

**Overpressure leak detector**

**DL .. ELC**

Z – 65.23 - 409

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Documentation DL .. ELC

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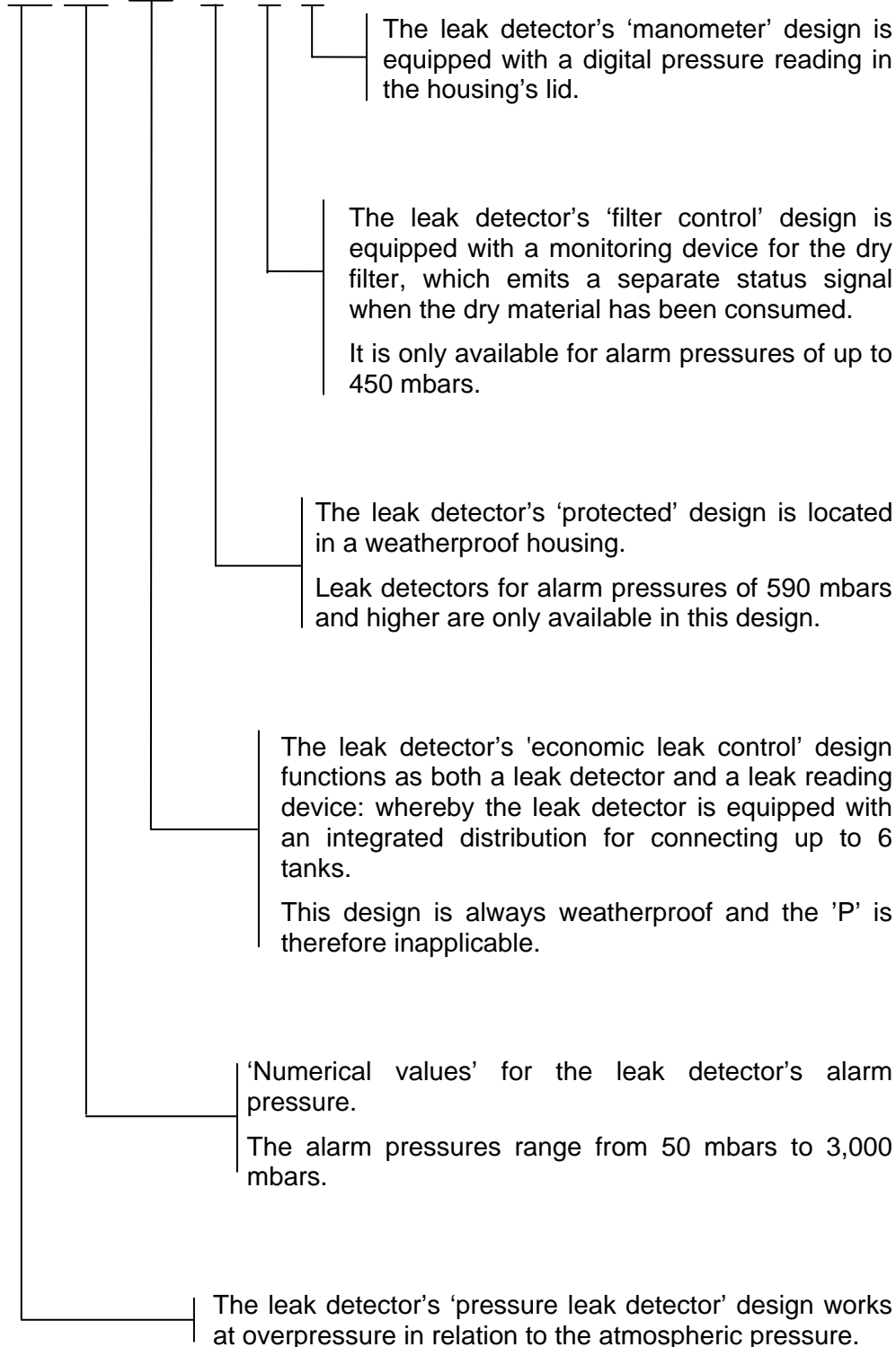
**SGB GMBH**  
Hofstraße 10  
57076 Siegen  
GERMANY



## Overview of the various designs

The different designs of overpressure leak detectors in the DL series are described more precisely by means of the attached letters.

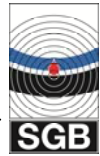
### **DL .... ELC (P) FC M**





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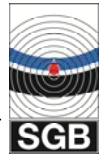
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**DIAGRAMS**

Positions of the three-way cocks	P – 063 000
Installation example – DL .. ELC	M – 063 000
Current flow diagram – leak detection unit	SL – 853 650
Block diagram / current flow diagram – leak detector	SL – 853 651

**APPENDIX**

B Switching and pressure values	B-1
TD Technical data	TD-1
FC Dry filter monitoring (FC9)	FC-1
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## 1 Subject

Overpressure leak detector comprising a leak indication unit and a leak detector. Up to 8 underground double walled tanks can be connected to the leak detector via the integrated distributor.

Type: DL .. ELC (FC) The dots are used in place of the alarm pressure.

## 2 Field of application

### 2.1 Requirements for interstitial spaces

- Verification of the pressure resistance of the interstitial space (see Appendix B, column " $p_{TEST}$ " for the minimum test pressure for the interstitial space)
- Verification of suitability of the interstitial space (for Germany: building authority certificate of suitability).
- Tightness of the interstitial space (see section 6.4.6)
- The number of interstitial spaces of **underground tanks** which is to be monitored depends on the overall volume of the interstitial space. According to EN 13160, this must not exceed  $8\text{m}^3$ . In order to make it possible to verify the tightness of the interstitial space, we recommend that a value of  $4\text{m}^3$  is not exceeded.

### 2.2 Tanks / interstitial spaces (see also section 2.4)

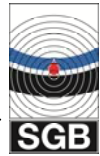
- Underground double walled steel or plastic tanks, with no leak detection liquid in the interstitial space, manufactured either in the plant or on-site, with an interstitial space suitable for connection of a DL ..ELC in accordance with Appendix B.
- Underground single walled steel or plastic tanks with pressure-resistant leak detection lining or leak detection jacketing, with an interstitial space which is suitable for connection of a DL ..ELC in accordance with Appendix B.
- Underground double walled collecting tanks or surface sealing devices, with an interstitial space which is suitable for connection of a DL ..ELC in accordance with Appendix B.

### 2.3 Products being stored

Liquids which are hazardous to water. The following points must be satisfied:

- The leak detection medium which is used must not react with the products being stored.
- Any arising vapour-air mixtures which are created due to
  - the stored liquid
  - the stored liquid in conjunction with air / air moisture or condensate
  - the stored liquid in conjunction with the components (materials) with which the liquid comes into contact

must be classifiable as gas group IIA or II B and temperature code T1 to T3.



## 2.4 Exclusions

The leak detector DL ..ELC MUST NOT BE USED if, due to the nature of the product being stored and the material structure of the inner tank walls, permeation takes place into the interstitial space (e.g. tanks with plastic walls on the storage medium side) which could lead to the formation of an potentially explosive atmosphere in the interstitial space during normal operating condition.

## 3 Description of functions and operation

The overpressure leak detector DL .. ELC monitors both walls of a tank for leaks. The monitoring pressure is high enough for leaks above or below the level of the liquid (i.e. of the material being stored and of the groundwater) to be indicated through a drop in pressure.

In order to build up the required pressure, outside air is sucked in by the DL .. ELC by means of the integrated pump and fed through a dry filter to the interstitial spaces.

The dry filter dries the outside air to a relative humidity of approximately 10%. The drying process is necessary in order to eliminate any accumulation of moisture or condensation in the interstitial space. **Used dry filter cartridges should be regenerated or replaced.**

### 3.1 Switching values and pressure values

A list of switching values is shown in Appendix B.

### 3.2 Normal operation

The overpressure leak detector is connected to the interstitial spaces via the pressure and measuring lines. The overpressure generated by the pump is measured via a pressure sensor and regulated.

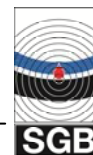
When the operating pressure (Pump OFF) is reached the pump is switched off. Due to leaks in the leak detection system which are unavoidable, the pressure will start to slowly fall again. When the switching pressure "Pump ON" is reached the pressure generating system is switched on and the system builds operating pressure back up again.

During normal operation, the leak detector fluctuates between these two pressure values, with short run-up times and longer standstill times which depend on the tightness and temperature fluctuations of the system.

### 3.3 Air or fluid leaks

If a leak occurs above or below the level of the liquid or the groundwater, leak detection medium will escape from the interstitial space. The pressure will drop until the pump is switched on in order to restore operating pressure. If the volumetric flow escaping through the leak exceeds the feed delivery rate then the pressure in the system will drop even with the pump running.

Any increase in the size of the leak leads to a further pressure loss until eventually the alarm pressure is reached. Visual and audible alarm signals are then triggered.



