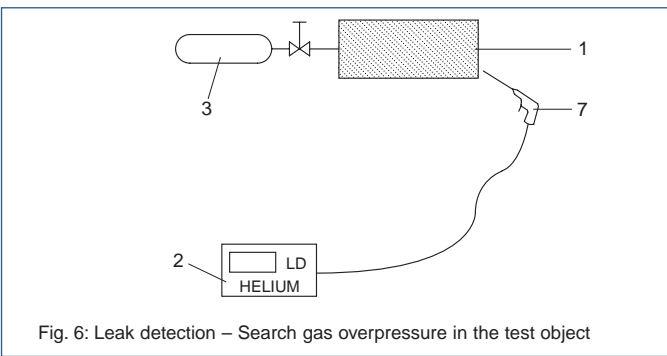
Determination of the total leak rate of a test object

The testing arrangement is the same as for local leak detection, but in this case the test object is not sprayed with search gas on selected areas, but it is surrounded by a hood or a chamber which is filled with the search gas (refer to fig. 5). Thus the entire outer surface of the test object comes into contact with the search gas. If the search gas enters the test object, the total leak rate is indicated independently of the number of existing leaks. With helium leak detectors it is possible to determine the helium content of the air. This is utilized in the detection of gross leaks.

Leak Testing Based on Overpressure Methods

Pressure Drop Method

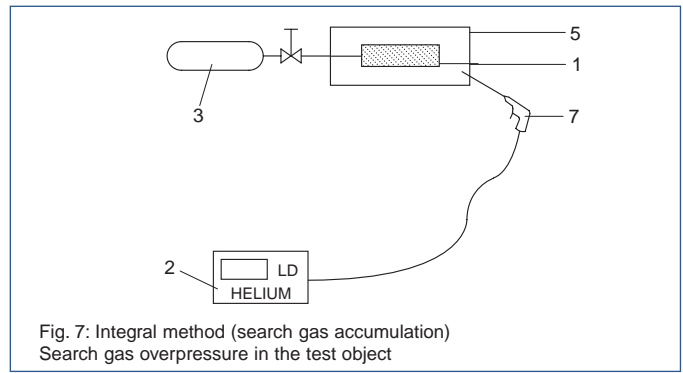
The test object is filled with a gas (for example air or nitrogen) until the testing pressure is reached (refer to fig. 6). Precision vacuum gauges are used to detect a possible pressure drop during the testing period. This method is simple to implement, it is suitable for the determination of gross leaks and can be improved upon by using differential pressure gauges. By applying soap solutions or similar, leaks can be located.



Key to Figure
 1 Test object, 2 Leak detector, 3 Search gas cylinder, 7 Sniffer probe

Local Leak Detection with Leak Detectors – Sniffing

The test object is filled with the search gas or the search gas/air mixture to which the leak detector is sensitive. The leak detector is equipped with a sniffer probe, with low pressure at the probe tip. As the sniffer tip passes suspicious points on the test object, the search gas coming out of the leak is sucked in and transferred to the detection system of the leak detector. After conversion into electrical signals the leaks are displayed optically and acoustically by the leak detector.



Key to Figure
 1 Test object, 2 Leak detector, 3 Search gas cylinder, 5 Hood, 7 Sniffer probe

Integral Method – Hood Test 0

To determine the total leak rate of a test object subjected to a search gas overpressure, the test object is surrounded by a hood of a known volume (refer to fig. 7). The search gas which escapes through the leaks collects in the hood. After a fixed accumulation period a sniffer probe is used to measure the concentration of the search gas which has collected in the hood. The leak detector should be previously calibrated by a reference measurement using a known search gas concentration. The leak rate can then be determined by the equation for q_L where V is the volume of the hood, Δp is the partial pressure difference of the search gas (concentration change) and t is the accumulation period. Uncertainties in the determination of the volume, leaks in the hood and a wrong accumulation period make precise leak rate measurements based on this method very questionable.

Integral Method – Vacuum Hood Test

This test is a variation of the hood test described above, providing considerable advantages (refer to fig. 8). A vacuum chamber which is evacuated by an auxiliary pump and which is connected to a leak detector is used as the hood. The search gas escaping through the leaks is converted by the leak detector into electrical signals which are immediately displayed. After calibration of the leak detector with a calibrated leak, it is possible to quantitatively determine the total leak rate. This method permits the detection of very small leaks and is especially suited for automatic industrial leak detection.

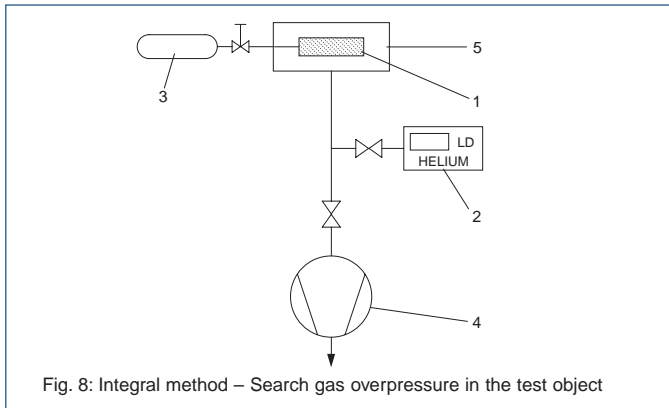


Fig. 8: Integral method – Search gas overpressure in the test object

Key to Figure

1 Test object, 2 Leak detector, 3 Search gas cylinder, 4 Vacuum pump, 5 Hood

Integral Method – Bombing-Test

This method is used for testing hermetically sealed components such as transistors, IC-packages or dry reed relays.

It is basically a variation of the vacuum hood test. Here the test objects are placed in a vessel which is pressurized with the search gas - preferably helium. At a fairly high search gas pressure after a period of up to several hours, search gas is forced inside leaky test objects. This is the actual so called “bombing” process.

After this, the test objects are transferred to a vacuum chamber and their total leak rate is determined in the same way as in the vacuum hood test. During evacuation of the vacuum chamber down to the required testing pressure, those test objects which have a gross leak may already lost their accumulated search gas. These parts are not detected as leaking during the actual leak test. Therefore the test with the vacuum chamber is often preceded by a “bubble test”.

This method permits the detection of the lowest leak rates and is used mainly in automatic industrial leak testing especially when it is not possible to fill the parts with gas in any other way.

Operating Principles of the Helium Leak Detectors from INFICON

Operating Principle

A helium leak detector permits the localization of leaks and the quantitative determination of the leak rate, i.e. the gas flow through the leak. Such a leak detector is a helium flow meter.

The leak detector performs this task by firstly evacuating the part to be tested, so that gas from the outside may enter through a leak due to the pressure difference present. If only helium is brought in front of the leak (for example, by using a spray gun) this helium flows through the leak and is pumped out by the leak detector. The helium partial pressure present in the leak detector is measured by a sector mass spectrometer and is displayed as a leak rate. This is usually given in terms of volume flow of the helium (pV-flow).

Important Specifications

The two most important features of a leak detector are its measurement range (detection limits) and its response time.

The measurement range is limited by the lowest and the highest detectable leak rate. The lowest detectable leak rate is defined by the sum of drift and noise in the most sensitive measurement range. Usually the sum of noise amplitude and zero drift per minute is equivalent to the lowest detectable leak rate. With INFICON leak detectors the amount of drift is so low, that the noise amplitude alone determines the detection limit.

The highest detectable leak rate depends strongly on the method employed. Especially the counterflow method and partial flow operation (see description below) permit the measurement of very high leak rates even with a sensitive helium leak detector.

The multi-stage switchable high impedance input amplifiers of the INFICON leak detectors also permit the measurement of high leak rates.

In practical applications, especially in the localization of leaks the response time is of great significance. This is the time it takes from spraying the test object with helium until a measured value is displayed by the leak detector. The response time of the electronic signal conditioning circuitry is an important factor in the overall response time. In INFICON leak detectors the response time of the electronic circuitry is well below 1 s.

The volume flow rate for helium at the point of the test object is of decisive significance to leak detection on components which are pumped down solely by the leak detector. The volume flow rate provided by the leak detector takes care of the helium entering through a leak and it ensures quick detection by the leak detector. The volume of the test object delays the arrival of the helium signal. The response time can be calculated on the basis of the following simple equation:

$$\text{Response time for helium } t_A = 3 \cdot \frac{V}{S_{\text{He}}}$$

(for 95% of the final value)

with V = Volume of the test object

S_{He} = Volume flow rate for helium at the point of the test object (or at the inlet of the leak detector, if it alone pumps down the test object).

Counterflow Method

With this method shown in figure 10, the test object is not connected to the high vacuum. Instead it is connected to the forevacuum (between the turbomolecular pump and backing pump), so that the entire gas flow (especially water vapor) does not contribute to the pressure increase in the mass spectrometer. A cold trap is no longer required.

