Vacuum leak detector

VLX .. / Ex

Z-65.22-340

Z-65.25-341

Documentation VLX../Ex

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1. Subject

Vacuum leak detectors of Type VLX …/Ex, completely explosion-proof as part of a leak detection system.

2. Operative Range

2.1. Requirements for the Interstitial Spaces

- Vacuum-resistant with respect to the operating vacuum of the leak detector, even with temperature fluctuations.
- Ensuring the suitability of the interstitial space as part of a leak detection system (e.g. DIN standards, applicability certificates, suitability of use declarations, etc.).
- No leak detection liquid in the interstitial space (if there is liquid, see Appendix A)
- Tanks listed under 2.2 must fulfil the above requirements.

2.2. Pressureless Tanks

Group	Tank design	Installation example	Suitable Leak Detector Type	Usage limits
A	Single-walled horizontal (underground or aboveground) cylindrical tanks with leak protection lining or jacketing and suction line leading to the low point	A – 01	VLX 34/-Ex VLX 330/Ex	None for density and diameter
B	Same as A, without suction line to the low point	B/C–01	VLX 330/Ex	Appendix E, No. E.1
C	Double-walled horizontal cylindrical (underground or aboveground) tanks			
D	Double-walled (or single-walled with leak protection lining or jacketing) vertical cylindrical tanks or troughs with a dished bottom (underground or aboveground) with a suction line leading to the low point	D–01	VLX 34/Ex VLX 330/Ex	Appendix E, No. E.3
E	Same as D, without suction line to the low point	E – 01	VLX 330/Ex	App. E, No. E.1
F	Rectangular or cylindrical tanks or troughs with a flat bottom (double-walled or with leak detection lining or jacketing) with a suction line to the low point	F–01	VLX 34/Ex VLX 330/Ex	Appendix E, No. E.2
G	Same as F, without suction line to the low point	G–01	VLX 330/Ex	App. E, No. E.1
H	Standing cylindrical tanks with double bottom made of metal (e.g. according to DIN 4119)	H/I/J–01 H/I/J–02	VLX 330/Ex	None regarding tank height and density of the stored product
I	Same as H, but with leak protection lining (rigid or flexible)			
J	Standing cylindrical tanks made of plastic with double bottom			

2.3. Tanks with Interior Overlay Pressure

Group	Tank design	Installation example	Suitable Leak Detector Type	Usage limits
K	Tank design same as under 2.2	K - 01	VLX 330/Ex	Up to 10 bar overlay pressure

2.4. Pipes / Hoses

Group	**Pipes**	Installation example	Suitable Leak Detector Type	Usage limits
L	Pipes made at the factory or on-site of metal or plastic with general building site approval or with acceptance as part of an individual determination by the responsible authority.	L/M–01 L/M–02 L/M–03	VLX 330/Ex	Up to 10 bar conveyor pressure
M	Double-walled hoses made at the factory or on-site of metal or plastic with general building site approval or with acceptance as part of an individual determination by the responsible authority.			

2.5. Stored/Conveyed Product

Water-polluting liquids, the (possible) explosive vapor-air mixtures (even those which stem from the stored liquid combined with air, humidity, condensation or the materials with which the liquid comes into contact) must be classified in gas group II A to II B3, as well as in temperature code T1 to T3(T4) like gasoline, for example.

If different water-polluting liquids are conveyed in individual pipes and monitored with one leak detector, these liquids must not have any hazardous effects on one another or cause any chemical reactions.

2.6. Resistance to Materials

For VLX ../Ex leak detectors, the MS 58 material (brass), (1.4301, 1.4306, 1.4541)[1]or 1.4571[2], as well as the material used for the connecting lines, must be sufficiently resistant to the stored product [3] .

[1] See DIN 6601, center section

[2] See DIN 6601, right section

[3] Sufficient means that the physical properties are not adversely affected; discoloration is acceptable.

3. Function Description

3.1. Normal Operation

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 vacuum switch.

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 switch value is reached, the pump turns on and the interstitial space is evacuated until the operating vacuum is reached (Pump OFF).

In normal operation, the vacuum swings between the Pump OFF and Pump ON switch values, with short periods when the pump is run and longer standstills, depending on the tightness and temperature fluctuations of the leak detection system.

3.2. 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 increase in pressure (with the pump running) until the Alarm ON switch value is reached. This triggers the visual and audible alarms.

3.3. Liquid Leaks

In case of a liquid leak, the product 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 leaked liquid is sucked into the interstitial space, the measuring line and, if applicable, into a pressure-compensating vessel. This causes the vacuum to drop until the "Alarm ON" pressure is reached. This triggers the visual and audible alarms.

3.4. Switch Values of the Leak Detector

Type	Alarm ON	Pump OFF	Used in Group:
34	60 ± 25	100 ± 25	A/D/F
330	370 ± 40	500 ± 40	A/B/C/D/E/F/G/H/I/J//K/L/M

- The measured switch value for "Alarm OFF" must be less than the measured switch value for "Pump OFF".
- The measured value for "Pump ON" must be greater than the measured value for "Alarm ON".

4. Installation Instructions

4.1. General Notes

(1) Observe the approvals of the manufacturer for the tank/pipe and the interstitial space.

(2) Only qualified service companies may be used for installation and start up[4].

(3) Comply with relevant regulations regarding electric installation[5], (e.g. EN 60 079-14) explosion protection[6] (e.g. EN 60 079-17) and accident prevention.

(4) Explosion protection requirements must be satisfied (where necessary), such as laws on the basis of the European Directive 1999/92/EG and/or other applicable codes.

(5) Pneumatic connections, connecting lines and fittings must be designed to at least PN 10 for the entire temperature range.

(6) Before entering inspection chambers, the oxygen content must be tested and the inspection chambers must be rinsed, if necessary.

4.2. Personal Protective Equipment

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 may be expected, the minimum required equipment is as follows:

- Suitable clothing (risk of electrostatic charge).
- Suitable tools (e.g., per 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)[7].
- Measuring equipment to determine the oxygen content of the air (Ex/O-Meter).

4.3. Installation of the Leak Detector

(1) Installation on a wall.

(2) Outside and inside the hazardous location (zone 1), in the open air, without any more protective boxes.
Chose a mounting place, where the ventilation in the housing (by convection) between the flange plate (be distant to the housing) and the vent opening is not being effected.
If the protection box should nevertheless be necessary for operational reasons, the protective box must be ventilated in a way that the ventilation as mentioned above is not effected.

[4] For Germany: Specialist services per § 19 l WHG, which have documented qualifications to install leak detection systems including TRbF 180/280 No. 1.7.

[5] For Germany: e.g., VDE regulations, regulations of the electrical supply companies.

[6] For Germany: e.g., ElexV, GSiG.

[7] Other countries' regulations may give different percentages.

(3) If the leak detector ist installed in an enclosed space (e.g. room), 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.

(4) The ambient temperature must not exceed 40°C; appropriate measures must be taken. (e.g. installation of a roof to protect against sunlight).
If the leak detector VL-H9/Ex is operated with an alarm horn in the potentially explosive area, **the operator must ensure** that a 70% duty cycle is not exceeded, i.e. the acoustic alarm must be switched off within 45 minutes.The cable included in the delivery content for the horn shell not be extended. If this cannot be achieved due to local conditions, contact the manufacturer (SGB).

(5) Not in manhole pits or inspection chambers.

4.4. Installation of the Connecting Lines

(1) Strong, metallic pipes must be used for the connecting lines (e.g. copper pipes). Plastic pipes with sufficient pressure resistance (over the entire temperature range) may also be used if the interstitial space is NOT zone 0.
Conduits for connecting lines through which the explosion atmosphere can carry over must be sealed gas-tight.

(2) Inside clearance at least 6 mm.

(3) Resistant to the stored product.

(4) Color coding: *Measuring line*: RED; *suction line:* WHITE or CLEAR; *exhaust* GREEN:

(5) The full cross section must be maintained.

(6) 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.
For the exhaust line there are different requirements, see sec. 4.4.1.

(7) Condensate traps must be installed at all low points of the connecting lines.

(8) A liquid stop valve shall be installed in the suction line.

(9) If products are being stored or conveyed that require compliance with explosion protection, suitable flame arrester(s) must be installed at the entry(ies) to the interstitial space.

(10) Leak detector side flame arresters:

- Are necessary, when either the suction line or the exhaust line (or both) are connected to zone 0.
- Are not necessary, when the suction line just as the exhaust line are NOT connected to zone 0.

(11) For applications with pressure-compensating vessel (see drawing L/M-01 to L/M-03): Length of the measuring line from the pressure-compensating vessel (V=0.1 l)[8]:

Type 330: L_{max} 8 m

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

For each 10 ml of the condensate trap(s) used in the measuring line between the pressure-compensating vessel and leak detector, L_{max} is reduced by 0.4 m.

(12) OR (alternatively to the pressure-compensating vessel)
50% of the overall length of the measuring line must be laid horizontally, or with a 0.5 to 1% gradient to the node point. L_{min} = 0.5 x total length of the measuring line (compare with L/M-01 top).

(13) When using the V4A version, as a rule, stop cocks should be provided on the interstitial space side.

4.4.1 Installation of the exhaust line

(1) The following lengths may not be exceeded for the exhaust line:
Pipe with 4 mm inside clearance: max. 35 m
Pipe with 6 mm inside clearance: max. 50 m
If these lengths are not sufficient, the manufacturer must be consulted.

(2) The exhaust line is generally routed to the tank vent, in which case an explosion protection device must be installed on the tank vent side (exception, see TRbF 20 and 40).
Further exceptions:
Tanks with interior overlay pressure, tanks according to DIN 4119 with double-layered floor, or comparable:

A) The exhaust line can lead outside to a safe area, outside of the explosion area:
Provide a condensate trap and liquid stop valve in the exhaust. 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.

B) The exhaust ends in zone 1 (e.g. remote fill chamber or collection space):
An explosion protection device[9] must be provided at the end of the exhaust line. Condensate traps must be provided 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 according to water protection laws.

(3) 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.

4.4.2 If more than one pipe interstitial space is connected to one leak detector at a time:

(1) Lay connecting lines at a downward angle to the interstitial space or the manifold. If there are low points in the connecting lines and lines are laid out of doors as well, install condensate traps at all low points.

