Documentation

Explosion-protected vacuum leak detector VLXE .. Ex M and VLXE .. Ex MMV

TÜV-A 19 ATEX 1119 X

Please read instructions prior to commencing any work

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1. General

1.1 Information

These instructions provide important notes on using the leak detector VLXE.. Ex M and VLXE .. Ex MMV. The prerequisite for workplace safety is the adherence to all safety and handling instructions specified in this manual.

Furthermore, any local regulations for prevention of accidents applicable at the site of use of the leak detector and general safety instructions must be complied with.

1.2 Explanation of Symbols

In these instructions, warnings are marked with the adjacent symbol.

The signal word expresses the level of hazard.

DANGER:
Imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING:
Potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION:
Potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Information:
Highlights useful tips, recommendations, and information.

1.3 Limitation of Liability

All information and instructions in this documentation have been compiled considering the applicable standards and regulations, the state of the art, and our longstanding experience.

SGB does not assume any liability in the case of:

- Noncompliance with these instructions
- Improper use
- Use by unqualified personnel
- Unauthorized modifications
- Connection to systems not approved by SGB

1.4 Copyright

1.5 Warranty Conditions

We provide warranty for the leak detector VLXE .. Ex M and VLXE .. Ex MMV for a period of 24 months from the day of installation on site in accordance with our General Terms & Conditions.

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

Warranty conditions are subject to submission of the functional/test report on initial commissioning by trained personnel.
The serial number of the leak detector must be stated.

The obligation of warranty shall cease to exist in the case of
- inadequate or improper installation
- improper use
- modifications/repairs without consent of the manufacturer.

Our warranty does not include parts, which may be perished premature due to their consistence or category of usage (e.g. pumps, valves, gaskets, etc.). Furthermore, we are not liable for defects or corrosion damages caused by humid or inappropriate installation environments.

1.6 Customer service

Our customer service is available for any inquiries.

For information on contacts, please refer to our website sgb.de/en or the label of the leak detector.

2. Safety

2.1 Intended Use

WARNING!

Danger from misuse

- Assembly of housing, preferably outdoors
- Conditions from Section 3.5 “Field of Application” must be adhered to.
- Only the interstitial spaces of double-walled tanks/pipelines that show sufficient underpressure
- Grounding/equipotential bonding in accordance with applicable regulations
- Interstitial space denotation flame arresters required by regulation
- Tightness of the interstitial space according to this documentation (Section 6.1).
- Installation only in Zone 1, Zone 2 or outside of the EX-area
- Explosive vapor-air mixtures: II A to II B3; T1 to T4 alternatively, depending on the flame arrestor types
  Explosive vapor-air mixtures: II B and H_2; T1 to T4
- Ambient temperature -40°C to +55°C
- Implementation in manhole pits or inspection chambers shall be sealed gas-tight
- The power supply cannot be disconnected
- Ground/main voltages shall be at the same potential as the equi-potential bonding of the tank/pipelines
- The volume of the space monitored by the leak detector must not exceed 10 m^3 (manufacturer’s recommendation: 4 $m^{3)}$.

Any claims arising from misuse are excluded.

CAUTION: The protective function of the device may be impaired if it is not used as specified by the manufacturer.

2.2 Obligation of the Operating Company

Leak detector VLXE .. Ex M and VLXE .. Ex MMV are used in the commercial sector. The operating company is therefore subject to statutory occupational safety obligations.

In addition to the safety instructions in this documentation, all applicable safety, accident prevention, and environmental regulations must be adhered to. In particular:

WARNING!

Danger in case of incomplete documentation

- Compiling a risk assessment and implementing its results in a directive
- Performing regular checks as to whether the directive is in compliance with the current standards
- The directive includes information on how to react to an alarm that might arise
- Arranging for an annual functional check

2.3 Qualification

WARNING!

Danger to humans and the environment in the case of inadequate qualification

The personnel must be capable of independently recognizing and avoiding potential risks based on their qualifications.

Companies that put leak detectors into operation must be trained by SGB or an authorized representative.

National guidelines must be adhered to.

For Germany: Technical service qualification for mounting, commissioning, and maintenance of leak detection systems.

2.4 Personal Protective Equipment

Personal protective equipment must be worn during work.

- Wear the necessary protective equipment for the work in question
- Note and comply with existing PPE signs
- For further information, see 2.4.1

Entry in the "Safety Book"

Wear HV vest

Wear safety footwear

Wear hard hat

Wear gloves – where necessary

Wear safety goggles – where necessary

2.4.1 Personal protective equipment for systems that may be subject to risk of explosion

The parts listed here refer in particular to safety when working with systems that may be subject to risk of explosion.

If work is performed in areas in which an explosive atmosphere must be expected, the minimum required equipment is as follows:

- Suitable clothing (risk of electrostatic charge)
- Suitable tools (in accordance with EN 1127)
- Suitable combustible gas indicator calibrated to the existing vapor-air mixture (work shall be performed only at a concentration of 50 % below the lower explosion limit)[1]
- Measuring equipment to determine the oxygen content in the air (Ex/O-meter)

2.5 Fundamental Hazards

DANGER:

From electric current

When working on the leak detector, it must be disconnected from the power supply unless stated otherwise in the documentation.

Comply with relevant regulations regarding electric installation, explosion protection (e.g., EN 60 079-17), and accident prevention.

CAUTION:

From moving parts

If work is being done on the leak detector, it must be disconnected from the power supply.

DANGER:

From explosive vapor-air mixtures

Explosive vapor-air mixtures can exist in the leak detector and in the connection lines.

Ensure there is no gas present prior to performing work

Comply with explosion regulations, e.g., German Ordinance on Industrial Safety and Health (Betriebssicherheitsverordnung, BetrSichV) (and/or directive 1999/92/EC and the laws of the respective member states resulting therefrom) and/or others.

DANGER:

From working in chambers

The leak detector is usually assembled in the open air, whereas the assembly kit is usually assembled in manhole chambers. Therefore, the chamber must be entered for assembly.

Before entering, the corresponding protective measures must be taken and it must be ensured that no gas and sufficient oxygen are present.

[1] Other manufacturers' or countries' regulations may provide different percentages.

3. Technical Data of the Leak Detector

3.1 General Data

Dimensions and drilling pattern		see Section 12.3
Weight		10 kg
Storage temperature range		-40°C to +60°C
Operating temperature range		-40°C to +55°C
Buzzer volume		105 dB with external horn
Housing protection class		IP 66
Version	without solenoid valve	≤ 5 bar (feed pressure)
	with solenoid valve	> 5 ≤ 25 bar (feed pressure)
	with solenoid valve and additional pressure switch	> 25 ≤ 90 bar (feed pressure)

3.2 Electrical Data

Power supply	100 to 240 V AC, 50/60 Hz or: 24 V DC
Power input	50 W (incl. heating)
Terminals 5, 6, external signal:	max. 24 V DC; max. 400 mA
Terminals 11 – 13, potential free:	DC ≤ 25 W or AC ≤ 50 VA
Fuse protection:	max 2 A (1500 A)
Overvoltage category:	2

3.3 EX data

Leak detector	II 1/2(2)G Ex db eb ib [ib Gb] mb IIB+H_2 T4 Ga/Gb
with F 501:	II 1/2(2)G Ex db eb ib [ib Gb] mb IIB3 T4 Ga/Gb
with F 502:	II 1/2(2)G Ex db eb ib [ib Gb] mb IIC T4 Ga/Gb

3.4 Switching Values

Type	**Alarm ON,** at the latest:	**Pump OFF,** not more than:	**Functionality***of the interstitial space given for
34	- 34 mbar	- 120 mbar	- 500 mbar
230	- 230 mbar	- 360 mbar	- 650 mbar
255	- 255 mbar	- 380 mbar	- 650 mbar
330	- 330 mbar	- 450 mbar	- 700 mbar
410	- 410 mbar	- 540 mbar	- 750 mbar
500	- 500 mbar	- 630 mbar	- 850 mbar
570	- 570 mbar	- 700 mbar	- 900 mbar

Special values can be agreed upon between the client and SGB.

Overpressure alarm (VLXE .. Ex MMV) at + 50 mbar

* Fundamental lower values are possibly valid for double-walled steel tanks, if need be with the use of an underpressure valve

3.5 Field of application

3.5.1 Tank

a) Single-walled horizontal (underground or aboveground) cylindrical tanks with leak protection lining (LAK) or leak protecting jacket (LUM) and suction line leading to the low point

Usage limits: None for density and diameter

b) Double-walled horizontal cylindrical (underground or aboveground) tanks (e.g., DIN 6608-2, 6616, or DIN EN 12 285-1-2)
- Same as a), but with no suction line to low point
- Same as c), but with no suction line to low point
- Same as d), but with no suction line to low point

Usage limits:

Density of the stored material [kg/dm³]	$H_{max.}$ (Tank height or height of the low point of the pipelines to the node point[2]) [m]					
	230	**255**	**330**	**410**	**500**	**570**
0.8	2.6	2.9	3.8	4.8	6.0	6.9
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
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

A minimum of **density 1** is needed for **underground** systems.

[2] The node point is the merger of the suction and measuring lines at a vacuum leak detector for pipelines. This can also be in the assembly kit or a manifold.

c) Double-walled (or single-walled with leak protection lining or leak protecting jacket) vertical cylindrical tanks or troughs with a dished bottom (underground or aboveground) with a suction line leading to the low point (DIN 6618-2: 1989)

Usage limits:

Diameter [mm]	Height [mm]	Max. density of the stored material [kg/dm³]			
		34	**230**	**255**	**330 to 570**
1600	≤ 2 820	≤ 1,9	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 3740	≤ 1,6	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 5350	≤ 1,6	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 6960	≤ 1,6	≤ 1,9	≤ 1,9	≤ 1,9
2000	≤ 5400	≤ 1,4	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 6960	≤ 1,4	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 8540	≤ 1,4	≤ 1,9	≤ 1,9	≤ 1,9
2500	≤ 6665	≤ 1,0	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 8800	≤ 1,0	≤ 1,9	≤ 1,9	≤ 1,9
2900	≤ 8400	≤ 0,9	≤ 1,9	≤ 1,9	≤ 1,9
	≤ 9585	≤ 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

d) Rectangular or cylindrical tanks or troughs with a flat bottom (double-walled or with leak detection lining or leak detection jacket) with a suction line to the low point

Density of the stored material [kg/dm³]	$H_{max.}$ [m]						
	34	**230**	**255**	**330**	**410**	**500**	**570**
0.8	7.5	17.3	19.1	23.4	23.8	24.5	24.2
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
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) Standing cylindrical tanks with double-layered floor made of metal (e.g., according to DIN 4119)
   - As above, but with leak protection lining (stiff or flexible)
   - Vertical cylindrical tanks made of plastic with double-layered floor

   Usage limits: None for density and diameter

f) Tanks according to a) to d) that operate with an inner overlay pressure of up to 25 bar

   Usage limits: in line with the aforementioned points using a type VLXE .. Ex MMV

3.5.2 Pipelines/tubes

In factory or on-site construction

Usage limits: according to the Table in Chap. 3.5.1 under b) where instead of the tank diameter the height between the low point of the interstitial space and the node point is to be set.

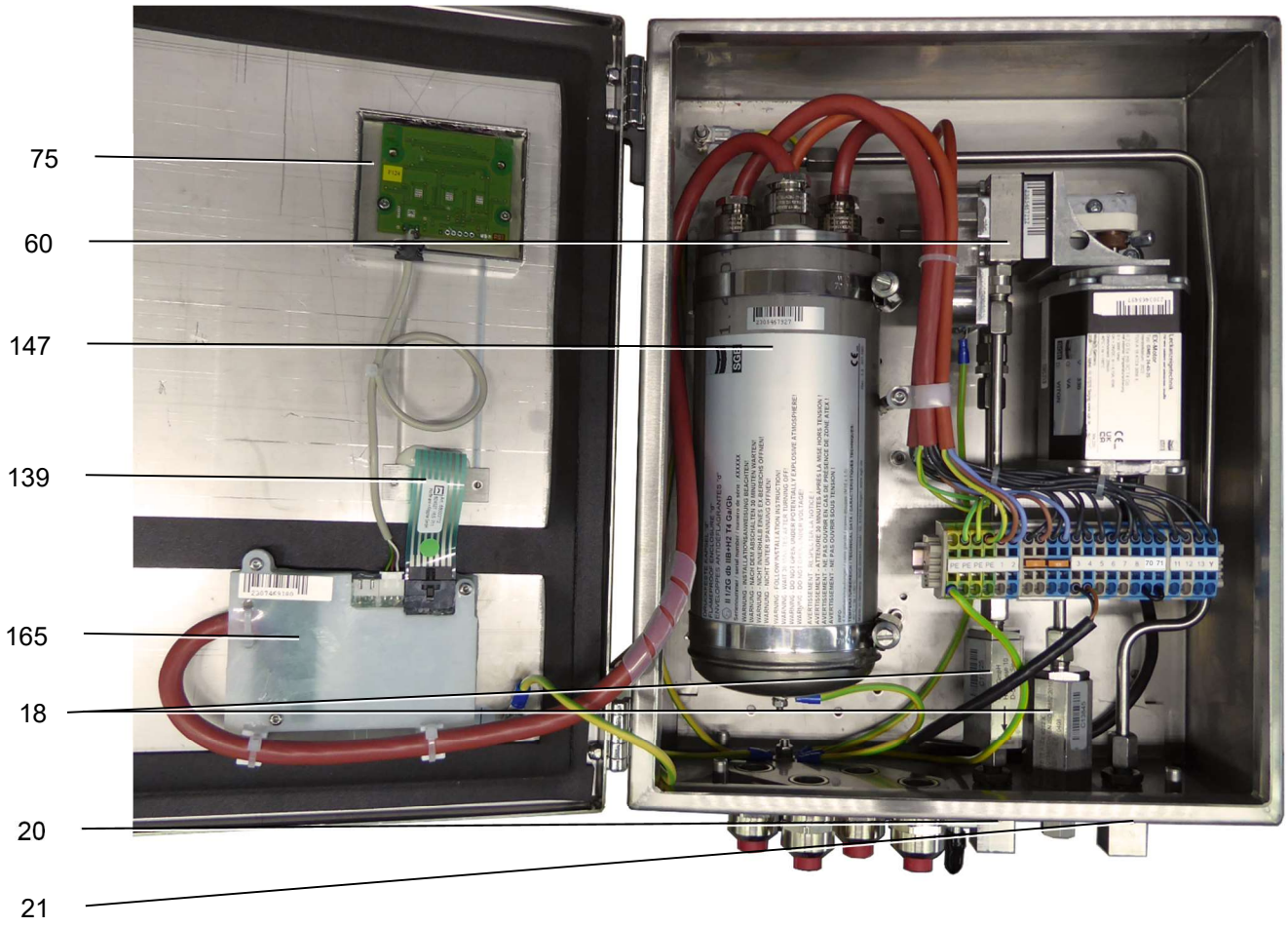
- Suction lines: The alarm-vacuum shall be at least 30 mbar higher than the max underpressure in the inner pipe at the high point of the interstitial space
- Pressure lines with feed pressure of up to 5 bar:
  Version VLXE 230 Ex M to VLXE 570 Ex M
- Pressure lines with feed pressure of up to 25 bar:
  Version VLXE 230 Ex MMV to VLXE 570 Ex MMV
- Pressure lines with feed pressure of up to 90 bar:
  Version VLXE 230 Ex MMV to VLXE 570 Ex MMV, only in conjunction with an additional pressure switch, combined with solenoid valve.
- In particular applications (single pipe, gradient to a point), the version VLXE 34 Ex M can also be used.
- For Germany: with proof of usability from construction authority

3.5.3 Monitorable fluids

Liquids hazardous to water with a flash point below 60°C (55°C for Germany as per TRBS/TRGS), such as fuels. The following also applies:

- The materials used must be resistant to the liquids being monitored.
- Water-polluting liquids, the (possible) explosive steam-air mixture (also such ones that can arise through the stored/conveyed liquids in contact with air, humidity, condensation or the materials used) of which classes them in gas groups II A to II B and H_2, as well as temperature codes T1 to T4 such as gasoline, for example.
- If different water-polluting liquids are transported in individual pipelines and monitored with a leak detector these liquids or their mixing must not have any hazardous effects on one another or cause any chemical reactions.

