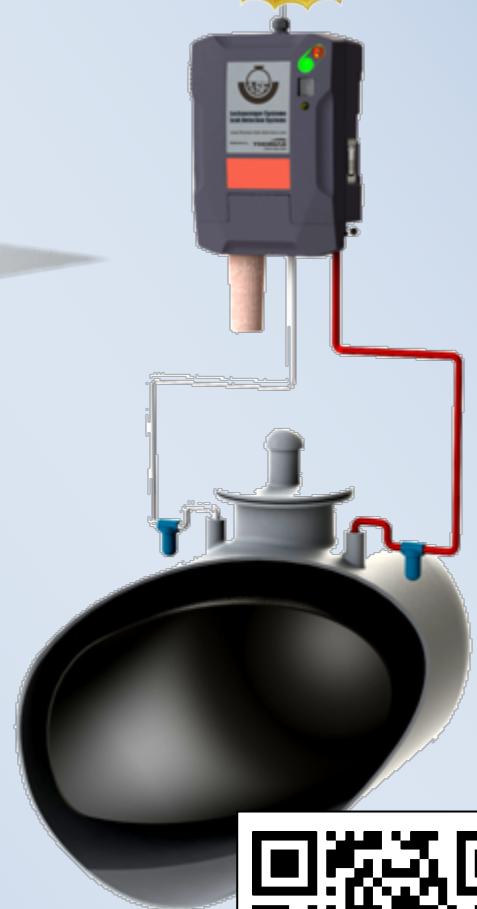
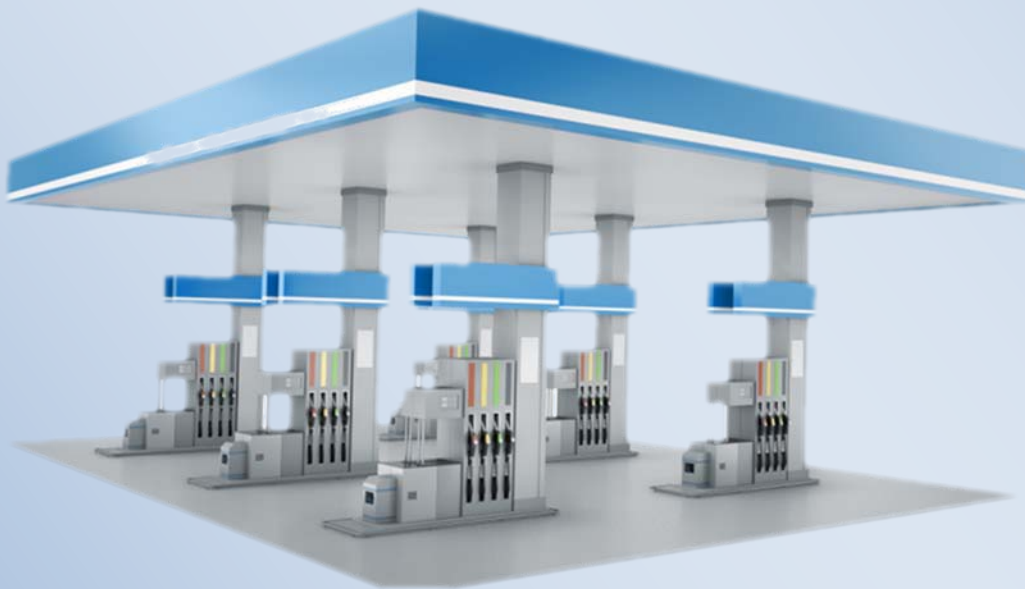


**Class I Leak Detection Systems -
Highest level of monitoring and prevention of
double walled tanks and pipes,
according EU Standard EN 13160-2**



- ... Advantages
- ... Working Principle
- ... Product Overview



ABOUT US

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Mail: info@thomas-leak-detection.com

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Focus on Safety, for a clean environment

Since five decades, nearly 1 million ASF leak detectors have been installed in consumer heating oil facilities, gas stations, tank farms and industrial plants. This confirms the reliability of our products for monitoring of water-polluting liquids in double-walled tanks and piping.

All our leak detection systems working on the pressure or vacuum principle are corresponding with DIN EN13160 Class 1, and are approved by the DIBt (German Institute for Building Technology).

Since the merger with Gardner Denver, Inc. in 2005 and formation of the Thomas Products Division, we are part of one of the world's largest manufacturer and supplier of pump solutions for various applications.

The environmental protection is one of the main activities of the company. With high standards and application specific product solutions, we contribute to the active protection of our environment.

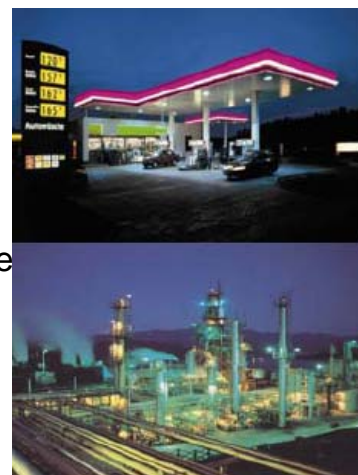


Best customer relations

We make a point to fulfil the expectations and needs of our customers in the best possible manner. This applies to the regional working specialists as well as to international organized companies.

Our customers are tank service companies, manufacturers of leak protection linings, petrol stations and industrial plant building companies, planners, real estate managing companies, tank manufacturers, petroleum industry and companies working in the waste and recycling business.

