



Overpressure leak detector

DL and DLG

Z – 65.23 - 409

Documentation DL

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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

The leak detector's 'manometer' design is equipped with a digital pressure reading in the housing's lid.



The leak detector's 'filter control' design is equipped with a monitoring device for the dry filter, which emits a separate status signal when the dry material has been consumed.

It is only available for alarm pressures of up to 450 mbars.

The leak detector's 'protected' design is located in a weatherproof housing.

Leak detectors for alarm pressures of 590 mbars and higher are only available in this design.



The leak detector's 'economic leak control' design functions as both a leak detector and a leak reading device: whereby the leak detector is equipped with an integrated distribution for connecting up to 6 tanks.

This design is always weatherproof and the 'P' is therefore inapplicable.



'Numerical values' for the leak detector's alarm pressure.

The alarm pressures range from 50 mbars to 3,000 mbars.

The leak detector's 'pressure leak detector' design works at overpressure in relation to the atmospheric pressure.



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DRAWINGS

Setting three-way valves	P – 060 000
Installation example DL ..	M1 + M2 – 060 000
Installation example DLG ..	M3 + M4 – 065 000
Wiring diagram DL ..	SL - 853 600
Wiring diagram DLG ..	SL – 853 700
Test device	P - 115 392

ANNEX:

B Switching and pressure values	B – 1
TD Technical data	TD – 1



1 Subject

Overpressure leak detector for double-walled tanks with pressure provided either by a pump or by a compressed gas supply.

DL .. Overpressure leak detector with integrated pump. Dots stand for alarm pressure.

DLG .. Overpressure leak detector with compressed gas supply. Dots stand for alarm pressure

2 Field of application

2.1 Requirements for interstitial space

- Evidence of the pressure resistance of the interstitial space (see Annex B, column "p_{TEST}" minimum test pressure of the interstitial space)
- Evidence of the suitability of the interstitial space (for Germany: Building Inspectorate Suitability Serification)
- Tightness of the interstitial space (see chap. 6.4.4)
- The number of interstitial spaces for monitoring in **underground tanks** depends on the total interstitial space volume. According to prEN 13160, 8 m³ must not be exceeded. It is recommended not to exceed 4 m³ with regard to the feasibility of monitoring the tightness of the interstitial space.

2.2 Tanks/interstitial space (see chapter 2.4)

- Under- and above ground double-walled steel or plastic tanks, without leak detection liquid in the interstitial space, manufactured in the factory or on site, whose interstitial space is suitable for the connection of a DL .. as per Annex B.
- Under- and above ground single-walled steel or plastic tanks with pressure-resistant leak detection lining or leak detection jacketing, whose interstitial space is suitable for the connection of a DL .. as per Annex B.
- Double-walled sumps or containments with interstitial space suitable for the connection of a DL .. as per Annex B.

2.3 Stored products

Liquids hazardous to water with regard to the following points:

- The leak detection medium must not react with the stored products.
- Vapour/air mixtures resulting from the
 - stored liquid
 - stored liquid in combination with air / humidity or condensation
 - stored liquid in combination with parts (materials) in contact with the liquidmust be classified in gas group IIA and II B and in temperature code T1 to T3.



2.4 Exclusion

If permeation occurs in the interstitial space as a result of the stored product and the material structure of the inner tank wall (e.g. in double-walled GRP tanks) which can result in an explosive atmosphere in the interstitial space under normal operating condition, ONLY leak detector DLG .. must be used in combination with an inert leak detection medium (pressure cylinder or operational network).

3 Description of functions

The overpressure leak detector DL .. resp. DLG .. monitors both walls of a tank for leaks. The monitoring pressure is high so that any leaks above or below the liquid level (stored product and ground water) are detected as a fall in pressure.

Pressure is built in up in:

DL .. by sucking in the **outside air** through the integrated pump via a dry filter and forwarding it to the interstitial space.

The dry filter dries the air to approx. 10% humidity. Drying is necessary to prevent moisture/condensation from collecting in the interstitial space. **Spent dry filter fillings must be regenerated or replaced.**

DLG .. by conveying compressed gas (dried air or inert gas) to the interstitial space. The leak detector has a display in the housing lid which shows the operating pressure in the interstitial space.

- Values under 50 mbar or under 0.73 PSI are not shown.
- Values between 50 and 999 mbar are shown in mbar without decimals.
- Values from 1 bar are shown in bar with 2 decimal places and from 10 bar with 1 decimal place.
- Values in PSI are shown with 1 or 2 decimal places.

3.1 Switching and pressure values

Annex B contains a list of the switching values.

3.2 Normal operation

The overpressure leak detector is connected by pressure and measuring line with the interstitial space(s). The overpressure created by the pressure generator (pump or pressure cylinder) is measured and controlled by a pressure sensor.

On reaching the operating pressure (refill OFF), the pressure generator (pump or solenoid valve) is switched off. The pressure slowly falls again due to unavoidable leaks in the leak detection system. On reaching the switching value for "refill ON", the pressure generator is switched on again and operating pressure restored.

In normal operation, the leak detector swings between these two pressure values with short operational times and longer standstill periods, depending on the level of tightness and temperature fluctuations in the system.

3.3 Air or liquid leak

If a leak occurs below or above the liquid level or ground water, leak detection medium escapes from the interstitial space. Pressure falls until the pressure generator is switched on to restore the operating pressure. If the volume flow escaping out of the leak is greater than the refill intake from the pressure generator, then the pressure in the system falls although the pressure generator is activated.

Enlargement of the leak causes a further loss in pressure until the alarm pressure is reached. The visual and audible alarm is triggered.

3.4 Air drying / dry filter (DL . ONLY)

The air fed to the interstitial space passes through a dry filter in the suction line. The dry filter dries the air to approx. 10% humidity to prevent corrosion and accumulation of condensation¹ in the interstitial space.

The dry filter is rated for twelve months as long as the system is used for its intended use and there are no additional fluctuations in temperature.

A dry filter is orange when new and turns colourless (or green) when spent. Spent dry filters must be replaced or regenerated without delay.

3.5 Overpressure valve

The overpressure valve integrated in the pressure line protects the interstitial space from intolerably high overpressure (exceeding the test pressure).

Intolerably high overpressure can be caused among others by:

- increase in ambient temperature (e.g. direct sunshine)
- increase in temperature from hot filling (possibly consult manufacturer)

3.6 Description of the display and control elements

3.6.1 Status of the display elements (LEDs) for type DL ..

LEDs	Operating status	Alarm status	Alarm, audible alarm switched off	Unit out of order
OPERATION: green	ON	ON	ON	ON
ALARM: red	OFF	ON	FLASHES	ON

¹ Accumulation of condensation in the interstitial space can cause an intolerable pressure increase.



3.6.2 Status of the display elements (LEDs) for type DLG ..

LEDs	Operating status	Refilling activated	Filling activated	Alarm status	Alarm, audible alarm switched off	Unit out of order
OPERATION: green	ON	ON	ON	ON	ON	ON
ALARM: red	OFF	OFF	OFF FLASHES ON ²	ON	FLASHES	ON
PRESSURE FEED: yellow	OFF	ON	FLASHES	ON	ON	OFF

3.6.3 Operating functions through keys

For DL .. and DLG ..

Switch audible alarm off:

Press the button "Audible alarm" once briefly, audible signal switches off, red LED flashes.

Press again to switch the audible signal on.

This function is not available in normal operation and during malfunctions.

Testing the visual and audible alarm

Press and hold the button "Audible alarm" (approx. 10 sec.), the alarm is triggered until the button is released.

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

² on or off depending on pressure and/or audible alarm

**DL ..**Zero point adjustment³:

Three-way valve 21 in setting II (alarm triggered, pump running)

Press and hold the button "Audible alarm" until the "Alarm" LED flashes quickly (approx. 5 sec.), release button, then press again and release. Zero point adjustment is confirmed by 3 visual and audible signals.

Three-way valve 21 in setting I

The zero point adjustment can only be repeated after operating pressure has been built up.

Checking the tightness of the monitored system

Press and hold the button "Audible alarm" until the "Alarm" LED flashes quickly, then release. A value for tightness is shown when the "Alarm" LED lights up (see chapter 6.4.5)

For this check, the leak detector must have completed at least 1 automatic refilling interval in normal operation (i.e. without filling with an installation pump) for a meaningful statement.

DLG ..Filling the interstitial space with leak detection medium

Press and hold the "Filling" button for approx. 5 sec. until the yellow LED flashes. Filling is activated.

On reaching the operating pressure, the yellow LED goes off and filling stops.

When pressure falls because of pressure compensation processes, filling can be activated again to ensure that the interstitial space is filled completely.

If you hold the button for longer than 10 sec., this triggers the alarm. It goes off again just after you release the button.

Checking the tightness of the monitored system.

Press and hold the button "Audible alarm" until the "Alarm" LED flashes quickly, then release. A value for tightness is shown when the "Alarm" LED lights up and is also shown in the display (see chapter 6.4.5)

10 sec. after the value is displayed, the leak detector goes back to normal operation.

For this check, the leak detector must have completed at least 1 automatic refilling interval in normal operation (i.e. without activating the filling function) for a meaningful statement.

4 Installation instructions**4.1 General**

- (1) Installation only by qualified companies⁴.
- (2) Comply with pertinent accident prevention regulations.
- (3) Comply with the ex regulations (if necessary) such as BetrSichV [Operational Safety Ordinance] or others.
- (4) Before inspecting control shafts, check the oxygen level and scavenge the control shaft if necessary.

DLG ONLY

- (5) When transporting the pressure cylinder to and from the site, always comply with the corresponding traffic regulations.
- (6) Secure the pressure cylinder on site to prevent it from falling over.

³ Only applicable for DL 50 to DL 450.

⁴ For Germany: qualified companies as per § 19I WHG [Water Resources Act] with skills and know-how when it comes to fire and explosion protection.



- (7) If start up/operation takes place in enclosed rooms, ensure that there is adequate ventilation. Affix a warning sign.

4.2 Personal Protective Equipment

The items listed here refer in particular to safety when working on systems which may be subject to risk of explosion.

When working in potentially explosive areas, at least the following items of equipment are required:

- Suitable clothing (risk of electrostatic charge)
- Suitable tools (as per EN 1127)
- Suitable gas detectors for the prevailing vapour/air mixtures (work should only be carried out at concentrations 50% below the lower flammable limit⁵)
- Instruments for measuring the oxygen level in the air (Ex / O-meter)

4.3 Installing the leak detector

- (1) Mounted to the wall usually with plugs and screws.
- (2) In a dry room, or in the open air in a suitable protective box.
- (3) Installation in protective box: additional external signal or alarm forwarding via dry relais contacts to central control desk or similar device.
- (4) **NOT in potentially explosive areas.**
- (5) The distance between leak detector and interstitial space should be kept as short as possible.

