Overpressure leak detector

DLR-GS

Documentation DLR-GS

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GERMANY

Overview of the design variants

The overpressure leak detector DLR-GS is available in various designs, which are described in more detail by the letters that follow.

DLR-GS…. PMN

“Feed required” (**N**), the leak detector indicates by means of a diode that the pressure in the interstitial space has decreased and that the pressure must be built up again.

“Pressure gauge” (**M**), the leak detector is equipped with a digital pressure display in the cover on the housing.

“Protected” (**P**) version of the leak detector in a weather-proof housing (IP54).

“Numerical value” for the alarm pressure of the leak detector in bar.

The alarm pressure ranges from 1 to 16 bar.

“**g**as(cylinder), **s**tatic” A pressure cylinder must be brought along to the site for commissioning, functional testing and for feeding.

“Pressure leak detector pipe” (**DLR**). The leak detector works with overpressures relative to the pressure of the environment and is equipped with double-walled pipes for monitoring.

Documentation contents

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1. Subject

Overpressure leak detector without built-in pressure generator for double-walled pipes and fittings, with inert gas or air used as the leak detection medium.

DLR-GS .. (the dots are replaced by the respective alarm pressure in bar)

2. Area of use

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).
- Leak-tightness of the interstitial space (see section 6.4.4)
- The number of interstitial spaces to be monitored depends on the overall volume of the interstitial space. According to EN 13160, this must not exceed 10m^3. In order to make it possible to verify the leak tightness of the interstitial space, we recommend that a value of 4 m^3 is not exceeded.
  The length of pipe which is to be monitored (per pipe branch) should not exceed 2500 m or as specified in the approval requirements of the pipeline.

2.2. Pipes

- Double-walled pipes made of metal or plastic, assembled in the plant or on-site.
  For Germany: more far-reaching requirements for double-walled pipes may result from TRbF 50, the DIBt approval principles or EN 13160.
- ONLY for applications where temperature fluctuations will not exceed ± 10°C (e.g. double-walled pipes installed underground or through buildings; no hot fluids).

2.3. Fittings

- Double-walled fittings made of metal or plastic, assembled in the plant or on-site.
  For Germany: with Allgemeine bauaufsichtliche Zulassung (General Building Authority Approval), where not included in the approval of the pipeline.
- ONLY for applications where temperature fluctuations will not exceed ± 10°C (e.g. fittings installed underground or in buildings; no hot fluids).

2.4. Materials carried in the pipes / leak detection medium

- Water-pollutant fluids
  – With flashpoint >55°C with air or inert gas used as the leak detection medium
  – With flashpoint <55°C with inert gas used as the leak detection medium as long as the interstitial space has been classified by the operator as zone 2
  – Which do not react with the leak detection medium

- The resistance of the pipeline/fittings to the material being conveyed must be verified by third parties (e.g. operator, manufacturer of the pipeline/fittings ....)

3. Description of functions and operation

The overpressure leak detector DLR-GS monitors both walls of the double-walled system for leaks. The monitoring pressure under normal operating conditions is higher than any other pressure applied to the inner or outer wall, so that leaks are indicated through a drop in pressure.

The leak detection medium used can be an inert gas or air from a pressurised gas canister or gas network (with the use of a suitable pressure reducer). If air is used, it must be dried to less than 10% relative humidity.

If the current pressure is shown in mbar/bar or in PSI[1] on the optional display screen, the following applies:

- Values under 150 mbar or 2.18 PSI are not displayed.
- Values between 100 and 990 mbar are displayed in mbar without any decimal places.
- Values >1 bar are displayed in bar to two decimal places, values >10 bar to one decimal place.
- Values in PSI are displayed to one or two decimal place(s).

3.1. Switching values and pressure values

A list of switching values is shown in Appendix B.

3.2. Normal operation

When the detector is put into operation, the normal operating state is achieved by building up pressure to the setpoint via a pressure accumulator (normally mobile).

The pressure applied in the interstitial space is monitored in the leak detector by a pressure sensor. Any small leakages result in a drop in pressure. That means that the interstitial space(s) and connecting pipes are subject to very high requirements of leak tightness if a full year of fault-free operation is to be ensured.

3.3. Functions in the event of a leak

If a leak occurs on the inner or outer wall then gas will escape from the interstitial space. The pressure drops.

When the alarm pressure is reached, an alarm (visual and acoustic) is triggered, and the potential-free contacts open.

[1] The display is preset to bar or PSI at the manufacturing plant, but this setting can also be carried out on site upon consultation with the manufacturer.

Optionally, an additional relay can be used for potential-free contacting when the pressure falls below the "Feed required" point. The pressure value for "Feed required" is about 1 bar above the switching value "Alarm ON".

3.4. Pressure relief valve

The leak detector is not designed with a safety valve, but one can be added if the application requires it. (Please consult the manufacturer).

3.5. Description of the display and control elements

3.5.1 Display element states (signal lamps)

Signal lamp	Operating status	Feed required (optional)	Alarm status	Alarm, acoustic alarm signal acknowledged/reset	Device fault
OPERATION: green	ON	ON	ON	ON	ON
ALARM: red	OFF	OFF	ON	FLASHING	ON
FEED: yellow	OFF	ON	ON	ON	OFF

3.5.2 Operating functions via pushbuttons

- Switching off the acoustic alarm signal:
  Briefly press the "Acoustic alarm" button once – the acoustic alarm signal is then switched off and the red LED flashes.
  Pressing the button again will cause the acoustic signal to be switched on.
  This function is not available in normal operation or during malfunctions.
- Testing the visual and acoustic alarm signal
  Press the "Acoustic 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.

4. Installation and assembly instructions

4.1. General notes

(1) Installation and assembly must only be performed by qualified firms[2].

(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) When transporting the gas canister to and from the construction site, the relevant traffic regulations must be observed.

(5) The gas canister must be secured at the construction site to prevent it falling over.

(6) If the device is being put into operation in closed spaces, ensure adequate ventilation.

(7) A test valve should be provided at the end of the pipe(s)/fitting(s) away from the leak detector.

(8) Before accessing control shafts, check the oxygen content and, if necessary, flush the control shaft.

(9) When using metallic connection lines, you must make sure that the mains earth is connected to the same potential as the pipe being monitored.

4.2. Personal safety equipment

The parts listed here apply in particular to safety when working on systems which pose an explosion hazard.

If work is carried out in areas with a potentially explosive atmosphere, then the following items of equipment are required as an absolute minimum:

- Suitable clothing (because of risk of 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)[3]
- Measuring device for determining the oxygen content of the air (Ex / O meter)

4.3. Installation of the leak detector

(1) Generally in a wall-mounted installation with wall plugs and screws.

(2) In a dry room, or out in the open in a suitable housing.

(3) Installation in a protective box: additional external signal or alarm forwarding via potential-free contacts to a central switch room or similar.

(4) **NOT in areas with an explosion hazard.**

[2]For Germany: "qualified firms" in the sense of § 19 I of the Wasserhaushaltsgesetz (Water Resources Act, WHG) which have demonstrated their qualification for installing leak detection systems, including TRbF.

[3] Other percentages may be applicable according to national, regional or plant-specific regulations.

4.4. Installation of the connecting lines (leak detector -> interstitial space)

(1) Metal (generally copper) or plastic pipes with a pressure resistance corresponding to at least the test pressure of the interstitial space – also applies to fittings and unions. (Observe the temperature range, particularly when using plastic materials.)

(2) Clear width at least 4 mm with inert gas as the leak detection medium
at least 6 mm with air as the leak detection medium

(3) Length should not significantly exceed 50 m, but if it does: use a pipe with a greater clear width together with bridging pieces.

(4) The full cross-section must be retained. No pinching or kinking[4].