4. Design and FunctionDesign



Interior view, with:

18	Denotation flame arrester
20	Three-way valve in suction line
21	Three-way valve in the measuring line
60	Vacuum pump
75	Display board
139	Keypad
147	Pressure-resistant housing with control
165	Separating barrier

4.2 Normal operating condition

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

When the operating vacuum is reached (Pump OFF), the pump shuts off. The vacuum slowly drops due to slight, unavoidable leaks in the leak detector system. When the Pump ON switching value is reached, the pump turns on and the interstitial space is evacuated until the operating vacuum is reached (Pump OFF).

In normal operating condition, the vacuum swings between the Pump OFF and Pump ON switching values, with short periods when the pump is run and longer standstills, depending on the tightness and temperature fluctuations of the entire unit.

4.3 Air Leaks

If an air leak occurs (in the outer or inner wall, above the liquid level), the vacuum pump switches on to restore the operating vacuum. If the leak causes the incoming air to exceed the pump's capacity limit, the pump remains on continuously.

Increasing leak rates lead to a further decrease in pressure (with the pump running) until the Alarm ON switching value is reached. This triggers the visual and audible alarms.

4.4 Liquid Leaks

In case of a liquid leak, the liquid enters the interstitial space and collects in the low point of the interstitial space.

The incoming liquid decreases the vacuum, which causes the pump to turn on and evacuate the interstitial space(s) until the operating vacuum is reached. The process repeats itself until the liquid stop valve in the suction line closes.

Because of the vacuum that still exists on the measuring line side, additional stored or conveyed product or water is sucked into the interstitial space, the measuring line, and, if applicable, into a pressure compensation vessel. This causes the vacuum to drop until the "Alarm ON" pressure is reached. This triggers the visual and audible alarms.

Comment: It is also an option to use a liquid sensor in conjunction with a solenoid valve instead of the liquid stop valve. The liquid alarm is then triggered when the sensor comes into contact with liquid.

4.5 Pressure increase above atmospheric pressure in interstitial space when using a leak detector VLXE .. Ex MMV, acc. to chapter 3.5.1 f) as well as 3.5.2

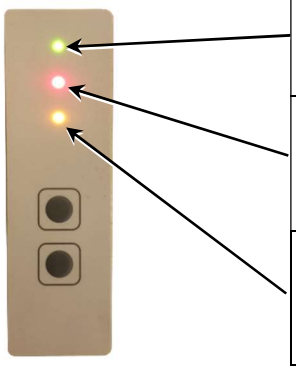
If a pressure increase of more than 50 mbar above atmospheric pressure occurs in the interstitial space, the solenoid valve in the suction or connection line is closed and the pump switches off.

The pressure increase is indicated visually and acoustically (pressure build-up alarm).

For the version up to 90 bar (additional pressure switch and solenoid valve), the additional pressure switch is actuated in the case of a fast pressure increase, which immediately closes the solenoid valve to protect the leak detector from inadmissibly high pressures. The pressure build-up alarm is triggered; if the additional pressure switch is connected via the probe contacts, the probe alarm is also shown.

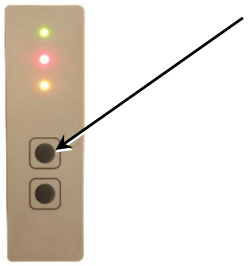
4.6 Displays and Controls

4.6.1 Display



Indicator light	Operating condition	Alarm, vacuum below " Alarm ON"	Probe alarm	Solenoid valve malfunction	Pressure build-up alarm	Malfunction
OPERATION: green	ON	ON	ON	ON	ON	ON
ALARM: red	OFF	ON (flashing)[3]	OFF	ON (flashing)	ON (flashing)	ON[4]
ALARM 2: yellow	OFF	OFF	ON (flashing)	ON	Flashing	OFF

4.6.2 Function "Turn off audible alarm signal"

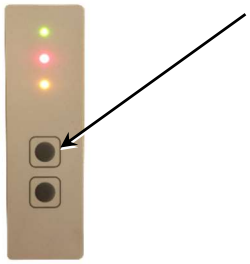


Briefly press "Mute" button once; audible signal turns off, and the red LED flashes.

Pressing the key again will turn the audible signal on.

This function is not available during normal operating conditions and malfunctions.

4.6.3 "Testing the optical and audible alarm signal" function



Press and hold the "Mute" button (for about 10 seconds). The alarm will be triggered until the key is released.

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

[3] (Flashing) is active for the acknowledged external signal.
[4] The "Mute" button does not have a function, which means the audible signal cannot be turned off.

4.6.4 “Tightness inquiry” function

Press and hold the „Mute“ button until the signal lamp is flashing rapidly, then release it. The display (103) will show a tightness value and the same value will be indicated by the number of “Alarm” signal lamp flashes.

This display disappears after 10 seconds and the current vacuum in the system is displayed again.

For the "Tightness inquiry" function, the leak detector must have performed at least 1 automatic refilling interval under normal operating condition (i.e., without external filling, e.g., by an installation pump) to achieve a valid statement.

This inquiry is recommended before performing a regular functional check of a leak detector. In this way, it is possible to estimate immediately whether it is necessary to look for leaks.

Number of flash signals	**Assessment of tightness**
0	Very tight
1 to 3	Tight
4 to 6	Sufficiently tight
7 to 8	Maintenance recommended
9 to 10	Maintenance urgently recommended

The smaller the above value, the tighter the system. The significance of this value also depends on temperature fluctuations and should thus be considered a reference point.

5. Mounting the System

5.1 Basic Instructions

- Prior to commencing work, the documentation must be read and understood. In case of ambiguities, please ask the manufacturer.
- Observe the approvals of the manufacturer for the tank/pipeline and the interstitial space.
- The safety instructions in this documentation must be adhered to.
- Only qualified service companies may be used for assembly and commissioning[5].
- Lead-throughs for pneumatic and electric connection lines, through which the EX-atmosphere can carry over, must be sealed gas-tight.
- Comply with relevant regulations regarding electric installation, explosion protection (e.g., EN 60 079-14, -17), and accident prevention.
- Comply with explosion regulations, e.g., BetrSichV (and/or directive 1999/92/EC and the laws of the respective member states resulting therefrom) and/or others
- Pneumatic connections, connection lines and fittings must be designed to at least PN 10 for the entire temperature range.
- Before entering inspection chambers, the oxygen content must be tested and the inspection chamber flushed if necessary.
- If metallic connection lines are used, it must be ensured that the power supply grounding is on the same potential as the pipeline/tank to be monitored.

5.2 Assembly of the Leak Detector

- Wall mounting using the supplied mounting material.
- Outside and inside the Ex-area (zone 1 or 2), in the open air, without any more protective boxes.

  If a protective box should nevertheless be necessary for operational reasons, the protective box must be adequately ventilated.
- Install the housing protected from external mechanical loads. (Test with low requirements).
- If it is assembled in an enclosed space, it must be well ventilated. The operator shall apply EN 60 079-10/EN 13 237 as a basis for evaluation.
- To avoid excessive heating, the leak detector must not be installed directly next to a heat source.

  The ambient temperature must not exceed 55°C; appropriate measures may need to be taken (e.g., installation of a roof to protect against sunlight).

[5] For Germany: Specialist service companies as per German water legislation that have documented qualifications to install leak detection systems.

- Ventilation systems must be kept clear.
- Do not mount in access or inspection chambers.
- The housing of the leak detector is integrated into the potential compensation.

5.3 Pneumatic Connection Lines

5.3.1 Requirements

- At least 6 mm inside clearance
- Resistant to the stored or conveyed product
- At least PN 10 over the total temperature range
- The full cross section must be maintained (not bent)
- Color coding: *Measuring line*: RED; *Suction line*: WHITE or CLEAR; *Exhaust*: GREEN.
- The lines between the interstitial space and leak detector must not exceed 50 m in length. If the distance is greater than this, a larger cross section must be used. There are special requirements for the exhaust line, see section 5.3.1.
- Condensate traps must be installed at all low points of the connection lines.
- Assemble liquid stop valve in the suction line (generally included in the assembly kit).
- If liquids are being stored or transported that require compliance with explosion protection, suitable denotation flame arresters must be installed at the entry to the interstitial space.

5.3.2 Exhaust

- The length of the exhaust line must not exceed 35 m. If these lengths are not sufficient, consult the manufacturer.
- The exhaust line is generally routed to the tank ventilation, in which case a denotation flame arrester must be installed directly before the connection on the tank vent side.
- Exceptions to the return of the exhaust to the tank ventilation:
  Tanks with interior overlay pressure, tanks according to DIN 4119 with double-layered floor, double-walled pipes or comparable:
  - The exhaust line can lead outside to a safe[6] area, outside of the explosion area: Provide a condensate trap and liquid stop valve at the end of the exhaust line. The area within 1 m diameter of the end of the exhaust is considered as having zone 1 conditions; attach a warning sign if necessary.
  - The exhaust ends in zone 1 (e.g., remote fill chamber or collection space): A denotation flame arrester[7] must be provided at the end of the exhaust line. Condensate traps must be provided

[6] Among other things, not accessible to public transport/persons
[7] The denotation flame arrester can be omitted, if the exhaust is laid frost-free and a kink (e.g., shifting of a protective tube) or a block in the exhausted can be precluded.

at low points; a liquid stop valve is not required if the end of the exhaust is in an area which is made liquid-tight (e.g., with collecting area).

- **Caution:** An exhaust line which ends outdoors must not in any circumstances be used to detect leaks (e.g., by “sniffing”). Attach warning signs if necessary.

5.3.3 Several pipelines interstitial spaces are connected in parallels

- Lay connection lines at a downward angle to the interstitial space or the manifold. If there are low points in the connection lines and lines are laid out of doors as well install condensate traps at all low points!
- Lay suction and measuring lines at a downward angle to the manifold. If this is not possible, place condensate traps at all low points.
- Connect a liquid stop valve to each connection line to the interstitial space, against the valve direction. This prevents leaking liquids from entering the interstitial spaces of the other pipelines.
- If stop valves are installed in the connection line shut-off valves, then they should be sealable in open position.
- For applications with pressure compensation vessel (see 5.7.4 and 5.7.5):
  Length of the measuring line from the pressure compensation vessel (V=0.1 l)[8]:

Type 230…330:	L_{max}	16 m
Type 410	L_{max}	12 m
Type 500	L_{max}	10 m
Type 570	L_{max}	8 m

CAUTION: The bottom edge of the pressure compensation vessel must not be lower than the node point; the upper edge of the pressure compensation vessel must not end more than 30 cm above the node point. For each 10 ml of the condensate trap(s) used in the measuring line between the pressure compensation vessel and leak detector, **L_{max} is reduced** by 0.5 m

- OR (alternatively to the pressure compensation vessel) 50% of the overall length of the measuring line must be laid with a 0.5 to 1% gradient to the node point. L_{min} = 0.5 x total length of the measuring line.

5.3.4 Several pipeline interstitial spaces are connected in parallel

The liquid stop valves installed against the direction of flow (27*) prevent that the other interstitial spaces become filled with liquid in case of a leak in a pipeline. The interstitial space volumes of the connected pipes must meet the following conditions:
$3 \cdot V_{ÜR\,1} > V_{ÜR\,1} + V_{ÜR\,2} + V_{ÜR\,3} + V_{ÜR\,4}$ and
$3 \cdot V_{ÜR\,2} > V_{ÜR\,2} + V_{ÜR\,3} + V_{ÜR\,4}$ etc.
$V_{ÜR\,(number)}$ is the volume of the respective interstitial space. No. 1 is the interstitial space the suction line is connected to (see 5.7.6)

[8] If this volume is multiplied, L_{max}. is multiplied in the same way.

5.4 Completing Pneumatic Connections

5.4.1 Assembling the connection to the tank's interstitial space.

(1) Generally according to the tank manufacturer's specifications.

(2) SGB offers assembly kits with the various connection possibilities.

5.4.2 Assembling the connection to the pipelines interstitial space or test valves

(1) Generally according to the pipelines/interstitial space manufacturer's specifications.

(2) If Schrader valves are used, please proceed as follows:
- Unscrew protective cap
- Re-tighten lock nut
- Unscrew valve insert and stick next to the connection with adhesive tape. (As evidence of disassembly)
- Screw connection to the interstitial space or test valve and fasten finger-tight.
- If necessary, further tighten with suitable pliers.

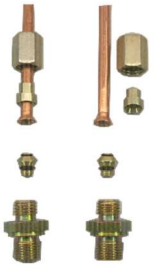
5.4.3 Between leak detector and interstitial space

(1) Select and install suitable pipe.

(2) During installation of the pipe, ensure again that they are protected against damage when the manhole chamber is entered.

(3) Complete the relevant connection (according to the illustrations in the following images)

5.4.3.1 Flanged screw connection (for flanged pipes)



(1) Lubricate O-rings

(2) Insert spacer ring loosely into the screw socket

(3) Slide union nut and pressure ring over the pipe

(4) Hand-tighten union nut

(5) Tighten union nut until need for increased force is clearly noticeable

(6) Final assembly: Tighten by another ¼ turn

5.4.3.2 Clamping ring screw connection for metal and plastic pipes

(1) Insert support sleeve (only plastic pipes) into end of the pipe

(2) Insert pipe (with support sleeve) all the way to the stop

(3) Tighten the screw connection by hand until resistance becomes noticeable, then tighten a further 1 ¾ turns with a wrench

(4) Loosen nut

(5) Tighten the nut by hand up to a noticeable stop

(6) Final assembly of the screw connection by tightening a ¼ turn

5.4.3.3 Quick screw connections for PA pipes

(1) Cut PA pipe to length at a right angle

(2) Unfasten union nut and slide over the end of the pipe

(3) Slide pipe onto nipple up to the beginning of the thread

(4) Hand-tighten union nut

(5) Wrench-tighten union nut until need for increased force is noticeable (approx. 1 to 2 turns)

5.5 Electrical Cables

The electrical connection lines should be resistant to the existing or expected vapors and liquids.

Cross section of 1.0 mm^2 to 2.5 mm^2

Outer cable diameter of 5.5 to 13 mm. 4 cable glands are provided.

If one of these cable glands is provided with a double hole in the sealing element, the cable diameter is limited to 5.9 mm to 6.5 mm.

If other cable diameters are used, the screw connections must be replaced, as **explosion protection depends on correct cable routing**.

