

Vacuum leak detector

VL ..

Documentation VL

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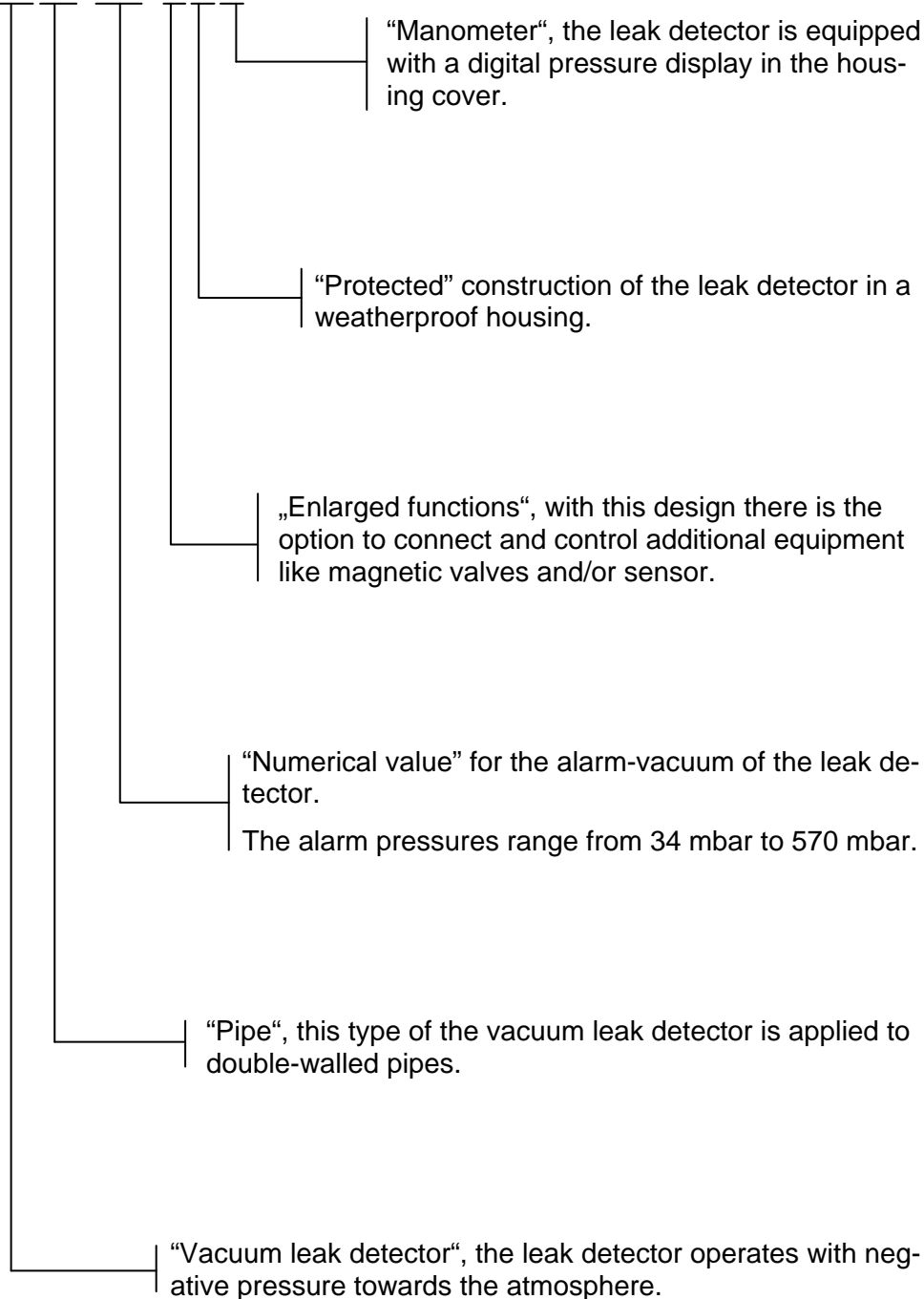
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Overview of the design variants

The vacuum leak detectors of the VLR-series are available in different designs which are described in detail by the suffix characters.

VL(R) /E PM





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1. Object

Vacuum leak detector of the type VL .. or VLR .. (dots stand for alarm vacuum) as part of a leak detection system in the following versions:

a) VL .. and VLR ..

b) VL .. / E and VLR .. / E (extended version, i.e. either a leak probe or solenoid valve or both can be connected in addition)

Leak probe: Either in place of the liquid stop valve if special installation conditions or resistancy matters make it necessary or as a probe used separately (e.g. in the leakage containment).

Solenoid valves: **Must be used** whenever tanks are operated at **more than 5 bar** overlay pressure or if resistancy requirements make them necessary (system is then executed resistant up to the solenoid valves).

2. Area of application

2.1. Interstitial space requirements

- Vacuum resistance to the operating vacuum of the leak detector, also taking fluctuations in temperature into account.
- Assurance of the suitability of the interstitial space as part of a leak detection system (e.g. DIN standards, proofs of usability issued by the building inspection authorities, determination of suitability etc.)
- No leak detection liquid in the interstitial space (see App. A if this is nevertheless the case)
- The tanks/pipes listed under sections 2.4 to 2.7 meet the above requirements acc. to App.E.
- The volume of the space monitored by the leak detector may not exceed 8 m³ for tanks and 10 m³ for pipes. The manufacturer recommends not exceeding 4 m³.

2.2. Material to be stored / conveyed

Liquids hazardous to water with a flash point > 55°C, where no potentially explosive vapour-air mixtures occur.

If different liquids are conveyed in individual pipes and monitored with one leak detector, these liquids may not have a negative influence on one another nor lead to chemical reactions.

2.3. Resistance / materials

For the leak detector VL .. the material polyamide (PA) in connection with brass (MS-58) or (1.4301, 1.4306, 1.4541)¹ or 1.4571², as well as the material of the connecting tubes used has to be sufficiently resistant to the material to be stored/conveyed.

If the materials mentioned above are not sufficiently resistant, correspondingly resistant solenoid valves can be used in the tanks.

¹ cf. DIN 6601, centre column

² cf. DIN 6601, right-hand column

2.4. Tanks with up to 0.5 bar superimposed pressure

Group	Tank design	Installation example	Suitable leak detector type	Use limits
A	Single-wall, horizontal (below / above ground), cylindrical tanks or spherical tanks with leak detection lining or jacketing and suction line leading to the low point	A – 01	VL 34 to VL 570	None with respect to density and diameter
B	As A, but without suction line to the low point	B – 01	VL 230 to VL 570	Appendix E, No. E.1
C	Double-walled, horizontal, cylindrical (below / above ground) tanks or spherical tanks			
D	Double-walled (also single-wall with leak detection lining or jacketing), vertical, cylindrical tanks or troughs with a dished bottom (below / above ground) with suction line to the low point	D – 01	VL 34 to VL 570	Appendix E, No. E.3
E	As D, but without suction line to the low point	E – 01	VL 230 to VL 570	Appendix E, No. E.1
F	Rectangular or cylindrical tanks or troughs with flat bottom (completely double-walled or with leak detection lining or jacketing) with suction line to the low point	A – 01	VL 34 to VL 570	Appendix E, No. E.2
G	As F, but without suction line to the low point	B – 01	VL 230 to VL 570	Appendix E, No. E.1
H	Battery tanks in series, with suction line to the low point	H – 01	VL 30-70	Manufacturer-related Appendix E, No. E.4
I	Battery tanks parallel, without suction line to the low point, individually monitored battery tanks as G	I – 01	VL 320-420	Installation instructions acc. to I-01
J	Double-walled surface seals	J – 01	VL 230 to VL 570	Appendix E, No. E.1
K	Double-walled shafts of hydraulic cylinders (e.g. in lifts)	K – 01	VL 34 to VL 570	Appendix E, No. E.2



2.5. Tanks with pressures up to 5 bar (in liquid leak case)

Group	Type of tank	Installation example	Suitable leak detector type	Use limits
L	Vertical cylindrical tanks with double bottom (leak detection lining), leak detector connected at the bottom (e.g. GFK tanks or tanks according to DIN 4119)	L – 01	VL 255	Tank height: ≤ 25 m
M	As L, but suction and measuring pipe as joint pipe leading from the tank (with node point)	M – 01		
N	As L, but with several (parallel) pipes leading from the tank. Interstitial space divided into segments.			

2.6. Tanks with superimposed pressures up to 25 bar

Group	Type of tank	Installation example	Suitable leak detector type	Use limits
O	Versions as under 2.4, in as far as overlay pressures up to 25 bar are permissible in the respective tank.	As 2.4, but with solenoid valve(s): O – 01	VL 34 /E to VL 570/E	See 2.4

2.7. Double-walled pipes (up to 5 bar or up to 25 bar)

Group	Type of pipe	Installation example	Suitable leak detector type	Use limits
P	Double-walled pipes made in the factory or on site with up to 5 bar pressure in the primary pipe (conveying pressure)	P – 01 to P – 03	VLR 230 to VLR 570	Appendix E, No. E.1
Q	Double-walled pipes made in the factory or on site with up to 25 bar pressure in the primary pipe (conveying pressure)	Only with solenoid valve(s): Q– 01 to Q– 04	VLR 230/E to VLR 570/E	Appendix E, No. E.1



3. Functional description

3.1. Normal operation

The vacuum leak detector is connected to the interstitial space via the suction and measuring line, possibly also via the connection line(s). The vacuum generated by the pump is measured and controlled by a pressure sensor.

When the operating vacuum (pump OFF) has been reached, the pump is switched off. Due to slight, unavoidable leaks in the leak detection system, the vacuum begins to fall slowly. When the switching value for "pump ON" has been reached, the pump is switched on and the interstitial space evacuated until the operating vacuum (pump OFF) has been reached again.

During normal operation the vacuum moves between the switching value pump OFF and the switching value pump ON, with the pump running for a short time and then switching off for a longer time, depending on the tightness and temperature fluctuations in the complete system.

3.2. Air leak

If an air leak occurs (in the outer or inner wall, above the liquid level) the vacuum pump switches on in order to re-establish the operating pressure. If the air flow leaking into the pipe exceeds the limited feed flow of the pump, the pump remains on continuously.

Increasing leak rates lead to a further increase in pressure until the switching value for alarm ON has been reached. An optical and audible alarm signal is triggered. If solenoid valves are closed, the pump stops.

3.3. Liquid leak

In the case of a liquid leak, liquid enters the interstitial space and collects at the lowest point of the interstitial space.

The incoming liquid leads to the vacuum dropping, the pump is switched on and evacuates the interstitial space(s) until operating pressure has been reached. This process is repeated until the liquid stop valve in the suction line closes.

Due to the vacuum still present in the measuring line, further leak liquid is sucked into the interstitial space, the measuring pipe and into a pressure compensating vessel if appropriate. This leads to reduction of the vacuum until the pressure has reached the "alarm ON" level. The optical and audible alarm signal is triggered. If solenoid valves are connected, they close and the pump stops.

If in place of the liquid stop valve a leak probe is mounted in the suction line in connection with solenoid valves, the alarm signal is triggered when leak liquid reaches the leak probe. This closes the solenoid valves and the pump stops.

3.4. Switching values of the leak detector in mbar

NOTE: The leak detector with the lowest alarm pressure for the respective application should be used whenever possible (lower component wear)

Type	alarm ON	Pump OFF	Use on Group:
VL 34, VL 34/E	> 34	< 90	A/D/F/K/O
VL 30-70	> 30	< 70	H
VL 230, VLR 230,	> 230	< 360	A to G and J/K/O
VL 255, VL 255/E	> 255	< 380	L/M/N also poss.: A to G and J/K/O
VL 320-420	> 320	< 420	I
VL 330 VL 330/E VLR 330, VLR 330/E	> 330	< 450	A to G and J/K/O/P/Q
VL 410 VL 410/E VLR 410, VLR 410/E	> 410	< 540	A to G and J/K/O/P/Q
VL 500 VL 500/E VLR 500, VLR 500/E	> 500	< 630	A to G and J/K/O/P/Q
VL 570 VL 570/E VLR 570, VLR 570/E	> 570	< 700	A to G and J/K/O/P/Q
VL(R) .. - .. (/E)	Special switching values agreed between SGB and customer		

The measured switching value for "alarm OFF" has to be at least 5 mbar smaller than the measured switching value for "pump OFF".

The measured switching value for "pump ON" has to be at least 15 mbar bigger than the measured switching value for "alarm ON".

3.5. Description of the display and operating elements

3.5.1 States of the display elements (signal lamps)

Signal lamp	Operating state	Start-up	Start-up, alarm acknowledged	Alarm, vacuum below the "alarm ON" level	Alarm, as left-hand column, acknowledged	Alarm probe	Alarm probe, acknowledged	Alarm solenoid valve	Alarm solenoid valve, acknowledged	Device malfunction
OPERATION: green	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
ALARM: red	OFF	BLINKING	BLINKING	ON	BLINKING	OFF	OFF	ON	BLINKING	ON ³
ALARM 2 ⁴ : red	OFF	BLINKING	BLINKING	OFF	OFF	ON	BLINKING	ON	ON	OFF

³ The button "audible alarm" is without function

⁴ Only applies to VL ../E and VLR ../E



Description:

Start-up: If the alarm is acknowledged as the pump is being put into operation, an optical distinction is not made, the audible signal is on or off depending on the button position. When the switching value "alarm OFF" has been exceeded, the audible signal is always off.

Alarm $p < p_{AE}$: Alarm signal when the vacuum in the monitored system is below the switching value "alarm ON".

NOTE: If an alarm probe should occur following this alarm signal, the alarm probe has priority! (i.e. the alarm probe is displayed. Once the cause for this has been eliminated, the Alarm $p < p_{AE}$ will be displayed again.) The audible alarm signal is not given, but the other LED blinks according to the table.

Alarm probe: See Alarm $p < p_{AE}$

Alarm solenoid valve: Is triggered when the solenoid valve has an electrical defect.

Device malfunction: Is displayed if a fault should occur on the PCB.