4.4 Installation of connection lines (between leak detector and tank)

- (1) Metal (usually copper) or plastic tubes with pressure resistance at least equal to the test pressure of the interstitial space, the same applies to fittings and screwed unions. (Note temperature range, particularly when using plastic).
- (2) Inside clearance min. 4 mm for inert gas as leak detection medium
 min. 6 mm for air as leak detection medium
- (3) Should not be much longer than 50 m. If longer than 50 m, use tube/hose with larger inside clearance using corresponding adapters.
- (4) Colour coding: Measuring line: red
 Pressure line: white (or clear)
- (5) The full cross section must be maintained. No squeezing or bending⁶.
- (6) Metal or plastic tubes underground or plastic tubes installed outside above ground must be routed in conduits.

⁵ Other percentages are possible based on national or company regulations.

⁶ If necessary, use commercially available moulded pieces (with stipulated bending radii) for plastic tubes.



- (7) Seal conduits to be gas-tight with protection from penetration of liquids.
- (8) Avoid build-up of static electricity (e.g. when inserting and routing tubes).
- (9) Details for connecting systems, see worksheet AB-820 500

4.5 Installation of the dry filter (DL .. ONLY)

- (1) As close as possible to the leak detector. If the leak detector is mounted in a protective box, the dry filter can be installed in the protective box or in the open air.
- (2) Vertical with intake opening at the bottom, using enclosed installation material.
- (3) Connect the dry filter to the leak detector intake port with a PVC hose (or similar).

4.6 Choice of pressure reducer (DLG ..ONLY)

- (1) The pressure reducer must have an integrated overpressure valve.
- (2) The range for the pressure reducer must be selected according to the specific application respectively adjusted pressure (see Annex B).

4.7 Pressure cylinder and pressure reducer (star up/function test) (DLG .. ONLY)

- (1) After the pressure cylinder has been set up securely, remove the protective cover.
- (2) Fit the pressure reducer to the cylinder.
- (3) Close the shut-off cock on the pressure reducer.
- (4) Install the connecting tube between leak detector and pressure reducer.
- (5) Turn pressure control valve all the way back.
- (6) Open bottle shut-off cock (poss. leak test between pressure reducer and bottle)
- (7) Adjust pressure at pressure reducer as per Annex B using pressure control valve on pressure reducer (poss. readjust during pressure build-up).
- (8) To change the pressure cylinder:
 - Close the shut-off cock on the pressure reducer.
 - Close the bottle shut-off cock.
 - Remove the pressure reducer from the cylinder (caution: gas escapes until pressure is relieved in the pressure reducer)
 - Put protection cover on the cylinder.
 - Erect and secure new cylinder, remove protection cover.
 - Fit the pressure reducer (poss. leak test between pressure reducer and cylinder)
 - Open bottle shut-off cock.
 - Open shut-off cock on pressure reducer, poss. readjust pressure using the pressure control valve.



4.8 Electric connection

- (1) Power supply: according to label
- (2) Permanent installation, i.e. no plugged or switched connections.
- (3) Comply with the regulations issued by the utility company.⁷

DL ..

- (4) Terminal configuration: (see also SL-853 600)
 - 1 / 2 Mains connection
 - 3 / 4 Occupied (internal pump)
 - 5 / 6 External signal (in an alarm, a line voltage present here, stopped by pressing button "Audible alarm").
 - 11 / 12 Dry relay contacts (opened on alarm and power failure).

DLG ..

- (4) Terminal configuration: (see also SL-853 700)
 - 1 / 2 Mains connection
 - 3 / 4 Occupied (internal solenoid)
 - 5 / 6 External signal (in an alarm, a line voltage here, stopped by pressing button "Audible alarm").
 - 11 / 12 Dry relay contacts (open on alarm and power failure)
 - 21 / 22 Occupied (internal sensor)

4.9 Installation examples

Installation examples are shown in the Annex

5 Start up/servicing

- (1) Observe also the instructions in chapter 4.
- (2) Special safety measures are required when commissioning a leak detector in an already filled tank (e.g. check that there is no gas in leak detector and/or interstitial space). Other measures can depend on local conditions at the discretion of the staff.
- (3) After completing the pneumatic connection, proceed with the electrical connection.
- (4) Check that the LEDs "Operation" and "Alarm" light up and that the audible alarm works. Press the button "Audible alarm".
- (5) Three-way valve 21 in position "III", connect test instrument.

DL ..

- (6) Apply operating pressure to leak detection system as per table on page 3 (use installation pump with adequately dimensioned dry filter or nitrogen pressure cylinder).
- (7) Pressure can be built up with the installation pump directly using the pressure line or via the three-way valve 20 (position IV).

Note: If pressure cannot be built up with the

DLG ..

- (6) Press and hold "Fill" button for approx. 5 secs. until yellow LED flashes. The solenoid valve opens to fill the interstitial space quickly. On reaching the operating pressure, filling stops and the yellow LED goes off.
For very large interstitial spaces, it may be necessary to change the cylinder (see chapter 4.6).

Note: If pressure cannot be built up in spite of

⁷ For Germany: also VDE regulations



connected installation pump, find and eliminate the leak (poss. check capacity of installation pump, check correct setting of pressure reducer).

the connected pressure cylinder, find and eliminate the leak (poss. check correct setting of pressure reducer). CAUTION: Leak detector display begins at 150 mbar pressure.

- (7) Filling can (should) be activated again to ensure that the interstitial space is filled completely.

- (8) On reaching the leak detector operating pressure (pressure generator in leak detector switches off), install pressure tube again or set both valves to setting "I". Remove pressure instrument.
- (9) Check functions as per chapter 6.4

6 Operating instructions

6.1 General

- (1) Following impervious, correct connection of the leak detection system, the leak detector can be presumed to work in the normal range.
- (2) If the pressure generator switches on frequently or runs continuously, this indicates leaks which must be eliminated in an appropriate period of time.
- (3) An alarm always indicates a major leak or defect. Find and eliminate the cause quickly.
- (4) The operator must regularly check that the "Operation" LED is working properly.
- (5) Disconnect the leak detector from the power supply before performing and repair work.
- (6) The operating lamp goes off when there is a circuit failure: the dry relay contacts open.
- (7) (DL .. ONLY). When the filter filling changes colour from orange to colourless (or green), it must be replaced or regenerated.

6.2 Maintenance

6.2.1 By the operator:

- (1) Check the dry filter regularly⁸. When it changes colour from orange to colourless (or green), replace or regenerate the filter filling.
- (2) Check the filling in the pressure cylinder regularly. If the pressure is only just above the pressure setting on the pressure reducer, refill or replace the cylinder.

6.2.2 Maintenance work and function check by qualified experts⁹.

⁸ Recommended: min. at 2 monthly intervals

⁹ For Germany: experts for installation/service of leak detectors or in the responsibility of an expert, according to the currently valid regulations.



- (1) Once a year to ensure functional and operational safety.
- (2) Scope of inspection as per chapter 6.4
- (3) Also check compliance with the conditions in chapter 4.5 and 6.2.

6.3 Intended use

- Groups of interstitial space **only for underground** interstitial spaces.
- Double-walled tanks, sumps or containments whose walls on the stored product side are resistant to permeation from particles which can generate potentially explosive vapours.
EXCEPTION:
Inner walls not resistant to permeation when using an inert leak detection medium.
- The alarm pressure must be min. 30 mbar higher than any pressure occurring in the interstitial space (from inside and/or outside).
- Grounding (where applicable) according to valid regulations¹⁰.
- Leak detection system is impermeable, according to chapter 6.4.6 of this documentation.
- Mount the leak detector outside potentially explosive area.
- Lead-throughs for the pneumatic hoses are sealed gas tight.
- Leak detector (electric) is connected so that it cannot be switched off.

6.4 Function test

Check functional and operational safety

- every time after start up
- on the basis of chapter 6.2 in the intervals stated there¹¹
- every time after troubleshooting

6.4.1 Test scope

- (1) Poss. check the scope of work with the person responsible on site.
- (2) Comply with the safety regulations for handling the specific stored product.
- (3) (DL .. ONLY) Regeneration/replacement of the filter filling.
- (4) Check the free passage of air (gas) in the interstitial space (chapter 6.4.2).
- (5) Check the switching values with the test unit (chapter 6.4.3),
alternatively: check the switching values without test unit (chapter 6.4.4)
- (6) Check the overpressure valve (chapter 6.4.5).
- (7) Tightness test (chapter 6.4.6).
- (8) Restore operating condition (chapter 6.4.7).
- (9) Test report confirming functional and operational safety to be compiled by the qualified person.

¹⁰ e.g. EN 1127

¹¹ For Germany; otherwise comply with the national regulations (e.g. VAWs)



6.4.2 Check the free passage of air (gas) in the interstitial space

- (1) If several interstitial spaces are manifolded together, check the free passage of each interstitial space on its own:
- (2) If several interstitial spaces are connected to a manifold with shut-off cocks in the pressure and measuring lines, close all shut-off devices at the distribution units.
- (3) Connect measuring gauge at three-way valve 21, setting "III".
- (4) Three-way valve 20 in setting "IV". The (corresponding) interstitial space is vented.
CAUTION: maintenance work and function checks only by qualified persons. If inert gas is used as leak detection medium, ensure there is adequate ventilation!
- (5) Open shut-off cocks of the first (following) tank (measuring and pressure lines in pairs).
- (6) Ascertain the pressure loss on the measuring gauge. If there is no pressure loss, find and remedy the cause.
- (7) Close the shut-off cocks opened under paragraph (4).
- (8) Proceed with steps (5) to (7) with every other tank.
- (9) Three-way valve 20 and 21 in setting "I", remove measuring gauge.
- (10) Open all shut-off cocks on the manifold with connected tanks.

6.4.3 Checking the switching values with test unit.

- (1) Connect the test unit to the test port of three-way valve 20 and 21. Both valves in setting "II".
- (2) Connect measuring gauge to the test unit.
- (3) Close needle valve (test unit), pressure is built up to operating pressure.
- (4) Vent using the needle valve, ascertain switching values for "Pump ON" and "Alarm ON" (visual and audible), note values.
- (5) Close needle valve and ascertain switching values for "Alarm OFF" and "Pump OFF". Note values (possibly open needle valve slightly for slow increase in pressure)
- (6) Three-way valve 20 and 21 in setting "I", remove measuring gauge.