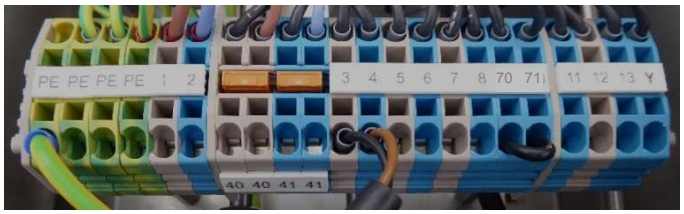
5.6 Electrical Wiring Diagram

(1) Fixed wiring, i.e., no plug or switch connections.

(2) Observe the requirements for electric installations, if necessary, also those of the electric companies.

(3) Leave unused cable glands properly and professionally closed.

(4) Terminal layout (see also SL-854 310):



PE	Ground for the power connection
1/2	Power connection (100…240 V AC)
3/4	Occupied (vacuum pump)
5/6	External signal (may be used for internal buzzer).
7/8	Solenoid valve
11/12	Potential-free contacts (opened in case of alarm or loss of power)
12/13	As above, but contacts closed
(17/18)	Potential-free contacts, in parallel with pump running (closed when pump is inactive and in case of loss of power)
(18/19)	As above, but contacts open
40/41	24 V DC as permanent power supply to power other assemblies or, for a device with a supply voltage of 24 V DC, the power supply is connected here.
70/71	Probe contacts; the potential-free contacts of a leak detection probe can be connected here.
Y	Laying on unneeded cores

(5) Do not apply voltage until all electrical and pneumatic cables are connected and the housing cover is closed.

5.6.1 Connecting the wires

(1) Insert a screwdriver into the opening above the point where the cable should be inserted. This opens the tension spring of the terminal.

(2) Insert the cable into the open terminal.

(3) Hold the cable and remove the screwdriver.

(4) Check the cable for a tight fit and connect more cables to the terminals using the same process.

5.6.2 Data bus module (BM-i)

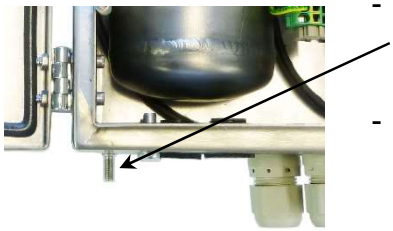
The BM-i data bus module is installed in the leak detector housing by the manufacturer when the order is placed.

The 4-wire cable is already connected to the M12 plug connector in the housing wall through the housing.

The customer can now connect the BM-i to the display unit (indicating unit) DDU via a bus supply isolator (BST).

For more details on the connection and the intrinsic safety certification, refer to the DDU and BST documentation.

5.6.3 Potential equalization



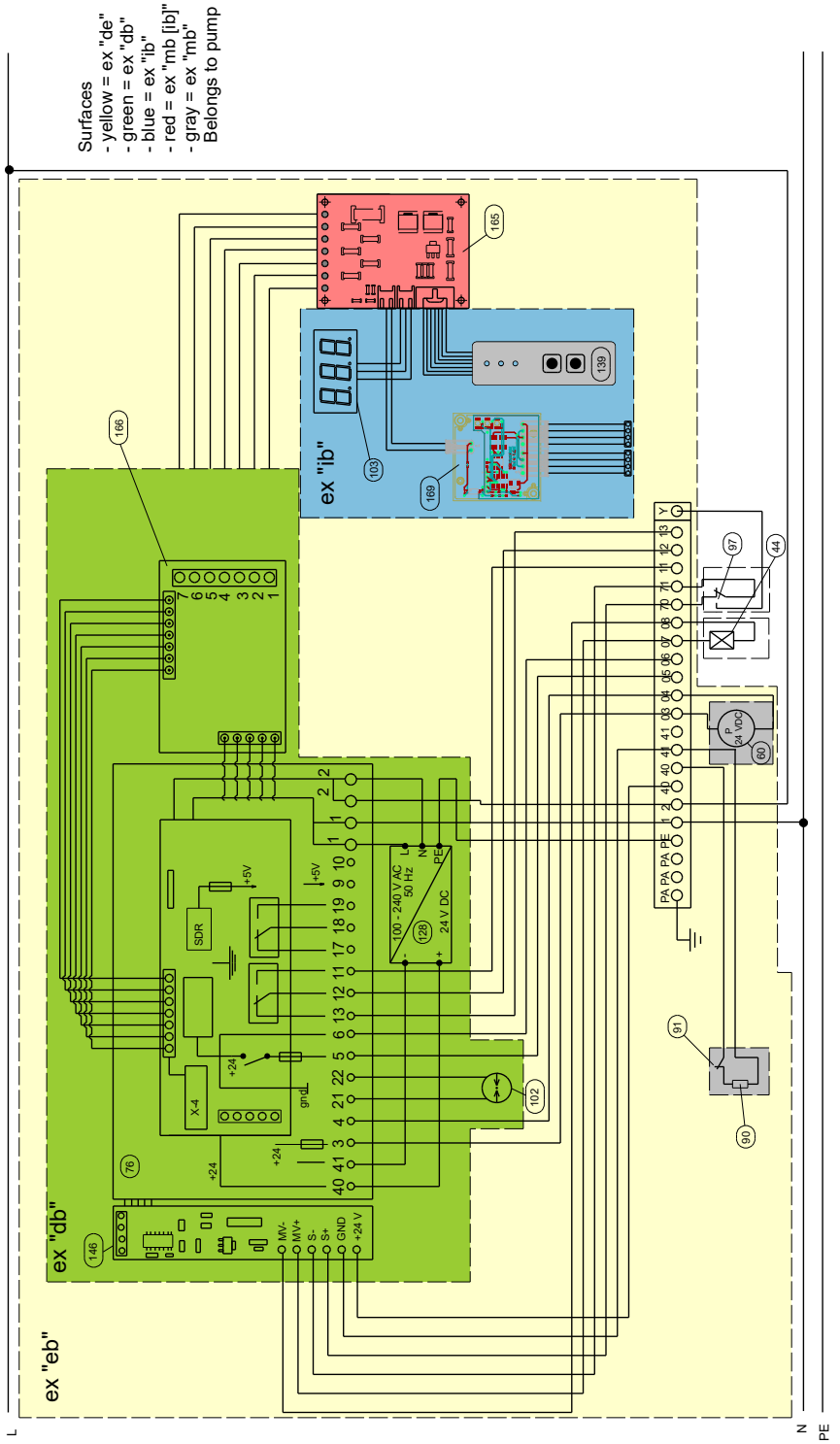
- The housing of the leak detector must be connected to the equipotential bonding of the overall system by means of the stud provided for that purpose.
- The fittings in the connection lines must likewise be integrated into the equipotential bonding, especially when plastic pipes (connection lines to tanks) have been used.
- Before replacing a leak detector (tool), disconnection lines or similar work, it must be ensured that the equipotential bonding remains intact (if necessary, pull electrically conducting bridges).

5.6.4 Location of fuses and their values

Note: The fuses are located inside the leak detector in the flameproof capsule. Access only by SGB!

Information and contact: +49 271 48964-0, sgb.de

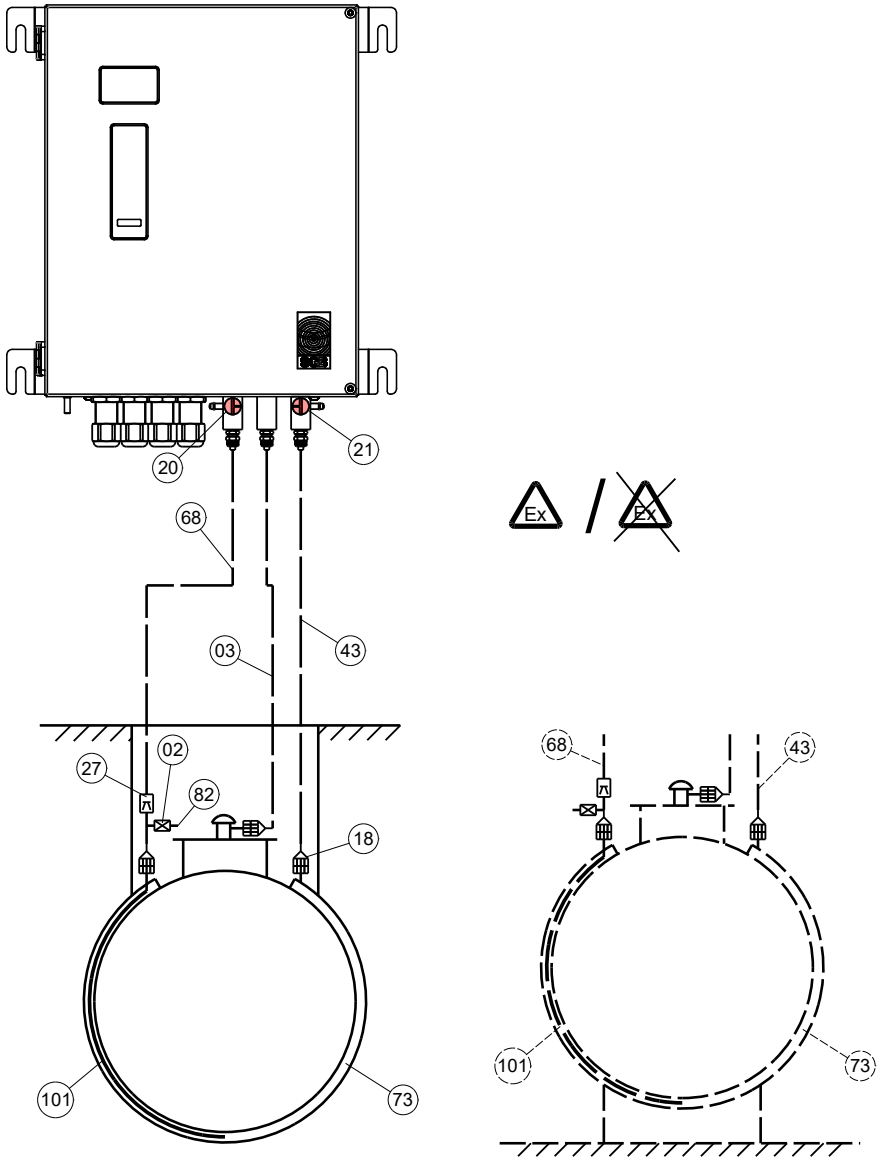
5.6.5 Block diagram (SL 854 310)



44	Solenoid valve	103	Display
59	Relay	128	Switching power supply
60	Pump (24 V DC)	139	Keypad
69	Buzzer (if installed)	146	Solenoid valve monitoring board
76	Main board	165	Separating barrier (TBI)
90	Temperature switch	166	TBI adapter (to 76)
91	Heating	169	Data bus module (BM-i)
97	Probe (potential free contacts used)		
102	Pressure sensor		