### 3.4 Air drying / dry filter

The air supplied to the interstitial space is passed through a dry filter in the intake line. The dry filter dries the air to a relative humidity of around 10% in order to prevent corrosion and accumulation of condensation<sup>1</sup> in the interstitial space.

The dry filter is designed to last for a year provided the equipment is used for its intended use and no additional temperature fluctuations occur.

Initially the dry filter is an orange colour, but this fades to a green, respectively colourless state when the filter has been used up. Once the filter cartridge has been used up it should be immediately replaced or regenerated.

The variant DL .. ELC FC is also equipped with an additional monitoring device which ensures that only dried air is fed into the interstitial space.

If the permitted residual moisture level is exceeded, then the leak detector outputs a visual, audible and potential-free alarm message. (Refer to Appendix FC for further information).

### 3.5 Overpressure valve

The overpressure valve installed in the pressure line protects the interstitial space against unacceptably high overpressures (exceeding of the test pressure).

Unacceptably high overpressures could for example arise due to:

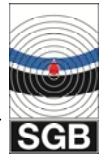
- temperature increases as a result of environmental influences (e.g. direct sunshine)
- temperature increases as a result of a hot medium being transported through the pipe (consult the manufacturer if necessary).

### 3.6 Description of the display and control elements

3.6.1 *Display element states on the leak detector (the cover on the housing of the leak detector needs to be opened in order to see and gain access to the display and control elements)*

Signal lamp	Operation	Alarm / Message	Alarm, audible alarm signal acknowledged	Alarm + TF message	Device fault
OPERATION: green	ON	ON	ON	ON	ON
ALARM: red	OFF	ON	FLASHING	ON	ON
Message Dry Filter: red	OFF	Alternating flashing of the two red LEDs	FLASHING	OFF (and back ON once the tank alarm has been rectified)	ON
Audible signal	OFF	ON	OFF	ON	ON (cannot be acknowledged)

<sup>1</sup> Accumulated condensation in the interstitial space can lead to prohibited pressure increases.



3.6.2 Display element states on the leak indication unit

Signal lamp	Operation	Alarm	Alarm, audible alarm signal acknowledged	Device fault
OPERATION: green	ON	ON	ON	ON
ALARM <sub>Tank-LA</sub> : red	OFF	ON	ON	ON
ALARM <sub>Pipe-LA</sub> : red	OFF	ON	ON	OFF
Message <sub>Dry Filter</sub> : red	OFF	ON	ON	OFF
Audible signal	OFF	ON	OFF	ON (can be acknowledged)

3.6.3 Control functions via the buttons on the leak detector (WITH NO effect on the leak indication unit)

Switching off the audible alarm signal:

Briefly press the "Audible alarm" button once – the audible alarm signal is then switched off and the LED flashes.

Pressing the button again will cause the audible signal to be switched on.  
(This function is not available in normal operation or during malfunctions.)

Testing the visual and audible alarm signal

Press the "Audible alarm" button and keep it pressed (approx. 10 seconds) – the alarm signals are triggered until the button is released again.

This test is only possible if the pressure in the system has exceeded the "Alarm OFF" pressure level.

Acknowledgement of the message "Dry filter used up"

The dry material should be replaced when this message appears.

If no replacement material is available, there are 2 options for acknowledging or switching off the audible signal:

- a) The audible signal can be switched off by briefly pressing the button, although the alternating flashing of the LEDs continues, as does the alarm at the leak indication unit.
- b) To fully delete the message, press the button for longer (approx. 5 s) until the LED "Message<sub>Dry filter</sub>" message start to flash at high speed. If the pump starts up again and the measured humidity of the air is too high then the visual and audible alarm signals are triggered again.

Zero point adjustment:

Three-way cock 21 in position II (the alarm is triggered, the pump runs).

Press "Audible alarm" button and keep it pressed until the "Alarm" light starts to flash quickly (approx. 5 seconds), then release the button and press and release it again.

The zero point adjustment is confirmed by 3 visual and audible alarm signals.

Three-way cock 21 in position I.

The zero point adjustment cannot be repeated until operating pressure has been built back up again.

Testing the tightness of the monitored system

Press the "Audible alarm signal" button and keep it pressed until the "Alarm" signal lamp flashes at high speed, then release the button. A value for the tightness is indicated through illumination of the "Alarm" signal lamp. (see section 6.4.5)

For this test the leak detector must have performed at least 1 automatic feed interval in normal operation (i.e. without being filled by an assembly pump) in order to obtain a valid result.





### 3.6.4 Control functions via the buttons on the leak indication unit (WITH NO effect on the leak detector)

#### Switching off the audible alarm signal:

Destroy the seal and flip the “Audible alarm” switch to silence the audible signal. Flipping this switch again will cause the audible signal to sound again if the pressure in the system remains below the alarm pressure.

## **4 Installation and assembly instructions**

### **4.1 General notes**

- (1) Installation and assembly must only be performed by qualified companies<sup>2</sup>.
- (2) The relevant accident prevention regulations must be complied with.
- (3) Explosion protection requirements must be satisfied (where necessary), such as laws on the basis of the European Directive 1999/92/EG and/or other applicable codes.
- (4) Before accessing control shafts, check the oxygen content and, if necessary, flush the control shaft.
- (5) When using metallic connection lines, you must make sure that the mains earth is connected to the same potential as the tank being monitored.

### **4.2 Personal safety equipment**

The parts listed here apply only to safety aspects when working on plants which may pose an increased risk of explosion.

If work is carried out in industries in which it must be assumed that a potentially explosive atmosphere is present then the following items of equipment are required as an absolute minimum:

- Suitable clothing (risk of a build-up of electrostatic charge)
- Suitable tools (compliant with EN 1127)
- A suitable gas warning device which is calibrated for the existing vapour-air mixture (work should only be performed at a concentration of 50% below the lower explosion limit<sup>3</sup>)
- Measuring device for determining the oxygen content of the air (Ex / O meter)

### **4.3 Installation of the leak detector**

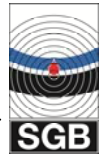
- (1) Both the leak indication unit and the leak detector are generally wall-mounted with wall plugs and screws.
- (2) The leak indication unit must be installed in a dry room or out in the open inside a suitable protective box.  
The leak detector can be set up out in the open without the need for any further protective measures.

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<sup>2</sup> In Germany: Companies who have the status of a “qualified company” in the sense of §19I of the *Wasserhaushaltsgesetz* (Water Resources Act, WHG) § 19I, who can also demonstrate proof of basic expertise and knowledge in relation to fire safety and explosion protection.

<sup>3</sup> Other %-specifications may result from works-specific or German *Land*-specific regulations.





## (4) Demands on the cable between work and reporting unit:

- Number of leads: 6 + PE
- Cross section: at least 1 mm
- Wire length: max. 100 m
- Outside diameter of the wire: 5–10 mm

## (5) Terminal assignment:

**Leak detector** (see also SL-853 651):

- 50 (connection to the leak indication unit) PE conductor
- 51 (connection to the leak indication unit) phase conductor (L 230V ~)
- 52 (connection to the leak indication unit) neutral conductor (external conductor)
- 53 (connection to the leak indication unit) tank alarm, leak indicator (L 230V ~)
- (connection to the leak indication unit) alarm, pipe leak detector (L 230V ~)
- 55 (connection to the leak indication unit) dry filter message (L 230V ~)
- 56 (connection to the leak indication unit) alarm, "Audible alarm" (L 230V ~)

*For the connection of an (external) pipe leak detector*

- 50 PE conductor
- 13 Phase conductor, pipe leak detector (L 230V ~)
- 14 Neutral conductor (external conductor), pipe leak detector
- 15 Alarm, pipe leak detector (L 230V ~ required)

**Leak indication unit** (see also SL-853 650):

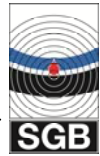
- 1 / 2 Mains connection
- 50 PE conductor
- 35/36 "Audible alarm" (can be switched off, 230 V ~ in the event of an alarm)
- 21/22 Potential-free relay contacts, "Tank leak detector" (open in the event of an alarm)
- 23/24 Potential-free relay contacts, "Pipe leak detector" (open in the event of an alarm)
- 25/26 Potential-free relay contacts, "Dry filter fault" (open in the event of an alarm)
- 50 (connection to the leak detector) PE conductor
- 51 (connection to the leak detector) phase conductor (L 230V ~)
- 52 (connection to the leak detector) neutral conductor (external conductor)
- 53 (connection to the leak detector) tank alarm, leak indicator (L 230V ~) (connection to the leak detector) alarm, pipe leak detector (L 230V ~)
- 55 (connection to the leak detector) dry filter message (L 230V ~)
- 56 (connection to the leak detector) alarm, "Audible alarm" (L230V ~)

#### 4.7 Example installation

Example installations are shown in the Appendix.

### 5 Commissioning / repairs

- (1) The instructions in section 4 should also be followed here.
- (2) If a leak detector is taken into operation on tanks which are already filled, then special protection measures need to be put in place (e.g. checking that the leak detector and/or the interstitial space is free of gas). Further measures may depend upon the local conditions and should be assessed by the personnel involved.
- (3) Once the pneumatic connections have been made, make the electrical connections.



