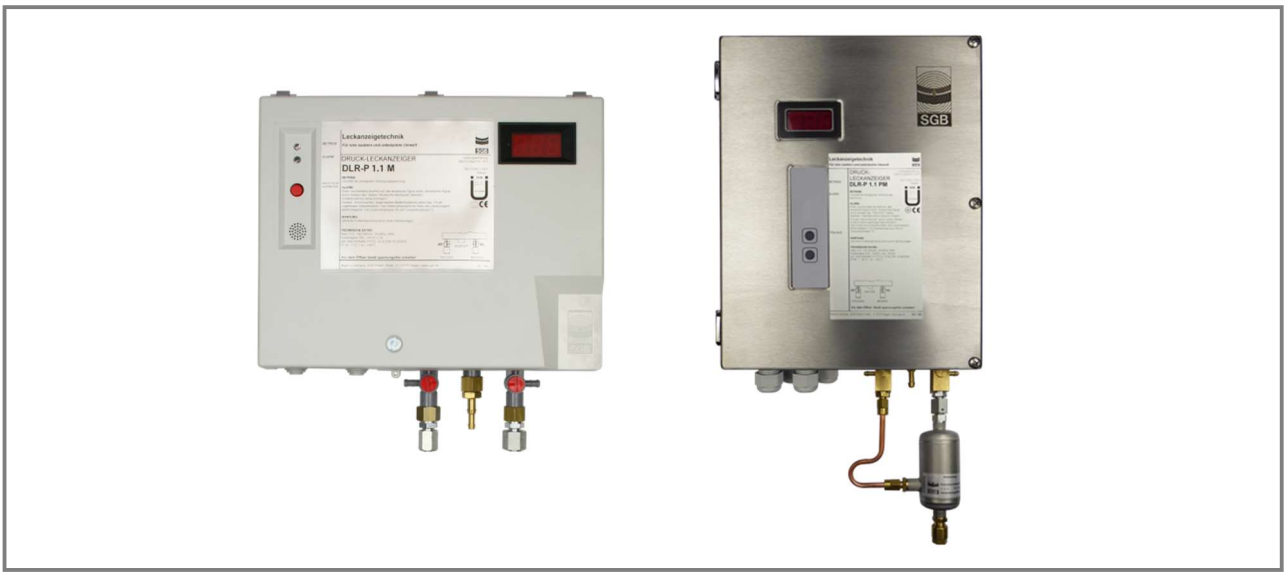
Documentation

Pressure leak detector DLR-P



Please read instructions before starting any work

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Table of Contents

1. General

1.1 Information

These instructions provide important notes on using the leak detector DLR-P. Complying with all safety instructions and guidelines is a prerequisite for safe working.

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 norms and regulations, the state of the art and our longstanding experience.

SGB does not assume any liability in case of:

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

1.4 Copyright

The contents, texts, drawings, images, and other representations are copyrighted and subject to industrial property rights. Any misuse is punishable.

1.5 Warranty Conditions

We provide warranty for the leak detector DLR-P 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 is subject to submission of the functional/test report on initial commissioning by trained personnel.

Stating the serial number of the leak detector is required.

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

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 or the label of the leak detector.

2. Safety

2.1 Intended Use

WARNING!

Danger from misuse

- For double-walled pipe/fittings with an interstitial space that is sufficiently pressure resistant
- The leak detector alarm pressure must be at least 1 bar higher than the maximum feed pressure in the product-transporting pipe.
- Grounding/equipotential bonding in accordance with applicable regulations[1].
- Tightness of the leak detection system according to section 7.3.4.
- Leak detector installed outside of the explosive area.
- Lead throughs into and out of the manhole chamber for connection lines must be closed gastight.
- Leak detector (electric) cannot be turned off.
- Based on the use of air as leak detection medium, the following points must be observed for conveyed media with a flash point ≤ 60 °C (Germany ≤ 55°C according to TRGS 509 and 751):
  - Explosive vapor-air mixtures must be assigned to temperature code T1 to T3 and gas group II A or II B.
  - The inner wall must not be permeable for media that can lead to the development of explosive vapor-air mixtures.
  - It must also be noted that in case of a leak in the inner pipe, air is pressed into the conveyed product. This must be considered when evaluating explosion protection of pumps/fittings along the length of the pipe run.
- The interstitial space must be designed sufficiently pressure-resistant.

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.

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

2.2 Obligation of the Operating Company

WARNING!

Danger in case of incomplete documentation

The leak detector DLR-P is used in a commercial environment. 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:

- 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, among others, 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 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 installation, commissioning, and maintenance of leak detection systems.

2.4 Personal Protective Equipment (PPE)

Personal protective equipment must be worn during work.

- Wear necessary protective equipment for the relevant work
- Note and comply with existing PPE signs

Entry in the "Safety Book"

Wear hard hat

Wear HV vest

Wear gloves – where necessary

Wear safety footwear

Wear safety goggles – where necessary

2.4.1 Personal Protective Equipment (PPE) on systems where explosion hazards can arise

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 should be performed only at a concentration of 50 % below the lower explosion limit)[2]
- Measuring equipment to determine the oxygen content of 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), if necessary, and accident prevention.

DANGER

From explosive vapor-air mixtures

Ensure there is no gas present prior to performing work.

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.

DANGER

From working in shafts

The leak detectors are mounted outside the manhole chambers. Pneumatic connection is usually performed inside the manhole chamber. Therefore, the chamber must be entered for mounting.

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

[2] 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 Appendix, sections 12.1 to 12.3
Weight:	2.7 kg (plastic housing) 6.3 kg (stainless steel housing)
Storage temperature range:	-40°C to +70°C
Operating temperature range / Housing protection class:	0°C to +40°C / IP30 DLR-P 1.1 up to DLR-P 2.0 in plastic housing
	-40°C to +60°C / IP66 DLR-P 1.1 PM up to DLR-P 3.0 PM in stainless-steel housing
	0°C to +40°C / IP54 DLR-P 3.5 M and DLR-P 4.5 M in ventilated stainless-steel housing
Max. height for safe operation:	≤ 2000 m NN
Max. relative humidity for safe operation:	95 %
Buzzer volume:	> 70 dB(A) im 1 m

3.2 Electrical Data

Power supply: optional:	100 to 240 V AC, 50/60 Hz 24 V DC
Power input up to DLR-P 2.0: DLR-P 4.5:	50 W 100 W
Terminals 5, 6, external signal	max. 24 V DC; max. 300 mA
Terminals 11…13 (voltage-free)	DC ≤ 25 W or AC ≤ 50 VA
Terminals 17…19 (voltage-free)	DC ≤ 25 W or AC ≤ 50 VA
Fuse protection: Note: Acts as a separating point for the device and should be attached as close as possible.	max. 10 A
Overvoltage category:	2
Degree of soiling:	PD2

3.3 Data for applications that fall under the Pressure Equipment Directive (PED) in the event of an error

Note: The leak detector, installation kits, and manifolds are pressure accessories without a safety function.

Volume leak detector incl. pulsation damper	0,11 liter
Volume manifold 2…8	0,02 … 0,08 liter
Max. operating pressure	see 3.4, col. p_{PA}

3.4 Switching Values

Type DLR-P	p_{FD} [bar]	p_{AE} [bar]	p_{PA} [bar]	$P_{ÜDV1}$[3] [bar]	$p_{PRÜF}$ [bar]
1.1	< 0.1	> 1.1	< 1.45	1.6 ± 0.07	≥ 2,0
1.5	< 0.5	> 1.5	< 1.9	2.2 ± 0.10	≥ 2,5
2.0	< 1.0	> 2.0	< 2.4	2.7 ± 0.10	≥ 3,0
2.3	< 1.3	> 2.3	< 2.8	3.1 ± 0.10	≥ 3,5
2.5	< 1.5	> 2.5	< 2.9	3.2 ± 0.10	≥ 3,5
3.0	< 2.0	> 3.0	< 3.4	3.8 ± 0.10	≥ 4,2
3.5	< 2.5	> 3.5	< 4.4	4.6 ± 0.20	≥ 6.5
4.5	< 3.5	> 4.5	< 5.5	6.3 ± 0.20	≥ 7,5
_	Special switching values agreed to by SGB and customers				

p_{FD} Max. feed pressure in inner pipe

p_{AE} Switching value "Alarm ON"; the alarm will be triggered at this pressure level at the latest

p_{PA} Switching value “Pump OFF” (= operating pressure)

$p_{ÜDV1}$ Opening pressure for overpressure valve 1 (interstitial space)

The use of overpressure valves can be omitted if the test pressure of the interstitial space is ≥ 3 bar (Type 1.1 and 1.5) or ≥ 10 bar (Type 2.0 to 3.0).

$p_{PRÜF}$ Minimum test pressure of the interstitial space

Supplement to the table:

p_{AA} Switching value "Alarm OFF"; the alarm will be deactivated if this value is exceeded
The switching value “Alarm OFF” is approx. 100 mbar higher than the switching value “Alarm ON” ($p_{AA} = p_{AE}$ + ~100 mbar)

p_{PE} Switching value “Pump ON”
The switching value “Pump ON” is approx. 100 mbar lower than the switching value “Pump OFF” ($p_{PE} = p_{PA}$ - ~100 mbar)

3.5 Field of Application

3.5.1 Interstitial space requirements

- Proof of pressure resistance of the interstitial space (see section 3.4 switching values, table, column “$p_{PRÜF}$” Minimum test pressure of the interstitial space)
- Proof of suitability of the interstitial space (for Germany: proof of usability from construction authority).
- Sufficient passage in the interstitial space for the leak detection medium air.
- Tightness of the interstitial space according to this documentation.

[3] The table lists the opening pressure for overpressure protection at which the volume flow of the pump is diverted. The operating pressure (initial opening) is lower.

- The number of interstitial spaces to be monitored depends on the total interstitial space volume. According to EN 13160, 10 m^3 may not be exceeded. To be able to test the tightness of the interstitial space, it is recommended not to exceed 4 m^3.

The pipeline length (per duct) to be monitored should not exceed 2500 m and must correspond with the specifications for the pipe permit.

3.5.2 Pipes

Double-walled pipes made of metal or plastic, in factory or on-site construction.
For Germany: Additional requirements may result from the respective permits.