3.5.2 Operating functions via buttons

- Switch off audible alarm signal:
Press the "audible alarm signal" button briefly once, the audible signal is switched off, the red LED blinks.
If the button is pressed again, the audible signal is switched back on.
This function is not available during normal operation and in the event of a malfunction.
- Testing the optical and audible alarm signal
Press the "audible alarm signal" button and keep it pressed (approx. 10 seconds), the alarm signal is triggered until the button is released again.
This scan is only possible if the pressure in the system has exceeded the "alarm OFF" pressure.
- Scanning the tightness of the system monitored
Press the "audible alarm signal" button and keep it pressed until the signal lamp "alarm" blinks quickly after approx. 5 seconds, then release the button. The "alarm" signal lamp displays a value for tightness on the basis of the number of blinks (see chapter 6.4.5)
10 seconds after this value has been displayed the signal lamp returns to normal operation. The leak detector must have carried out at least 1 automatic post-feed interval in normal operation (i.e. without external assembly pump) to achieve a valid statement.
- Zero point adjustment
Three way valve 21 in position II.
Press the "audible alarm signal" button and keep it pressed until the "alarm" signal lamp blinks quickly after approx. 5 seconds, then release the button. Press the button again immediately and then release it again. Adjustment is confirmed by 3 optical and audible signals.
Before repeating zero point adjustment the "pump OFF" switching value must be reached.

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- Start-up (opening the solenoid valves)
Press the "start-up" button and keep it pressed for approx. 5 seconds until both red signal lamps light up. The solenoid valves are opened, the pump starts to run.
If this button is kept pressed longer than 10 seconds, the alarm signal is generated. Shortly after the button is released the alarm signal triggered is deleted again.
For information about activating or deactivating the solenoid valves, refer also to chapter 4.5.1



4. Mounting instructions

4.1. General notes

- (1) Heed manufacturers' approval for the tanks/pipes and the interstitial space.
- (2) Installation and start-up must be carried out by a qualified company⁵.
- (3) Heed relevant regulations concerning electrical installation⁶
- (4) Heed and observe accident prevention regulations.
- (5) Pneumatic connections, connection lines and fittings must be able to withstand the pressure (static pressure plus superimposed pressure) which could occur in the case of a leak, for the whole temperature range possible.
- (6) Before anyone enters a dome or control shaft, the oxygen content must be checked and the shaft flushed out if necessary.

4.2. Mounting the leak detector

- (1) Wall mounting, within a building
- (2) Wall mounting in the open, using a suitable protective box.
If the detector is to be mounted in a protective box, at least one of the following points must be observed:
 - Signal lamps for operation must be visible from the outside (protective box with transparent lid or signal lamps mounted on the outside)
 - Use of potential-free contacts to extend alarm - if these contacts are not used, additional external signal
- (3) OUTSIDE potentially explosive areas.
- (4) As near to the tank/pipe as possible (cf. section (6) of the following chapter).

4.3. Mounting the (pneumatic) connecting lines

- (1) Plastic hoses (e.g. PVC) or tubes made of plastic or metal.
Pressure resistance, see requirements specified in chapter 4.1.
- (2) Clearance at least 6 mm.
- (3) Resistant to the product to be stored.
- (4) Colour marking: *Measuring line*: RED; *Suction line*: WHITE or TRANSPARENT, *Exhaust line*: GREEN.
- (5) The full cross-section must be retained.
- (6) The length of the lines between the interstitial space and the leak detector should not exceed 50 m. If the distance is bigger, a larger pipe cross-section must be used.
- (7) Routing lines with lowest points: mounting of condensate traps at each lowest point (heed pressure resistance specified in 4.1).

⁵ For Germany: For Germany: Specialist firms according to the Federal Water Act, which have verified their qualification for the installation of leak detection systems.

For Europe: Authorisation from the manufacturer.

⁶ For Germany: e.g. VDE regulations, regulations issued by utilities companies.



- (8) Mount the liquid stop valve in the suction line (heed pressure resistance specified in 4.1).
- (9) Exhaust line must lead with slope to the tank ventilation outlet. In the case of laying with lowest points, use condensate traps.
Alternatively: The exhaust line can terminate out in the open, at a non-dangerous spot. In this case, provide for a condensate trap and liquid stop valve in the exhaust line⁷.
- (10) Conduits for connecting lines have to be sealed gas- and liquid tight at the inlet and outlet points.
- (11) For applications using a pressure compensating vessel in the measuring line, if suction and measuring line are connected together in a node point, the following shall apply:
Per 0.1 litre volume⁸ of the pressure compensating vessel, the length of the measuring line (L_{\max}) may only be a maximum of

VL 230 and VL 255	17 m (6 mm clearance)	39 m (4 mm clearance)
VL 320-420	21 m	47 m
VL(R) 330	16 m	36 m
VL(R) 410	12 m	28 m
VL(R) 500	10 m	22 m
VL(R) 570	8 m	18 m

NOTE: The lower edge of the pressure compensating vessel must not be lower than the node point, the upper edge of the pressure compensating vessel must not be more than 30 cm above the node point.

Per 10 ml of the condensate trap(s) mounted in the measuring line between pressure compensating vessel and leak detector, L_{\max} **is reduced by:**

0.5 m (6 mm clearance)

1 m (4 mm clearance).

ALTERNATIVELY: In place of the pressure compensating vessel, the measuring line can be laid from the node point over 50% of the measuring line length ($=L_{\min}$) with approx. 1% slope to the node point.

4.3.1 In case several interstitial spaces for pipes are connected parallel to a leak detector.

- (1) Route connecting lines with slope to the interstitial space or to the manifold. In the case of lowest points in the connecting lines with the lines routed in the open, mount condensate traps at all the lowest points.
- (2) Route the suction and measuring line with slope to the manifold. If this is not possible, use condensate traps at all the lowest points.
- (3) Connect a liquid stop valve in each of the connecting lines to the interstitial space, against the stop direction.
These prevent leaked liquid entering the interstitial spaces of the other ducts of the double walled pipe.

4.4. Mounting the probe (VL(R) ../E ONLY)

4.4.1 Probe requirements

- (1) Approval as overload protection or as leak probe is required.
- (2) Voltage supply identical to voltage supply of the leak detector.

⁷ Condensate trap and liquid stop valve are not required if the exhaust pipe ends above a liquid-proof area (e.g. filling area, leak containment room).

⁸ Multiplying this volume leads to a multiplication of L_{\max} . Dividing this volume leads to a division of L_{\max} .

- (3) Current consumption of the probe $P < 200 \text{ W}$
- (4) Dry relay contacts which open in the case of alarm.
- (5) Other versions can be agreed with the manufactures, since adaptation could be necessary.

4.4.2 Probe in place of the liquid stop valve

- (1) A probe can be integrated in the suction line as a component part of the installation kit in place of a liquid stop valve (agree version of installation kit (MBS) with the manufacturer). The probe can also be mounted as an additional fixture at the low point of the interstitial space.
- (2) With this version the leak detector indicates that liquid (product or groundwater) is in the suction line (and thus usually in the interstitial space).
- (3) This version can become necessary if
 - the alarm signal is not possible due to the pneumatic principle
 - the liquid to be monitored is extremely dangerous (e.g. potentially fatal).
 - if escaping liquid (e.g. due to "just" sufficient resistance of the interstitial space) has to be established immediately.

4.4.3 Probe in addition to the leak detector for monitoring increase in liquid level

- (1) Set up or mount the probe in the space to be monitored (dome or control shaft, leak tub, leakage containment) according to the manufacturer's instructions.
- (2) Install the electrical supply line to the leak detector and connect it according to the instructions in chapter 4.7.

4.5. Mounting the solenoid valve(s) (VL(R) ../E ONLY)

- (1) The solenoid valves must be mounted as near to the interstitial space as possible. Pressure resistance, resistance to substances (incl. sealing materials), temperature range and protective rating (in the case of mounting in the open air) must be guaranteed.
- (2) For VLR ../E: ONLY one solenoid valve in the connection line to the interstitial space:
 - Voltage supply: Voltage version 230 V or 120 V only
 - Current consumption: 5 to 10 W
- (3) For VL ../E: Connect two solenoid valves (one each in the suction and measuring line) to the leak detector according to the instructions in chapter 4.7:
 - Voltage supply: 115 V per solenoid valve (only possible with 230 V supply)
 - Current consumption: 5 to 10 W

4.5.1 Activation or deactivation of the solenoid valve monitoring

- (1) If solenoid valves (or one solenoid valve) are used, solenoid valve monitoring must be **ACTIVATED**:
The coding plug must be inserted according to the photo. The photo shows an active solenoid valve monitoring case.
NOTE: If solenoid valve monitoring is not activated, the valve will not open, the start-up button will not work!





4.6. Selection of the electrical supply line (VL(R) ../E ONLY)

4.6.1 Probe

- (1) Cable length should not be longer than 30 metres⁹
- (2) Recommended cable type: NYM 5 x 1.5 mm², LiYY 5 x 0.75 mm² with wire-end sleeves

4.6.2 Solenoid valve(s)

- (1) Cable length should not be longer than 30 metres¹⁰
- (2) Recommended cable type: NYM 3 x 1.5 mm², LiYY 3 x 0.75 mm² with wire-end sleeves

4.7. Electrical connection

- (1) Voltage supply: see type plate.
- (2) Firmly laid, i.e. no plug or switch connectors.
- (3) Terminal assignment (see also SL-853 600 (VL(R).. and SL-854 800 (VL(R)../E):

1	Phase
2	Neutral
3/4	Occupied (leak detector pump)
5/6	External signal (voltage supply in case of alarm, is switched off using "audible alarm signal" button.
7/8	VL(R) ../E ONLY connection of the solenoid valve(s)
11/12	Dry relay contacts, open in case of alarm and power failure
21/22	VL(R) ../E ONLY connection of the dry relay probe contacts (contacts have to be open in case of alarm and power failure) ¹¹
	<u>NOTE:</u> When the device is delivered a bridge is used which must be removed when the probe is connected
X/X	Serial data transmission (no. 106 in the circuit diagrams)

4.8. Installation examples

Installation examples are given in the appendix.

The following notes must always be heeded:

Note: The connection of interstitial spaces is only permitted for battery tank plants and pipework UNDER the following conditions.

1. For tanks with suction line to the low point:
The suction line must lead either in the interstitial space or on the outside of the tank (but then pressure-resistant) from the low point of the interstitial space to above the interstitial space and also above the max. tank filling level.
2. Installation example A – 01:
Here, the probe is drawn with a dotted line for the version VL ../E in order to show the different possibilities.

⁹ The length is limited for EMC-related reasons, longer lengths only after consultation and agreement with the manufacturer.

¹⁰ The length is limited for EMC-related reasons, longer lengths only after consultation and agreement with the manufacturer.

¹¹ 9/10 ONLY for probes requiring a voltage supply. E.g. not for floating switches.



3. Installation example H – 01:
This series connection is **ONLY** permitted and possible for the tank type(s) listed in Appendix E.4.
4. Installation example K – 01:
The exhaust pipe ends in a non-dangerous position.
The following possibilities are available for monitoring these shafts:
 - Double-walled pipe around the hydraulic cylinder, suction line in the interstitial space leading to the low point.
 - Interstitial space between the single-wall pipe and hydraulic cylinder, with the suction line leading to the low point of the interstitial space.
 - Suction and measuring line connected to the highest point of the interstitial space. In addition, probe at the low point of the interstitial space. This means the shaft can be as deep as required.
5. Installation example P – 01:
The low point(s) must not exceed the dimension H_{\max} .
The pipe may also have further highest points and lowest points AS LONG AS the difference in height between high points and lowest points is not above H_{\max} .
6. Installation example P – 02:
The pipe here, as under No. 5, may also have highest and lowest points within the above-mentioned limits.
7. Installation example P – 03:
The dimensions H_{\max} is the limit between the "highest" highest point and the "lowest" lowest point. The volumes of the pipes connected have to keep the following conditions:
 $4 \bullet V_{\dot{U}R\ 1} > V_{\dot{U}R\ 1} + V_{\dot{U}R\ 2} + V_{\dot{U}R\ 3} + V_{\dot{U}R\ 4}$ and
 $4 \bullet V_{\dot{U}R\ 2} > V_{\dot{U}R\ 2} + V_{\dot{U}R\ 3} + V_{\dot{U}R\ 4}$ etc.
 $V_{\dot{U}R\ (number)}$ is the volume of the respective interstitial space.
8. Installation example Q – 01:
The solenoid valve protects the leak detector from impermissibly high pressure. The solenoid valve is monitored electronically, which means failure of the solenoid valve leads to triggering of the alarm signal. The conditions listed under points 5 to 7 also apply here.

5. Start-up

- (1) Heed and observe specifications in chapter 4.
- (2) Carry out pneumatic connection.
- (3) Set up electrical connection, do not apply voltage supply yet.
- (4) Close the housing cover.
- (5) Apply voltage supply.
- (6) Establish lighting up of operating and alarm lamp as well as the audible alarm signal. Press the "audible alarm signal" button, the signal lamp "alarm" will blink.
- (7) Only VL(R)..E with solenoid valve: carry out the start-up sequence (see chapter 3.5.2).
- (8) Three way valve 21 in position "III", connect measuring gauge. (cf. P-060 000)
- (9) Apply vacuum to the system.
To do this, the installation pump can be connected to the muff on three way valve 20, position IV. Switch on the installation pump. The interstitial space will be evacuated. Monitor the vacuum build-up on the measuring gauge.



NOTE: If no pressure is built up with the installation pump connected, the leak must be located and eliminated (if necessary check the feed capacity of the pump and/or the position of the three way valve).

- (10) Once the leak detector has reached operating vacuum (pump in the leak detector switches off), the three way valve must be set to position I, the installation pump switched off and removed.
- (11) Three way valve 21 in position "I", remove the measuring gauge.
- (12) Carry out the functional test according to section 6.4.

6. Operating instructions

6.1. General instructions

- (1) If the leak detection system is installed tightly and correctly then it can be assumed that the leak detector is working in the range of control.
- (2) Frequent switching on, or continuous running of the pump indicates leaks which must be eliminated within a reasonable period of time.
- (3) In the case of an alarm there is always either a major leak or a fault. The cause must be established quickly and the problem eliminated.
- (4) The leak detector must be disconnected from the mains for any repair work.
- (5) Current interruptions are indicated by the "operation" signal lamp going out. The alarm signal is triggered via the dry relay contacts (if used to extend the alarm).
Following the current interruption the green signal lamp lights up again, the alarm signal is switched off via the potential-free contacts (unless the pressure has fallen below the alarm pressure during power failure). Carry out the start-up sequence for leak detectors with connected solenoid valve(s).