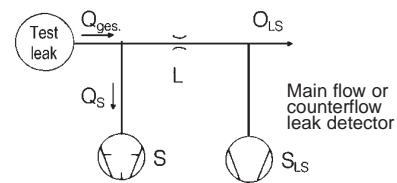
The helium that enters the forevacuum can still be detected, as it is able to flow against the pumping direction of the turbomolecular pump into the mass spectrometer. This is due to the high particle velocity of the helium. The sensitivity of this counterflow arrangement is equal to that of the main flow principle, provided the right combination of volume flow rate of the backing pump and helium compression of the turbomolecular pump is used.

The advantages of the counterflow method are:

- No liquid nitrogen is required
- High permissible inlet pressures (i.e. pressure within the test object)

This makes the counterflow method especially suitable for mobile leak detection on systems. For leak detection on larger components where a short response time is essential (i.e. high volume flow rate) an additional turbomolecular pump stage is required at the inlet of the leak detector. All INFICON helium leak detectors offer this optimized counterflow method.

Partial Flow Method



For $L \ll S$ and $L \ll S_{LS}$ the following applies:

$$Q_{LS} \approx \gamma \cdot Q_{ges.}$$

where $\gamma = \frac{L}{S}$ (Partial flow ratio)

L can be a fixed conductance (orifice) or a throttle valve

Fig. 11: Partial flow method

In order to expand the measurement range in the direction of higher leak rates and for operation at higher inlet pressures, helium leak detectors incorporate a partial flow or a gross leak system (refer to fig. 11). This consists of a throttle and a rotary vane pump. At pressures above the normal inlet pressure (main flow: above 10^{-2} mbar, counterflow: above 10^{-1} mbar) or in the case of high helium leak rates, the inlet valve is closed and the main flow is allowed to enter the partial flow pump, whereas only a small part enters the leak detector via the partial flow throttle. The total pressure and the helium pressure are dropped to values suitable for operation of the leak detector.

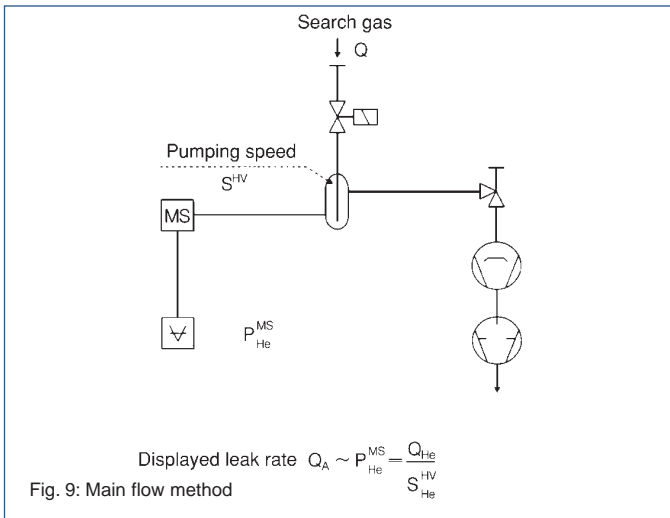


Fig. 9: Main flow method

Main Flow Method

The classic operating principle of helium leak detectors is based on the main flow method (refer to fig. 9). The entire helium flow passes through the high vacuum system of the leak detector, where the mass spectrometer measures the partial pressure of the helium. The use of a liquid nitrogen cold trap is essential to remove water vapor or other condensable gases in the vacuum system which impair the operation. Moreover, the use of a cold trap permits the low operating pressures for the mass spectrometer to be reached (below 10^{-4} mbar) despite the directly connected (and possibly contaminated) test object.

The advantages of the main flow method are:

- Highest sensitivity, i.e. low detection limit
- Short response time due to a high volume flow rate at the inlet.

The main flow method is thus especially suitable for stationary leak detection on components. Leak detection on systems having their own pump sets and at higher pressures requires the use of an external throttling valve, i.e. a partial flow with subsequently reduced sensitivity is utilized.

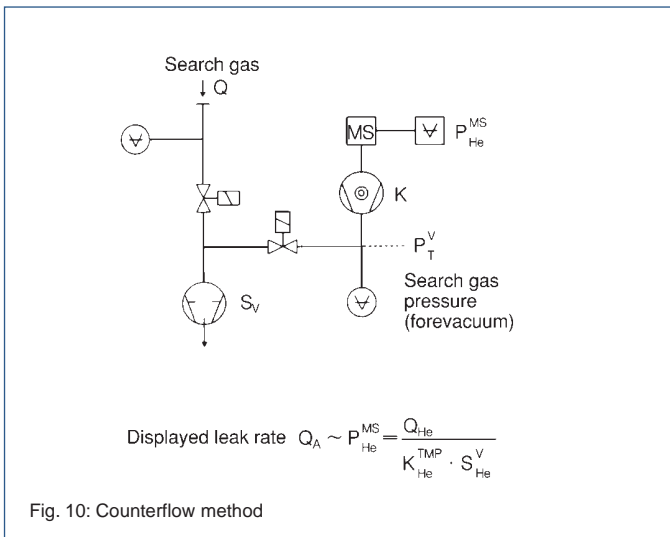


Fig. 10: Counterflow method

To obtain correct leak rate readings in the partial flow mode, the partial flow ratio, i.e. the ratio between the actually measured gas flow and the total gas flow, must be known and stable.

Calibration of Helium Leak Detectors with Calibrated Leaks

In the process of leak detection, a test object which does not have a leak produces a zero reading on the leak detector. In this any malfunctions are excluded. Calibrated leaks, i.e. artificial leaks which produce a known helium leak rate, are essential for reliable results.

To obtain a quantitatively correct leak rate, the sensitivity of the leak detector must also be adjusted. This requires the use of a calibrated leak.

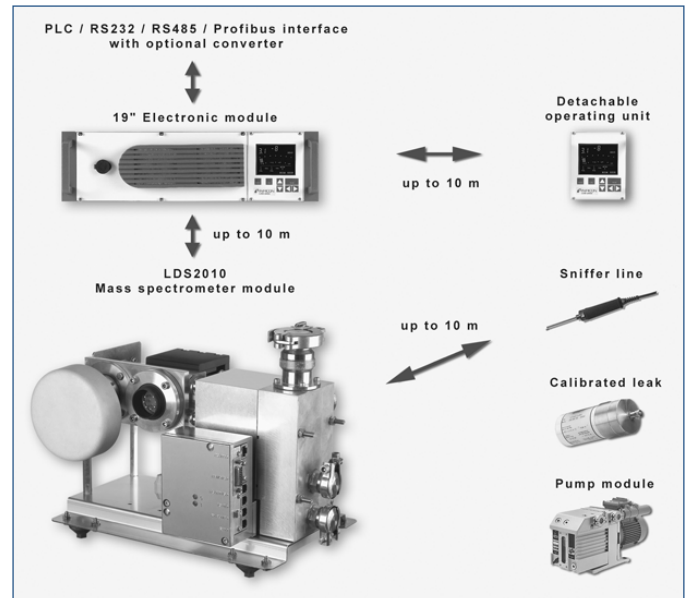
INFICON offers calibrated helium leaks of various designs covering the range between 10^{-7} to 10^{-4} mbar x l x s⁻¹ as part of the standard range of products. All leak rates are traceable to the standards of the German Calibration Service controlled by the PTB (Federal Institution of Physics and Technology). If requested, each helium calibrated leak can be supplied with a calibration certificate issued by the German Calibration Service.

The calibration itself is performed by the German Calibration Service for Vacuum which is run by Leybold Vacuum on behalf of the PTB.

Modular Leak Detector LDS2010 for System Integration in Industrial Leak Testing Systems

The LDS2010 is a modular helium leak detectors for universal integration into industrial leak testing systems. This leak detector was especially designed to speed up industrial leak test processes.

To guarantee a maximum of flexibility in system design the small mass spectrometer and the electronics unit are separate modules. Due to its compact shape the mass spectrometer module can be placed directly at the test chamber of the system. The electronics module that is prepared for a 19" rack can be integrated into the control enclosure of the leak testing system up to ten meters away from the mass spectrometer module.