3.5.3 Fittings

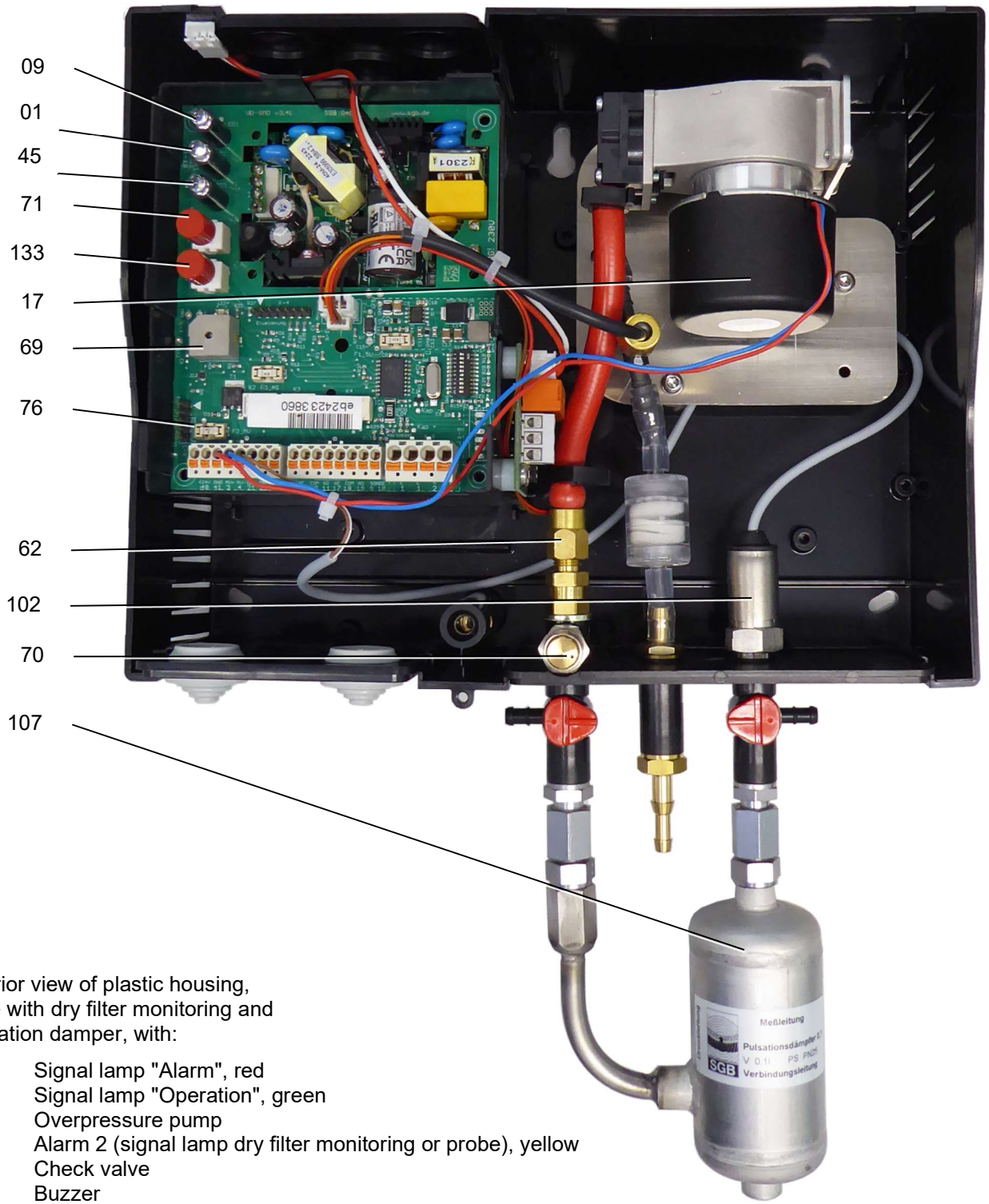
Double-walled fittings made of metal or plastic in factory or on-site construction.
For Germany: with proof of usability from construction authority, unless it is part of the pipe permit.

3.5.4 Conveyed product

- Liquids hazardous to water with a flash point of > 60°C (Germany: > 55 °C according to TRGS 509 and 751)
- Liquids hazardous to water with a flash point of ≤ 60 °C (Germany ≤ 55 °C according to TRGS 509 and 751) **ONLY** for double-walled pipes/fittings which have a feed side wall that is impermeable.
  For pipes/fittings that are permanently filled with liquids, make sure that the product feeding equipment (pumps...) is suitable for zone 0, because air will be pressed into the product in the case of a leak.
- The conveyed product may not react with the leak detection medium.

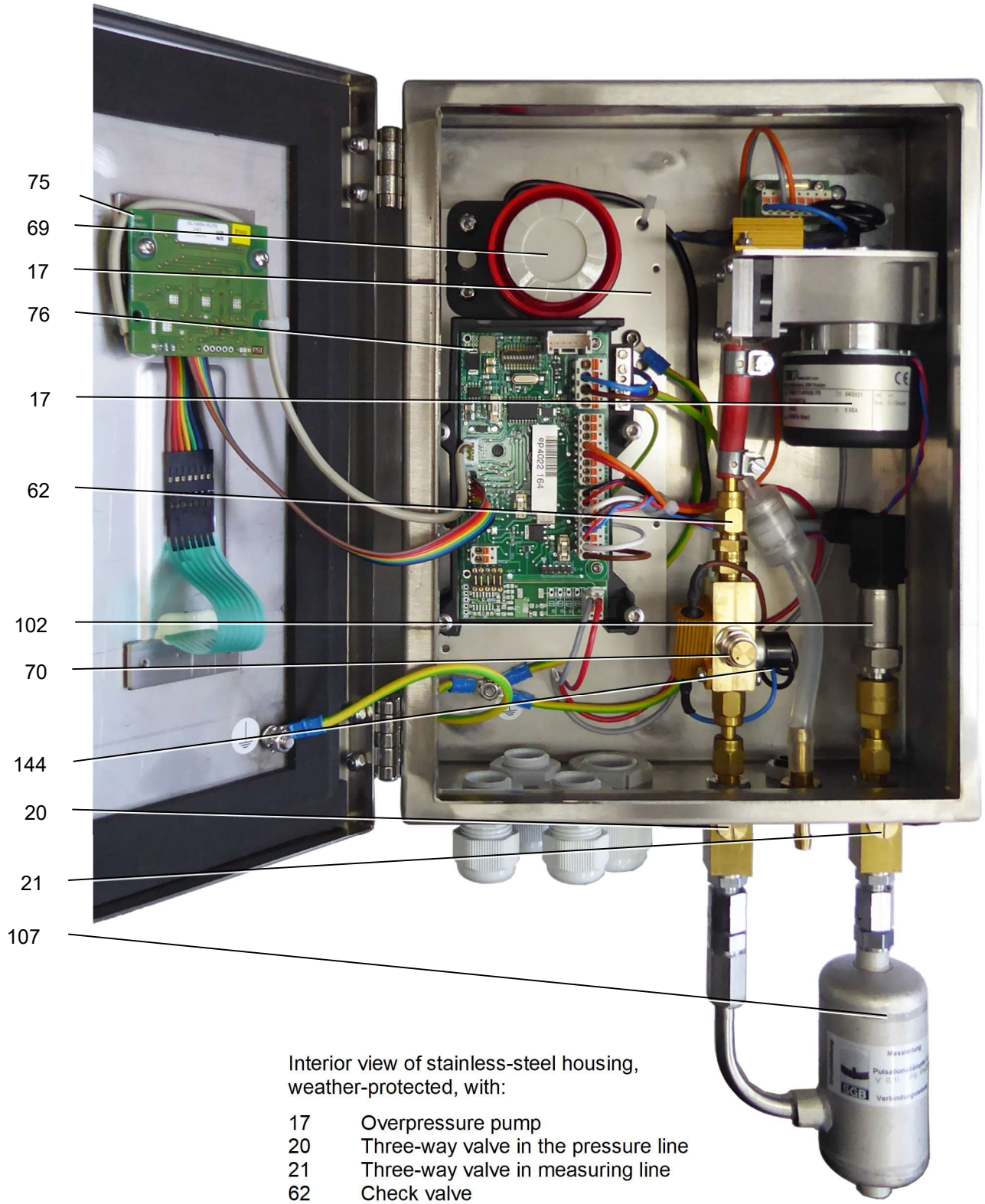
4. Design and Function

4.1 Design



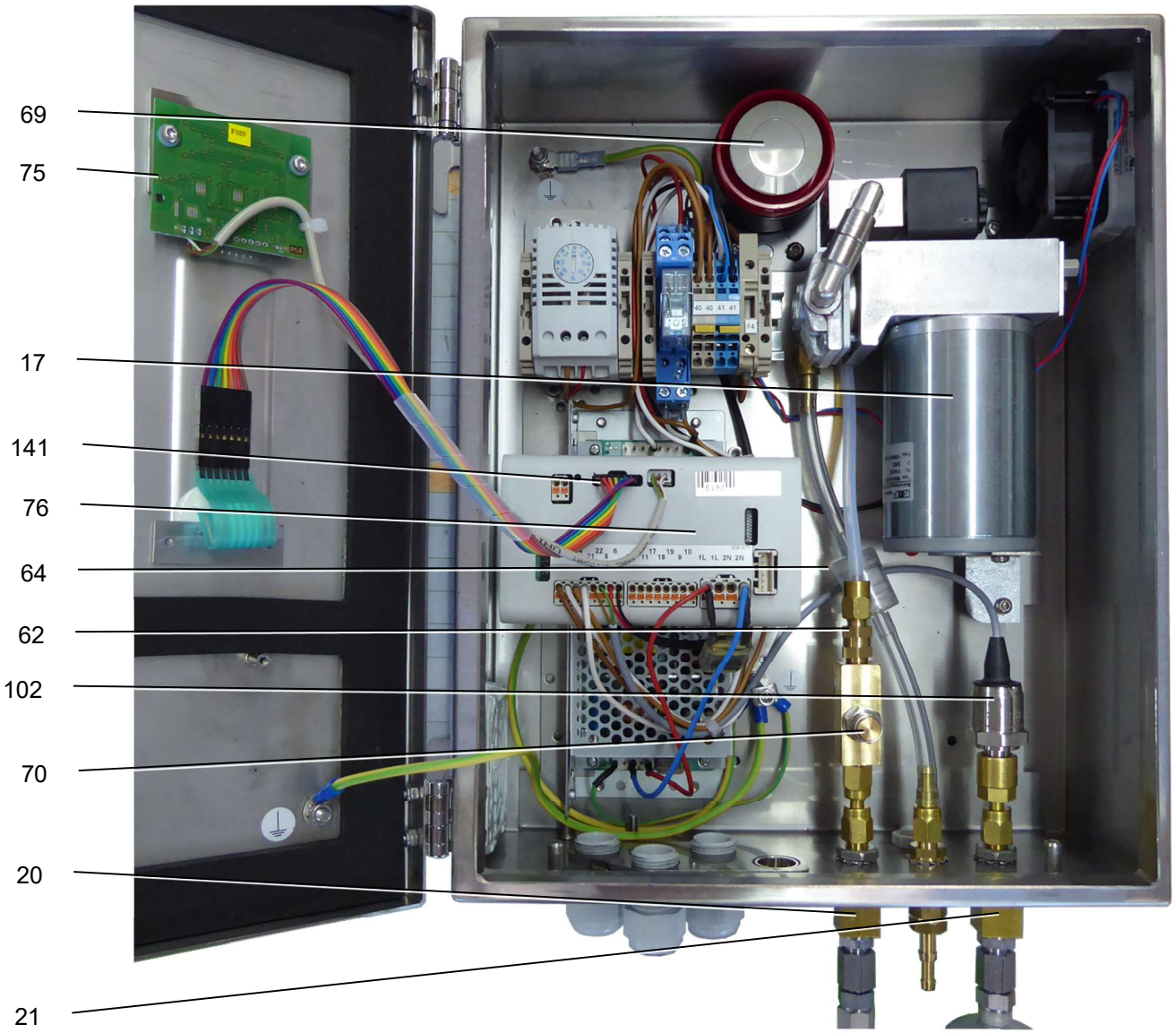
Interior view of plastic housing,
here with dry filter monitoring and
pulsation damper, with:

01	Signal lamp "Alarm", red
09	Signal lamp "Operation", green
17	Overpressure pump
45	Alarm 2 (signal lamp dry filter monitoring or probe), yellow
62	Check valve
69	Buzzer
70	Overpressure valve (interstitial space side)
71	“Mute” button
76	Main board
102	Pressure sensor
107	Pulsation damper
133	Button "acknowledgment dry filter signal"



Interior view of stainless-steel housing, weather-protected, with:

17	Overpressure pump
20	Three-way valve in the pressure line
21	Three-way valve in measuring line
62	Check valve
69	Buzzer
70	Overpressure valve (interstitial space)
75	Display board
76	Main board
102	Pressure sensor
107	Pulsation damper
141	Keypad connection
144	Temperature switch, frost protection



Interior view of stainless-steel housing for
DLR-P devices with pressure values > 3.0:

17	Overpressure pump
20	Three-way valve in the pressure line
21	Three-way valve in the measuring line
62	Check valve
64	Dust filter
69	Buzzer
70	Overpressure valve (interstitial space side)
75	Display board
76	Main board
102	Pressure sensor
141	Keypad connection

The pressure leak detector DLR-P monitors both walls of the double-walled system for leaks. The monitoring pressure during operation is higher than any pressure on the inner or outer wall, so that leaks will be indicated by a pressure drop.