6.2. Intended use

- Double-walled tanks and pipes according to chapter 2, under the listed conditions
- Grounding according to valid regulations
- Leak detection system is tight according to the table in the documentation
- Leak detector is mounted outside the potentially explosive area
- Conduits into and out of dome or control shafts are closed airtight
- Electrical connection cannot be switched off

6.3. Maintenance

- (1) Maintenance work and functional tests may only be carried out by trained staff¹².
- (2) Work is carried out once a year to assure functional and operating safety.
- (3) Extent of the tests is described in chapter 6.4.

¹² For Germany: qualified knowledge or under the responsibility of a qualified person.
For Europe: Authorisation from the manufacturer.



- (4) It must be checked whether the conditions described in chapters 4 to 6.3 are being observed.
- (5) Disconnect from the mains before opening the leak detector housing.

6.4. Functional test

Tests of the functional and operating safety must be carried out

- after every start-up,
- acc. to chapter 6.3¹³,
- after every case of troubleshooting.

6.4.1 Extent of the test

- (1) If necessary, discuss the tasks to be carried out with the person responsible on-site.
- (2) Heed the safety instructions regarding contact with the stored products present.
- (3) Monitoring and emptying the condensate traps if necessary (6.4.2).
- (4) Testing the probe if appropriate (chapter 6.4.3)
- (5) Check the free passage of air in the interstitial space (chapter 6.4.4).
- (6) Test the switching values with the interstitial space (chapter 6.4.5).
alternatively: test the switching values using the test device (chapter 6.4.6).
- (7) Test the lift of the vacuum pump (chapter 6.4.7).
- (8) Check tightness of the leak detection system (chapter 6.4.8).
- (9) Set up operating state (chapter 6.4.9).
- (10) A qualified person must fill out a test report confirming function and operational safety.

6.4.2 Checking and emptying the condensate traps if necessary

- (1) If there are shut-off cocks on the interstitial space, close these.
- (2) Three way valve 20 and 21 to position IV to ensure aeration of the connecting lines.
- (3) Open condensate traps and empty them.
NOTE: Condensate traps can contain storage/conveying product(s), make sure you take suitable precautions.
- (4) Close condensate traps.
- (5) Three way valves 20 and 21 to position I.
- (6) Open shut-off cocks on the interstitial space.

6.4.3 Testing the probe

- (1) If there are shut-off cocks on the interstitial space, close these.
(Not applicable when the probe is installed separately from the leak detector. Also applicable for section (2) and section (6))

¹³ For Germany: heed state-specific regulations accordingly (e.g. VAWs)



- (2) Three way valve 20 in position IV, thus aeration of the connecting line.
- (3) Remove probe and check reaction in storage products or water.
- (4) Establish optical and audible alarm signal on the leak detector. Press the "audible alarm signal" button if necessary.
- (5) Clean / dry and insert the probe.
- (6) Move three way valve 20 to position I and open the shut-off cocks.

6.4.4 *Checking the free passage of air in the interstitial space*

- (1) Connect the measuring gauge to three way valve 21, then position III.
- (2) For tanks and pipes according to Installation examples P-03, Q-03: Three way valve 20 to position IV,
For pipes according to Installation examples P-01, P-02, Q-01, Q-02 and Q-04: Open the test valve at the end of the interstitial space away from the leak detector. In the case of several ducts of a pipe the stop valves of the interstitial spaces not integrated in the test can be closed.
- (3) Determine the drop in pressure on the measuring gauge. If there is no drop in pressure, establish the cause and eliminate it.
- (4) Three way valve 20 to position I, or close test valve(s).
- (5) Three way valve 21 to position I.
- (6) Remove measuring gauge.

6.4.5 *Testing the switching values using the interstitial space*

- (1) Connect the measuring gauge to three way valve 21 and three way valve 21 in position III.
- (2) For tanks and pipes acc. to Installation examples P-03, Q-03: Aerate via three way valve 20 (position III)
For tanks and pipes acc. to Installation examples P-01, P-02, Q-01, Q-02 and Q-04: Open the test valve at the end of the interstitial space away from the leak detector. In the case of several ducts the stop valves of the interstitial spaces not integrated in the test can be closed.
- (3) Determine switching values "pump ON" and "alarm ON" (with optical and audible alarm signal). Note values.
- (4) Press the "audible alarm signal" button if necessary.
- (5) Carry out the start-up sequence if necessary (see chapter 3.5.2).
- (6) Three way valve 20 to position I, or close test valve and determine switching values "alarm OFF" and "pump OFF". Note values.
- (7) The test is considered passed if the switching values measured are within the specified values.
- (8) Open the shut-off cocks previously closed, if appropriate.
- (9) Three way valve 21 to position I. If necessary, press "audible alarm signal" button again.
- (10) Remove the measuring gauge.



6.4.6 Testing the switching values using the testing device (P-115 392)

- (1) Connect the testing device with both hose ends on one of the free muffs of three way valves 20 and 21 respectively.
- (2) Connect the measuring gauge to the T-piece of the testing device.
- (3) Close the needle valve of the testing device.
- (4) Three way valves 20 and 21 to position II. Operating pressure is built up in the test tank.
- (5) Aerate using the needle valve, determine the "pump ON" and "alarm ON" (optical and audible) switching values. Note values.
- (6) Press the "audible alarm signal" button if necessary.
- (7) Carry out the start-up sequence if necessary.
- (8) Slowly close the needle valve and determine the switching values "alarm OFF" and "pump OFF".
- (9) The test is considered passed if the switching values measured are within the specified values.
- (10) Three way valves 20 and 21 to position I. Press the "audible alarm signal" button if appropriate.
- (11) Remove the testing device.

6.4.7 Testing the lift of the vacuum pump

- (1) Connect a measuring gauge to three way valve 20. Three way valve 20 to position II.
- (2) Three way valve 21 to position II, thus aeration of the pressure switch, the alarm is triggered, the pump runs (carry out the start-up sequence if necessary to make the pump run)
- (3) Read off the lift of the pump on the measuring gauge.
- (4) The test is considered passed when the pressure value reached is
 - > 150 mbar (Type 34 and 30-70),
 - > 430 mbar (Type 230, 255)
 - > 500 mbar (Type 330, 230-340),
 - > 600 mbar (Type 410)
 - > 680 mbar (Type 500) or
 - > 750 mbar (Type 570).
- (5) Three way valve 20 and 21 to position I.
- (6) Remove the measuring gauge.

6.4.8 Tightness test on the leak detection system

- (1) Check that all the shut-off cocks between the leak detector and interstitial space are open.
- (2) Connect the measuring gauge to three way valve 21, position III.
- (3) For the tightness test, the vacuum pump must have reached the "pump OFF" switching value. Wait for possible pressure compensation and then begin with the tightness test.



- (4) It must be evaluated as positive if the values in the following table are observed. A higher drop in pressure means increased stress on the wear parts.

Volume of interstitial space in litres	1 mbar drop in pressure in	Volume of interstitial space in litres	1 mbar drop in pressure in
100	9 minutes	2000	3.00 hours
250	22 minutes	2500	3.75 hours
500	45 minutes	3000	4.50 hours
1000	1.50 hours	3500	5.25 hours
1500	2.25 hours	4000	6.00 hours

- (5) Test cock to position I, remove measuring gauge.

6.4.9 Setting up the operating condition

- (1) Seal the housing
- (2) Seal the shut-off cocks (between leak detector and interstitial space) in the open position for every interstitial space connected.

6.5. Alarm

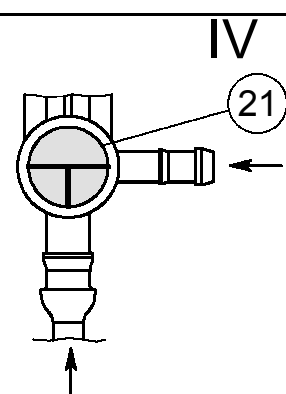
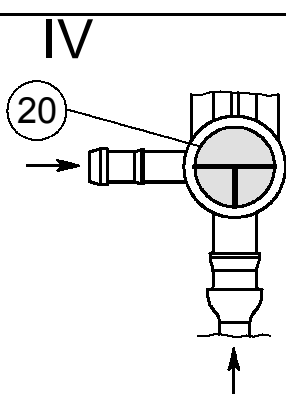
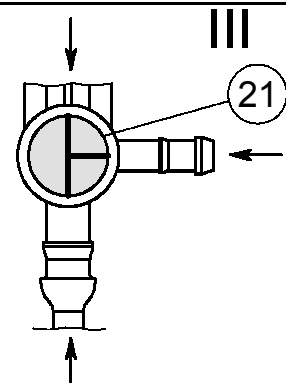
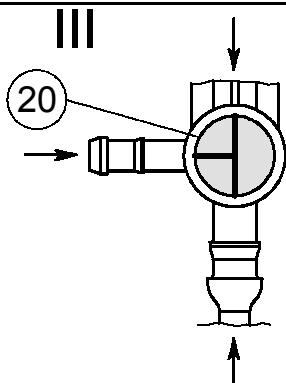
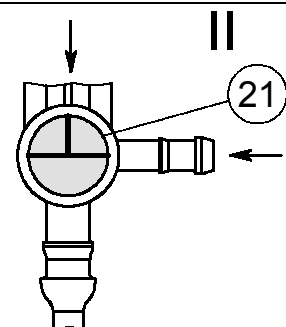
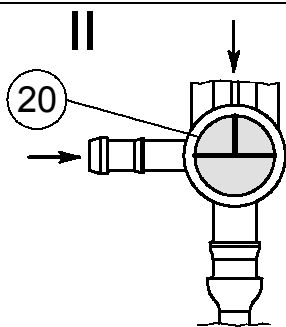
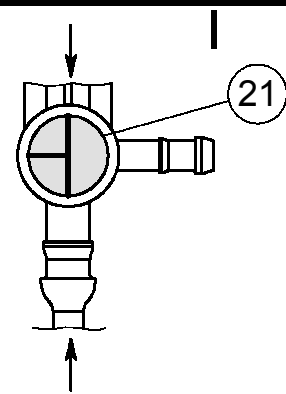
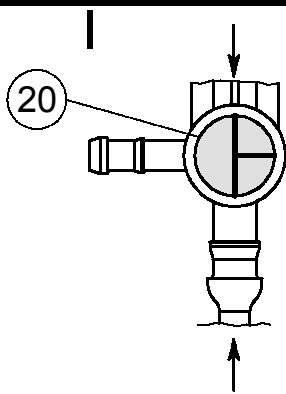
- (1) In case of alarm the "alarm" signal lamp lights up and the audible signal sounds.
- (2) If available, close the shut-off cocks in the connection line between interstitial space and leak detector.
- (3) Switch off the audible signal by pressing the "audible alarm signal" button. The button will light up.
- (4) Determine the cause of the alarm signal according to the table in chapter 3.5.1.
- (5) Inform the installation company (detailing the cause of the problem if possible).
- (6) The installation company has to determine and eliminate the cause.
- (7) Carry out the functional test according to chapter 6.4, observing the conditions specified in chapters 4 to 6.2.

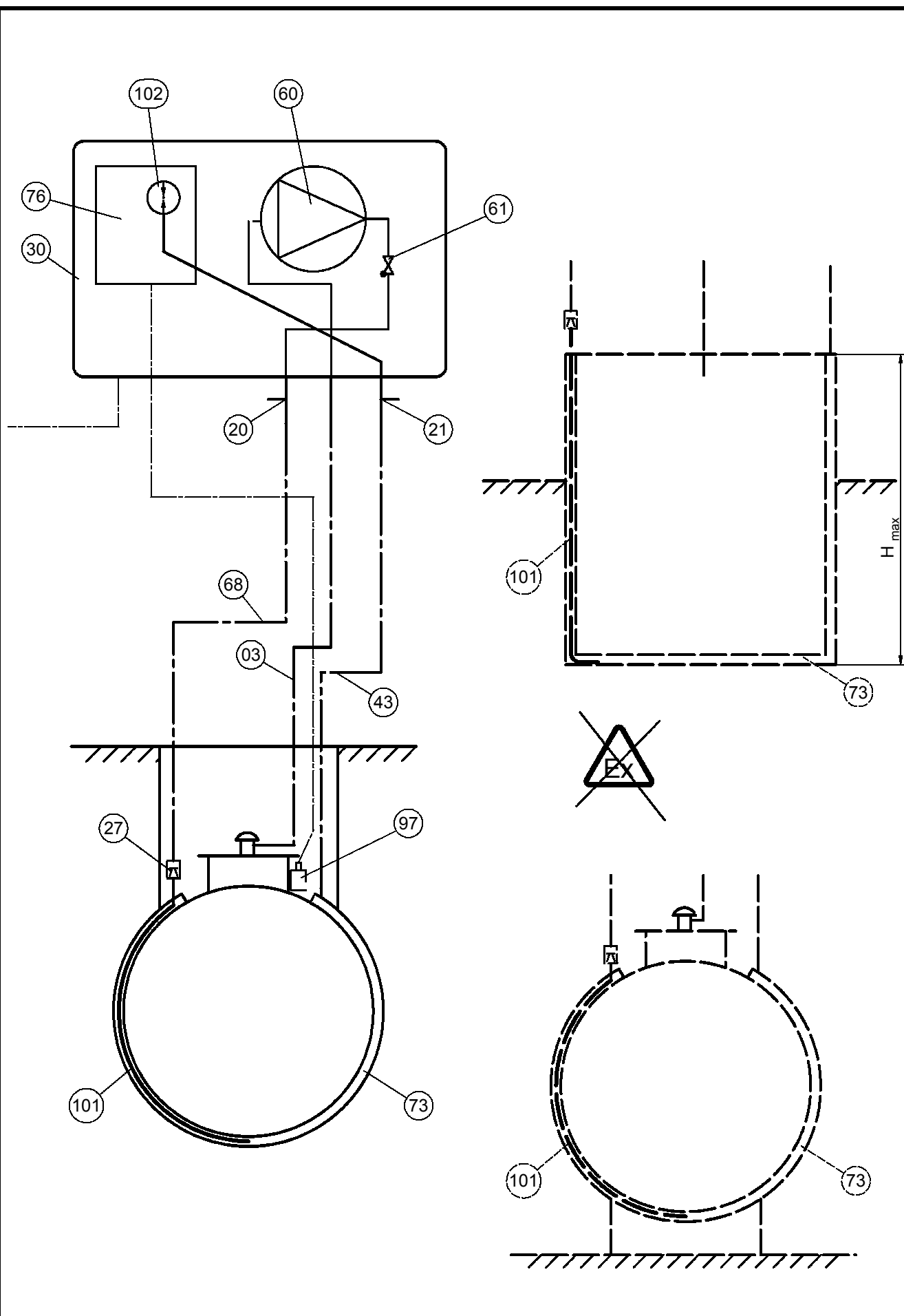
7. Marking

- Type
- Electrical data
- Manufacturer or manufacturer's mark
- Model year (month / year)
- Serial number
- Approval number
- Statutory marks