(5) Metal or plastic pipes laid underground and plastic pipes laid overground should be laid inside a protective pipe.

(6) The protective pipe should be sealed gas-tight and protected to prevent fluids from penetrating inside.

(7) Avoid any build-up of electrostatic charge (e.g. when drawing in lines).

(8) For details of the connection technology to be used refer to Work Sheet AB-820 500 (see Information).

4.5. Selecting the pressure reducer

(1) The pressure reducer must have a built-in pressure relief value.

(2) The adjusting range of the selected pressure reducer must be suitable for the specific application or pressure required. (See Appendix B.)

(3) The maximum pressure which can be set on the pressure reducer must not be greater than the test pressure of the interstitial space (SGB recommendation).

4.6. Gas canister and pressure reducer (functional tests and commissioning)

(1) After setting up the gas canister securely, remove the protection cap.

(2) Install the pressure reducer on the canister.

(3) Close the shut-off valve on the pressure reducer.

(4) Connect the connecting pipe between the leak detector and the pressure reducer.

(5) Turn the pressure regulating valve all the way back.

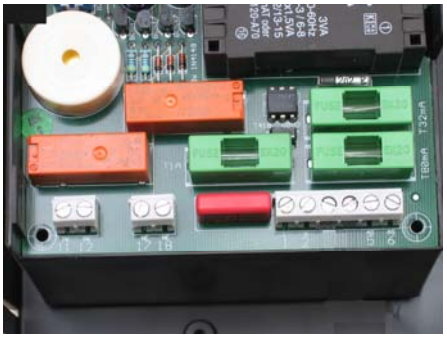
(6) Open the canister shut-off valve. (leak test if necessary between pressure reducer and canister)

(7) Set the pressure on the pressure reducer in accordance with Appendix B using the pressure regulating valve on the pressure reducer (re-adjustment may be required during pressure build-up).

[4] With plastic pipes, standard commercially available moulded parts (with given bend radiuses) may need to be used

(8) After functional testing has been carried out
- Close shut-off valve on the pressure reducer
- Close the canister shut-off valve.
- Remove the pressure reducer from the canister (attention: gas escapes until the pressure reducer is depressurised).
- Fit the protection cap onto the canister.

4.7. Electrical connections



(1) Voltage supply: in accordance with the imprint on the type plate.

(2) Hard-wired, i.e. no plug-in or switchable connections.

(3) The regulations of the electricity supply companies must be satisfied[5].

(4) Terminal assignment: (see also SL-853 350)

1 / 2	Mains power supply
3 / 4	Not connected
5 / 6	External signal (in the event of an alarm, mains voltage is applied here - it is switched off by pressing the "Acoustic alarm" button).
11 / 12	Potential-free contacts (open in the event of an alarm and in the event of a power failure)
17 / 18	12 V is applied to these terminals if the pressure falls below the "Feed required" point. Suitable for connecting a relay (12 V) for potential-free forwarding of this signal.
21 / 22	Connected (to an internal sensor)

4.8. Example installation

Example installations are shown in the Appendix.

5. Commissioning / repairs

5.1. General notes

(1) Note the requirements in section 4.

(2) Flushing of the interstitial space with inert gas if the walls on the storage medium side allow permeation.[6]

(3) If a leak detector is put into operation on a pipe (or fitting) which is already in operation, then special protection measures need to be taken (e.g. checking that the leak detector and/or interstitial space is free of gas). Further measures may be required depending upon the local conditions and should be assessed by qualified personnel.

[5] For Germany: VDE regulations as well.

[6] For Germany: with double-walled pipes of this kind, DIBT requirements must also be met.

(4) Once the pneumatic connections have been made, connect the electrical supply.

(5) Check that the signal lamps for "Operation" and "Alarm" light up and that the acoustic alarm signal sounds; if necessary switch off the acoustic alarm.

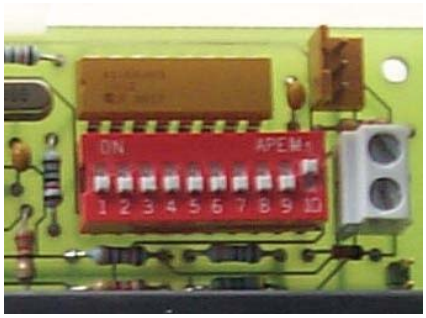
(6) Pressure build-up via device shown in drawing P-115 520

Note:If pressure does not build up even though the gas canister is connected, then the leak must be located and rectified (you may need to check that the setting on the pressure reducer is correct). IMPORTANT NOTE: The display screen on the leak detector does not show a reading until the pressure reaches 150 mbar.

(7) During the entire pressure build-up, make sure that the test pressure of the interstitial space is not exceeded.

(8) Functional test in accordance with section 6.4.

5.2. Changing the pressure level



(1) Switch positions 1-9 are for selecting the pressure level.

(2) Switch positions for the pressure levels (switches 1 to 9) are shown in Appendix B for each pressure level.

6. Operating instructions

6.1. General notes

(1) It can be assumed that the system will work correctly without any problems if the leak detection system is installed correctly without leaks.

(2) Even very small leaks will trigger an alarm.

(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) If an alarm is triggered, locate and rectify the cause quickly.

(5) Disconnect the supply voltage to the leak detector whenever performing servicing work on it.

(6) Interruptions in the power supply are indicated by the "Operation" signal lamp going out. Alarm signals are sent out via the potential-free relay contacts (if used for alarm forwarding).
After the interruption in the power supply, the green signal lamp comes back on and the sending of the alarm signal via the potential-free contacts is cancelled (unless the pressure has dropped below the alarm pressure while the power supply was interrupted.)

6.2. Maintenance

(1) Maintenance work and functional tests must only be performed by qualified persons[7].

(2) Once a year to ensure functional and operational reliability and safety.

(3) Scope of testing: as described in section 6.4.

(4) Also to be verified: that the conditions in sections 4 and 5 are satisfied.

6.3. Proper use

- Only for double-walled pipes/fittings laid underground or through buildings, as set out in sections 2.2 and 2.3.
- The delivery pressure must be at least 1 bar lower than the minimum alarm pressure.
- The system must be earthed in accordance with applicable regulations[8].
- Leak-tightness of the leak detection system should be ensured according to section 6.4.4.
- The leak detector must be installed outside the explosion hazard area.
- Feedthroughs for connecting lines into and out of the manhole shaft are sealed gas-tight.
- The leak detector should be (electrically) connected in a way which cannot be switched off.
- Use of compressed air as the leak detection medium:
  for conveyed fluids with flashpoint >55°C
- Use of nitrogen as the leak detection medium:
  for conveyed fluids with flashpoint >55°C
  for conveyed fluids with flashpoint <55°C if the interstitial space is zone 2.

6.4. Functional tests

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

- at every commissioning
- in accordance with the intervals set out in section 6.2[9]
- whenever a fault is rectified.

6.4.1 Scope of testing

(1) If necessary the work to be performed should be discussed with the person responsible on-site.

(2) Observe the safety information regarding handling of the materials being conveyed.

(3) Check for leaks on the test valve at the end of the interstitial space away from the leak detector, and check that it is free of dirt – clean as required.

(4) Continuity test of the interstitial space (section 6.4.2)

(5) Testing the switching values (section 6.4.3)

[7] For Germany: someone specialising in leak detection systems or under the supervision of such an expert (if applicable, also with expertise in fire and explosion hazard protection; annual verification of the company)

[8] For Germany: e.g. EN 1127

[9] For Germany: regional regulations must also be observed (e.g. VAwS)

(6) Leak test (section 6.4.4)

(7) Set up the equipment ready for operation (section 6.4.5)

(8) Completion of a test report by the qualified person, with confirmation of functional and operational safety and reliability.

6.4.2 Continuity test of the interstitial space

If several interstitial spaces are connected in parallel, each interstitial space must be tested individually for continuity.