System schematics LDS2010

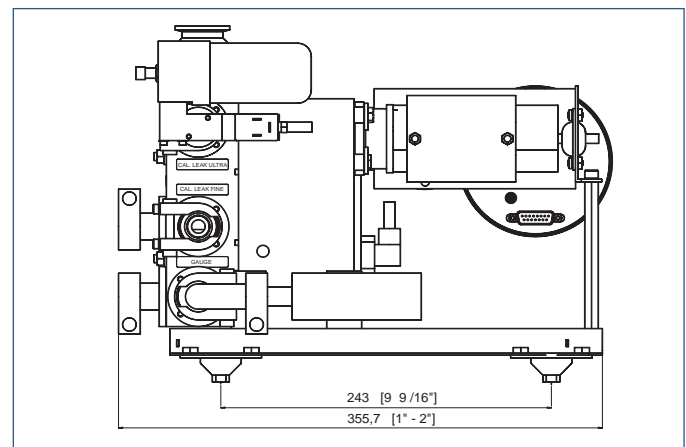
USER ADVANTAGES

- Very fast signal response time due to a very high helium pumping speed
- No loss of pumping speed caused by long connection tubes between the system and the leak detector, as the small mass spectrometer module can be placed close to the vacuum chamber
- The rugged and reliable high compression turbo pump
 - makes the unit insusceptible for rising helium back-grounds caused by contaminated roughing pumps
 - allows the use of cost -effective single stage roughing pumps.
- Short pumping time due to a high max. inlet pressure (20 mbar)
- Variety of data control and acquisition options via:
 - RS232
 - RS485
 - PLC
 - Profibus compatible with optional converter
 - Lin/log chart recorder
- Rugged mass spectrometer system with dual filament ion source (3 years warranty) ensures high uptime and low maintenance cost
- Switching over from vacuum leak detection to sniffer leak detection allows for immediate pin-pointing of the leak during the same test step
- Calibration via internal calibrated leak; also external or dynamic calibration is possible while pumping down is in progress (faster start-up)

TYPICAL APPLICATIONS

The flexibility of the LDS2010 makes the instrument ideal for the integration into complex helium leak detection systems.

- Evaporators
- Condensers
- Valves
- Compressors
- Airbags
- Brake lines
- Fuel lines
- Hydraulic components
- Engines



Dimensional drawing of the mass spectrometer module in mm (inch).

SPECIFICATIONS	LDS2010
Smallest detectable leak rate: ULTRA mode FINE mode GROSS mode SNIFFER mode	$\leq 2 \cdot 10^{-11}$ mbar l/s (5 l/s Helium pumping speed) $\leq 2 \cdot 10^{-10}$ mbar l/s (1.7 l/s Helium pumping speed) $\leq 8 \cdot 10^{-8}$ mbar l/s $\leq 5 \cdot 10^{-8}$ mbar l/s
Units of measurement (selectable)	mbar l/s, Pa m ³ /s, atm cc/s, g/a, ppm
Max. inlet pressure	20 mbar (FINE 3 mbar, ULTRA 0.4 mbar)
Response time	< 1 s
Ion source	2 yttrium/iridium longlife cathodes
Vacuum connections	DN 16 KF / DN 25 KF
Relays	4
Control inputs	SPS compatible (max. 35 V)
Chart recorder output lin/log	0 - 10 V PLC
Interface	RS232, RS485, and Fieldbus options
Dimensions (L x W x H) Mass spectrometer module Electronics module	348 x 244 x 267 mm (13.7 x 9.6 x 10.5 in.) 482.6 x 359.9 x 134.1 mm (19 x 14.17 x 5.28 in.)
ORDERING INFORMATION	PART NUMBER
LDS2010 consisting of electronic module with integrated operating unit and mass spectrometer	560-100
LDS2010 consisting of electronic module with integrated operating unit and mass spectrometer and 10 m cable	560-101
Connection cable: Electronic module / mass spectrometer module 1.5 m (4.8 ft.) 3 m (10 ft.) 5 m (16 ft.) 10 m (32 ft.) incl. MSV board	560-111 560-112 560-113 560-114
Options: Pump module (complete with connection accessories) TRIVAC D 4 B, single-phase motor, 230 V, 50/60 Hz	 145 11
Sniffer valve Sniffer line, incl. handle with sniffer tip, 200 mm Line lengths: 3 m (10 ft.) 5 m (16 ft.) 10 m (32 ft.) Replacement sniffer probe, 400 mm length	145 20 145 21 145 22 145 23 200 04 642
Connection cable Electronics module / operating unit 5 m (16 ft.) 10 m (32 ft.) 15 m (48 ft.)	 146 40 146 41 146 42
Internal calibrated leak TL7	145 49
Profibus converter TIC255	560-021

Helium Leak Detector Modul1000

Building up a leak test bench was never easier. The Modul1000 is the world first leak detector that fulfills jobs which are normally done by a PLC. The detector itself provides all necessary valves for a vacuum leak test and controls the complete leak test process from charging the test object with helium until venting of the test chamber.



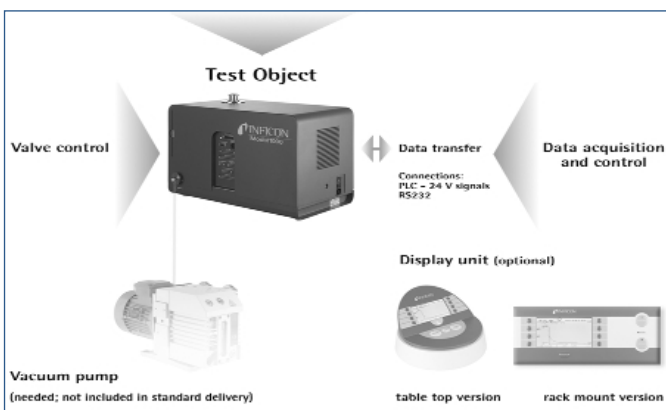
USER ADVANTAGES

- Implemented “Commander” software menu for direct control of test benches and the complete leak test process.
- Easy to operate
- The choice between two different types of optional display units which can be placed up to 5 m away from the main unit for a maximum flexibility in test bench design.
- Low impact for rising helium background and contamination as a consequence of the high compression ratio of the turbo molecular pump
- The high compression turbo molecular pump allows the use of cost-effective single stage roughing pumps.
- Rugged mass spectrometer system with dual filament ion source (3 years warranty) ensures high uptime and low maintenance cost
- Switching over from vacuum leak detection to sniffer leak detection allows for immediate pin-pointing of the leak during the same test step

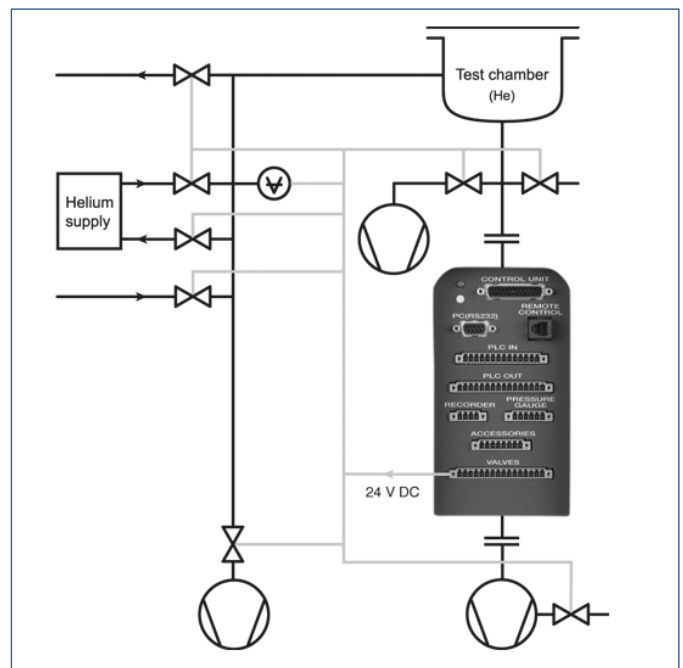
TYPICAL APPLICATIONS

The Modul1000 was especially designed for the integration into medium automated test benches.

- Evaporators
- Condensers
- Valves
- Compressors
- Brake lines
- Fuel lines
- Hydraulic components
- Engines



Modul1000 system schematics



Example: Test station with Helium supply. Implemented “Commander” software menu for direct control of test systems

SPECIFICATIONS	MODUL1000
Minimum detectable leak rate	< 5 x 10 ⁻¹² mbar l/s
Maximum inlet pressure	0.4 mbar
Operational mode	wide range without crossover (12 decades)
Helium pumping speed at inlet	2.5 l/s
Ion source	2 filaments, Iridium/Yttria-oxide coated
Start-up time	< 3 minutes
Inlet port / Fore-vacuum port	DN 25 KF
Power supply	100 - 240 V, 50/60 Hz
Control inputs	8 x PLC compatible (max. 35 V)
Status / Valve control / Trigger outputs	9 / 11 / 3 x relay contacts (max. 60 V AC / 25 V DC / 1 A)
Chart recorder output lin/log	2 x 0-10 V, programmable
Recommended fore-vacuum pump	2.5 - 16 m ³ /h, wet or dry
Dimensions (width x depth x height)	535 x 350 x 339 mm (21 x 13.8 x 13.4 in)
Weight	30 kg (66 lbs)
ORDERING INFORMATION	PART NUMBER
Modul1000, vacuum version	550-300
Modul1000, vacuum and sniffer version	550-310
Display unit for table-top use	551-100
Display unit for rack installation	551-101
Connecting cable for display unit, 5 m	551-102
Set of connecting plugs	551-110
Sniffer line SL200	140 05
Hand unit	200 99 022
Connecting cable for hand unit, 4 m	200 99 027
Test chamber TC1000	551-005

Helium Leak Detector UL1000

The mobile UL1000 with a rotary vane pump is an automated leak detector offering fast pumpdown and short response time for quick testing results in industrial systems.