8. Index used

- 01 Signal lamp "alarm", red
- 01.2 Signal lamp "alarm 2", red (leak probe)
- 02 Shut-off cock
- 03 Exhaust line
- 09 Signal lamp "operation", green
- 20 Three way valve in the suction line
- 21 Three way valve in the measuring pipe
- 22 Needle valve
- 24.1 Fine-wire fuse T 1 A (230 V version)
- 24.2 Fine-wire fuse T 250 mA (230 V version)
- 24.3 Fine-wire fuse T 1 A (230 V version)
- 27 Liquid stop valve
- 27* Liquid stop valve, connection against the block direction
- 30 Device housing
- 33 Condensate trap
- 36 "Start-up" button
- 43 Measuring pipe
- 44 Solenoid valve
- 52 Measuring gauge
- 57 Test valve
- 59 Relay
- 60 Vacuum pump
- 61 Check valve with filter
- 68 Suction line
- 69 Buzzer
- 71 "Audible alarm signal" button
- 73 Interstitial space
- 74 Connection line
- 76 Main PCB
- 84 Test tank 1 litre
- 85 Test muff for measuring gauge
- 88 Double-walled pipe
- 89 Double-walled battery tank
- 93 Tank ventilation
- 95 Pressure compensating vessel
- 96 Node point
- 97 Leak probe (only VL(R) ../E)
- 98 Sealing plug
- 101 Suction line leading to low point
- 102 Pressure sensor
- 105 Control unit
- 106 Contacts for serial data transmission
- 111 Cooling section
- 112 Insulation

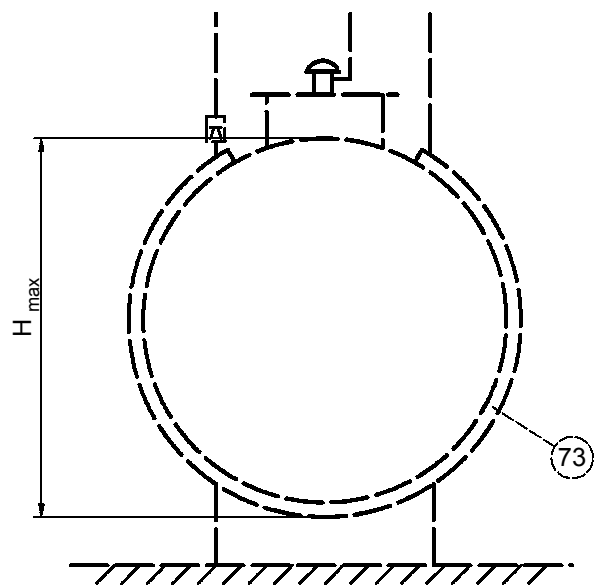
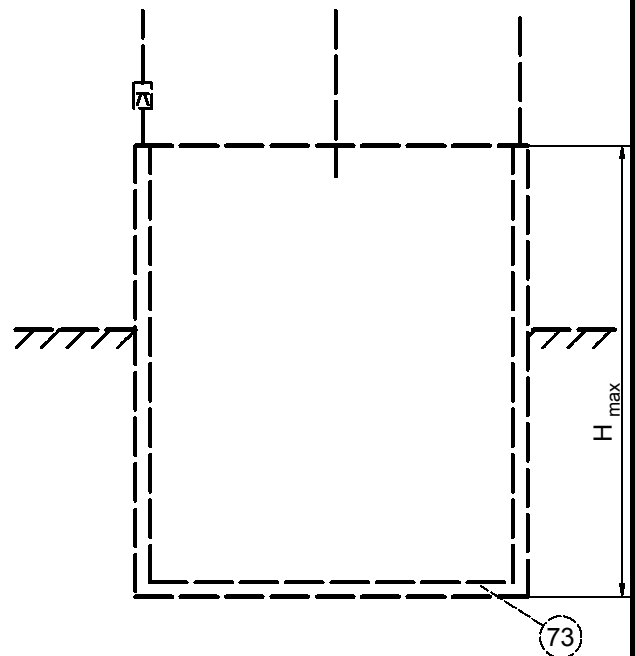
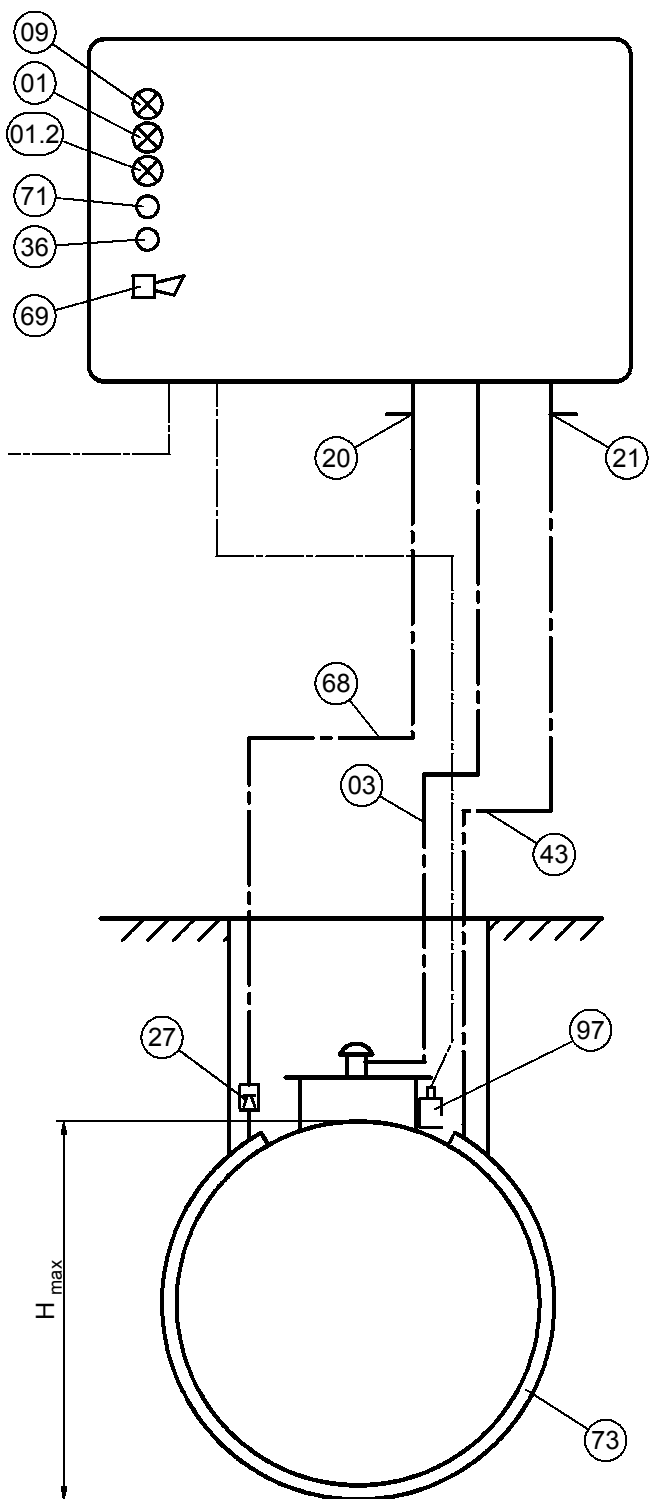


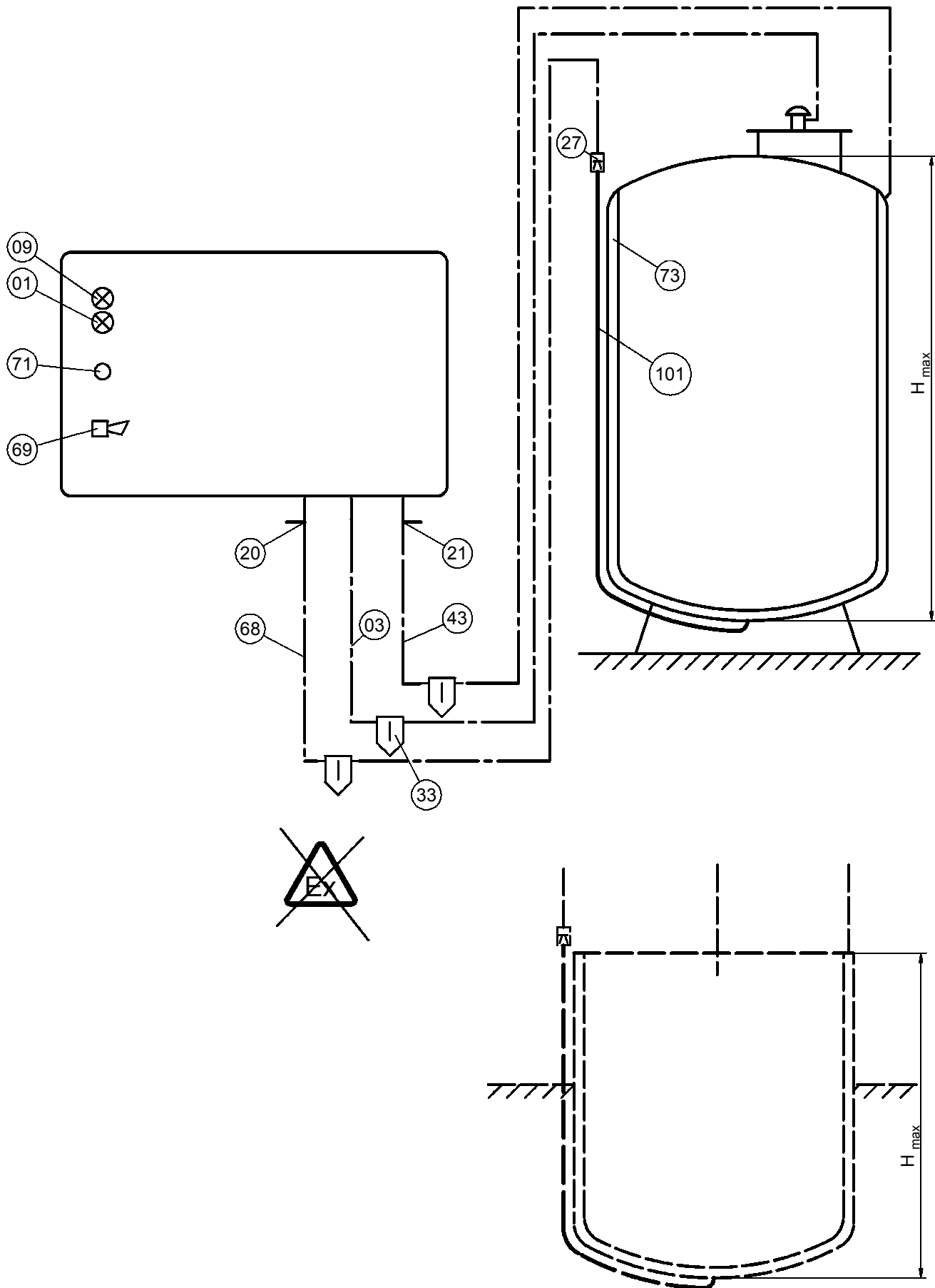


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- 09
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- 21

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- 03
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H_{max}