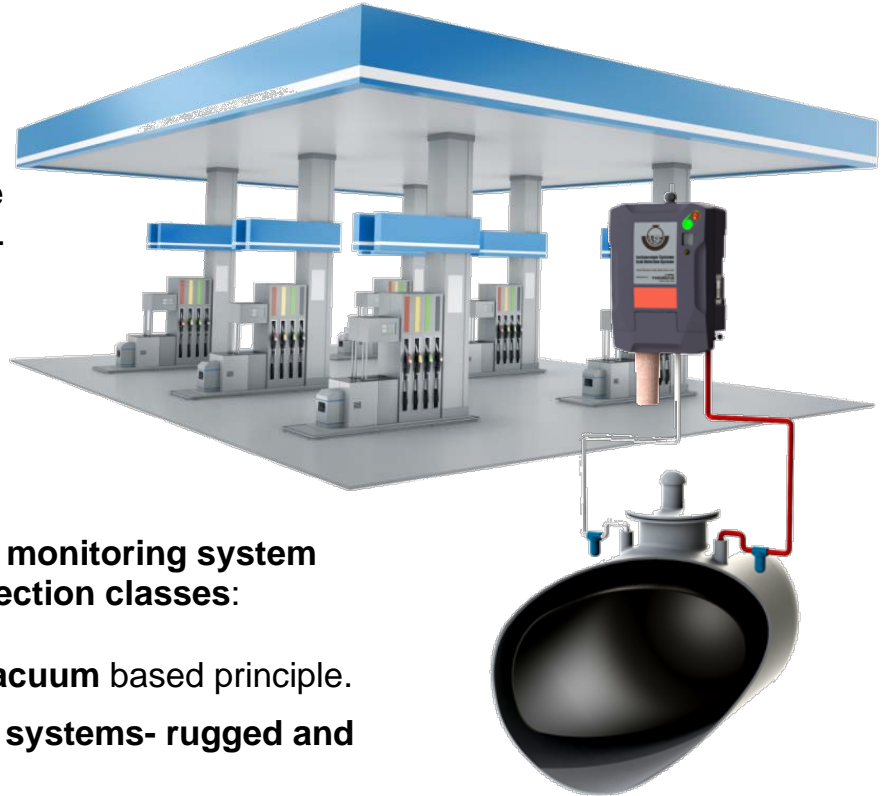
We see it for granted to support our customers with service and trainings on the selection, installation and service of our leak detection equipment, so they are able to serve the respective end customers properly and professionally.



**Advantages - Class I Leak Detection Systems -
 Highest level of monitoring and prevention of double tanks and pipes,
 based on the EU Standard EN 13160-2**

Class I lowers:

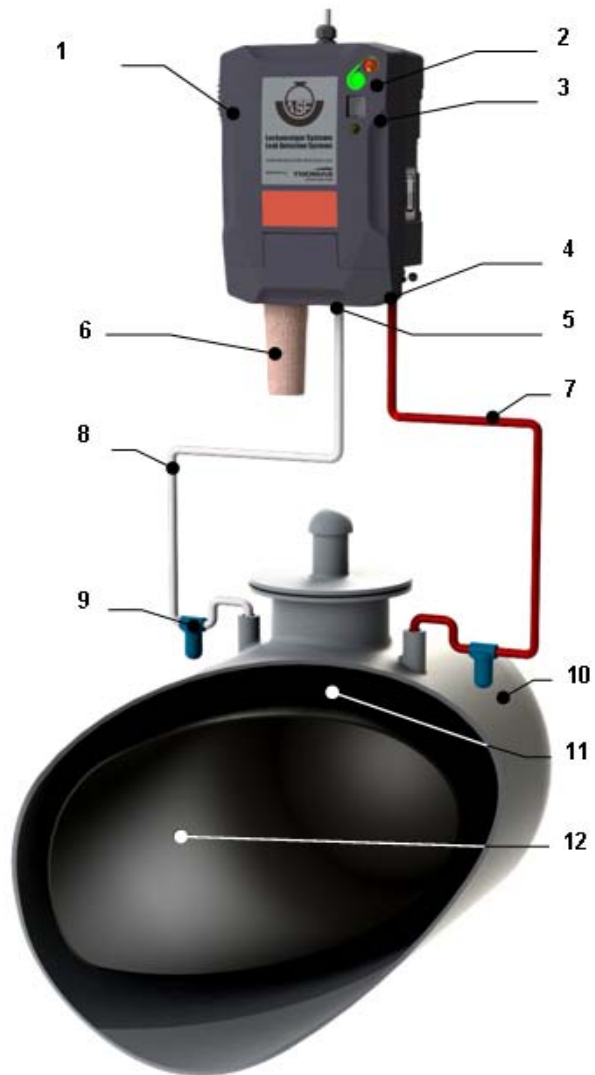
- **Risks of contamination** of the environment and ground water.
- **Risks of fire and explosion.**
- **Risks of financial losses and penalties** to the operators.