(1) Close both stop cocks on the test device. Insert the measuring instrument for the test into test connection 51, and connect the test device to connection 6.2 (see also P-115 520 No. I). The measuring instrument now displays the current pressure in the interstitial space.

(2) Open the test valve for the first interstitial space connected.

(3) Observe any pressure loss on the measuring instrument.

(4) Close the test valve.

(5) Repeat the procedure from steps (2) to (4) with every other test valve on the interstitial spaces connected to this leak detector.

(6) Connect the pressure accumulator to connection 6.1.

(7) Set the pressure regulating valve to the pressure setpoint.

(8) Open the shut-off valve on the pressure reducer.

(9) Open stop cock 2.2.

(10) Pressure build-up until pressure setpoint; during filling, monitor the pressure on the pressure reducer (test pressure must not be exceeded) and re-adjust if necessary.

(11) Close stop cock 2.2 once the pressure setpoint is reached.

(12) Close the shut-off valve on the pressure reducer, remove the test device from its connection, remove the measuring instrument and pressure accumulator from the test device.

6.4.3 Testing the switching values

(1) If several interstitial spaces are connected via a distributor, close all of the stop cocks on the distributor apart from the one for the interstitial space which is to be used for testing.

(2) Close both stop cocks on the test device. Insert the measuring instrument for the test into test connection 51, connect the pressure accumulator to connection 6.1 and connect the test device to connection 6.2 (see also P-115 520)

(3) Set the pressure regulating valve to the pressure setpoint.

(4) Open the shut-off valve on the pressure reducer.

(5) Open stop cock 2.1 until alarm signal output (visual and acoustic) can be detected; note down value.

(6) Close stop cock 2.1.

(7) Compare the measured value with the specified value. The test is considered to have been passed if the measured value for "Alarm ON" is greater than/equal to the specified value.

(8) Open stop cock 2.2.

(9) Pressure build-up until pressure setpoint; during filling, monitor the pressure on the pressure reducer (test pressure must not be exceeded) and re-adjust if necessary.

(10) Close stop cock 2.2 once the pressure setpoint is reached.

(11) Repeat steps (7) to (9) several times if necessary until the possible pressure equalizing processes are completed.

(12) Close the shut-off valve on the pressure reducer, remove the test device from its connection, remove the measuring instrument and pressure accumulator from the test device.

6.4.4 Leak test[10]

(1) Insert the measuring instrument for the test into test connection 51, and connect the test device to connection 6.2 (see also P-115 520 No. I).

(2) The current pressure is shown on the measuring instrument.

(3) For a full year of fault-free operation, the leak test is to be assessed as positive if the following conditions are maintained:
Work out the difference between the measured value for "Feed (filling) OFF" and "Alarm ON" and convert to mbar (x 1000). Divide the result by 8760 (hours in a year). That gives a maximum tolerable pressure drop (per hour) to prevent an alarm being triggered before the end of one year.
If the value calculated is not measurable, the pressure drop can be multiplied for a corresponding multiplication of the testing time.

Example:
Difference between the above-mentioned switching values: 1.75 bar (value measured on-site)
1.75 x 1000 = 1750
1750 / 8760 = 0.2 mbar / h (permitted pressure drop)
The measuring instrument available on-site allows "only" a value of 5 mbar to be read, which is 25 times the permitted value (5 / 0.2). That means that the testing time is increased to 25 hours.

(4) The values stated above should be achieved in order to ensure a full year of fault-free operation.

(5) After carrying out the leak test, remove the test device from its connection and remove the measuring instrument from the test device.

6.4.5 Setting up the equipment ready for operation

(1) Seal the housing and test valve(s) at the end of the interstitial space away from the leak detector.

(2) If stop cocks are used in the connecting lines, seal them (if an interstitial space is connected) in their open position.

[10] In this section, it is assumed that the pressure in the interstitial space has been built up to the setpoint and pressure compensation has taken place.

6.5. Alarm / fault

(1) In the event of an alarm, the red signal lamp lights up and the acoustic signal sounds

(2) Switch off the acoustic 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.

(5) In the event of a fault, the red signal lamp lights up and the acoustic signal cannot be reset. Notify the manufacturer.

7. Disassembly

The following points are particularly important for the disassembly of systems which pose an explosion hazard.

- Applicable regulations for the disassembly of electrical systems must be followed.
- Check that no gas is present before and during the work.
- Seal any openings gas-tight which could otherwise allow the spread of an explosive atmosphere.
- Do not use electrical equipment capable of generating sparks (saw, cutting grinder...) for disassembly. If this is unavoidable, ensure compliance with EN 1127.
- Use low-sparking tools.
- Avoid any build-up of electrostatic charge (e.g. due to friction).
- Contaminated components (potential outgassing) should be disposed of appropriately.

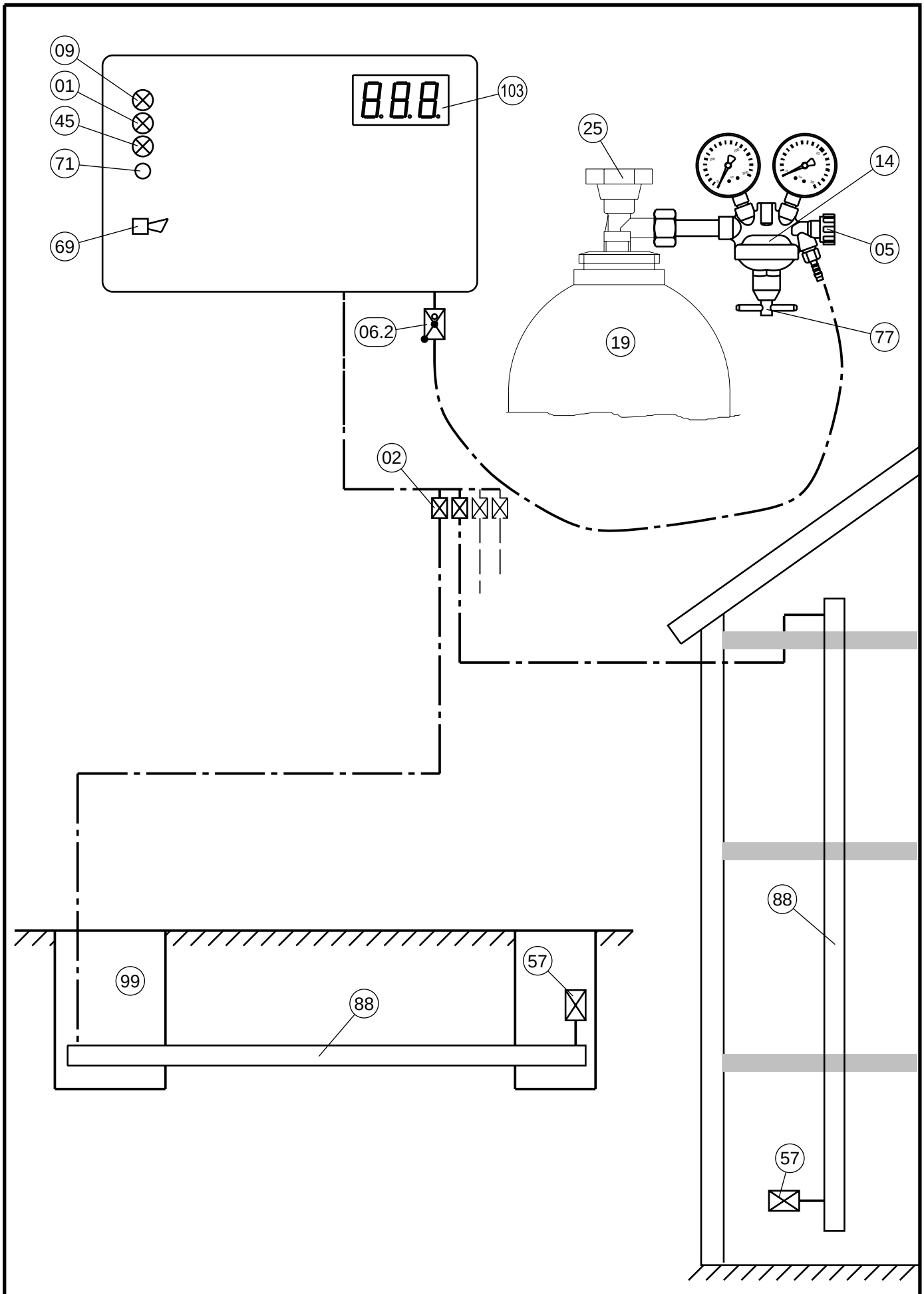
8. Identification

- Electrical data
- Serial no.
- Type designation
- Date of manufacture (month / year)
- Manufacturer’s code
- Legally required symbols/marks
- The connecting line(s) can be connected to areas for which category 3 devices (Group II (G)) are required (T1 to T3; IIA to IIB).