- (4) Check that the signal lamps for "Operation" and "Alarm" light up and that the audible alarm signal sounds,  
Leak indication unit: flip the "Audible alarm" switch  
Leak detector: Press the "Audible alarm" button.
- (5) Cock 21 in position "II", connect a gauge. (Refer to P-063 000)
- (6) The leak detection system should be supplied with the operating pressure according to the table on page 3. (Use an assembly pump, together with an adequately dimensioned dry filter or nitrogen pressure cylinder, and make sure that the settings of the pressure reducer are correct).  
Note: If the delivery pressure of the assembly pump (or the pressure on the pressure reducer) exceeds the opening pressure of the overpressure valve then the pressure is dissipated via the overpressure valve.  
All cocks (with connected interstitial space) in the open position.
- (7) Pressure can be built up with the assembly pump via cock 20 (position II).  
Note: If no pressure can be built up with the assembly pump connected, then the leak should be located and rectified (if required check that the delivery rate of the assembly pump and the settings of the pressure reducer are correct).
- (8) Once the operating pressure of the leak detector has been reached (the pump inside the leak detector switches off), reconnect the high-pressure line and/or set both cocks to "I", remove the pressure measuring instrument.
- (9) Functional test according to section 6.4.

## **6 Operating instructions**

### **6.1 General notes**

- (1) It can be assumed that the leak detector works within the control range if the leak detection system is installed correctly without leaks.
- (2) If the pressure generating system comes on frequently or runs continuously then this indicates that leaks are present which will require attention within due course.
- (3) In the event of an alarm, a larger leak or defect is always present. Determine the cause and rectify the problem quickly.
- (4) The operator must check at regular intervals that the "Operation" signal lamp works properly.
- (5) Disconnect the power supply to the leak detector whenever performing servicing work on it.
- (6) Current interruptions are indicated by the "Operation" lamp going out. The potential-free relay contacts open.
- (7) The filter cartridge should be replaced or regenerated when it changes colour from orange to having no colour (or if it changes to green, depending on the drying material).

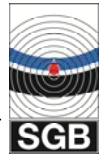
### **6.2 Maintenance**

#### *6.2.1 Performed by the operator*

The dry filter should be checked at regular intervals<sup>6</sup>. The filter cartridge should be replaced or regenerated when it changes colour from orange to having no colour (or if it changes to green).

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<sup>6</sup> A gap of at least 2 months is recommended.



### 6.2.2 Maintenance work and functional tests performed by qualified persons<sup>7</sup>.

- (1) Testing once a year for functional and operational reliability and safety.
- (2) Test scope according to section 6.4.
- (3) It should also be checked that the conditions in sections 4, 5 and 6.2 are satisfied.
- (4) Explosion protection requirements must be satisfied (where necessary), such as laws on the basis of the European Directive 1999/92/EG and/or other applicable codes.

### 6.3 Proper use

- Several interstitial spaces can only be joined together to one overpressure leak detector if they are **underground**.
- Double walled tanks, tanks or surface sealing units, with walls on the side of the storage medium which do not allow the constituent ingredients of the product being stored to permeate through and potentially generate explosive vapours.
- The alarm pressure must be at least 30 mbar higher than any pressure acting on the interstitial space (this requirement applies both to pressures acting from the inside and/or pressures acting from the outside).
- Where applicable, the system must be earthed in accordance with applicable regulations<sup>8</sup>.
- The leak indication system must be tight in accordance with the table in section 6.4.6 of this documentation.
- The leak detection unit must be installed outside the potentially explosive area.
- Conduits for the tubing must be sealed gas-tight.
- The leak detector should be (electrically) connected in a way which cannot be switched off.

### 6.4 Functional tests

Testing of the functional and operational safety and reliability should be performed

- at every commissioning
- in accordance with the intervals laid out in section 6.2<sup>9</sup>
- whenever a fault is rectified.

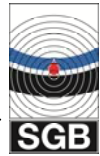
#### 6.4.1 Test scope

- (1) If necessary the work to be performed should be discussed with the person who is responsible on-site.
- (2) Observe the safety information on handling the products being stored.
- (3) Replacement or regeneration of the filter cartridge.
- (4) Test for the free passage of air through the interstitial space (section 6.4.2)
- (5) Test the switching values with a testing device (section 6.4.3). Alternatively: test the switching values without a testing device (section 6.4.3)
- (6) Check the overpressure valve (section 6.4.5)

<sup>7</sup> In Germany: by a trained specialist with expertise in the maintenance and servicing of leak detection systems, or under the responsibility of a trained and qualified individual in accordance with the applicable regulations.

<sup>8</sup> E.g. according to EN 1127

<sup>9</sup> In Germany: legal regulations of the *Länder* also need to be satisfied (e.g. VAWS).



- (7) Tightness test (section 6.4.6)
- (8) Set up the equipment ready for operation (section 6.4.7)
- (9) Completion of a test report by the qualified person, with confirmation of functional and operational safety and reliability.

#### 6.4.2 Test for the free passage of air through the interstitial space

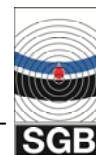
- (1) If several interstitial spaces are connected then each interstitial space should be tested individually for free passage of air.
- (2) Connect the gauge to cock 21, position "III" (all shut-off valves (to the interstitial spaces) closed). (see P - 063 000)
- (3) Cock 20 in position "III".
- (4) Open the shut-off valves of the first (subsequent) tank (measuring and pressure lines in pairs).
- (5) Observe any pressure loss on the measuring instrument. If no pressure loss takes place, locate and rectify the cause.
- (6) Close the shut-off valves opened in step (4).
- (7) Repeat steps (5) to (7) for every other tank.
- (8) Set the cocks 20 and 21 to position "I" and disconnect the gauge.
- (9) Open all shut-off valves with connected tanks.

#### 6.4.3 Testing the switching values with a testing device

- (1) Close off all cocks for the interstitial spaces. Connect the testing device to cocks 20 and 21. Set both cocks to position "III".
- (2) Connect a gauge to the testing device.
- (3) Close the needle valve (testing device) – pressure is then built up on top of the operating pressure.
- (4) Vent via the needle valve, determine the switching values for "Pump ON" and "Alarm ON" (visual and audible), write the values down.
- (5) Close the needle valve and determine the switching values for "Alarm OFF" and "Pump OFF", write the values down. (If necessary open the needle valve slightly so that there is a slow pressure increase.)
- (6) Set the cocks 20 and 21 to position "I". (This opens the connection to the interstitial spaces). Disconnect the testing device.

#### 6.4.4 Testing the switching values without a testing device

- (1) Close all shut-off valves to the interstitial spaces except the cocks on the tank with the smallest interstitial space volume.
- (2) Connect a gauge to cock 21 and set it to position "II".
- (3) Vent via cock 20 (position "II"), determine the switching values for "Pump ON" and "Alarm ON" (with visual and audible alarms), write the values down.
- (4) Set cock 20 to position "I" and determine the switching values for "Alarm OFF" and "Pump OFF", write the values down.
- (5) Set the cock 21 to position "I" and disconnect the gauge.



- (6) Open all cocks with connected tanks.

#### 6.4.5 Checking the overpressure valve

Operating pressure needs to be built up in the leak detector before this test can be performed (pump is switched off).

- (1) Connect a gauge to cock 20 and set it to position "III".
- (2) Close all cocks to the interstitial spaces.
- (3) Set cock 21 to position "III" – the pressure sensor is vented, the pump switches on and an alarm is triggered.
- (4) Determine the opening pressure of the overpressure valve (no further pressure increase) and make a note of the value. If the opening pressure of the overpressure valve exceeds the test pressure of the tank, replace or readjust it.
- (5) With cock 21 in position "I", open the cocks with connected interstitial spaces. The pump switches off. Determine the closing pressure of the overpressure valve (no further drop in pressure<sup>10</sup>), make a note of the value.
- (6) Set cock 20 to position "I" and disconnect the gauge.

#### 6.4.6 Tightness test

- (1) Check that all shut-off valves with connected tanks are opened.
- (2) Connect a gauge to cock 21 and set it to position "II".
- (3) Start with the tightness test once the pressure has been equalised. The outcome of the test is positive if the values in the table below/beside are met.

<b>Interstitial space volume (litres)</b>	<b>Max. pressure drop of 1 mbar (0.015 psi) after</b>
<b>250</b>	22 minutes
<b>500</b>	45 minutes
<b>1000</b>	1.50 hours
<b>1500</b>	2.25 hours
<b>2000</b>	3.00 hours
<b>2500</b>	3.75 hours
<b>3000</b>	4.50 hours
<b>3500</b>	5.25 hours
<b>4000</b>	6.00 hours

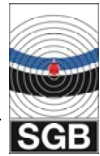
- (4) Set the cock 21 to position "I" and disconnect the gauge.