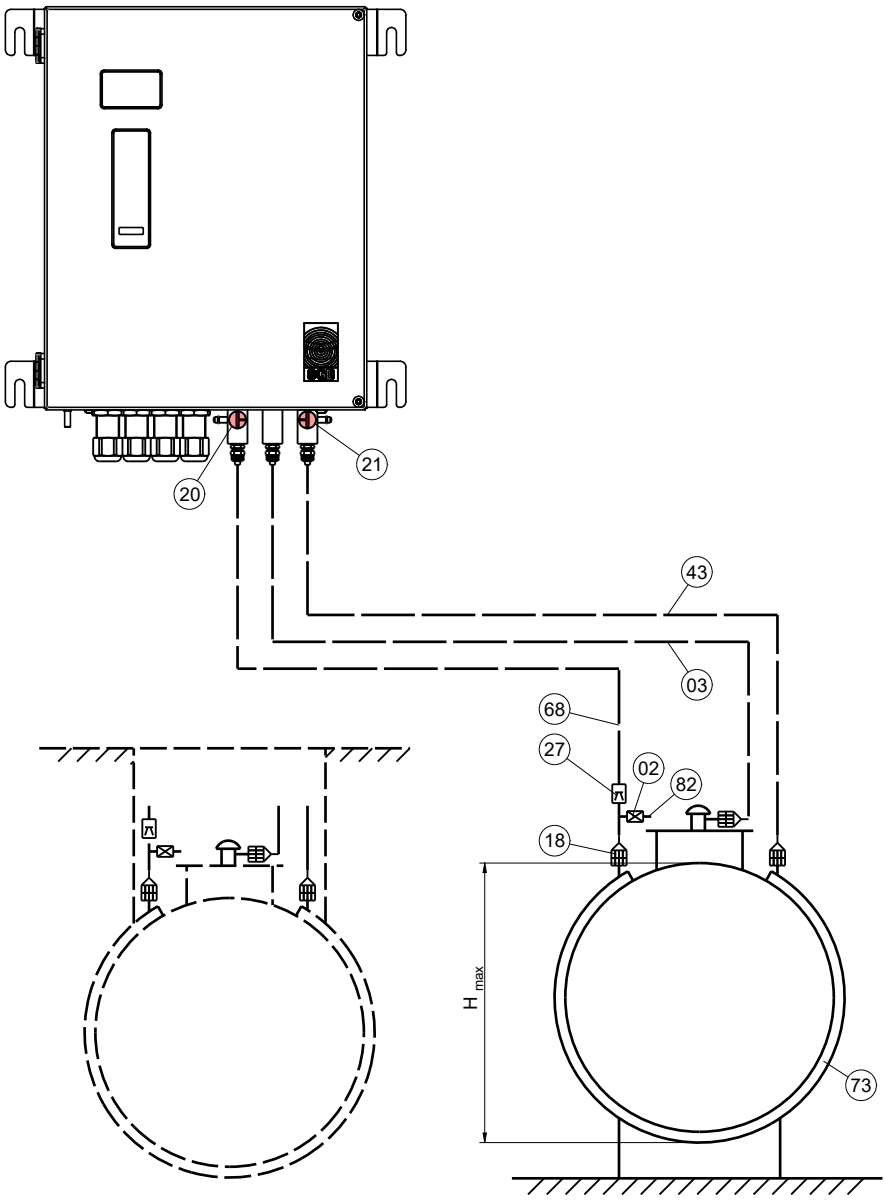
5.7 Installation Examples

5.7.1 Horizontal cylindrical tank with leak protection lining and suction line to low point



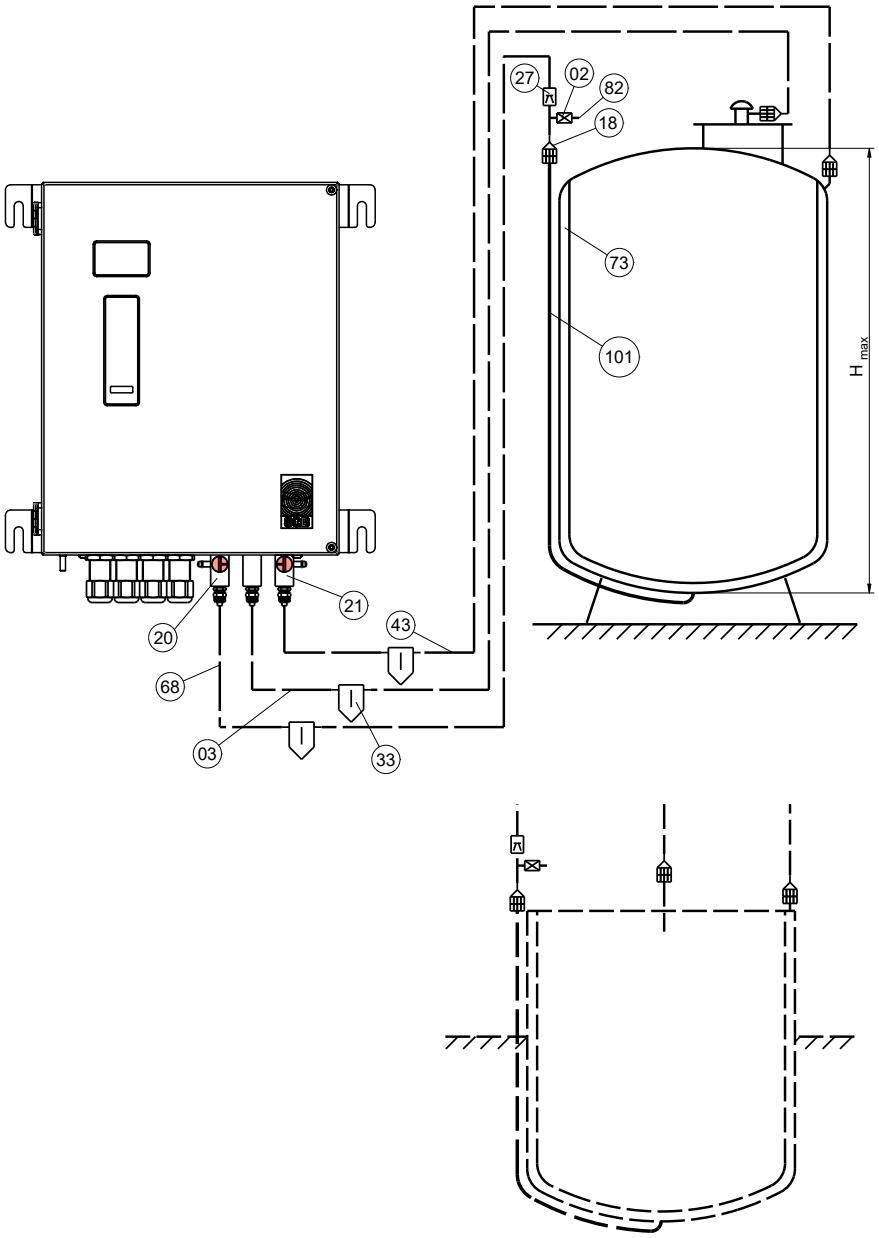
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
43	Measuring line
68	Suction line
73	Interstitial space
82	Nozzle for assembly pump
101	Suction line to low point

5.7.2 Horizontal cylindrical tank, double-walled steel, without suction line to low point



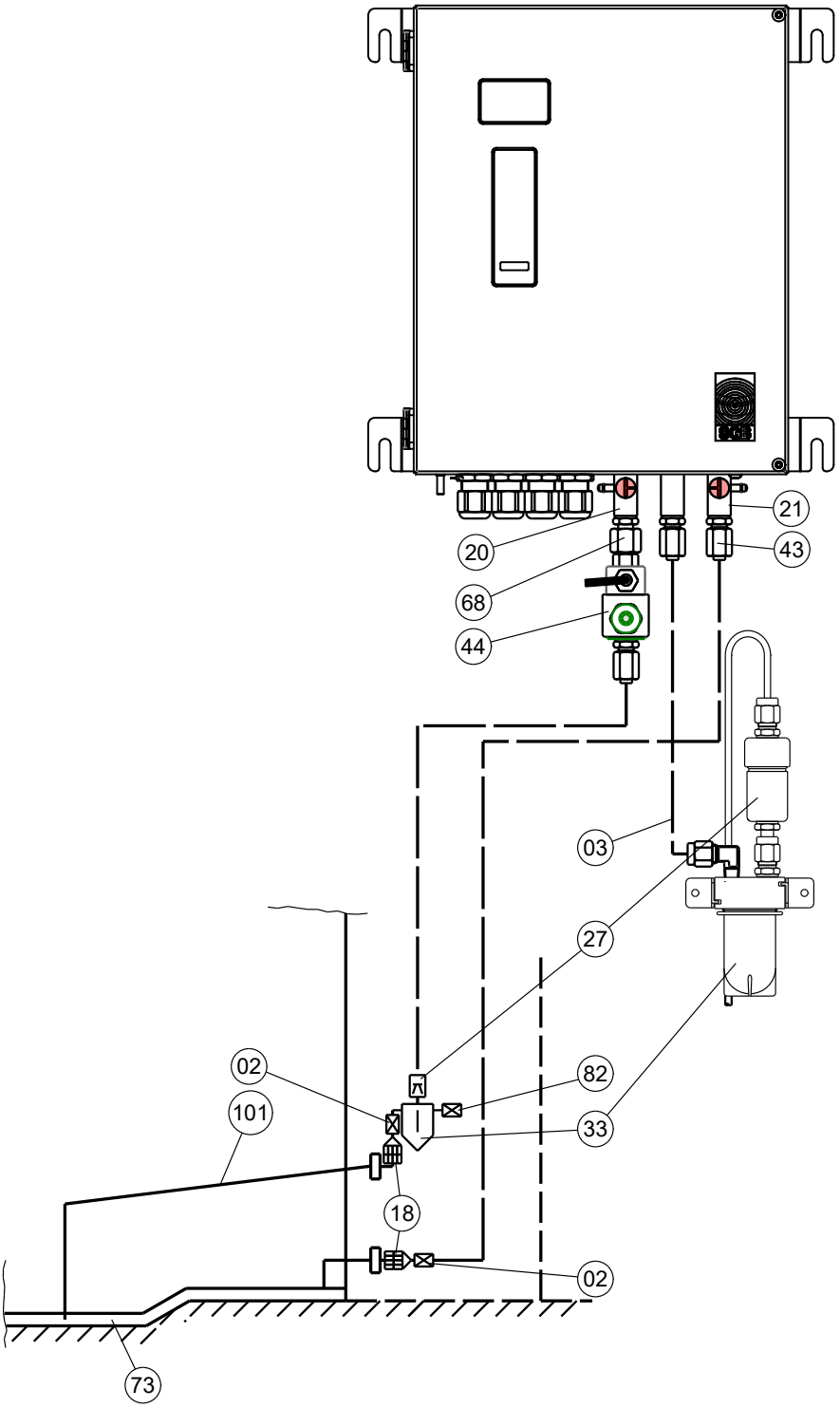
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
43	Measuring line
68	Suction line
73	Interstitial space
82	Nozzle for assembly pump

5.7.3 Vertical cylindrical tank in accordance with DIN 6618-2 (downwards outside suction line)



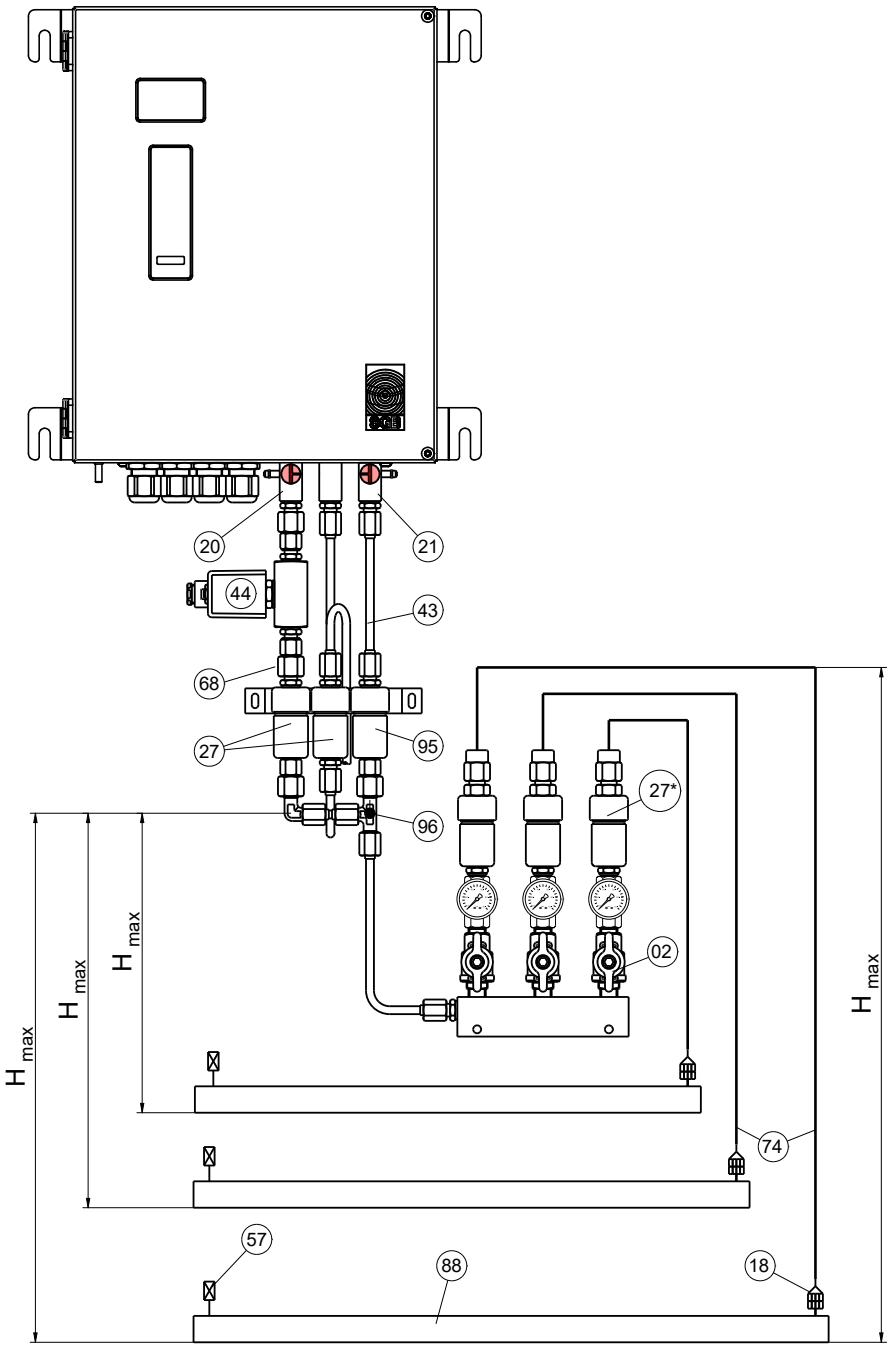
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
33	Condensate trap
43	Measuring line
68	Suction line
73	Interstitial space
82	Nozzle for assembly pump

5.7.4 Tank with double bottom, exhaust opens in the open air



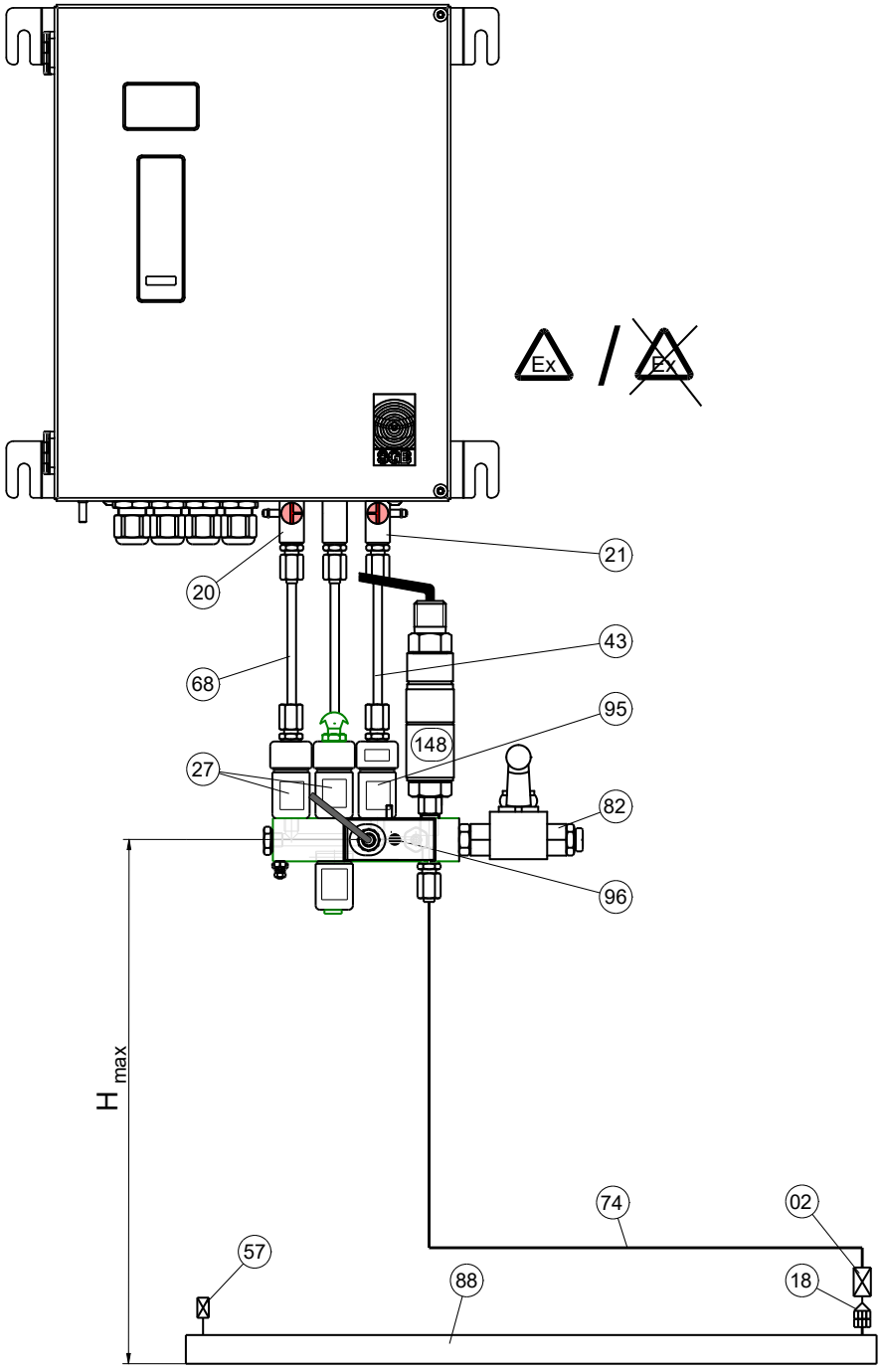
02	Shut-off valve	43	Measuring line
03	Exhaust	44	Solenoid valve (optional)
18	Detonation flame arrester	68	Suction line
20	Three-way valve, suction line	73	Interstitial space
21	Three-way valve, measuring line	82	Nozzle for assembly pump
27	Liquid stop valve	101	Suction line to low point
33	Condensate trap		

5.7.5 Double-walled pipe, connected in parallel, with solenoid valve in the suction line. To be used for conveyance pressures 5 bar > p < 25 bar in the inner pipe. Version VLXE .. Ex MMV