9. Abbreviations

01 Signal lamp – "Alarm" – red
02 Stop cock
2.1 Stop cock, venting
2.2 Stop cock, pressing
6.1 Connection, test device

6.2	Connection, on leak detector side
05	Shut-off valve (on pressure reducer)
09	Signal lamp – "Operation" – green
14	Pressure reducer
19	Pressure accumulator
24.1	Microfuse "External signal" slow-blow 1A
24.2	Microfuse "Transformer" slow-blow 32mA
25	Canister shut-off valve
30	Housing
45	Signal lamp "Feed required" (available as an option)
51	Test connection
57	Test valve
59	Relay
69	Buzzer
71	"Acoustic alarm" button
76	Main circuit board
77	Pressure regulating valve
88	Double walled pipe / double walled fitting or combination of the two
99	Control shaft
102	Pressure sensor
103	Display screen (available as an option)
104	Operational compressed gas network (e.g. air / nitrogen)
105	Control unit
106	Contacts for serial data transfer



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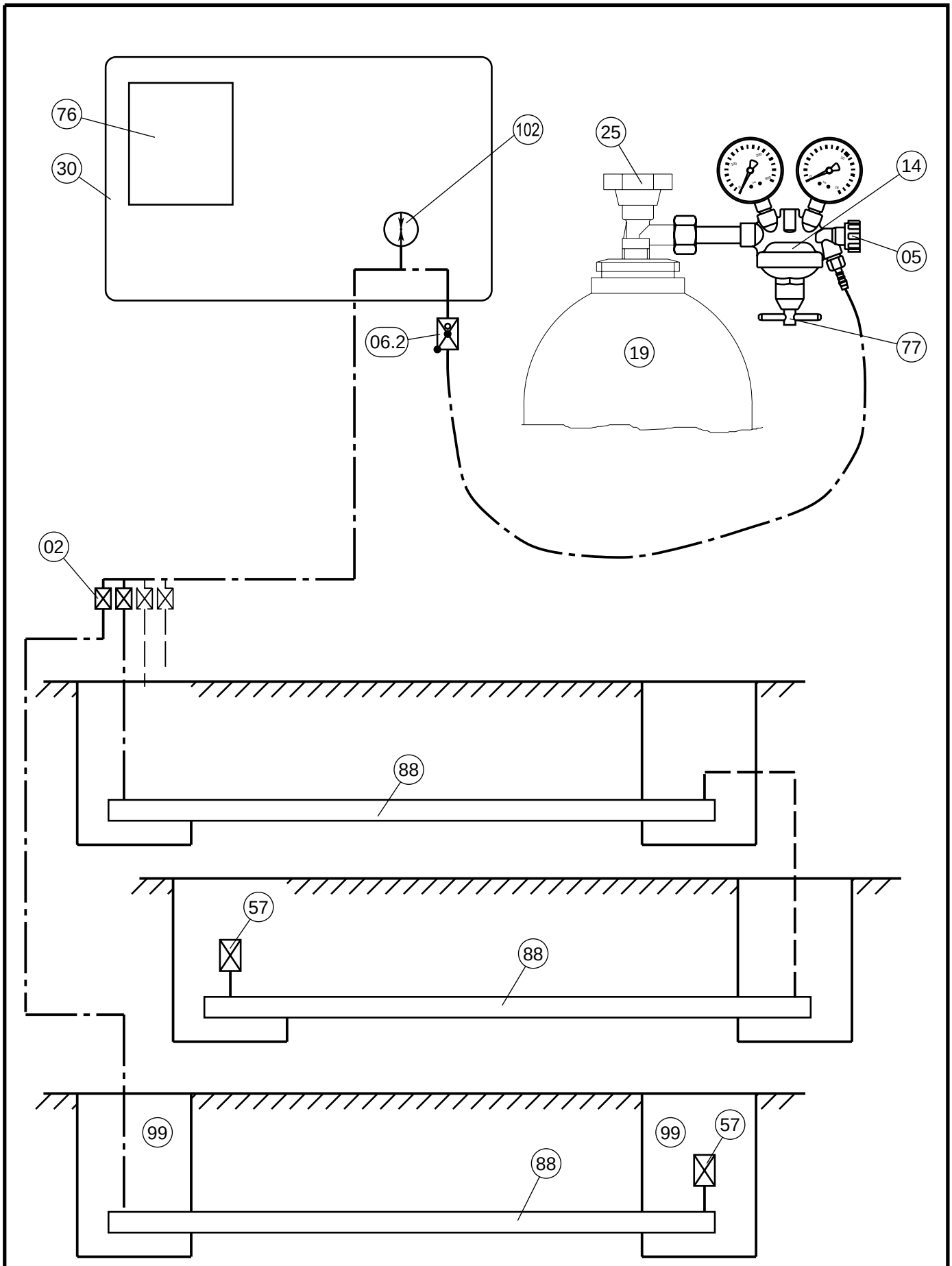