#### 6.4.7 Set up the equipment ready for operation

- (1) Seal the housing.
- (2) The shut-off valves for all connected tanks must be set to their open position.

<sup>10</sup> If the pump switches on before the closing pressure is reached then the cause should be determined and rectified.





## 6.5 Alarm

- (1) The red signal lamp comes on and an audible signal sounds.
- (2) Switch off the audible signal.
- (3) Contact the installation company immediately.
- (4) Determine and rectify the cause for the alarm, then perform a functional test of the leak detection system as described in section 6.4.

## 7 Disassembly

The following points are particularly important for the disassembly of plants and systems which could represent Ex-hazards.

- Check that no gas is present before and during the work.
- Seal any openings gas-tight that could otherwise allow the spread of a potentially explosive atmosphere.
- Do not use tools capable of generating sparks (saw, cutting grinder...) for disassembly. If this is unavoidable, follow the instructions in EN 1127.
- Avoid any build-up of electrostatic charge (caused e.g. by rubbing plastic components or wearing inappropriate work clothing).
- Contaminated components (risk of outgassing) should be disposed of appropriately.

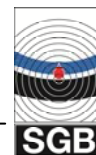
## 8 Marking

- Electrical data
- Serial no.
- Type designation
- Date of manufacture (month / year)
- Manufacturer's code
- Legally required symbols/marks
- Together with air as the leak detection medium, the pressure and measuring lines can be connected to interstitial spaces of zone 2.

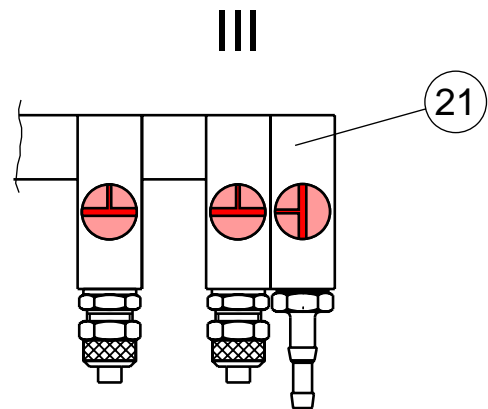
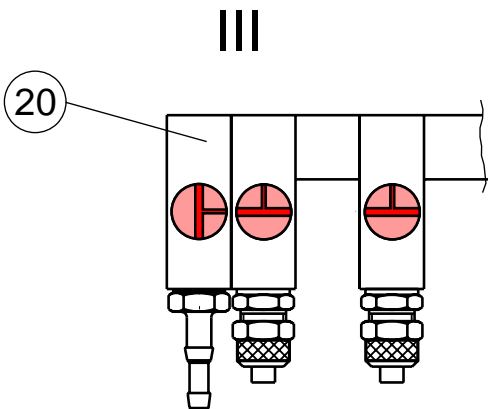
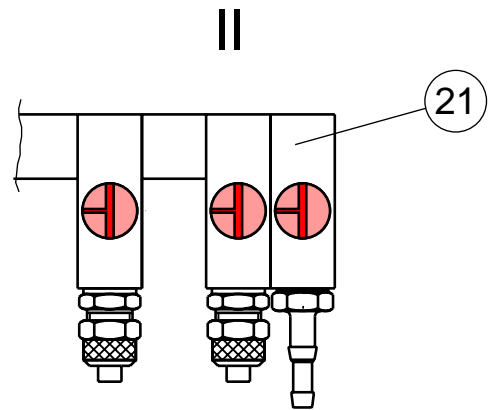
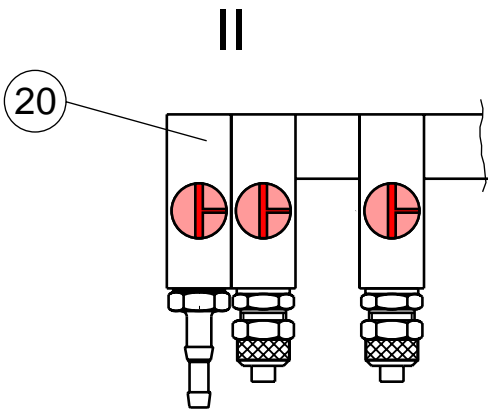
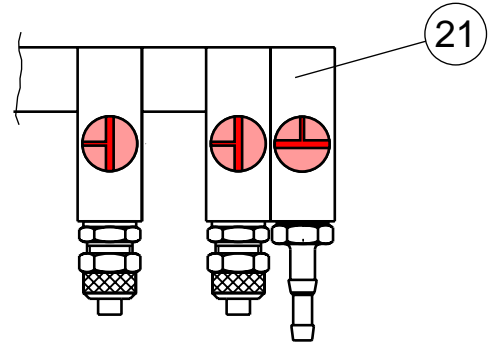
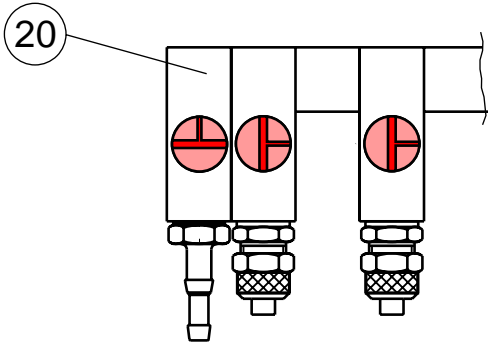
## 9 Abbreviations

- 01.1 Signal lamp – "(Tank) Alarm" – red
- 01.2 Signal lamp – "Dry filter message" – red
- 01.3 Signal lamp – "(Pipe) Alarm" – red
- 02 Shut-off valve
- 09 Signal lamp - "Operation" - green
- 13 High-pressure line
- 17 Overpressure pump
- 20 Cock in the high-pressure line
- 21 Cock in the measuring line
- 24.1 Microfuse
- 24.2 Microfuse