(2) Lay suction and measuring lines at a downward angle to the manifold. If this is not possible, place condensate traps at all low points.

(3) Connect a liquid stop valve to each connecting line to the interstitial space, against direction of flow.
These prevent leaking liquids from entering the interstitial spaces of the other pipes.

[9] The explosion protection device is not required if the exhaust is routed so that it is frostproof, and it can be guaranteed that the exhaust will not become kinked or clogged.

(4) If stop cocks are installed in the connecting lines then they must be sealable in open position.

4.5. Electrical Connection

(1) Power supply: 230 V – 50 Hz.

(2) Observe GROUNDING.

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

(4) Terminal layout:

L	Outer conductor (phase)
N	Neutral conductor
5/6	Outer signal (230 V in case of alarm, can be turned off by activating the “audible alarm” switch.)
21/24	Voltage-free contacts (opened in case of alarm or loss of power)

(5) Voltage may be only applied when
– all electric and pneumatic lines are connected properly.
– the housing lid for the Ex terminal box is closed.

4.5.1 Grounding and Equipotential Bonding

(1) The housing of the leak detector must be connected to the equipotential bonding of the overall system by means of the ground stud provided for that purpose.

(2) The fittings in the connecting lines must likewise be integrated into the equipotential bonding, especially when plastic pipes (connecting lines to tanks) have been used.

(3) Before replacing a leak detector (working unit), disconnecting lines or similar work, it must be ensured that the equipotential bonding remains intact (if necessary, pull electrically conducting bridges).

4.6. Additional Notes for Underground Tanks/Pipelines

If a tank / pipe is installed in a KKS system (cathode corrosion protection) that requires voltage isolation, then electrical isolators need to be installed in the pneumatic lines. These isolators must be provided with overload protection (spark plug gaps) and the isolators need to be protected against accidental bridging.

4.7. Installation Examples

Installation examples are given in the Appendix.

Observe the following information at all times:

The 82 pipe unions (connection for installation pump) are listed in the installation examples only as examples. These pipe unions can be installed anywhere. These pipe unions are not needed, when, for example, the test valve is used to connect the vacuum generator.

1. Installation example L/M – 02:
   – The laying system can also be combined with L – 01

2. Installation example L/M – 03:
   TOP: If there is a liquid leak in the (suction line side) first pipe, the interstitial space for the second (and following) pipes can also become filled with liquid. The length of the measuring line must not exceed 3.5 m, if it does, use of a pressure-compensation vessel as per section 4.4.
   CENTER and BOTTOM:
   The liquid stop valve, installed against the direction of flow, (27*) prevents that the other interstitial spaces become filled with product in case of a leak in a pipe. The volumes of the connected pipes must meet the following conditions:
   $3 \bullet V_{ÜR\,1} > V_{ÜR\,1} + V_{ÜR\,2} + V_{ÜR\,3} + V_{ÜR\,4}$ and
   $3 \bullet V_{ÜR\,2} > V_{ÜR\,2} + V_{ÜR\,3} + V_{ÜR\,4}$ etc.
   $V_{ÜR\,(number)}$ is the volume of the respective interstitial space. No. 1 is the interstitial space where the suction lines are connected (see also L/M-03, center and bottom)

5. Start Up

(1) Connect the pneumatic lines.

(2) Complete the electrical wiring, but do not yet connect to the power supply.

(3) Close the lids on the terminal box and the housing.

(4) Apply voltage supply.

(5) Determine illumination of the operating and alarm lights, as well as the audible alarm (if available) and turn the ”Audible Alarm” switch to OFF.

(6) a) Set three-way valve 21 to position ”III” and connect the vacuum gauge. (see also P-094 000)
b) V4A Version: Connect the stop cock on the measuring side in position 2 and connect the vacuum gauge. (see also P-095 000)
Connect only suitable equipment to the 3-way cocks in suction and measuring line (categorie 1 (inside) for interstitial spaces of zone 0, categorie 2 (inside) for interstitial space of zone 1)

(7) Apply a vacuum to the system. (when necessary, use of **explosion-proof** installation pump (Caution: Be aware of temperature code and gas group!!!)
To do this, connect the installation pump at pipe union 82, turn on the installation pump and open its stop cock. The interstitial space will then be evacuated. Monitor the vacuum build up on the vacuum gauge.
NOTE: If no pressure build-up is achieved with the installation pump connected, the leak must be located and corrected (check the performance of the installation pump as well if necessary).

(8) After reaching the operating vacuum of the leak detector (the pump in the leak detector shuts off), close the previously opened stop cock, switch off the pump and remove it.

(9) a) Put the three-way valve 21 in position I, remove the vacuum gauge.
b) V4A Version: Put the stop cock on the measuring side in position 1 and remove the vacuum gauge.

(10) Perform the function test per section 6.4.

6. Operating Instructions

6.1. General Notes

(1) If the leak detection system is installed properly and tightly, it can be assumed that the leak detector works within the control range.

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

(3) If the alarm goes off, this always indicates a more significant leak or a defect. Determine the cause and correct it quickly.

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

(5) For any repair work, disconnect the power to the leak detector and check for explosive atmosphere, if necessary.

(6) Explosion protection requirements must be satisfied (where necessary), such as laws on the basis of the European Directive 1999/92/EG and/or other applicable codes.

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

(8) A loss of power is indicated by the “Operating” signal light going off. A loss of power to the voltage-free relay contacts (if used for alarm transmission) triggers the alarm.
After the power loss, the green signal light 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).

(9) To clean the leak detector, use a moist cloth.

6.2. Intended Use

- Double-walled tanks and pipes/hoses
- tank-/pipe-/hose-side flame arrester
- leak detector side flame arrester may be used under the mentioned conditions
- Grounding as per EN 1127
- The leak detection system must be tight according to the table in the documentation
- Leak detector installed outdoors, i.e. outside or inside the hazardous (clasiefied) location (inside the building possible if the listed requirements are met)
- Explosive vapor-air mixtures: IIA and II B3, T1 to T3(T4)
- Conduits inside and outside of the manhole or inspection chamber must be sealed gas-tight
- The power supply cannot be disconnected

6.3. Maintenance

(1) Maintenance work and function tests must be performed by trained personnel only.

(2) Once a year [10] to ensure functional and operational safety.

(3) Test scope per section 6.4.

(4) Compliance with the conditions per sections 4 to 6.3 must also be tested.

(5) Disconnect the power to the leak detector before opening the housing.

(6) The conditions in sec. 4.5.1 must be observed and complied with at all times.

(7) As part of the annual function test, check the motor of the pump for running noises (damaged bearings).

(8) If the pump has to be changed or when working on the pumps exhaust line a pressure test of the suction- and measuring line with 10 bar has to be carried out for the parts inside the housing.

(9) For exchange or repair-work take care that the venting-measures are given (Distance between housing and flange plate >2.5 mm)

6.4. Function Testing

The functional and operational safety tests must be performed

- after each start up
- according to section 6.3.
- each time a malfunction has been corrected.

The explosion-protection measures must be considered in all function testing.

Connect only suitable equipment to the 3-way cocks in suction and measuring line (categorie 1 (inside) for interstitial spaces of zone 0, categorie 2 (inside) for interstitial space of zone 1)

6.4.1 Test Scope

(1) If necessary, coordinate the work to be performed with those responsible for operation.

(2) Observe the safety instructions for working with the stored product.

(3) Checking and if necessary emptying the condensate traps (section 6.4.2).

(4) Check the free passage of air in the interstitial space (section 6.4.3).

(5) Test the switch values with the interstitial space (section 6.4.4)
Alternatively: Test the switch values with the testing device (section 6.4.5).

(6) Test the vacuum pump delivery (section 6.4.6).

(7) Test the leak detection system for tightness (section 6.4.7).

(8) Create the operating conditions (section 6.4.8).

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

[10] For Germany: regulations of the respective *Länder* must also be observed (e.g., VAwS)

6.4.2 Checking and if necessary emptying of the condensate trap

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

(2) a) Set three-way valves 20 and 21 to position IV to ventilate the connecting lines. (P-094 000)
b) V4A Version: set measuring and suction line side stop cock to position 2. (P-095 000)

(3) Open and empty the condensate traps.
CAUTION: The condensate traps may contain the stored/conveyed product. Take appropriate protective measures.

(4) Close the condensate traps.

(5) a) Set three-way valves 20 and 21 to position I. (P-094 000)
b) V4A Version: set measuring and suction line side stop cock to position 1. (P-095 000)

(6) Open the stop cocks on the interstitial space side.

6.4.3 Checking the Free Passage of Air in the Interstitial Space

(1) a) Connect the vacuum gauge to three-way valve 21, then set to position III. (P-094 000)
b) V4A Version: Connect the vacuum gauge to the stop cock on the measuring line side, and set to position 2. (P-095 000)

(2) <u>For tanks and pipes per installation example L/M -3:</u>
a) Set three-way valve 20 to position IV. (P-094 000)
b) V4A Version: open suction line side stop cock (P-095 000)
<u>For pipes as per installation example L/M-1 and L/M-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.

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

(4) Close three-way valve 20 in position I, or suction line side stop cock (V4A Version) of test valve(s) respectively.

(5) a) Set three-way valve 21 to position I. (P-094 000)
b) V4A Version: Close measuring line side stop cock. (P-095 000)

(6) Remove the vacuum gauge.

6.4.4 Testing the Switch Values with the Interstitial Space

(1) Connect the vacuum gauge to three-way valve 21, position III. (P-094 000)
b) V4A Version: Connect the vacuum gauge to the stop cock on the measuring line side, and set to position 2. (P-095 000)

(2) <u>For tanks and pipes per installation example L/M -3:</u>
a) Ventilate with three-way valve 20 (position III). (P-094 000)
b) V4A Version: Ventilate with the suction line side stop cock (position 2) (P-095 000)
<u>For pipes as per installation example L/M-1 and L/M-2:</u> Open the test valve at the end of the interstitial space opposite the leak detector. In case of multiple pipes, the leak detector-side stop cocks of the interstitial spaces not included in the test can be closed.

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

(4) if necessary. Activate ”Audible Alarm” switch.

