

Overpressure leak detector

DL - 5

Z – 65.23 - 1

Documentation DL-5

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Technical Description

of the leakage indicator type DL-5 as a component of a leakage indicator system

1 Device

Leakage indicators with an alarm overpressure > 330 mbar as a component of a leakage indicator system for double-walled tanks for storage of non-flammable, aquatoxic liquids.

2 Type

Leakage indicator, type DL-5

3 Field of application

3.1 Double-walled tanks not operated under pressure.

- acc. to DIN 6608, DIN 6616 form A, DIN 6619, DIN 6623, DIN 6624,
- without leakage indicator fluid in the monitoring space.

3.2 Storage material

Aquatoxic liquids that may be stored in tanks as defined under 3.1.

4 Functional Characteristics

- (1) In tanks with monitoring space equipped with the leakage indicator DL-5, leaks in the tank walls above and below the liquid level of the storage material and the groundwater as well as leaks in the connection lines between the leakage indicator and the monitoring space and in the leakage indicator itself are indicated automatically by pressure drop, both visually and acoustically.
- (2) The overpressure pump used in the leakage indicator produces overpressure in the monitoring space at a specified level above atmospheric and tank interior pressure. This ensures that the overpressure, in relation to the bottom of the tank, is
at least 30 mbar greater
than the static pressure of the storage material / groundwater.
- (3) The overpressure pump DRp sucks in atmospheric air through a dry filter TF and a dust filter SF and conducts it to the monitoring space through the pressure line DL (see drawing 4.1184).
- (4) The overpressure built up by the overpressure pump DRp in the monitoring space is measured and regulated by the overpressure switch PUE connected to the monitoring space via the measurement line ML (see drawing 4.1184).

When the operating overpressure level of 410 ± 10 mbar is reached, the microswitch M2 in the overpressure switch switches off the overpressure pump. A pressure drop leads to switching on of the overpressure pump via the same microswitch at a level of $360 \pm$ mbar. In normal operation, the overpressure varies between these two regulative operating overpressure levels with short operating times and longer downtimes of the overpressure pump, depending on how leak-tight the system is as a whole.

- (5) When the pressure falls off in the monitoring system as a result of a leak to below the regulative operating overpressure level, microswitch M1 in the overpressure switch PUE switches on the alarm when an overpressure of $330 \pm 10/0$ mbar is reached. The alarm is visual - red alarm signal lamp A - and acoustic - buzzer SU. The acoustic signal can be switched off by a switch T, which is sealed during normal operations. Parallel to the buzzer integrated in the leakage indicator, an additional external signal can be hooked up to certain terminals in terminal strip KL.

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- (6) When the overpressure climbs (e.g. commissioning and functional test) up to an overpressure level of 370 ± 10 mbar, alarm release is switched off by microswitch M1.
- (7) If a leak occurs in the walls of the monitoring space below or above the liquid level of the storage material or the groundwater, the overpressure in the monitoring space will result in an escape of compressed air through the leak.
In all cases of leaks, the leakage indicator DL-5 must release the alarm at latest when the overpressure falls to 330 mbar.
- (8) To make sure the operating overpressure will not exceed tank test pressure of 0.5 bar, a safety valve SV is integrated in the pressure line DL. This safety valve opens when the pressure climbs to 0.45 bar and recloses at an overpressure of 0.40 bar.
- (9) The leakage indicator is designed to be powered by an electrical connection with 220 V and 50 Hz. The green signal lamp B (operating lamp) lights up as soon as the electrical connection is completed.

5 Design of leakage indicator

5.1 Structure

The leakage indicator comprises an overpressure pump DRp, a control system with overpressure switch PUE, switching elements with message systems, the dry filter TF, the dust filter SF and the connections for the pressure and measurement line.

The parts required for the leakage indicator to function are listed in the parts list and drawings 3.1184 and 4.1184.

5.2 Dry Filter

- (1) The atmospheric air introduced into the monitoring space to produce overpressure, which tends to form condensate, is dried to a relative moisture level of $>10\%$ in the dry filter.
- (2) Regarding the dimensions of the dry filters that can be used, the additional amounts of air required due to leakage involved in normal operation as well as the amounts required in above-ground tanks to compensate for weather-caused temperature variations in the leakage indicator fluid (dried air) have been taken into consideration. This requirement results from the amount of air blown out through the safety valve SV when the pressure goes up to 450 mbar due to temperature increases in the leakage indicator medium in the monitoring space.
- (3) The types of dry filter to be used are dimensioned that the filter cartridge filling need not be replaced at intervals of less than one year at an assumed daily leakage rate caused by leaks of 2.0 l and the temperature related blow-out volume. These data are valid for sucked in air containing 80% rel. hum. and $+30^{\circ}\text{C}$ air temperature.

Table 1 - Dimensions of the dry filter

tank	tank volume	Dry filter type contents: KC pellets
Underground DIN 6608-D	≤ 5 to 100 m^3	TF 1 50 x 5 x 180 mm = 226 cm^3
Underground DIN 6619-D	5 to 15.5 m^3	
Above-ground DIN 6623-D	0.4 to 0.995 m^3	
Above-ground DIN 6624-D	1.0 to 5.0 m^3	
Above-ground DIN 6616-DA	≤ 5 to 30 m^3	
Above-ground DIN 6616-DA	40 to 100 m^3	TF 2 70 x 5 x 230 mm = 650 cm^3

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6 Installation instructions

6.1 Basic information

- (1) Installation of the leakage indicator system with leakage indicator DL-5 must be carried out by specialist companies licensed in accordance with § 19 1 of the German Water Act (WHG) that have provided proof of qualification to install leakage indicator systems.
- (2) In underground tanks the fact that the groundwater level may be above the crown of the contain must be taken into account.
- (3) The hydrostatic pressure of the storage material on the bottom of the tank must not exceed 300 mbar.

6.2 Installation of the leakage indicator

- (1) Installation of the leakage indicator should take place, if possible, in a closed, dry room not accessible to unauthorized persons. The room need not be heated. The leakage indicator must not be installed in explosion risk areas.
- (2) The leakage indicator is intended for wall mounting. It is fastened with wallplugs and bolts. The bolt heads are covered with plastic caps over the mounting holes in the housing floor. The distance between the monitoring space and the leakage indicator is to be kept to a minimum.
- (3) If the leakage indicator is to be installed out-of-doors or in rooms classified as moist rooms acc. to VDE regulations, the leakage indicator must be installed in a weatherproof protective box with a clear lid (DIN 40050 IP 55). In this case, an additional external signal (horn) is to be installed at a suitable site.

6.3 Electrical connection

- (1) The leakage indicator is designed for electrical power supply with 220 V~ 50 Hz alternating current. The connection must be laid permanently. Plug and switch connections are not permissible. An earthing connection is required.
- (2) Local power utility and VDE regulations must be complied with.
- (3) An additional external acoustic signal is connected to the terminals so designated on the leakage indicator. Power consumption of this external signal must not exceed 50 VA.

6.4 Installation of dry filter

- (1) A dry filter (type TF 1 or TF 2) using KC drying pellets is supplied with the leakage indicator along with a reserve filling of drying pellets.
- (2) Before commissioning the leakage indicator, the dry filter must be connected to the leakage indicator by a hose line with hose clamps with good allround contact and generous overlap (see drawing 5.1184).
- (3) The reserve filling is for refill purposes. During commissioning - in particular when larger monitoring spaces are involved - the KC drying pellets may in some cases be activated (colour change from orange to transparent). Replace activated pellets.

6.5 Installation of connection lines

- (1) Pressure, weather and water-resistant plastic hoses or rigid pipe may be used for the connection lines between the leakage indicator and the monitoring space.

These lines must have the following dimensions and colour codes:

Plastic hoses	Colour code	Dimension
Pressure line	glass clear / white	10 x 2 mm

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Measurement line	red	10 x 2 mm
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Rigid pipes

Pressure line	white rings at ends	8 x 1 mm
Measurement line	red rings at ends	8 x 1 mm

Make sure that the line cross-section is maintained over the entire length of the lines, i.e. the lines must not be buckled or squashed.

- (2) If plastic lines are laid in the earth, use protective pipe conduits. If there is a risk of damaging heat effects on plastic lines, make sure that sufficient heat protection is provided or that the line segments at risk are laid in metal conduit.
- (3) The connections of the connection lines at the muffs of the leakage indicator and the monitoring space are to be realized acc. to drawing 6.1184 / 7.1184.

If plastic hoses are used, all of the connections and lines between hoses and rigid pipes are to be secured with hose clamps providing an allround seal with plenty of overlap.

7 Commissioning of the leakage indicator device

- (1) For double-walled tanks acc. to 3.1, a sealing test of the monitoring space must be carried out at the factory under the overpressure specified for the type in question. As a rule, it is not necessary to check the monitoring space for leak-tightness at the construction site.
- (2) In spite of this, we recommend putting the monitoring space under an overpressure of 400 mbar using a strong installation pump, which is to be connected for this purpose to the pressure muffs of the tank. Install a measurement instrument to the measuring muff, which is then used to control the overpressure level reached.