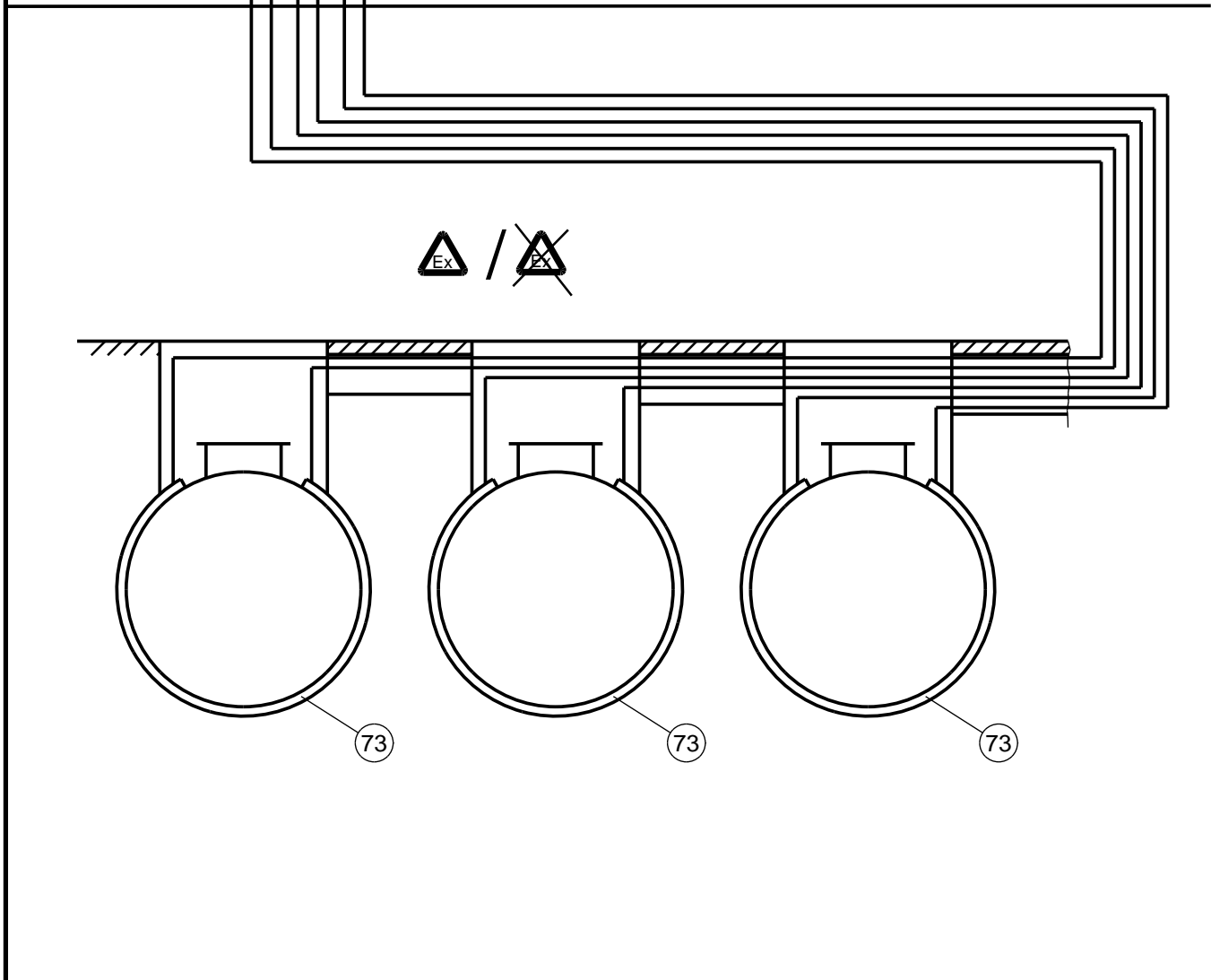
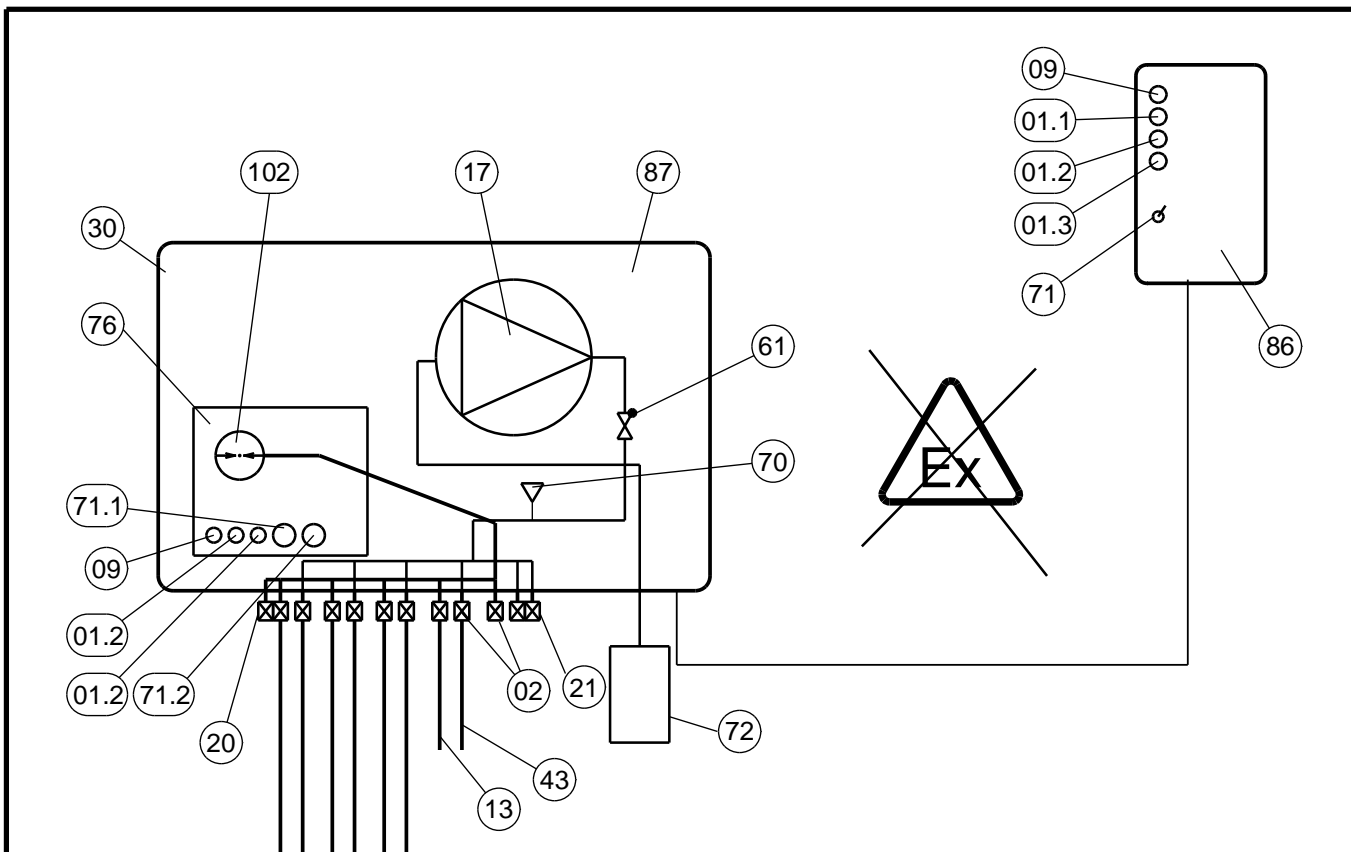


- 24.3 Microfuse
- 30 Housing
- 43 Measuring line
- 59.1 Relay
- 59.2 Relay
- 59.3 Relay
- 61 Non-return valve with filter
- 69 Buzzer
- 70 Overpressure valve
- 71 "Audible alarm" switch
- 71.1 "Audible alarm" button
- 71.2 "Dry filter message" button
- 72 Dry filter
- 73 Interstitial space
- 76 Main circuit board
- 86 Leak indication unit
- 87 Leak detector
- 102 Pressure sensor
- 105 Control unit
- 106 Contacts for serial data transfer



Pressure line  
(front bar)

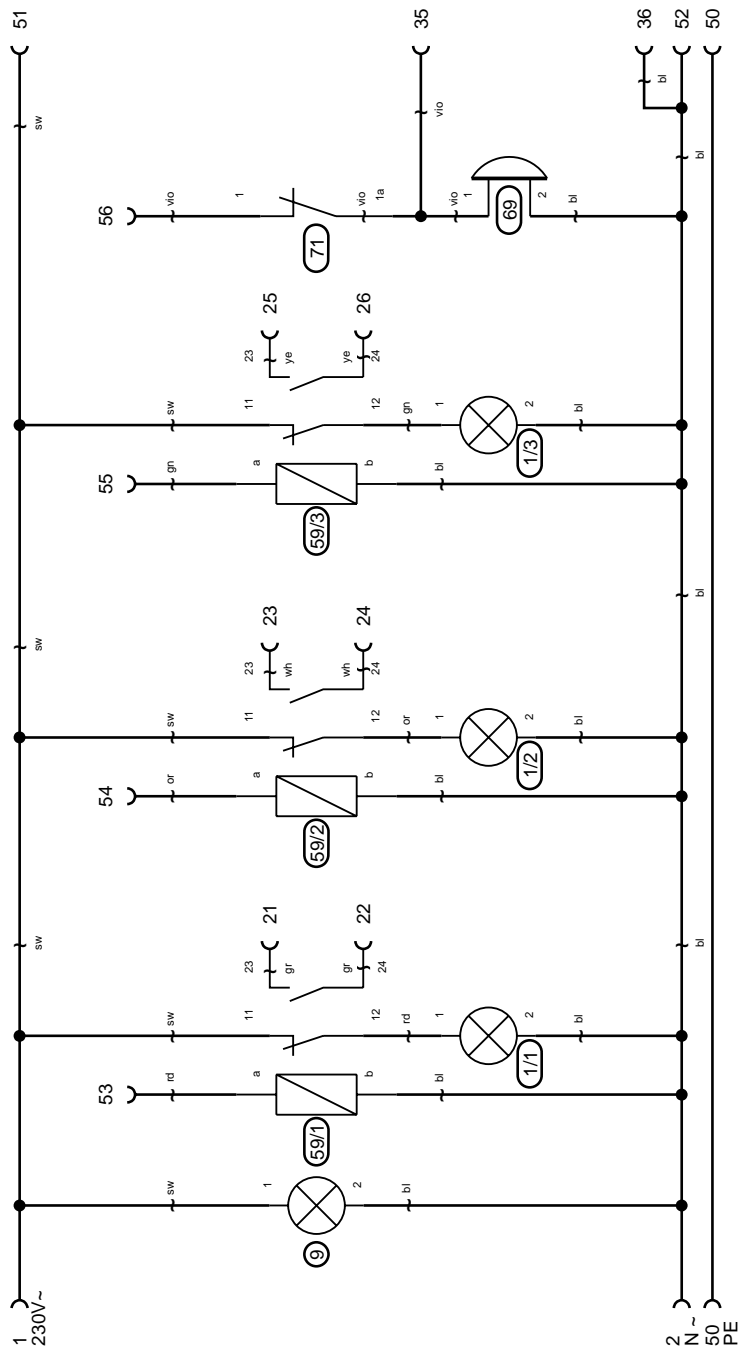
Measuring line  
(rear bar)



02-09-2014

**SGB**

M - 063 000







**B Switching and pressure values**

Type DL	p <sub>TS</sub> [mbar]	p <sub>AE</sub> [mbar]	p <sub>PA</sub> [mbar]	P <sub>ÜDV1</sub> <sup>1</sup> [mbar]	p <sub>PRÜF</sub> [mbar]
50	20	> 50	< 100	170 ± 20	≥ 200
100	70	> 100	< 150	220 ± 20	≥ 250
230*	200	> 230	< 310	360 ± 10	≥ 400
280**	250	> 280	< 330	360 ± 10	≥ 400
290	260	> 290	< 350	420 ± 20	≥ 450
330	300	> 330	< 410	465 ± 20	≥ 500
400	370	> 400	< 500	565 ± 20	≥ 600
450	420	> 450	< 510	565 ± 20	≥ 600
—	Special switching values agreed between SGB and customer				