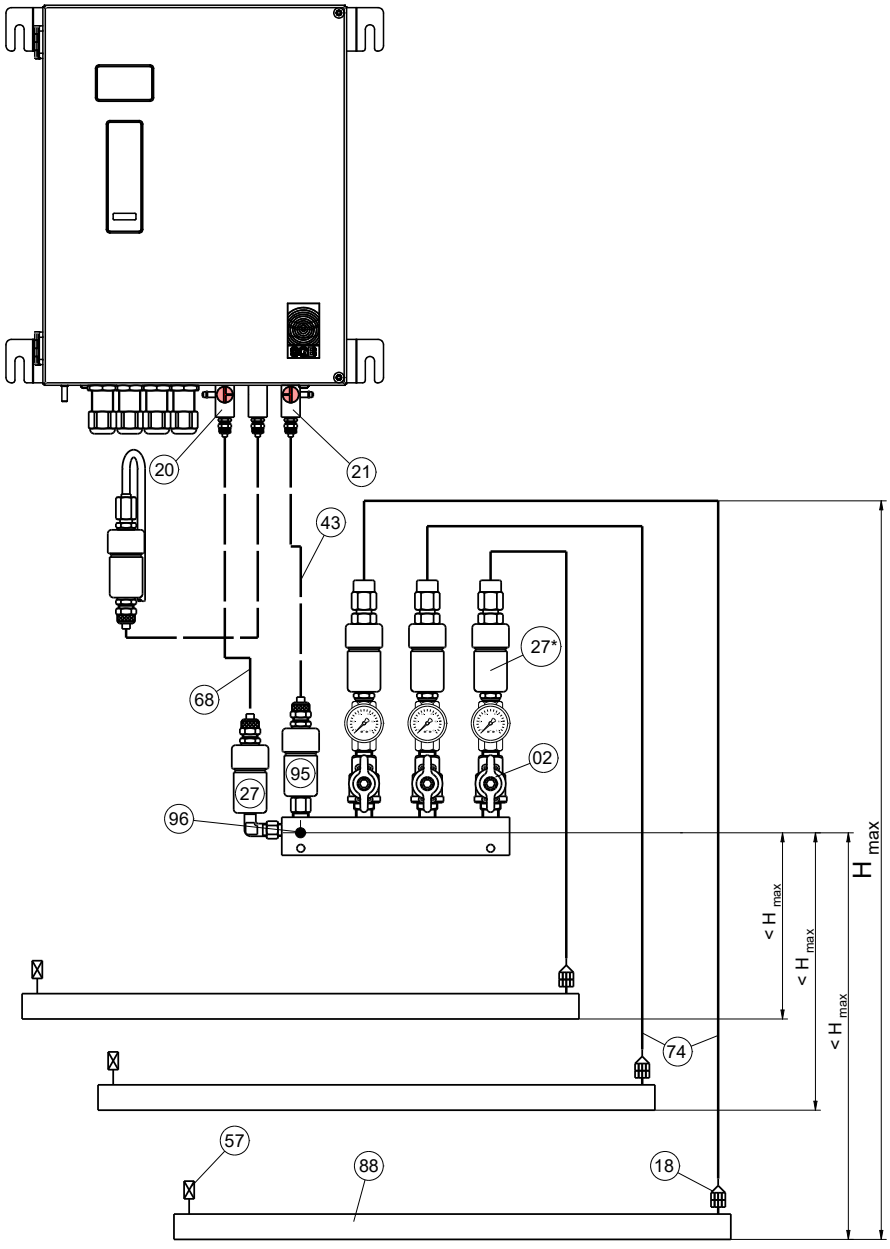
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
27*	Liquid stop valve, connected against the flow direction
33	Condensate trap
43	Measuring line
44	Solenoid valve
57	Test valve
68	Suction line
74	Connection line
82	Nozzle for assembly pump
88	Double-walled pipe
95	Pressure compensation vessel
96	Node point

5.7.6 Double-walled pipe with solenoid valve in the connection line and additional pressure switch. To be used for conveyance pressures 25 bar > p < 90 bar in the inner pipe.



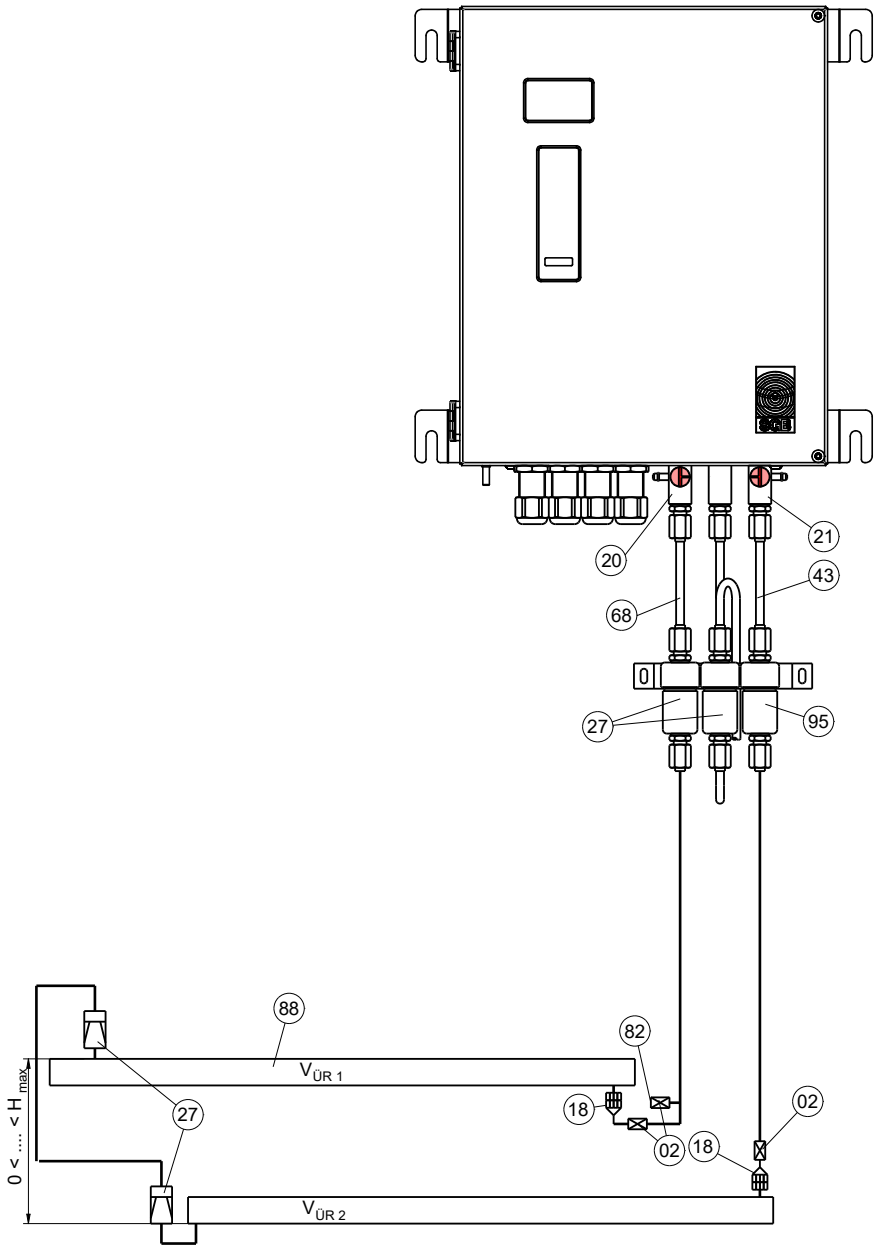
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
27*	Condensate trap
43	Measuring line
44	Solenoid valve
57	Test valve
68	Suction line
74	Connection line
82	Nozzle for assembly pump
88	Double-walled pipe
95	Pressure compensation vessel
96	Node point
148	Additional pressure switch

5.7.7 Double-walled pipe, connected in parallel (node point in the manifold)



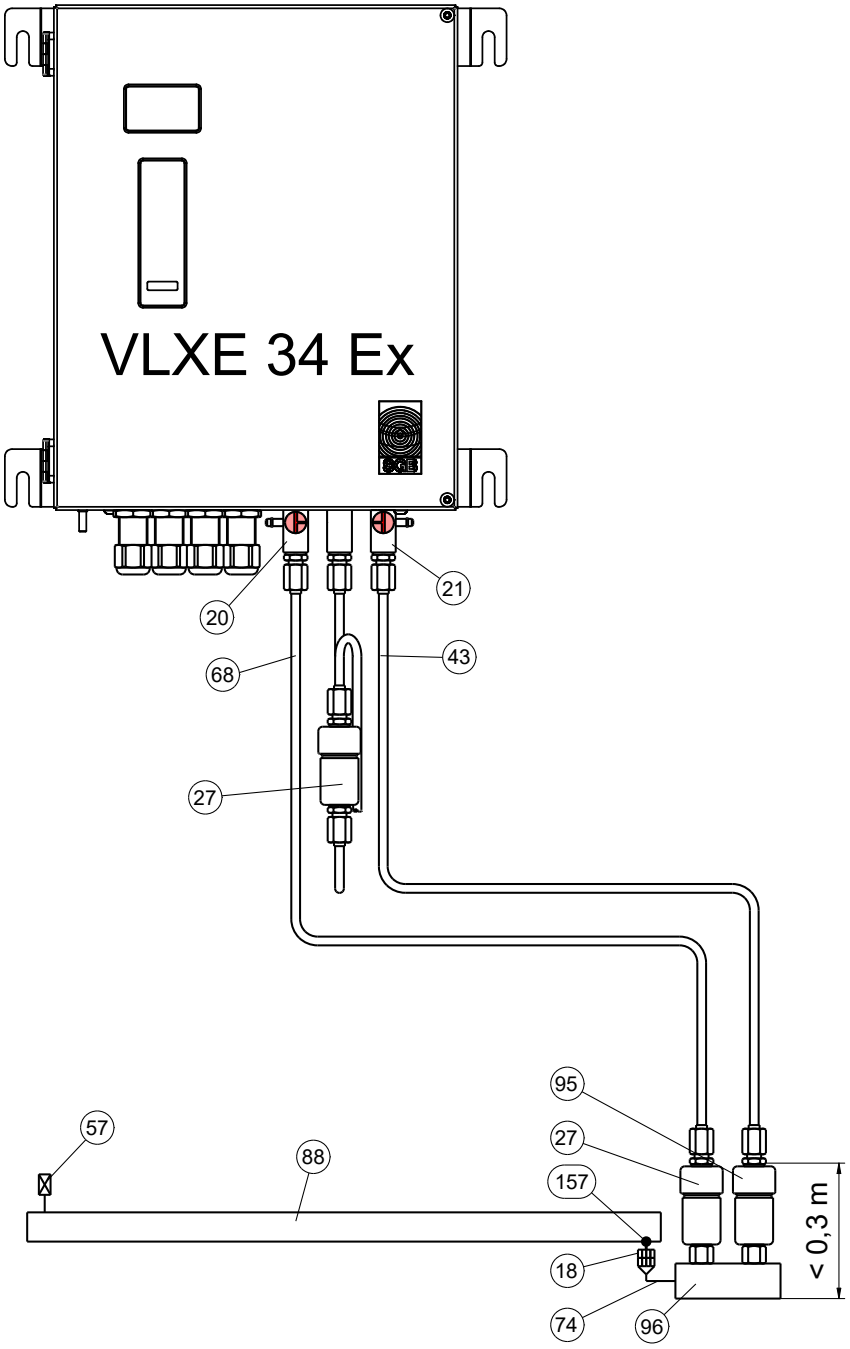
02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
27*	Liquid stop valve, connected against the flow direction
43	Measuring line
44	Solenoid valve
57	Test valve
68	Suction line
74	Connection line
82	Nozzle for assembly pump
88	Double-walled pipe
95	Pressure compensation vessel
96	Node point

5.7.8 Double-walled pipe, connected in series



02	Shut-off valve
03	Exhaust
18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
27*	Liquid stop valve, connected against the flow direction
43	Measuring line
44	Solenoid valve
57	Test valve
68	Suction line
74	Connection line
82	Nozzle for assembly pump
88	Double-walled pipe
95	Pressure compensation vessel
96	Node point

5.7.9 Double-walled pipe, individual pipe with low vacuum



18	Denotation flame arrester
20	Three-way valve, suction line
21	Three-way valve, measuring line
27	Liquid stop valve
43	Measuring line
57	Test valve
68	Suction line
74	Connection line
88	Double-walled pipe
95	Pressure compensation vessel
96	Node point **Here:** must (geodetically) be under 157
157	Lowest point of the interstitial space

6. Commissioning

(1) Only perform commissioning once the steps in Section 5 “Assembly” have been completed.

(2) If a leak detector is operated on an interstitial space that is already in operation, special protective measures must be taken (for example, testing for gas freedom in the leak detector and/or the interstitial space). Additional measures may be necessary depending on the local conditions and must be assessed by qualified personnel.

(3) If an external vacuum pump is used to evacuate, this shall be carried out with **explosion protection** (Warning: be aware of temperature code and EX group!).

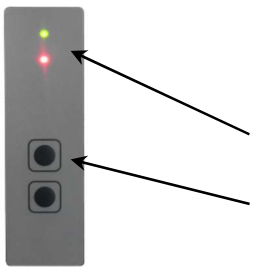
6.1 Tightness test

Prior to commissioning, ensure the leak-tightness of the interstitial space.

The vacuum build-up (generally approx. 500 mbar) should be executed using an external vacuum pump.

The test is generally considered passed if the vacuum does not drop by more than 1 mbar within a test period (in minutes) calculated from the interstitial space volume divided by 10.
E.g.: The test period for an interstitial space volume of 800 liters is: 800/10 = 80 minutes. Within this test period, the vacuum must not fall below 1 mbar.

6.2 Commissioning the Leak Detector



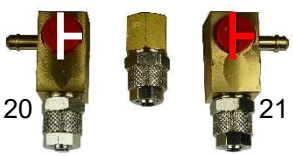
(1) Tightness of the interstitial space prior to commissioning is assumed.

(2) Connect voltage supply.

(3) Ascertain lighting of "Operation" and "Alarm" indicator lights and sounding of the audible alarm. If necessary, turn off audible alarm signal.

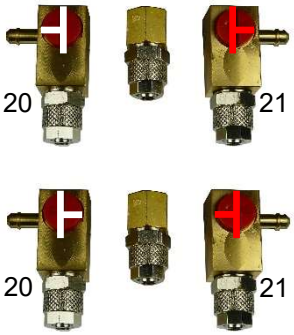
The vacuum pump starts immediately and builds up the vacuum in the monitored system (if the interstitial space has not already been evacuated).

Note: If the VLXE .. Ex MMV is used as per Section 3.5.1 f) and 3.5.2, it must be ensured that the probe contacts (9/10) are bridged and a solenoid valve (24 V DC) is connected to terminals 7 and 8.



(4) Attach measuring gauge to connection on the three-way valve 21 in order to turn the valve 180°,
CAUTION: Explosive vapor-air mixtures can exist in the interior (of the test valve/connection line). Sufficient safety measures should be met (e.g., insert a diaphragm seal or a relevant, approved pressure measuring instrument).

(5) The vacuum build-up can be monitored via the connected measuring gauge.



(6) If the vacuum build-up is too slow, an assembly pump can be attached to the connection on three-way valve 20.

Turn valve 180° and switch on the assembly pump.

(7) After the operating vacuum of the leak detector has been reached (pump in leak detector shuts off), turn three-way valve 20 180°, switch off the assembly pump, and remove it.