The atmospheric air sucked in the process must be drawn through a dry filter of sufficient dimensions used for installation purposes only.

- (3) The overpressure achieved in the monitoring space of 400 mbar must not drop off measurably within 30 minutes of achievement of pressure stability.
- (4) Following the sealing test of the monitoring space, the pressure and measurement lines are to be attached to the leakage indicator pressure-tight. The tank ends of the lines are then to be connected to one another for leakage control of the leakage indicator and the connection lines. Then the leakage indicator is connected to the electric power source.

The leakage indicator begins operation and will reach the operating pressure level of 410 mbar rapidly due to the small monitoring space volume in the connection lines. Connect a metering instrument with precision class at least 1.6 in test position "B" at the test cock of the leakage indicator. Begin the test for leakage c. 5 minutes after the first switch-off of the leakage indicator. The test result is positive if the pressure level reached within 30 minutes does not drop by more than 12.5 mbar.

- (5) After the leakage test of the leakage indicator and connection lines has been passed, disconnect them and connect them carefully to the monitoring space muffs (drawing 6.1184 and 7.1184).

Then the specified operating overpressure is created by means of the leakage indicator in the entire system. After the overpressure pump of the leakage indicator, the connections to pressure and measurement lines on the leakage indicator, the monitoring space and at all connections, e.g. fixtures in the lines, are to be carefully brushed with Nekal or another leakage control liquid.

- (6) Then carry out a functional test acc. to 8.3 below.

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8 Operating instructions

8.1 General information

- (1) If the leakage indicator system is installed leak-tight and properly (monitoring space, connection lines and leakage indicator), it can be assumed that the leakage indicator will only function within the regulatory range if the overpressure does not drop off due to unavoidable small leaks and is then built up to its upper value within the regulatory range (operating overpressure).
- (2) Frequent or continuous operation of the overpressure pump indicates leaks that should be eliminated within a reasonable period.
- (3) An alarm release is always caused by a serious leak or defect. The cause must be determined and eliminated immediately.
- (4) The leakage indicator may only be opened after the voltage supply is switched off.

8.2 Maintenance

- (1) The DL-5 leakage indicator must be tested for function and operating safety and reliability by an expert from a qualified specialist company or the operator once a year. The scope of the test is as defined under 8.3.
- (2) This test must also determine whether the conditions of section 6 have been met.
- (3) The drying pellet filling of the dry filter must be renewed at one-year intervals or more frequently if saturation of the drying material is indicated by a colour change from orange (initial colour) to transparent is observed.

8.3 Functional test

The function and operational reliability of the leakage indicator are to be tested

- after every commissioning procedure,
- in accordance with 8.2 at the intervals stipulated there and
- following every defect elimination procedure.

The function test is to be carried out using the three-way cock integrated in the measurement line ML below the leakage indicator using test muffs Ph in connection with the deaerator EV also located below the leakage indicator.

Deaeration of the monitoring space must be realized slowly using the deaerator in the pressure line to avoid measurement errors.

Each functional test thus also includes testing of free passage through the measurement and pressure lines between monitoring space and leakage indicator.

Minimum scope of the functional test:

- (1) The operating overpressure in the leakage indicator system (monitoring space with connection lines and leakage indicator) is to be measured by connecting a measurement instrument with a class accuracy of at least 1.6 at the test muffs in test cock position "B".
- (2) At test cock position "B", the pneumatic system is to be deaerated slowly via the deaeration system so that the drop in pressure facilitates measurement of the switching values of the overpressure switch. In this way, clear passage through the measurement and pressure lines is also determined.
- (3) Visual and acoustic alarm release by the leakage indicator is to be determined. The alarm must be tripped at the latest when an overpressure of 330 mbar is reached. In case of alarm, the seal on the sealed switch is to be removed and the acoustic signal switched off.

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(4) Once alarm release has been determined, the deaeration device must be closed and the leakage indicator system tested under increasing overpressure up to the switching value "operating overpressure" (overpressure pump OFF).

(5) Leaving the measurement instrument connected to the test muff in position "B", deaerate the monitoring system once again to the switching value "ON". Then close the deaeration device and switch the test cock to position "A". This renders the overpressure switch blind. The overpressure pump continues to operate and raises the overpressure in the monitoring space.

Opening of the safety valve at 0.45 bar overpressure is to be determined (pressure drop on measuring instrument).

Then switch test cock to position "B". the overpressure pump must switch off immediately.

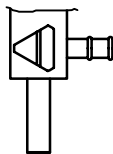
Following switchoff of the overpressure pump, the overpressure drops further via the still-opened safety valve and closure of the safety valve is determined on the measurement instrument at 0.4 bar.

(6) Move test cock to "operating position", remove the measurement instrument and reseal the sealable switch.

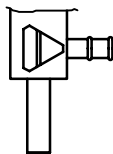
(7) Test the fixtures and system parts (in particular the dry filters) for function and operational reliability.

(8) Replace the drying material in the dry filter if the original orange colour changes to transparent.

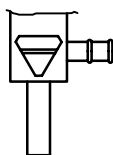
(9) A report must be written up on this test.



Operating position: Deaeration line and test cock closed



Test position "B": Leak-tightness of leakage indicator system, deaeration through deaeration device, test of switching values



Test position "A": Test of safety valve and pump head of overpressure pump

8.4 Alarm release

- (1) When the alarm is tripped, the red signal lamp A lights up and the acoustic signal Su sounds.
- (2) Remove seal on alarm switch T, switch off acoustic signal and inform installation company without delay.
- (3) Expert representing the qualified specialist company or the operator must determine the cause of the alarm, eliminate it and then subject the leakage indicator system to a functional test acc. to 8.3.

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- A = Alarm signal lamp, red
- B = Operating signal lamp, green
- DL = Pressure line
- DRp = Overpressure pump
- EV = Deaerator
- G = Device housing
- K = Terminal strip
- ML = Measurement line
- Ph = Test cock
- PUE = overpressure switch
- SF = Dust filter
- Su = Buzzer
- SV = Safety valve
- T = Sound-off switch
- TF = dry air filter