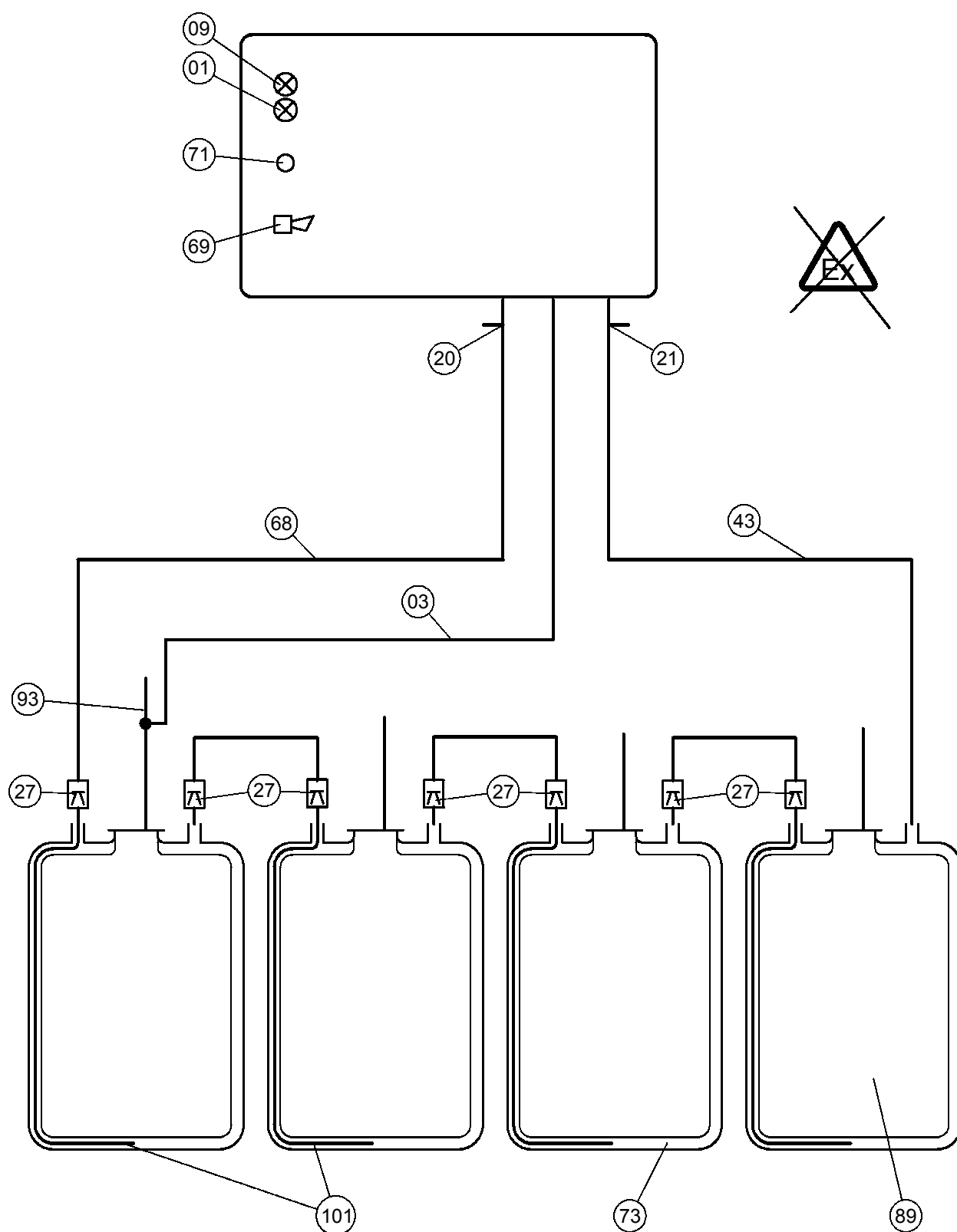
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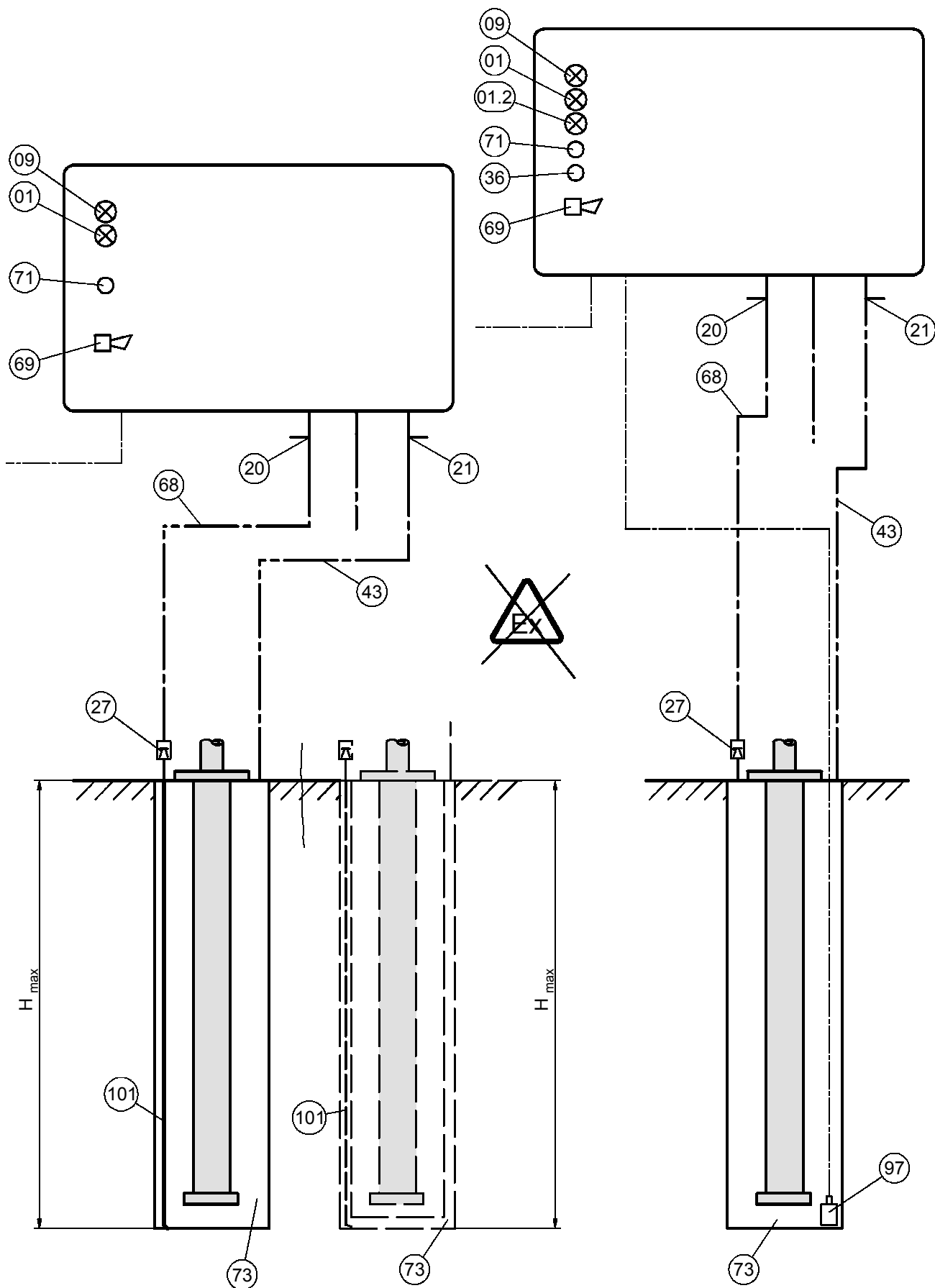


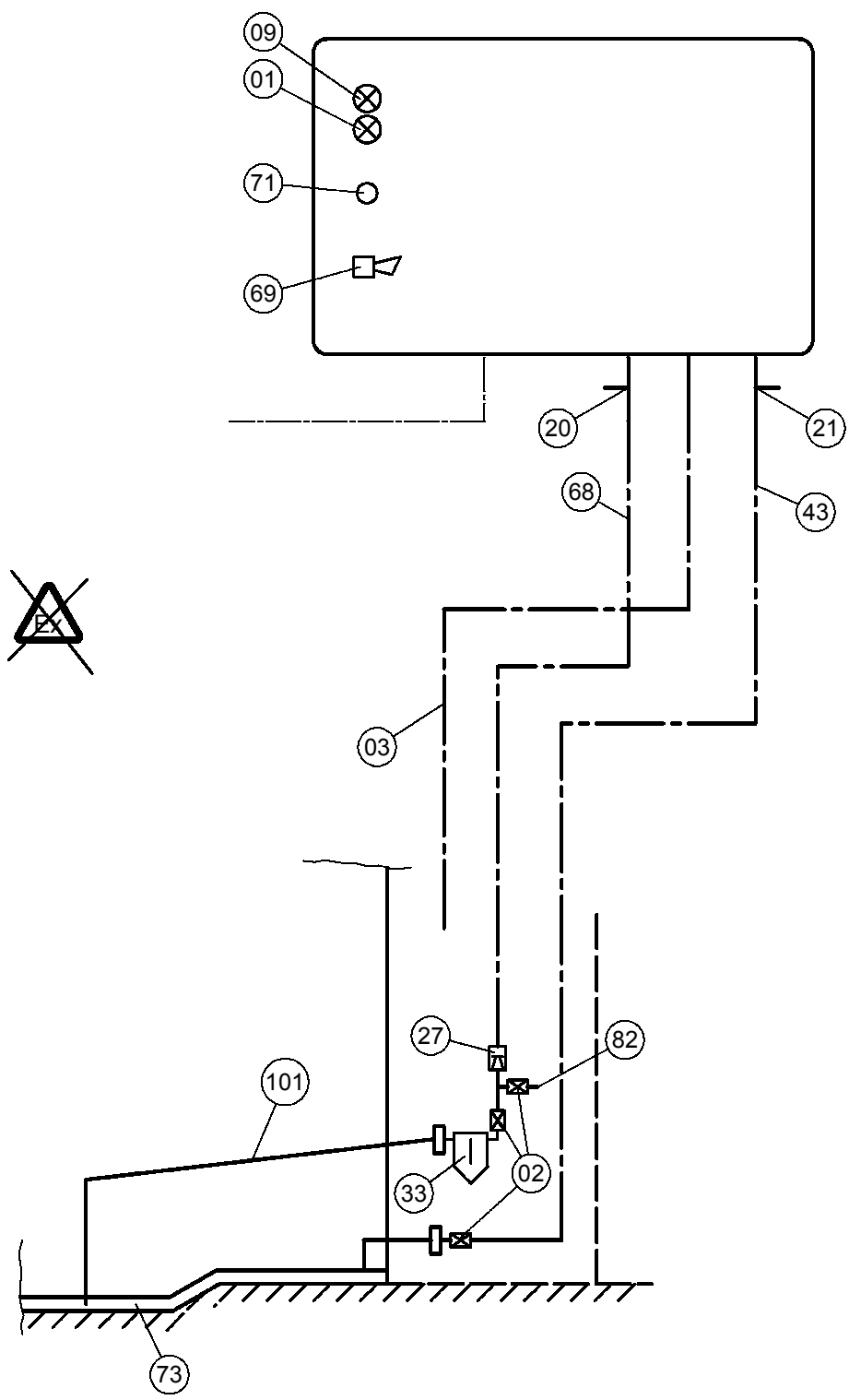
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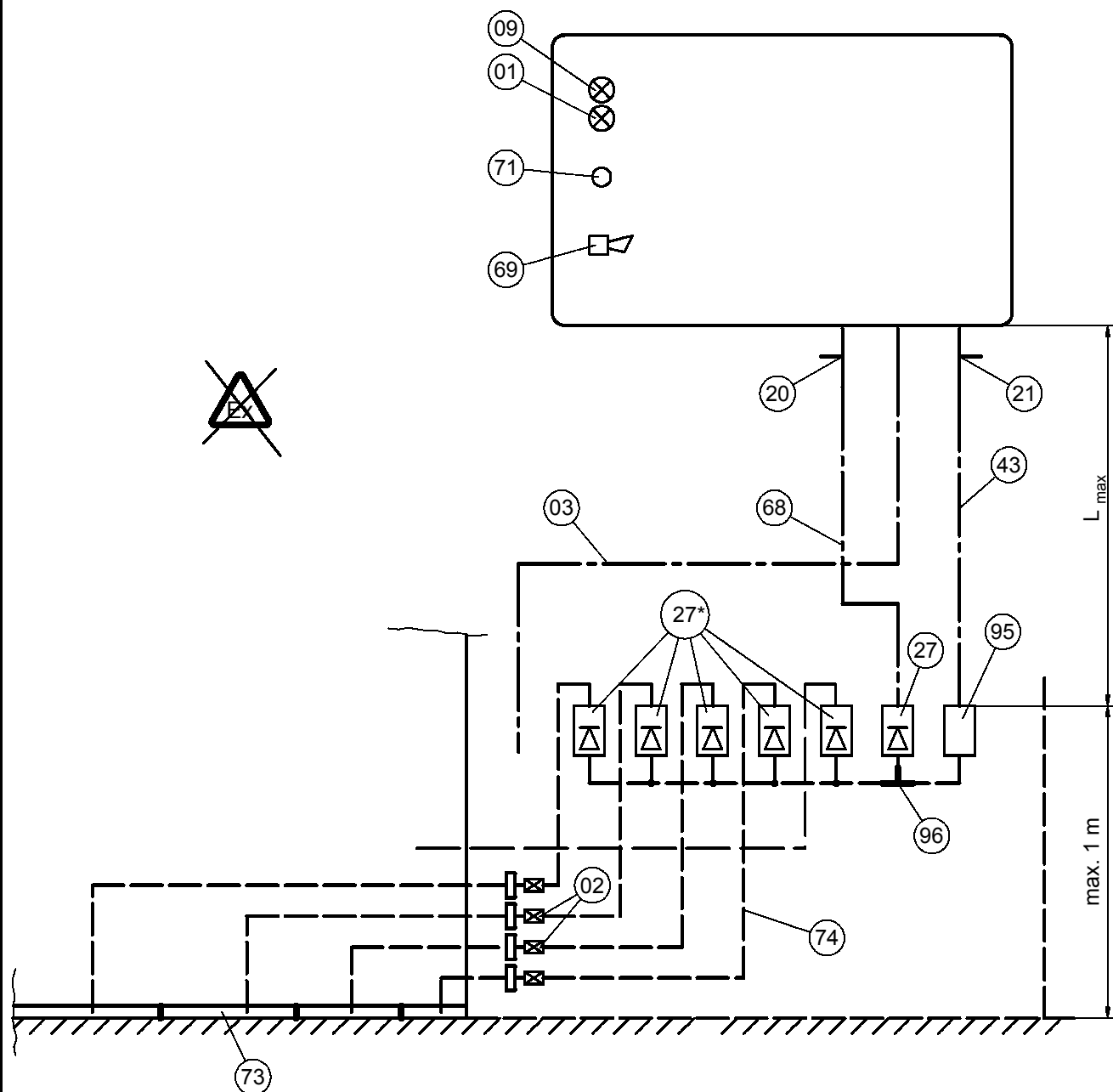
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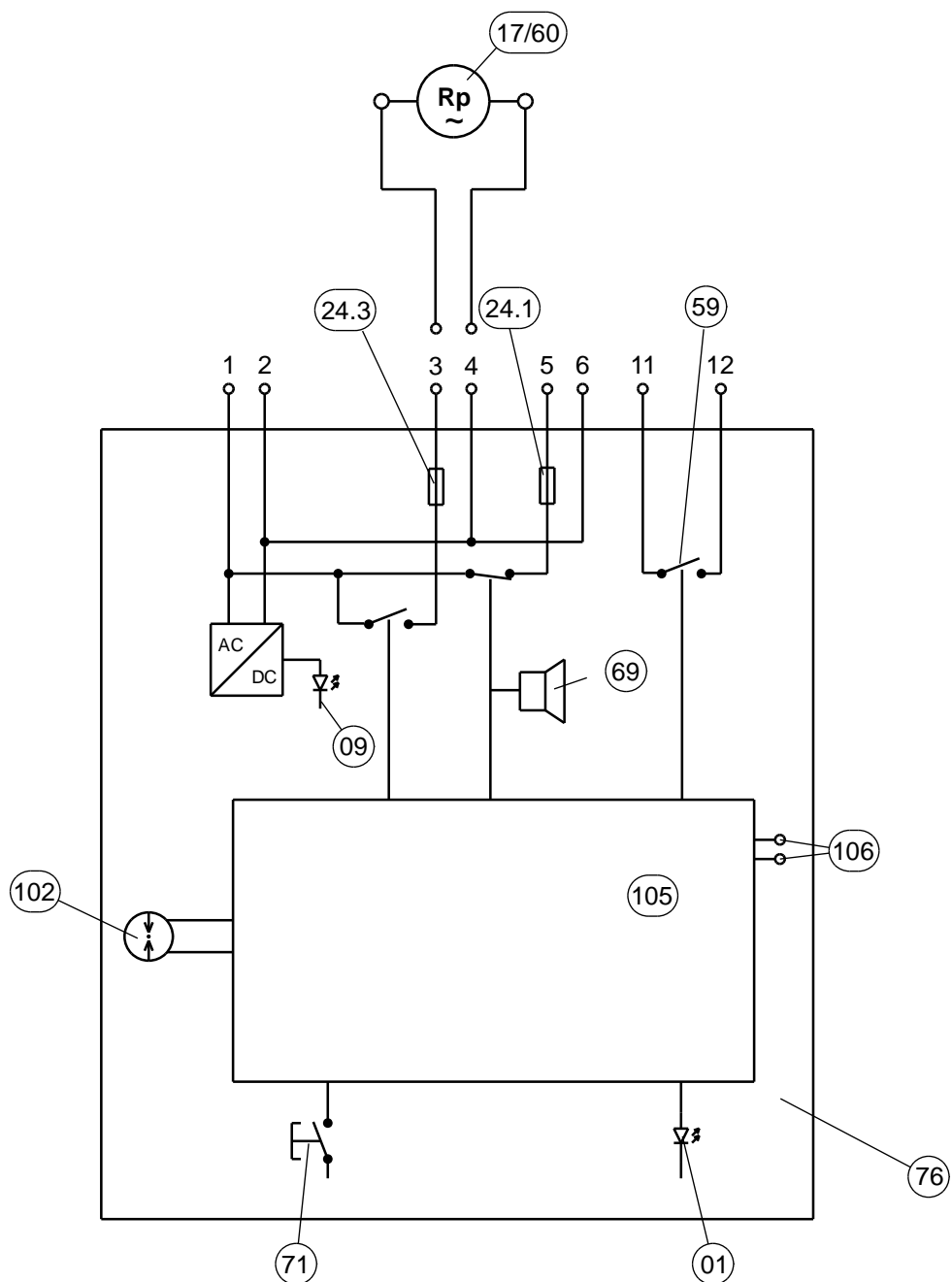