(5) Set three-way valve 20 to position I and close suction line side stop cock (V4A Version) or test valve and check switch values "Alarm OFF” and "Pump OFF”. Record the values.

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

(7) Open any stop cocks that were closed prior to the test.

(8) a) Set three-way valve 21 to position I. (P-094 000)
b) Set measuring line side stop cock to position 1. (P-095 000)

(9) Remove the vacuum gauge.

6.4.5 Testing the Switch Values with the test equipment

(1) a) Connect the testing device to the two hose ends on each of the free pipe unions of three-way valves 20 and 21. (P-094 000 and P-115 392-a)
b) V4A Version: Connect the testing device with both hose ends to each of the free pipe unions of the suction and measuring line side stop cocks. (P-095 000 and P-115 392-b)

(2) Connect the vacuum gauge to the tee of the testing device.

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

(4) a) Set three-way valves 20 and 21 to position II. The operating vacuum is built up in the test vessel. (P-094 000 and P-115 392-a)
b) V4A Version: Close both stop cocks on the interstitial space side. Set the suction and measuring line side stop cocks to position 2. The operating vacuum builds up in the test vessel. (P-095 000 and P-115 392-b)

(5) Ventilate using the needle valve, check switch values ”Pump ON” and ”Alarm ON” (visual and audible, if necessary). Record the values.

(6) if necessary. Activate ”Audible Alarm” switch.

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

(8) The unit passes the test if the measured switch values fall within the specified tolerance.

(9) a) Set three-way valves 20 and 21 to position I. (P-094 000)
b) V4A Version: Set suction and measuring line stop cock to position 1 (P-095 000), open interstitial space side stop cock.

(10) Remove the testing device.

6.4.6 Testing the Vacuum Pump Delivery

(1) Connect the vacuum gauge to three-way valve 20 and set to position II. (P-094 000)
b) V4A Version: Close both stop cocks on the interstitial space side. Connect the vacuum gauge to the stop cock on the suction line side, and set to position 2. (P-095 000)

(2) a) Set three-way valve 21 to position II to ventilate the vacuum switch. The alarm is triggered and the pump runs. (P-094 000)
b) V4A Version: Set measuring line side stop cock to position 2 to ventilate the vacuum switch. The alarm is triggered and the pump runs. (P-095 000)

(3) Read the delivery rate of the pump from the vacuum gauge.

(4) The test has been passed when the pressure value reached > 150 mbar (type 34) and/or > 500 mbar (Type 330).

(5) a) Set three-way valves 20 and 21 to position I. (P-094 000)
b) V4A Version: Set suction and measuring line stop cock to position 1 (P-095 000), open interstitial space side stop cocks.

(6) Remove the vacuum gauge.

6.4.7 Leak Detection System Tightness Testing

(1) Check that all stop cocks between the leak detector and interstitial space are open.

(2) Connect the vacuum gauge to three-way valve 21, position III. (P-094 000)
b) V4A Version: Connect the vacuum gauge to the stop cock on the measuring line side, and set valve to position 2. (P-095 000)

(3) The vacuum pump must have reached the Pump OFF switch value for the tightness test. Wait for a possible pressure compensation and then start the tightness test.

(4) The test is positive if the values of the following table are met. A higher pressure drop means a higher load on the wear parts.

Interstitial space volume in liters	**1 mbar pressure drop in**
100	9 minutes
250	22 minutes
500	45 minutes
1000	1.50 hours
1500	2.25 hours
2000	3.00 hours
2500	3.75 hours
3000	4.50 hours
3500	5.25 hours
4000	6.00 hours

(5) a) Test valve in position I, remove vacuum gauge.
b) V4A version: Put the stop cock on the measuring side in position 1 and remove the vacuum gauge.

6.4.8 Creating the Operating Conditions

(1) Seal the housing.

(2) Seal the stop cocks (between the leak detector and interstitial space) for each connected interstitial space in the open position.

(3) Ensure again that the 3-way-cocks are in position I.

6.5. Alarms

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

(2) An alarm is indicated by the ”Alarm” signal lighting up and the sounding of the audible signal, if available.

(3) Close any stop cocks in the connecting line between the interstitial space and leak detector.

(4) Shut off the audible signal by activating the ”Audible alarm” switch, if available.

(5) Inform the installation company.

(6) The installation company must detect the cause and correct it.
CAUTION: Depending on the tank, there could be liquid under pressure in the connection lines.
CAUTION: Do not allow the interstitial space in the tanks with flexible leak detector jackets to become pressureless (collapse of the insert).

(7) Repairs to the leak detector (e.g. replacement of components) may only be made outside the hazardous (classified) location or suitable proction measures shall be established.

(8) Perform the function test per section 6.4, observing the conditions from sections 4 to 6.3.

7. Removal

For removal, the following points must be observed in particular:

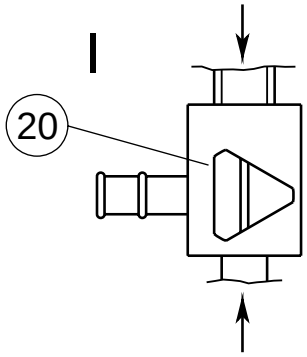
- Make sure the unit is free of gas before and during removal (see also section 4 above).
- Seal any openings gas-tight through which the explosion atmosphere can carry over.
- Avoid using spark-producing tools (saws, parting grinders, etc.) for removal whenever possible. If this is unavoidable, be certain to observe EN 1127.
- Avoid the buildup of electrostatic charges (e.g., through friction).
- Properly dispose of contaminated components (possibly through outgassing).

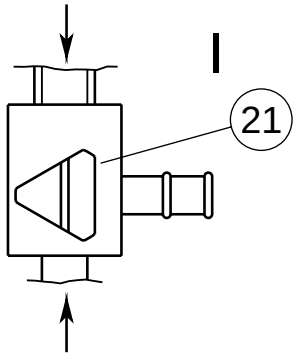
8. Marking

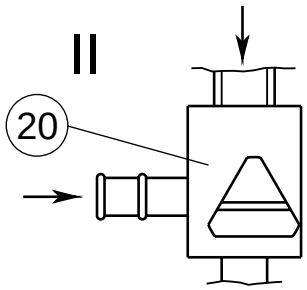
- Type
- Electrical data
- Manufacturer or manufacturer symbol
- Date of manufacture (month/year)
- Serial number
- Approval number
- Symbol specified by law
- Explosion data

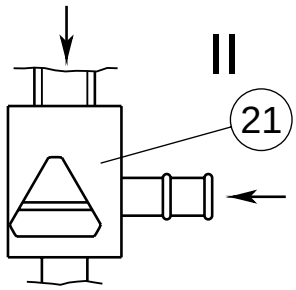
9. Index Used

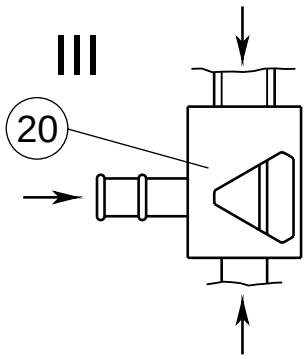
01 ”Alarm” signal light, red
02 Stop cock
03 Exhaust line
09 ”Operating” signal light, green
11 Vacuum switch
18 Explosion protection device
20 Three-way valve in suction line
21 Three-way valve in measuring line
24.1 Fuse, motor, MT 1 A
24.2 Fuse, external signal, MT 0.2 A
27 Liquid stop valve
27* Liquid stop valve, installed against direction of flow
30 Housing
33 Condensate trap
41 Alarm switch in 11
42 Pump switch in 11
43 Measuring line
57 Test valve
59 Relay
60 Vacuum pump
68 Suction line
69 Buzzer
71 ”Audible Alarm” switch
73 Interstitial space
74 Connecting line
82 Installation pump connection
88 Double-walled pipe
95 Pressure-compensating vessel
96 Node point
101 Suction line leading to the low point

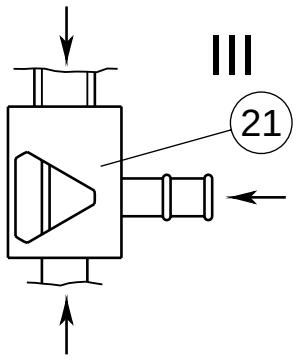


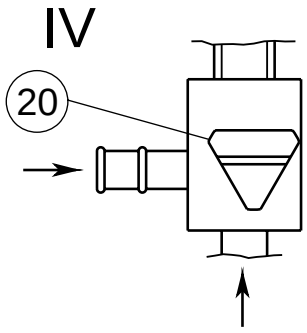


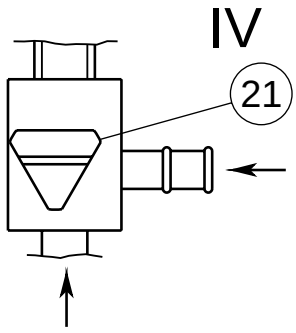












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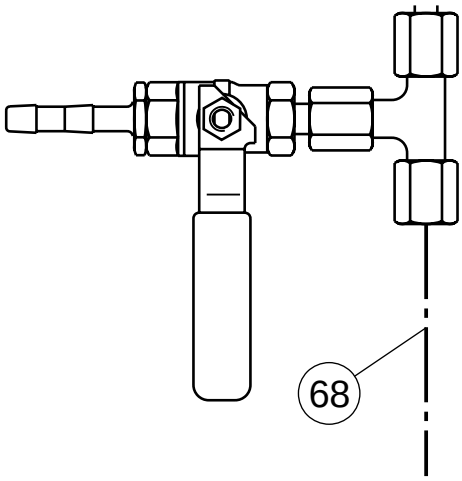

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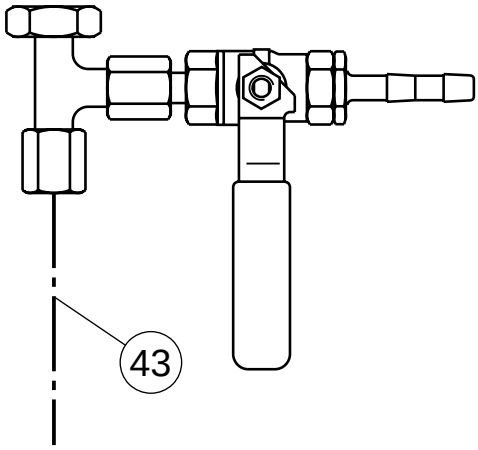