**Class I fulfils the highest level of a monitoring system
 Advantages against other leak detection classes:**

- Working on the **pressure or vacuum based principle.**
- **Most reliable –THOMAS ASF systems- rugged and safety design.**
- **Continuous and reliable monitoring, alarm signal clearly indicated. Class II liquid systems don't often work without any notification because of wrong installation or maintenance.**
- **Cost savings** for installation and operation compared to other systems.
- **Lower risks of not or late recognized leaks** of tanks and pipes to an absolute minimum.
- **Class I systems** have been consequently **installed** in many European Countries **since decades** in more than **1 million installations. Since that time, there have been no bigger injuries by leaking systems taken place.**
- **A leak will be detected above or below the liquid level** of the stored liquid, and in case of an **alarm, no liquid has entered the environment and prevents the system** for a sufficient reaction time for service.
- → All the **other classes** of monitoring systems (class II – V) do **have the negative effect, that in case of an indicated leakage, hazardous liquids could have been entered into the environment.**
- For installation, maintenance and disposal - **no handling of hazardous liquids** in contrast to, e.g. glycols / additives / water mixtures used in common liquid monitoring systems (Class II).

Overpressure leak detector at a double-walled steel tank

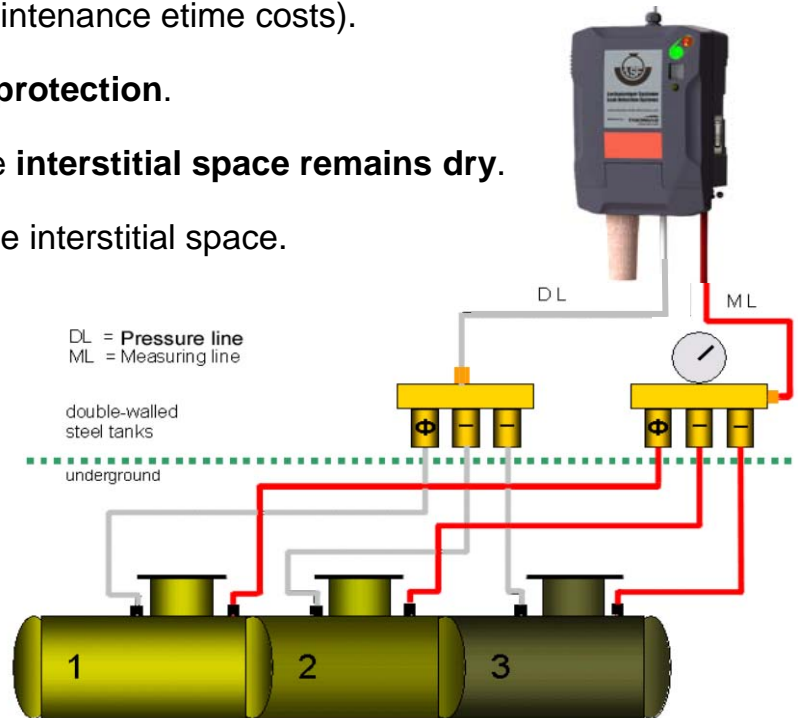


1. Overpressure leak detector (e.g. THOMAS-ASF Type D9)
2. Visual display, green power lamp, red alarm lamp
3. Switch "Disable acoustic Alarm"
4. Measuring line - connection and test valve
5. Pressure line - connection and test valve
6. Air dryer
7. Measuring line - colour coding red
8. Pressure line - colour coding white or clear
9. Condensate vessel at respective bottom points of connection lines - recommended
10. Outer tank wall of the double-walled tank
11. Interstitial space
12. Inner tank wall of the double-walled tank

Main advantages of overpressure leak detection systems:

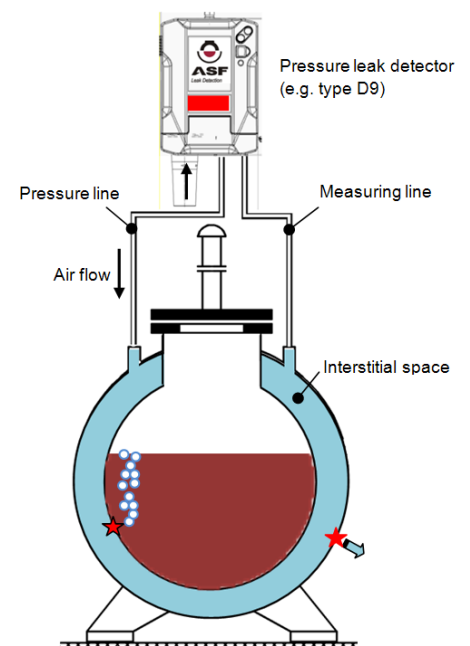
- Pressure systems need **less installation efforts** than vacuum systems.
- An **integrated pump** compensates small leakages.
- **Up to 6 underground tanks** can be monitored at the same time by **one leak detector**. **Cost savings up to several thousands EUROS** compared to liquid monitored installations (investments and maintenance etime costs).
- Equipped with an **overpressure protection**.
- In case of a leakage, normally the **interstitial space remains dry**.
- An **airdryer limits humidity** to the interstitial space.

Overpressure leak detector (type D9) connected to up to 6 underground tanks via a manifold.