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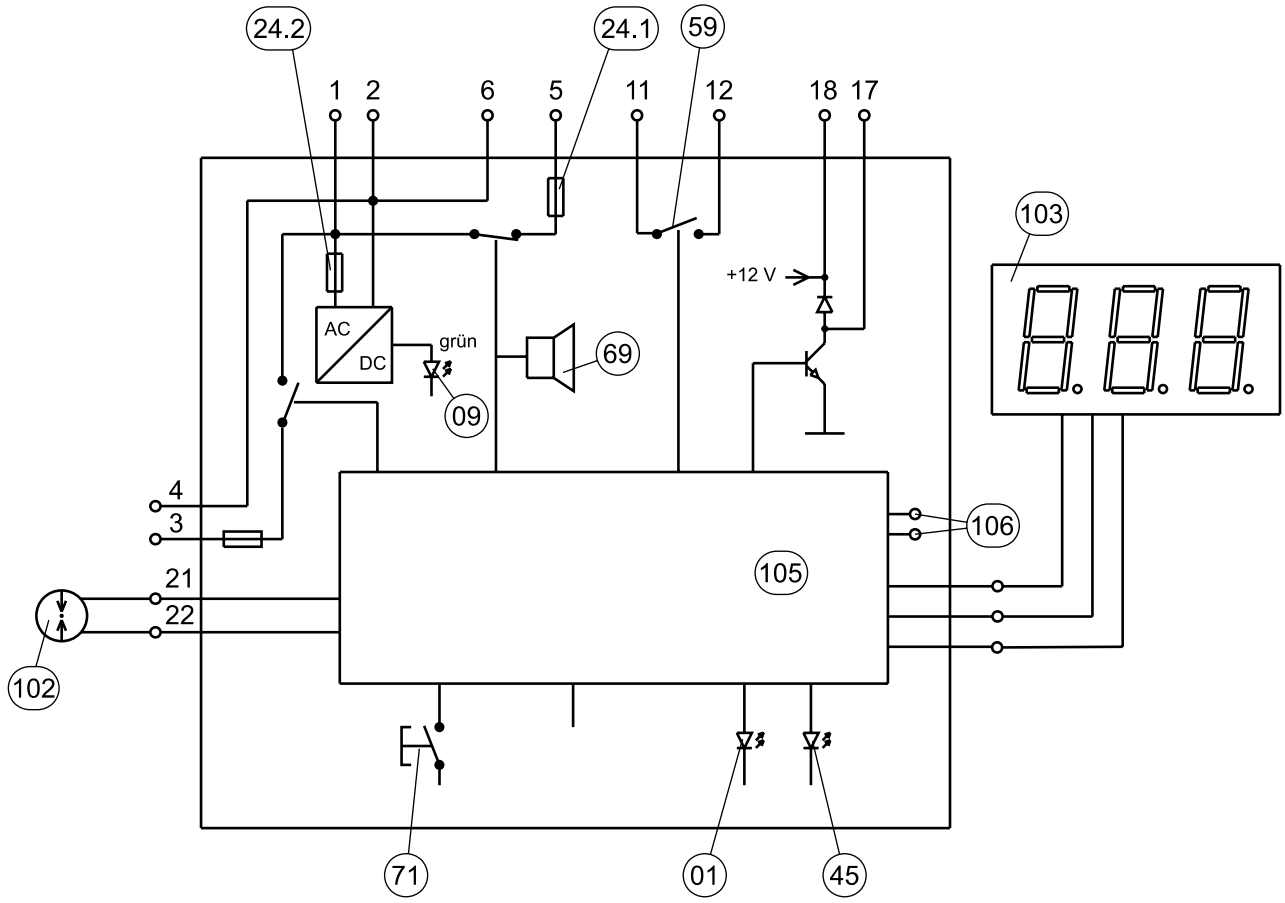

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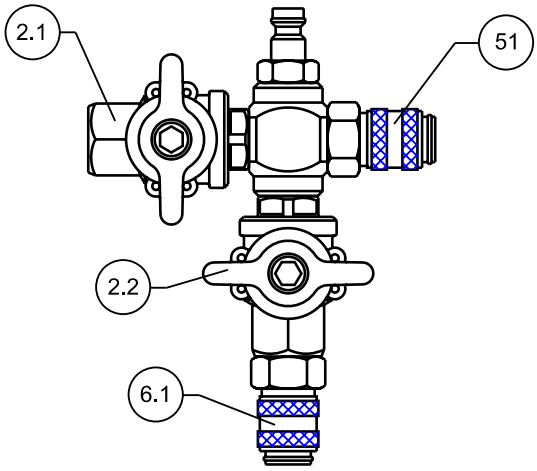

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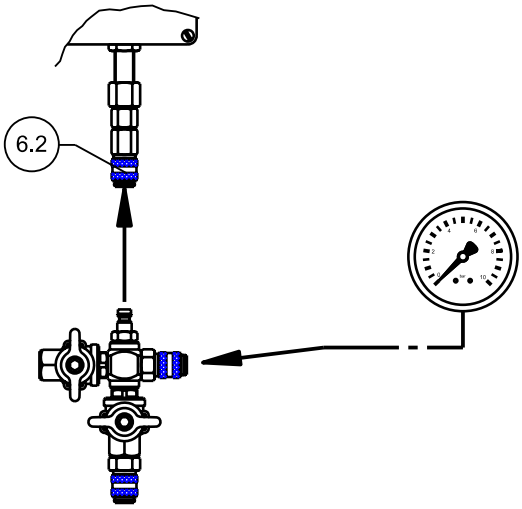

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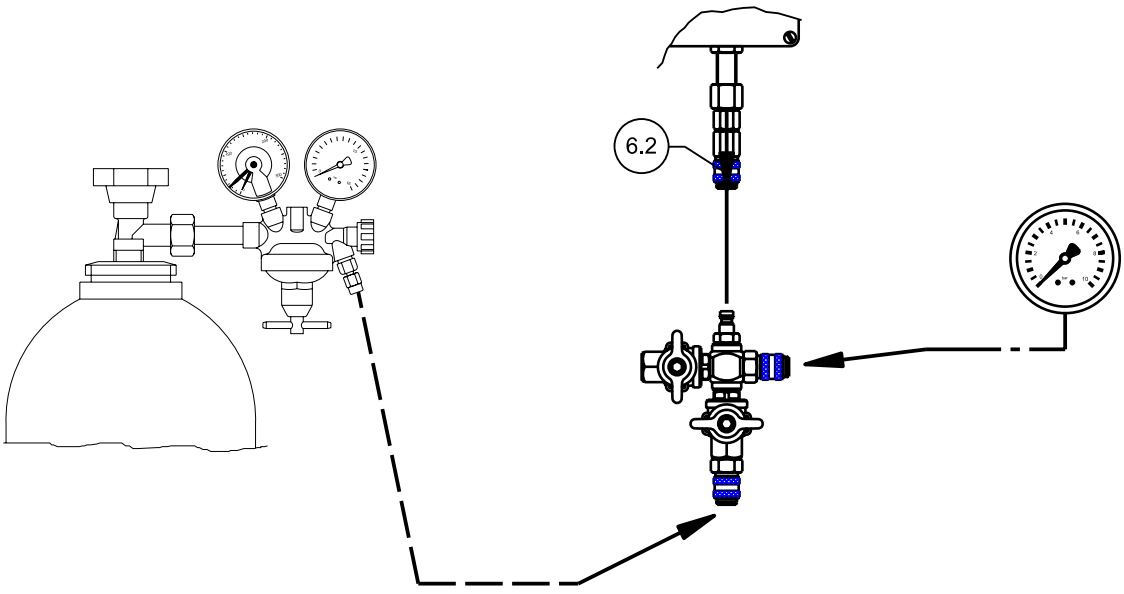

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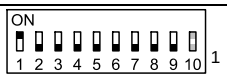
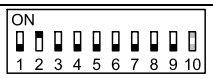
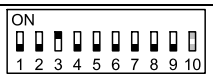
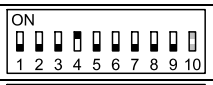
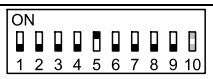
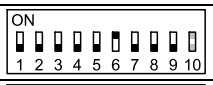
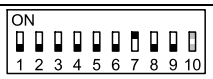
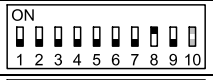
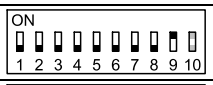
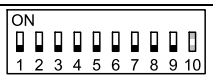
B Switching values and pressure values

Type DLR-GS	p_O [bar]	p_{AON} [bar]	p_{SETPT} [bar]	Switch position of the dip switch	p_{TEST} [bar]	p_{PR} [bar]
1	Depressurised	> 1	5	 [1]	> 6,5	5
2	< 1	> 2	6		> 8	6
3	< 2	> 3	7		> 9	7
4	< 3	> 4	8		> 10	8
6	< 5	> 6	10		> 13	10
8	< 7	> 8	12		> 16	12
10	< 9	> 10	14		> 18	14
13	< 12	> 13	17		> 22	17
16	< 15	> 16	20		> 26	20
–	Special values agreed between SGB and the customer.					