USER ADVANTAGES

- Wide measurement range over 15 decades
- Short pumpdown and response time
- Mobile all metal housing for added convenience with uncompromised maneuverability
- **I-CAL** (Intelligent Calculation Algorithm for Leak rates) to ensure fastest response time to leaks in all measurement ranges
- Zero function with automatic integration time alignment for fast and reliable test results
- Intelligent vacuum design with rugged roughing pump and multiple inlet turbomolecular pump that provides high helium pumping speed with high compression
- Rotatable display and user interface allows simple and easy control and interaction with the unit
- Self protection features to protect the UL1000 from helium and particle contamination
- Auto purge cycle to ensure clean up and readiness for test
- Software updates via email easily possible
- Rugged mass spectrometer system with 2 filament ion source (3 years warranty) ensures long running time and low maintenance cost
- Built-in test leak for internal calibration to ensure accurate test results
- Built-in software menu "Auto Leak Test" function to perform tests of hermetically sealed components.
By use of the optional test chamber TC1000 (see page 36) this test runs automatically

TYPICAL APPLICATIONS

Leak testing and quality control of all types of components including

- Automotive components
- Refrigeration and air conditioning components and sub-assemblies
- Hermetically sealed electronic devices
- Heat exchangers

Advanced software menu Auto Leak Test

This function controls the test cycle and allows entering of test parameters like

- measuring cycle time
- trigger level
- number of parts tested

The status of the test cycle can always be monitored on the display. The optional test chamber TC1000 (see page 36) turns the UL1000 in a user-friendly workstation for the test of hermetically sealed parts.

The test starts automatically when closing the chamber lid, short cycle times can be achieved (10^{-9} mbar l/s in < 5 sec). The status of the test can always be monitored on the display. After the adjusted cycle time the test stops and the chamber will be vented. A selectable "Standby" mode keeps the chamber under vacuum while discontinuing the leak test. Protective functions prevent helium contamination by big leaker and ensure continuous operation.

SPECIFICATIONS	UL1000
Min. detectable leak rate for helium (Vacuum mode) *)	< 5 x 10 ⁻¹² mbar l/s
Min. detectable leak rate for helium (Sniffer mode) *)	< 5 x 10 ⁻⁸ mbar l/s
Max. detectable leak rate for helium that can be displayed	0.1 mbar l/s
Max. inlet pressure	GROSS mode: 15 mbar FINE mode: 2 mbar ULTRA mode: 0.4 mbar
Pumping speed during evacuation	16 m ³ /h (11.2 cfm) at 50 Hz
Helium pumping speed	GROSS mode: max. 8 l/s FINE mode: 7 l/s ULTRA mode: 2.5 l/s
Time constant of the leak rate signal (blanked off, 63% final value)	< 1 s
Pumpdown time until ready to detect leaks (Background 5 x 10 ⁻⁹)	
Without additional volume	5 s
At a test volume of 1 litre	10 s
At a test volume of 10 litre	80 s
Response time (for a leak rate of 10 ⁻⁹ mbar l/s)	
Up to a volume of 1 litre	< 1 s
Up to volume of 10 litre	< 2 s
Time until ready for operation	< 3 min
Detectable masses	2,3,4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments, Iridium/Yttria oxide coated
Calibrated leak TL7 (built-in) leak rate in the range	10 ⁻⁷ mbar l/s
Units of measurement (selectable)	mbar l/s, Pa m ³ /s, Torr l/s, atm cc/s, ppm, g/a (only in sniffer mode)
Test port	25 KF
Adjustable triggers	2
Interface	RS 232
In/outputs	PLC compatible for control and status information
Chart recorder output	2 x 10 V
Supply voltages	230 V (±10%) 50 Hz 115 V (±10%) 60 Hz 100 V (±10 %) 50/60 Hz
Power consumption	1100 VA
Dimensions (L x W x H)	1068 x 525 x 850 mm (42 x 21 x 33 inch)
Weight	110 kg (242 lbs)
Type of protection	IP 40
Permissible ambient temperature (during operation)	+10 °C+40 °C
*) per AVS and EN 1518	
ORDERING INFORMATION	PART NUMBER
UL1000, 230 Volts, 50 Hz, EU mains plug	550-000
UL1000, 115 Volts, 60 Hz, US mains plug	550-001
UL1000, 110 Volts, 60 Hz, Japan mains plug	550-002
Test chamber TC1000	551-005
Tool box with lock, attachable	551-000
Helium bottle holder	551-001
ESD mat	551-002
Remote control kit	
Hand unit	200 99 022
Cable (required), 4 m length	200 99 027
Extension cable, 10 m (max length of extension 34 m)	140 22
PC software LeakWare	140 90
Sniffer line SL200, 4 m length	140 05

Dry Helium Leak Detector UL1000 Fab

The mobile UL1000 Fab with its dry vacuum system is an automatic leak detector offering fast pumpdown and short response time to meet the demanding requirements in semiconductor applications.



USER ADVANTAGES

- Wide measurement range over 15 decades
- Short pumpdown and response time
- Mobile all metal housing for added convenience with uncompromised maneuverability
- **I-CAL** (Intelligent Calculation Algorithm for Leak rates) to ensure fastest response time to leaks in all measurement ranges
- Zero function with automatic integration time alignment for fast and reliable test results
- Intelligent vacuum design with rugged scroll pump and multiple inlet turbomolecular pump that provides high helium pumping speed with high compression
- Rotatable display and user interface allows simple and easy control and interaction with the unit
- Self protection features to protect the UL1000 Fab from helium and particle contamination
- Auto purge cycle to ensure clean up and readiness for test
- Software updates via email easily possible
- Rugged mass spectrometer system with 2 filament ion source (3 years warranty) ensures long running time and low maintenance cost
- Built-in test leak for internal calibration to ensure accurate test results
- Built-in software menu "Auto Leak Test" function to perform tests of hermetically sealed components.
By use of the optional test chamber TC1000 (see page 36) this test runs automatically

TYPICAL APPLICATIONS

- Leak testing of
 - Components
 - Chambers
 - Subassemblies
- used on
 - Semiconductor tools
 - Flat display tools
- Leak testing of hermetically sealed electronically devices

Advanced software menu Auto Leak Test

This function controls the test cycle and allows entering of test parameters like

- measuring cycle time
- trigger level
- number of parts tested

The status of the test cycle can always be monitored on the display. The optional test chamber TC1000 (see page 36) turns the UL1000 in a user-friendly workstation for the test of hermetically sealed parts.

The test starts automatically when closing the chamber lid, short cycle times can be achieved (10^{-9} mbar l/s in < 5 sec). The status of the test can always be monitored on the display. After the adjusted cycle time the test stops and the chamber will be vented. A selectable "Standby" mode keeps the chamber under vacuum while discontinuing the leak test. Protective functions prevent helium contamination by big leaker and ensure continuous operation.

SPECIFICATIONS	UL1000 FAB
Min. detectable leak rate for helium (Vacuum mode) *)	< 5 x 10 ⁻¹² mbar l/s
Min. detectable leak rate for helium (Sniffer mode) *)	< 5 x 10 ⁻⁸ mbar l/s
Max. detectable leak rate for helium that can be displayed	0.1 mbar l/s
Max. inlet pressure	GROSS mode: 15 mbar FINE mode: 2 mbar ULTRA mode: 0.4 mbar
Pumping speed during evacuation	25 m ³ /h (17.6 cfm) at 50 Hz 30 m ³ /h (21.1 cfm) at 60 Hz
Helium pumping speed	GROSS mode: max. 8 l/s FINE mode: 7 l/s ULTRA mode: 2.5 l/s
Time constant of the leak rate signal (blanked off, 63% final value)	< 1 s
Pumpdown time until ready to detect leaks (Background 5 x 10 ⁻⁹)	
Without additional volume	5 s
At a test volume of 1 litre	10 s
At a test volume of 10 litre	80 s
Response time (for a leak rate of 10 E-9 mbar l/s)	
Up to a volume of 1 litre	< 1 s
Up to volume of 10 litre	< 2 s
Time until ready for operation	< 3 min
Detectable masses	2,3,4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments, Iridium/Yttria oxide coated
Calibrated leak TL7 (built-in) leak rate in the range	10 ⁻⁷ mbar l/s
Units of measurement (selectable)	mbar l/s, Pa m ³ /s, Torr l/s, atm cc/s ppm, g/a (only in sniffer mode)
Test port	25 KF
Adjustable triggers	2
Interface	RS 232
In/outputs	PLC compatible for control and status information
Chart recorder output	2 x 10 V
Supply voltages	230 V (±10%) 50 Hz 115 V (±10%) 60 Hz 100 V (±10 %) 50/60 Hz
Power consumption	1100 VA
Dimensions (L x W x H)	1068 x 525 x 850 mm (42 x 21 x 33 inch)
Weight	110 kg (242 lbs)
Type of protection	IP 40
Permissible ambient temperature (during operation)	+10 °C+40 °C
*) per AVS and EN 1518	
ORDERING INFORMATION	PART NUMBER
UL1000 Fab, 230 Volts, 50 Hz, EU mains plug	550-100
UL1000 Fab, 100/115 Volts, 50/60 Hz, US mains plug	550-101
Test chamber TC1000	551-005
Tool box with lock, attachable	551-000
Helium bottle holder	551-001
ESD mat	551-002
Remote control kit	
Hand unit	200 99 022
Cable (required),4 m length	200 99 027
Extension cable, 10 m (max length of extension 34 m)	14022
PC software LeakWare	14090
Sniffer line SL200, 4m length	14005

Dry Helium Leak Detector UL5000

The mobile UL5000 is designed to meet the most critical and demanding semiconductor applications, providing fast pumpdown time and delivering fast response time.