The following abbreviations are used in the table:

- p<sub>TS</sub> maximum pressure at the low point of the tank, including overlay pressure
- p<sub>AE</sub> switch value "Alarm ON", the alarm is triggered at the latest at this pressure
- p<sub>AA</sub> switch value "Alarm OFF", the alarm goes off on passing this value.  
The switching value "Alarm OFF" is approx. 15 mbar higher than the switch value "Alarm ON" (p<sub>AA</sub> = p<sub>AE</sub> + ~15 mbar)
- p<sub>PA</sub> Switch value "Pump OFF" (=nominal pressure)
- p<sub>PE</sub> Switch value "Pump ON"  
The switch value "Pump ON" is approx. 15 mbar lower than the switch value "Pump OFF" (p<sub>PE</sub> = p<sub>PA</sub> - ~15 mbar)
- p<sub>ÜDV1</sub> Opening pressure overpressure valve 1 (interstitial space side)
- p<sub>PRÜF</sub> Minimum test pressure of the interstitial space
- \* was added to the table later
- \*\* only for underground tanks; values were added to the table later

<sup>1</sup> The table states the opening pressure for the overpressure valve at which the volume flow of the pump is blown off. The triggering pressure (first opening) is lower.



## **Technical data**

### **1. Electrical data**

Power supply (without external signal)	230~ V - 50 Hz - 50 W
Switch contact load, terminals AS (35 and 36)	max. 230~ V - 50 Hz - 200 VA min. 20 mA
Switch contact load, potential-free contacts, (Terminals 21/22, 23/24 and 25/26)	max: 230~ V - 50 Hz - 3 A min: 6 V / 10 mA
External fuse of the leak detector	max. 10 A
Overvoltage category	2

### **2. Pneumatic data (requirements for the test measuring gauge)**

Nominal size	mind. 100
Class accuracy	mind. 1.6
Scale end value	-600 mbar / -1000 mbar



## **Dry filter monitoring (FC)**

### **1 Function**

A sensor is integrated in the suction line of the pump between pump and dry filter to measure the moisture of the air intake.

The sensor registers the increase in relative humidity when the desiccant is spent. The optical and audible message is triggered together with the potential-free message when the drying capacity is insufficient.

The visual indication consists of alternate flashing of the two red alarm LEDs. The potential-free indication is present at terminals 25 to 26:

25/26 Contact opens on receiving a message

### **2 Changing the drying material**

When getting the indication "dry filter spent", the drying material should be replaced after an appropriate period of time.

The audible signal can be acknowledged by pressing briefly once. The visual and potential-free indication remains.

The entire indication can be acknowledged by pressing and holding the button "Acknowledge dry filter message" (until the lower LED flashes). Next time the pump starts up (or if this function is carried out while the pump is running, after approx. 30 s), the indication is triggered again if the residual moisture is too high.

After replacing the drying material, quit the indication by pressing and holding the button as described above.

### **3 Limits of use**

The following limits of use must be observed for the dry filter monitoring function:

1. The pump must run min. 30. sec to obtain a meaningful statement.  
During or after start up of the leak detector, the time between pump ON and OFF should be measured to check whether this minimum operating time is achieved.
2. No meaningful measuring results are obtained at low temperatures (below 5°C) so that the measurement is deactivated below 5°C.





### **Evaluating the display for the function "Tightness test"**

Chapter 3.6.3 described "Checking the tightness of the monitored system". This function can be used to obtain an indication of the tightness of the monitored system.

This is only possible if the switching value "Alarm OFF" has been exceeded. It can be repeated several times in succession.

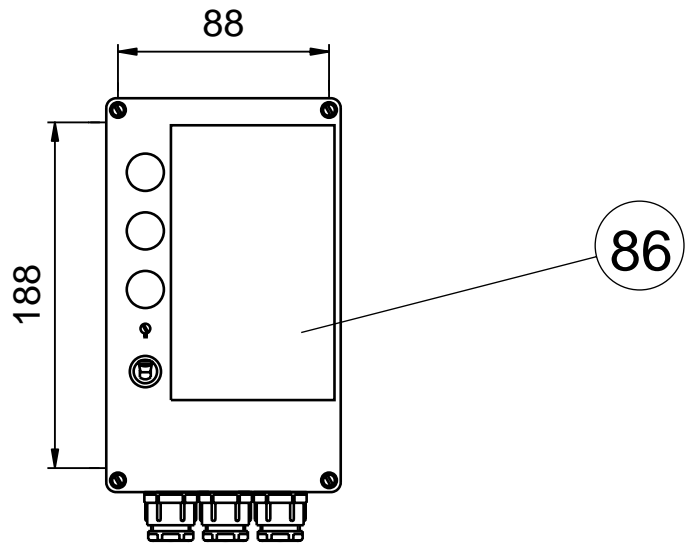
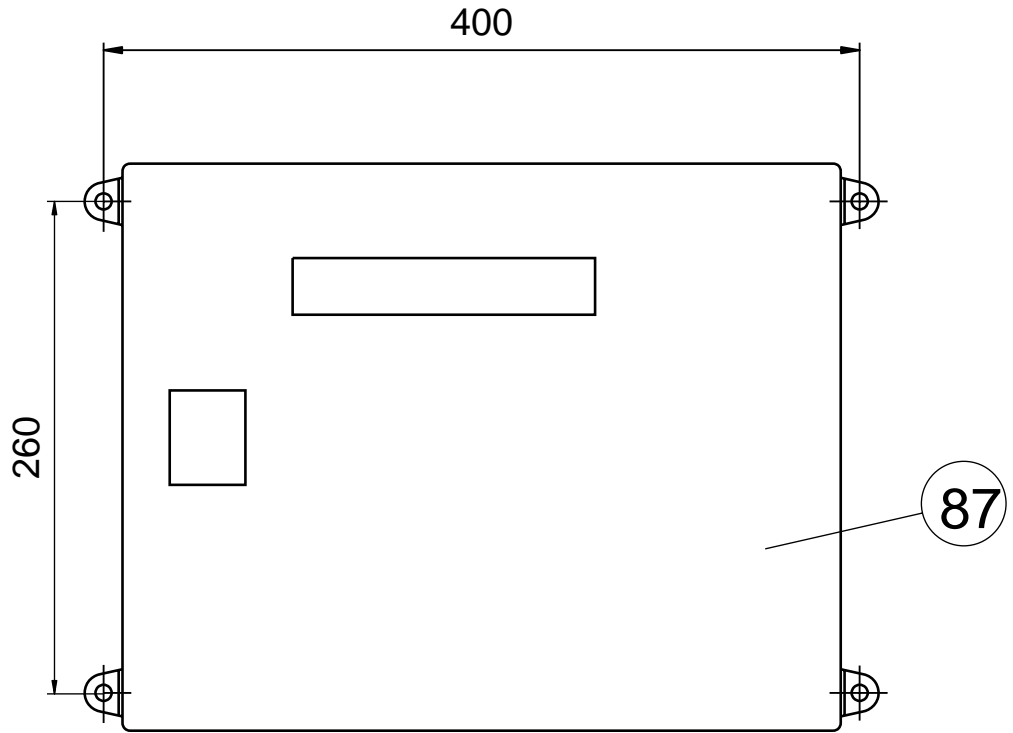
This check is advisable **before** carrying out a recurrent function test on a leak detector, to see directly whether there is any need to look for leaks.

After pressing the button, this is confirmed by a brief acoustic signal which can be heard once, followed by a flashing signal, i.e. the Alarm LED flashes briefly to indicate the tightness as follows:

No flashing:           the system is very tight

10 flashes:            the system has major leaks

The smaller the above value, the more tight is the system. The meaningfulness of this value naturally also depends on temperature fluctuations and should therefore be considered to be an indicative value.