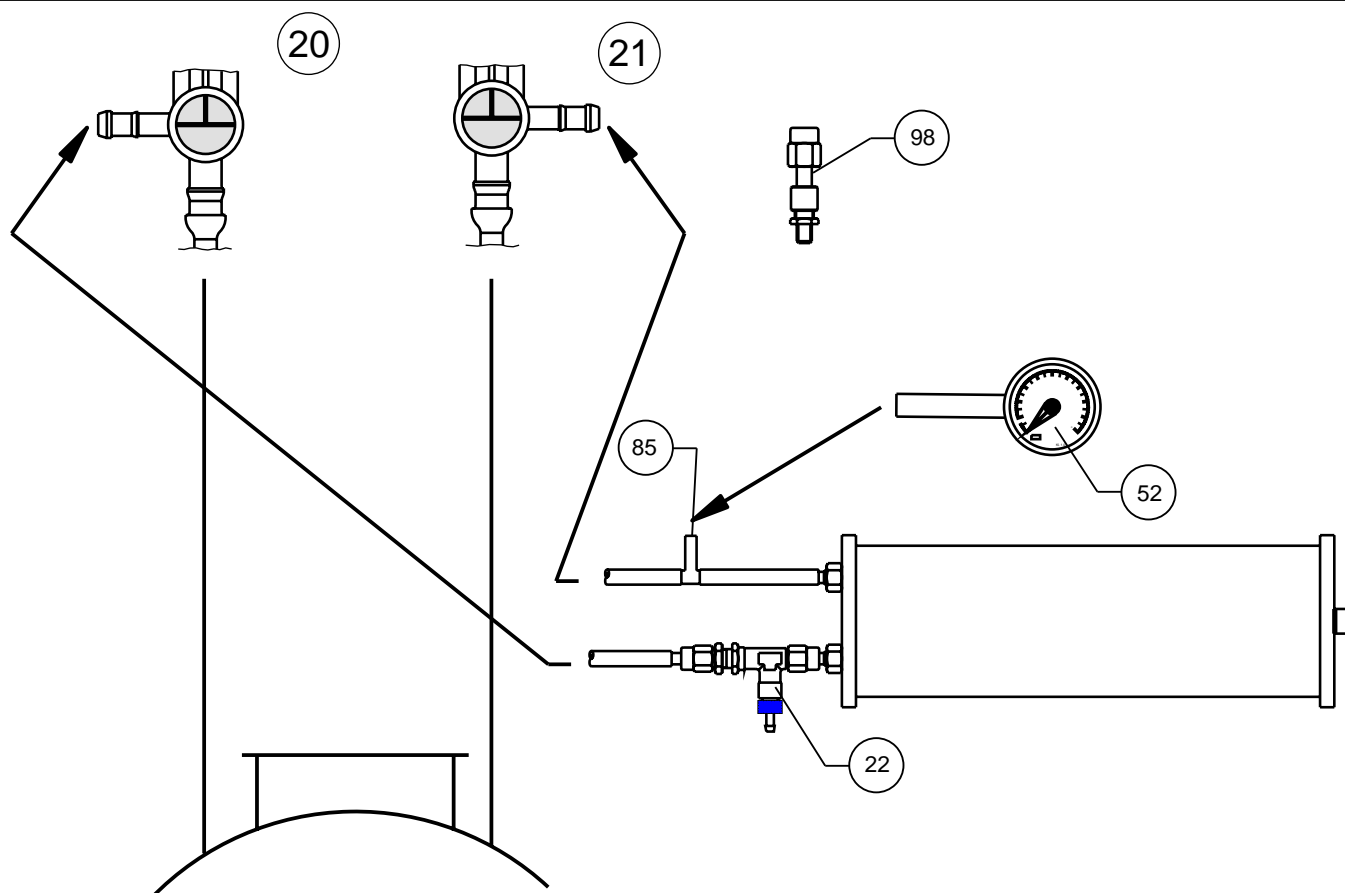
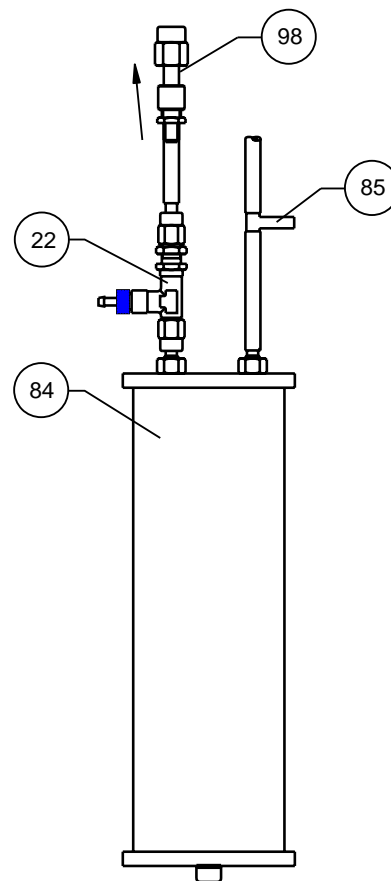
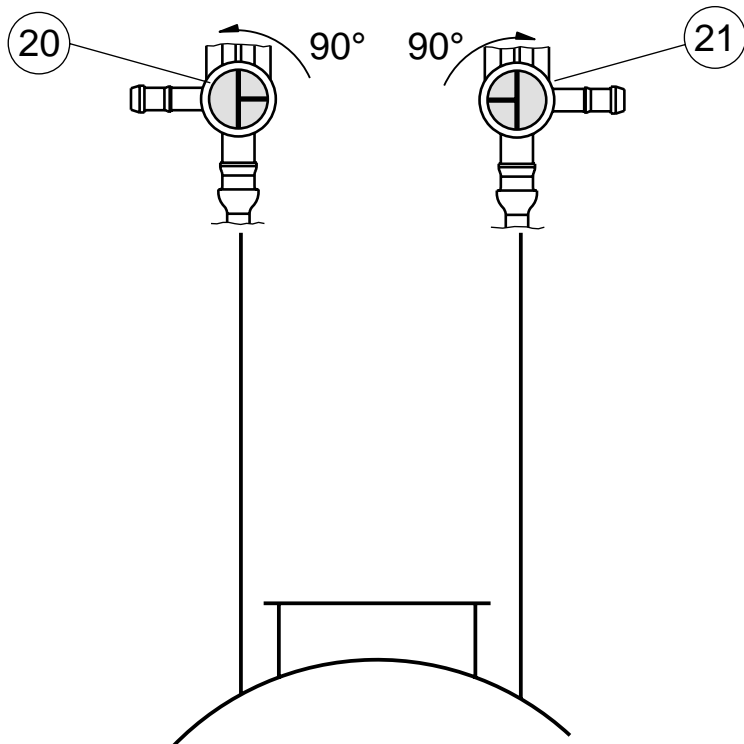














Use of the vacuum leak detector VL .. on interstitial spaces filled with leak detection liquid

A.1 Pre-conditions

- (1) Only leak detectors with suitable alarm pressures may be used, depending on the diameter of the tank and the density of the stored product.
- (2) The procedure described in the following is designed for tanks in compliance with DIN 6608.
- (3) If this procedure is carried out on other tanks, agreement with the local authority responsible is required in individual cases.

A.2 Preparation

- (1) Dismount the leak detector on liquid basis.
- (2) Suction the leak detection liquid out of the interstitial space:
- (3) Suction procedure:
 - Mount the adapters for suction and measuring line
 - Connect the installation pump to the suction line connection via an intermediate tank¹
 - **Suction off until there is no more liquid drawn in**
 - Connect the vacuum measuring gauge to the measuring line connection
 - Continue the evacuation process (at approx. 500 mbar) until no more liquid is suctioned
 - Repeat the evacuation process after a break if necessary to make sure a gas buffer is created above the remaining leak detection liquid.

A.3 Mounting and starting-up the leak detector

- (1) A gas buffer has been created above the leak detection liquid due to the suction process.
- (2) Mount the leak detector according to the documentation and start operation.
- (3) Carry out a functional test on the leak detector.

A.4 Alarm

- (1) An alarm can occur if insufficient leak detection liquid was suctioned off and the level of liquid has increased in the interstitial space due to an increase in temperature.
Remedy:
Create a new air buffer above the leak detection liquid.
- (2) An alarm can also be triggered by the penetration of groundwater / product to be stored or air in the interstitial space and an increase in liquid level connected with this.
Remedy:
Look for the leak and eliminate if necessary, then put the leak detector back into operation. If the leak cannot be located or repaired, consult the specialist responsible on site to clarify further procedure.

¹ The liquid suctioned off is collected in this tank.



E.1 H_{max} Depending on density

In this appendix, VL .. stands for all versions, i.e. also for VLR .. or VLR ../E

Density of the product stored [kg/dm ³]	H _{max.} [m]						
	VL 230	VL 255	VL 330	VL 410	VL 500	VL 570	
0.8	2.6	2.9	3.8	4.8	6.0	6.9	Aboveground tank(s) and pipe(s)
0.9	2.3	2.6	3.4	4.3	5.3	6.1	
1.0	2.0	2.3	3.1	3.9	4.8	5.5	Above- and under- ground tank(s) / pipe(s)
1.1	1.9	2.1	2.8	3.5	4.4	5.0	
1.2	1.7	1.9	2.6	3.2	4.0	4.6	
1.3	1.6	1.8	2.4	3.0	3.7	4.2	
1.4	1.5	1.6	2.2	2.8	3.4	3.9	
1.5	1.4	1.5	2.0	2.6	3.2	3.7	
1.6	1.3	1.4	1.9	2.4	3.0	3.4	
1.7	1.2	1.4	1.8	2.3	2.8	3.2	
1.8	1.1	1.3	1.7	2.2	2.7	3.1	
1.9	1.1	1.2	1.6	2.0	2.5	2.9	

E.2 Max. Tank height depending on density

Density of the product stored [kg/dm ³]	H _{max.} [m]							
	VL 34	VL 230	VL 255	VL 330	VL 410	VL 500	VL 570	
0.8	7.5	17.3	19.1	23.4	23.8	24.5	24.2	Above- ground tanks
0.9	6.6	15.3	17.0	20.8	21.1	21.8	21.5	
1.0	6.0	13.8	15.3	18.7	19.0	19.6	19.4	Above- and underground tanks
1.1	5.4	12.6	13.9	17.0	17.3	17.8	17.6	
1.2	5.0	11.5	12.8	15.6	15.8	16.4	16.2	
1.3	4.6	10.6	11.8	14.4	14.6	15.1	14.9	
1.4	4.3	9.9	10.9	13.4	13.6	14.0	13.8	
1.5	4.0	9.2	10.2	12.5	12.7	13.1	12.9	
1.6	3.7	8.6	9.6	11.7	11.9	12.3	12.1	
1.7	3.5	8.1	9.0	11.0	11.2	11.5	11.4	
1.8	3.3	7.7	8.5	10.4	10.6	10.9	10.8	
1.9	3.1	7.3	8.1	9.8	10.0	10.3	10.2	

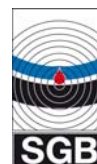


E.3 Tanks according to DIN 6618 T2: 1989 and tubs with vaulted base and the same dimensions

Diameter [mm]	Height [mm]	Max. density of the product stored [kg/dm ³]						
		VL 34	VL 230	VL 255	VL 330	VL 410	VL 500	VL 570
1600	≤ 2 820	≤ 1.9	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 3 740	≤ 1.6	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 5 350	≤ 1.6	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 6 960	≤ 1.6	≤ 1.9	≤ 1.9	≤ 1.9			
2000	≤ 5 400	≤ 1.4	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 6 960	≤ 1.4	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 8 540	≤ 1.4	≤ 1.9	≤ 1.9	≤ 1.9			
2500	≤ 6 665	≤ 1.0	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 8 800	≤ 1.0	≤ 1.9	≤ 1.9	≤ 1.9			
2900	≤ 8 400	≤ 0.9	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 9 585	≤ 0.9	≤ 1.9	≤ 1.9	≤ 1.9			
	≤ 12 750	≤ 0.8	≤ 1.2	≤ 1.2	≤ 1.6			
	≤ 15 950	-	≤ 1.0	≤ 1.0	≤ 1.2			

E.4 Series of interstitial spaces in battery tanks

- From Messrs Berolina Polyester GmbH & Co. KG according to General Approval No. Z-40.11-165 from the Building Inspection Authorities.