It is an ideal tool for bigger testing volumes > 50 l volume.



USER ADVANTAGES

- Wide measurement range over 15 decades
- Short pumpdown and response time
- Mobile all metal housing for added convenience with uncompromised maneuverability
- Software algorithm **HYDRO-S (HYDROgen-Suppression)** to enable test conditions to be reached quickly
- **I-CAL (Intelligent Calculation Algorithm for Leak rates)** to ensure fastest response time to leaks in all measurement ranges
- Zero function with automatic integration time alignment for fast and reliable test results
- Intelligent vacuum design with rugged Scroll pump and multiple inlet turbomolecular pump that provides high helium pumping speed with high compression
- Rotatable display and user interface allows simple and easy control and interaction with the unit
- Self protection features to protect the UL5000 from helium and particle contamination
- Auto purge cycle to ensure clean up and readiness for test
- Software updates via email easy possible
- New workstation design with optimal height work surface that includes an ESD mat and a lockable tool box
- Rugged mass spectrometer system with 2 filament ion source (3 years warranty) ensures long running time and low maintenance cost
- Built-in test leak for internal calibration to ensure accurate test results

TYPICAL APPLICATIONS

Leak testing of

- Components
- Bigger chambers (> 50 l volume)
- Subassemblies

used on

- Semiconductor tools
- Flat display tools

SPECIFICATIONS	UL5000
Min. detectable leak rate for helium (Vacuum mode) *)	< 5 x 10 ⁻¹² mbar l/s
Min. detectable leak rate for helium (Sniffer mode) *)	< 5 x 10 ⁻⁸ mbar l/s
Max. detectable leak rate for helium that can be displayed	3 mbar l/s
Max. inlet pressure	GROSS mode: 15 mbar FINE mode: 2 mbar ULTRA mode: 0.4 mbar
Pumping speed during evacuation	25 m ³ /h (17.6 cfm) at 50 Hz 30 m ³ /h (21.1 cfm) at 60 Hz
Helium pumping speed	GROSS: max. 8 l/s FINE: max. 20 l/s ULTRA: > 20 l/s
Time constant of the leak rate signal (blanked off, 63% final value)	< 1 s
Pumpdown time until ready to detect leaks in the range of 10 ⁻⁹ mbar l/s	
Without additional volume	< 5 s
At a test volume of 10 litre	< 48 s
At a test volume of 50 litre	< 150 s
Response time (for a leak rate of 10 ⁻⁹ mbar l/s)	
Up to a volume of 10 litre	< 1 s
Up to volume of 50 litre	< 3 s
Venting (with test volume of 100 litres)	approx. 25 s
Time until ready for operation	< 3 min
Detectable masses	2,3,4
Mass spectrometer	180° magnetic sector field
Ion source	2 filaments, Iridium/Yttria oxide coated
Calibrated leak TL7 (built-in) leak rate in the range	10 ⁻⁷ mbar l/s
Units of measurement (selectable)	mbar l/s, Pa m ³ /s, Torr l/s, atm cc/s ppm, g/a (only in sniffer mode)
Test port	40 KF
Adjustable triggers	2
Interface	RS 232
In/outputs	PLC compatible for control and status information
Chart recorder output	2 x 10 V
Supply voltages	230 V (±10%) 50 Hz 115 V (±10%) 60 Hz 100 V (±10%) 50/60 Hz
Power consumption	1200 VA
Dimensions (L x W x H)	1068 x 525 x 850 mm (42 x 21 x 33 inch)
Weight	140 kg (308 lbs)
Type of protection	IP 40
Permissible ambient temperature (during operation)	+10 °C+40 °C
*) per AVS and EN 1518	
ORDERING INFORMATION	PART NUMBER
UL5000, 230 Volts, 50 Hz, EU mains plug	550-500
UL5000, 100/115 Volts, 50/60 Hz, US mains plug	550-501
Tool box with lock, attachable	551-000
Helium bottle holder	551-001
ESD mat	551-002
Remote control kit	
Hand unit	200 99 022
Cable (required), 4 m length	200 99 027
Extension cable, 10 m (max length of extension 34 m)	14022
PC software LeakWare	14090
Sniffer Line SL200, 4 m	14005
Reduction piece 40/25 KF to connect SL200 to UL5000 inlet port	211-283

Helium Sniffer Leak Detector Protec P3000

INFICON Protec P3000 Helium Sniffer Leak Detector is specifically designed for full-time sniffing applications in demanding production environments.

The Protec P3000 brings increased levels of productivity and reliability to the sub-assembly and mid-production testing of refrigerators, freezers, air conditioners, automotive air conditioners, RAC components and similar products. Numerous features make it easy and comfortable to use, while making it more immune to careless or untrained operation. It is also fast to make the best use of your available cycle time. Protec P3000 uses innovative INFICON Wise Technology in its robust, reliable and maintenance-free sensor that combined with the unique design and ruggedness of the leak detector, provides a very low cost of ownership and high up-time.



USER ADVANTAGES

- Improved system design compensates for operator error reducing the potential for missed leaks.
- Multiple alarm functions make sure alarms can not be overlooked.
- Built-in PRO-Check reference leak allows for easy and fast calibration at the production line at any time.
- A small display in the ergonomically-designed probe handle shows the leak rate, so the operator can concentrate on the sniffing process and monitoring the leak rate at the same time.
- I-Guide operator guiding mode ensures your operator is testing the right locations with the correct technique.
- Leak rates can be displayed in refrigerant equivalents from a gas library.
- Built-in illumination source of the probe helps precisely position the sniffer tip.
- New, low-maintenance sensor yields high reliability and low cost of ownership.
- Automatic standby prevents intake of contaminants into the sniffer probe, thus saving filter and sensor life.
- Operating software is available in many languages.

TYPICAL APPLICATIONS

The Protec P3000 is ideal for all helium sniffing applications of pressurized components that need to be leak tested.

- Refrigerating / air conditioning industries
 - Evaporators
 - Condensers
 - Valves
 - Compressors
 - Testing of pre-assembled air condition systems before filling with refrigerant
 - Testing of pre-assembled refrigerators and freezers before filling with refrigerant
 - Testing of pre-assembled heat pump systems before filling with refrigerant
- Automotive industry
 - Brake lines
 - Fuel lines
 - Hydraulic components
 - Engines
 - Testing of pre-assembled air conditioning systems before filling with refrigerant



Protec P3000RC
with external display unit for rack mounting

SPECIFICATIONS	PROTEC P3000
Detectable gases	Helium
Smallest detectable leak rate	1 x 10 ⁻⁷ mbarl/s
Measuring scale	5 decades
Sensor response time	450 ms
Response time incl. sniffer line	< 0.7 s
Leak rate units	mbar l/s; Pa m ³ /s; ppm
Refrigerant equivalent leak rates	g/a; oz/yr; lb/yr
Start-up time	< 3 min
Dimensions (width x depth x height)	610 x 265 x 370 mm 24 x 10.4 x 14.6 in
Weight	27 kg (60 lbs)
Gas flow	300 sccm
Ambient temperature range	10-45°C (50-113°F)
ORDERING INFORMATION	PART NUMBER
Protec P3000 230 V, 50 Hz 110/115 V, 50/60 Hz	520-001 520-002
Protec P3000RC 230 V, 50 Hz 110/115 V, 50/60 Hz	520-103 520-104
Sniffer line with integrated display and push-buttons SL3000-3, 3 m length SL3000-5, 5 m length SL3000-10, 10 m length SL3000-15, 15 m length	525-001 525-002 525-003 525-004
Sniffer line adapter for system integration	525-005
Sniffer tips ST 312, 120 mm, rigid FT 312, 120 mm, flexible ST 200, 200 mm, rigid FT 250, 250 mm, flexible ST 385, 385 mm, rigid FT 385, 385 mm, flexible FT 600, 600 mm, flexible ST 400, 400 mm, 45° angled	12213 12214 12218 12266 12215 12216 12209 12272
Holder for sniffer probe	525-006
PRO-Check reference leak - optional (Not included with delivery of Protec P3000.)	521-001
Display unit for Protec P3000RC Table top version Rack version	551-100 551-101
Connecting cable for display unit, 5 m	551-102

Protec and Wise Technology are trademarks of INFICON.