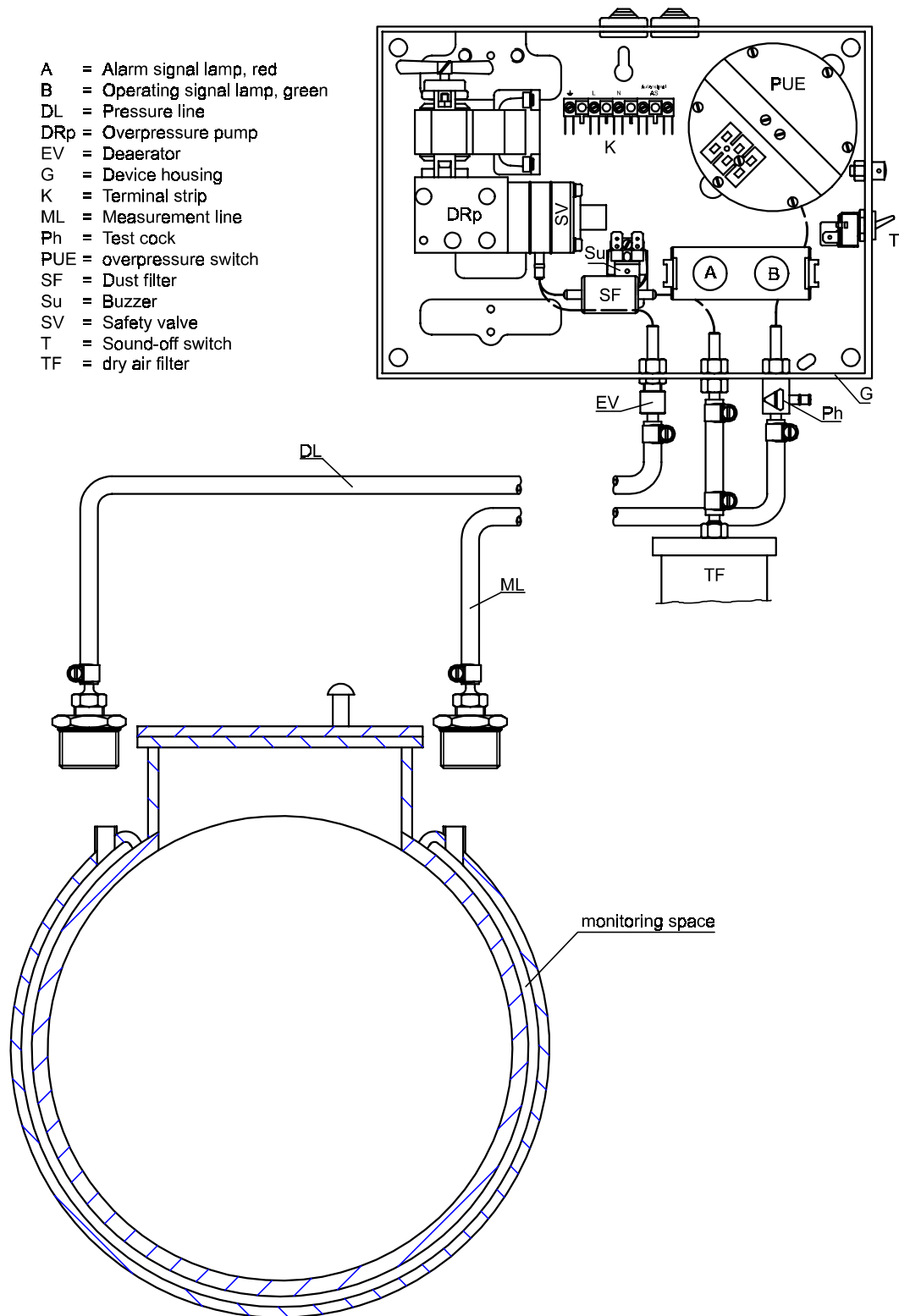


fig. 1: Pneumatic circuit diagram

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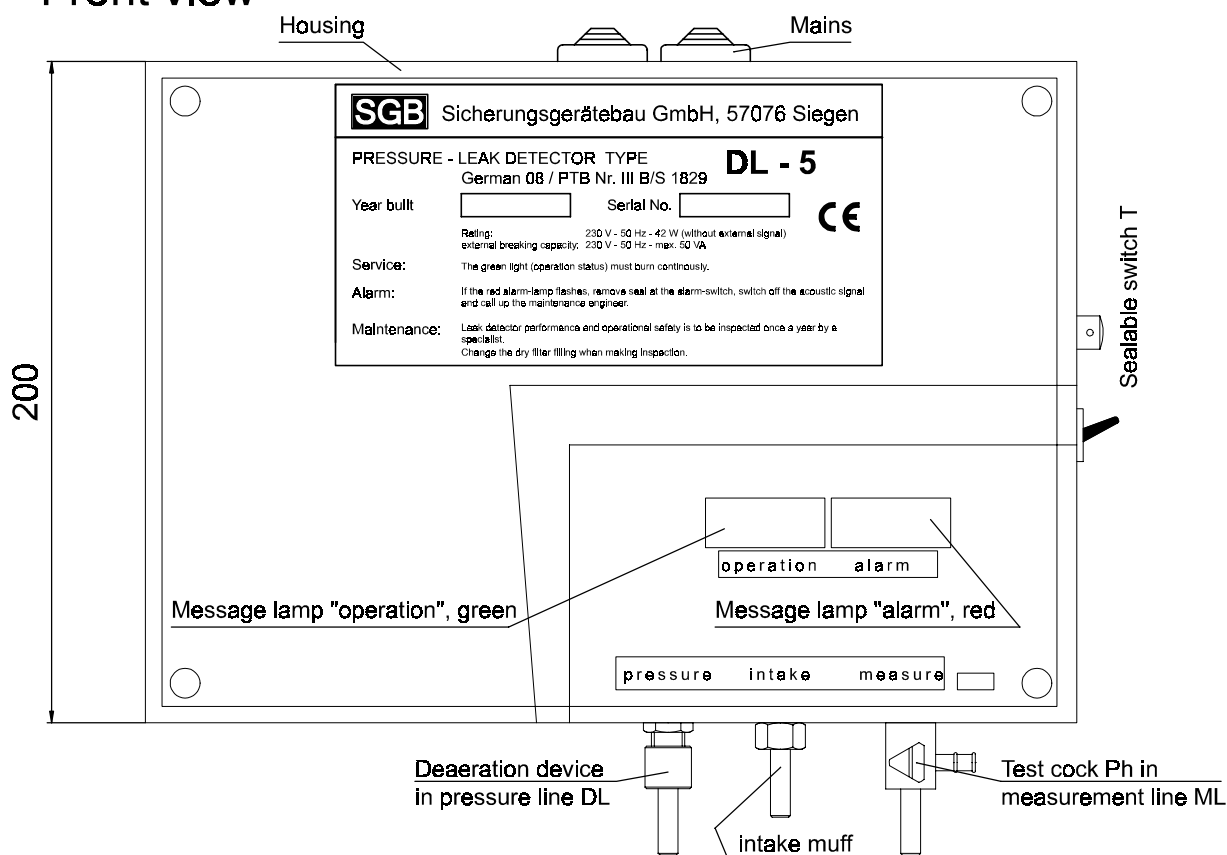
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Front view



View from below

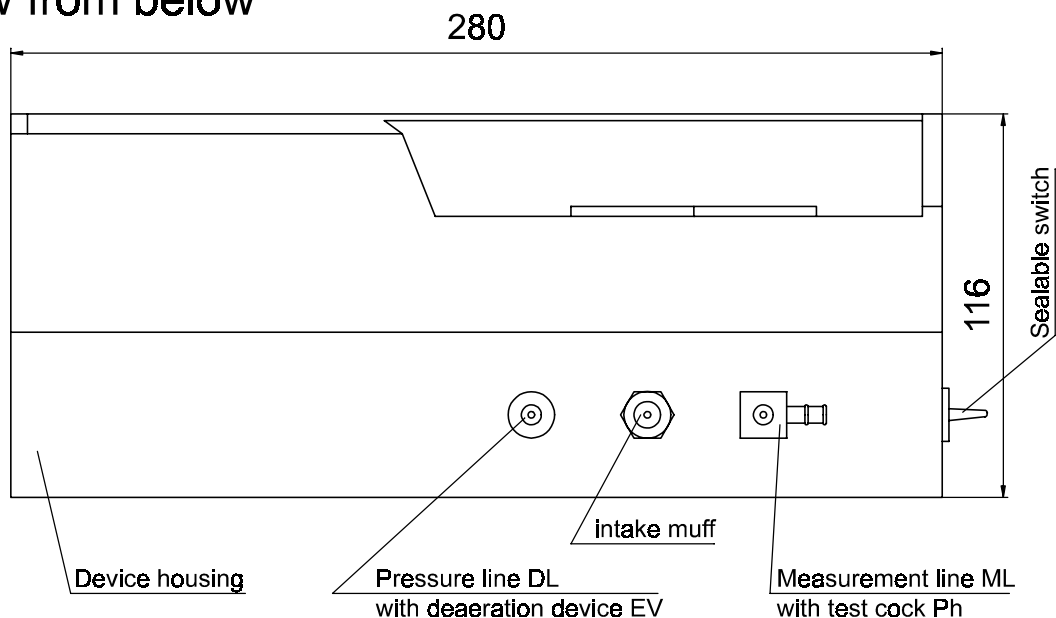


fig. 2: external view

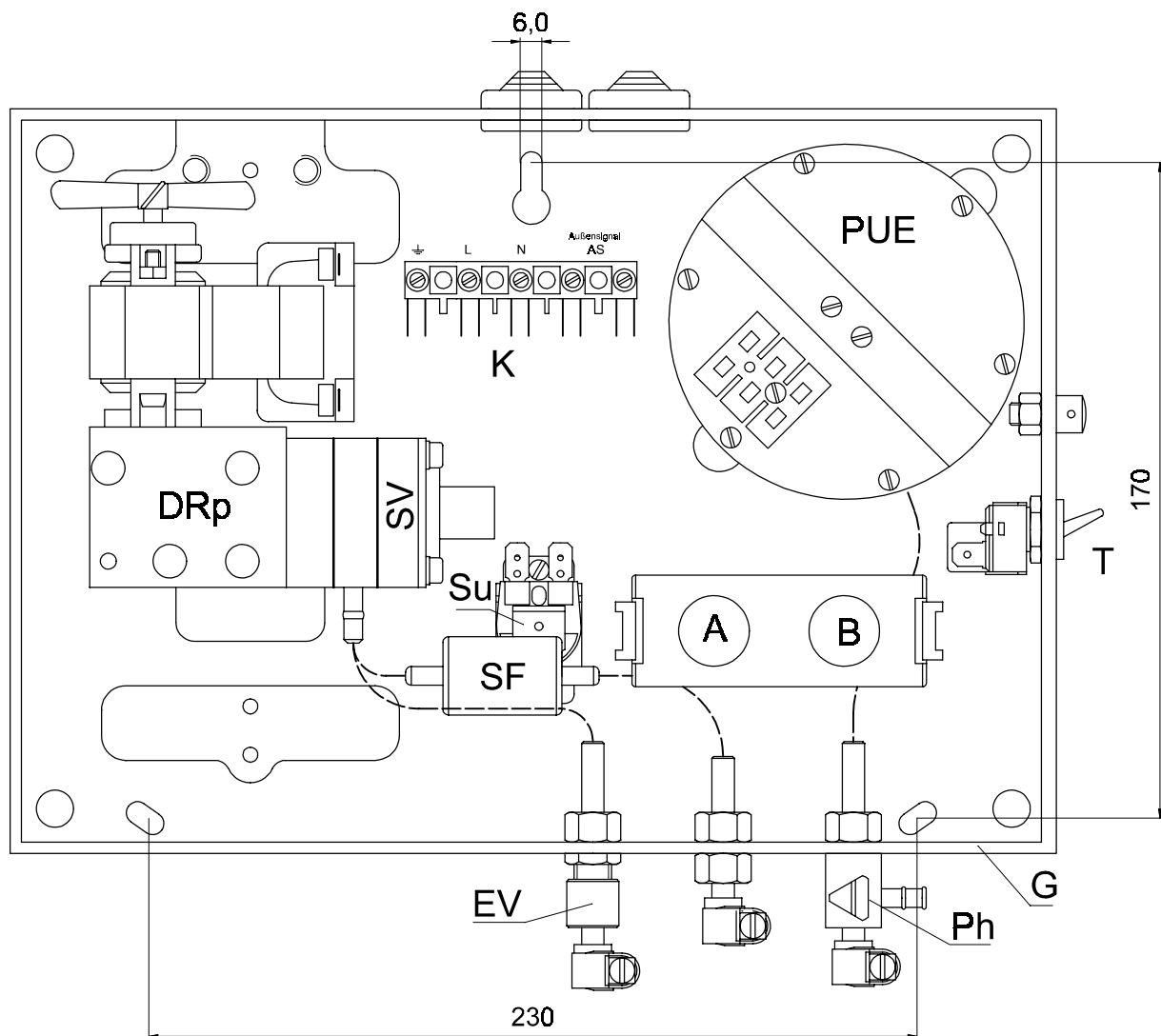
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- A = Alarm signal lamp, red
- B = Operation signal lamp, green
- DRp = Overpressure pump
- EV = Deaerator
- G = Device Housing
- K = Socket-bolt terminal
- Ph = Test cock
- PUE = Overpressure switch
- SF = Dust filter
- SV = Safety valve
- Su = Buzzer
- T = Sealable switch