6.4.4 Checking the switching values without test unit

- (1) If several tanks are connected by a manifold, close all the shut-off cocks on the manifold apart from the valves for the tank with the smallest interstitial space.
- (2) Connect measuring gauge to three-way valve 21, setting "III".
- (3) Vent via three-way valve 20 (setting "III"), ascertain switching values for "Pump ON" and "Alarm ON" (with visual and audible alarm), note values.
- (4) Three-way valve 20 in setting "I", ascertain switching values for "Alarm OFF" and "Pump OFF", note values
- (5) Three-way valve 21 in setting "I", remove measuring gauge.
- (6) Open all shut-off cocks on the manifold with connected tanks.



6.4.5 Checking the overpressure valve

Operating pressure must have been built up in the leak detector for this test.

- (1) Three-way valve 21 in setting "II" (pressure sensor is vented). The pump switches on and the alarm is triggered.
- (2) Connect measuring gauge to three-way valve 20, setting "II".
- (3) Ascertain opening pressure of the overpressure valve (no further increase in pressure) and note value. If the opening pressure of the overpressure valve exceeds the test pressure of the tank, replace or adjust the valve.
- (4) Three-way valve 21 in setting "I". The pump switches off, ascertain the closing pressure of the overpressure valve (no further fall in pressure¹²), note the values.
- (5) Three-way valve in setting "I", remove measuring gauge.

6.4.6 Tightness test

- (1) Check that all shut-off cocks with connected tank are open.
- (2) Connect measuring gauge to three-way valve 21, setting "III".
- (3) Begin with the leak test after pressure has compensated. The tightness test is passed when the values in the following table are achieved.

Interstitial space volume in litres	Max. 1 mbar (0.015 psi) pressure loss in
250	22 minutes
500	45 minutes
1000	1.50 hours
1500	2.25 hours
2000	3.00 hours
2500	3.75 hours
3000	4.50 hours
3500	5.25 hours
4000	6.00 hours

- (4) Three-way valve 21 in setting "I", remove measuring gauge.

6.4.7 Restore the operating condition

- (1) Seal the housing
- (2) The shut-off cocks for every connected tank must be in the "open" setting.

¹² If the pump switches on before the closing pressure is reached, find out why and eliminate the cause.



6.5 Alarms

DL ..

- (1) Red LED lights up, the audible signal can be heard.
- (2) Stop the audible signal.
- (3) Inform the installation company immediately.
- (4) Find and eliminate the cause of the alarm, then check the functions of the leak detection system according to section 6.4.

DLG ..

- (1) Red and yellow LEDs light up, the audible signal can be heard.
- (2) Stop the audible signal.
- (3) Inform the installation company immediately.
- (4) Find and eliminate the cause of the alarm, then check the functions of the leak detection system according to section 6.4.
- (5) In the event of a malfunction, only the red LED lights up (yellow is off). Inform the manufacturer.

7 Removal

For the removal of units, which can cause a risk of explosion, always comply with the following points:

- Check that no gas is present before and during work.
- Any openings which could allow for entrainment of a potentially explosive atmosphere must be sealed gas-tight.
- Do not use spark-producing electrical tools (saws, abrasive cutters). If this is unavoidable, comply with EN 1127.
- Avoid the build-up of electrostatic charges (e.g. through friction or wearing unsuitable clothing).
- Dispose of contaminated parts appropriately (risk of outgassing).

8 Marking

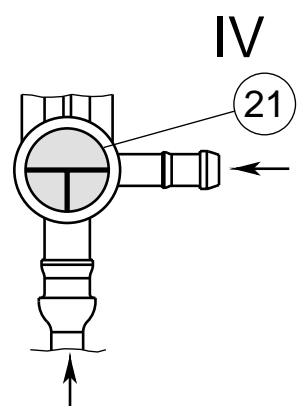
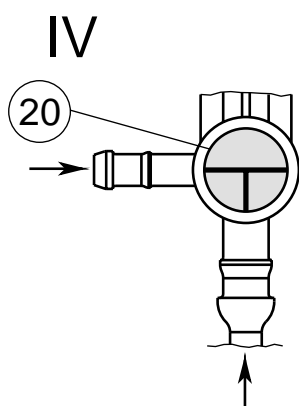
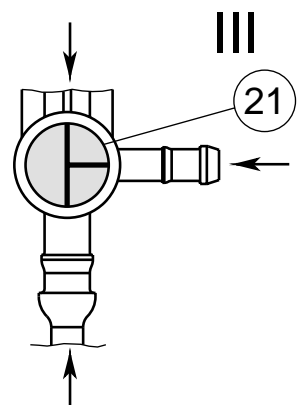
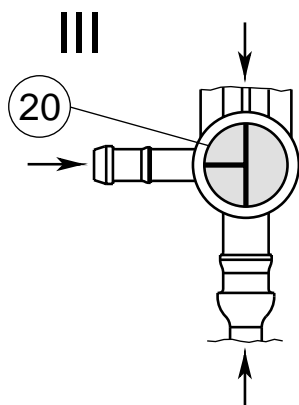
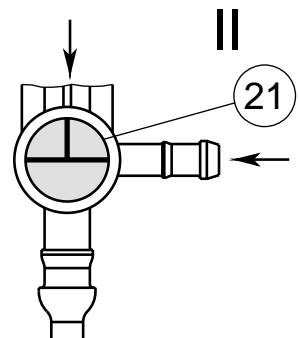
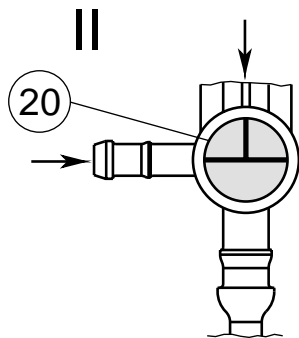
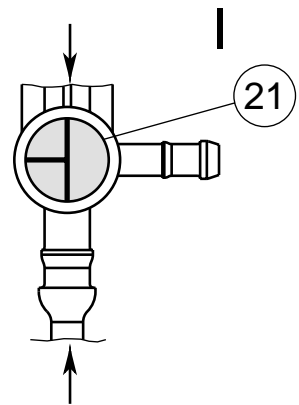
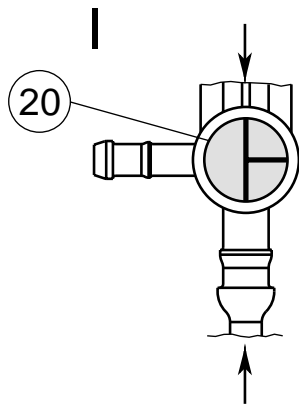
- Electrical data
- Serial number
- Type designation
- Manufacturing date (month / year)
- Manufacturer's symbol
- Statutory symbols
- Pressure and shut-off cock line for leak detection medium air can be connected to zone 2 interstitial space; there are no restrictions for nitrogen as leak detection medium.

9 Abbreviations

01	LED "Alarm", red	44	Solenoid valve
02	Shut-off cock	45	LED "Refill", yellow"
05	Shut-off cock (pressure regulator)	59	Relay

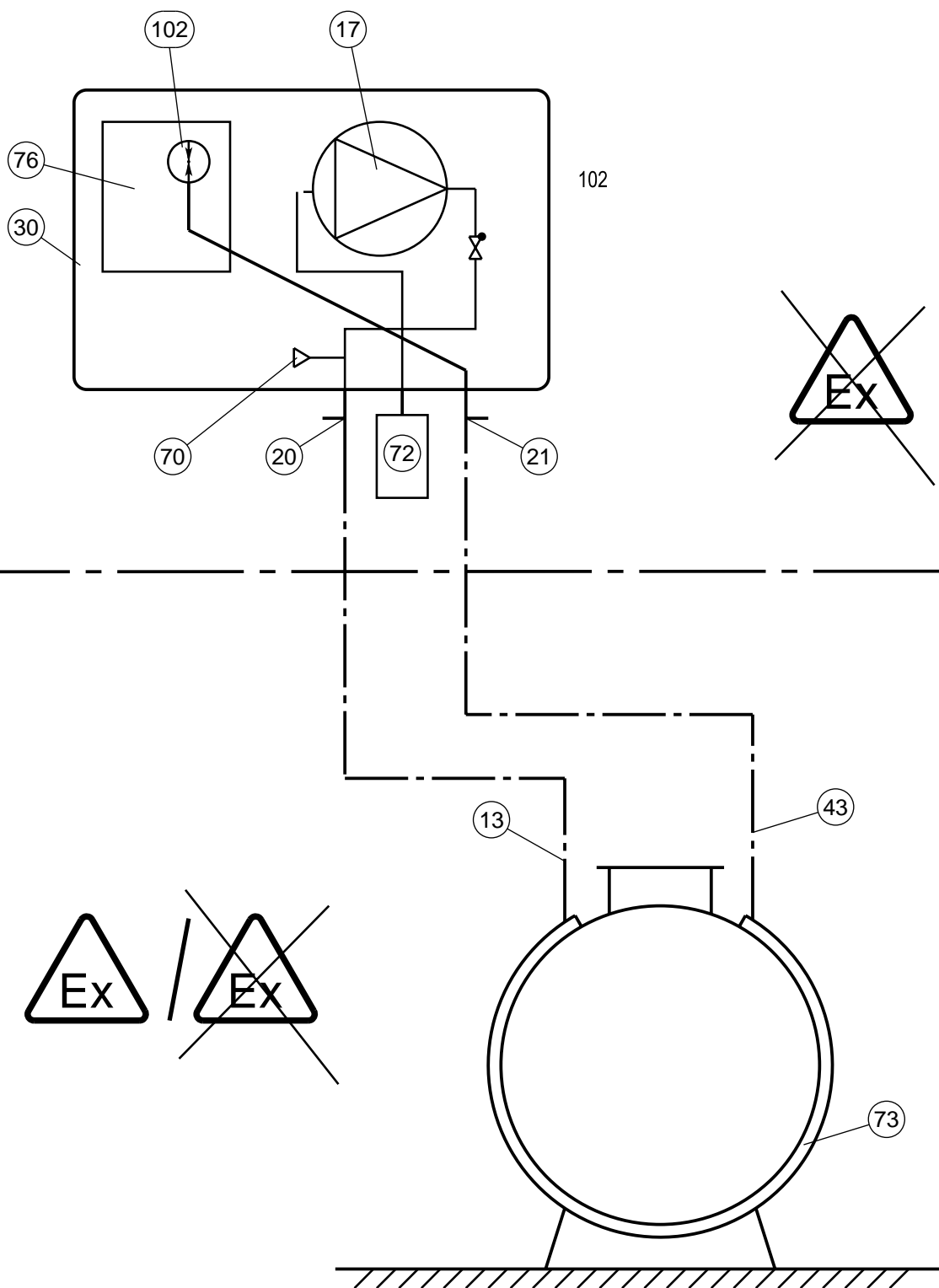


09	LED "Operation", green	61	Check valve with filter
13	Pressure line	69	Buzzer
14	Pressure reducer	70	Overpressure valve
17	Overpressure pump	71	Key "Audible alarm"
19	Pressure cylinder	72	Dry filter
20	Three-way valve in pressure line	73	Interstitial space
21	Three-way valve in measuring line	76	Main PCB
24.1	Fine-wire fuse	77	Pressure control valve
24.2	Fine-wire fuse	102	Pressure sensor
24.3	Fine-wire fuse	103	Display
25	Pressure cylinder shut-off cock	104	Operational pressure network (air / nitrogen)
29	Key "Fill"	105	Control unit
30	Housing	106	Contacts for serial data transfer
43	Measuring line		