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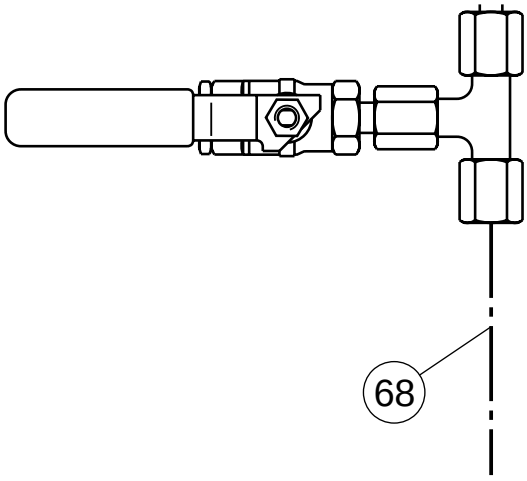

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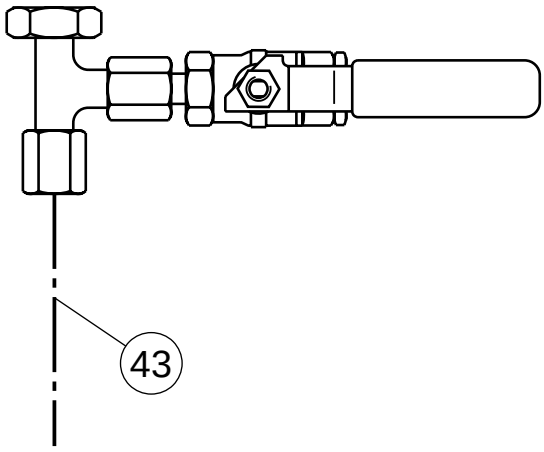

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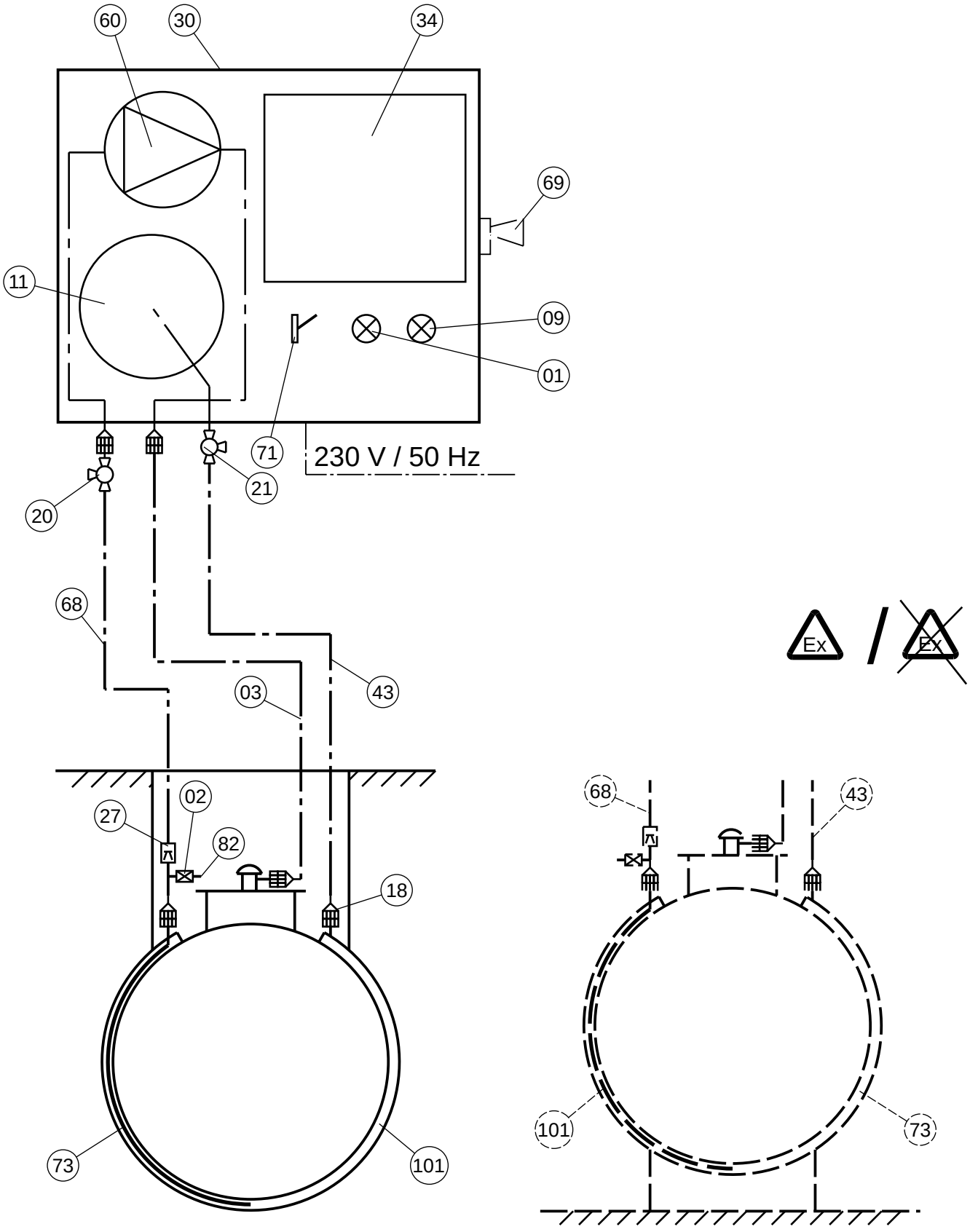

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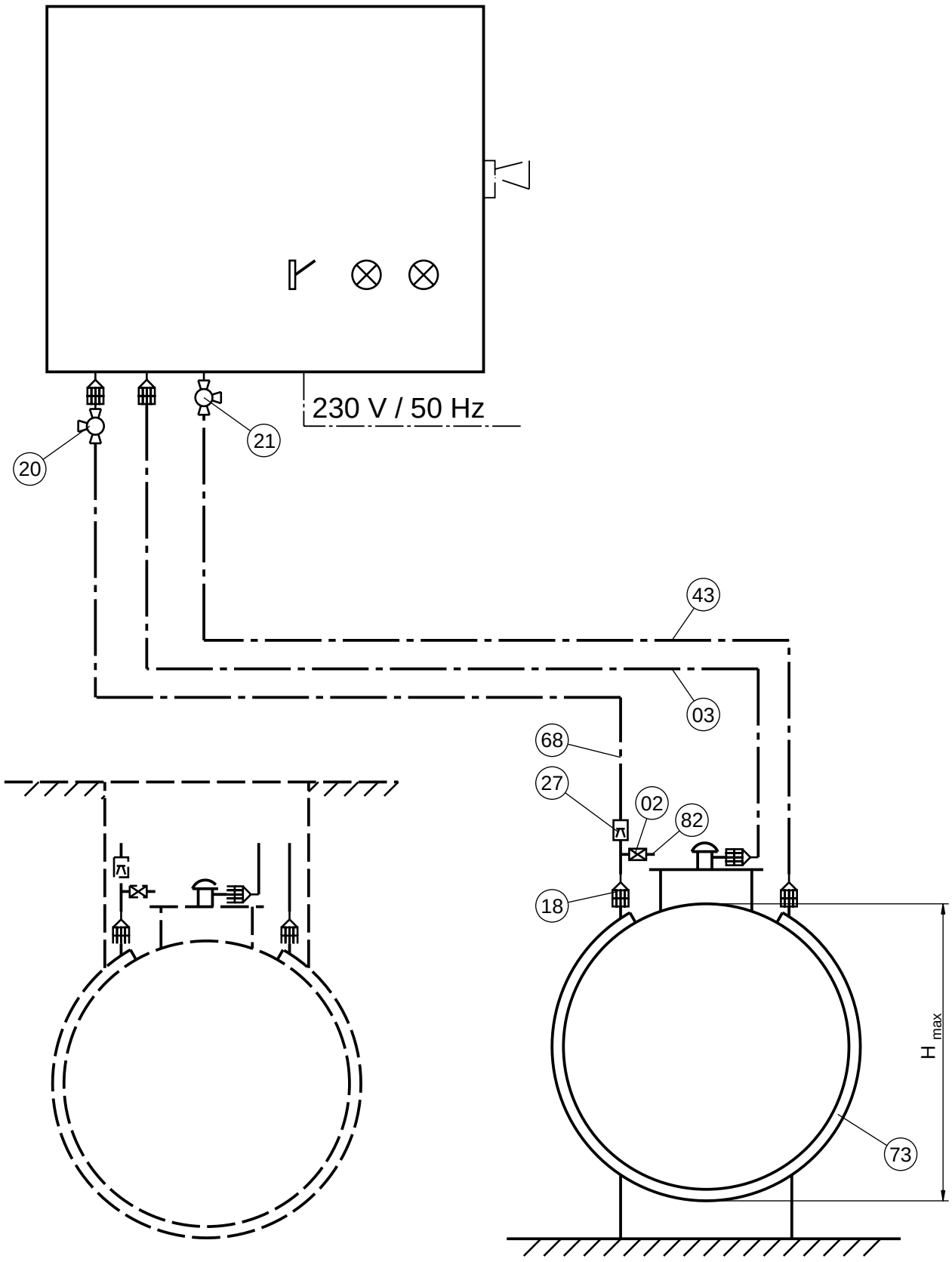