fig. 3: Inside view showing lay-out of individual components

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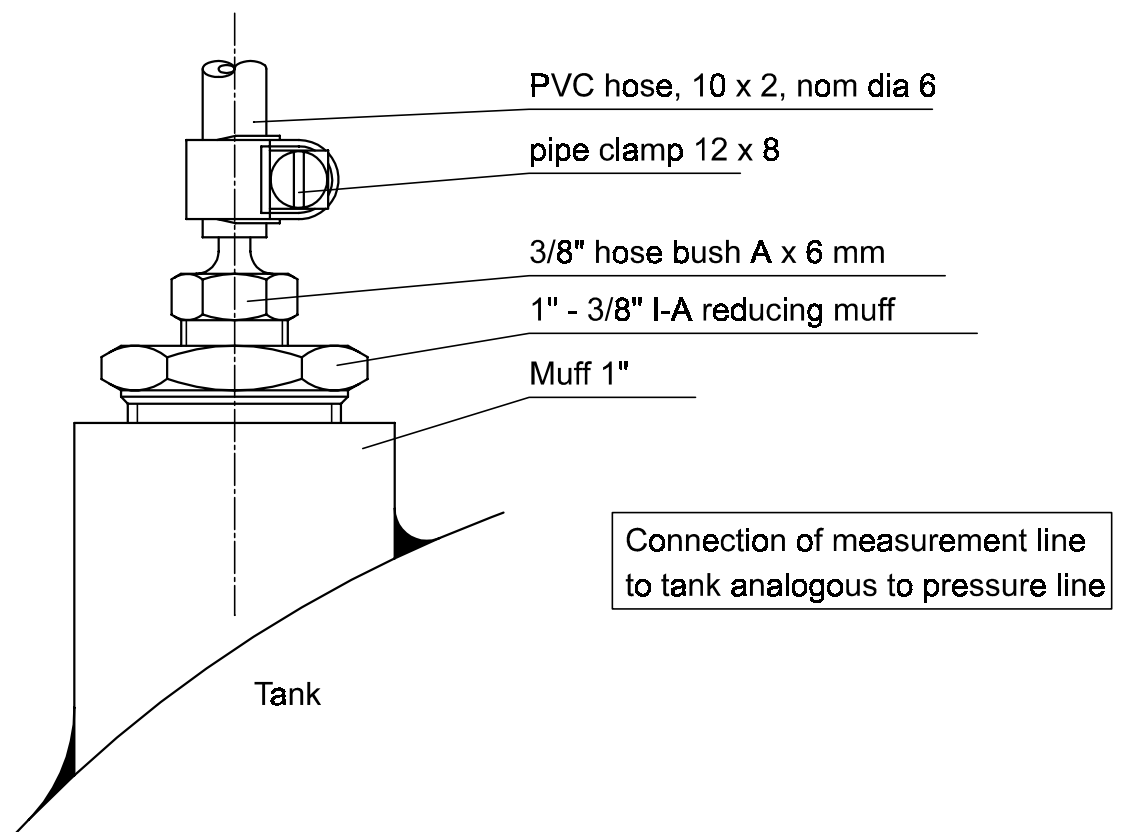
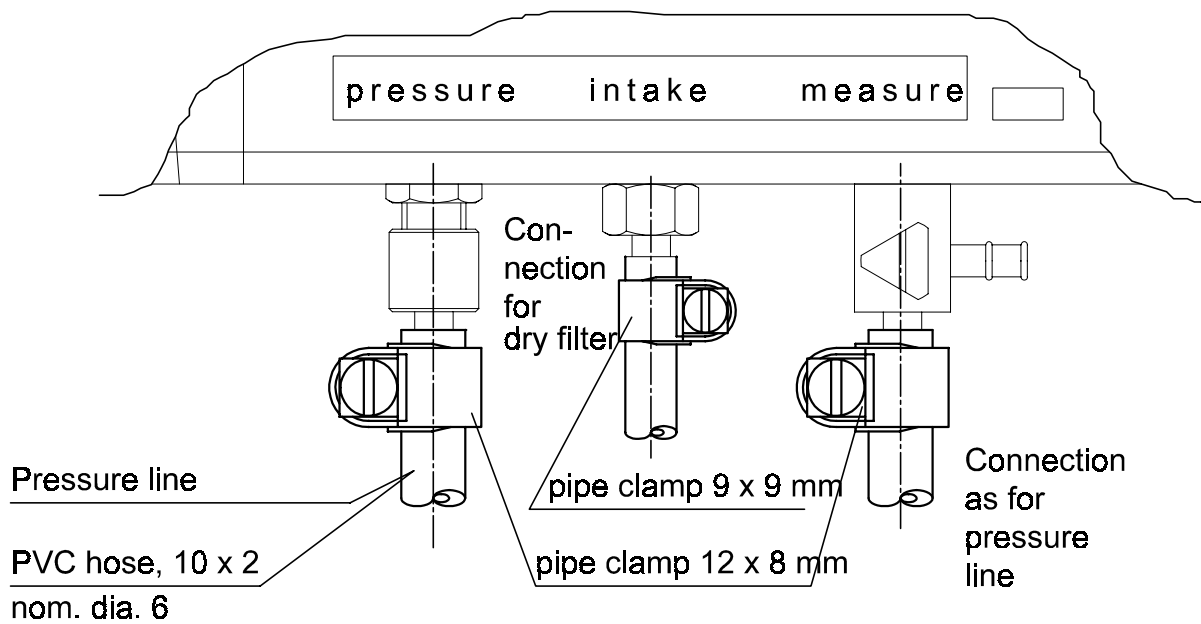