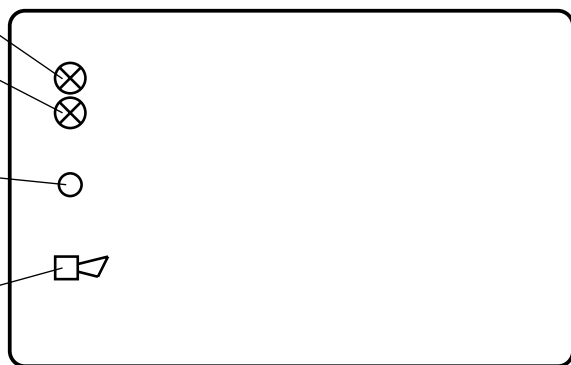


Druckleitung

Messleitung



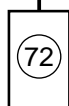
- 09
- 01
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- 69



230 V / 50 Hz

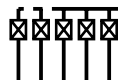


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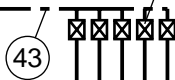


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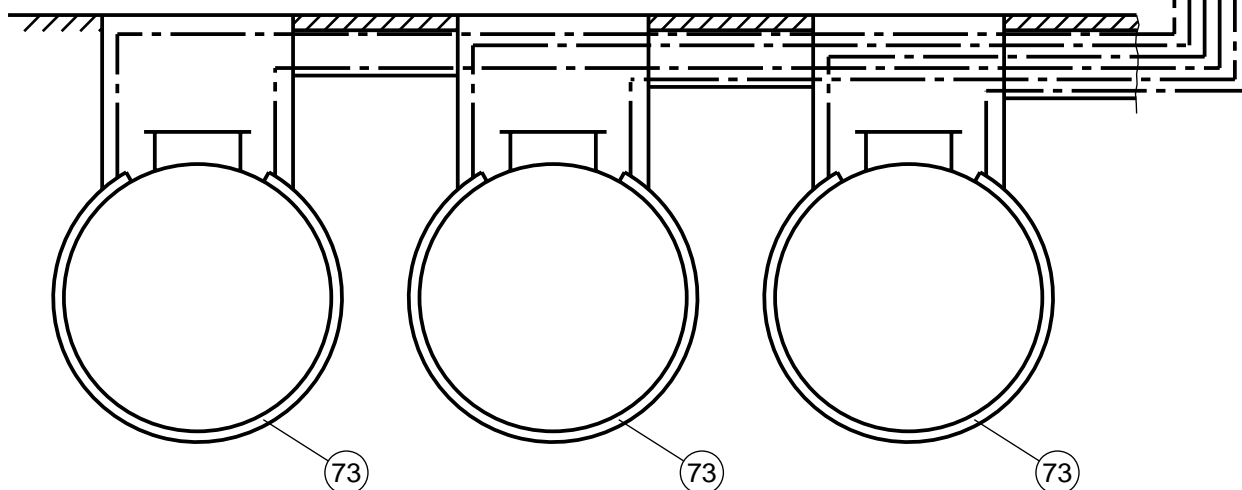
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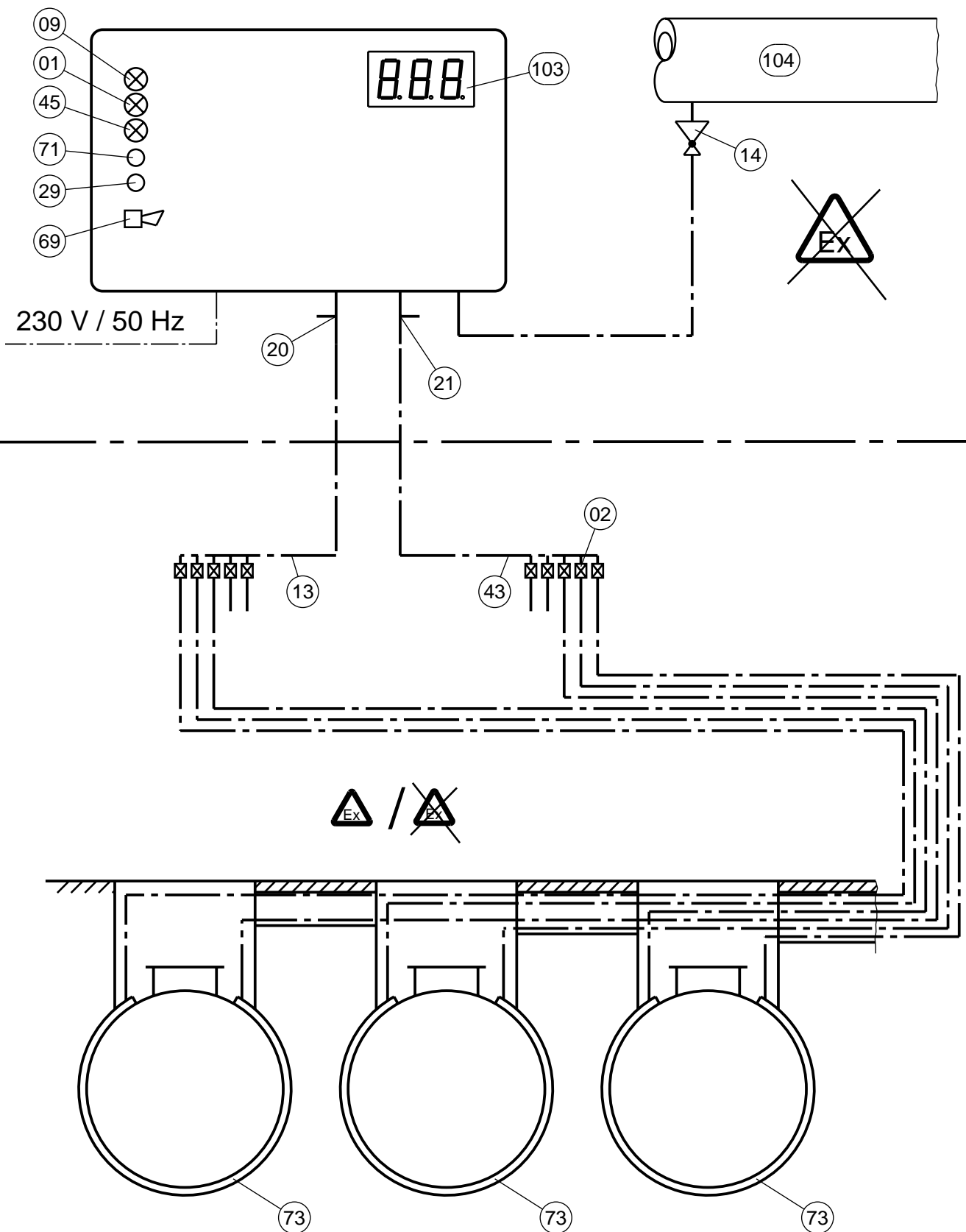