The following abbreviations are used in the table:

p_O Maximum operating pressure in the inner pipe (delivery pressure + velocity pressure + pressure due to differences in geodetic height

p_{AON} "Alarm ON" switching value – an alarm is triggered when this value is reached if not before

p_{AOFF} "Alarm OFF" switching value – the alarm is cancelled when this value is exceeded
Type 1 to 8 approx. 250 mbar
Type 10 to 16 approx. 500 mbar.

p_{SETPT} Pressure setpoint which should be built up according to the manufacturer's recommendation. Note: there is no display indication when this pressure is reached. This setting can be varied, in which case the following must be noted:
Upwards: the test pressure must be at least 1.3 times higher.
Downwards: the alarm pressure is reached considerably more quickly.

p_{TEST} Minimum test pressure of the interstitial space

p_{PR} Set pressure on the pressure reducer (must be adjusted in some cases, according to the pressure setpoint)

If the optional function for "Feed required" display is ordered, this pressure value is about 1 bar higher than the alarm pressure.

[1] Switches 1 to 9 for determining the pressure level

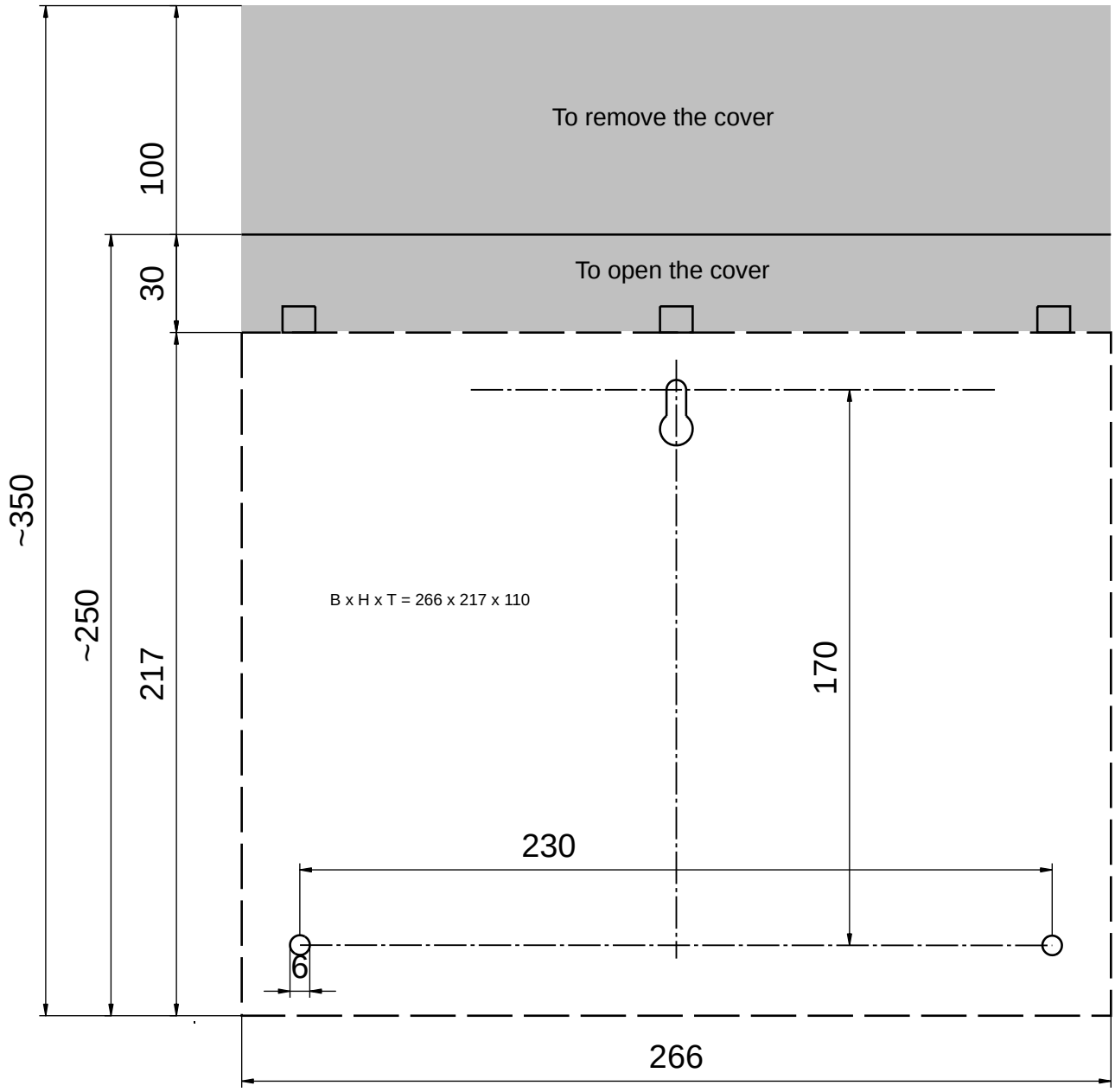
Technical data

1. Electrical data

Rated input (without external signal)		230 V – 50 Hz – 10 W
Contact rating, alarm loop terminals		230 V – 50 Hz – 1 A
Contact rating, potential-free contacts	max.:	230 V – 50 Hz – 2 A
	min.:	10 V – 10 mA
External fusing of the leak detector		max. 10 A
Overvoltage category		2

2. Pneumatic data (requirements for the measuring instrument for testing)

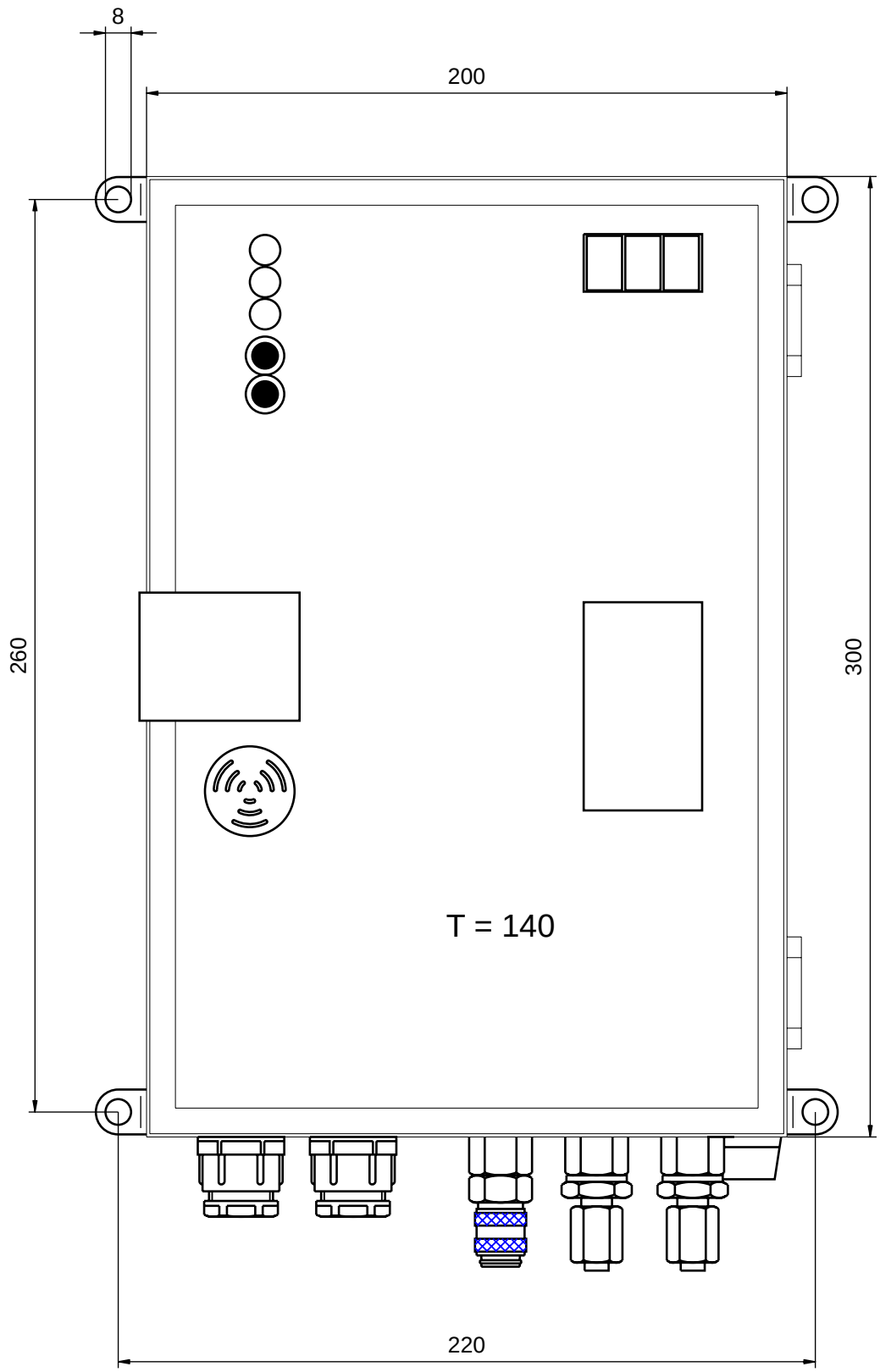
Nominal size	at least 100
Accuracy rating	at least 1.6
Maximum scale reading	adapted to pressure level