fig. 4: Hose unions

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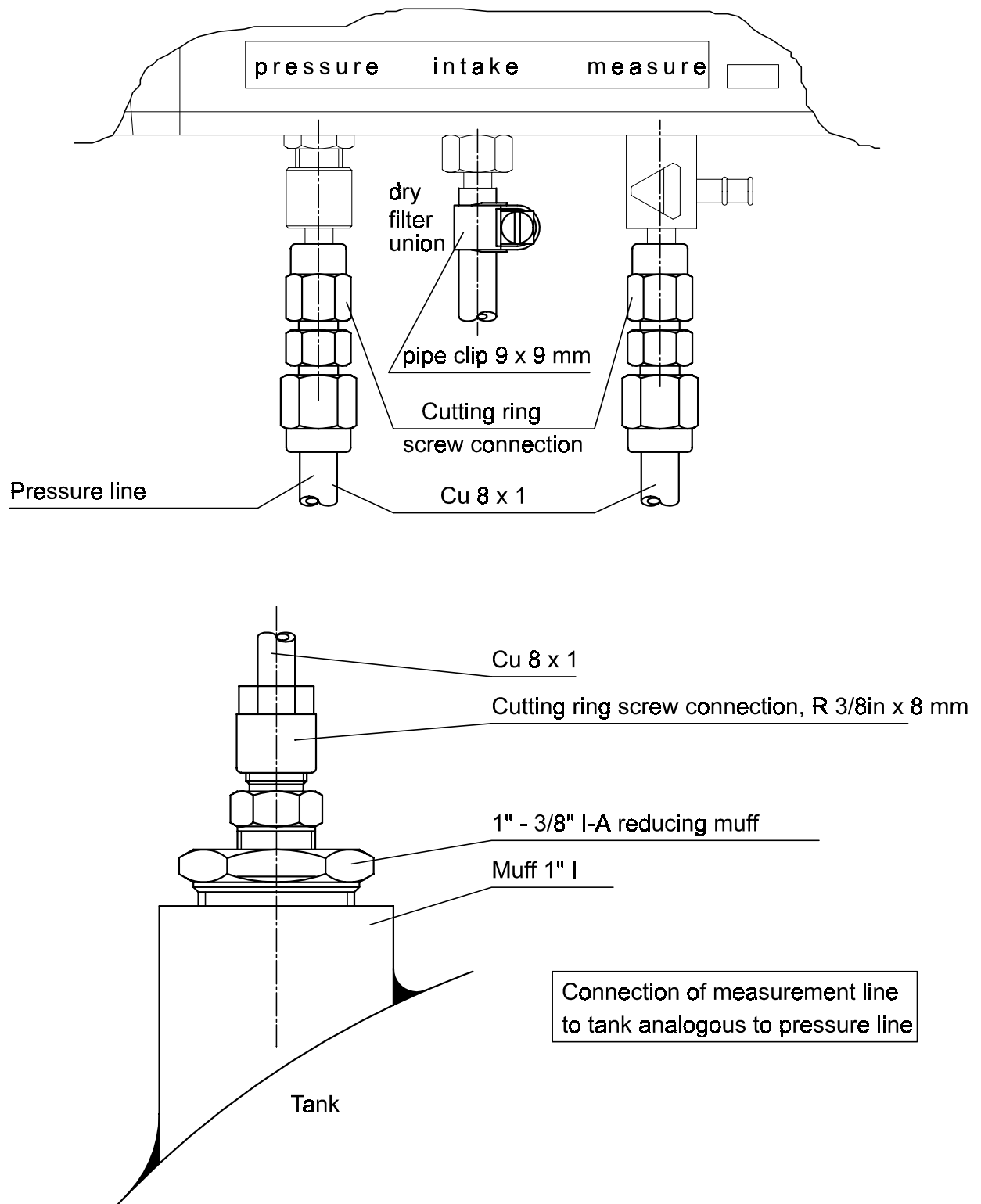


fig. 5: Rigid pipe unions

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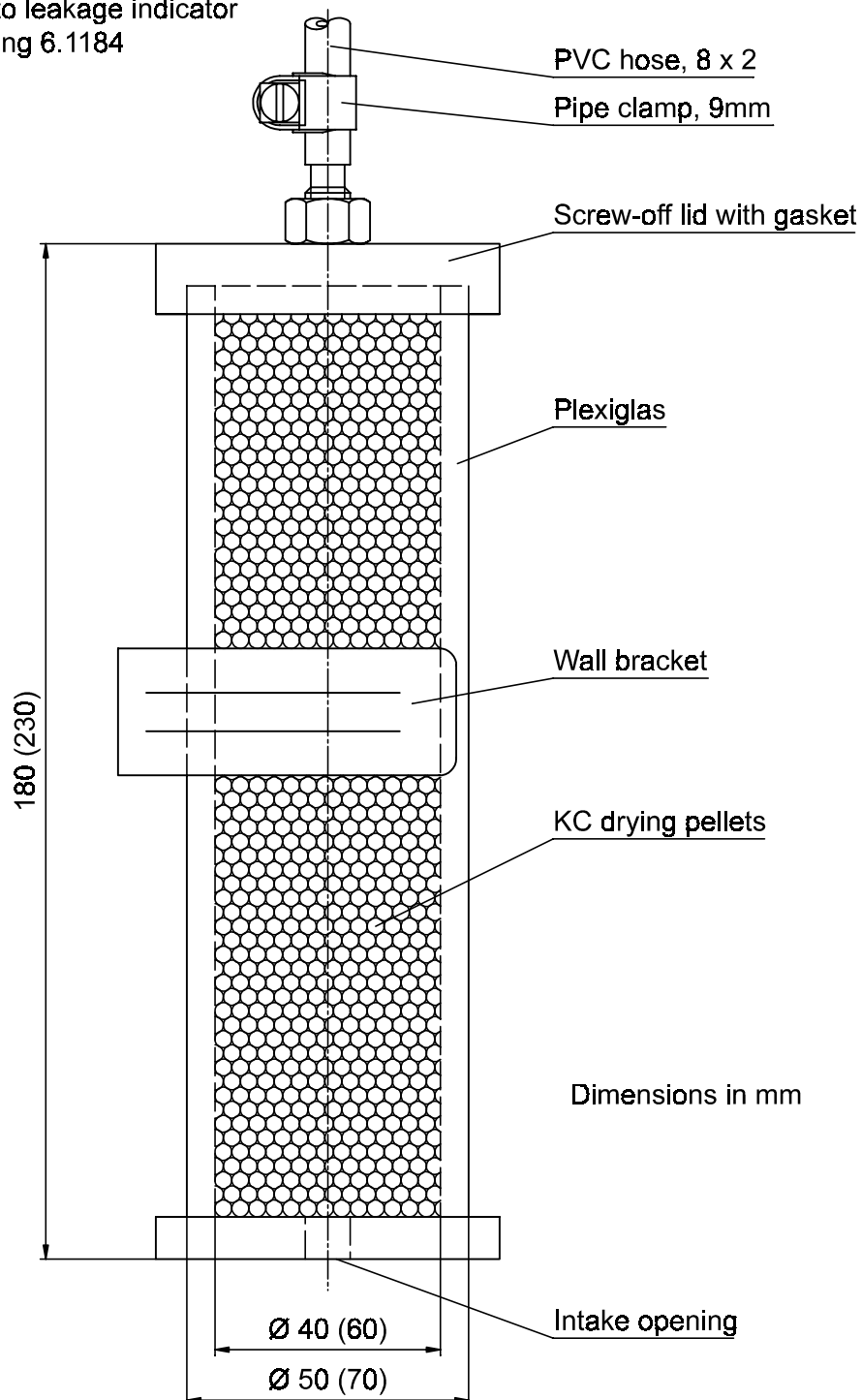
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Connection to leakage indicator
acc. to drawing 6.1184



Values in brackets apply to TF 2

fig. 6: Mounting the dry filter

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Index	Part	Designation/material	Order no.
			DL-5/...
A	Alarm signal lamp, red	Glow lamp 220 V, 0.1 W	DL-5/1
B	Operating signal lamp, green	Glow lamp 220 V, 0.1 W	DL-5/2
T	Sealable switch	Rocker switch no. 1620-0401	DL-5/3
PUE	Overpressure switch	PUE 4000/50-2	DL-5/4
M1	Alarm switch in PUE	Microswitch 10 A	none
M2	Pump switch in PUE	Microswitch 10 A	none
DRp	Overpressure pump	Membrane pump 7005 D Data acc. to characteri- stic	DL-5/5
	Selection	Membrane pump W 112	DL-5/5 A
		Membrane pump W 122	DL-5/5 B
		Membrane pump W 201	DL-5/5 C
SV	Safety valve	UVS	DL-5/6
Su	Buzzer	E 2772 BV01, 75 dB (A)	DL-5/7
G	Device housing	280x200x116, polystyrene, shock-resistant 2 wall thickness, IP43 acc. to DIN 40050	DL-5/8
KI	Socket-bolt terminal	Weco 424 - 4-contact	DL-5/9
SF	Dust filter	SF 2568	DL-5/10
Ph	Test cock (three-way cock)	rectangular, Ms	DL-5/11
EV	Deaerator	Ms	DL-5/12
TF	Dry filter	TF 1 or TF 2, silica gel	DL-5/13
DL	Pressure line	PVC, glass-clear / white or Cu, seamless drawn DIN 1785	none
ML	Measurement line	PVC, red or Cu, seamless drawn DIN 1785	none