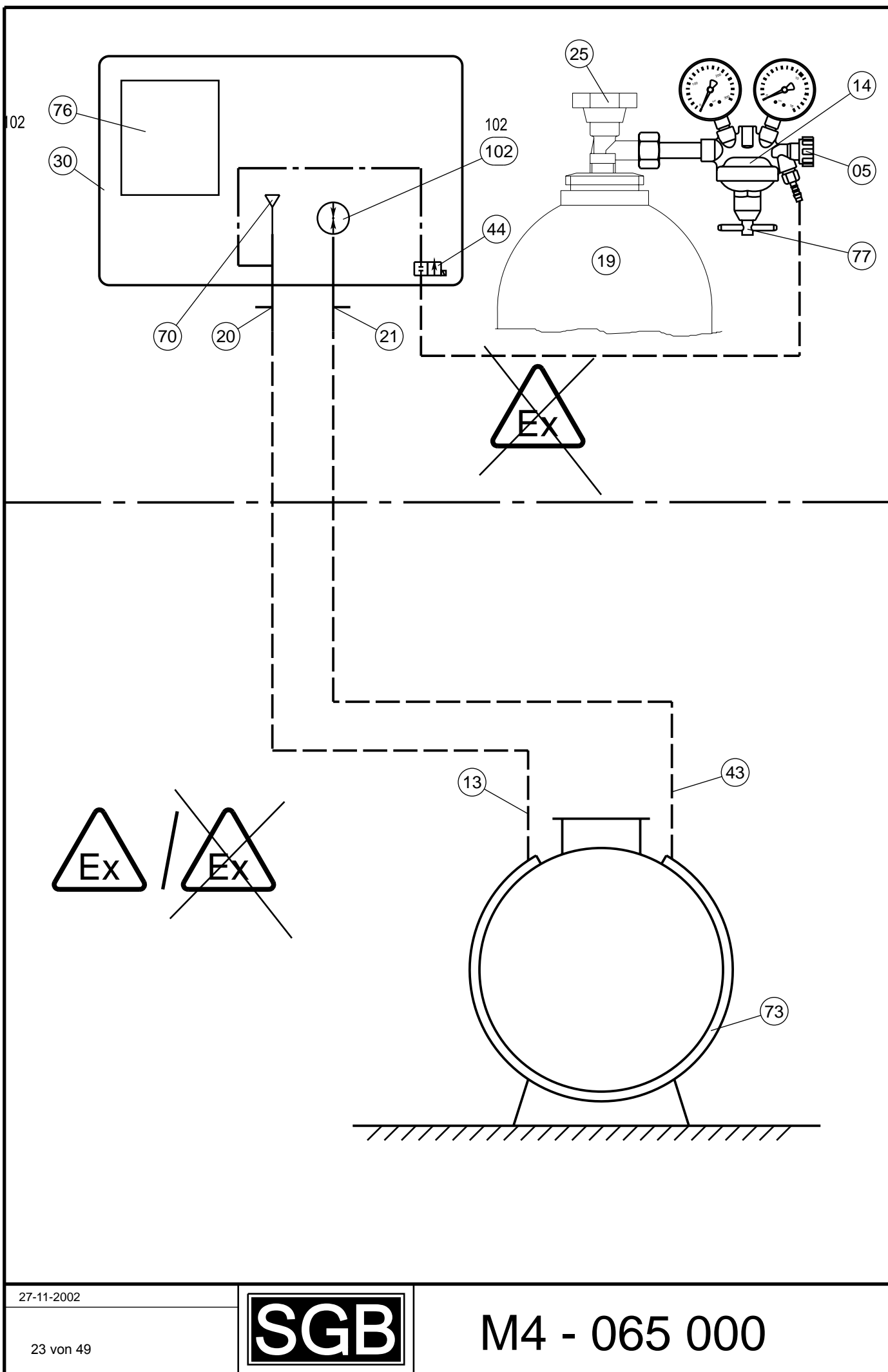
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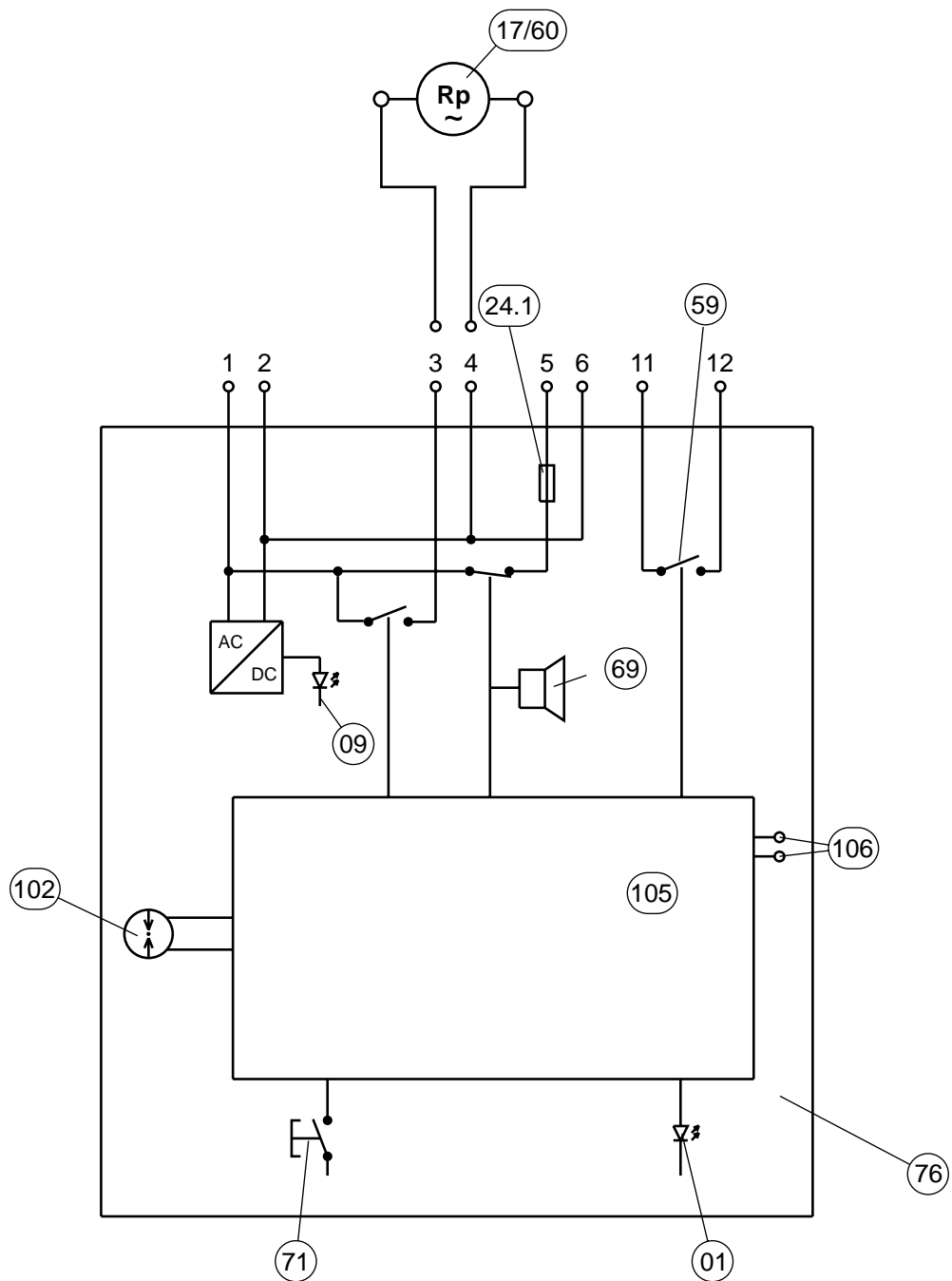


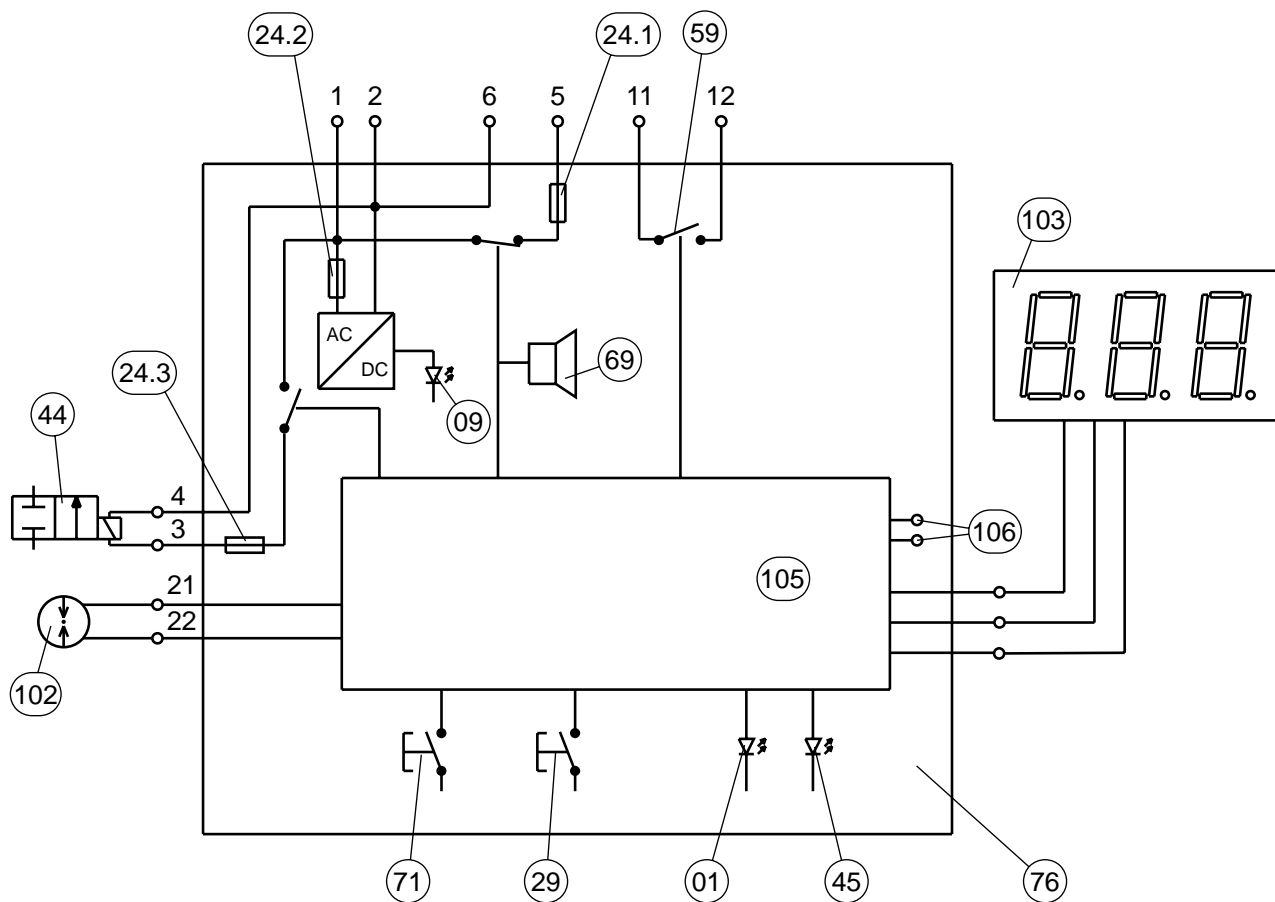
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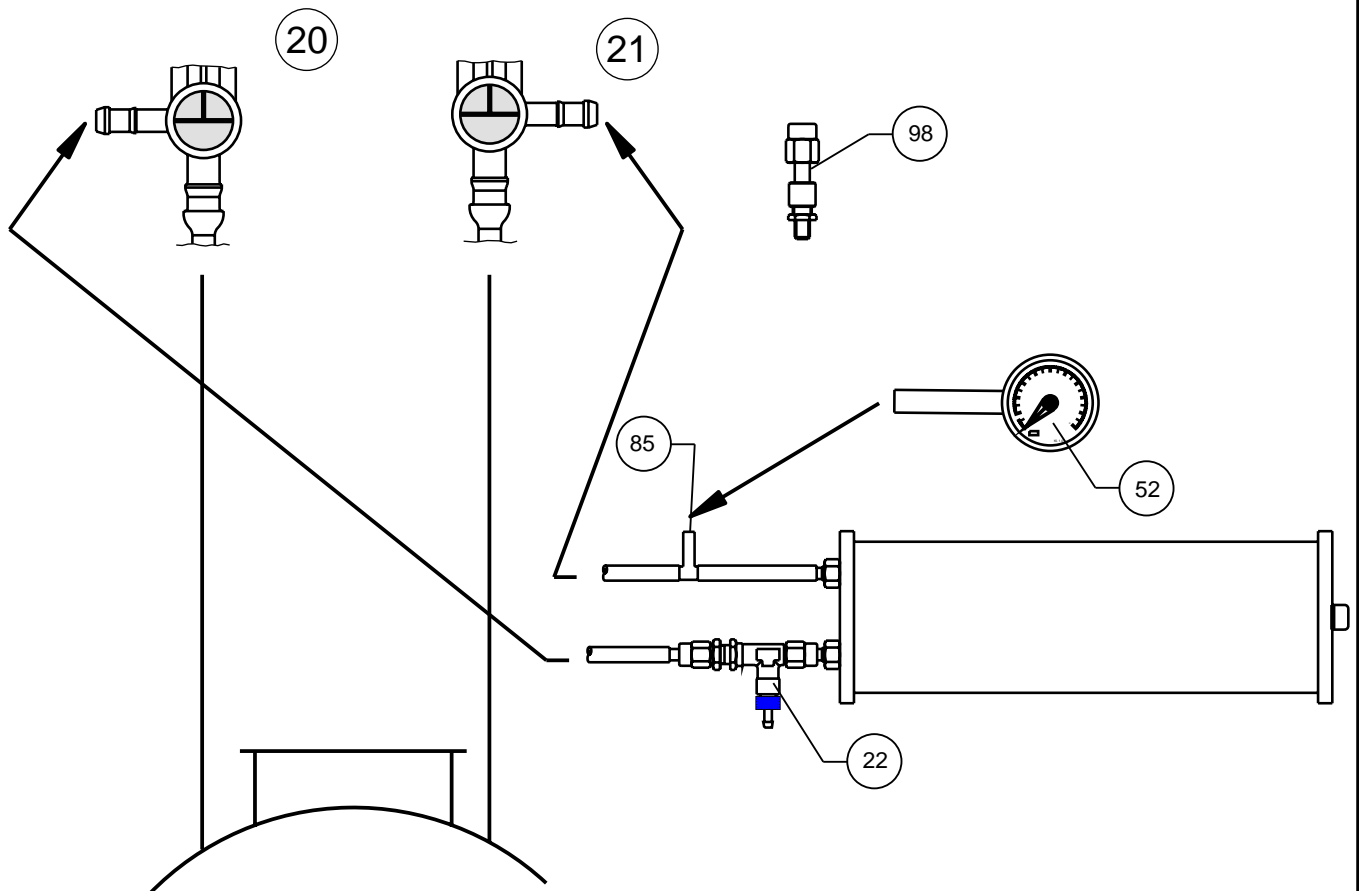
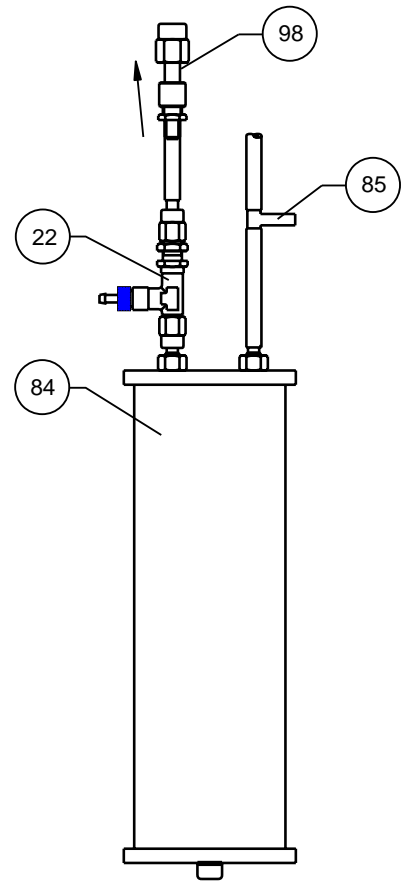
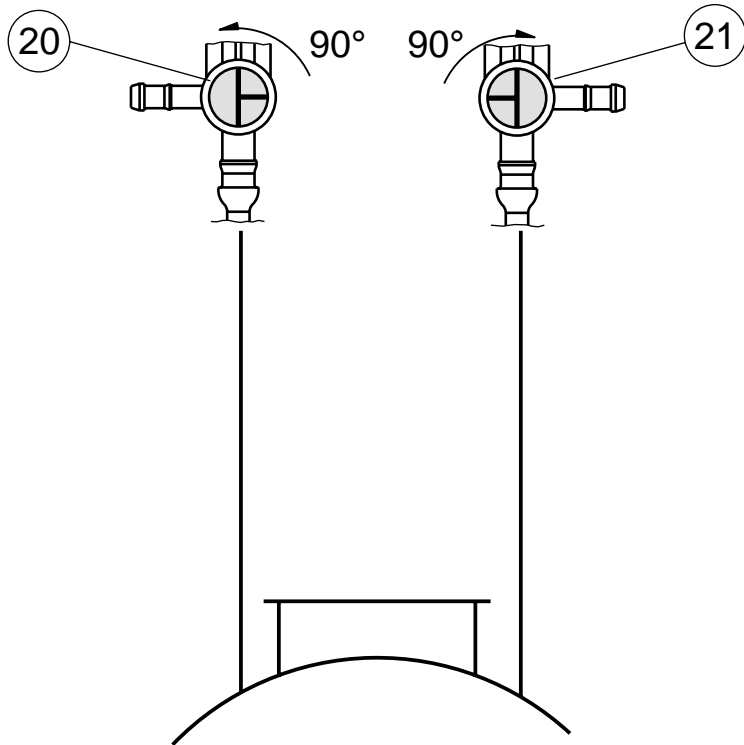