Multi-Gas Sniffer Leak Detector Ecotec E3000

The Ecotec E3000 leak detector brings new levels of productivity and reliability to the final testing of refrigerators, freezers, automotive air conditioners and similar products. It is specifically designed for demanding production environments. Numerous features make it easy and comfortable to use while making it more immune to careless operation and minimizing operator errors. It is also fast to make the best use of your available cycle time. Innovative design and robustness keep the cost of ownership down and ensure very high up-time.



USER ADVANTAGES

- Improved system design compensates for poor sniffing operation reducing the potential for missed leaks
- IGS (Interfering Gas Suppression) ensures only leaks are detected
- Built-in ECO-Check reference leak allows for easy and fast calibration at the production line at any time
- Multiple alarm functions make sure alarms cannot be overlooked
- I-Guide (operator guiding mode) ensures your operator tests the right locations with the right technique
- Unit can be operated via the probe display and probe buttons without access to the main unit
- Built-in illumination source on the probe helps precisely position the sniffer tip
- Ergonomic probe design allows for easy and comfortable use
- Operating software is available in many languages

TYPICAL APPLICATIONS

- Refrigerators and deep freezers
- Transportation refrigeration
- Cooling and refrigeration systems
- Air conditioning units
- Water coolers
- Compressors and evaporators
- Halogen lamps
- Gas panels



Ecotec P3000RC
with external display unit for table top use

SPECIFICATIONS		ECOTEC E3000
Smallest detectable leak rate	R134a R600a Helium	0.05 g/a (0.002 oz/yr) 0.05 g/a (0.002 oz/yr) 1 x 10 ⁻⁶ mbar l/s
Measuring scale		0.05 – 999.99 g/a (0.015 – 99.999 oz/yr)
Sensor response time		0.3 s
Response time incl. sniffer line		0.8 s
Max no. of gases detected simultaneously		4
Leak rate units		g/a, oz/y, mbar l/s, ppm, Pa m ³ /s
Gas flow		160 sccm
Start-up time		< 2 min
Ambient temperature range		10 – 45 °C (50 – 113 °F)
Dimensions (W x H x D)		610 x 370 x 265 mm (24 x 14.6 x 10.4 in)
Weight		34 kg (75 lbs)
ORDERING INFORMATION		PART NUMBER
Ecotec E3000, 230 V, 50 Hz 100/115 V, 50/60 Hz		530-001 530-002
Ecotec E3000RC 230 V, 50 Hz 100/115 V, 50/60 Hz		530-103 530-104
Sniffer line with integrated display and push-buttons SL3000-3, 3 m length SL3000-5, 5 m length SL3000-10, 10 m length SL3000-15, 15 m length		525-001 525-002 525-003 525-004
Sniffer line adapter for system integration		525-005
Sniffer tips ST 312, 120 mm, rigid FT 312, 120 mm, flexible ST 200, 200 mm, rigid FT 250, 250 mm, flexible ST 385, 385 mm, rigid FT 385, 385 mm, flexible FT 600, 600 mm, flexible ST 400, 400 mm, 45° angled		122 13 122 14 122 18 122 66 122 15 122 16 122 09 122 72
Holder for sniffer probe		525-006
ECO-Check reference leak R134a - optional (Not included with delivery of Ecotec E3000.)		531-001
Display unit for Ecotec E3000RC Table top version Rack version		551-100 551-101
Connection cable for display unit, 5 m		551-102
Test leaks for refrigerants (2 - 5 g/a) R134a R600a R404A R502 R22 R152a R407C R410A R401a R290 Forming gas (10% hydrogen, 90% helium) Halon 1301		122 20 122 21 122 22 122 23 122 25 122 27 122 28 122 29 122 30 122 31 122 33 122 34

Multi-Gas Leak Detector Ecotec E3000A

The Ecotec E3000A multi-gas leak detector is the reliable and low-cost solution for testing cooling circuits in Airbus airplanes. Simpler and measurably faster than conventional leak-testing methods, the Ecotec E3000A does not require evacuation. It simply “sniffs” for refrigerant leaks while the system is in use, reducing downtime and waste. The Ecotec E3000A is recommended for use in the A340 (for more information see AMM chapter 25-34-00) and will also be recommended for the next-generation A380. It comes with a library of more than 100 detectable gases including all refrigerants and heat transfer fluids used in Airbus airplanes as well as many other commonly used gases.



USER ADVANTAGES

- Improved system design compensates for poor sniffing operation reducing the potential for missed leaks
- Simpler and measurably faster than conventional testing methods
- Does not require evacuation
- Less downtime for airplanes
- Fewer instances where food cannot be served because of refrigeration issues, resulting in better customer service
- Pinpoints the exact location of the leak
- Detected leak rate can be read from the probe display as numerical value
- Can detect up to four different gases at the same time
- Built-in, adjustable illumination helps operators precisely position the tip even in tight compartments where light is limited
- Wheeled transportation case that holds all accessories to be easily hauled around the airplane
- Recommended in AMM A340, Chapter 25

TYPICAL APPLICATIONS

- Leak testing of
- Galley systems
 - Transfer lines
 - Main chiller system
 - Air conditioning system

SPECIFICATIONS
ECOTEC E3000A

Smallest detectable leak rate	0.05 g/a (0.02 oz/yr)
Measuring scale	0.5 – 50 g/a (0.02 – 1.76 oz/yr)
Response time	< 1s
Leak rate units	g/a; oz/yr; lb/yr; mbar l/s; Pa m ³ /s
Start-up time	< 2 min
Max no. of gases detected simultaneously	4
Interfaces	RS232
Dimensions (diameter; height)	580 x 260 x 350 mm (22.8 x 12.2 x 13.8 in)
Weight	34 kg (75 lbs)
Gas flow	160 sccm
Ambient temperature range	10-45 °C (50-113 °F)
Software available in	English, German, Spanish, French, Italian, Portugese, Chinese, Japanese (Katakana)
Warranty	2 years

ORDERING INFORMATION
PART NUMBER

Ecotec E3000A including:

5 m sniffer line, power plug adapter for all major regions,
 120 mm rigid sniffer tip, 385 mm flexible sniffer tip,
 built-in ECO-Check reference leak, transportation case
 230 V, 50 Hz
 100/115 V, 50/60 Hz

530-101
 530-102

Refrigerant Sniffer Leak Detector HLD5000

The HLD5000 refrigerant leak detector uses an innovative technology to find leaks quickly and reliably with dramatically fewer false alarms.

With its IR sensor it is designed to only detect refrigerant leaks. It reliably suppresses any signals caused by other gases present in the atmosphere. Numerous other features enhance the units convenience, reliability and durability. A selection of probes for single gases as well as a universal probe for all halogen-based refrigerants is available.



USER ADVANTAGES

Highly reliable detection of leaks

- No false alarms due to background compensation by dual inlet technology
- No cross sensitivity to non-halogens (water, breath, alcohols, etc)
- No undetected leaks due to undetected malfunctioning of the leak detector as functionality is constantly monitored
- Short response time for fast use

Universal base unit for high flexibility

- Universal base unit with different probes
- Selection of different probes for single refrigerants including non-halogens (CO₂, SF₆)
- Universal probe for all halogen-based refrigerants
- Unit can be switched over by simply connecting a different sniffer line

Easy to operate

- ATM-like display
- Visual (probe and base unit) and acoustic alarm
- Integrated test leak for easy and traceable calibration at the line as well as regular verification of the calibration
- May be used in automated testing systems with digital processing of test data via RS232 interface

Low cost of operation

- Reliable operation of the unit and very low cost of operation
- Long sensor life, resistant to water intake

TYPICAL APPLICATIONS

- Air conditioning systems
- Automotive air conditioning units
- Heat pumps
- Compressors and tubing
- CO₂ components
- Components or systems filled with SF₆

SPECIFICATIONS	HLD5000
Detectable refrigerant (depends on version)	R134a; R404A; R407C; R410A; R22; R744 (CO ₂); SF ₆ ; all halogen-based refrigerants
Min. detectable leak rate	1.0 g/a 0.5 g/a
	for single gas probes for universal probe
Measuring scale	0.5 - 50 g/a
Response time	< 1 s
Leak rate units	mbar l/s, g/a, oz/y, Pa m ³ /s, lb/yr
Warm-up time	30 s
Dimensions (diameter; height)	260 mm; 14.4 in.
Weight	4.5 kg
Length of sniffer line	4.8 m
Sniffer tip length	100 mm
Gas flow	320 sccm
Ambient temperature range	5 - 50 °C

ORDERING INFORMATION	PART NUMBER
HLD5000 including hand piece, sniffer tip (100 mm, 3.9 in.) and calibrated leak	
R134a	510-010
R744 (CO ₂)*	510-015
SF ₆ *	510-016
Universal Smart probe	510-017
Additional sniffer line for different refrigerants	
R134a	511-030
R744 (CO ₂)	511-035
SF ₆	511-036
Universal Smart probe	511-037
Replacement calibrated leak COOL-CHECK	511-010
Extra sniffer tip, 100 mm (3.9 in.)	511-021
Extra sniffer tip, 400 mm (15 in.)	511-024
Extra extension, 400 mm (15 in.) for sniffer tip	511-020
Extra extension, 500 mm (19.7 in.) for sniffer tip, 45° offset	511-029
Set of tip filter holders (20 pcs)	511-027
Set of filter cartridges (20 pcs)	511-018
Test leaks for refrigerants (2 - 5 g/a)	
R134a	12220
R404A	12222
R407C	12228
R410a	12229
R744 (CO ₂)	12232

*without calibrated leak COOL-Check

Calibrated Test Leaks

In order to perform reliable quantitative measurements of leak rates, the used leak detection equipment must be calibrated by inlet of a known leakage flow delivered by a test leak.