18-11-2003

SGB

Dimension / Drilling



28-06-2005

SGB

Drilling / Dimensions

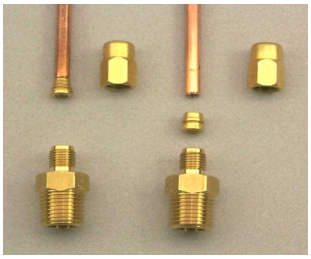
Work Sheet: AB-820 500

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 ¼ of a revolution

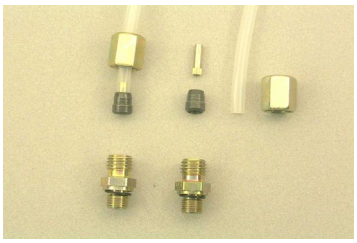
2 Clamping ring threaded fitting for plastic and metal pipes



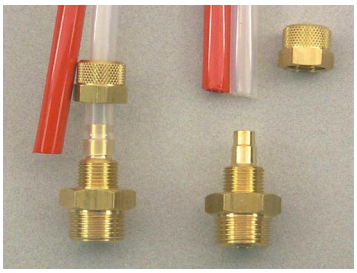
1. Insert the support sleeve into the end of the pipe
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the thread until strong resistance can be clearly felt
4. Lightly loosen the nut
5. Tighten the nut until resistance can be felt (nut must exactly match the thread of the basic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

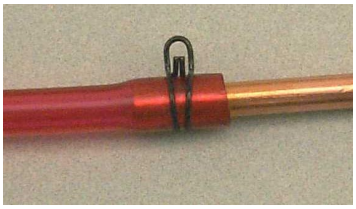
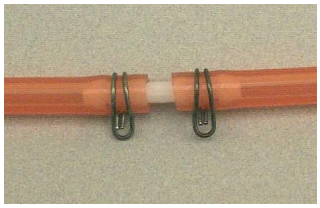
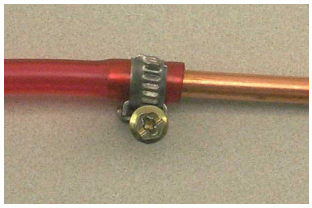


1. Make a right-angled cut in the PA pipe
2. Loosen the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to where the thread begins
4. Tighten the union nut by hand
5. Further tighten the union nut using a wrench until clearly increased force is needed (approx. 1 to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

EC DECLARATION OF CONFORMITY

We,

SGB GmbH
Hofstraße 10
57076 Siegen, Germany,

hereby declare in sole responsibility that the leak detectors

DLR-GS ..

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 + A1: 2011 EN 61 000-6-2: 2005 EN 61 000-3-2: 2014 EN 61 000-3-3: 2013
73/23 EEC Low Voltage Directive	EN 60 335-1: 2012 EN 61 010-1: 2010 EN 60 730-1: 2011
89/106/EEC Construction Products Directive	EN 13 160-1-2: 2003 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

p.p. Martin Hücking
(Technical Director)

A p p r o v a l C e r t i f i c a t e

for the design of a leak detector
as part of a leak indication device

Client:

SGB
Sicherungsgerätebau GmbH
Hofstraße 10
57076 Siegen

Dipl.-Ing.
TÜV NORD GmbH.
Große Bahnstraße 31, 22525 Hamburg
Tel.: 040/85572102
Az.:0111 BM 21610
Date: 01. February 2006

1 Subject

Overpressure leak detector as part of a leak detection system for connection to interstitial spaces of double walled pipes.

2 Manufacturer

SGB Sicherungsgerätebau GmbH
Hof Strasse 10 57076 Siegen

3 Information about the leak detector

3.1 Type

DLR-....

3.2 Area of use

Double walled pipes and double walled fittings, the interstitial spaces of which are sufficiently resistant to pressure and are verifiably suitable for connection of an overpressure leak detector.

3.3 Design

The overpressure leak detector DLR-... essentially comprises a pressure recorder and a leak detection device. Air or an inert gas can be used as the leak detection medium, whereby the conditions laid out in section 6.3 of the technical description must be complied with.

On this leak detector, controlling and signal processing are performed by an electronic circuit. The alarm switching pressure can be adjusted in 1 bar increments up to a maximum of 18 bar using the micro selector switch on the PCB. Special switching values which can be agreed with the manufacturer of the leak detector are also possible. The leak detector can be operated with both air and inert gas as the leak detection medium, with two possible operating modes:

Mode S - The necessary operating overpressure in the interstitial space is created through a process of pressure-controlled refilling from a stationary pressure accumulator which is connected to the interstitial space.

Mode M - The necessary operating overpressure in the interstitial space is provided by connecting a mobile pressure accumulator before starting up the leak detector.

The operating modes S and M should be selected via a micro selector switch located in the unit before the leak detector is started up. The current interstitial space pressure is indicated via a digital display which is integrated in the front panel. If the operating overpressure in the interstitial space drops to the selected alarm switching value then visual and acoustic alarms are automatically triggered.

Overpressure leak detector DLR-P..

With this variant of the device, the pressure in the interstitial space is generated by means of an integrated pump, as a result of which only dried ambient air is used as the leak detection medium. According to the technical description provided by the manufacturer, the lowest monitoring pressure is 1.45 bar and the highest interstitial space pressure is 3.4 bar. According to details provided by the manufacturer, special switching values are also possible.

Overpressure leak detector DLR-GS..

With this variant of the device, the overpressure in the interstitial space can only be generated by means of an externally connected pressure gas accumulator, whereby compressed air or inert gas can be used as the leak detection medium. Two types of the leak detector DLR-GS.. are manufactured. These two types differ in terms of the maximum operating pressure of the interstitial space. The DLR-GS 11 is designed for a maximum operating overpressure of 11 bar, while leak detector DLR- GS 22 is designed for a maximum operating pressure of 22 bar in the interstitial space. The alarm switching values are freely adjustable via an adjusting screw on the pressure switch and should be set beforehand in accordance with the operating instructions.

All variants of the device are equipped with a test connection which allows an external measuring device to be connected. Overpressure protection devices for protection of the devices and the interstitial spaces against violations of upper pressure limits are not a fixed part of the leak detector. Depending on the requirements, they can be connected in the device or externally to the interstitial space.

Details about the design of the leak detector DLR-.. can be found in the technical description provided by Sicherungsgerätebau GmbH dated 26 February 2002, and details about the design of the variant DLR-P.. can be found in the technical description dated 21 December 2005.