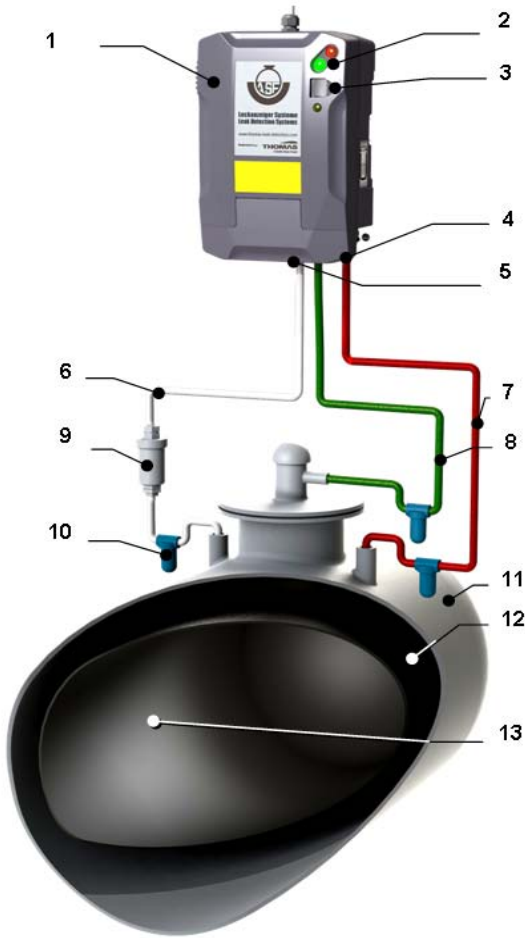
Functional principle pressure leak detector with integrated pump

- See the working principle on a video presentation on our WEB:
www.asf-leak-detection.com/operating-principle
- Pressure level in the interstitial space is higher than max. hydrostatical or operating pressure inside the tank (or pipework).
- In case of a leak in the tank wall, above or below the liquid level in the tank, overpressure escapes from the interstitial space.
- The overpressure in the interstitial space prevents liquid does not enter into the environment.
- Pressure differences in the interstitial space, caused by e.g. temperature changes as well as very small leakages are compensated by an integrated pump.
- At higher leakages, the pressure level in the interstitial space decreases slowly, an alarm will be indicated.

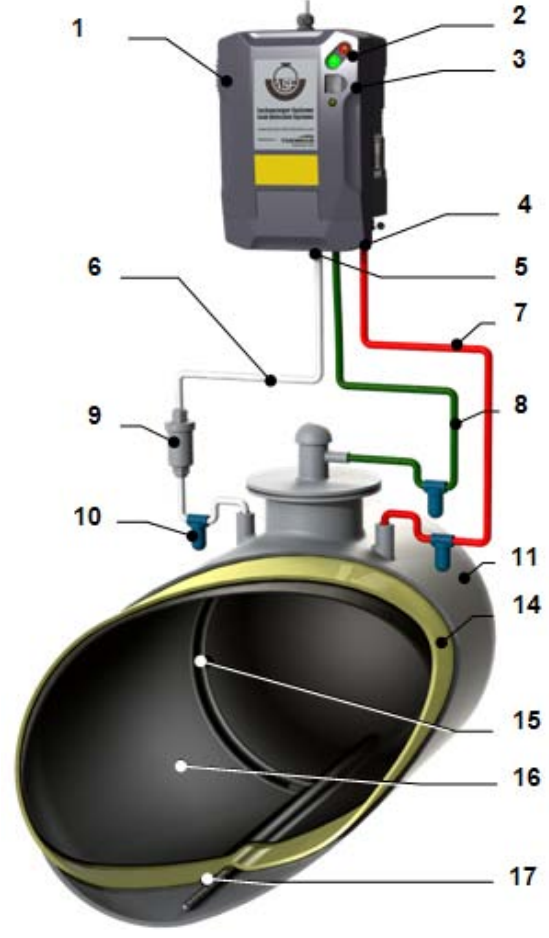


Vacuum leak detector:

Connected to a double walled steel tank



Connected to a single walled tank with a protective lining system and suction line installed down to the lowest point of the tank bottom



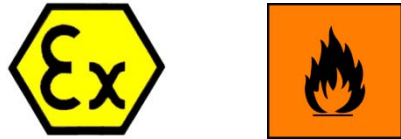
1. Vacuum leak detector
2. Visual display, green power lamp, red alarm lamp
3. Switch "Disable acoustic Alarm"
4. Measuring line - connection and test valve
5. Suction line - connection and test valve
6. Suction line - colour coding white or clear
7. Measuring line - colour coding red
8. Exhaust line, only required with vacuum leak detector, colour coding green
9. Liquid barrier, partly with integrated condensate vessel, only required with vacuum leak detector

10. Condensate vessel at respective bottom points of connection lines
11. Outer tank wall
12. Interstitial space of the double walled tank
13. Inner tank wall
14. Intermediate layer of the protection lining, at the same time interstitial space
15. Suction line to tank bottom point, not perforated
16. Protective lining
17. Induction line laid along the longitudinal axis of the tank bottom, must be perforated

Main advantages of vacuum leak detection systems:

- **Wide range of tanks** can be monitored, e.g.
 - Large cylindrical and vertical tanks**
 - Flat bottom storage tanks**
 - Single walled tanks with a protective lining system**
 - Up to 8m³ interstitial space volume**
- **Class II** systems (liquid leak detection) can be **upgraded to class I vacuum leak detection**.
- **Pipeworks** (also with high operating pressure) can be monitored by a vacuum leak detector as well.

- **Ex protected versions** for flammable liquids.