(8) Turn three-way valve 21 180° and remove the pressure measuring gauge.

(9) Perform a functional check according to Section 7.3.

7. Functional Check and Maintenance

7.1 General

(1) If the leak detection system has been properly installed and is free of leaks, trouble-free operation can be assumed.

(2) Frequent switching on or continuous running of the pump indicates leaks, which should be corrected within a reasonable time.

(3) In the event of an alarm, determine the cause and fix it quickly.

(4) The operator must check the function of the operating lights at regular intervals.

(5) The leak detector must be disconnected from the power when performing any repairs. if necessary. Test EX atmosphere.

(6) A loss of power is indicated by the "Operation" indicator light going off. Alarm signals are triggered via the potential-free relay contacts if contacts 11 and 12 were used.
After the power loss, the leak detector automatically goes into operation again and the potential-free contacts no longer generate an alarm (unless the power loss has caused the pressure to drop below the alarm pressure).

(7) CAUTION: For single-walled tanks, equipped with a flexible leak detector lining, the interstitial space can never be without pressure (danger of collapse of the leak protection lining).

(8) To clean the leak detector, use a **moist** cloth (electrostatic).

7.2 Maintenance

- Maintenance work and functional checks must be performed by trained personnel only[9].
- Once a year to ensure functional and operational safety.
- Test scope according to Section 7.3.
- Compliance with the conditions in sections 5 and 6 must also be tested.
- Comply with explosion regulations (if required), e.g., BetrSichV (and/or directive 1999/92/EC and the laws of the respective member states resulting therefrom) and/or others.
- As part of the annual functional check, check the motor of the pump for running noises (damaged bearings).
- If the pump or its exhaust pipe is exchanged or detached, then a tightness test should be carried out for the installed pump with a pressure of 10 bar after the exchange in order to ensure the impermeability of the exhaust in the housing.

[9] For Germany: Technical service according to water legislation with expertise in leak detection systems
For Europe: Authorization by the manufacturer

7.3 Functional check

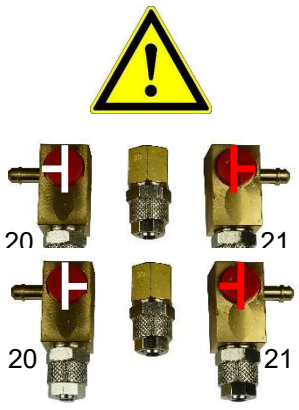
The functional and operational safety tests must be performed:

- after each commissioning
- according to the time intervals given in Chap. 7.2[10]
- each time a malfunction has been corrected

Two persons may be required to perform a functional check, depending on the type of pipeline or tank. The following contents must be observed or met:

- Coordinate the work to be performed with those responsible for operation.
- Observe the safety instructions for working with the product to be stored or conveyed.
- Checking and if necessary, emptying the condensate traps (7.3.1).
- Continuity test of the interstitial space (7.3.2)
- Testing the switching values with the interstitial space (7.3.3) or testing the switching values with testing equipment (7.3.4)
- Testing the pump delivery pressure (7.3.5)
- System tightness test (7.3.6)
- Checking the overpressure alarm (only for version VLXE .. Ex MMV) (7.3.7)
- Checking the additional pressure switch in conjunction with VLXE .. Ex MMV (7.3.8)
- Testing of the probe (only VLXE .. Ex MMV LS) (7.3.9)
- Creating the operating condition (7.3.10)
- A test report must be completed, confirming functional and operational safety. (Test reports are available for download for the SGB website)

7.3.1 Checking and emptying the condensate traps, if required



CAUTION: The condensate traps may contain the stored/conveyed product. Take appropriate protective measures.

(1) Close any shut-off valves on the interstitial space side.

(2) Turn three-way valves 180° to ventilate the connection lines.

(3) Open and empty the condensate traps.

(4) Close the condensate traps.

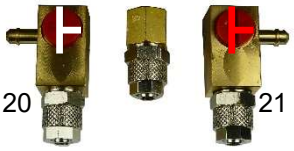
(5) Three-way valves back to the operating position.

(6) Reopen the valves closed in No. (1).

7.3.2 Checking free passage in the interstitial space

Checking the free passage of air ensures that an interstitial space is connected to the leak detector and that it has sufficient passage to cause an air leak to trigger an alarm.

[10] For Germany: In addition, national laws apply (e.g., AwSV)



(1) Attach the measuring gauge to the connection on three-way valve 21 and turn valve 180°.

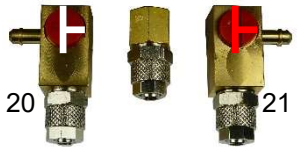
(2) <u>For pipelines:</u>
Open the test valve at the end opposite the leak detector; in case of multiple pipe interstitial spaces, the test valves must be opened sequentially at the end opposite the leak detector.

<u>For tanks</u>
Turn three-way valve 20 90° (UZS) so that the suction line and system are ventilated.

(3) Check if the measuring gauge registers a vacuum drop. If no pressure drop occurs, locate and correct the cause.

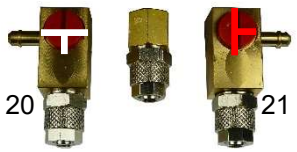
(4) Return three-way valves to the operating position and remove the measuring gauge.

7.3.3 Testing the switching values with the interstitial space



(1) Attach measuring gauge to connection on three-way valve 21 and turn valve 180°.

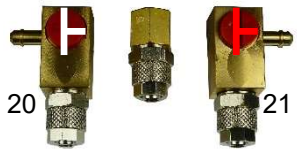
(2) <u>For pipelines:</u>
Open the test valve on the end away from the leak detector, in case of multiple pipe interstitial spaces, the leak detector-side shut-off valves of the interstitial spaces not included in the test can be closed



<u>For tanks</u>
Turn three-way valve 20 90° (clock-wise) so that the suction line and system are ventilated.

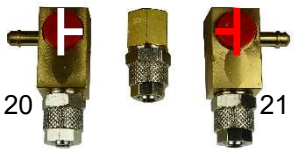
(3) Check switching values ”Pump ON” and ”Alarm ON” (with visual and audible, if available). Record the values.

(4) Press the “Audible alarm” button if necessary.



(5) Return three-way valve 20 to its original position or close test valve and check the switching values “Alarm OFF” and “Pump OFF”. Record the values.

(6) The unit passes the test if the measured switching values fall within the specified tolerance.



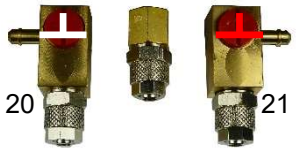
(7) Open any shut-off valves that were closed prior to the test.

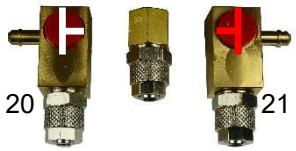
(8) Return three-way valves to the operating position and remove the measuring gauge.

7.3.4 Testing the switching values with the testing device (see Section “Accessories”)

(1) Connect the testing device to the two hose ends on each of the free connections of three-way valves 20 and 21.

(2) Connect the measuring gauge to the T-piece of the testing device.





(3) Close the needle valve of the testing device.

(4) Turn three-way valve 20 90° (CCW) and three-way valve 21 90° (CW) so that the interstitial space is disconnected.
The interstitial space volume is now simulated by the test tank.

(5) The operational vacuum is now established in the test tank.

(6) Ventilate using the needle valve, check switching values “Pump ON” and “Alarm ON” (visual and acoustic, if necessary). Record the values.

(7) Press the “Audible alarm” button if necessary.

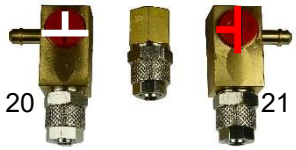
(8) Slowly close the needle valve and check switching values “Alarm OFF” and “Pump OFF”.

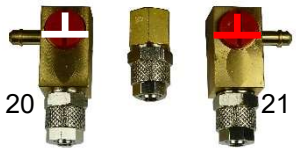
(9) The unit passes the test if the measured switching values fall within the specified tolerance.

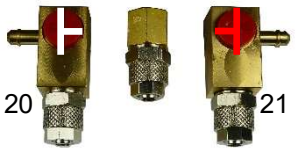
(10) Turn back three-way valves 20 and 21 and remove the testing device.

7.3.5 Testing the pump delivery pressure

The test of the delivery pressure of the pump is carried out in order to determine if the vacuum source is capable of establishing the operating vacuum in the interstitial space.







(1) Attach measuring gauge to connection on three-way valve 20 and turn valve 90° (CCW).

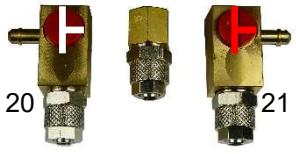
(2) The pump is usually not running at this moment, i.e., the pressure sensor must be vented to start the pump.

(3) Turn three-way valve 21 90° (CW). The pressure sensor is vented, the pump starts (and the alarm is triggered, acknowledge if necessary).

(4) This unit passes the test if the suction height of the vacuum pump is at least 40 mbar higher than the switching value “Pump OFF” (i.e., the operational vacuum).

(5) Once the test is complete, return valves to their original positions and remove the measuring gauge.

7.3.6 System Tightness Test

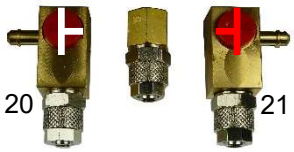


(1) The system tightness requirement is defined in Section 6.1.

Determine the test period for each interstitial space connected (and/or the entire monitored system) (calculate or use test reports prepared by SGB GmbH).

(2) Attach the measuring gauge to the connection on three-way valve 21 and turn valve 180°.

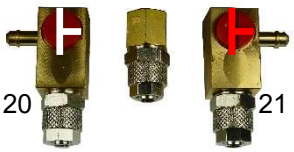
(3) Read off and record starting vacuum and time. Wait for the test period to elapse and determine the vacuum drop.



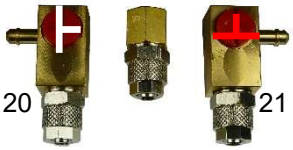
(4) The test is considered passed if the vacuum does not drop by more than 1 mbar during the test period.
Of course, a multiple of the test period can also be measured; in this case, the permissible vacuum drop is also a multiple.

(5) Once the test is complete, return valves to their original positions and remove the measuring gauge.

7.3.7 Checking the excess pressure alarm (only for version VLXE .. Ex MMV)



(1) Attach excess pressure testing device to connection on three-way valve 21 and turn valve 180°.

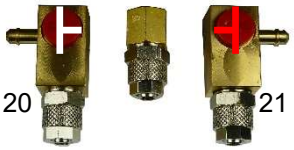


(2) Then turn three-way valve 21 90°.

(3) Apply pressure using the excess pressure testing device. First the pumps are switched on, then the alarm is triggered (red LED on), and if the pressure continues to increase, the excess pressure alarm is triggered (yellow LED flashes).

(4) With the overpressure alarm, the pump halts and the solenoid valve switches.

(5) Relieve excess pressure by detaching the excess pressure testing device. This alarm goes out and the pump runs; the solenoid valve opens.



(6) Once the test is complete, return valves to their original positions and remove the measuring gauge.

7.3.8 Checking the additional pressure switch in conjunction with VLXE .. Ex MMV

(1) Connect the testing device as per Section 7.3.5 and complete steps (1) to (5).

(2) Close shut-off valve on the interstitial space side.

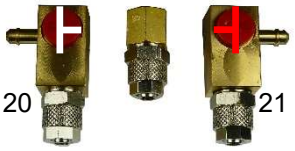
(3) Connect an external pressure booster to connection 82 and open the relevant valve.

(4) Pressure build-up until activation of the pressure switch (probe alarm is triggered and the solenoid valve switches).

(5) Check the corresponding alarm.

(6) Relieve pressure; probe alarm goes out and the solenoid valve switches.

(7) Close the shut-off valve at 82 and remove the pressure booster.



(8) Open the shut-off valve on the interstitial space side, put three-way valves 20 and 21 into operating position, and remove testing device.

7.3.9 Testing of the probe (only VLXE .. Ex MMV LS)

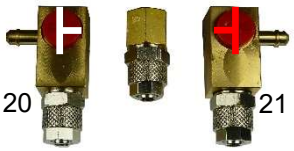
(1) Bring the probe into the alarm state. Depending on the probe version, either by pressing a test button (“WHG probes”), by turning the housing (float), or by removing it and dipping it in test liquid.

Note: If the probe is checked by removing it the stop valves must be closed to maintain the vacuum in the interstitial space. Open again after the test!

(2) Check probe alarm as per Section 4.6.1 and the switching of the solenoid valve.

(3) Establish the probe operating condition again; the probe alarm goes out and the solenoid valve opens.

7.3.10 Achieving the Operating Condition



(1) Test if all pneumatic connections are completed.

(2) Check that the three-way valves are in the correct position.

(3) Seal the housing.

(4) Seal the shut-off valves (between the leak detector and interstitial space) for each connected interstitial space in the open position.

(5) Attach a sign with troubleshooting information.

(6) Fill out a test report and hand over to the operating company.

8. Malfunction (Alarm)

8.1 Alarm Description

If an alarm goes off, one must assume that there is an explosive vapor-air mixture in the interstitial space. Take appropriate protective measures.

When monitoring pressure lines, use the potential-free contacts of the leak detector to switch off the feed pumps.

(1) An alarm (vacuum loss) is indicated by the red “Alarm” signal lamp lighting up and the sounding of the audible signal, if available.

(2) Other alarms are indicated as follows:

Probe alarm: Yellow LED that flashes when the audible signal is acknowledged.

Pressure build-up alarm: Yellow LED flashing, red LED on and red LED flashing on acknowledgment of the audible signal.

(3) Close any shut-off valves in the connection line between the interstitial space and leak detector.

(4) Shut off the audible signal by activating the „Mute“ button, if available.

(5) Inform the installation company.

(6) The installation company must detect the cause and correct it.
CAUTION: Depending on the tank/pipelines, there could be liquid under pressure in the connection lines.
CAUTION: Do not depressurize the interstitial space in the tanks with flexible leak protection lining (risk of collapse of the insert).

(7) Repairs to the leak detector (e.g., replacement of components) may only be made outside the ex-area, or if suitable safety measures have been met.

(8) Perform a functional check as per 7.3.

8.2 Malfunction

In case of a malfunction, only the red signal lamp will light up in addition to the green signal lamp (yellow is off), and at the same time, the audible signal cannot be acknowledged.

Solenoid valve malfunction (e.g., no power): Yellow LED lights up and the red LED flashes.

8.3 How to Behave

The different alarms can be used for different automated reactions (e.g., switching off pumps).

Inform the installation company. They need to find and rectify the error.

After repair a functional check must be conducted.

8.4 Repairs inside the Pressurized Capsule

8.4.1 General

(1) This activity requires training on working in ex-areas in accordance with Directive 1999/92/EC and, in Germany, the Industrial Safety Ordinance (Betriebssicherheitsverordnung).

(2) In particular, the ignition protection category Ex d (60079-1) must be known in terms of function and design.

(3) According to TRBS 1201-3, Table 2 (collection of examples), this is a general repair.

(4) Training by SGB or its authorized representative is required. The main contents are described below.

8.4.2 Opening the pressurized capsule

(1) The unit must be disconnected from the supply voltage and secured to prevent it from being switched back on.