Air is used as leak detection medium. It is dried to a relative humidity of less than 10 % by the dry filter in the vacuum line. **Used dry filter fillings must be regenerated or exchanged.**

The current pressure is shown on the display in mbar/bar or PSI[4]:

- Values of less than 150 mbar or less than 2.18 PSI will not be displayed.
- Values of up to 990 mbar will be displayed in mbar and without decimal.
- Values from 1 bar are displayed in bar with two decimals and from 10 bar with one decimal.
- Values in PSI are displayed with one or two decimals.

4.2 Normal Operating Condition

The pressure leak detector is connected with the interstitial space(s) through the connection line(s). The excess pressure generated by the pump is measured and controlled by a pressure sensor.

When the operating pressure is reached (Pump OFF), the pump shuts off. The pressure drops off slowly due to unavoidable leaks in the leak detector system. When the ”Pump ON” switching value is reached, the pump will be turned on and the operating pressure will be built up again.

Depending on the grade of tightness of the entire unit, the overpressure moves between the switching value “Refilling OFF” and the switching value “Refilling ON”.

4.3 Function in Case of Leaks

If there is a leak in the inner or outer wall, air will leak from the interstitial space. The pressure will fall until the overpressure pump is turned on to reestablish the operating pressure. If the volume flow that is flowing out due to the leak is larger than the (limited) feed capacity of the pump, the pressure in the system will fall and the pump will work in constant mode.

An enlargement of the leak will lead to further falling of pressure until the alarm pressure is reached. This triggers the visual, audible, and potential-free alarms.

4.4 Overpressure Valve

The overpressure valve installed in the pressure line is designed for the protection of the interstitial space against impermissibly high overpressures (exceeding of the test pressure). Impermissibly high overpressures can occur due to:

[4] The change of the bar and PSI settings is performed at the factory. This change can also be performed on site following coordination with the manufacturer.

- Temperature increase resulting from environmental influences (e.g., sunlight)
- Temperature increase resulting from hot filling (absolutely contact the manufacturer!)

The installer/operator must determine whether any further measures are to be taken in consideration of the interstitial space volume.

With sufficient pressure resistance of the interstitial space, the over-pressure valve can be omitted if so agreed between the manufacturer of the pipe/fitting and SGB.

4.5 Dry filter

A dry filter is needed to dry the incoming ambient air to the point where condensation does not occur in the interstitial space.

For interstitial spaces underground, the minimum requirement is a TF 200; larger ones can also be used.

	Max. volume (liters) of the interstitial space with			
Type	**TF 200**	**TF 400**	**TF 600**	**TF 1200**
DLR-P 1.1	400	750	1150	2600
DLR-P 1.5	300	650	800	1850
DLR-P 2.0				
DLR-P 2.3	250	480	700	1600
DLR-P 2.5				
DLR-P 3.0	230	450	600	1400
DLR-P 3.5	150	250	400	950
DLR-P 4.5				

4.5.1 Devices with FC (dry filter monitoring)

A meaningful report on the consumption of the drying material is only guaranteed if original SGB drying beads are used.

4.5.1.1 Function

There is a sensor installed in the pump suction line, between the pump and the dry filter, which measures the moisture in the air that is drawn in.

The increase in relative humidity when the dry material has been used up is detected by the sensor. In the event of insufficient drying capacity, the visual, audible, and potential-free signals will be triggered.

The signal is indicated visually via alternate flashing of the red and yellow alarm indicator lights.

The potential-free signal is indicated at terminals 31 to 34:
31/32 Contact opens in the event of a signal
31/34 Contact closes in the event of a signal

4.5.1.2 Replacing the dry material

When a "Dry filter used up" signal is triggered, the dry material should be replaced within a reasonable time.

The audible signal can be acknowledged by pressing the key briefly. The visual and potential-free signals will continue.

The whole signal can be acknowledged by pressing the "Acknowledge dry filter signal" key for longer (until the bottom LED flashes). When the pump is next activated (or, if this function is performed while the pump is running, after approx. 30 seconds), the signal will be triggered again if the residual moisture is too high.

Once the dry material has been replaced, the dry filter signal must be acknowledged as described.

4.5.1.3 Usage limits

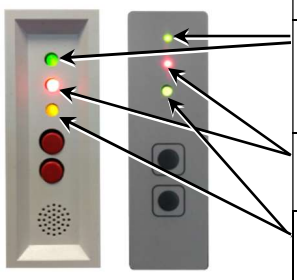
The following usage limits must be observed with regard to the dry filter monitoring system:

1. The pump must run for at least 30 seconds in order to obtain a meaningful measurement. During or after commissioning of the leak detector, the time between pump ON and OFF should be measured to establish whether this minimum run time is achieved.

2. It is not possible to obtain meaningful measurement results at low temperatures (below 5°C). The measurement function is therefore deactivated below 5°C.

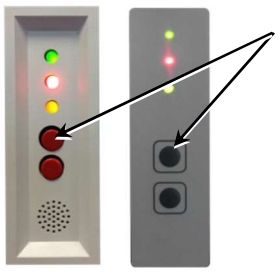
4.6 Displays and Controls

4.6.1 Display



Signal lamps	Operating condition	Alarm condition	Alarm, audible alarm acknowledged	Malfunction
OPERATION: green	ON	ON	ON	ON
ALARM: red	OFF	ON	BLINKING	ON
LED: yellow	Not used or, if dry filter monitoring is connected, yellow and red flash alternately.			

4.6.2 Function "Turn off audible alarm signal"

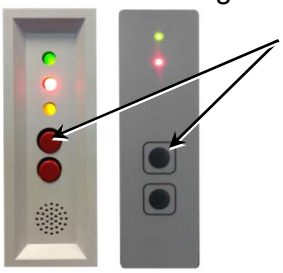


Shortly press the "mute" button once, audible signal turns off, the red LED blinks.

Pressing the button again will turn the audible signal on.

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

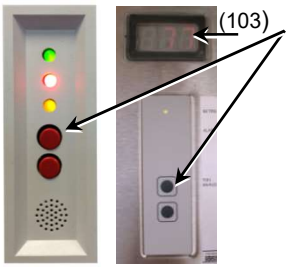
4.6.3 Function "Testing the optical and audible alarm signal"



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

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

4.6.4 Function "Tightness inquiry"



Press and hold the "mute" button until the signal lamp is blinking rapidly, then release it. The display shows a value for the impermeability (103, on the version with stainless steel housing). The same value is indicated by the number of times the “Alarm” signal lamp flashes.

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

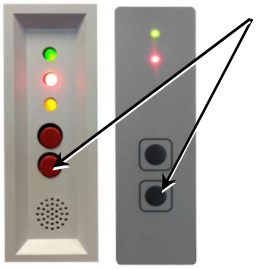
For the "Tightness inquiry" function, the leak detector must have performed at least 1 automatic refilling interval in normal operation (i.e. without external filling, e.g. by an installation pump) to achieve a valid statement.

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 depends also on temperature fluctuations and should thus be considered a reference point.

4.6.5 Acknowledgement of the “Dry filter notification” (only if filter check FC provided)



Briefly press the button “Acknowledge dry filter alarm” to shut off the audible signal. The visual signal (alternate flashing of the red and yellow LEDs) continues.

To reset the dry filter alarm completely, press and hold the button until an audible signal sounds.

5. Installing the System

5.1 Basic Instructions

- Prior to commencing work, the documentation must be read and understood. In case of ambiguities, please refer to the manufacturer.
- The safety instructions in this documentation must be adhered to.
- Only qualified service companies may be used for installation
- Comply with relevant regulations for prevention of accidents.
- Lead-throughs for pneumatic and electric connection lines, through which the explosion atmosphere can carry over, must be sealed gas-tight.
- 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.
- If nitrogen is used to pressurize the interstitial space initially, appropriate safety precautions must be taken (e.g., secure cylinder, use appropriate pressure reducer, ensure ventilation in areas and shafts …).
- Provide a test valve at the end facing away from the leak detector at the end of the pipe(s)/fitting(s).
- 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 pipe to be monitored.
- Important notes on personal protective equipment are provided in chapter 2.4 and 2.4.1.

5.2 Leak Detector

(1) Generally mounted on walls with plugs and screws.

(2) To allow the ventilation slots to work properly, make sure there is a side clearance of at least 2 cm from other objects and walls.

(3) **NOT in potentially explosive areas.**

(4) Plastic housing:
- In a dry room or
- Outdoor in a suitable protective box. This requires an additional external signal or signal forwarding via voltage-free contacts to a switch board or similar device.

(5) Stainless steel housing: Outdoor or in a building

(6) Dimensions of housings and drilling patterns are illustrated in Appendix 12.1 to 12.3.

(7) Prior to closing the housing lid, make sure that the function of the overpressure valve is not impeded.

5.3 Dry filter

(1) Near the leak detector, if possible. If a leak detector is installed in the protective box, the dry filter can be installed in the protection box or outdoors.

(2) Fastening with the provided installation material.
TF 180: Vertical with suction opening pointing down
TF 200, 300, 400, 600, 1200: Vertical with suction opening pointing up, beneath the leak detector if possible

(3) Connect the dry filter and the aspiration port of the leak detector through a PVC hose (or comparable).

5.4 Pneumatic Connection Lines, Requirements

- Pressure resistance of the metal (generally Cu) or plastic pipes must at least correspond with the test pressure in the interstitial space. Also applies to fittings and screwed connections. Note temperature range, especially when using plastic.
- Make sure that the correct screw connections and matching threads are used.
- Inside clearance of at least 6 mm for air as leak detection medium
- 50 m should not be exceeded, but if this happens: Install pipe with greater inside clearance using transition pieces.
- The full cross section must be maintained. Do not push in or bend[5].
- Before connecting cut pipes, deburr and clean them (free of chips).
- Install metal or plastic pipes that are installed underground or overground exposed on the surface in protective pipes.
- Seal the protective pipe gas-tight and protect from moisture.
- Avoid build-up of electrostatic charges (e.g., during pulling of lines).

5.5 Completing Pneumatic Connections

5.5.1 Mounting the connection to the interstitial space or test valves

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

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

5.5.2 Between leak detector and interstitial space

(1) Select and install suitable pipe.

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

(3) Provide grounding/equipotential bonding of metal parts in non-conductive connection lines.

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

[5] If necessary, install commercial fittings for plastic pipes (specified bending radii)

5.5.2.1 Flanged screw connections (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

5.5.2.2 Clamping ring screw connection for metal and plastic pipes

(1) Insert support sleeve (only plastic pipe) into end of the pipe
(2) Insert pipe (with support sleeve) as far as the stop
(3) Tighten nut of screw connection by hand to the resistance; then turn further 1¾ turns with the wrench
(4) Loosen nut
(5) Tighten nut by hand until stop is felt
(6) Final fitting of the screw connection by tightening ¼ turn.

5.5.2.3 Quick screw connections for PA tubing

(1) Cut PA tube 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)

5.6 Electrical Cables

Supply line:
at least 1.0 mm^2, e. g., NYM 3 x 1.5 mm^2, and max. 2.5 mm^2

Power connection:
- 2.5 mm^2 without ferrule
- 1.5 mm^2 with ferrule and plastic collar

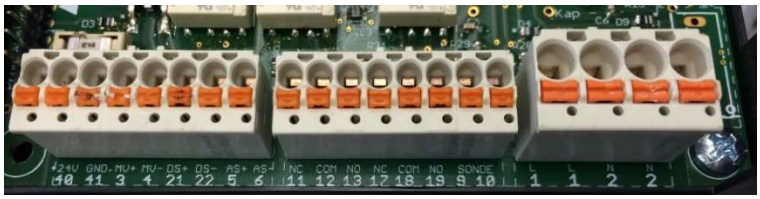
Voltage-free contacts, external signal, and power supply 24 VDC via terminals 40/41:
- 1.5 mm^2 without ferrule
- 0.75 mm^2 with ferrule and plastic collar

5.7 Electrical Wiring Diagram

(1) Power supply: according to label imprint.
(2) Recommended cable type: NYM 3 x 1,5 mm^2, LiYY 3 x 0,75 mm^2 with wire end ferrules
(3) Fixed wiring, i.e., no plug or switch connections.
(4) Devices with plastic housing may only be connected with a fixed cable.
(5) Close unused cable glands properly and professionally.