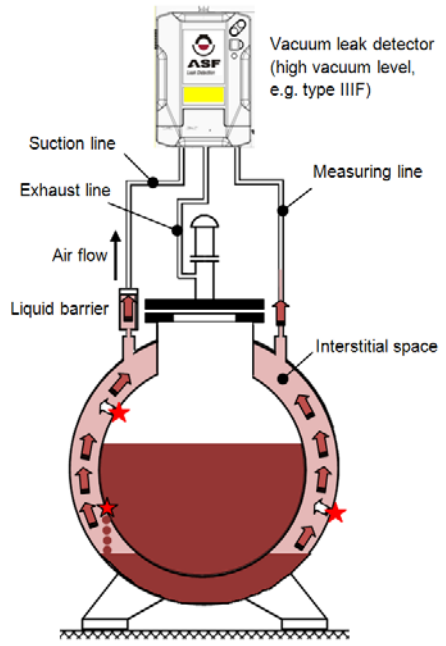


- **Stainless steel versions** for **chemicals**.



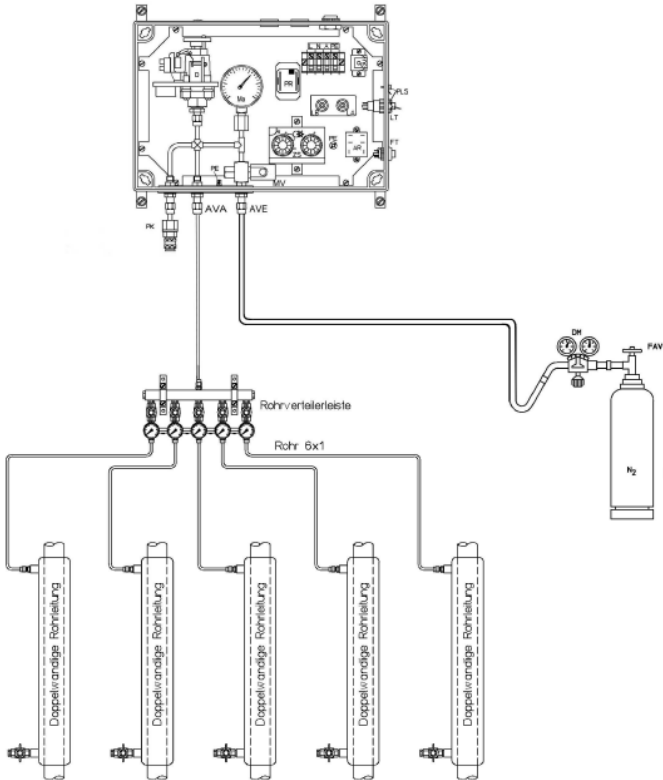
Functional principle vacuum leak detector with integrated pump

- See the working principle on a video presentation on our WEB:
www.asf-leak-detection.com/operating-principle
- Vacuum level in the interstitial space higher is than max. hydrostatical pressure inside the tank.
- In case of a leak in the tank wall, above or below the liquid level in the tank, air or stored liquid will be sucked into the interstitial space.
- The vacuum level in the interstitial space prevents liquid does not enter into the environment.
- At higher leakages, the vacuum level in the interstitial space decreases slowly, an alarm will be indicated.

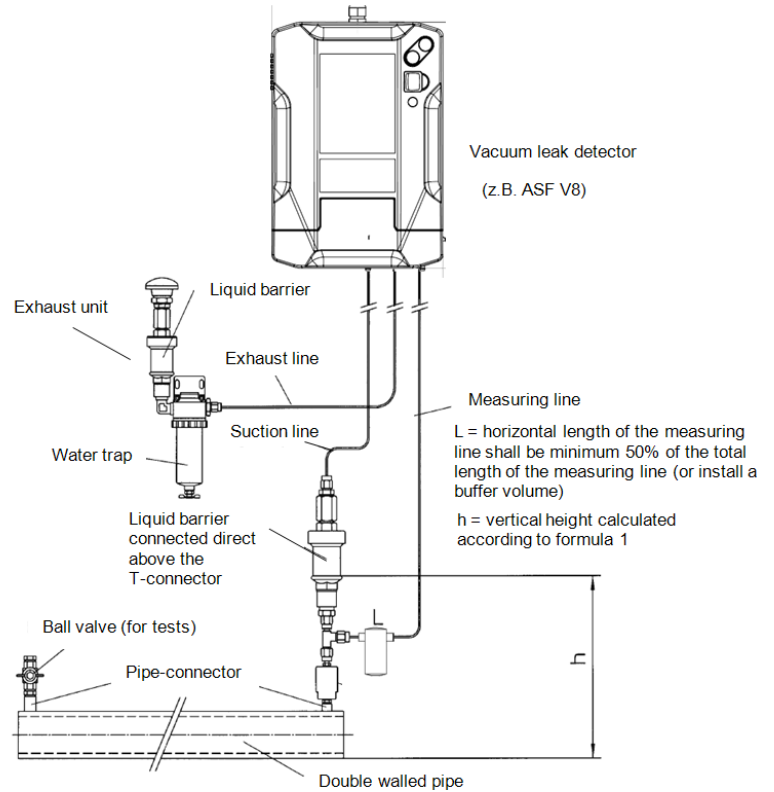


Class I leak detection at pipeworks:

Overpressure leak detection, e.g. with nitrogen (N₂) in the interstitial space, e.g. type ASF D26 and D25 or D29 with integrated air pump



Vacuum leak detector, e.g. type ASF V8



Generals for class I leak detection at pipeworks

- THOMAS ASF overpressure leak detectors for pipeworks could be connected to pipes with up to 17 bar operation pressure depending on type of leak detector.
- Overpressure systems can be connected to several pipes via a manifold.
- In case of a leak, overpressure systems keep the interstitial space dry.
- Advantage of overpressure nitrogen (N₂): no explosive atmosphere in the interstitial space, at steel pipes, no corrosion inside the interstitial space.
- With vacuum systems pipework with higher pressure (>17 bar) can be monitored by installing safety solenoid valves.