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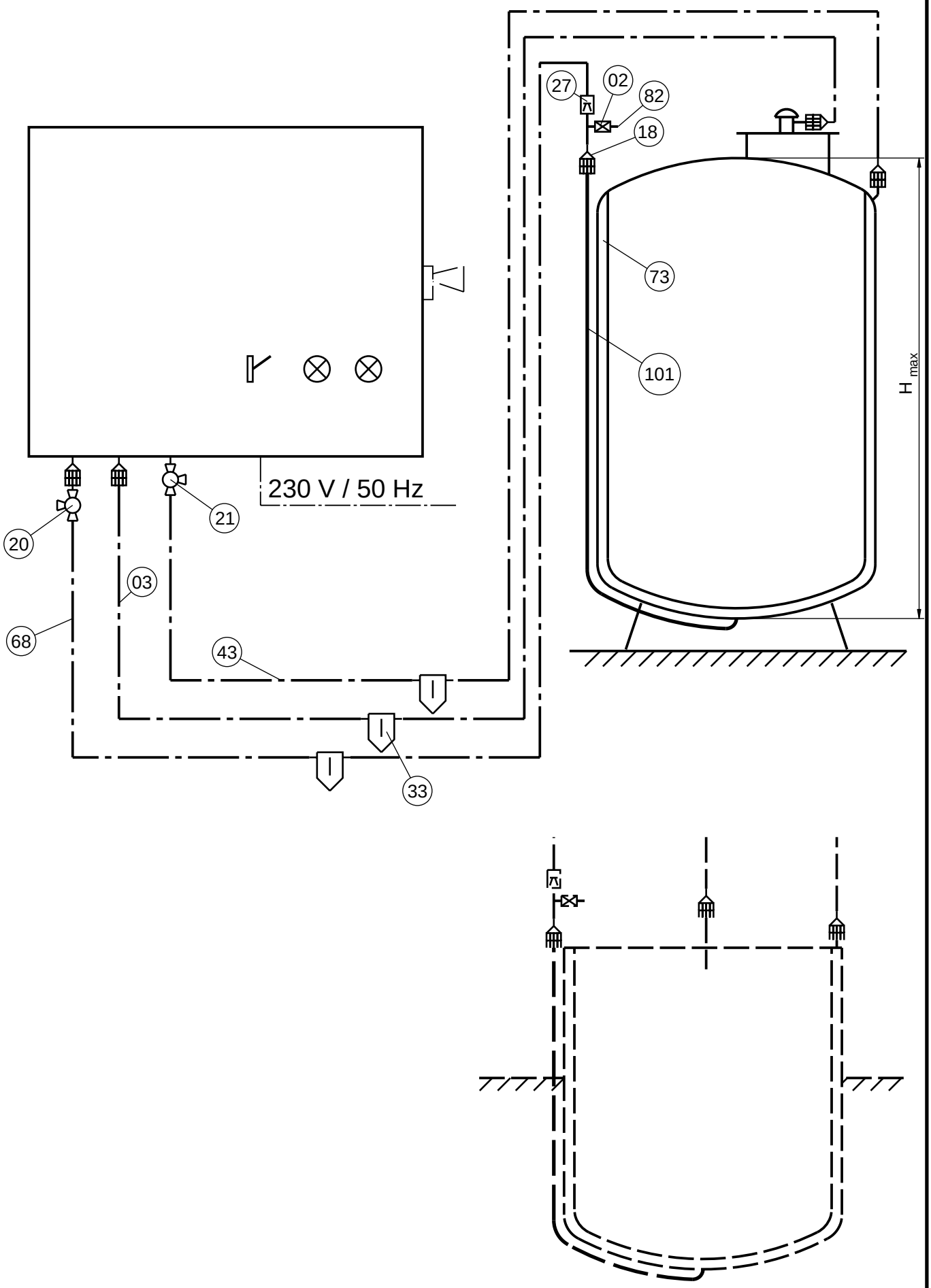

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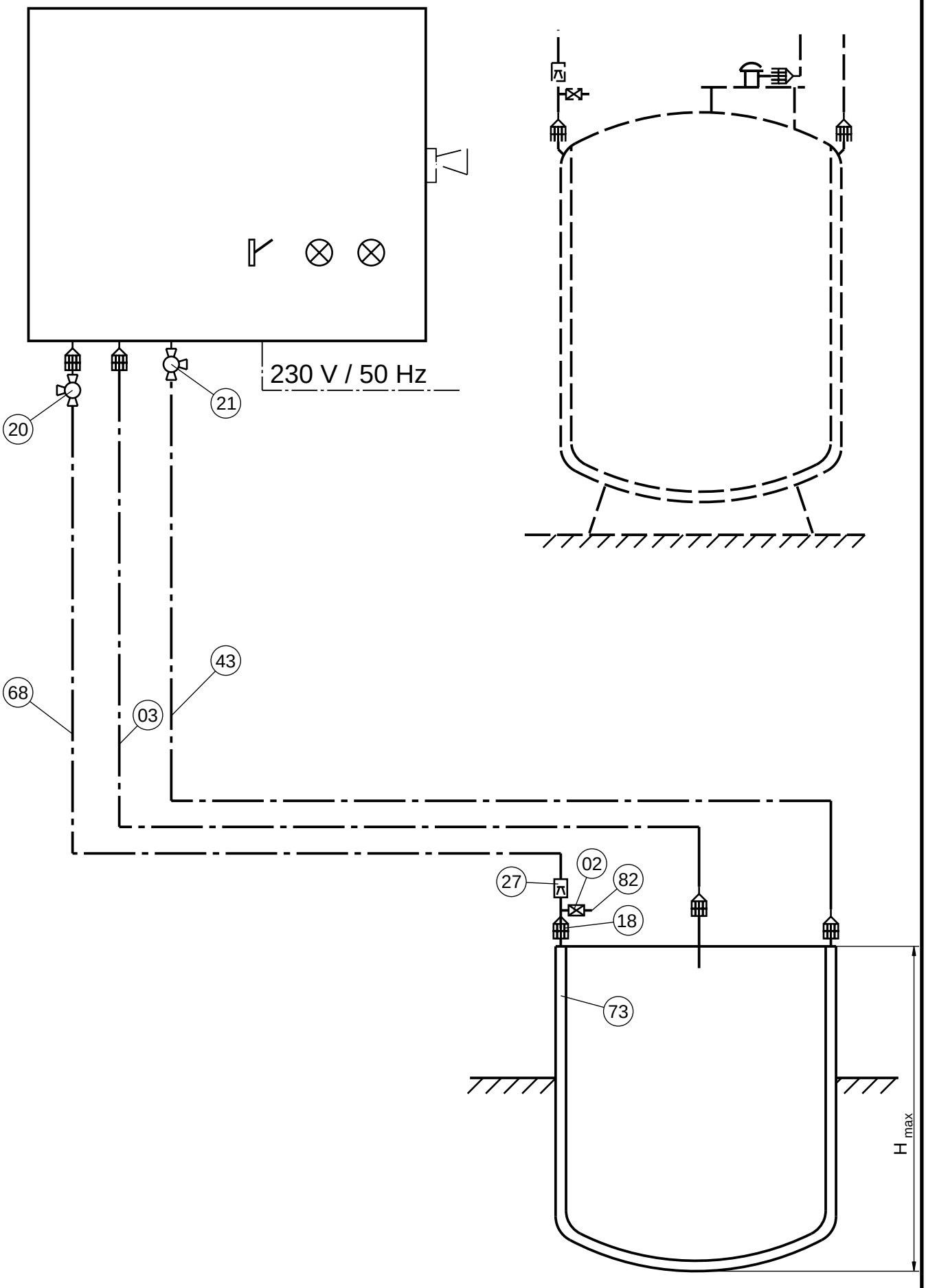

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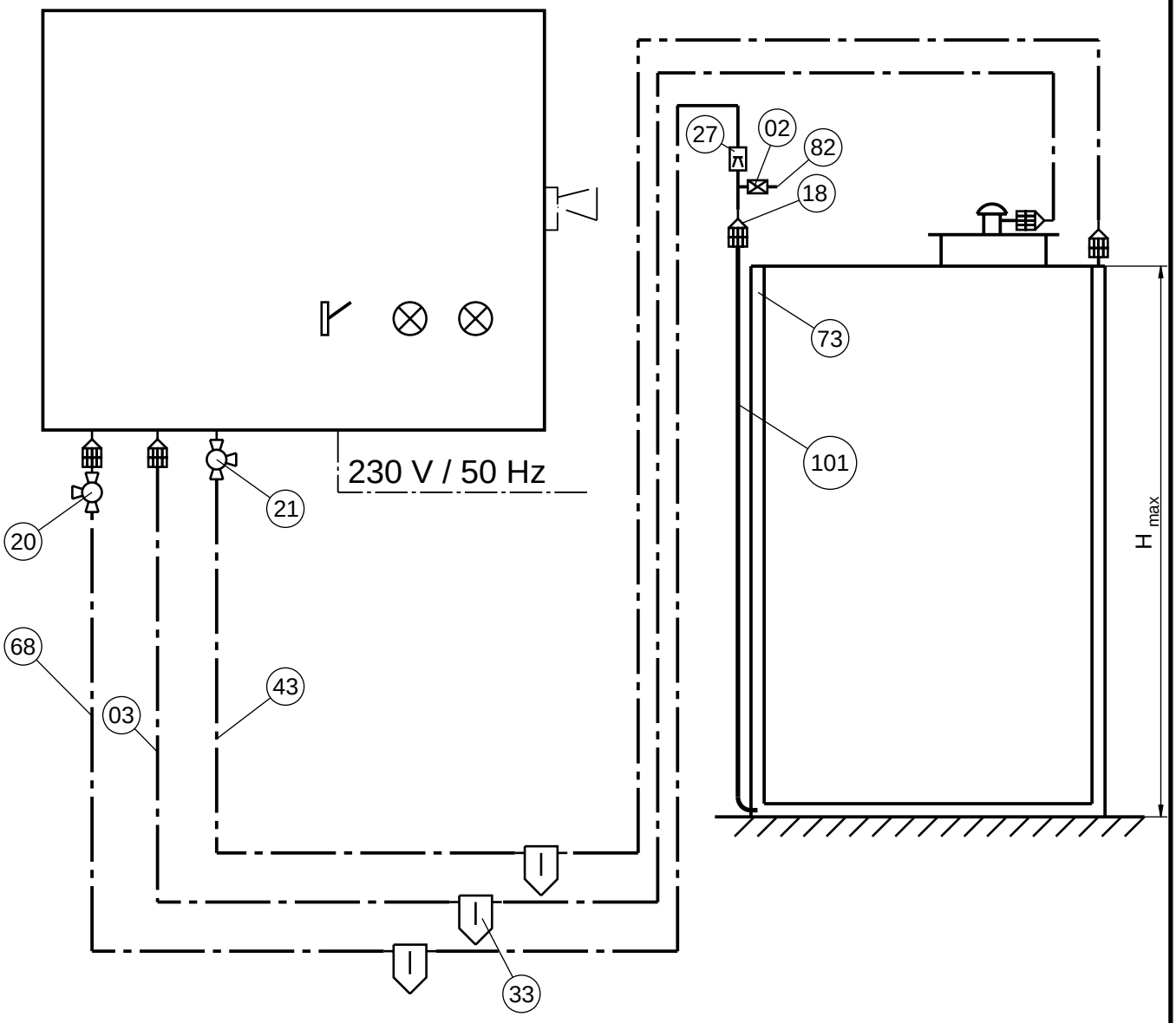