(2) Close the tank shut-off valves (assembly kit), if present.

(3) Gas-free measurement must be ensured over the entire time.

(4) Wait half an hour before opening the pressurized capsule in order to reduce the temperature and release the energy stored. Use this time to dismantle the unit, as the following operations can only be carried out correctly lying down.

(5) Disconnect the measuring line at the elbow fitting above the pressurized capsule.

(6) Disconnect the equipotential bonding from the pressurized capsule (bottom).

(7) Remove the pressurized capsule (now) horizontally from the clamps so that the flange does not hang on the cables.

(8) Hold the flange and unscrew the sleeve (pipe with torispherical head) to open the pressurized capsule.
Caution: The thread is greased.

(9) Put the cover down in a clean and safe place to avoid any damage and soiling.

(10) Carry out the repair inside the pressurized capsule.

8.4.3 Closing the pressurized capsule

(1) Check that the flange thread (internal and external) does not display any damage.

(2) Visually check that the cover and housing on the thread are free from foreign particles.

(3) The thread is already lightly greased in the manufacturer’s factory to prevent the thread from “seizing”. This grease is intentional and should not be wiped away or removed.

(4) A seal, thread sealing tape or similar must not be used under any circumstances!

(5) The sleeve with torispherical head is screwed on until the surface above the thread is on top of the sleeve. Only tighten by hand.

(6) Place the pressurized capsule in the holder and bring the safety clamps together.

(7) Position the pressurized capsule so that the measuring line fits snugly without tension and tighten the clamps.

(8) Connect the measuring line, tighten the union nut by hand and then tighten it ¼ turn with the spanner.

(9) Reconnect the equipotential bonding.

(10) Place the unit back in the intended location and connect it up.

8.4.4 Check the operating condition

(1) Visually check that the pressurized capsule has been reassembled properly.

(2) If necessary, check the cable glands on the Ex-d housing. The base body must be tightened to 10 Nm and the union nut to 8 Nm.

(3) Check that the equipotential bonding has been carried out correctly.

(4) Switch the voltage back on. The leak detector indicates the operating voltage and is in alarm status. Acknowledge the alarm signal if necessary.

(5) Reopen the tank shut-off valves and create a vacuum in the system, possibly using a suitable Ex assembly pump.

(6) Mark the repair in accordance with EN 60079-19

8.4.5 Additional information

Please contact the manufacturer first if there is any doubt, even if it is not described here.

“Safety first!” is key

If the thread “seizes” when unscrewing or screwing on, i.e. the sleeve cannot be unscrewed or screwed on, the leak detector must not be put back into operation under **any** circumstances!

9. Spare parts

See shop.sgb.de

10. Accessories

For accessories, please refer to our website shop.sgb.de e.g.

- Assembly kits

- Electrical isolators
- Manifolds
- Testing device
- Pressure booster

11. Disassembly and Disposal

11.1 Disassembly

Prior to and during works, make sure the unit is free of gas and the breathing air contains sufficient oxygen levels!

Seal any openings through which an explosive atmosphere can carry over so they are gas-tight.

Avoid using spark-producing tools (saws, parting grinders, etc.) for disassembly whenever possible. Should this be unavoidable, however, comply with EN 1127 or the area must be free of explosive atmosphere.

Avoid the build-up of electrostatic charges (e.g., through friction).

11.2 Disposal

Properly dispose of contaminated components (possibly through outgassing).

Properly dispose of electronic components.

12. Appendix

12.1 Use of Interstitial Spaces That Are Filled with Leak Detector Fluid

12.1.1 Requirements

(1) Only leak detectors with suitable alarm pressures which depend on the tank diameter and the density of the stored material may be used.

(2) The procedure described below is intended for the horizontal cylindrical tanks (e.g., DIN 6608 or EN 12285-1).

(3) If this method is used on other tanks, the permission of the locally responsible authority is required on a case-by-case basis.

12.1.2 Preparation

(1) Remove the fluid-based leak detector.

(2) Remove the leak detection fluid from the interstitial space by suction. With the following procedure:

- Connect the suction line connection of the assembly pump to a tank[11] socket with intermediately connected tanks.
- Suction out until no more liquid is being suctioned.
- Assembly of a (large) shut-off valve (at least ½") on the other connection and close the shut-off valve.
- Pump out liquid until no more liquid comes into the intermediate tanks.
- Suddenly open shut-off valve (with pump running) so that a further “surge” of leak detecting fluid enters the intermediate tanks.
- Continue operating with opening and closing of the test valve until no fluids enter the intermediate tanks either in the open position or in the close position.

12.1.3 Installation and Commissioning of the Leak Detector

(1) The suctioning of the leak-detection liquid creates an air cushion above the leak detection liquid.

(2) Install the leak detector according to the documentation and start it up.

(3) Perform a functional check on the leak detector.

[11] The liquid to be suctioned out is collected in this tank.

12.2 Appendix W, Warmed Tanks (Heated Tanks)

12.2.1 Heated tanks (> 50°C $\vartheta \leq$ 200°C)

(1) It is assumed that the temperature increase from before filling to after filling the tank is not more than 25 K.
If there are major temperature differences Section 12.2.2 must also be observed.

(2) The design of the leak detector for use on a heated tank is essential due to the temperature resistance and/or suitability of the components used.
For this reason, both the cooling line (cooling the intake air-vapors mixtures) and the probe in conjunction with the solenoid valve (retention of the hot liquid) are used.

(3) When commissioning a tank like this, special attention should be paid to the leak detector, especially during the heating phase, as this can result in strong pressure changes.

When using the VLXE .. Ex MMV, the following points must be observed or checked:

a) Check whether special switching values as per 12.3.2 are required.

b) Only metallic pipes should be used as the connection line between the leak detector and the tank.

c) The leak detector including the solenoid valve(s) must be installed so that the ambient temperature does not exceed 55°C (e.g., radiant heat of the tank).

d) The process temperature for the sensor can be up to 200°C; the ambient temperature must not exceed 70°C (clarification with SGB GmbH on a case-by-case basis).

e) If the sensor used is approved as overfill protection its testing is based on this approval. Other sensors must be checked in the annual functional check, by removing them if necessary (e.g., float switch, where the mobility needs to be checked).

f) The vacuum build-up should be executed using an external vacuum pump.

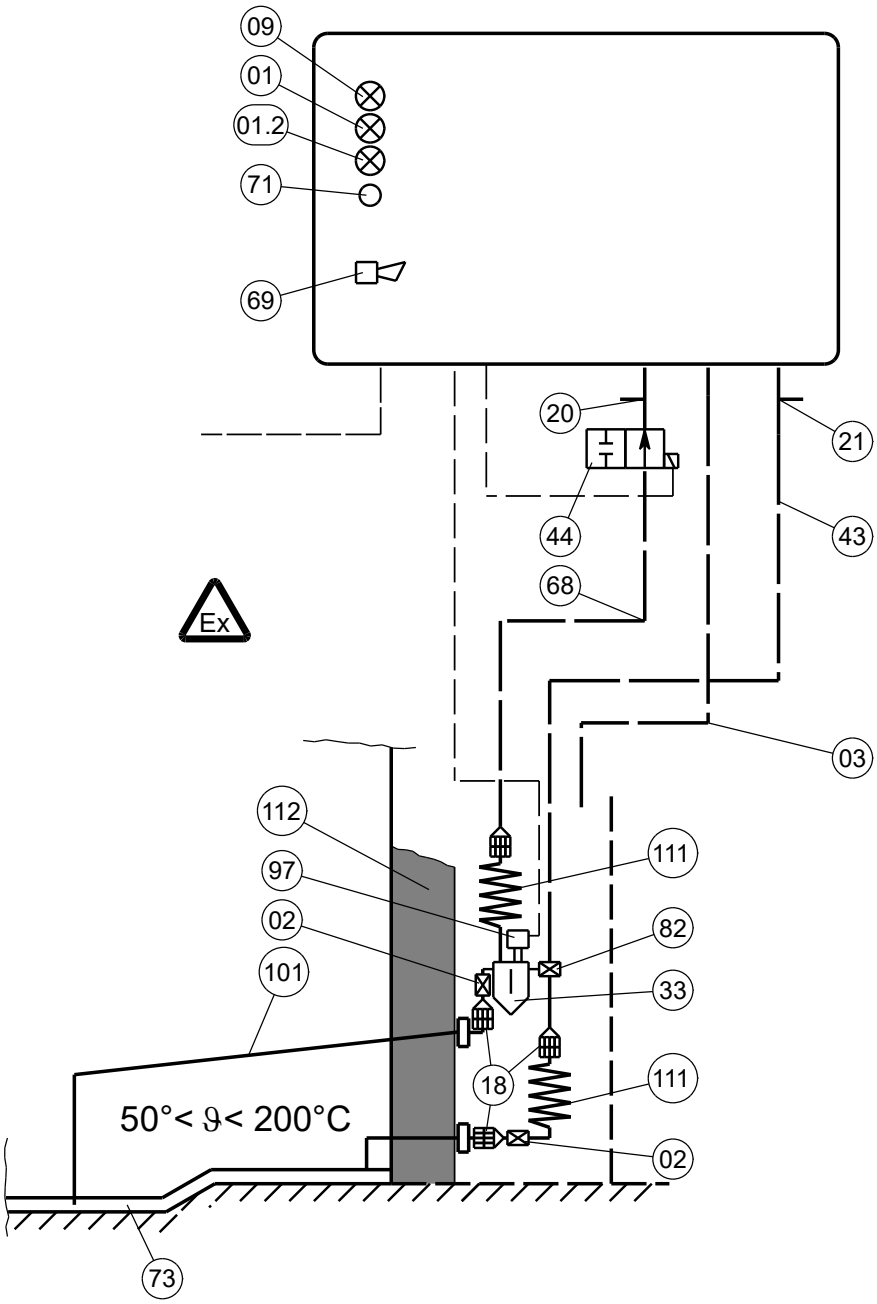
g) If no pressures of more than 5 bar can occur in the tank interstitial space, it is enough to install a solenoid valve in the suction line.

12.2.2 Tanks that need to be filled hot (ΔT > 25°C)

Calculation of the (possibly) required special switching valuesin coordination with SGB GmbH. Special switching values are intended to ensure that the alarm is triggered and that false alarms cannot occur.

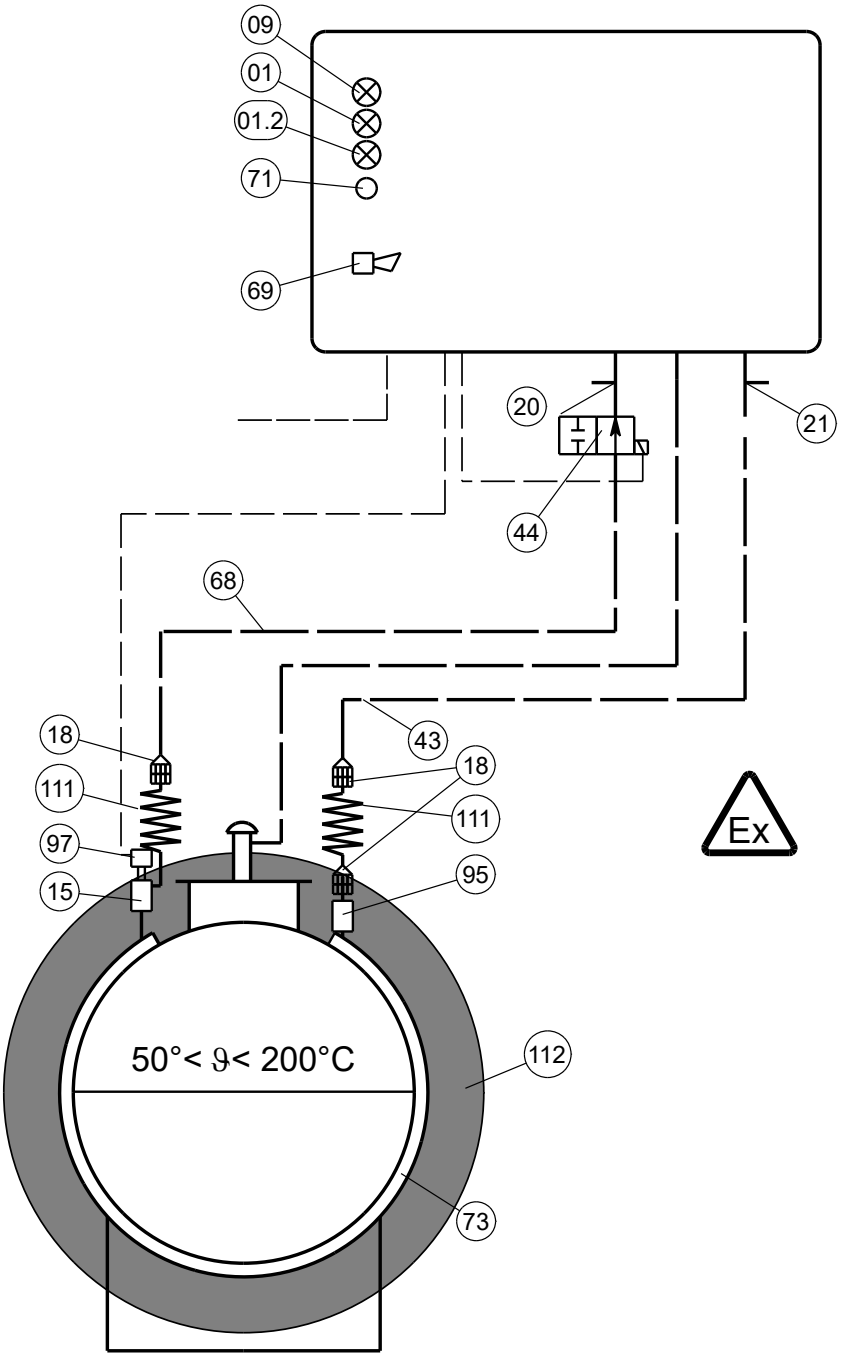
It is important that the temperature differences are noted, as well as the speed of the temperature change in the interstitial space.