Class I leak detection at flat bottom storage tanks

Application: Double-walled tanks, double-walled bottoms or single-walled tanks with a leak protection lining.
Double-walled pipes with max. operating pressure of 6bar.

Stored Liquids: Water-endangering liquids, also with a flash point $\leq 55^\circ \text{C}$, temperature class T4, explosion group IIA, (IIB-option).

Approval: General Design Permit (DIBT) No. **Z-65.22-217**
Tested by TÜV Nord, Hamburg
ATEX Certificate **PTB99 ATEX 2037 X**



Assembly: The armature box can be installed in the ex zones 1 and 2. The switch box must be installed outside the ex zones.

Function: The leak detector works on the vacuum principle. Visual and audible alarms are triggered by a pressure increase as a result of leaks in the tank walls, above or below the liquid level. The vacuum pump draws air from the monitoring space through suction line. Normally, the exhaust air is pumped back into the tank.

Advantages: Wide range of stored liquids can be monitored by the system.

High reliability of the vacuum controlled system (e.g. against static electricity, thunderbolt)

A leak is detected and reported, before fluid leaks into the environment.

The system prevents against a liquid drain off after an alarm output for a certain period of time.

Small system leakages are balanced by the pump automatically.

Air and fluid leakages are detected, indifferently if the inner or outer tank wall is leaking.

Beside an annual functional inspection, normally there is no further maintenance required.

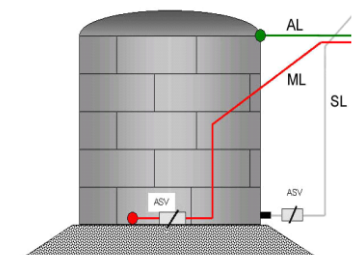
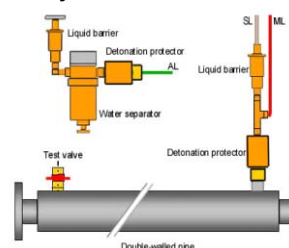
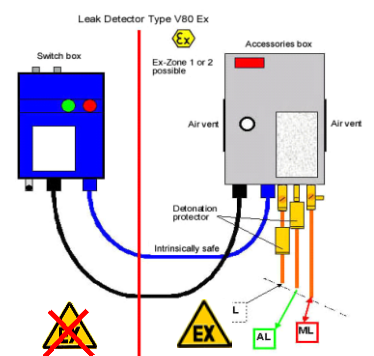
All relevant components are protected by an enclosure.

Minimal installation work for the leak detector.

Setup: Alarm "on" P_{AE} -325 mbar
Pump "off" P_{PA} -450 mbar

Standard: EU Standard for Leak Detection Systems EN 13160-2, Class I

Switch Box Armature Box



New Generation of Leak Detectors



Focus on **Safety**, For A Clean Environment

After our previous device models are used for nearly four decades in more than half a million installed systems for reliable monitoring of tanks and piping, our leak detector types IVF, IIIF, V8, D9, D29, and D25 are introduced in a new design.

Additional advantages of the new design for the specialized company and the operator:

- Practical design with clear controls
- Safety-oriented design for optimum reliability
- Protection against unauthorized use and intervention on the device
- Service friendly design and advanced functionality
- Identical parts supply with proven key components

Further details see on www.thomas-leak-detection.com

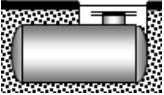
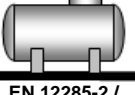











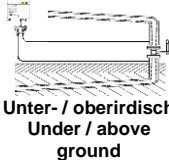




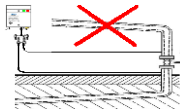





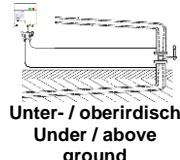




- **Rugged design**, gives **clear instructions** and displays on the front panel.
- A **switched OFF buzzer** is clearly indicated by a yellow light.
- **Documentation** stored for long-term availability back side housing.
The color-marking indicates function principle yellow → vacuum system, red → pressure system
- **Easy interchangeability** with already installed units, similar mounting points and electrical supply connections.
- **Two additional cable ducts integrated.**
- **Similar supply of spare parts old-new** units through the use of proven components.
- **Potential free contact** standard on most versions or can easily be retrofit.
- **Safety-related design** features provide an **optimum operational safety** to the user as well as to the installation and service specialist.
- **Unauthorized access not possible without being detected.** The front panel with its attached service flap can be secured with the lower housing part.
- **Only an opened and lockable service flap** provides **free access to the tube connections.**
- Robust **3-way test valves** allow a **time-saving and convenient function testing** of the device or the entire leak detector system.
- The product features described above apply equally to the THOMAS ASF vacuum and pressure leak detectors.
- **The air dryer** on the pressure leak detectors D9 and D29 can be changed easily by a **quick coupling.**