B Switching and pressure values

Type DL	p_{TS} [mbar]	p_{AE} [mbar]	p_{PA} [mbar]	$P_{ÜDV1}^1$ [mbar]	$p_{PRÜF}$ [mbar]
50	20	> 50	< 100	170 ± 20	≥ 200
100	70	> 100	< 150	220 ± 20	≥ 250
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
590	560	> 590	< 700	750 ± 30	≥ 850
750	720	> 750	< 850	940 ± 30	≥ 1000
1000	970	> 1000	< 1400	1550 ± 50	≥ 1750
1100	1070	> 1100	< 1450	1580 ± 70	≥ 1820
1500	1450	> 1500	< 1900	2100 ± 50	≥ 2350
2000	1950	> 2000	< 2400	2650 ± 50	≥ 2950
2300	2250	> 2300	< 2770	3100 ± 100	≥ 3500
2500	2450	> 2500	< 2900	3200 ± 50	≥ 3550
3000	2950	> 3000	< 3400	3750 ± 50	≥ 4150
—	Special switching values agreed between SGB and customer				

The following abbreviations are used in the table:

- p_{TS} maximum pressure at the low point of the tank, including overlay pressure
- p_{AE} switch value "Alarm ON", the alarm is triggered at the latest at this pressure
- p_{AA} 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" for pressure stages < 1000 and approx. 100 mbar higher for pressure stages > 1000
($p_{AA} = p_{AE} + \sim 15 \text{ mbar (pressure stages < 1000)} \sim 100 \text{ mbar (pressure stages > 1000)}$)
- p_{PA} Switch value "Pump OFF" (=nominal pressure)
- p_{PE} Switch value "Pump ON"
The switch value "Refill ON" is approx. 15 mbar lower than the switch value "Refill OFF" for pressure stages < 1000 and approx. 100 mbar lower for pressure stages > 1000
($p_{PE} = p_{PA} - \sim 15 \text{ mbar (pressure stages < 1000)} \sim 100 \text{ mbar (pressure stages > 1000)}$)
- $p_{ÜDV1}$ Opening pressure overpressure valve 1 (interstitial space side)
- $p_{PRÜF}$ Minimum test pressure of the interstitial space

¹ 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.

ANNEX B
OVERPRESSURE LEAK DETECTOR DL ..



Type DLG	p_{TS} [mbar]	p_{AE} [mbar]	p_{PA} [mbar]	$P_{ÜDV1}^2$ [mbar]	$p_{ÜDV2}^3$ [mbar]	$p_{PRÜF}$ [mbar]	p_{DM} [mbar]
50	20	> 50	< 100	170 ± 20	600 ± 50	≥ 200	200
100	70	> 100	< 150	220 ± 20	650 ± 50	≥ 250	250
290	260	> 290	< 350	420 ± 20	850 ± 50	≥ 450	450
330	300	> 330	< 410	465 ± 20	900 ± 50	≥ 500	500
400	370	> 400	< 500	565 ± 20	1000 ± 50	≥ 600	600
450	420	> 450	< 510	565 ± 20	1000 ± 50	≥ 600	600
590	560	> 590	< 700	740 ± 30	1250 ± 100	≥ 850	850
750	720	> 750	< 850	940 ± 30	1500 ± 100	≥ 1000	1000
1000	970	> 1000	< 1400	1550 ± 50	2700 ± 100	≥ 1750	1800
1100	1070	> 1100	< 1450	1580 ± 70	2400 ± 100	≥ 1820	1850
1500	1450	> 1500	< 1900	2100 ± 50	3400 ± 100	≥ 2350	2400
2000	1950	> 2000	< 2400	2650 ± 50	4200 ± 100	≥ 2950	3000
2300	2250	> 2300	< 2770	3100 ± 100	4800 ± 200	≥ 3500	3500
2500	2450	> 2500	< 2900	3200 ± 50	5000 ± 100	≥ 3550	3600
3000	2950	> 3000	< 3400	3750 ± 50	6000 ± 100	≥ 4150	4200
—	Special switching values agreed between SGB and customer						

The following abbreviations are used in the table:

- p_{TS} maximum pressure at the low point of the tank, including overlay pressure
- p_{AE} switch value "Alarm ON", the alarm is triggered at the latest at this pressure
- p_{AA} switch value "Alarm OFF", the alarm goes off on passing this value.
The switch value "Alarm OFF" is approx. 15 mbar higher than the switch value "Alarm ON" for pressure stages < 1000 and approx. 100 mbar higher for pressure stages > 1000
($p_{AA} = p_{AE} + \sim 15 \text{ mbar (pressure stages < 1000)} \sim 100 \text{ mbar (pressure stages > 1000)}$)
- p_{PA} Switch value "Pump OFF" (=nominal pressure)
- p_{PE} Switch value "Pump ON"
The switch value "Refill ON" is approx. 15 mbar lower than the switch value "Refill OFF" for pressure stages < 1000 and approx. 100 mbar lower for pressure stages > 1000
($p_{PE} = p_{PA} - \sim 15 \text{ mbar (pressure stages < 1000)} \sim 100 \text{ mbar (pressure stages > 1000)}$)
- $p_{ÜDV1}$ Opening pressure overpressure valve 1 (interstitial space side)
- $p_{ÜDV2}$ Opening pressure overpressure valve 2 (supply side)
- $p_{PRÜF}$ Minimum test pressure of the interstitial space
- p_{DM} Set pressure at the pressure reducer

² 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.

³ Overpressure valve 2 ÜDV2 can be omitted if the test pressure in the interstitial space is higher than the triggering pressure of the overpressure valve integrated in the pressure reducer.



Technical data

1. Electrical data

Power supply (without external signal)	230~ V - 50 Hz - 50 W
Switch contact load, terminals AS (5 and 6)	230~ V - 50 Hz - 200 VA
Switch contact load, potential-free contacts, (Terminals 11 and 12)	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	suitable



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 alarm 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 31 to 34:

31/32 Contact opens on receiving a message

31/34 Contact closes 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.



Dry filter

1 Size of dry filter for underground tanks:

TF 180 (the larger dry filters can also be used)

2 Size of dry filters for above ground tanks:

Type	Max. volume of the interstitial space with			
	TF 180	TF 1	TF 2	TF 6
DL 50	350	750	2100	4800
DL 100				
DL 290	300	600	1600	3700
DL 330				
DL 400	250	520	1500	3500
DL 450				
DL 590	240	500	1350	3000
DL 750				
DL 1000	210	400	1150	2600
DL 1100				
DL 1500	150	300	800	1850
DL 2000				
DL 2300	130	250	700	1600
DL 2500				
DL 3000	110	230	600	1400



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.