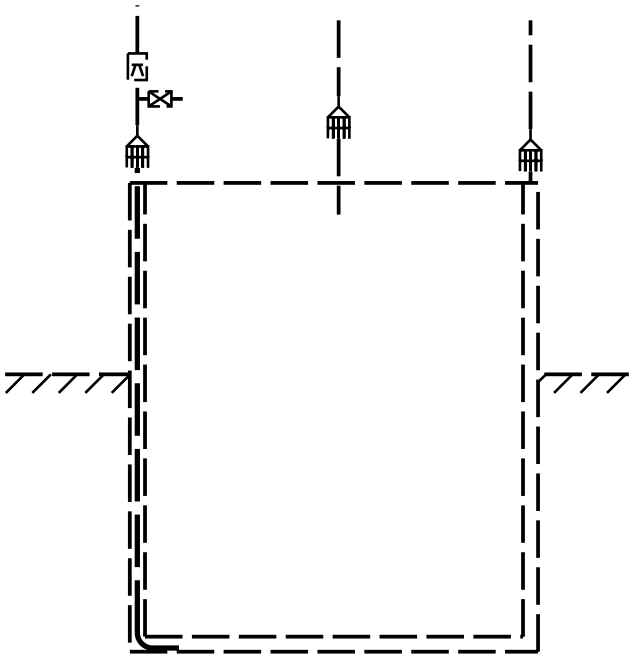

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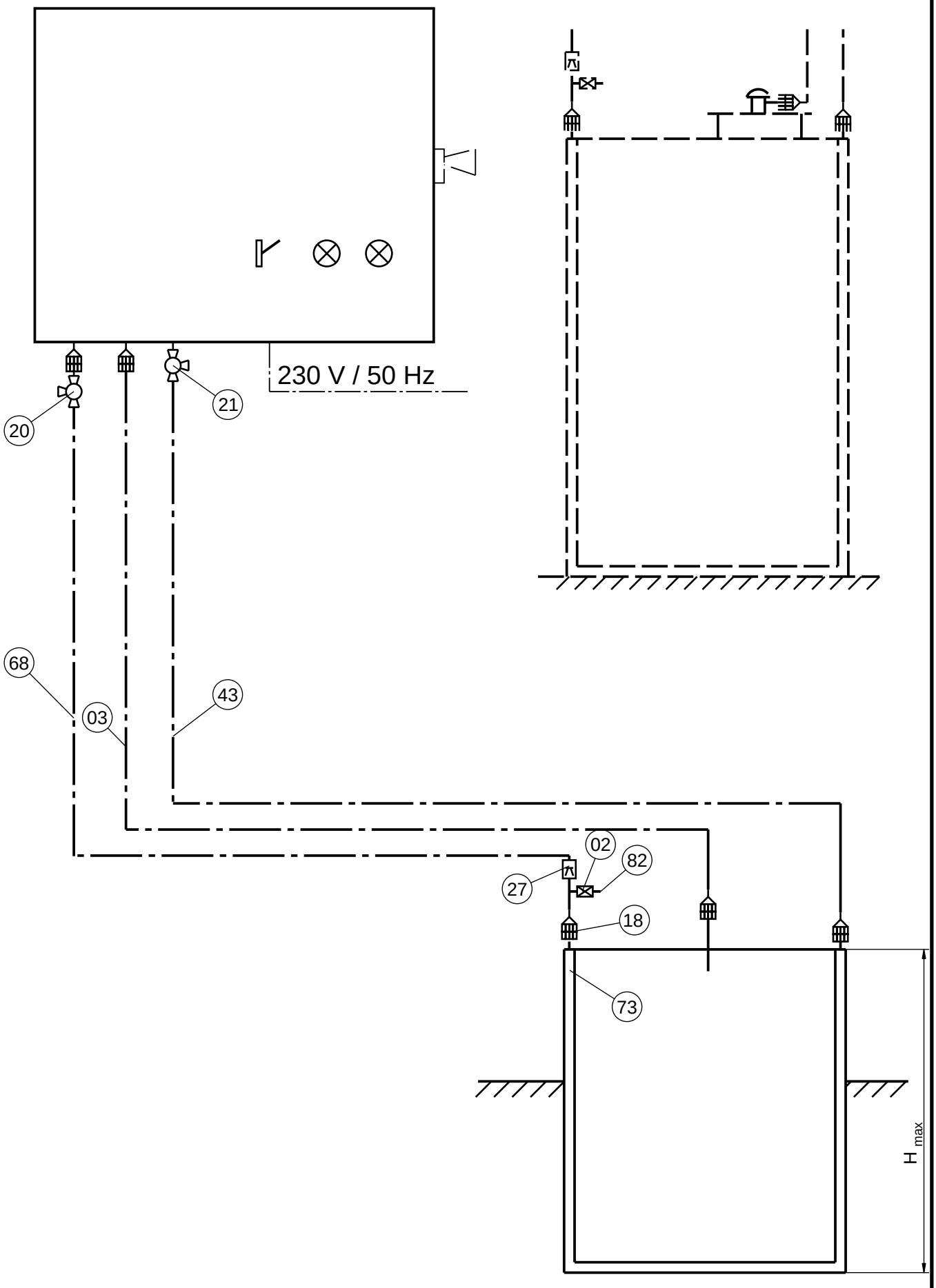

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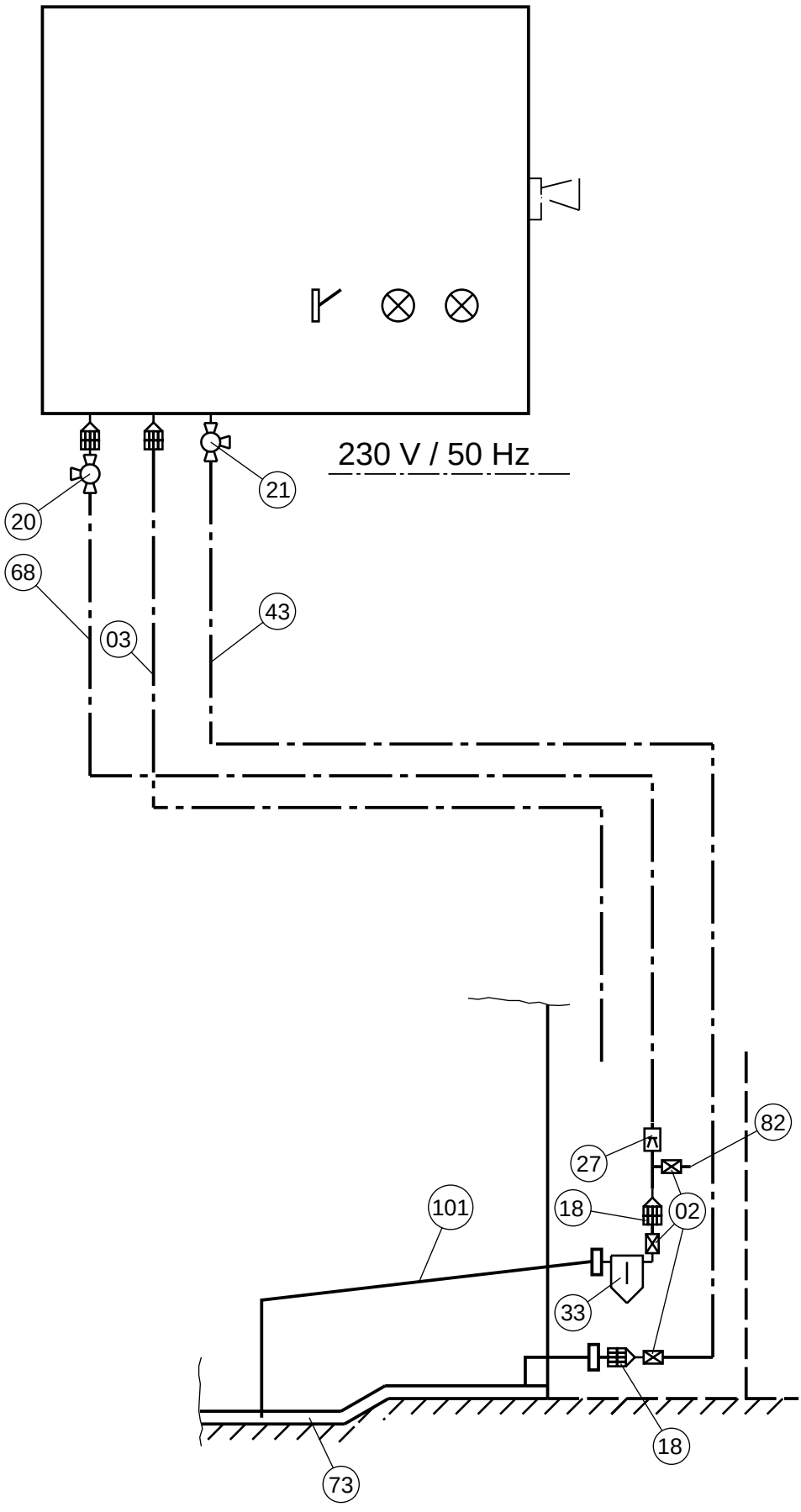