Technical data

1. Electrical data

Electrical supply (without external signal)		230~ V - 50 Hz - 50 W
Switch contact load, terminal strips AS (5 and 6)	max:	230~ V - 50 Hz - 200 VA
	min:	20 mA
Switch contact load, dry relay contacts (terminals 11 and 12)	max:	230~ V - 50 Hz - 3 A
	min:	6 V / 10 mA
External fuse for the leak detector		max. 10 A
Overvoltage category		2
Protection type of housing, Plastic		IP 30
Implementation VL .../p (sheet steel)		IP 54

2. Pneumatic data (requirements concerning the test measuring gauge)

Nominal size	min. 100
Accuracy class	min. 1.6
Scale end value	-600 mbar / -1000 mbar



Evaluating the display for the function "Tightness test"

Chapter 3.5.2 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.



Using the VL .. underpressure leak detector on tanks which have been allowed to warm up

The following example applications are described in this appendix:

- W.1: Tank for storing liquids which are viscous or have a tendency to solidify at ambient temperature (temperatures $>50^{\circ}\text{C}$ and $<150^{\circ}\text{C}$), and where a sufficient length of the measuring line has been routed inside the tank insulation, or for tanks used to store liquids which remain thin at ambient temperature.
- W.2: Tank for storing liquids which are viscous or have a tendency to solidify at ambient temperature (temperatures $>50^{\circ}\text{C}$ and $<150^{\circ}\text{C}$), and where only a short length of the measuring line has been routed inside the insulation.
- W.3: Tanks which are filled with hot product quickly; in other words, the temperature of the filled product is more than 25°C higher than the temperature of the tank (worst case scenario), introducing the risk of false alarms.

The design and dimensioning of the leak detector for a heated tank (chapters W.1 and W.2) is significant on account of the temperature resistance of the leak detector components used. In these applications, either a sufficient cooling section or a system of leak sensors in conjunction with solenoid valves (instead of a liquid stop valve) needs to be used in order to ensure that alarms will be triggered correctly.

Tanks which are filled with hot products (chapter W.3) experience a change in temperature in the interstitial space and therefore a change in pressure (drop in underpressure). False alarms which might be triggered due to this rise in pressure need to be avoided if at all possible. Both aspects can even be significant simultaneously (particular care must be taken to monitor the leak detector system especially when heating or filling a tank for the first time)¹.

The interstitial spaces of the above tanks should be dry prior to starting up the leak detector (if they are not, they should be dried in order to ensure that the leak detector will function correctly).

W.1 Tanks with heating (and insulation) at temperatures $> 50^{\circ}\text{C}$ and $< 150^{\circ}\text{C}$ (design with cooling section)

- (1) This design requires that the parts of the interstitial space which are used for pressure reduction² are sufficiently heated or that the product inside the tank remains sufficiently thin at ambient temperature.
- (2) Check whether special switching values might be necessary (see W.3).
- (3) A cooling section approx. 3 m in length (spiralled pipe) is installed between the mounting set and the liquid stop valve in order to prevent impermissible increases in temperature at the liquid stop valve. In most cases the liquid stop valve is then installed underneath the leak detector.
- (4) Metal pipes have to be used for reasons associated with temperature.

W.2 Tanks with heating (and insulation) at temperatures $> 50^{\circ}\text{C}$ and $< 150^{\circ}\text{C}$ (design with sensor in suction line)

- (1) Check whether special switching values might be necessary (see W.3).

¹ Cases have even been known of overpressure caused by heat rise, introducing the risk of damage to the interstitial space.

² Volume displacement in the event of a liquid leak in the interstitial space/measuring line.



- (2) Selection of the lines connecting the mounting set and the leak detector.
Use of metal pipes, Cu or VA pipes. Plastic pipes are not suitable.
The between the leak detector and the mounting set must be at least 3 m in length. This will ensure that the warm (hot) air extracted from the interstitial space can cool down before it reaches the leak detector.
- (3) Installing the leak detector.
The leak detector (including the solenoid valves in the suction and measuring lines) has to be installed so that the ambient temperature of 60°C (e.g. radiant heat from the tank) is not exceeded.
- (4) Installation of the mounting set
The ambient temperature at the mounting kit must not exceed 100°C and the temperature of the medium must not exceed 150°C.
If the mounting set needs to be installed inside the tank insulation, care must be taken to ensure that this does not impair accessibility (so that the annual functional test of the leak detector can still be carried out).
- (5) Special condition for the mounting set (suction line side)
The operator/system integrator must ensure that in the event of a leak, the product inside the tank will remain free-flowing even in the condensate trap.
Suitable measures, such as heating the condensate trap (e.g. with a heater band) might need to be introduced.
- (6) To exclude the risk of the leak detector pump overheating, underpressure must be generated with a suitable installation pump.
- (7) A float switch (vertical installation position) can be used as a sensor. Alternatively, a vibrating fork sensor (any installation position) can be used.

W.3 Tanks filled with hot product (temperature difference in relation to the product inside the tank > 25°C)

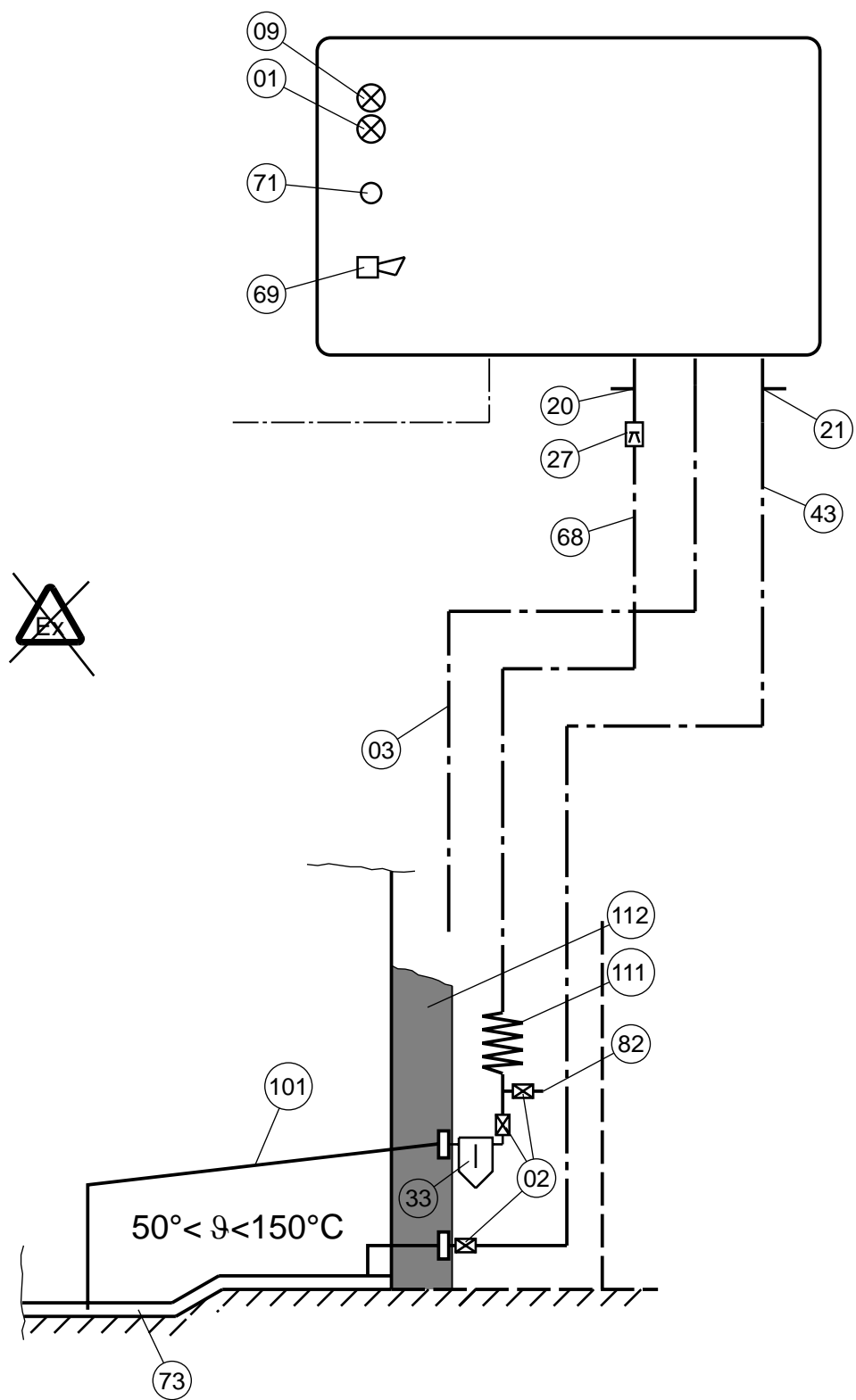
- (1) Calculation of the (potential) special switching value requirements in order to ensure reliable alarm triggering on the one hand and to prevent false alarms due to heat rise on the other.
What is important for this calculation is that the differences in temperature are known, and that the rate at which the temperature in the interstitial space changes can be approximated.
- (2) Please see W.2 for information about installing the leak detector, selecting connecting lines and installing the mounting set.