(6) Regulations of power supply companies must be adhered to[6].

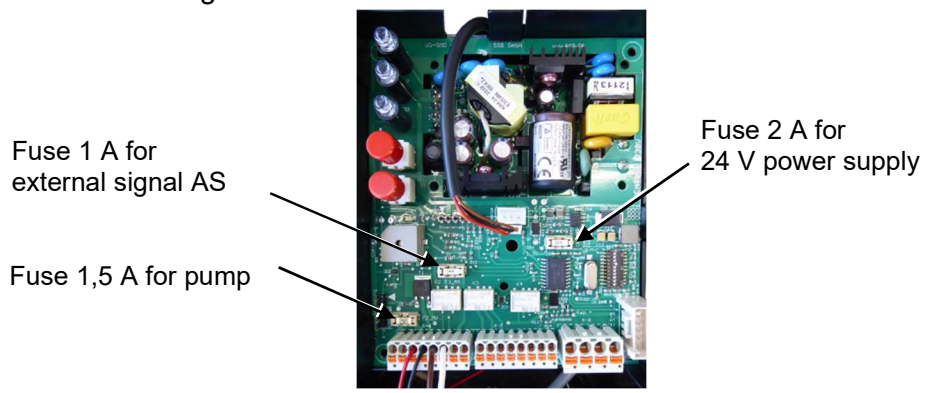
(7) Terminal layout (See also section 5.8.5 Block diagram):



1/2	Power connection (100…240 VAC) **Caution:** both terminals exist in duplicate!
3/4	Occupied (with internal pump)
5/6	External signal (24 VDC in case of alarm, can be turned off by activating the “mute” button).
11/12	Voltage-free contacts (opened in case of alarm or loss of power)
12/13	As above, but contacts closed
17/18/19	Potential-free contacts, while power failure:
	17/18 closed
	18/19 open
	Potential-free contacts, while pump running:
	17/18 open
	18/19 closed
21/22	Occupied (with internal sensor)
40/41	24 VDC as permanent power supply to power other assemblies or, for a device with a supply voltage of 24 VDC, the power supply is connected here.

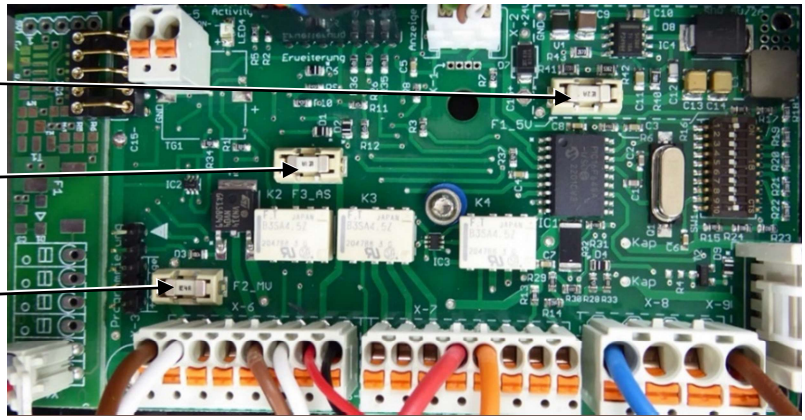
5.7.1 Location of fuses and their values

5.7.1.1 Plastic housing

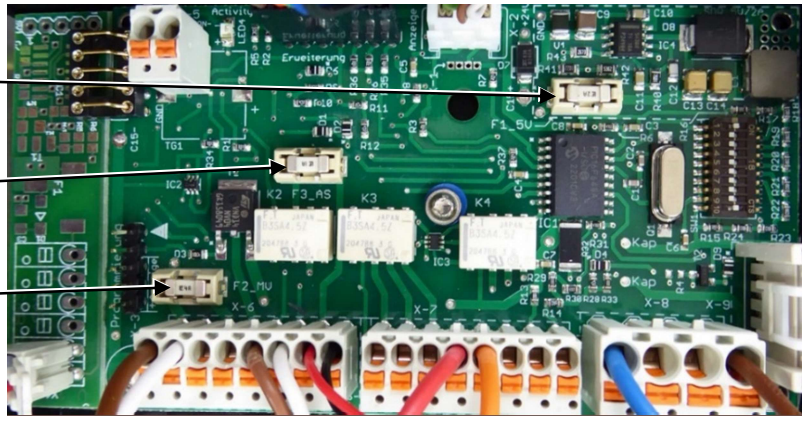


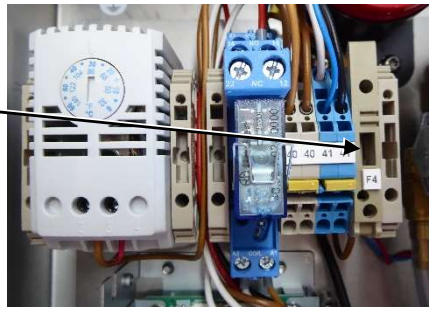
[6] For Germany: also, VDE regulations

5.7.1.2 Stainless-steel housing with pressure values ≤ 3.0



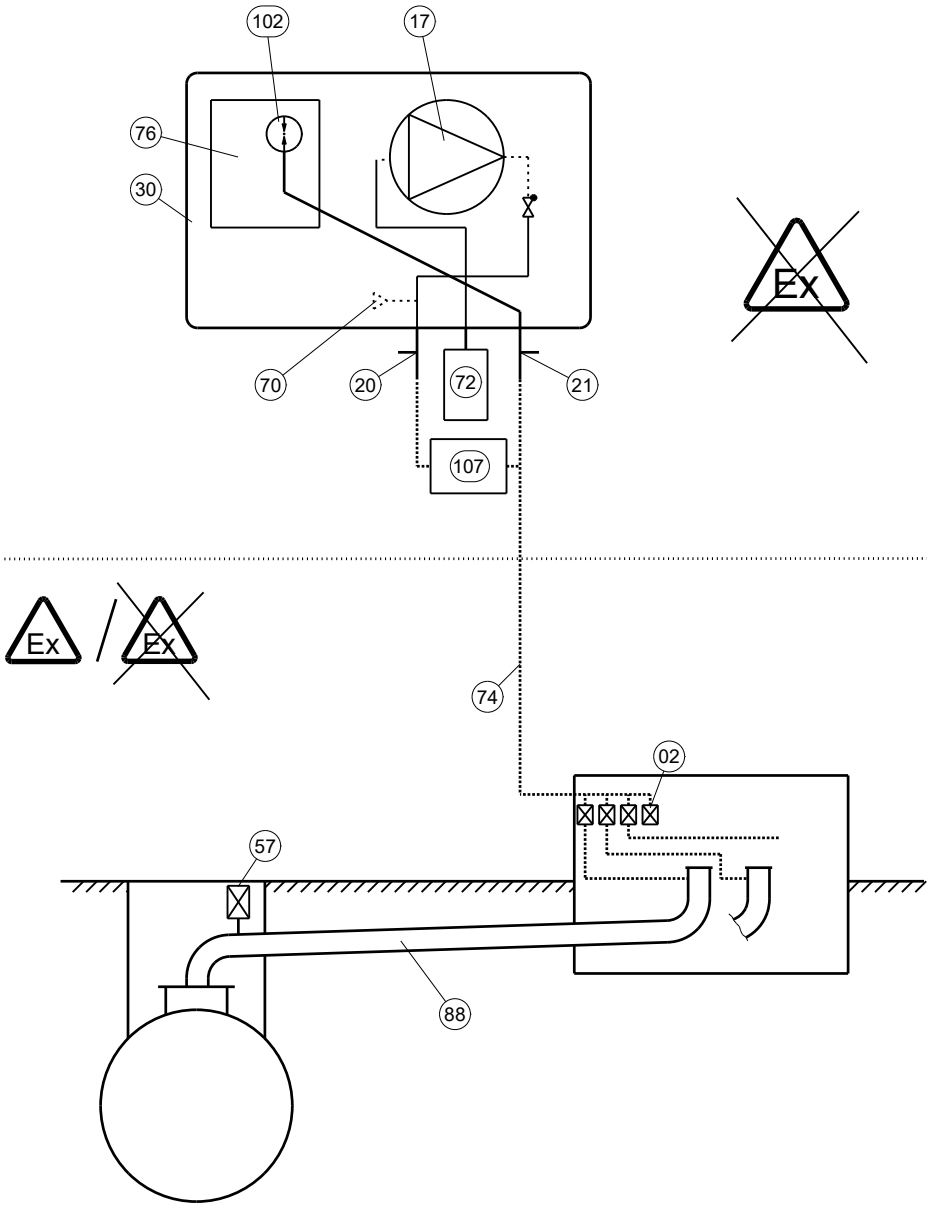
5.7.1.3 Stainless-steel housing with pressure values > 3.0