12.2.3 Installation example of heated flat-bottomed tank (> 50°C ϑ ≤ 200°C)



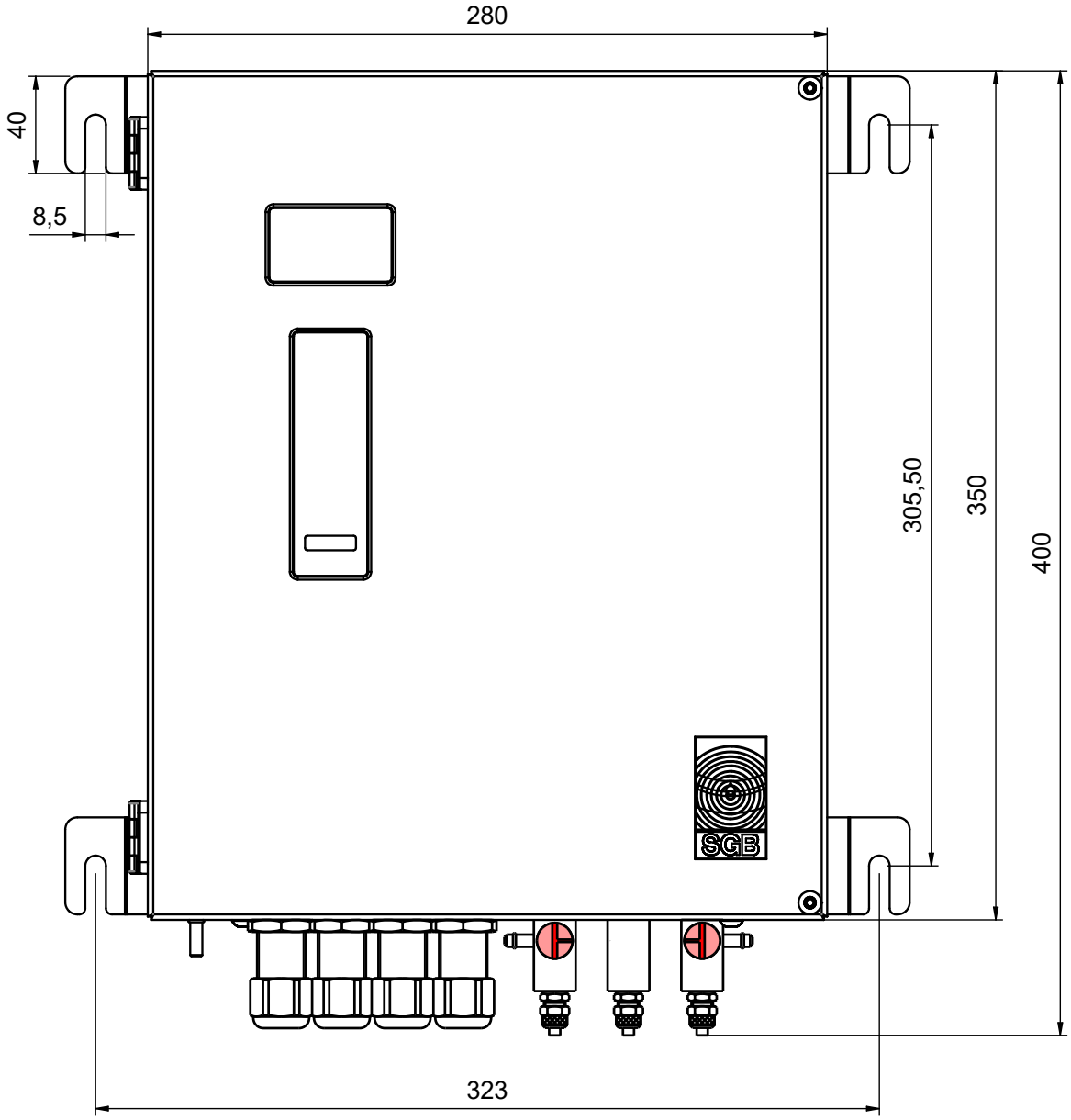
01	"Alarm" indicator light, red
01.2	Signal lamp “Probe alarm”, yellow
02	Shut-off valve
03	Exhaust line
09	"Operation" indicator light, green
18	Denotation flame arrester
20	Three-way valve in suction line
21	Three-way valve in the measuring line
33	Condensate trap
43	Measuring line
44	Solenoid valve
68	Suction line
69	Buzzer (if installed)
71	„Mute“ button
73	Interstitial space
82	Connection assembly pump
97	Probe
101	Suction line to low point
111	Cooling line, 3 meters
112	Isolation

12.2.4 Installation example of heated horizontal cylindrical tank (> 50°C ϑ ≤ 200°C)



01	"Alarm" indicator light, red
01.2	Signal lamp “Probe alarm”, yellow
02	Shut-off valve
03	Exhaust line
09	"Operation" indicator light, green
15	Detector pipe
18	Denotation flame arrester
20	Three-way valve in suction line
21	Three-way valve in the measuring line
33	Condensate trap
43	Measuring line
44	Solenoid valve
68	Suction line
69	Buzzer (if installed)
71	„Mute“ button
73	Interstitial space
82	Connection assembly pump
95	Pressure compensation vessel (here: mounted inside the isolation, i.e., needs to be warm due to fluidity)
97	Probe
101	Suction line to low point
111	Cooling line, 3 meters
112	Isolation

12.3 Dimensions and Drilling Pattern



D = 138

12.4 Declaration of Conformity

We,

SGB GmbH

Hofstr. 10

57076 Siegen, Germany,

hereby declare in sole responsibility that the leak detectors

VLXE .. A-Ex, VLXE .. Ex and **VLXE .. Ex MMV**

is in conformity with the essential requirements of the EU directives / regulations / UK statutory requirements listed below.

If the device is modified or used in a way that was not agreed with us, this declaration shall lose its validity.

Number/short title	Satisfied regulations
2014/30/EU EMC Directive SI 2016 No. 1091	EN 61 000-6-3: 2012 EN 61 000-6-2: 2006 EN 61 000-3-2: 2015 EN 61 000-3-3: 2014
2014/34/EU Equipment for EX areas SI 2016 No. 1107	The pneumatic components of the leak detector may be connected to spaces (interstitial spaces of pipelines/fittings) that require category 1 devices. The following documents have been consulted: TÜV-A 19 ATEX 1119 X with: EN 60079-0:2012/corr. 2013; EN 60079-1:2014 EN 60079-7:2015 EN 60079-11:2012 EN 60079-18:2015 EN60079-26:2015 The ignition hazard assessment did not result in any additional hazards Marking of the components: ⟨Ex⟩ II 1/2(2)G Ex db eb ib [ib] mb IIB+H_2 T4 Ga/Gb With denotation flame arrester: ⟨Ex⟩ II G IIB3 or ⟨Ex⟩ II G IIC
Named location with identifier	TÜV Austria Services GmbH 0408
2014/68/EU Pressure Equipment Directive SI 2016 No. 1105	Pressure accessory without safety function in accordance with Art. 1 (2) letter f) iii)

Conformity is declared by:

ppa. Martin Hücking
(Technical Director)

As of: 02/2023

12.5 Declaration of Performance

Number: **010 EU-BauPVO 2017**

1. Unique identification code of the product type:

   Vacuum leak detector type VLXE xx/yy

2. Use:

   Vacuum leak detector of class I for monitoring double-walled pipes and tanks

3. Manufacturer:

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

4. Authorized representative:

   N/A

5. System for assessment and verification of constancy of performance:

   System 3

6. In case of a declaration of performance for a construction product which is covered by a harmonized standard:

   Harmonized standard: EN 13160-1-2: 2003
   Notified body: TÜV Nord Systems GmbH & Co.KG, CC Tankanlagen, Große Bahnstraße 31, 22525 Hamburg, Germany
   Identification number of the notified testing laboratory: 0045

7. Declared performance:

Essential characteristics	Performance	Harmonized standard
Electrical function	corresponds to documentation	EN 13160-2: 2003
Operating/alarm signal light	green/red	
Tightness test	< 1 Pa l/s	
Pressure switching values, depends on type	Satisfied	
Ensuring the Alarm	System requirement (met, if field of application is observed)	

8. Signed for and on behalf of the manufacturer by:

   Dipl.-Ing. M. Hücking, Technical Director

   Siegen, 02-2023

12.6 Declaration of Compliance of the Manufacturer

SGB
MVV TB
Anhang C 2.15.15
TÜV-NORD

Compliance of the leak detector with the Specimen Administrative Provision of the Technical Building Regulations is hereby declared.

Dipl.-Ing. M. Hücking, Technical Director

Siegen, 02-2023

12.7 Ex-approval

ZERTIFIKAT | CERTIFICATE | CERTIFICAT | CERTIFICADO | СЕРТИФИКАТ | شهادة | 证书 | 인증서

Certificate

TÜV AUSTRIA

(1) **EU - TYPE EXAMINATION CERTIFICATE**
in accordance with Directive 2014/34 / EU, Annex III, point 6

(2) Equipment and Protective System Intended for use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3)	EU - Type Examination Certificate Number:	TÜV-A 19ATEX1119 X
(4)	Product:	**Vacuum leak detector Typ: VLXE ... Ex**
(5)	Manufacturer:	**SGB GmbH**
(6)	Address:	**Hofstraße 10 57076 Siegen**

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) TÜV AUSTRIA SERVICES GMBH, Notified Body number 0408, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. TUV-A 2019-TAD-000102

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012/corr. 2013 EN 60079-1:2014 EN 60079-7:2015 EN 60079-11:2012

EN 60079-18:2015 EN 60079-26:2015

except in respect of those requirements listed at item 18 of the Schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

Vienna *Place* | 2020-07-24 *Date* | Michael Reuschel *Notified Body 0408* TÜV AUSTRIA SERVICES GMBH

Online Verification

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E-Mail: explosionsschutz@tuv.at
Web: http://www.tuv.at

Akkreditierung Austria A 0274 ISO/IEC 17020

040464-19-1

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(12) **Schedule**

(13) Certificate Number TÜV-A 19ATEX1119 X

(14) The marking of the product shall include the following:

Ex II 1/2 (2) G Ex db eb ib [ib Gb] mb IIB + H2 T4 Ga/Gb

With detonation flame arrester Type F501:

Ex II 1/2 (2) G Ex db eb ib [ib Gb] mb IIB3 T4 Ga/Gb

With detonation flame arrester Type F502:

Ex II 1/2 (2) G Ex db eb ib [ib Gb] mb IIC T4 Ga/Gb

(15) **Description of Product**

vacuum leak detector is used for monitoring double-walled tanks and pipelines. The VLXE is connected to the monitoring space (gap between inner and outer wall).

The entire device is for intended use in zone 1, pneumatically the connection can be made to zone 0. Zone separation is achieved by a diaphragm with an additional flame arrester.

Type codes:

Type	**Alarm ON,** at the latest:	**Pump OFF,** not more than:	**Functionality*** of the interstice given for
34	- 34 mbar	- 120 mbar	- 650 mbar
230	- 230 mbar	- 360 mbar	- 650 mbar
255	- 255 mbar	- 380 mbar	- 650 mbar
330	- 330 mbar	- 450 mbar	- 700 mbar
410	- 410 mbar	- 540 mbar	- 750 mbar
500	- 500 mbar	- 630 mbar	- 850 mbar
570	- 570 mbar	- 700 mbar	- 900 mbar

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Technical data:

TÜV AUSTRIA

Nominal voltage	100 bis 240 V AC
Nominal frequency	50 / 60 Hz
Nominal power	50 W
Terminals 5 and 6 (external signal)	
Nominal voltage	max. 24 V DC
Nominal power	max. 300 mA
Terminals 11 to 13 (potential-free contacts)	
Switching capacity	≤ 25 VA AC
	≤ 50 VA DC
Trennerbarriere (TBI)	
U_o	6,30 V
I_o	193 mA
P_o	304 mW
L_o	0,8 mH
C_o	30µF
L_o/R_o	0,117mH/Ω
Anzeigeplatine (ANZI)	
U_i	6,5 V
I_i	200 mA
P_i	325 mW
C_i	1,1 µF
L_i	negligible
Busmodul (BMI)	
Input data (internal connection to TBI)	
U_i	6,3 V
I_i	193 mA
P_i	304 mW
C_i	negligible
L_i	negligible
Output data (external connection M12 plug to RS485-Bus)	
U_i	10 V
I_i	70 mA
P_i	700 mW
C_i	110 nF
L_i	negligible

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(16) **Report Number**

TUV-A 2019-TAD-000102

(17) **Specific Conditions of Use**

a) The device must bear the warning label:
- WARNING - DO NOT OPEN UNDER VOLTAGE

b) The housing in the ignition protection type of flameproof enclosure must bear the warning marking:

- WARNING - DO NOT OPEN WITHIN A POTENTIALLY EXPLOSIVE AREA
- WARNING - DO NOT OPEN UNDER VOLTAGE
- WARNING - WAIT 30 MINUTES AFTER SWITCHING OFF BEFORE OPENING

c) The display and keypad have been tested according to low requirements regarding mechanical stress. The device must be mounted protected from mechanical stress

(18) **Essential Health and Safety Requirements**

Met by the standards mentioned above.

(19) **Drawings and Documents**

Document / Drawing no / File name/ Reference	Rev	Pages	Date	Description
TUV-A 2019-TAD-000102	01	13	2020-07-22	Test report
Dokumentation VLXE ... Ex	--	57	02/2020	Manual
Z - 18-39-01	03	1	2019-07-26	Schema

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12.8 Certification TÜV-Nord

Note:
By TÜV not certified translation of the German original version

TÜV NORD Systems GmbH & Co. KG
PÜZ – Center for containers, pipes and equipment for plants with materials hazardous to water

Große Bahnstraße 31-22525 Hamburg
Phone: 040 8557-0
Fax: 040 8557-2295
hamburg@tuev-nord.de
www.tuev-nord.de

Certification

Subject of the test:	**Leak detector type VLXE.. Ex (with solenoid valve type VLXE.. MV-Ex)**
Client:	SGB GmbH Hofstrasse 10 57076 Siegen
Manufacturer:	SGB GmbH, Hofstraße 10, 57076 Siegen
Test type:	Initial test of a vacuum-based explosion-proof type VLXE.. Ex (with solenoid valve type VLXE.. MV-Ex) leak detector with indicating unit in accordance with DIN EN 13160-1:2003/EN 13160-1:2010 and DIN EN 13160-2:2003 as a class I leak monitoring system
Test period:	03/2015 until 05/2018
Test location:	PÜZ Prüflabor TÜV NORD Systems GmbH & Co. KG
Test results:	**The explosion-proof leak detector type VLXE.. Ex (with solenoid valve type VLXE.. MV-Ex) corresponds to class I according to DIN EN 13160-1:2003/EN 13160-1:2010 as an underpressure system and meets the requirements of DIN EN 13160-2:2003. In terms of the application and installation*, the specifications of technical description "Documentation of explosion-proof underpressure leak detector VLXE.. Ex and VLXE.. MV-Ex" as of 07/2017 shall apply**

For details on testing please refer to the test report: PÜZ 8112235530-1 dated 19 June 2018.

Hamburg, 6/19/2018 Head of Test Laboratory

Straube

*Applies for use in facilities for storing fuels intended to supply heating systems in buildings.

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As of 01/2013
STPÜZ-QMM-321-032-02

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TÜV®

Our/Your Sign	Contact Partner	Direct	Date
	Viviana Schliewe **vschliewe@tuev-nord.de**	**Tel.: -2436** **Fax: -2710**	**January 15, 2024**

Conducting an initial test as per DIN EN 13160-1:2003 and DIN EN 13160-2:2003 by the inspection authority accredited by the HBauO, identification number HHA02 of TÜV NORD Systems GmbH & Co. KG.

Order No. 8112235530

We hereby certify the successful completion of the initial test of the explosion-protected vacuum leak detector type VLXE.. Ex (with solenoid valve type VLXE.. MV-Ex) with leak indication unit, class I, as part of a leak detection system as per Lfd. No. C 2.15.24 of the sample administrative regulation for technical building regulations – MVV TB 2017/1.

The regulations of the current MVV TB 2023/1 are also complied with.

By submitting the declaration of conformity, the manufacturer must declare conformity with the relevant state building regulations and label the products accordingly with the conformity marking.

p. p. Viviana Schliewe
Material and welding technology
Accredited inspection authority, code number HHA02

Registered office of the company
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Chairman of the Board
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Complementary
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Hamburg Local Court
HRB 88330

Managing Directors
Dr. Ralf Jung (Chairman)
Silvio Konrad
Ringo Schmelzer

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