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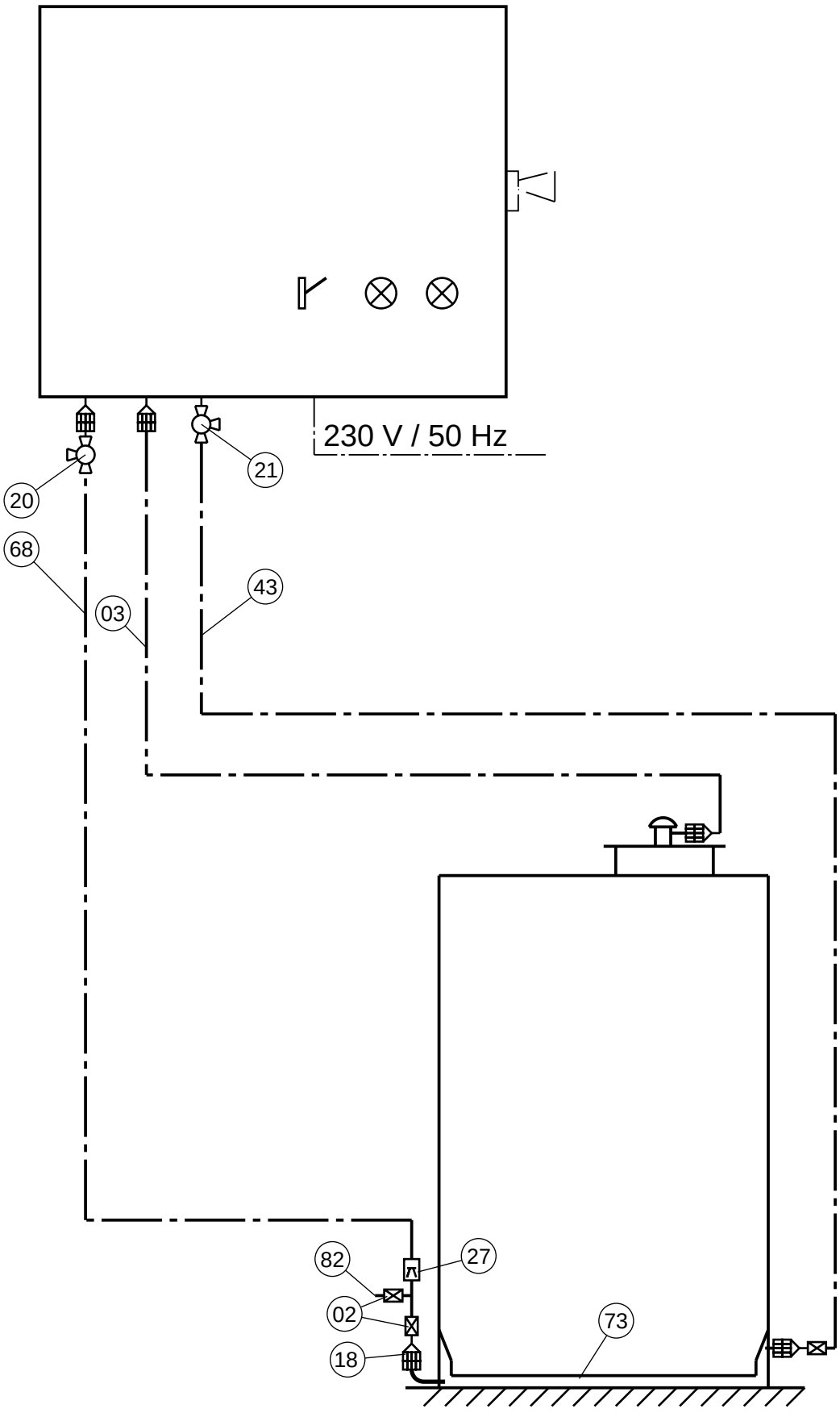

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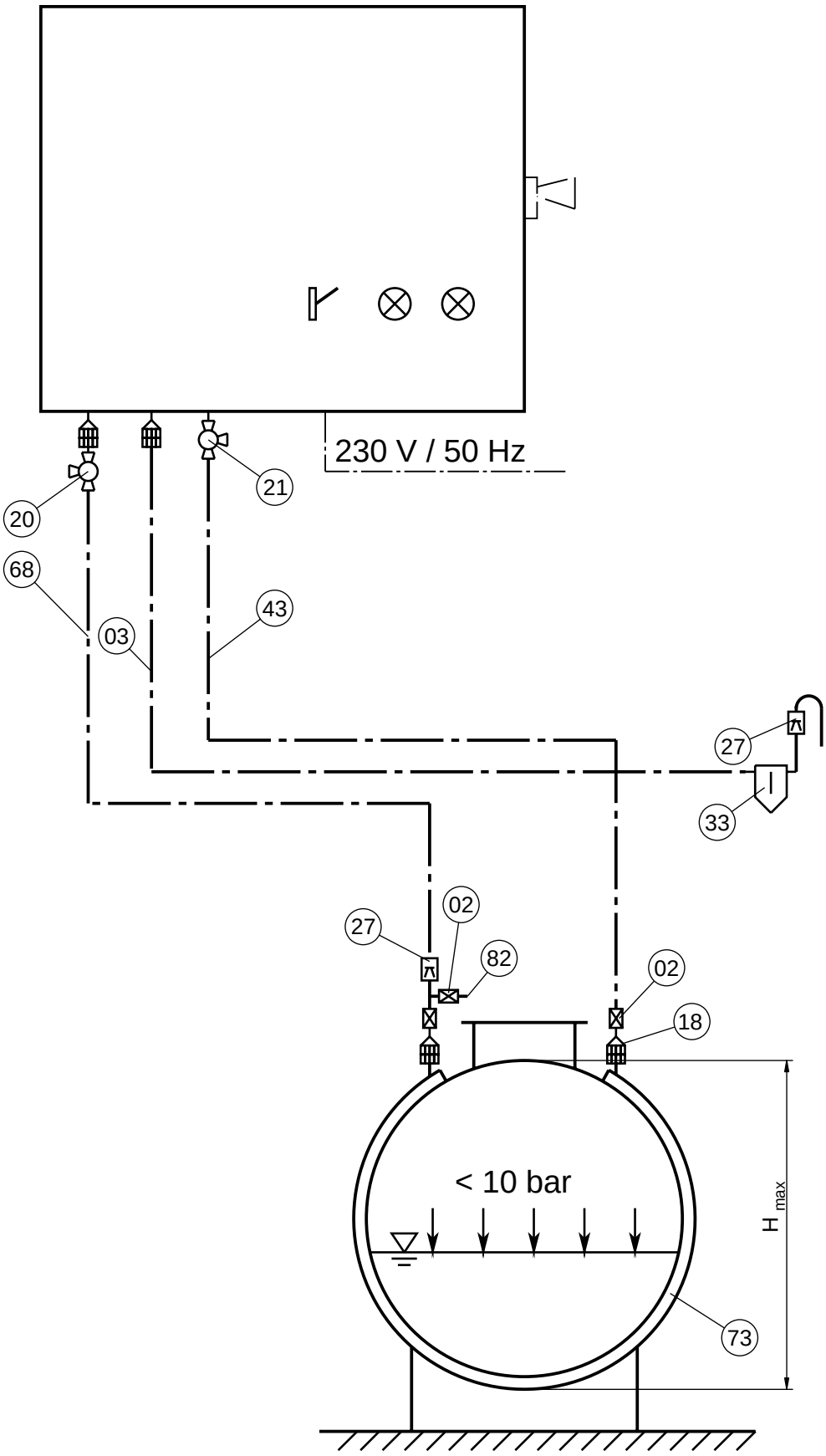

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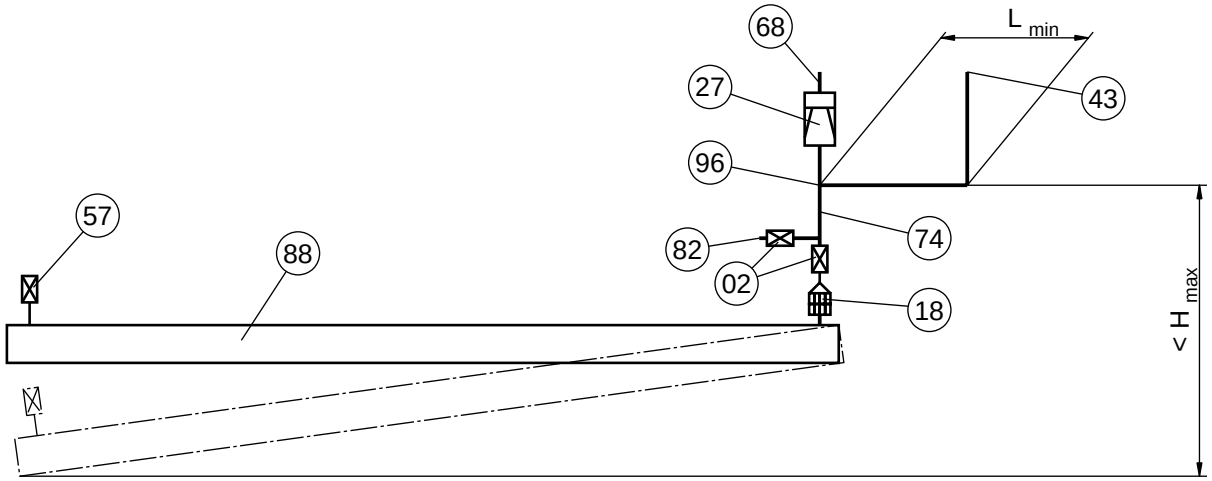