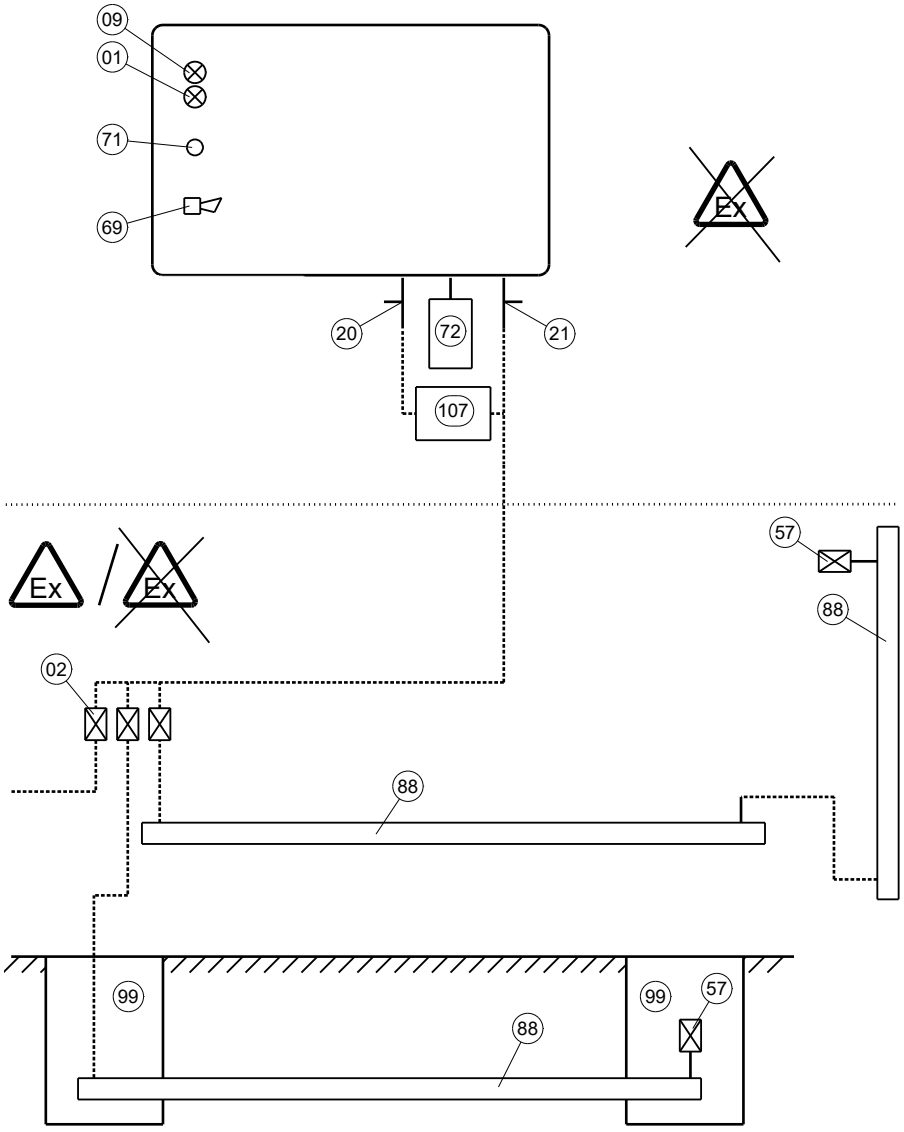
5.8 Installation Examples

5.8.1 Leak detector DLR-P .. with pulsation damper, pipelines connected in parallel



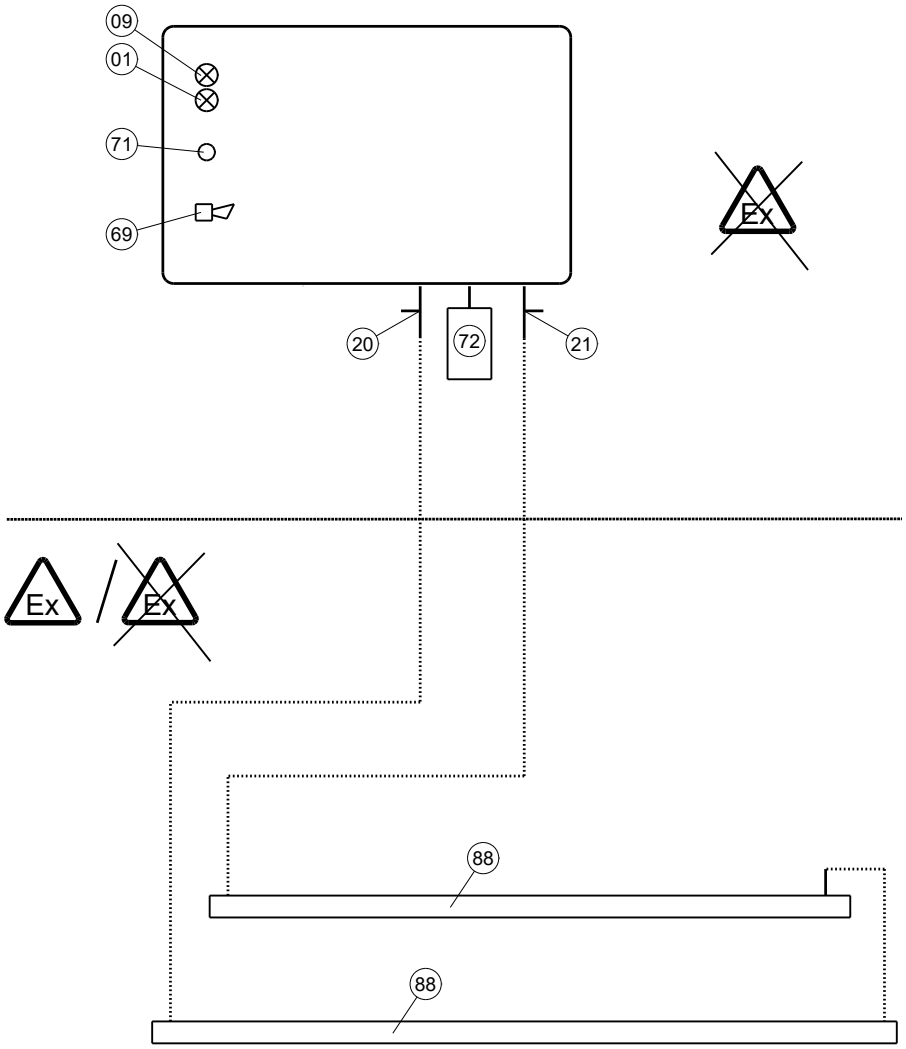
02 Shut-off valve
17 Overpressure pump
20 Three-way valve in the pressure line
21 Three-way valve in measuring line
30 Housing
70 Overpressure valve
72 Dry filter
74 Connection line
76 Switchboard
88 Double-walled pipe
102 Pressure sensor
107 Pulsation damper

5.8.2 Leak detector DLR-P .. with pulsation damper, pipelines connected in parallel and in series



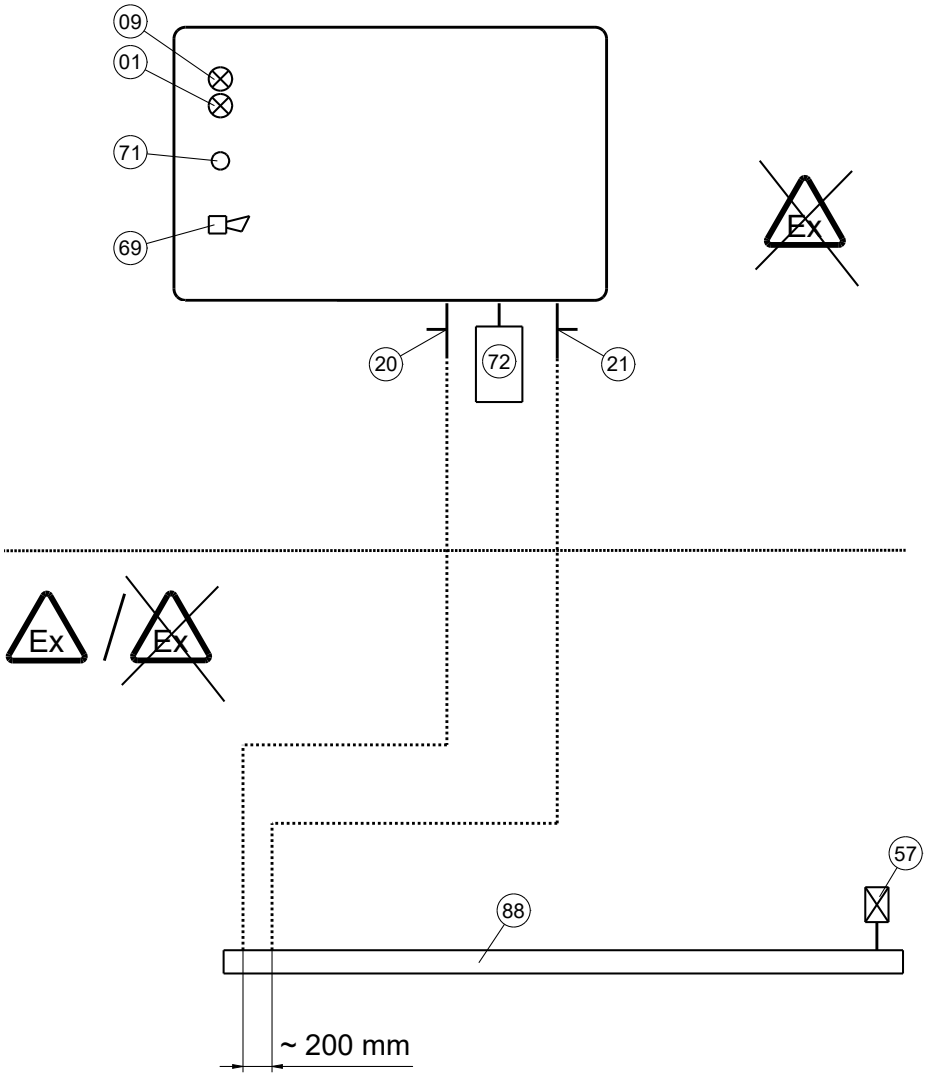
01 Signal lamp "Alarm", red
02 Shut-off valve
09 Signal lamp "Operation", green
20 Three-way valve in the pressure line
21 Three-way valve in measuring line
57 Test valve
69 Buzzer
71 “Mute” button
72 Dry filter
88 Double-walled pipe
99 Inspection chamber
107 Pulsation damper

5.8.3 Leak detector DLR-P.., pressure and measuring line installed separated in a ring line



01 Signal lamp "Alarm", red
02 Shut-off valve
09 Signal lamp "Operation", green
20 Three-way valve in the pressure line
21 Three-way valve in measuring line
57 Test valve
69 Buzzer
71 “Mute” Button’
72 Dry filter
88 Double-walled pipe

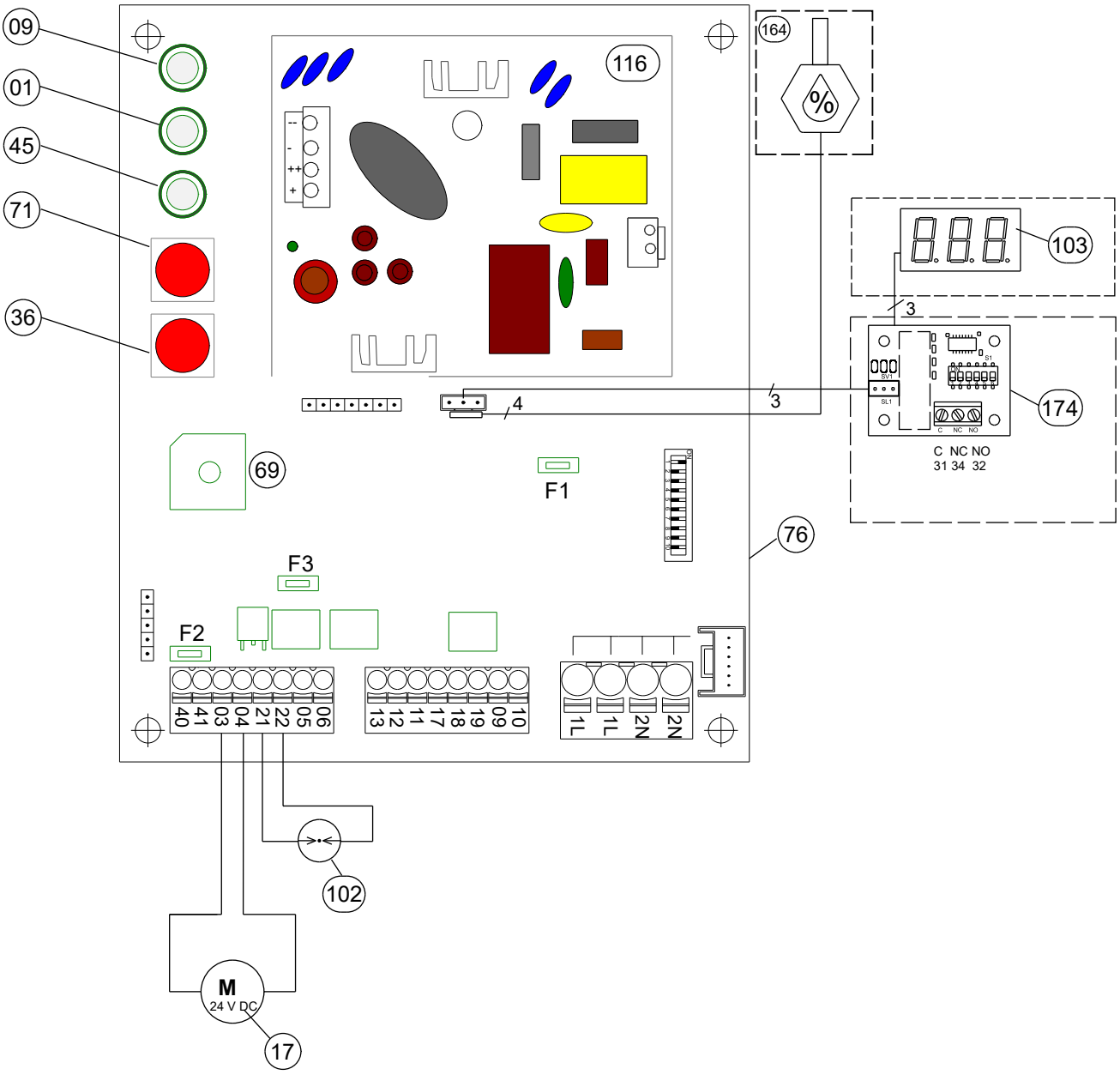
5.8.4 Leak detector DLR-P.., instead of pulsation damper, pressure and measuring line connected separately to the interstitial space



01 Signal lamp "Alarm", red
02 Shut-off valve
09 Signal lamp "Operation", green
20 Three-way valve in the pressure line
21 Three-way valve in measuring line
57 Test valve
69 Buzzer
71 “Mute” button
72 Dry filter
88 Double-walled pipe