## Installation of screw connections

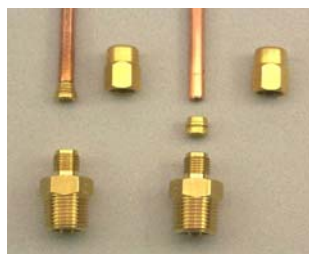
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### 1 Flanged screw connection for flanged pipes

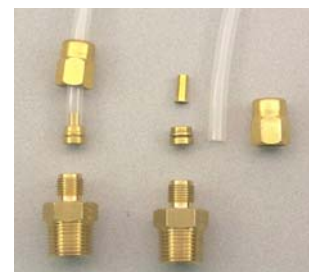
1. Oil O-rings
2. Place the intermediate ring loosely in the screw connection sleeve
3. Push the union nut and pressure ring over the pipe
4. Tighten the union nut by hand
5. Tighten the union nut until there is a noticeable increase in force
6. Final installation: Turn  $\frac{1}{4}$  turn further



### 2 Clamping ring screw connection for plastic and metal pipes



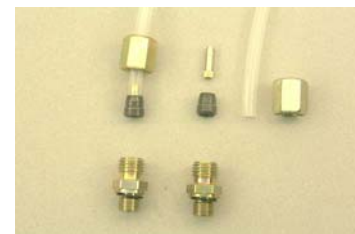
1. Insert support sleeve into the pipe end
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the screw connection until stronger resistance can be felt
4. Unfasten the nut slightly
5. Tighten the nut until there is noticeable resistance (The nut must match the thread on the base body exactly)



### 3 Cutting ring screw connection for plastic and metal pipes



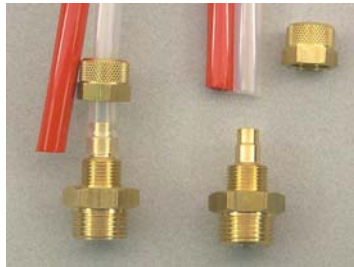
1. Insert the reinforcement sleeve into the end of the pipe
2. Drive in the reinforcement sleeve
3. Push the union nut and cutting ring over the end of the pipe
4. Screw the union nut on by hand until it noticeably rests in place
5. Press the pipe against its limit stop with internal cone
6. Tighten the union nut by approximately 1.5 turns (pipe must not turn)
7. Unfasten the union nut: check whether the pipe can be seen to protrude from the cutting ring. (not of significance if the clamping ring can be turned)
8. Tighten the union nut without applying increased force.



### Installation of screw connections

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#### 4 Quick-release screw connection for PA and PUR hose



1. Cut the PA pipe to length at a right angle
2. Unfasten the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to the start of the thread
4. Tighten the union nut by hand
5. Re-tighten the union nut with a screwdriver until there is a noticeable increase in force (approximately 1 to 2 turns)

NOT suitable for PE hose

#### 5 Hose connections (4 and 6 mm nozzle for OVERPRESSURE)



1. Push the wire or screw clip over the hose
2. Push the hose onto the Cu pipe or hose nozzle (heat or moisten PVC hose as necessary). The hose must fit tightly all round
3. Wire clip: press together with pliers and push onto the connection point  
Screw clip: push onto the connection point and tighten with screwdriver make sure that the clip is an even tight fit..

#### 6 Hose connections (4 and 6 mm nozzle for NEGATIVE PRESSURE)

For negative pressure applications with which there is no overpressure on the connection lines even in case of a leak, as point 5 but without clips.

For negative pressure applications with which there may be overpressure, as point 5 but without clips.

# EC DECLARATION OF CONFORMITY



We,

SGB GmbH  
Hofstraße 10  
57076 Siegen, Germany

hereby declare in sole responsibility that the leakage probes

***DL .., DLR-P ..***

comply with the essential requirements of the EC directives listed below.

This declaration shall lose its validity if the device is modified without consulting us.

Number / short title	Satisfied regulations
2004/108/EC EMC Directive	EN 61 000-6-3: 2007 EN 61 000-6-2: 2005 EN 61 000-3-2: 2006 + A1 :2008 + A2 : 2009 EN 61 000-3-3: 2008
2006/95/EC Low Voltage Directive	EN 60 335-1: 2012 EN 61 010-1: 2010 EN 60 730-1: 2011
89/106/EEC Construction Products Directive 93/68/EEC	EN 13 160-1-2: Approved body: TÜV-Nord, Hamburg
94/9 EEC Equipment in Potentially Explosive Atmospheres	The leak detector with its pneumatic parts may be connected to spaces (interstitial spaces of tanks / pipelines / fittings) which are required for category 3 devices. The following documents were used: EN 1127-1: 2011 EN 13 160-1-2: 2003 EN 13463-1: 2009 The ignition hazard analysis did not result in any additional hazards.

Compliance is declared by

ppa. Martin Hücking  
(Technical Director)

GERMAN INSTITUTE FOR BUILDING TECHNOLOG  
Public Law Institution

10829 Berlin, 5 April 2005  
Kolonnenstraße 30 L  
Phone: +49(0) 30 78730-364  
Fax: +49(0) 30 78730-320  
Ref: III 14-1.65.23-9/05

## General Building Inspectorate Approval

**Approval number:** Z-65.23-409

**Applicant:** SGB GmbH  
Hofstraße 10  
57076 Siegen

**Approval item:** Overpressure leak detector type DL.. and type DLG.. as part of a leak detection system for double walled tanks, tanks with leak detection lining or leak detection jacketing, interstitial space of sumps and containments for the storage of water polluting liquids

**Validity period:** until 30th April 2010

Extension notification as an appendix to this approval.
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The above approval item is herewith granted general building inspectorate approval. This general building inspectorate approval consists of six pages and two annexes.

/round stamp/  
German Institute  
for Building Technology

## II. SPECIAL REGULATIONS

### 1. Approval item and scope of application

- 1.1 The subject of this general building inspectorate approval is an overpressure leak detector type designations DL.. (with integrated pump) and DLG.. (with integrated compressed gas supply) with the design variants for alarm pressure switching values of  $\geq 50$  mbar,  $\geq 100$  mbar,  $\geq 290$  mbar,  $\geq 330$  mbar,  $\geq 400$  mbar,  $\geq 450$  mbar,  $\geq 590$  mbar,  $\geq 750$  mbar,  $\geq 1000$  mbar,  $\geq 1100$  mbar,  $\geq 1500$  mbar,  $\geq 2000$  mbar,  $\geq 2300$  mbar,  $\geq 2500$  mbar and  $\geq 3000$  mbar overpressure.
- 1.2 The leak detectors may be connected to suitable interstitial spaces of double walled tanks, tanks with leak detection lining or leak detection jacketing, sumps and containments for plant for the storage, filling and transshipment of water polluting liquids (structure of the leak detection system see Annex 1).
- 1.3 Suitable interstitial space refers to interstitial space with a volume of up to 8 m<sup>3</sup> rated with an interstitial space test pressure corresponding to the specific design variant of the particular leak detector.
- 1.4 The general building inspectorate approval is issued notwithstanding test or permit reservations in other legal areas (e.g. 1<sup>st</sup> Ordinance on the Machine Safety Law – Low Voltage Ordinance – Law on Electromagnetic Compatibility of Machines – EMC - , 11<sup>th</sup> Ordinance on the Machine Safety Law – Explosion Protection Ordinance).
- 1.5 With this general building inspectorate approval, the approval item is not required to undergo specific water suitability testing and type approval as per § Law 19 h of the Water Resources Act (WHG)<sup>1</sup>.

### 2 Stipulations for the product

#### 2.1 Properties and composition

- 2.1.1 A leak in the walls of the interstitial space is indicated visually and audible when pressure falls to the alarm switching value.
- 2.1.2 The leak detector consists of the display and control elements, the overpressure pump with upstream dry filter or a permanently connected pressure cylinder or operational pressure network with inert gas or dried air, the pressure and measuring lines with shut-off and safety valves, the pressure sensor and electrical control components. The parts and components are stated in the Technical Description<sup>2</sup>. To protect the interstitial space from intolerable overpressures, the overpressure valves are adjusted to the opening pressures stated in Annex B to the Technical Description.

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<sup>1</sup> Act on the Management of Water Resources (Water Resources Actw – WHG) dated 19 August 2002

<sup>2</sup> Technical Description verified by Tüv Nord dated 11 March 2005 for the overpressure leak detector type DL..

2.1.4 Verification of safe functioning of the approval item was provided according to the "Approval principles for leak detection systems for tanks (ZG-LAGB)" of the German Institute for Building Technology dated August 1994.

## **2.2 Production and marking**

### 2.2.1 Production

The leak detectors must only be produced in the applicant's factory. They must comply with the documentation featured in Annex 2 of this general building inspectorate approval with regard to design, dimensions and materials.

### 2.2.2 Marking

The leak detector, its packaging or delivery note must be marked by the manufacturer with the compliance symbol (Ü-symbol) according to the compliance symbol ordinances of the federal states. The marking may only be applied if the prerequisites as per section 2.3 are fulfilled. In addition, the leak detector must be marked with the following details:

- type designation
- approval number

## **2.3 Compliance verification**

### 2.3.1 General

Confirmation that the leak detectors comply with the stipulations of this general building inspectorate approval must be provided for every production factory with the manufacturer's Declaration of Conformity on the basis of inhouse production controls and type testing of the leak detector by an acknowledged testing agency.

### 2.3.2 Inhouse production controls

Inhouse production controls are to be set up and implemented in the production factory.

Inhouse production controls are too include individual testing of every leak detector. The individual tests by the manufacturer are to warrant that the parts of the leak detector function reliably and comply with the tested type.

The results of the inhouse production controls are to be recorded and evaluated. The records must include at least the following details:

- leak detector designation
- type of control or test
- date of production and testing of the leak detector
- results of the controls or tests
- signature of the person responsible for inhouse production control



The records are to be kept for at least five years. They are to be submitted to the German Institute for Building Technology and the highest building supervisory authorities on demand.