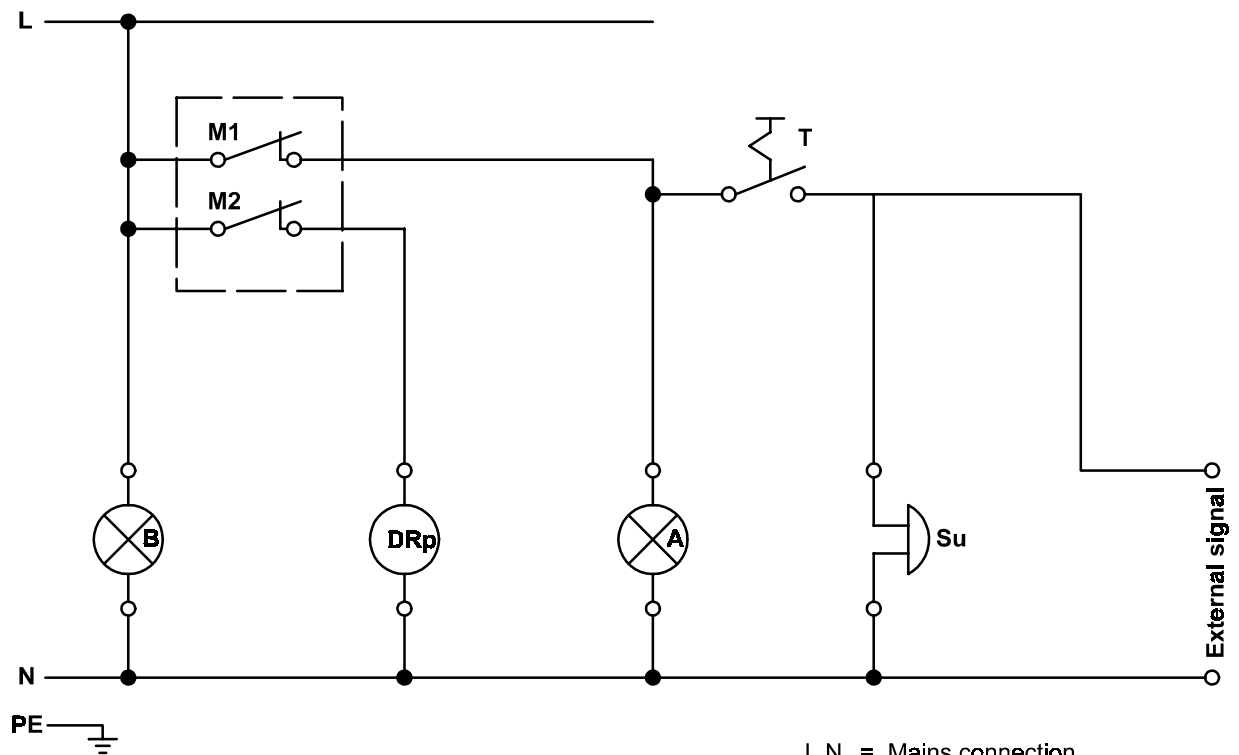
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L,N = Mains connection
 PE = Earthing
 A = Red signal lamp (alarm)
 B = Green signal lamp (operation)
 DRp = overpressure pump
 M1 = Microswitch 1 (alarm)
 M2 = Microswitch 2 (pump)
 Su = Buzzer
 T = Alarm switch

fig. 7: Circuit diagram

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**Addendum to
technical description
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1 Expansion of field of application by increasing switching values

As of device no. 7,000, type DL-5 leakage indicators are designed for an alarm overpressure of > 465 mbar instead of the earlier alarm overpressure value of > 330 mbar.

This constitutes a change in the technical description of 14/05/85, switching values for the overpressure switch and other overpressure values.

- 1.1** The overpressure switch switching values indicated in sections 4 (4) to 4 (8) of the functional description are set as follows:

Overpressure pump „OFF“	545 ⁺¹⁰ / ₋₁₀ mbar
Overpressure pump „ON“	500 ⁺¹⁰ / ₋₁₀ mbar
Alarm „ON“	465 ⁺¹⁰ / ₋₀ mbar
Alarm „OFF“	500 ⁺¹⁰ / ₋₁₀ mbar
Alarm release at latest	465 mbar
Safety valve „OPEN“	570 mbar
Safety valve „CLOSED“	530 mbar (at latest)

- 1.2** In section 5.2 (2) - Dry Filter - 450 mbar overpressure is replaced by 580 mbar.

- 1.3** In the installation instructions, no. 6.1 (3) is reformulated as follows:

The hydrostatic pressure of the storage material on the bottom of the tank must not exceed 435 mbar including internal overpressure.

- 1.4** The overpressure values in section 7 - Commissioning of the leakage indicator - system are replaced by new values as follows:

- No. 7 (2) 400 mbar replaced by 535 mbar
- No. 7 (3) 400 mbar replaced by 535 mbar
- No. 7 (4) 410 mbar replaced by 545 mbar

- 1.5** The values in section 8.3 - Functional test of the leakage indicator system - are replaced by new values as follows:

- Nr. 8.3 (3) 330 mbar replaced by 465 mbar
- Nr. 8.3 (5) 0,45 bar replaced by 570 mbar
- Nr. 8.3 (5) 0,4 bar replaced by 530 mbar

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2 Expansion of field of application - tanks

2.1 Double-walled tanks without leakage indicator fluid in monitoring space as follows:

2.1.1 Double-walled tanks acc. to DIN 6608, DIN 6616 form A, DIN 6619, DIN 6623 and DIN 6624.

2.1.2 Equivalent double-walled tanks made of metallic or non-metallic materials bearing construction authority test symbols with monitoring spaces suitable for connection of leakage indicator DL-5.

2.1.3 Tanks constructed on-site with monitoring spaces bearing test certification by the Office for Testing of Leakage Indicators, TÜV Nord e.V. stating that the monitoring spaces are suitable for use in connection with the leakage indicator DL-5 as part of a leakage indicator system.

3 Conditions for use

All other stipulations of the technical description of 14/05/85 - Annexes 1-22 to the General Construction Supervising Authority Approval - are not affected.

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Leakage indicator type DL - 5

Supplement to Technical Description

- 1 The Construction Engineering Institute in Berlin issued on 31 May 1985 the certification no. PA-VI 622.01 for the leakage indicator type DL - 5 with an alarm pressure overpressure > 330 mbar as a component in a leakage indicator system for double-walled tanks for storage of non-flammable, aquatoxic liquids.
- 2 The overpressure leakage indicator DL - 5 is also to be used to monitor double-walled tanks (tanks) for storage of flammable liquids acc. to VbF.

2.1 Field of application

2.1.1 Double-walled tanks operated without pressure

- acc. to 6608, DIN 6616 form A, DIN 6619, DIN 6623, DIN 6624
- without leakage indicator fluid in the monitoring space

2.1.2 Storage material

Flammable liquids of hazard classes AI, AII, AIII and B acc. to the "Directive on flammable liquids (VbF).

- 2.2 The qualified companies carrying out the installation work must comply with the conditions under 6.1(1) of the 5th annex on test certification PA-VI 622.01 as well as those under TRbF 180/280 no. 1.7.

- 2.3 The following is added to no. 6.5 Installation of connection lines (6th and 7th annexes to test certification) in paragraph (1):

The plastic hoses used must be resistant to the storage material and its vapours.

The following paragraph is added to no. 6.5:

- (4) Reference is made to TRbF 120 no. 4.4, para. 3 regarding breaching for protective conduits in domed pits.

- 2.4 Additions to 6. Installation instructions above beyond the conditions set out in test certification PA-VI 622.01:

6.6 Installation of connection lines laid above ground for storage material of hazard class AI, AII and B.

- (1) For connection lines laid above ground, solid, rigid pipe must always be used with minimum dimensions of 8 x 1.
- (2) The connection lines (pressure and measurement line) must be laid free, i.e. without protective conduit.
- (3) The connection line connections to the muffs of the leakage indicator and the monitoring space must be installed as per drawing 7.1184.
- (4) Reference is made to section, para. 1 regarding labelling of the connection lines.

- 3 All other descriptions, drawings and specifications of annexes 1-22 to test certification PA-VI 622.01 are not affected.

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4 Installation instruction	AI-2
4.1 personal equipment	AI-2
5 fault search and repair	AI-3
6 Disassembly	AI-3
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1. Field of application / Purpose

In this appendix further statements are made, which are to be observed when monitoring tanks for the storage of inflammable liquids (flash point < 55°C).

This appendix has become necessary because of appendix II to directive 94/9/EWG.

2. Intended use

Summary of the intended use is described as follows:

- underground double-walled tank, stored product side wall made of steel
- pressure less tank resp. liquid-and excess pressure may not exceed max. pressure on tank bottom.
- tank grounding according EN 1127
- leak detection system is tight according to the documentation
- leak detector is installed outside Ex-area
- Protecting tube for the pneumatic hose has to be closed gas-tight
- leak detector (electrical) connected disconnectible

3. Extension to field of application

The field of application stated in the documentation remains, however with the following restriction for the stored liquid.

steam-air mixtures, which can develop by

- stored liquids
- stored liquids in connection with air / air moisture or condensate
- stored liquids in connection with parts (materials), which are in contact with the liquids

have to be able to be classified in explosion group II B and the temperature class T3.

4. Installation instructions

Supplementary to the installation instruction are the points, listed in this chapter to be observed.

- (1) The valid Ex-regulations are to be observed.
- (2) The protecting tube for the pressure- and measuring line has to be closed at least gas tight at the entrance of the manhole chamber. Electrostatic chargings (e.g. when entering resp. leading through of lines) has to be avoided.
- (3) For establishment of a power failure (on leak detector resp. of its power supply), we recommend the assignment of the potential free contacts for transmitting the alarm or another securing, that the operation lamp (leak detection unit) extinguishes.