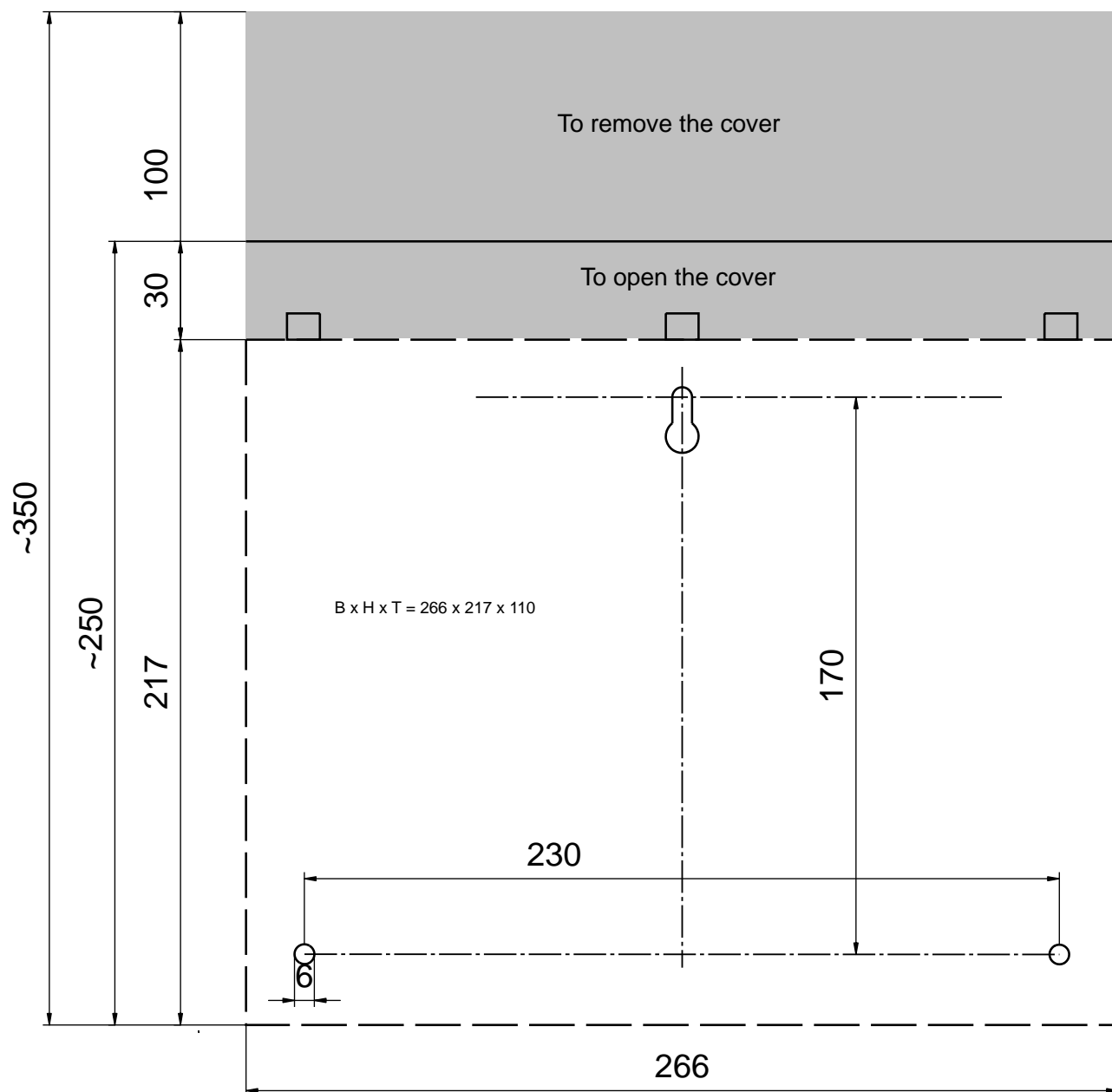
This is only possible if the switching value "Alarm OFF" has been exceeded. It can be repeated several times in succession.

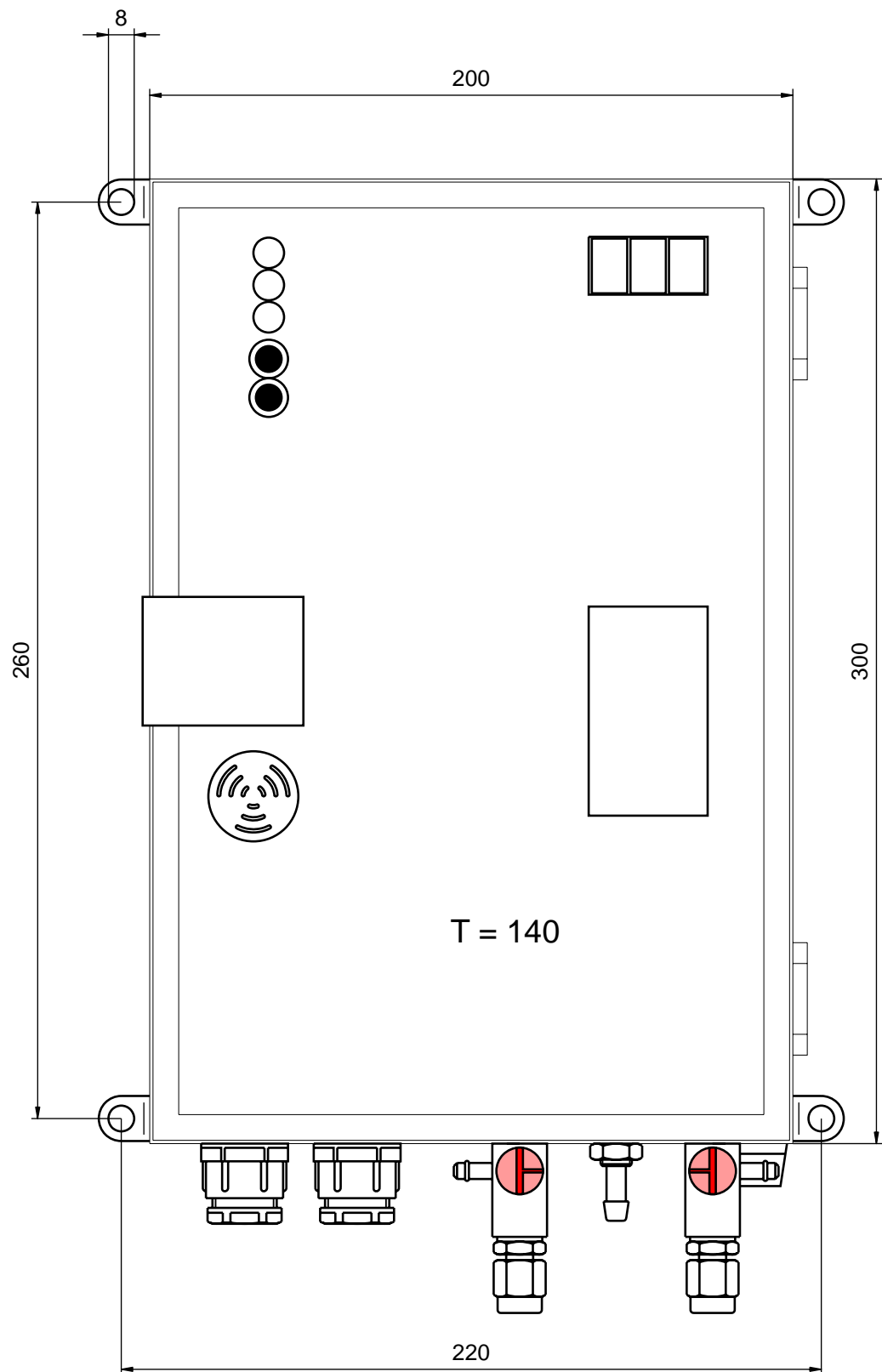
This check is advisable **before** carrying out a recurrent function test on a leak detector, to see directly whether there is any need to look for leaks.

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

Number of flashes	Evaluation of the tightness
0	Very tight
1 bis 3	Tight
4 bis 6	Sufficient tight
7 bis 8	Maintenance recommended
9 bis 10	Maintenance highly recommended

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.





Work Sheet: AB-820 500

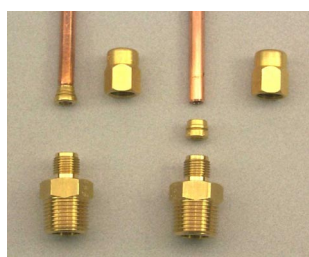
Pneumatic connections

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



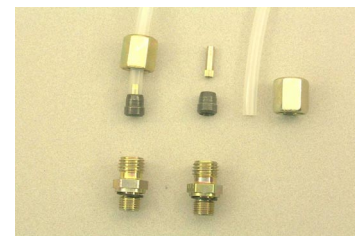
1. Insert the support sleeve into the end of the pipe
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the thread until strong resistance can be clearly felt
4. Lightly loosen the nut
5. Tighten the nut until resistance can be felt (nut must exactly match the thread of the basic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



3 Olive threaded fitting for plastic and metal pipes

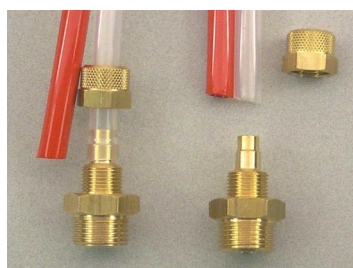


1. Insert the reinforcing sleeve into the end of the pipe
2. Knock in the reinforcing sleeve
3. Push the union nut and the olive over the end of the pipe
4. Screw the union nut by hand until you feel a stop
5. Press the pipe against the stop in the inner cone
6. Tighten the union nut by approx. 1.5 revolutions (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

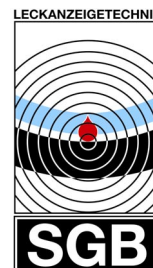
4 Quick-action fitting for PA- and PUR-tubes



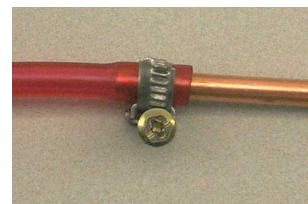
1. Make a right-angled cut in the PA pipe
2. Loosen the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to where the thread begins
4. Tighten the union nut by hand
5. Further tighten the union nut using a wrench until clearly increased force is needed (approx. 1 to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

1 July 2005

2102Stb

File: 3237DV01040

Order No.: 8100586804

Approval Certificate

for the design of a leak detector
as part of a leak detection system

=====

1 **Subject**

Overpressure leak detector as part of a leak detection system function on the basis of overpressure

2 **Commissioned by**

Sicherungsgerätebau GmbH
Hofstraße 10
57076 Siegen

3 **Details about the leak detector**

3.1 **Manufacturer**

See commissioned by

3.2 **Type**

DL .. / DLG ..