In the case of unsatisfactory test results, the manufacturer must introduce immediate measures to eliminate the defects. Leak detectors which fail to comply with requirements must be handled in such a way so as to rule out any risk of confusion with conforming approval items. After eliminating the fault, the corresponding test must be repeated immediately insofar as technically feasible and required as verification that the fault has been eliminated.

### 2.3.3 Type testing by acknowledged testing agency

Type testing includes the function tests stated in the "Approval principles for leak detection systems for tanks". If verification according to the general building inspectorate approval has been obtained in samples from on-going production, the corresponding tests replace type testing.

## 3. Stipulations for the design

- 3.1 (1) Care must be taken to ensure that the leak detector is adequately resistant to the liquid being stored and that the water polluting liquid does not react with the leak detection medium.
- 3.2 The limits of operation of the leak detectors to ensure that the alarms are given are stated in Annex B of the Technical Description with reference to the maximum effective liquid pressure on the bottom of the tank (static pressure of the stored liquid plus overlay pressure) depending on the alarm switching value of the leak detector version.
- 3.3 The leak detector must only be connected to several interstitial spaces in the case of underground tanks. The shut-off valves for every connected tank must be set to "open" when the leak detector is operating.
- 3.4 Connection of the leak detectors to tanks as per section 1.2 for the storage of liquids with flash points  $\leq 55^{\circ}\text{C}$  is only permitted if the operating modes stated in the Technical Description with safeguarded refilling or without safeguarded refilling with the use of inert gas or dried air as leak detection medium, comply with the requirements made in Annex B of DIN EN 1310-1<sup>3</sup> regarding the equipment categories as per EN 1127-1<sup>4</sup>.

Refilling as per Annex B of DIN EN 13160-1 with air or inert gas as leak detection medium (monitoring medium) is said to be safeguarded

- if the leak detector has an integrated pump
- if the leak detector is connected to a permanently operating compressed air or gas network suitable for operation of the leak detector

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<sup>3</sup> DIN EN 1310-1:09/2003, leak detection systems, Part 1 General principles

<sup>4</sup> DIN EN 1127-1:10/1997, Explosion protection, Part 1 Principles and methods

- if residual pressure monitoring of the pressure cylinder with alarm function is installed for operation with a permanently connected pressure cylinder (stationary a pressure cylinder).

Refilling according to Annex B of DIN EN 13160-1 with air or inert gas as leak detection medium (monitoring medium) is considered not to be safeguarded if there is no residual pressure monitoring of the pressure cylinder with alarm function for operation with the permanently connected pressure cylinder (stationary pressure cylinder).

#### **4. Stipulations for the execution**

- 4.1 (1) The leak detector must be installed according to section 4 of the Technical Description and started up according to section 5 of the Technical Description.

Installation, servicing, repairs and cleaning of the leak detector must only be contracted to such companies which are specialist companies for these activities in accordance with § 19 I Water Resources Act (WHG).

(2) The activities as per (1) do not have to be carried out by specialist companies if they are featured under the exceptions for mandatory specialist companies according to the national regulations or the manufacturer of the approval item carries out these activities with his own specially qualified staff. This does not affect the occupational safety requirements.

- 4.2 The leak detectors must be installed outside potentially explosive areas in a dry room, or in a protective box when installed in the open air.

#### **5 Stipulations for use, servicing, maintenance and recurrent tests**

The leak detection systems with leak detectors must be operated and maintained according to section 6 of the Technical Description. The manufacturer must include the Technical Description with the delivery.

/round stamp/  
German Institute for  
Building Technology

/signature/

Certified

Dr. Ing. Kanning



## Notification

On amendment and extension to the  
Period of validity  
General Building Inspectorate Approval

April 5th, 2005

German Institute for Building Technolog  
Public Law Institution

Registration office for building products and types  
of building, Bautechnisches Prüfamt, Member  
of the European Organisation of Technical  
Approvals EOTA and The European Union for  
the Agrément in the Building Industry, UEAtc

Tel.: +49 30 78730-0  
Fax: +49 30 78730-320  
E-Mail: [dibt@dibt.de](mailto:dibt@dibt.de)

Date:	Reference:
3rd June 2010	I 53-1.65.23-85/09

Approval number:	Validity period:
<b>Z-65.23-409</b>	<b>until 30th April 2015</b>

Applicant:  
**SGB GmbH**  
Hofstraße 10  
D-57076 Siegen  
GERMANY

Approval item:

**Overpressure leak detector type DL.. and type DLG.. as part of a leak detection system for double walled tanks, tanks with leak detection lining or eak detection jacketing, interstitial space of sumps and containments for the storage of water polluting liquids**

This notification amends the General Approval no. Z-65.23-409 from 5<sup>th</sup> April 2005 and extends the period of validity. This notification consists of three pages. It is only valid in connection with the above-mentioned General Building Approval and may only be used together with this approval.

German Institute for Building Technolog, a facility jointly supported by the federal and state governments.  
DIBt, Kolonnenstraße 30 L, D-10829 Berlin, Tel.: +49 30 78730-0, Fax. +49 30 78730-320,  
E-Mail: [dibt@dibt.de](mailto:dibt@dibt.de), [www.dibt.de](http://www.dibt.de)

## II. SPECIAL REGULATIONS

The special conditions of the General Building Approval are amended as follows:

Section 1 now has the following wording:

### 1. Approval item and scope of application

- 1.1 The subject of this general building inspectorate approval is an overpressure leak detector type designations DL.. (with integrated pump) and DLG.. (with integrated compressed gas supply) with the design variants for alarm pressure switching values of  $\geq 50$  mbar,  $\geq 100$  mbar,  $\geq 290$  mbar,  $\geq 330$  mbar,  $\geq 400$  mbar,  $\geq 450$  mbar,  $\geq 590$  mbar,  $\geq 750$  mbar,  $\geq 1000$  mbar,  $\geq 1100$  mbar,  $\geq 1500$  mbar,  $\geq 2000$  mbar,  $\geq 2300$  mbar,  $\geq 2500$  mbar and  $\geq 3000$  mbar overpressure.
- 1.2 The leak detectors may be connected to suitable interstitial spaces of double walled tanks, tanks with leak detection lining or leak detection jacketing, sumps and containments for plant for the storage, filling and transshipment of water polluting liquids (structure of the leak detection system see Annex 1).
- 1.3 Suitable interstitial space refers to interstitial space with a volume of up to 8 m<sup>3</sup> rated with an interstitial space test pressure corresponding to the specific design variant of the particular leak detector.
- 1.4 The general building inspectorate approval is issued notwithstanding test or permit reservations in other legal areas (e.g. 1<sup>st</sup> Ordinance on the Machine Safety Law – Low Voltage Ordinance – Law on Electromagnetic Compatibility of Machines – EMC - , 11<sup>th</sup> Ordinance on the Machine Safety Law – Explosion Protection Ordinance).
- 1.5 With this general building inspectorate approval, the approval item is not required to undergo specific water suitability testing and type approval as per § Law 63 of the Water Resources Act (WHG)<sup>1</sup>.
- 1.6 The period of validity of this General Building Approval (refer to page 1) relates to use in the sense of installation of an approval object and does not relate to use in the sense of subsequent use.

**Section 4, design specifications, paragraph 4.1(1), sentence 2 now has the following wording:**

Only companies which are specialist companies for these activities in the sense of §3 of the directive for equipment for handling substances that are hazardous to water, from 31<sup>st</sup> March 2010 (BGBl page 377), may be deployed to install, maintain, repair and clean the leakage detector.

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<sup>1</sup> Act on the Management of Water Resources (Water Resources Actw – WHG) dated 31 July 2009

# Warranty

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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.

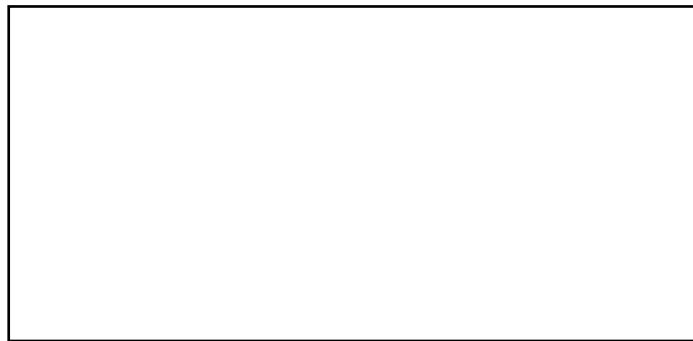
The **warranty period** for our leak detectors is **24 months**, beginning on the date of installation on site.

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

**SGB GmbH**

Hofstr. 10

57076 Siegen, Germany

Phone +49 271 48964-0

fax: +49 271 48964-6

e-mail [sgb@sgb.de](mailto:sgb@sgb.de)

web [www.sgb.de](http://www.sgb.de)