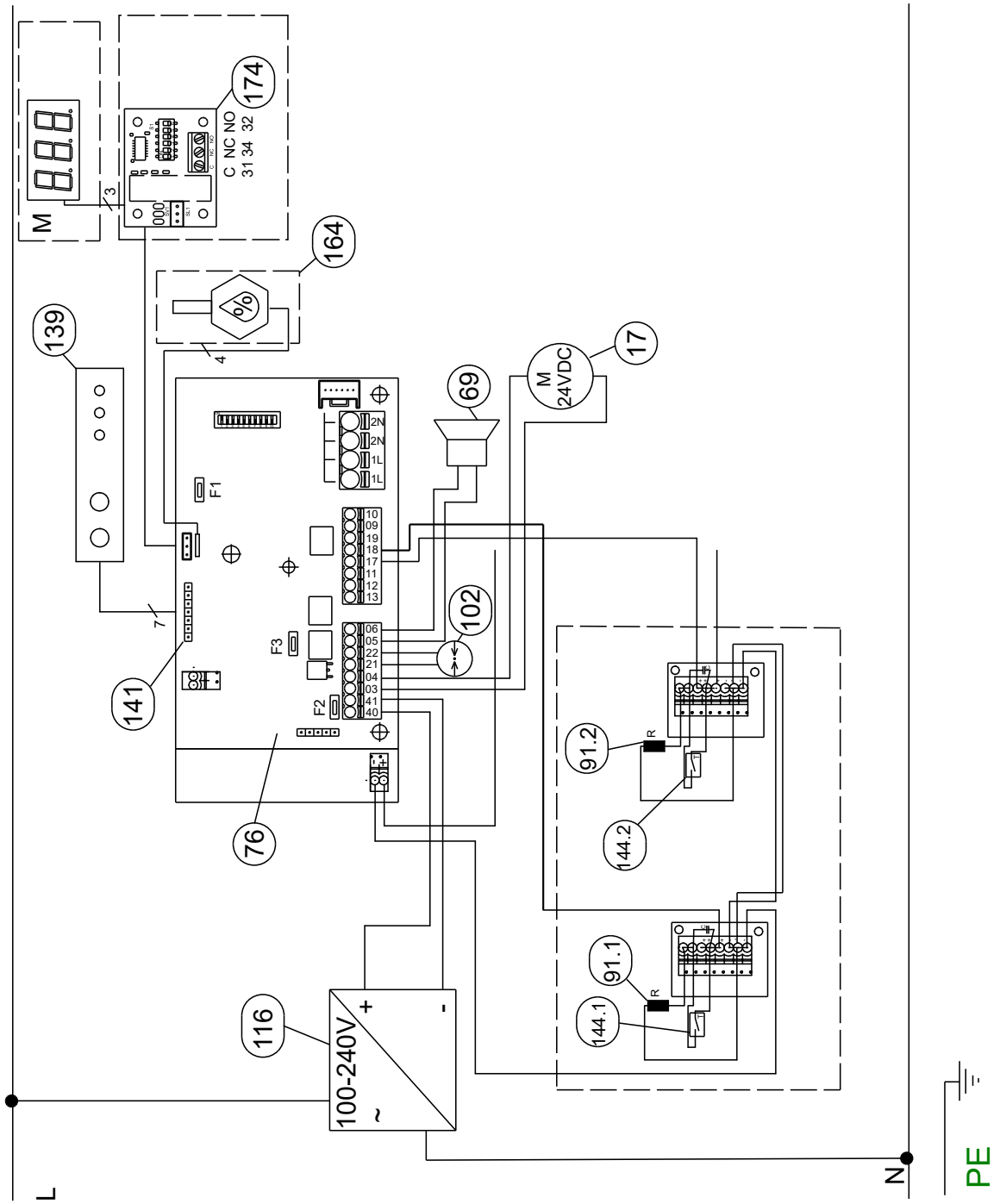
5.8.5 Block diagram

Plastic housing



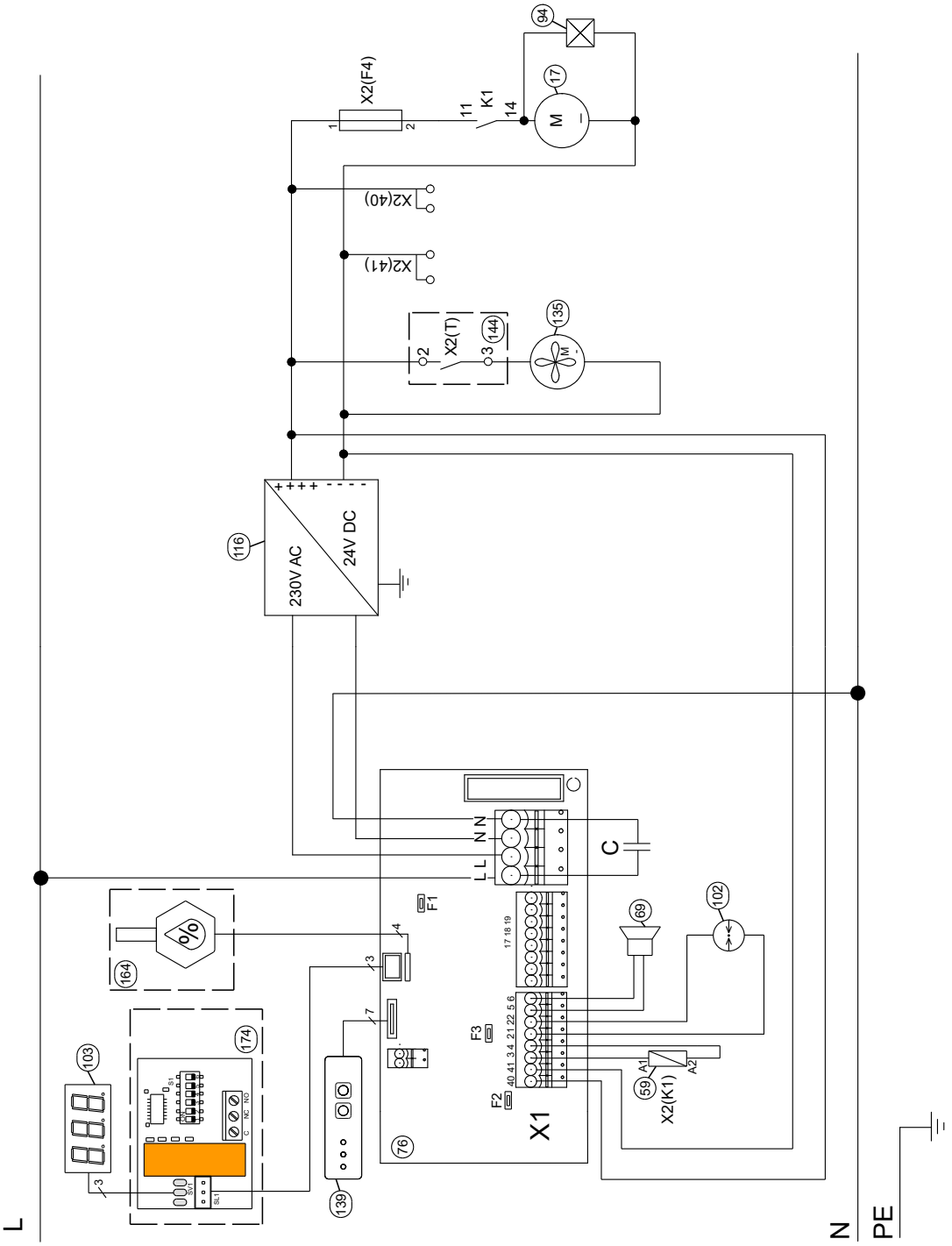
01	Signal lamp "Alarm", red	76	Main board
09	Signal lamp "Operation", green	102	Pressure sensor
17	Overpressure pump	103	Display
36	Button “Commissioning”	116	Power supply unit 24 VDC
45	Signal lamp “Dry filter monitoring”, yellow	164	Humidity sensor
69	Buzzer	174	Forwarding board
71	“Mute” button		

Stainless-steel housing



17 Overpressure pump
69 Buzzer
76 Main board
91.1 Heating “Overpressure valve”
91.2 Heating “Pump”
102 Pressure sensor
116 Power supply unit 24 VDC
139 Keypad
141 Keypad terminal strip
144.1 Temperature switch Overpressure valve
144.2 Temperature switch Pump
164 Humiditiy sensor
174 Forwarding board

Stainless-steel housing DLR-P devices with pressure values > 3.0



17	Overpressure pump	116	Power supply unit 24 VDC
59	Relay	135	Fan 24 VDC
69	Buzzer	139	Keypad
76	Main board	144	Temperature switch (for controlling the fan)
94	3/2 Solenoid valve, 24 VDC	164	Humidity sensor (optional)
102	Pressure sensor	174	Forwarding board (optional, in conjunction with humidity sensor)
103	Display		

6. Commissioning

(1) Only perform commissioning once the steps in section 5 "Installing the System" have been fulfilled.

(2) If a leak detector is commissioned on a pipe (fitting) that is already in operation, special protective measures must be taken (e. g., testing that the leak detector and/or the interstitial space is free of gas). Additional measures may be necessary depending on the local conditions and must be assessed by qualified personnel.

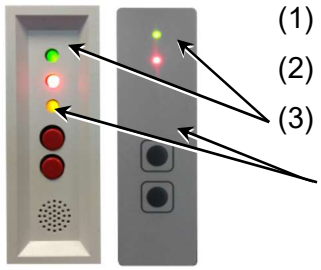
6.1 Tightness Test

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

In the case of larger interstitial spaces, the pressure build-up should be achieved with the aid of an external pump (use dry filter!) or a nitrogen cylinder (use suitable pressure reducer!).

The test is generally considered passed if within a test period (in minutes) of the interstitial space divided by 10 the pressure does not drop by more than one mbar.
Example: Interstitial space volume = 800 liters; thus: 800/10 = 80;
thus: Test 80 minutes for max. 1 mbar pressure drop.

6.2 Commissioning the Leak Detector



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

(2) Connect voltage supply.

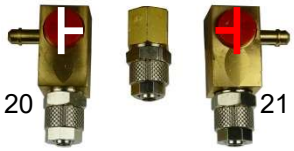
(3) Ascertain lighting of "Operation" and "Alarm" signal lamps and sounding of the audible alarm. If necessary, turn off audible alarm signal.

The pump starts immediately and builds up pressure on the monitored system (if the interstitial space has not already been pressurized)

(4) Attach measuring gauge to connection on the three-way valve 21 in order to turn valve 180°.

(5) The pressure build-up can be monitored via the attached measuring gauge.

(6) If the pressure build-up occurs too slowly, an installation pump with dry filter (or nitrogen cylinder with suitable pressure reducer) can be attached to the connection on the three-way valve 20.
Turn valve 180° and switch on the installation pump.
Note: If no pressure build-up is achieved with the attached installation pump (or gas cylinder) localize and eliminate the leak (if necessary, check delivery of the installation pump or pressure reducer for correct setting).



(7) Check all connections for leaks with a foaming agent.

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

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

(10) 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 leak detector must be disconnected from power for any repairs to be performed on the leak detector.

(5) A loss of power is indicated by the "Operation" signal lamp going off. Alarm signals are triggered via the voltage-free relay contacts (if used for alarm transmission) if contacts 11 and 12 were used. After the power loss, the green signal lamp lights up again and the voltage-free contacts no longer generate an alarm (unless the power loss has caused the pressure to drop below the alarm pressure).

(6) At regular intervals, the operating company must
   a) check functioning of the operating lights
   b) check consumption of the dry filter (used material – color change from orange to dark green or colorless, or from dark blue to pink – needs to be exchanged or regenerated).

(7) Use a dry cloth to clean the leak detector with a plastic housing.

7.2 Maintenance

- Maintenance work and functional checks must be performed by trained personnel only[7].
- Once a year to ensure functional and operational safety.
- Test scope according to section 7.3.
- Compliance with the conditions according to 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.
- For DLR-P devices with alarm values > 3: As part of the annual function test, check the ventilation of the housing and clean or replace the filter mat if necessary.