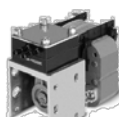


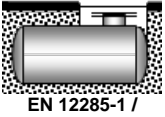
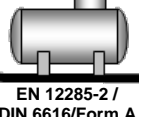
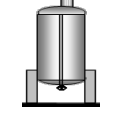

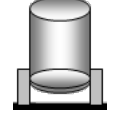
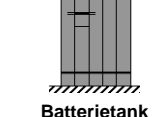










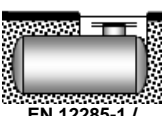
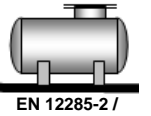


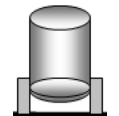




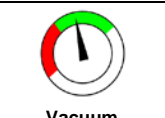


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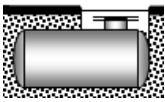
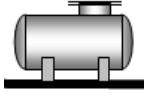
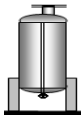



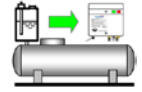

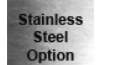





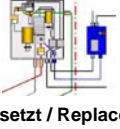



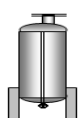






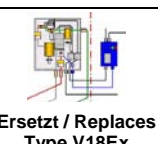
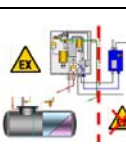
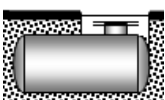
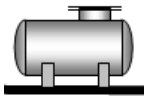
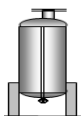





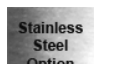








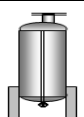







Überdruck Leckanzeiger / Pressure Leak Detectors

Type	Einsatzbereiche; Eigenschaften / Application *								
D9 Zulassung Z-65.23-109	 EN 12285-1 / DIN 6608 / Teil 2	 EN 12285-2 / DIN 6616/Form A DIN 6624 / Teil 2	 DIN 6619 / Teil 2		 FP > 55°C / R10, R11(F) R12 (F+), AI, AII, AIII	 Druck / Pressure Alarm ≥ 330mbar	 Pumpe		
D29 Zulassung Z-65.26-410	 Betriebsdruck Working Pressure ≤ 0,1 bar	 FP < 55°C / R10, R11(F) R12 (F+), AI, AII, AIII	 Druck / Pressure Alarm: 1,1 bar	 Pumpe	 Unter- / oberirdisch Under / above ground				
D25 Zulassung Z- 65.26-250	 Betriebsdruck Working Pressure ≤ 16bar	 FP < 55°C / R10, R11(F) R12 (F+), AI, AII, AIII	N₂	 Nur unterirdisch Only underground					
D26 Zulassung Z- 65.26-249	 Betriebsdruck Working Pressure ≤ 17bar	 FP < 55°C / R10, R11(F) R12 (F+), AI, AII, AIII	 Automatic	 Unter- / oberirdisch Under / above ground					

* Weitere Details – siehe Dokumentation / Montageanleitung des jeweiligen Leckanzeigers / Further application details see in the product documentation and installation instruction

Unterdruck Leckanzeiger für Flüssigkeiten mit Flammpunkt >55°C/ Vacuum Leak Detectors									
Type	Einsatzbereiche; Eigenschaften / Application *								
IV F Zulassung Z-65.22-2	 Tankinnenhülle Tank with Lining	 SL zum Tiefpunkt / down to tank bottom	 Nur / only FP>55°C, AIII	 Vacuum Alarm ≥ -34mbar	 Pumpe				
III F Zulassung Z-65.22-2	 EN 12285-1 / DIN 6608 / Teil 2	 EN 12285-2 / DIN 6616/Form A DIN 6624 / Teil 2	 DIN 6618 Teil 2+4	 DIN 6619 / Teil 2	 DIN 6623 / Teil 2	 Batterietank DIN 6625	 Change Class II into Class I detection, EN13160, liquid > air	 Nur / only FP>55°C, AIII	
V8 Zulassung Z-65.22-5	 Flachbodentank Flat Bottom Tank (DIN 4119)	 Betriebsdruck Working Pressure ≤ 3bar	 Nur / only FP>55°C, AIII	 Vacuum Alarm ≥ -330mbar	 Pumpe				
V33 Zulassung Z-65.22-6	 EN 12285-1 / DIN 6608 / Teil 2	 EN 12285-2 / DIN 6616/Form A DIN 6624 / Teil 2	 DIN 6618 Teil 2+4	 DIN 6619 / Teil 2	 DIN 6623 / Teil 2	 Flachbodentank Flat Bottom Tank (DIN 4119)	 Nur / only FP>55°C, AIII	 Stainless Steel Option Stainless Steel Standard DIN 6601	
	 Vacuum Alarm ≥ -330mbar	 Pumpe							