4.1. Personal equipment

The mentioned parts refer only to the safety when working on units, where Ex-dangers can be assumed.

When working in potentially explosive areas, use the following equipment:

- suitable cloth (danger from electrostatic charging)
- suitable tools (according EN 1127)
- suitable, calibrated gas-warning device for the existing steam-air mixtures (works should only be carried out with a concentration of 50% below the explosion limit)

5. Commissioning and repair

- (1) The statements made in the previous chapter are to be observed here as well.
- (2) In case a leak detector is started on an already filled tanks, special protection provisions are to be observed (e.g. testing of the gas freedom in the leak detector). Further provisions can depend on and are therefore estimated by the personnel.
- (3) Repairing the leak detector , especially the exchange of parts should only be carried out by adequate educated personnel or in co-ordination with SGB.

6. Disassembly

When disassembling, the following points are to be observed:

- Before and during working, testing of gas freedom (see chapter 4 above).
- Openings, through which a procrastination of Ex-atmosphere can occur, have to be closed gas tight.
- If possible not to carry out the disassembly with non sparking tools (saw, grinder...). If this should be unavoidable, EN 1127 has to be observed.
- Avoidance of electrostatic charging (e.g. by rubbing)
- Suitable disposal of contaminating parts.

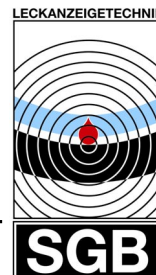
7. Designation

The chapter "designation" of the documentation is extended by the following point:

- pressure- and measuring line can also be connected to areas, for which units of group II (G), category 3 are required.

Overpressure leak detector

Overpressure valve



Statement about overpressure valves

The pressure values given in the documentation for “overpressure valve ON” are the values for the triggering pressure (=initial opening) of the overpressure valve.

If a functional test is carried out according to the chapter “Functional test”, the opening pressure (blowing-off pressure) of the overpressure valve is measured using the test described. The opening pressure is up to 30 mbar higher than the triggering pressure. The volume flow blown off at opening pressure corresponds to the maximum volume flow feed from the pump or from the pressure tank.

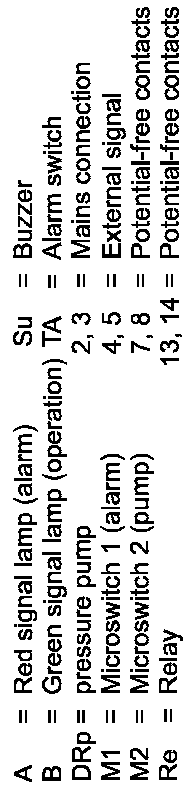
When a functional test is carried out it is also considered to have been passed if the measured value for overpressure valve ON is approx. 30 mbar higher than is given in the table. The opening pressure guarantees the prevention of pressure exceeding that of the testing pressure of the monitoring space caused perhaps by the pressure switch failing to control the pump or by changes in temperature.


The above statements are valid for the following leak detectors:

- ELC
- DL-4000
- DL-5
- DL-6
- DL-8

Siegen, 06.12.00

J. Berg
-Managing director-



						Werkstoff	Maßstab
						Bezeichnung	
				Bearb.	12.01.98	Borheier	Circuit diagram with relay
				Gepr.			
						Zeichnungsnummer	Blatt
1	Klemmenbezeichnung	26.02.98	Borheier			SL - 851 500	
Nr.	Änderung	Datum	Name				Bl.

Technical data

1. External electrical data

Electrical supply (without external signal)
Switch contact load, terminal strip, terminals AS
Switch contact load, potential free contacts

max:
min:

230~ V - 50 Hz - 50 W
230~ V - 50 Hz - 50 VA
230~ V - 50 Hz - 8 A
5 V / 5 mA
max. 10 A
2

2. Pneumatic data (leak detector trip values)

2.1 Serial-no. > 7.000

ALARM		PUMP		Overpressure valve	
ON	OFF	ON	OFF	OPEN	CLOSED
465^{+10}_{-0}	500 ± 10	500 ± 10	545 ± 10	570	530

2.2 Serial-no. < 7.000

ALARM		PUMP		Overpressure valve	
ON	OFF	ON	OFF	OPEN	CLOSED
330^{+10}_{-0}	370 ± 10	360 ± 10	410 ± 10	450	400

3. Pneumatic data (requirements concerning the test measuring instrument)

Nominal size
Accuracy class
Scale end value

min. 100
min. 1,6
600 mbar

M.:

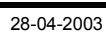
Date: 24. Juli 2003

Seite: TD-1

Technical data

DL – 5

SGB Sicherungsgeräte-
bau
GmbH
57076 Siegen



Work Sheet: AB-820 500

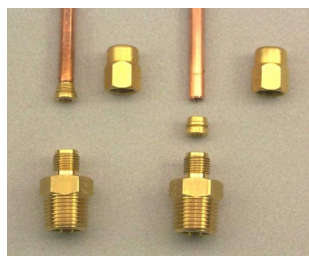
Pneumatic connections

1 Flare type fitting for flare type pipes

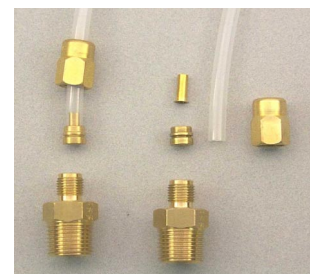
1. Lubricate the O-rings
2. Place the intermediate ring loosely in the threaded connection piece
3. Push the union nut and the thrust collar over the pipe
4. Tighten the union nut manually
5. Tighten the union nut until clearly increased force is needed
6. Finished assembly: turn by a further $\frac{1}{4}$ of a revolution



2 Clamping ring threaded fitting for plastic and metal pipes



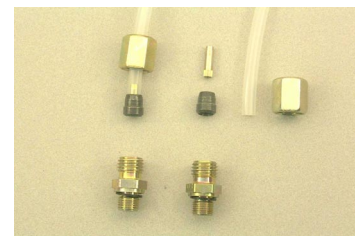
1. Insert the support sleeve into the end of the pipe
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the thread until strong resistance can be clearly felt
4. Lightly loosen the nut
5. Tighten the nut until resistance can be felt (nut must exactly match the thread of the basic body)



3 Olive threaded fitting for plastic and metal pipes

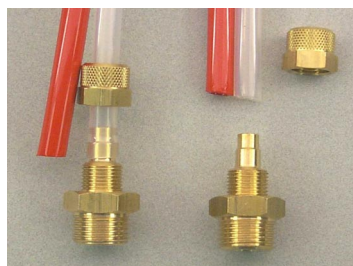


1. Insert the reinforcing sleeve into the end of the pipe
2. Knock in the reinforcing sleeve
3. Push the union nut and the olive over the end of the pipe
4. Screw the union nut by hand until you feel a stop
5. Press the pipe against the stop in the inner cone
6. Tighten the union nut by approx. 1.5 revolutions (pipe must not turn)
7. Loosen the union nut: check whether the pipe visibly projects from under the cutting ring (it doesn't matter if the clamping ring can be turned)



8. Retighten the union nut using normal force

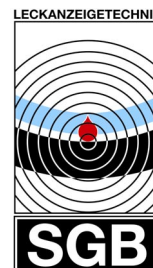
4 Quick-action fitting for PA- and PUR-tubes



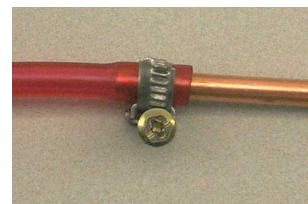
1. Make a right-angled cut in the PA pipe
2. Loosen the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to where the thread begins
4. Tighten the union nut by hand
5. Further tighten the union nut using a wrench until clearly increased force is needed (approx. 1 to 2 revolutions)

NOT suitable for PE-pipes

Pneumatic connections



5 Tube connections (socket 4 and 6 mm for EXCESS PRESSURE)



1. Push wire or screw clip over the tube
2. Push the tube onto the Cu pipe or the tube socket (if necessary heat or dampen PVC tube), tube must fit tightly all the way round
3. Wire clip: clamp tightly using pliers and push onto the joint
Screw clip: push the clip over the joint and tighten it using a screwdriver, care must be taken that the clip is a smooth tight fit.

6 Tube connections (socket 4 and 6 mm for VACUUM)

For vacuum applications where there is no excess pressure on the connection lines even in the case of a leakage proceed as in item 5, but without clips.

For vacuum applications where excess pressure could arise in the case of a leakage, proceed as in Item 5.