7.3 Functional Check

The functional and operational safety tests must be performed:

- after each commissioning
- in accordance with the time intervals listed in section 7.2[8]
- each time a malfunction has been corrected

[7] For Germany: Technical service according to water law with expertise in leak detection systems
For Europe: Authorization by the manufacturer
[8] For Germany: In addition, national laws apply (e.g., AwSV)

7.3.1 Test scope

Two persons may be required to perform a functional check, depending on the type of pipeline and how it is laid.

(1) Coordinate the work to be performed with those responsible for operation on site.

(2) Observe the safety instructions for working with the product to be conveyed.

(3) Check the test valve at the end of the interstitial space pointing away from the leak detector for tightness and contamination, and clean it, if necessary.

(4) Checking the free passage of air in the interstitial space (section 7.3.2)

(5) Testing the switching values (section 7.3.3)

(6) Testing the overpressure valve and/or the pump delivery head (section 7.3.4)

(7) Tightness test following commissioning or correction of malfunctions (section 7.3.5)

(8) Tightness inquiry as part of the annual functional check (section 7.3.6)

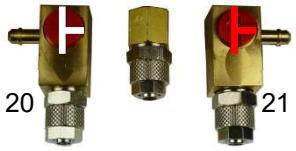
(9) Creating the operating condition (section 7.3.7)

(10) A qualified person must complete a test report, confirming functional and operational safety.

7.3.2 Checking the free passage of air in the interstitial space

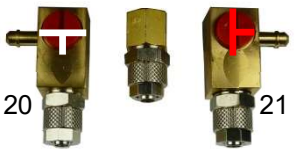
Checking the free passage of air ensures that the interstitial space connected to the leak detector allows sufficient passage to cause an air leak to trigger an alarm.

If several interstitial spaces are connected in parallel, each one of them must be checked for passage.



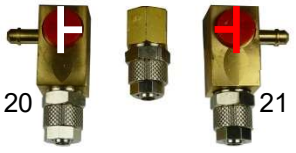
(1) Attach measuring gauge to connection on three-way valve 21 and turn valve 180°.

(2) <u>For pipelines in accordance with 5.8.1 and 5.8.2:</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.



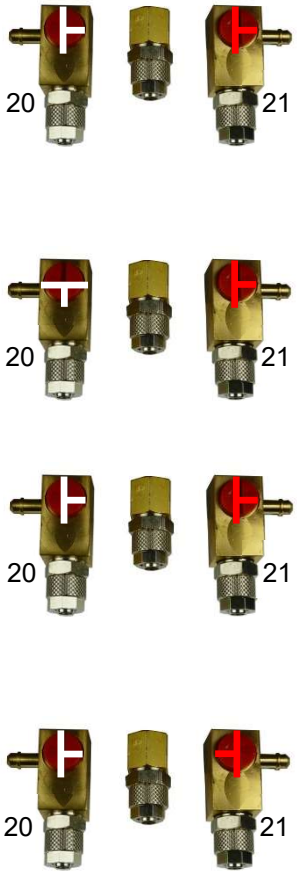
<u>For pipelines in accordance with 5.8.3 and 5.8.4:</u>
Turn three-way valve 20 90° (UZS) so that the pressure lines and system are ventilated.

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



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

7.3.3 Testing the switching values



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

(2) <u>For pipelines in accordance with 5.8.1 and 5.8.2:</u>
Close the shut-off valves on the manifold except for the interstitial space on which the test is being performed.
Open the test valve (end pointing away from the leak detector) on this interstitial space.

<u>For pipelines in accordance with 5.8.3 and 5.8.4:</u>
Turn three-way valve 20 90° (UZS), the system is ventilated.

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

(4) Press the “mute” button if necessary.

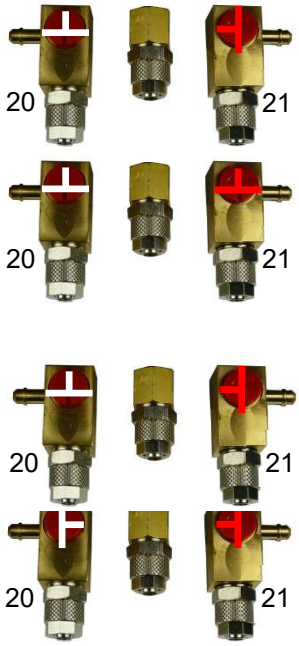
(5) Return three-way valve 20 to its original position or close test valve and test the switching values “Alarm OFF” and “Pump OFF”. Record the values.

(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 valve to the operating position and remove the measuring gauge.

7.3.4 Testing the overpressure valve and pump delivery head



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

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

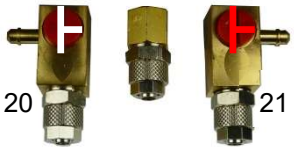
(3) Turn three-way valve 21 90° (UZS). The pressure sensor is vented, the pump starts (and the alarm is triggered, acknowledge if necessary).

(4) This test is considered passed if the pressure does not increase beyond the value listed in the table in section 3.4, column $P_{ÜDV1}$.

(5) Turn three-way valve 21 90° (GUZS). The pump stops and the pressure drops to the closing pressure of the overpressure valve. The measured closing pressure should not be below the measured value for Pump Off.

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

7.3.5 Tightness test following commissioning or correction of malfunctions[9]



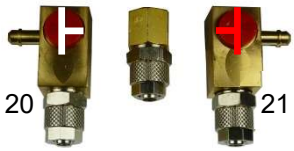
(1) The system tightness requirement is defined in section 6.1.

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

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

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

(4) The test is considered passed if the pressure does not drop by more than 1 mbar in the test time.
The test time and allowed pressure drop can be extended or increased proportionally.



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

7.3.6 Tightness inquiry as part of the annual functional check

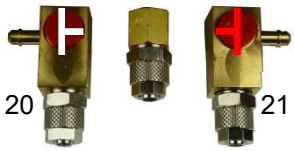
For the "Tightness inquiry" function, the leak detector must have performed at least 1 automatic refilling interval in normal operating conditions (i.e., without external filling/evacuation, e.g., by an installation pump) to achieve a valid statement.

This means that point 7.3.6 does not apply to the initial commissioning.

(1) Perform a tightness inquiry (see section 4.6.4).

(2) Evaluate the displayed value (visible on the display for 10 seconds) according to section 4.6.4. This inquiry serves informational purposes only and is not part of the permit.

7.3.7 Creating the operating condition



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

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

(3) If shut-off cocks have been installed in the connection lines, they must be sealed in an opened position (if connected to an interstitial space).

(4) Exchange dry filter or restore original unused condition.

[9] Prerequisite: The operating pressure has been built up in the interstitial space and pressure equalization has occurred.

8. Alarm (Malfunction)

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

8.1 Alarm

(1) The red indicator light lights up, the audible signal sounds.

(2) Turn the audible signal off.

8.2 Malfunction

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

8.3 How to Behave

(1) Inform the installation company immediately and state the display from the preceding paragraph.

(2) Determine the cause for the alarm, fix it, and then perform a functional check for the leak detection system according to section 7.3.

9. Spare Parts

Spare parts can be found on our shop site shop.sgb.de.

10. Accessories

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

- Installation kits

- Electrical isolators

- Manifolds

- Pressure limiter

- Dry filter/funnel for refilling

- Hood for housing, stainless-steel 1.4301

- P version (protected), stainless-steel housing

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 gas-tight through which an explosion atmosphere can carry over.

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).

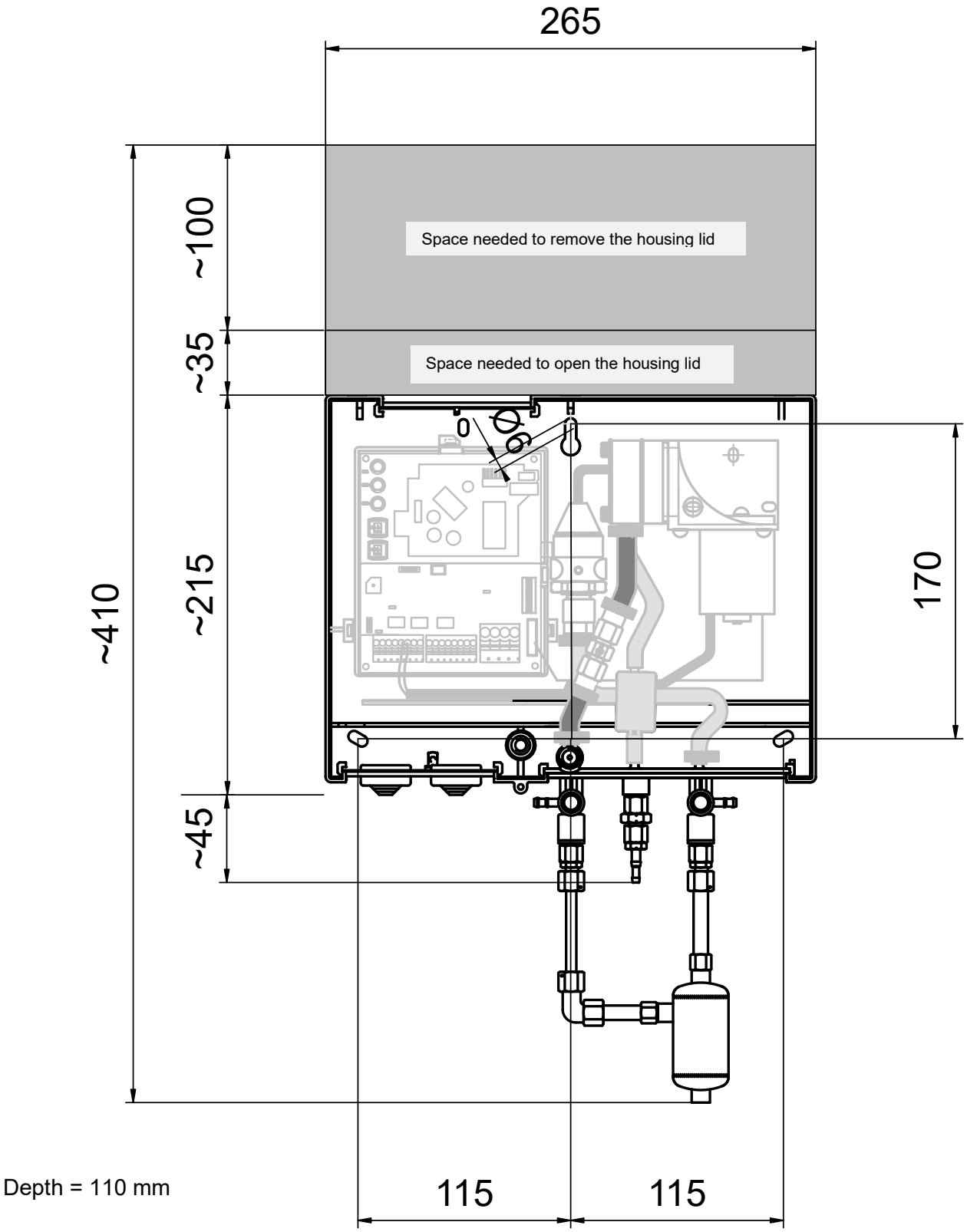
11.2 Disposal

Properly dispose of contaminated components (possibly through outgassing).

Properly dispose of electronic components.