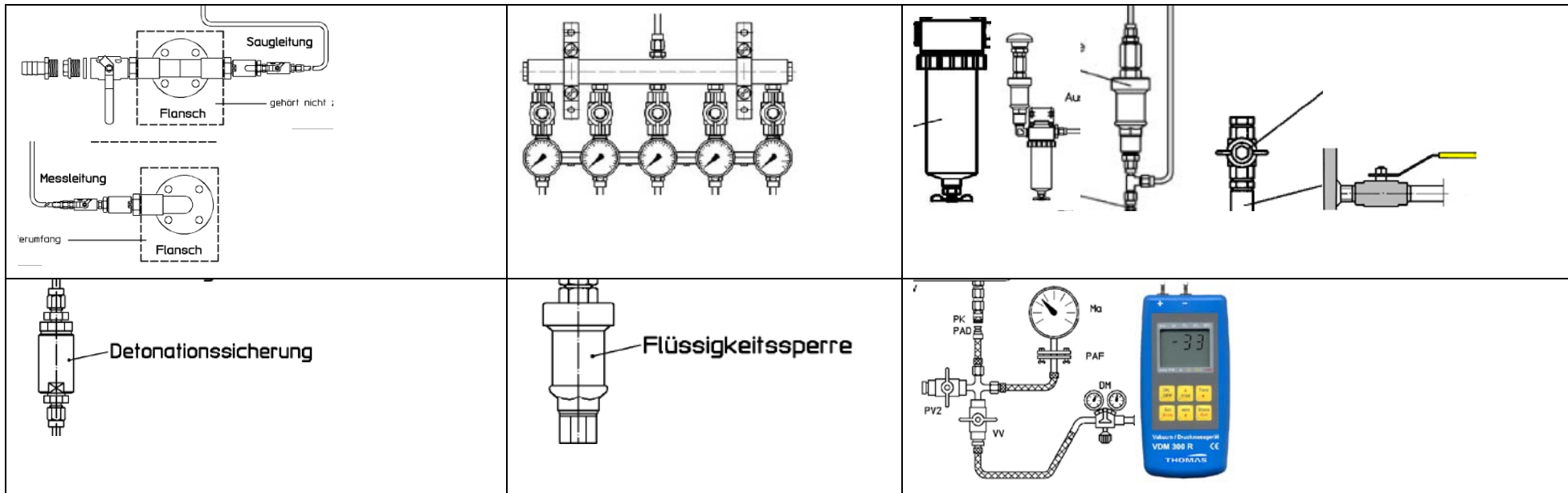
* Weitere Details – siehe Dokumentation / Montageanleitung des jeweiligen Leckanzeigers / Further application details see in the product documentation and installation instruction

Unterdruck Leckanzeiger für entzündliche Flüssigkeiten / Vacuum Leak Detectors with Ex Protection										
Type	Einsatzbereiche; Eigenschaften / Application *									
V80E x H	 EN 12285-1 / DIN 6608 / Teil 2	 EN 12285-2 / DIN 6616/Form A DIN 6624 / Teil 2	 DIN 6618 Teil 2+4	 DIN 6619 / Teil 2	 DIN 6623 / Teil 2	 Flachbodentank Flat Bottom Tank (DIN 4119)	 Change Class II into Class I detection, EN13160, liquid > air	 Betriebsdruck Working Pressure ≤ 6bar	 Stainless Steel Option DIN 6601	
	Zulassung Z-65.22-217 PTB 99 ATEX 2037 X	 Ex proofed IIA / IIB Option / T4	 FP<55°C / R10, R11(F), R12 (F+), AI, AII, AIII	 Vacuum Alarm ≥ -330mbar	 Pumpe	 Ersetzt / Replaces Type V17Ex				
V80E x N	 Tankinnenhülle Tank with Lining	 SL zum Tiefpunkt / down to tank bottom	 DIN 6618 Teil 2+4	 Ex proofed IIA / IIB Option / T4	 FP<55°C / R10, R11(F), R12 (F+), AI, AII, AIII	 Stainless Steel Option DIN 6601	 Vacuum Alarm ≥ -34mbar	 Pumpe		
	Zulassung Z-65.22-217 PTB 99 ATEX 2037 X	 Ersetzt / Replaces Type V18Ex								
V90 H	 EN 12285-1 / DIN 6608 / Teil 2	 EN 12285-2 / DIN 6616/Form A DIN 6624 / Teil 2	 DIN 6618 Teil 2+4	 DIN 6619 / Teil 2	 DIN 6623 / Teil 2	 Flachbodentank Flat Bottom Tank (DIN 4119)	 Change Class II into Class I detection, EN13160, liquid > air	 Betriebsdruck Working Pressure FP>55°C: ≤ 6bar FP<55°C: 0 bar	 Stainless Steel Option DIN 6601	
	Zulassung Z-65.22-399, Z-65.22-400	 Mechanic Part Ex protected IIA / IIB Option / T4	 FP<55°C / R10, R11(F), R12 (F+), AI, AII, AIII	 Vacuum Alarm ≥ -330mbar	 Pumpe					
V90 N	 Tankinnenhülle Tank with Lining	 SL zum Tiefpunkt / down to tank bottom	 DIN 6618 Teil 2+4	 Mechanic Part Ex protected IIA / IIB Option / T4	 FP<55°C / R10, R11(F), R12 (F+), AI, AII, AIII	 Stainless Steel Option DIN 6601	 Vacuum Alarm ≥ -34mbar	 Pumpe		

* Weitere Details – siehe Dokumentation / Montageanleitung des jeweiligen Leckanzeigers / Further application details see in the product documentation and installation instruction

Accessory Programm:

We also offer a wide range of accessories to connect our leak detectors to the different tanks or pipes, as well as other installation components to complete the leak detection system, e.g. water separators, flame arrestors, liquid barriers, enclosure with external alarm signal, heatings, valves, filters, test equipment




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