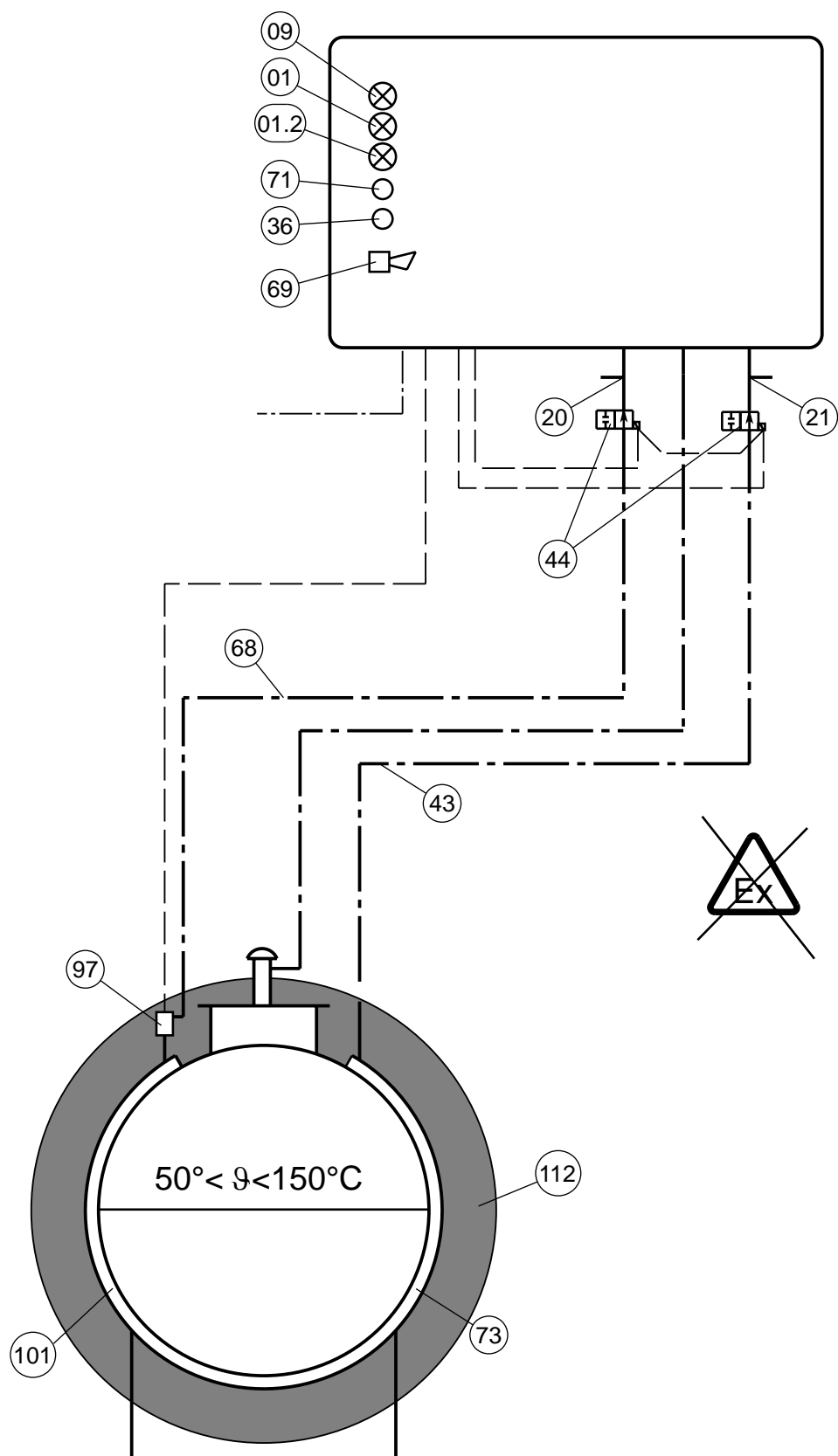
Commissioning the leak detector

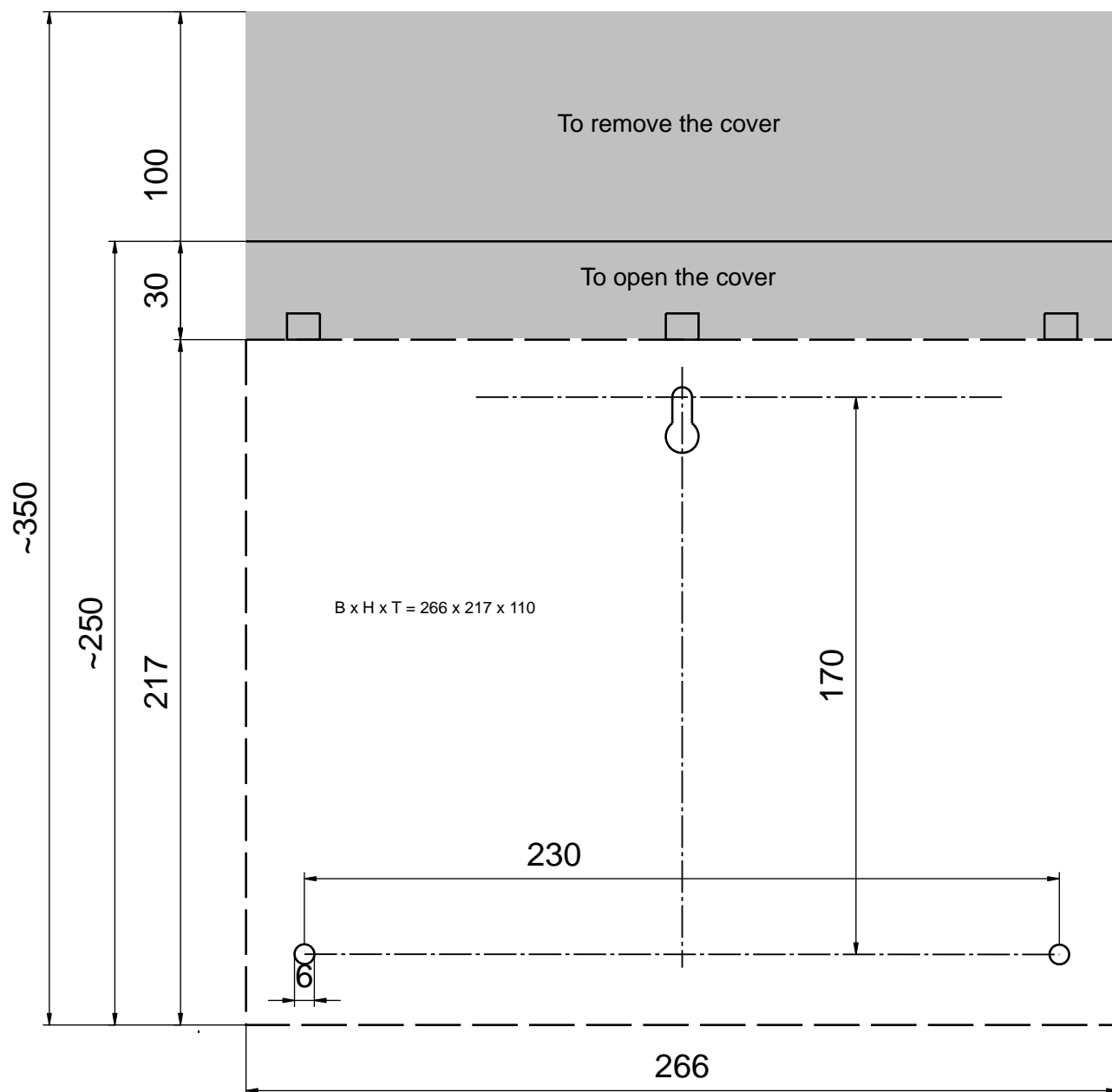
- (1) Chapters 5 and 6 describe how to commission the leak detector and test its function.
Compliance with the information in the sections of text describing the VL./E model and the use of solenoid valves should be ensured where applicable.

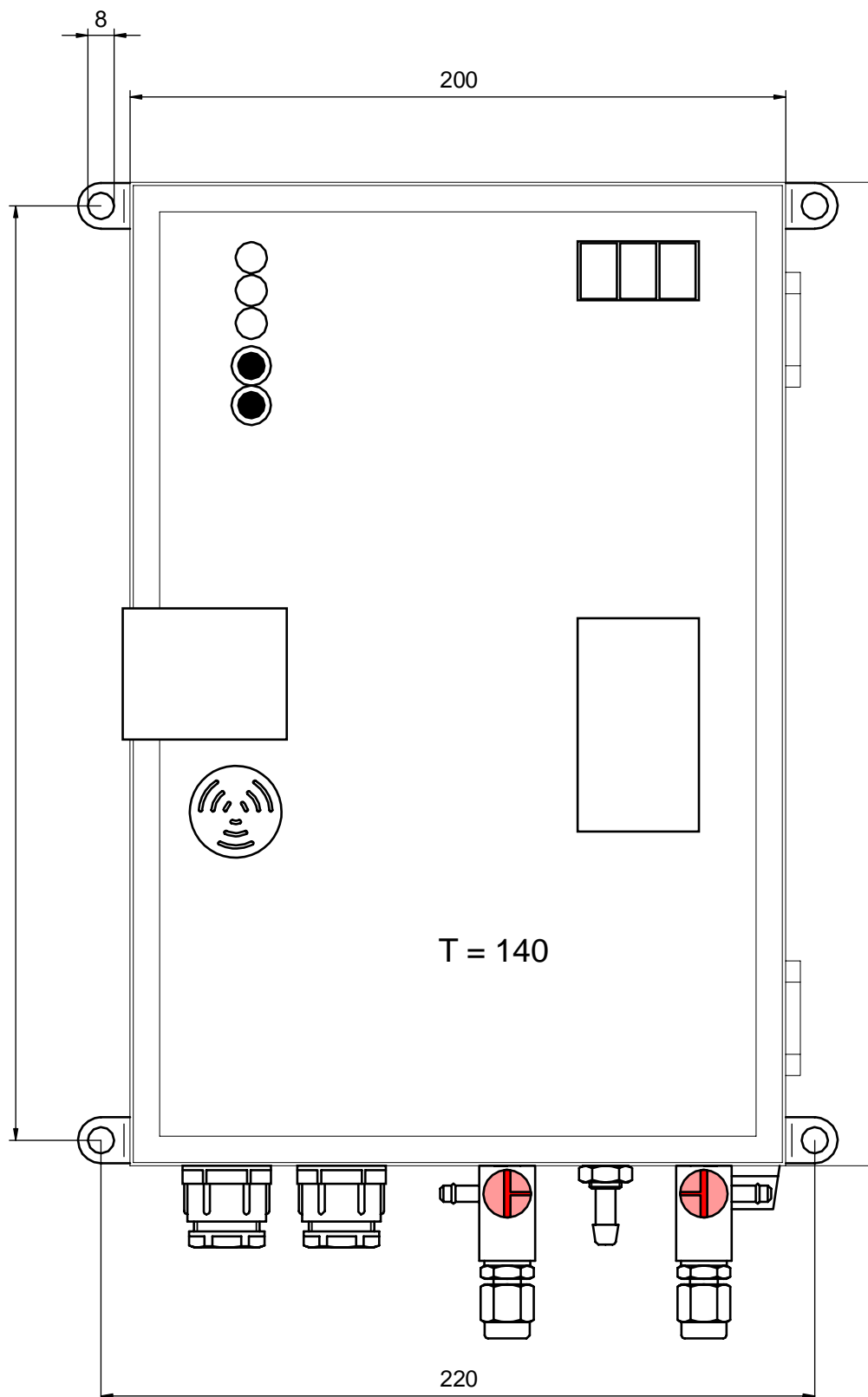
Triggering of an alarm

- (1) Please see chapter 6.5 of the documentation.
- (2) Note (for version with sensor and solenoid valves): If liquid manages to reach as far as the sensor, the solenoid valves will remain closed even if the commissioning sequence is completed.





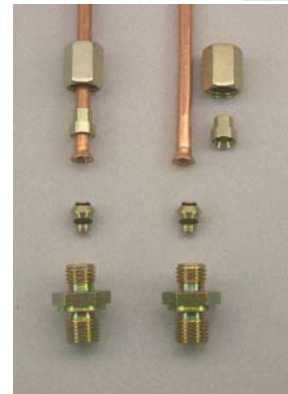




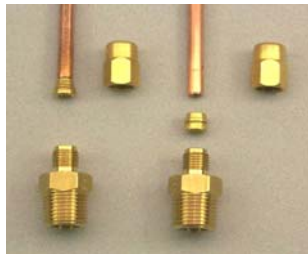
Installation of screw connections

1 Flanged screw connection for flanged pipes

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



2 Clamping ring screw connection for plastic and metal pipes



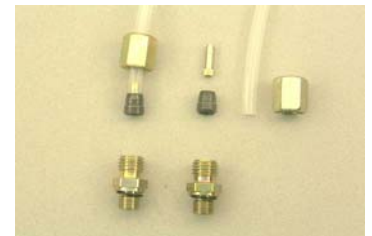
1. Insert support sleeve into the pipe end
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the screw connection until stronger resistance can be felt
4. Unfasten the nut slightly
5. Tighten the nut until there is noticeable resistance (The nut must match the thread on the base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



3 Cutting ring screw connection for plastic and metal pipes

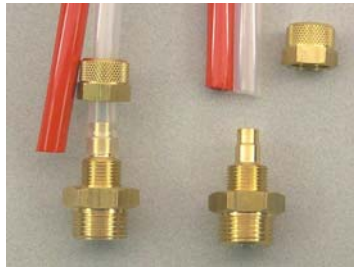


1. Insert the reinforcement sleeve into the end of the pipe
2. Drive in the reinforcement sleeve
3. Push the union nut and cutting ring over the end of the pipe
4. Screw the union nut on by hand until it noticeably rests in place
5. Press the pipe against its limit stop with internal cone
6. Tighten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



Installation of screw connections

4 Quick-release screw connection for PA and PUR hose



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

NOT suitable for PE hose

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



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

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

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

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

EC DECLARATION OF CONFORMITY



We,

SGB GmbH
Hofstraße 10
57076 Siegen, Germany,

hereby declare in sole responsibility that the leak detector

VL(R)..

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
2006/95/EC Low Voltage Directive	EN 60 335-1: 2012 EN 61 010-1: 2010 EN 60 730-1: 2011

Compliance is declared by

ppa. Martin Hücking
(Technical Director)

Declaration of Performance (DoP)

Number: **001 EU-BauPVO 06-2014**

1. Distinct identification code of the product type:

***Class I
Vacuum leak detector***

2. Type, batch or serial number or other label for the identification of the building product according to article 11 para. 4:

***VL xx / yy: Vacuum leak detector for containers,
with xx vacuum for alarm setting
with yy for alternative designs***

***VLR xx / yy: Vacuum leak detector for pipelines,
with xx vacuum for alarm setting
with yy for alternative designs***

3. Purpose of use or purposes of use of the building product intended by the manufacturer according to the applicable harmonised technical specification:

Vacuum leak detector, which is intended for application in double-walled, underground or above-ground, pressurised or unpressurised tanks or pipelines for liquids/fluids hazardous to water

4. Name, registered trade name or registered brand and contact address of the manufacturer according to article 11 para. 5:

***SGB GmbH
Hofstraße 10
57076 Siegen,
Germany
Tel.: +49 271 48964-0
Fax.: +49 271 48964-6
e-mail: sgb@sgb.de***

5. If applicable, name and contact address of the agent authorised with the tasks according to article 12 para. 2:

n/a

6. System or systems for the evaluation and inspection of the reliability of performance of the building product according to appendix V of the Building Products Regulation:

System 3

7. In the case of the declaration of performance, which applies to a building product, which is covered by a harmonised standard:

***TÜV Nord Systems GmbH & Co.KG, CC Tankanlagen, Große
Bahnstraße 31, 22525 Hamburg, Germany
ID number of the notified test laboratory: 0045***

conducted a type approval test according to system 3 and issued the following test report:

Test report no.: STPÜZ-QMM-8111391811

8. Declared performance:

Essential features	Performance	Harmonised technical specification
Pressure switch point	Passed	EN 13160-2: 2003
Reliability	10,000 Cycles	
Pressure test	Passed	
Volume flow rate test in the alarm switch point	Passed	
Function and leak tightness of the leak detection system	Passed	
Temperature resistance	-20°C .. +60°C	

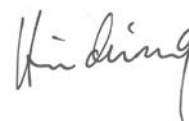
9. The performance of the product according to numbers 1 and 2 corresponds to the declared performance according to number 8:

Solely the manufacturer is responsible for the compilation of this declaration of performance according to number 4

Signed for the manufacturer and in the name of the manufacturer by:

Dipl.-Ing. M. Hücking, Director of Operations

Siegen, 30-06-2014



TÜV NORD Systems GmbH & Co. KG

PÜZ (testing, supervision and certification) — centre for containers, pipelines and pieces of equipment for systems with substances hazardous to water

Große Bahnstraße 31.22525 Hamburg

Tel.: 040 8557-0
Fax: 040 8557-2295

hamburg@tuev-nord.de
www.tuev-nord.de

Certification

Contracting body:

SGB GmbH
Hofstraße 10
D-57076 Siegen

Note: Translation of the German test report

Manufacturer:

See above

Subject of testing:

**Leak detectors with leak detector system type VL .../VLR ... according to DIN EN 131601:2003 and DIN EN 13160-2:2003
Class I vacuum monitoring system**

Type of test:

Testing of the building product before confirming conformance in line with the ÜHP (manufacturer's declaration of conformity) procedure (initial testing)

Testing period: 19.06. – 08.12.2014

Test results:

The leak detectors of type VL .../VLR ... as vacuum systems correspond to the leak monitoring system class I according to EN 13160-1:2003 and meet the requirements of EN 13160-1:2003 in conjunction with EN 13160-2:2003.

Regarding the area of application and the installation of the leak detectors, the specifications given in the following shall apply:

- operating manual "Vacuum Leak Detector VL ..", document no. 605.300, updated 12/2014,
- operating manual "Vacuum Leak Detector VLR", document no. 605.400, updated 12/2014.

Compatibility with the building regulation list A, part 1, order No. 15.43, appendix is confirmed.

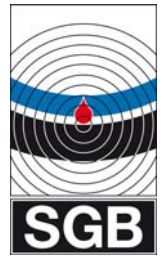
Details on testing can be found in the test report PÜZ 8111391811 dated 08.12.2014 for leak detectors type VL 330.

Hamburg, 08.12.2014

Test laboratory supervisor

J.Straube

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.

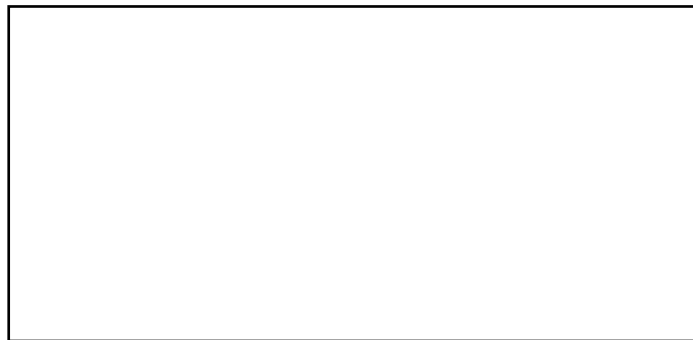
The **warranty period** for our leak detectors is **24 months**, beginning on the date of installation on site.

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

SGB GmbH
Hofstraße 10
57076 Siegen, Germany
phone +49 271 48964-0
fax: +49 271 48964-6
e-mail sgb@sgb.de
web www.sgb.de