3.3 **Application**

Double walled tanks, single walled tanks with pressure-resistant jacketing and double walled sumps and containments with sufficient pressure resistance (see section No. 2 of the Technical Description dated 21 April 2004)

3.4 **Design**

The designation "overpressure leak detector type DL.. / DLG.." covers two types which differ according to how pressure is generated and with regard to the switching pressures. The units consist essentially of a pressure transducer and a display/message unit, with electronic control and signal processing. Air or inert gas can be used as leak detection medium, complying with the maximum pressures on the tank bottom stated in Annex B of the Technical Description.

The following unit variants are used:

Overpressure leak detector DLG ..

The leak detector can be operated with air as well as with inert gas as leak detection medium. The necessary operating pressure in the interstitial space is generated by pressure-controlled refilling from a stationary pressure accumulator connected to the interstitial space. If the operating pressure in the interstitial space falls below the adjusted alarm value, then the visual and audible alarm is triggered automatically.

Overpressure leak detector DL ..

In this version, pressure is generated in the interstitial space by an integrated pump, using only dried ambient air as leak detection medium.

All unit variants are equipped with a test coupling for connecting an external measuring gauge.

Overpressure valves to protect the interstitial space from excessive overpressure are an integral part of the leak detectors and installed in the pressure lines of the unit. Overpressure valves to protect the type DLG .. units when connected to an external pressure accumulator must be connected externally between the leak detector and pressure accumulator, as required.

Details of the design for leak detector DL.. / DLG .. are contained in the Technical Description issued by Sicherungsgerätebau GmbH dated 21 April 2004.

4. Test principles

Approval principles for leak detection systems for double walled pipes (ZG-LAGR)

EN 13160 Part 1 and 2

5. Test documents/Test samples

- 5.1 Technical Description of the overpressure leak detector DL.. dated 21 April 2004
- 5.2 Sample version of leak detector type DL 400
- 5.3 Approval certificate DLR-G dated 14 May 2002
- 5.4 Supplement with details of the dry filters for DL_4000
- 5.5 Parts list leak detector VL..

6. Tests

The sample version of the leak detector in the variant DL 400 was tested with reference to the Technical Description with design drawings and circuit diagrams as well as installation and operating instructions and software documentation, for compliance with the requirements of the approval principles for leak detection systems.

The following tests were carried out:

1. Test of the electrical equipment (without taking account of explosion protection).
2. Switching cycles at various limit temperatures (-25°C to +70°C)
3. Testing the visual and audible alarm
4. Pressure and leak tests of the installations

7 Test results

The Leak detector DL.. fulfilled the requirements stipulated in the approval principles for leak detection systems. The parts of the sample unit conform with the Technical Description and drawings. The function tests on sample unit leak detector type DL400 showed that the unit withstands the loads and remains fully functional. The parts of the electronic circuit integrated in the unit remained fully functional even under the temperature loads.

The mechanical function tests and software test produced positive results. Undefined measured values, incorrect calibrations and failure of the system cycle triggered the alarm.

The function tests over 440 hours also produced positive test results. Leak detector DL 400 fulfils the requirements made of it with regard to monitoring the overpressure generated in the interstitial space with an automatic alarm on reaching the alarm pressure. The leak detector pump is capable of compensating for pressure fluctuations caused for example by changes in temperature. The switching values of the pressure switch (alarm ON > 400 mbar, pump ON <500 mbar) are met as stated in the Technical Description. The pressure switching values remain within the stated tolerances even at the limit temperatures of -25°C and +70°C.

Evaluation of continuous operation of the unit as a whole – the unit was subject to 10,000 load cycles – also produced no notable deviations in the pressure switching values or restrictions in its functioning ability.

Measurement of the volume flow using a suspended particle flow meter showed that the volume flow at the stated alarm switching value of 400 mbar amounts to 85 ± 15 l/h (see curves). The flow rate of the pressure pump is adequately rated.

Pump curve leak detector DL 400:

The switching processes were adjusted to the upper temperature limit of +70°C and lower temperature limit of -25°C in such a way as to trigger an alarm within 5 minutes.

Tests of the alarm signalling device also produced positive results. The audible alarm produces a sound level of > 70 dB(A) at 1 m distance from the closed housing after 24 h continuous operation. The visual alarm can be considered adequate.

The overpressure valve triggered in the pressure range stated by the manufacturer. The overpressure valve is capable of dissipating the entire flow output of the overpressure pump so that the interstitial space of the tank is protected with regard to an excessive increase in pressure after the tank has heated up or following failure of the pressure switch.

The electrical installation in the switching box complies with the DIN VDE regulations. An external alarm lead is protected by switching a potential-free relay, with an additional fuse to protect the unit from the circuit of the outer alarm.

The leak detector with type designation DLG.. is identical to the leak detector DLR-G which was already certified with the approval certificate dated 14 May 2002 and approved with approval number Z-65.26-349, so that its suitability for the intended application was already verified in the approval process.

Suitability of the adequate capacity of the dry cartridges was already verified in the approval process for leak detector type DL-4000.

8 Assessment

Leak detector type DL../DLG.. is suitable as a component in a leak detection system based on overpressure and fulfils the requirements of the approval principles for leak detection systems. The leak detector as component in an overpressure leak detection system constitutes a safety device in accordance with §19h Water Resources Act for rapid, reliable detection of leaks in water polluting liquids when the following conditions are met:

1. The leak detector variants are to be produced, adjusted and operated in accordance with the Technical Description dated 22 April 2004.
2. The corresponding leak detector type must only be used for the interstitial spaces stated in the section "Limits of operation" in the Technical Description. The corresponding leak detector type must be

selected so that the alarm switching pressure is always at least 30 mbar above the static pressure of the stored liquid, taking account of possible overlay pressure in the tank. In the case of a sump, the maximum liquid height of the liquid being collected must be taken into consideration. The units are to be selected on the basis of the tables contained in Annex B of the Technical Description dated 21 April 2004.

3. The details stated by the manufacturer in the operating instructions must be heeded for producing and sustaining the operating pressure of the leak detector. The leak detectors are to be operated so that the tolerable operating pressure of the interstitial space is not exceeded. For leak detector type DLG., fundamentally only pressure reducers should be used with a maximum setting range for the pressure reducing valve 5% to 10% below the test pressure of the interstitial space. Otherwise, overpressure valves must be provided to prevent the pressure from exceeding the maximum tolerable operating pressure in the interstitial space.
4. The supply pressure for the leak detector DLG.. stated in the Technical Description for the pressure accumulator must be heeded because otherwise, the re-fill quantity of leak detector medium deviates from the tolerable value stated in the approval principles.
5. Every leak detector must be marked indelibly and legibly with at least the following details:
 - Manufacturer or manufacturer's symbol
 - Year of production
 - Production number
 - Approval code
 - Type designation
 - Nominal operating data.
6. Every leak detector must undergo individual testing before delivery. The requirements of ZG LAGR No. 7 must be observed in terms of production monitoring.
7. Every leak detector must be accompanied by installation and operating instructions together with a copy of the approval certificate and, in the case of type DL., corresponding documentation for the dry filters (cartridges) to be used and the corresponding interstitial space sizes.

9 Note

Compliance with the requirements for explosion protection, electromagnetic compatibility and the low voltage directive was not part of the tests.

/round stamp/signature/

Surveyor of the Technischer Überwachungs-Verein Nord e.V.
Test department for leak detection systems.

GERMAN INSTITUTE FOR BUILDING TECHNOLOG
Public Law Institution

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Phone: +49(0) 30 78730-364
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Ref: III 14-1.65.23-9/05

General Building Inspectorate Approval

Approval number: Z-65.23-409

Applicant: Sicherungsgerätebau 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 30 April 2010

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 ≥ 50 mbar, ≥ 100 mbar, ≥ 290 mbar, ≥ 330 mbar, ≥ 400 mbar, ≥ 450 mbar, ≥ 590 mbar, ≥ 750 mbar, ≥ 1000 mbar, ≥ 1100 mbar, ≥ 1500 mbar, ≥ 2000 mbar, ≥ 2300 mbar, ≥ 2500 mbar and ≥ 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 m³ 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. 1st Ordinance on the Machine Safety Law – Low Voltage Ordinance – Law on Electromagnetic Compatibility of Machines – EMC - , 11th 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)¹.

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 Description². 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.

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

² 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 1310-1³ regarding the equipment categories as per EN 1127-1⁴.

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

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

⁴ 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

EC DECLARATION OF CONFORMITY



We,

Sicherungsgerätebau GmbH
Hofstraße 10
D- 57076 Siegen

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 61 000-6-1: 2001 EN 61 000-6-2: 2000 + A2: 2005 EN 61 000-3-2: 2000 + A2: 2005 EN 61 000-3-3: 1995 + A1: 2001 + A2: 2005
73/23 EEC Low Voltage Directive	EN 60 335-1: 2002 EN 61 010-1: 2001 EN 60 730-1: 2000
89/106/EEC Construction Products Directive	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: 1997 EN 60 079-10: 1996 EN 13 160-1-2: 2003 EN 13463-1: 2001 The ignition hazard analysis did not result in any additional hazards.

Compliance is declared by

Martin Hücking
(Technical Director)

EC DECLARATION OF CONFORMITY



We,

Sicherungsgerätebau GmbH
Hofstraße 10
D- 57076 Siegen

hereby declare in sole responsibility that the leak detectors

DLG ..; DLR-G..

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

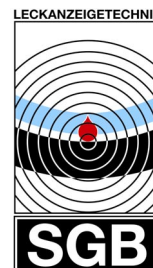
This declaration shall lose its validity if the device is modified without consulting us.

Number / short title	Satisfied regulations
2004/108/EC EMC Directive	EN 61 000-6-1: 2001 EN 61 000-6-2: 2000 + A2: 2005 EN 61 000-3-2: 2000 + A2: 2005 EN 61 000-3-3: 1995 + A1: 2001 + A2: 2005
73/23 EEC Low Voltage Directive	EN 60 335-1: 2002 EN 61 010-1: 2001 EN 60 730-1: 2000
89/106/EEC Construction Products Directive	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 and also, under specific conditions, to spaces which are required for category 1 device. The following documents were used: EN 1127-1: 1997 EN 60 079-10: 1996 EN 13 160-1-2: 2003 EN 13463-1: 2001 The ignition hazard analysis did not result in any additional hazards.

Compliance is declared by

Martin Hücking
(Technical Director)

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

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