GERMAN CONSTRUCTION ENGINEERING INSTITUTE
A public institution

10785 Berlin, 15 May 1995
File: II 51-1.65.23-53/94

General approval by the construction supervising authority

The approved device:

A leakage indicator as part of a leakage indicator aggregate functioning according to the overpressure system for double-walled tanks intended for storage of non-flammable aquatoxic liquids

is hereby granted General Construction Supervising Authority Approval.¹

Applicant:

Sicherungsgerätebau (safety and security equipment engineering)
GmbH
Hofstraße 10
57076 Siegen, Germany

Valid until:

31 May 2005

Approval no.:

Z-65.23-1

This certificate of approval comprises five pages plus an annex of 23 sheets.

STAMP: German Construction
Engineering Institute - 16)

¹ This general building authority approval certificate replaces certification of approval no. PA-VI 622.01 of 31 May 1990.

Leakage indicators for flammable liquid storage systems require industrial type approval in accordance with work safety legislation as defined under § 12 of the Flammable Fluids Administrative Order (VbF).

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II. SPECIAL SPECIFICATIONS

1 Approved device and field of application

- (1) The object of this General Construction Supervising Authority Approval is an overpressure leakage indicator. These leakage indicators may be used on double-walled tanks
- acc. to DIN 6608, DIN 6616, DIN 6619, DIN 6623 and DIN 6624,
 - with General Construction Supervising Authority Approval and
 - in versions produced on-site with test certification from the Office for Testing of Leakage Indicators, TÜV Nord e.V. for the monitoring space stating that the monitoring spaces in connection with the leakage indicator are suitable for use as elements of a leakage indicator device in systems designed for storage of non-flammable aquatotoxic liquids. Leaks in the walls of the monitoring space are indicated visually and acoustically in reaction to a drop in pressure (see Annex 1 for a schematic drawing of the leakage indicator).
- (2) The overpressure leakage indicator has an alarm overpressure setting of 465 mbar.

2 Specifications applying to the construction product

2.1 Components

The approved device comprises an overpressure leakage indicator, type DL 5

2.2 Manufacture and labelling

2.2.1 Manufacture

The leakage indicators may only be manufactured in the factories of the applicant. They must conform to the technical description of 14 May 1985, the first addendum of 14 July 1988 and the second addendum of 13 February 1990 as well as the stipulations and conditions defined therein (see Annex 3 for the test documentation of this General Construction Supervising Authority Approval) as to type, dimensions and materials used.

2.2.2 Labelling

The packaging of the leakage indicator or the shipping invoice must be labelled by the manufacturer with the conformity symbol in accordance with State conformity legislation. Labelling is only permissible when the preconditions acc. to section 2.3 have been met.

The parts of the leakage indicator must bear the following information:

Type designation

Approval number.

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2.3 Proof of conformity

2.3.1 General

Confirmation of the conformity of the leakage indicator with the specifications of this General Construction Supervising Authority Approval must be issued for each factory site in the form of a declaration of conformity by the manufacturer based on initial testing by the manufacturer and factory production control.

2.3.2 Factory production control

Factory production control facilities are to be set up and used at the manufacturing factory in accordance with the specifications of the German Construction Engineering Institute regulating factory production control of construction products².

Within the framework of factory production control, a routine check test of the leakage indicator units is to be carried out.

By means of the routine check test, the manufacturer must ensure that the materials, dimensions, fits and type conform to the tested type and that the leakage indicators function reliably.

The results of the factory production control must be recorded, evaluated and kept on file for at least 5 years. They must be provided to the German Construction Engineering Institute on demand.

2.3.3 Initial testing of the construction products by a recognized testing office

Initial testing comprises the functional tests listed in the construction and testing principles for leakage indicators and tanks. If proof is obtained of the principles defined for General Construction Supervising Authority Approval using samples from current production, these tests replace the initial testing.

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² The specifications for factory production controls of construction products are published in the information gazette of the German Construction Engineering Institute and are available from that body.

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3 Specifications on design of leakage indicators

- (1) When selecting leakage indicators, it is important for the indicators and the monitoring space to be sufficiently resistant to the non-flammable aquatoxic liquids. These liquids include, for leakage indicators without certification for the selected materials, all non-flammable aquatoxic storage liquids included in the positive list (Table 2) of DIN Standard 6601, October 1991 as usable as well as other non-flammable aquatoxic liquids comparable to these regarding their corrosive action.
- (2) The monitoring spaces must be suitable for connection of a leakage indicator for overpressure systems with an alarm overpressure of 465 mbar and withstand a test overpressure level of at least 0.6 bar.
- (3) The monitoring spaces must not contain leakage indicator fluid.
- (4) The pressure bearing on the storage liquids including permissible operating overpressure must not exceed 435 mbar at the bottom of the tank.
- (5) In the case of tanks operated under internal overpressure, the connection lines from the monitoring space to the leakage indicator must be made of strong pipe that is sufficiently resistant to the storage liquid.

4 Execution

Leakage indicators acc. to 1.1 must be installed by the manufacturer or a specialized company in accordance with § 19 1 of the German Water Act (WHG), section 6 of the technical description and its addenda and as described in section 2.2.1 and commissioned in accordance with section 7 of this annex (see annex 2 to this General Construction Supervising Authority Approval for technical description).

5 Rules for use, operating expenditures, maintenance and tests at set intervals

Leak indicator systems with leak indicators must be tested and maintained in accordance with section 8 of the technical description and its addenda as per 2.2.1 (see annex 2 to this General Construction Supervising Authority Approval for technical description).

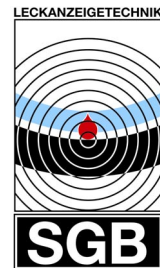
By order
Dr.-Ing. Kanning

Certified (signature)

STAMP: German Construction
Engineering Institute - 16)

M.:	pressure leak detector DL - 5	SGB Sicherungsgeräte- bau GmbH 57076 Siegen
Datum: 24. Juli 2003		
Seite: 4		

DECLARATION OF CONFORMITY



This declaration applies for

PRESSURE LEAK DETECTORS DL-4000, DL-5, ELC

from the Company **Sicherungsgerätebau GmbH**
Hofstraße 10
D- 57076 Siegen

With this declaration, SGB confirms that the leak detector specified above fulfills the protection requirements established in EC Guideline 89/336/EEC for alignment of the legal regulations of the member states regarding electromagnetic compatibility and in the German law on electromagnetic compatibility (EMC) dated 9 November 1992 (§ 4 Para. 1).

This declaration applies for appliances produced according to the documentation (technical description, drawing(s) – which are constituents of this declaration.

The following declarations were used for evaluation of the products in terms of its electromagnetic compatibility:

- EN 55 014-1:1998+A1:1999
- EN 55 014-2: 1998, Cat. I
- EN 61 000-3-3: 1995
- EN 61 000-3-2: 1997
+ A1:1998 + A2:1998

With this declaration, SGB confirms that the leak detector specified above fulfills the protection requirements established in EC Guideline 73/23/EEC for alignment of the legal regulations of the member states regarding electrical operating equipment for use within certain voltage limits and defined in the 1st Code on the Equipment Protection Law dated 11 June 1979.

The following declarations were used for evaluation of the products in terms of use within certain voltage limits:

- EN 60 335-1:1988
- EN 61 010-1:1993 (IEC 1010-1:1990 + A1:1992, modified)

With this declaration, SGB confirms that the leak detector specified above fulfills the protection requirements established in EC Guideline 94/9 EEC for alignment of the legal regulations of the member states for equipment and protective systems for intended use in explosion hazard areas or in the 2nd Code on the Equipment Protection Law dated 12 December 1996.

The leak detector may be connected with its pneumatic components to monitoring chambers of tanks requiring equipment regarding category 3.

This declaration applies for appliances produced according to the documentation in accordance with internal QM documentation (technical description with drawings) – which are constituents of this declaration.

Evaluation of the product was accomplished. The following documents were used for this purpose:

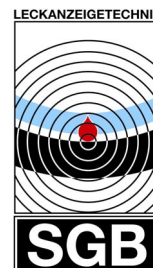
- EN 1127-1:1997
- EN 13463-1:2001
- EN 13160-1:2003

The ignition hazard analysis / risk evaluation indicated no further hazards.

Siegen, 4 July 2003

Martin Hücking, Development, Explosion-protection representative

Warranty



Dear customer,

You have purchased a high-quality leak detector from our company.

All of our leak detectors undergo a 100% quality control examination.

The type plate with the serial number is only affixed after all test criteria have been complied with.

The **warranty period** for our leak detectors is **24 months**, beginning on the date of installation on site.

The maximum warranty period is 27 months from our date of sale.

Our warranty will be effective only if the customer submits to us the functional report or test report on initial putting into service, prepared by a recognised company specialised in water and water protection systems, including the serial number of the leak detector.

Our warranty shall not apply in the event of faulty or improper installation or improper operation, or if modifications or repairs are carried out without the manufacturer's consent.

In case of malfunction, please contact your local specialist company:



Stamp of the specialist company

Yours sincerely



Sicherungsgerätebau GmbH
Hofstraße 10 - D - 57076 Siegen

☎ +49 / 271 / 48964 - 0

Fax: +49 / 271 / 48964 - 6