Calibrated Test Leaks with Gas Reservoir for Sniffer Applications

The function of these leaks is based on a special quartz capillary which is customized to deliver a specific reduced flow from a test gas reservoir.

This type of calibrated test leaks is available in different leak rates and test gases (see ordering information).



USER ADVANTAGES

- Highly accurate and reliable due to the profile of the quartz capillary
- Metal-free capillary for low temperature dependance
- Inspection certificate (included) in accordance to DIN EN 10204:2004-3.1
- Determination of the nominal leak rate by comparison with a calibrated leak having a PTB certificate
- DKD certificate (optional) traceable to PTB

ORDERING INFORMATION

CALIBRATED LEAK	LEAK RATE RANGE	PART NUMBER
S-TL 4, with helium gas reservoir	10^{-4} mbar l/s	122 37
S-TL 5, with helium gas reservoir	10^{-5} mbar l/s	122 38
S-TL 6, with helium gas reservoir	10^{-6} mbar l/s	122 39
Calibrated sniffer test leaks for refrigerants 2 - 5 g/a, 0.07 - 0.18 oz/y		
R22		122 25
R134a		122 20
R152a		122 27
R290		122 31
R401a		122 30
R404a		122 22
R407c		122 28
R410a		122 29
R502		122 23
R600a		122 21
R744 (CO ₂)		122 32
10% H ₂ / 95% He		122 33
R13B1 ² (Halon 1301)		122 34
10 - 14 g/a, 0.36 - 0.5 oz/y		
R134a		122 40
R404a		122 42
R502		122 43
R600a		122 41

Calibrated Test Leaks with with Gas Reservoir for Vacuum Applications

TL7

Capillary leak with helium reservoir and manual valve.
Leak rate range 10^{-7} mbar l/s.

TL8 / TL9

Helium test leak with helium reservoir and manual valve.
A special quartz bulb with a high helium permeation rate adjusts the constant gas flow.



USER ADVANTAGES

- Inured to pollution
- Metal-free flow reduction for low temperature dependence
- Inspection certificate (included) in accordance to DIN EN 10204:2004-3.1
- Highly accurate and reliable
- Determination of the nominal leak rate by comparison with a calibrated leak having a PTB certificate
- DKD certificate (optional) traceable to PTB

ORDERING INFORMATION

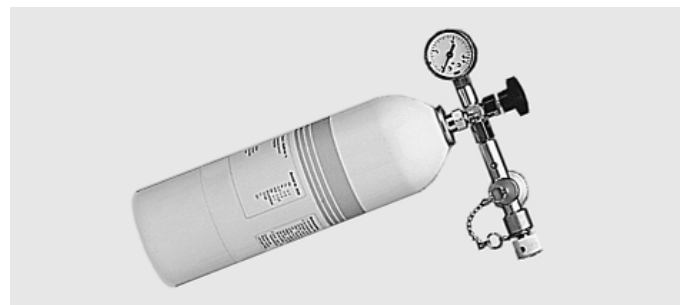
CALIBRATED LEAK	LEAK RATE RANGE	PART NUMBER
TL 7, with helium gas reservoir	10^{-7} mbar l/s	142 10 / 115 14
TL 8, with helium gas reservoir	10^{-8} mbar l/s	165 57
TL 8, with helium gas reservoir, DKD calibrated	10^{-8} mbar l/s	165 57DKD
TL 9, with helium gas reservoir	10^{-9} mbar l/s	144 08

Calibrated Test Leaks with with Gas Reservoir for Vacuum and Sniffer Applications

TL4-6

Universal gas source for the fast insert in a variety of applications

Helium capillary leak for vacuum and sniffing applications.
Adjustable leak rate in the range between 10^{-4} to 10^{-6} mbar l/s. Besides helium, which is included in delivery, the TL4-6 is also usable with different kind of gases.



ORDERING INFORMATION

CALIBRATED LEAK	LEAK RATE RANGE	PART NUMBER
TL4-6, with helium gas reservoir	10^{-4} to 10^{-6} mbar l/s	155 80

Calibrated Leaks for System Applications

Manufacturers of helium leak testing systems require calibrated leaks of various sizes with individually adjusted leak rates for the purpose of setting up and calibrating their systems.

Depending on the type of application, these calibrated leaks are either installed in the test sample as a master leak or are installed in the test chamber itself.

INFICON offers a family of calibrated leaks which are capable of meeting the requirements concerning type and required leak rate.



Integral test leak



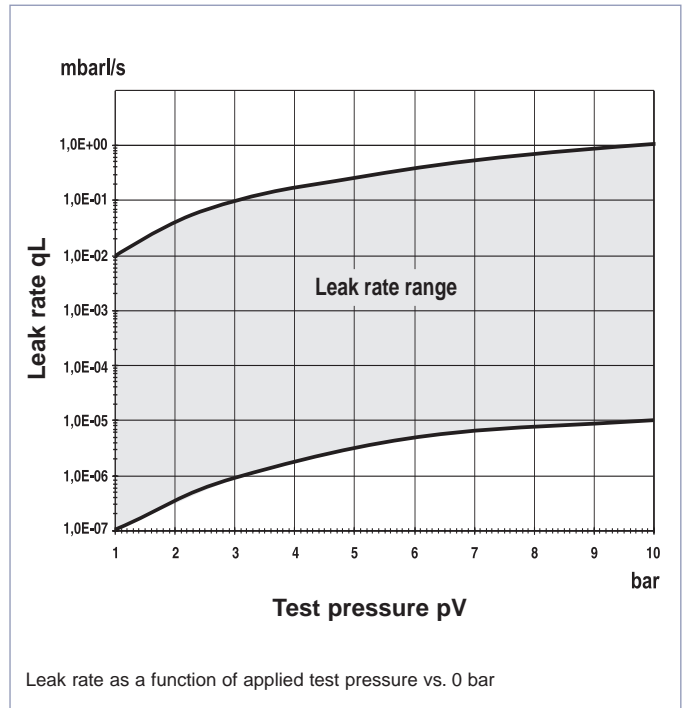
Calibrated leaks with screw-in sleeve (left), pin-type casing (center), cylindrical casing (right)

USER ADVANTAGES

- Various types adapted to different customer requirements
- Simple to operate
- Easy to install
- Ideal installation dimensions
- All calibrated leaks are supplied with a factory certificate indicating their leak rate

TYPICAL APPLICATIONS

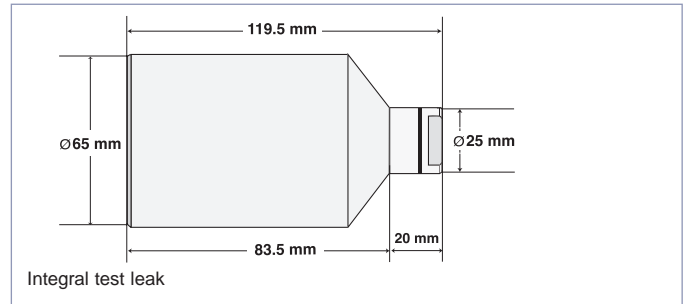
- As a master calibrated leak built directly into the test sample
- Directly installed to the test chamber
- Use as a calibrated leak for sniffer applications



CALIBRATED INTEGRAL LEAK WITH HELIUM RESERVOIR

The integral Helium test leak is for use in a vacuum test chamber and is designed for easy filling and refilling by the customer. It is used for

- Calibration of the vacuum system
- Evaluation of the machine factor for the system
- Verification of the test procedure



CALIBRATED LEAK WITH SCREW-IN SLEEVE

Used as a master leak to check the entire helium leak testing system.