4 Test basis

4.1 Approval principles for leak detection systems for pipes (ZG-LAGR),
4.2 Building and testing principles for leak detection devices for pipes (TRbF 502),
4.3 Leak detection systems EN 13160.

5 Test documents/test specimens

5.1 Technical description of the overpressure leak detector DLR-.. dated 26.02.2002,
5.2 Prototype design of the leak detector, type DLR-G 3,
5.3 Test certificate for overpressure leak detector, type DLR-2, dated 21.06.95,
5.4 Technical description of overpressure leak detector DLR-P.. dated 21.12.2005

6 Tests

Design variant DLR-G 3 of the prototype design of the leak detector was tested for compliance with the requirements in EN 13160:2003 and in accordance with the approval principles for leak detection devices for containers and pipes. It was tested in conjunction with the technical description / design drawings and the current flow diagrams, as well as the installation and operating instructions and the software documentation.

The following individual tests were performed:

1. Testing of the electrical equipment (excluding explosion protection aspects)
2. Functional testing and switching operations at various threshold temperatures
3. Testing of the visual and acoustic alarm devices,
4. Pressure and leak testing of the fixtures

Operating mode S with an operating overpressure of 4.1 bar was chosen for the test.

7 Test results

Leak detector DLR-... complies with the requirements defined in EN 13160 and in the approval principles and building/test principles. The components of the sample device comply with the technical description and the drawings. The functional tests performed on the sample device of the leak detector of type DLV-G 3 have shown that the device can withstand the stresses and strains

and remains operational. The components of the electronic circuitry integrated in the device remain operational even under the temperature loads.

The outcome of mechanical function tests and software tests was positive. Undefined measured values, faulty calibration and failure of the system clock pulse all cause an alarm to be triggered. The leak detector of type DLR-... can comply with the requirements made of it in terms of monitoring the overpressure generated in the interstitial space and in terms of automatically generating an alarm when the alarm pressure threshold is reached.

The outcome of the alarm device tests was also positive. After 24 hours of continuous operation, the acoustic alarm device generated a noise level > 70 dB(A) at a distance of 1 m with the control cabinet closed. The visual alarm device was deemed to be adequate.

According to information supplied by the manufacturer, the pressure measuring sensor is pressure-resistant up to an overpressure of 30 bar, so no impairment of functionality is anticipated in higher pressure ranges.

The electrical installation in the fittings box is compliant with DIN VDE regulations. External forwarding of an alarm is ensured via the switching of a potential-free relay, whereby the device is protected against the circuit of the external alarm and through an interconnected additional fuse.

The leak detector with the type designation DLR-P... has the same design as the leak detector DL-... and, during the course of the approval process for obtaining General Building Authority Approval (*allgemeine bauaufsichtliche Zulassung* for Germany), it was already subjected to a suitability test. The leak detector DL.. has been granted General Building Authority Approval (*allgemeine bauaufsichtliche Zulassung* for Germany) for monitoring of double walled containers (approval no. Z.65.23-409). From the point of view of the testing body, there are no objections to the use of the leak detector for monitoring of double walled pipes within the constraints of the application parameters according to 3.1 and in accordance with the technical description for the leak detector DLR-P.. dated 21.12.2005. The leak detector is pressure resistant up to a pressure of 30 bar.

The leak detector with the type designation DLR-GS has the same design as the leak detector of type DLR-2, as a result of which its suitability has already been verified in the approval process. The leak detector DLR-2 has already been granted General Building Authority Approval (*allgemeine bauaufsichtliche Zulassung* for Germany) under the approval no. Z-65.26-304.

8 Assessment

The leak detector of type DLR-... has been approved as suitable as part of a leak indication device operating on the basis of overpressure, and it complies with the requirements of EN 13160 and the approval principles for leak detection devices for pipes and TRbF 502, provided the following conditions are met:

1. The leak detector variants, comprising the signal part and a pressure measuring device, are to be manufactured, adjusted and operated in accordance with the technical description dated 26.02.2002, or for the variant of type DLR-P.. in accordance with the technical description dated 21.12.2005.

2. The relevant detector type must only be used in the interstitial spaces specified in the "Area of use" section in the technical description. The alarm switching pressure of the leak detector should be adjusted in accordance with the technical descriptions, whereby the value must be at least 1 bar above the operating pressure of the pipe to be monitored.

3. The information provided by the manufacturer in the operating instructions must be observed in relation to establishing and maintaining the operating pressure of the leak detector. Every leak detector should be operated in such a way that the maximum permitted operating pressure of the interstitial space in the pipe and the components of the leak detector is not exceeded. In general, the only pressure reducers which should be used are those where the maximum adjustment range on the pressure reduction valve does not exceed the test pressure of the interstitial space. Otherwise, overpressure protection devices should be provided which prevent the maximum permitted operating pressure of the interstitial space from being exceeded.

4. If the leak detector is connected to interstitial spaces of overground pipes or pipes with flammable liquids (flash point < 55 °C), then fixed connecting lines should be provided which comply at least with pressure level PN 10. Before being taken into operation, the connecting pipes should be subjected to a pressure test at a pressure of at least 1.1x the operating pressure of the leak detector (no less than 5 bar).

5. The supply pressure for the pressure accumulator indicated in the technical description must be met, as otherwise the feed quantity of the leak detection medium will deviate from the value permitted according to the approval principles.

6. Every leak detector is to be permanently and legibly marked with at least the following information:

Manufacturer’s name or manufacturer’s symbol/logo,

Year of manufacture,
Production no.,
Approval cert. no.,
Type designation,
Rated operating data.

7. Every leak detector is to be subjected to a routine check prior to delivery. In terms of production monitoring, the requirements in EN 13160-1, Annex C, of TRbF 502 and/or ZG-LAGR no. 7 are to be observed.

8. Installation and operating instructions and a copy of the approval certificate must be enclosed with every leak detector.

9. For operation of the leak detector without a pressure controlled feed (operating mode M), a pressure accumulator should be permanently connected to the leak detector if a pressure increase up to the alarm switching point occurs within a year in the interstitial space due to leaks which cannot be located, e.g. gas pores. The operating mode should be changed on the device in accordance with the adjustment information in the technical description.

9 Note

Compliance with requirements relating to explosion protection, electromagnetic compatibility and the low voltage directive are not covered by the scope of these tests.

Straube
Specialist expert of
TÜV NORD GmbH & Co. KG
Testing body for leak detection devices

Hamburg, 06.05.2007
file: 8103 543 368

Amendment
to the certificate of approval from 1st February 2006 for the construction method of a leak
detector as part of a leak detection device
for double-walled pipelines
File no. 0111BM21610
General technical approval no. Z-65.26-349

1. Procedure

In future, the DLR-GS leak detector will be equipped with electronic control and signal processing. The alarm switching pressure switch can be adjusted gradually to max. 16 bar via the micro selection switch on the board in the leak detector. Other special control values are also possible after consultation with the manufacturer.

2. Testing

Based on the documentation submitted and a design, the function and the compliance with the Approval Guidelines for leak detectors for pipes (ZG-LAGR), DIN EN 13160 and of the DIN VDE regulations was tested.

3. Result

From the point of view of the testing centre for leak detectors of TÜV NORD, there were no concerns regarding the change in construction method of the leak detector. The electronic components used have already been tested in the context of the design test on the issue of general building supervisory approval for the leak detector DLR-G .. The DLR-type GS .. is merely a sub-variant that works without an integrated vacuum generator. The pressure in the interstitial space is, as previously, generated via a mobile printer memory. The switching values are adjusted via a micro switch inside the device. For the operation and installation of the leak detector DLRGS, the technical description of SGB Gerätesicherungsbau GmbH from 25.04.2007 must be observed.

Straube
TÜV NORD Systems GmbH & Co.KG Authorized Expert
Testing centre for leak detectors

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

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