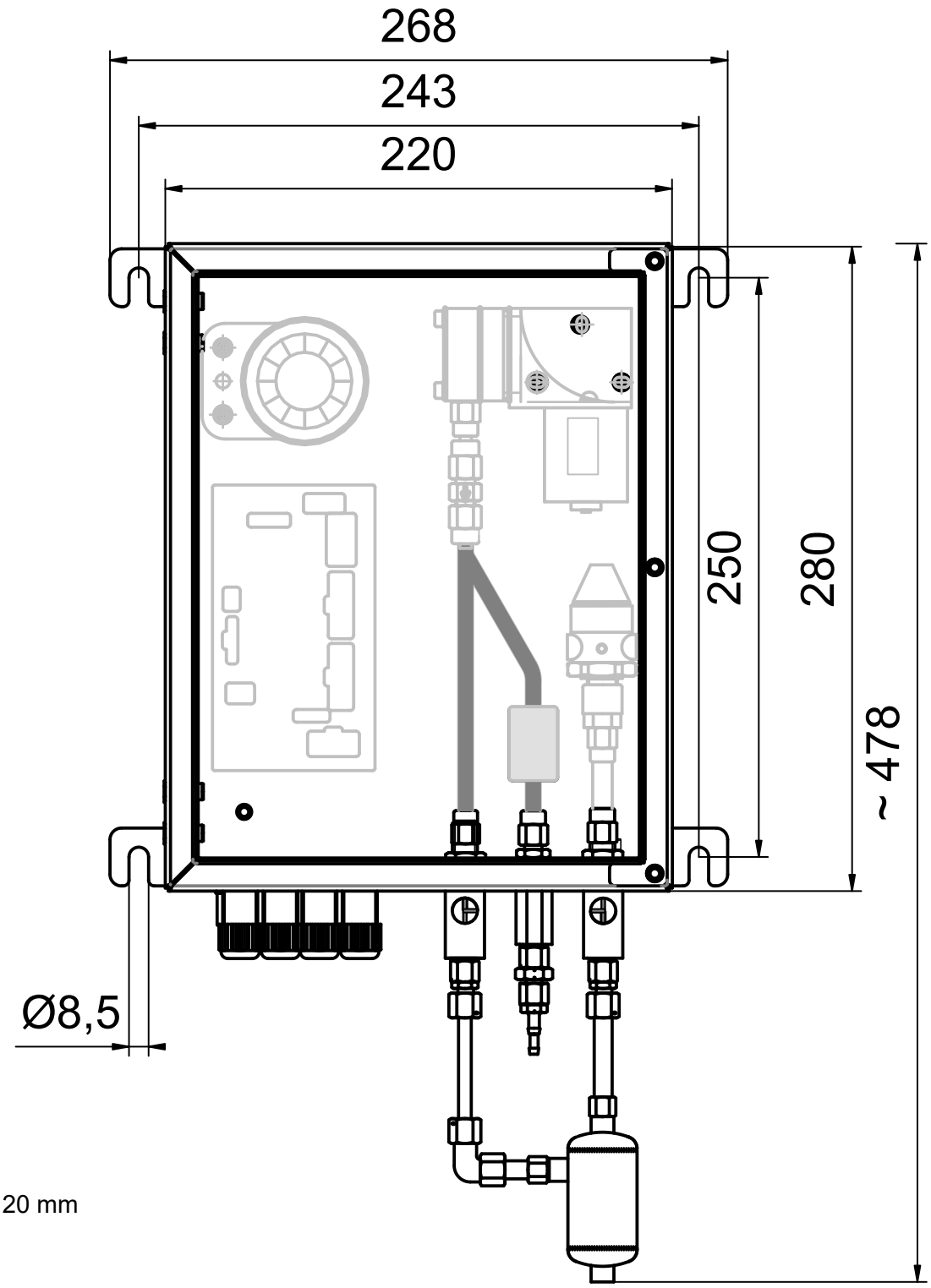
12. Appendix

12.1 Dimensions and Drilling Pattern Plastic Housing with Pulsation Damper



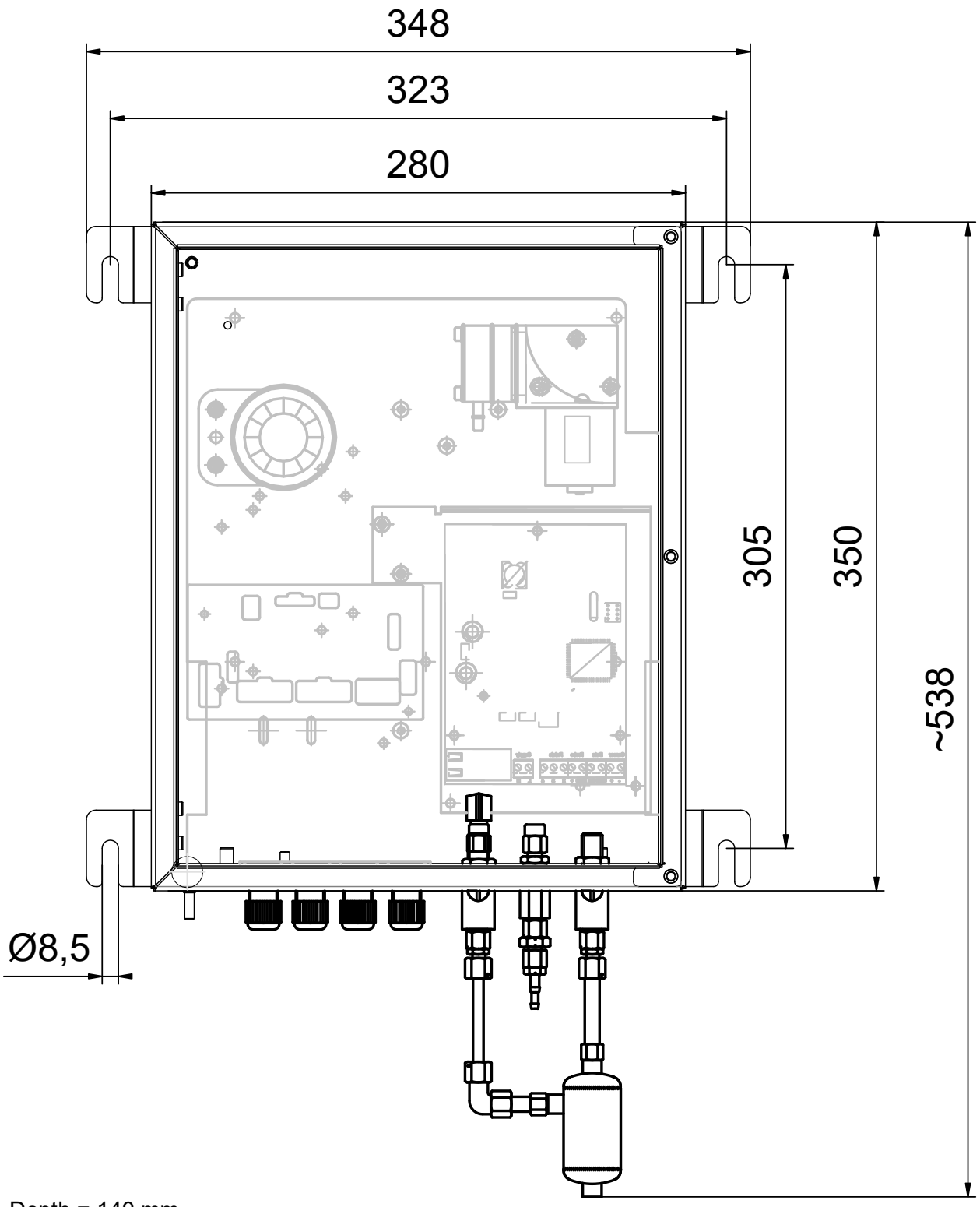
Depth = 110 mm

12.2 Dimensions and Drilling Pattern Stainless-Steel Housing with Pulsation Damper for Outdoor Installations for DLR-P 1.1 PM up to DLR-P 3.0 PM



Depth = 120 mm

12.3 Dimensions and Drilling Pattern Stainless-Steel Housing with Pulsation Damper for DLR-P 3.5 M and DLR-P 4.5 M



Depth = 140 mm

12.4 Declaration of Conformity

We,

SGB GmbH

Hofstr. 10

57076 Siegen, Germany,

hereby declare in sole responsibility that the leak detectors

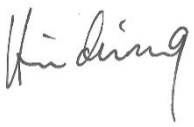
DLR-P

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

In case the device is modified or used in a way that has not been agreed with us, this declaration shall lose its validity.

Number/short title	Satisfied regulations
2014/30/EU EMC Directive SI 2016 No. 1091	EN 61000-6-3:2007 / A1:2011 EN 61000-6-2:2006 EN 61000-3-2:2014 EN 61000-3-3:2013
2014/35/EU Low Voltage Directive SI 1989 No. 728	EN 60335-1:2012 / A11:2014 / A13:2017 / A1:2019 / A2:2019 / A14:2019 / A15:2020 EN 61010-1:2010 / A1:2019 EN 60730-1:2011
2014/34/EU Equipment for potentially explosive atmospheres SI 2016 No. 1107	The pneumatic components of the leak detector may be connected to spaces (interstitial spaces of pipelines/fittings) that require category 3 devices. The following documents have been consulted: EN 1127-1: 2019 The ignition hazard assessment did not result in any additional hazards

Conformity is declared by:



As of: February 2023

ppa. Martin Hücking
(Technical Director)

12.5 Declaration of Performance

Number: ***008 EU-BauPVO 2017***

1. Unique identification code of the product type:

   Pressure leak detector type DLR-P ..

2. Use:

   Class I pressure leak detector for monitoring double-walled pipelines

3. Manufacturer:

   SGB GmbH, Hofstraße 10, 57076 Siegen, Germany
   Tel.: +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
   Location notified: 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 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 with the “Muster-Verwaltungsvorschrift Technische Baubestimmungen” (sample administrative regulation technical building regulations) is hereby declared.

Dipl.-Ing. M. Hücking, Technical Director

Siegen, 02-2023

12.7 Certifications 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

Identification no.: 0045

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: Client:	**Pressure leak detector - Type DLR-P..**
Manufacturer:	SGB GmbH Hofstraße 10 D-57076 Siegen
Test type:	SGB GmbH
Test period:	Initial test of a Type DLR-P.. pressure leak detector with leak indicating unit to DIN EN 13160-1:2003/EN 13160-1:2010 and DIN EN 13160-2:2003 as a Class 1 leak monitoring system
Test location:	06/2016 to 08/2017
Test results:	PÜZ Prüflabor TÜV NORD Systems GmbH & Co. KG
	The DLR-P.. pressure leak detector complies with Class 1 as defined in DIN EN 13160-1:2003/EN 13160-1:2010 as an overpressure system and fulfills the requirements according to DIN EN 13160-2:2003 for use on equipment for storing fuels used to supply heating systems in buildings. The specifications in the technical description "Documentation DLR-P" dated 07/2014 apply in relation to the field of application and installation

For details on testing please refer to the test report PÜZ 8112235824-1 dated 25 August 2017.

Hamburg, 25 August 2017 Head of the Testing Laboratory

J. Straube

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Version as of 0112013
STPÜZ -QMM-321-032-02

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

Identifier: HHA02

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:	**Pressure leak detector - Type DLR-P..**
Client:	SGB GmbH Hofstraße 10 D-57076 Siegen
Manufacturer:	SGB GmbH
Test type:	Initial test of a Type DLR-P.. pressure leak detector with leak indicating unit to DIN EN 13160-1:2003/EN 13160-1:2010 and DIN EN 13160-2:2003 and BRL A, Part 1, Annex 15.23 as Class 1 leak monitoring system
Test period:	06/2017 until 08/2017
Test location:	PÜZ Prüflabor TÜV NORD Systems GmbH & Co. KG
Test results:	**The DLR-P.. pressure leak detector complies with Class 1 as defined in DIN EN 13160-1:2003/EN 13160-1:2010 as an overpressure system and fulfills the requirements according to DIN EN 13160-2:2003 and/or BRL A, Part 1, No. 15.43 with Annex 15.23. The specifications in the technical description_"Documentation DLR-P" dated 07/2014 apply in relation to the field of application and installation**

For details on testing, please refer to the test report PÜZ 8112235824-1 dated 25 August 2017.

Hamburg, 25 August .2017 Head of the Testing Laboratory

*Use on equipment employed for storing fuels used to supply heating systems in buildings is excluded

As of 01/2013
STPÜZ-QMM-321-032-02

Legal notice

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