Two leak tight test samples are equipped with these calibrated leaks. These will ensure proper separation between passed and rejected parts. To be fitted to the customer's test samples either by a welded joint or the screw-in sleeve is glued in place.

CALIBRATED LEAK WITH PIN TYPE CASING

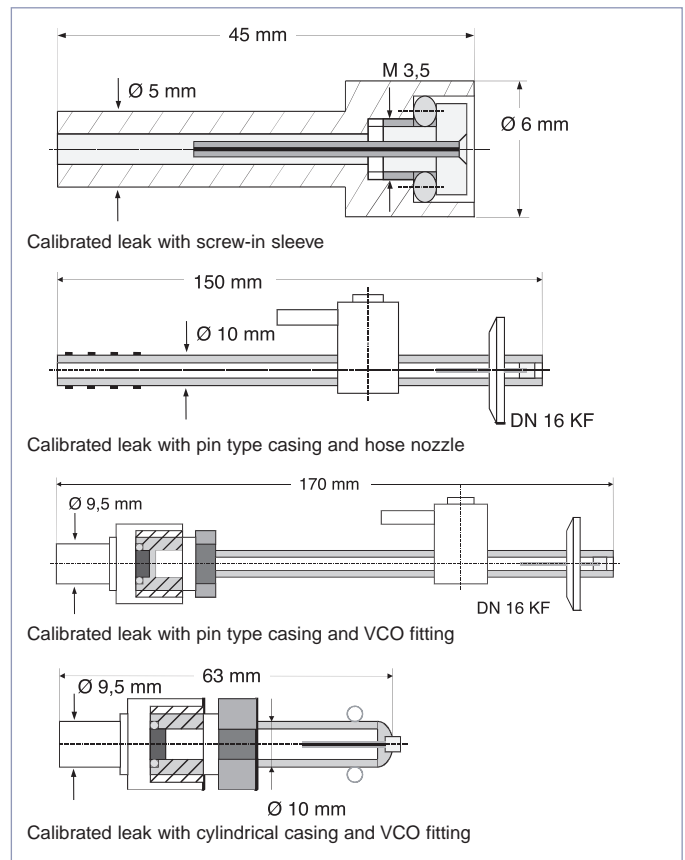
Serves as a calibrated leak for the entire helium leak testing system without being influenced by the presence of a test sample.

Here a dummy is placed in the test chamber. The connection to the test chamber is directly by a DN 10 KF fitting. The test gas connection is either by a VCO fitting or a 10 mm hose nozzle for flexible connections.

CALIBRATED LEAK WITH CYLINDRICAL CASING

The test gas connection is either by a VCO fitting or a 10 mm hose nozzle for flexible connections.

All calibrated test leaks for systems are designed for a max. working temperature of 80 °C.



ORDERING INFORMATION

CALIBRATED INTERNAL LEAK	MAX. OPERATING PRESSURE	PART NUMBER
Integral test leak	1 bar against vacuum	143 15S
Calibrated leak with screw-in sleeve	20 bar (up to 40 bar if the capillary is glued-in by the customer)	143 00
Calibrated leak with pin-type casing and hose nozzle casing only	6 bar	143 08 143 07
Calibrated leak with pin-type casing and VCO fitting casing only	6 bar	143 04 143 03
Calibrated leak with cylindrical casing and VCO fitting casing only	20 bar (up to 40 bar if the capillary is glued-in by the customer)	143 12 143 11

Sample Probes (Sniffers) and Accessories

Helium sniffers in connection with the UL1000, UL5000 and the Modul1000 leak detectors are used for leak testing test samples in which a helium overpressure is present. Besides pinpointing the leaks, it is possible to determine the leak rate of the escaping helium.

HELIUM SNIFFER LINE SL200 FOR THE UL1000/5000 AND MODUL1000

- Sniffer line connects directly to the inlet port
- Very fast response
- Extremely low detection limit $< 1 \times 10^{-7}$ mbar l/s
- Rigid 120 mm sniffer tip (included)



Helium sniffer line SL 200 P

HELIUM SNIFFERS QUICK-TEST QT100 FOR THE UL1000/5000, AND THE MODUL1000

- For greater distances up to 20 m between test object and leak detector
- Diaphragm pump for sucking the search gas
- Smallest detectable leak rate 1×10^{-6} mbar l/s
- Short response and decay times
- High sniffer velocity
- Built-in transformer for adaptation to any required power supply voltage



Helium sniffer QUICK-TEST QT 100 with sniffer

TEST CHAMBER TC1000 FOR THE UL1000/UL1000 FAB AND MODUL1000

- Turns the UL1000 / UL1000 FAB and the Modul1000 into a reliable and user-friendly workstation for testing of hermetically sealed parts (also according to MIL-STD 843, Method 1014)
- Easy to install
- Maintenance-free
- Volume (hemispherical shape): approx. 430 ccm
- Upper diameter / depth: 130 / 40 mm
- Material: Aluminum alloy, low outgasing rate
- Weight: 2.5 kg
- Vacuum connection: DN 25 KF
- Integrated sensor switch to start test in combination with UL1000 / UL1000 Fab and the Modul1000
- Clearly visible red/green LED's to display test results
- Calibration by an external test leak easy possible by using an optional adapter plate
- Protection of tested parts against static discharge by the standard ESD wrist band and an optional ESD mat (Cat. No. 551-002) for UL1000 / UL1000 Fab



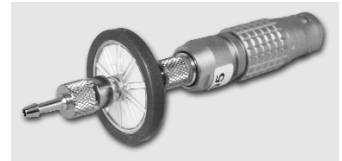
Test chamber TC1000



TC1000 in operation; exemplary menu function showed on the display

SNIFFER LINE ADAPTER FOR PROTEC P3000 AND ECOTEC E3000

Sniffer line adapter for system integration matching to Protec P3000 Helium leak detectors and Ecotec E3000 multi-gas leak detectors.



Sniffer line adapter

SEARCH GAS SPRAY GUN

The search gas spray gun with PVC hose (5 m long) is used for well aimed spraying of search gas at places where a leak is suspected.



Search gas spray gun

PC SOFTWARE LEAKWARE

Windows PC software used for data acquisition, documentation of measurements, and to control the operation of the leak detector.

SPECIFICATIONS

	SAMPLE PROBES	
	SL200	QT100
Smallest detectable leak rate	< 10 ⁻⁷ mbar l/s	10 ⁻⁶ mbar l/s
Supply voltage	-	110 - 220 V, 50/60 Hz
Signal response time, approx. at a length of 5 m 20 m	< 1 s -	1 s 8 s
Connection flange	DN 25 KF	DN 25 KF
Weight	0.6 kg (1.32 lbs)	3.5 kg (7.72 lbs)

ORDERING INFORMATION

	PART NUMBER
Helium sniffer line, SL200 P, 4 m long, straight handle with red / green LED for go / no-go indication, rigid sniffer tip 120 mm	140 05
Helium sniffer QUICK-TEST QT100	155 94
Test chamber TC1000 incl. ESD wrist band	551-005
Test leak adapter for TC1000, DN 25 KF flange	200 001 797
Sniffer line adapter for system integration	525-005
Sniffer line for the QT100, 5 m 20 m	140 08 140 09
PC software LeakWare	140 90
Search gas spray gun	165 55
Rubber bladder (Helium reservoir for spray gun)	200 20 218
Hose clamp for rubber bladder	200 20 217

Connection Flanges

LEAK DETECTORS			HELIUM SNIFFERS			CALIBRATED LEAK		
UL1000	–	DN 25 KF	SL200	–	DN 25 KF	TL8	–	DN 10 KF
UL1000 Fab	–	DN 25 KF	SL200	–	DN 25 KF	TL8	–	DN 10 KF
UL5000	–	DN 40 KF	SL200	–	DN 25 KF*	TL8	–	DN 10 KF

* Reducer for connection required

If components of the same nominal width are connected, only one centering ring and one clamping ring is required.

Connection Components

When connecting accessories (helium sniffer probe and calibrated leaks) to a vacuum leak detector, the following reducers and components may be necessary:

Reduction	Reducers Stainless steel / FPM	Centering Rings
DN 25 / 16 KF	Part No. 211-281, stainless steel	DN 16 KF, Part No. 211-066
DN 40 / 25 KF	Part No. 211-283, stainless steel	DN 40 KF, Part No. 211-070
DN 40 / 16 KF	Part No. 211-282, stainless steel	DN 40 KF, Part No. 211-070

The following metal hoses are recommended to connect the leak detectors to systems:

Nominal Width	Length	Part Number
DN 16 KF	1.0 m	211-338
DN 16 KF	0.5 m	211-336
DN 25 KF	1.0 m	211-342
DN 25 KF	0.5 m	211-340
DN 40 KF	1.0 m	211-346
DN 40 KF	0.5 m	211-344



www.inficon.com reachus@inficon.com

Due to our continuing program of product improvements, specifications are subject to change without notice.

mila01e1-f (0704) ©2007 INFICON