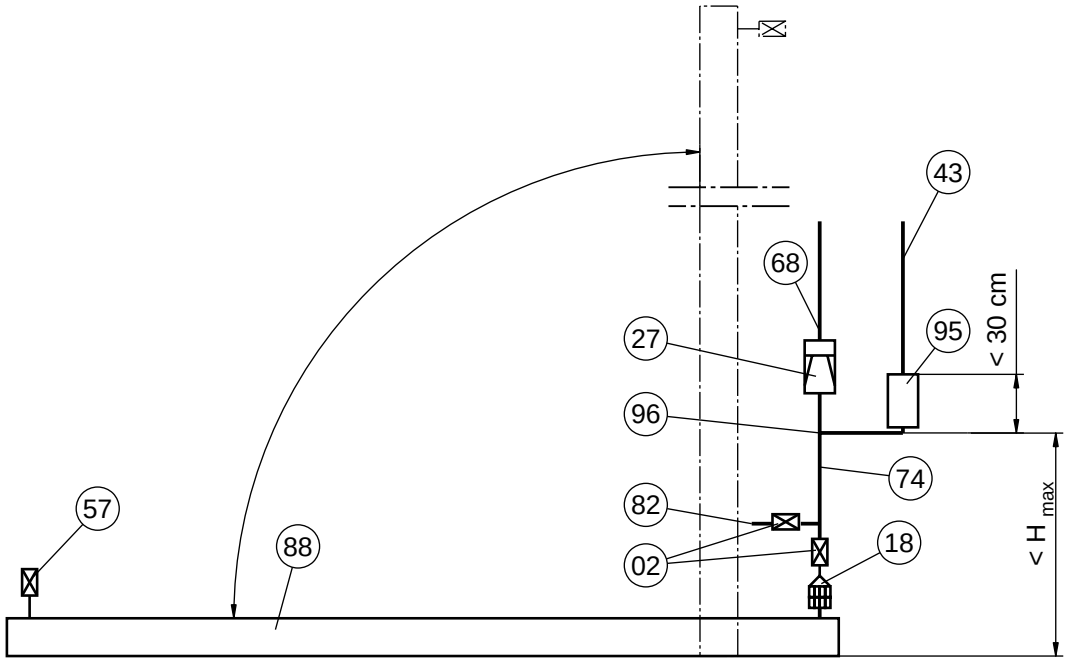

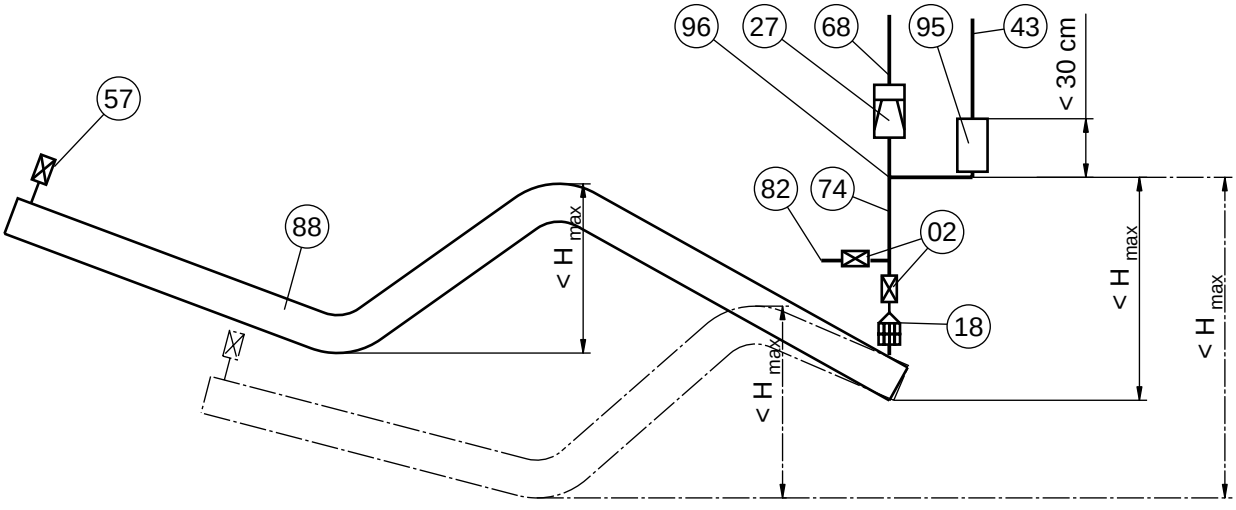

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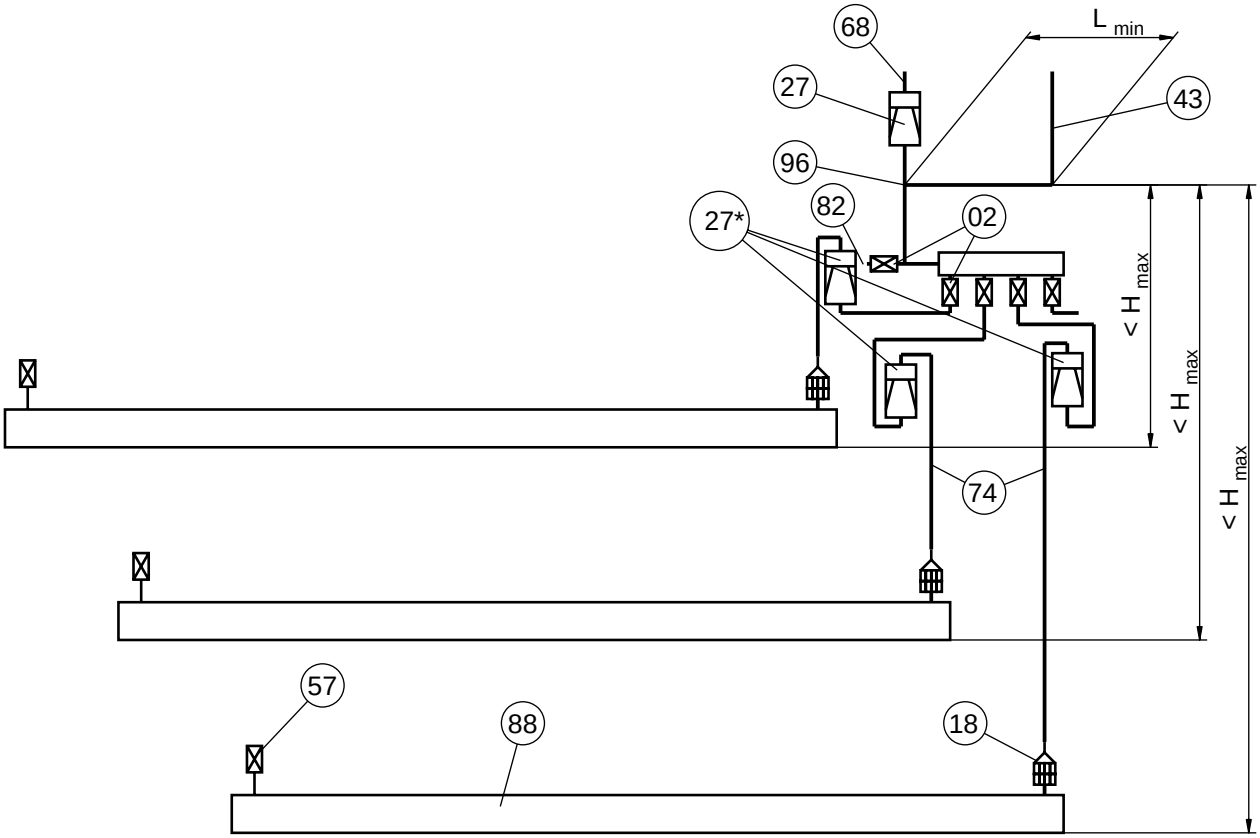

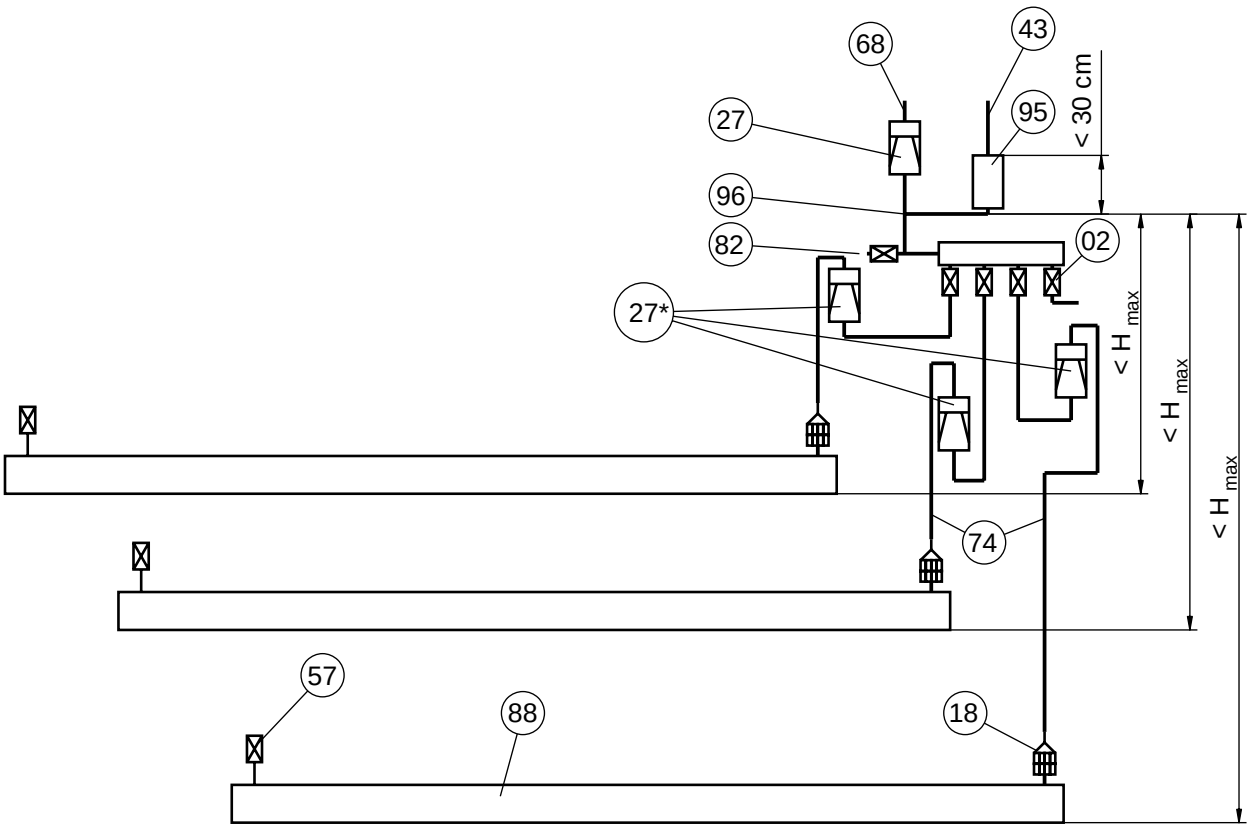

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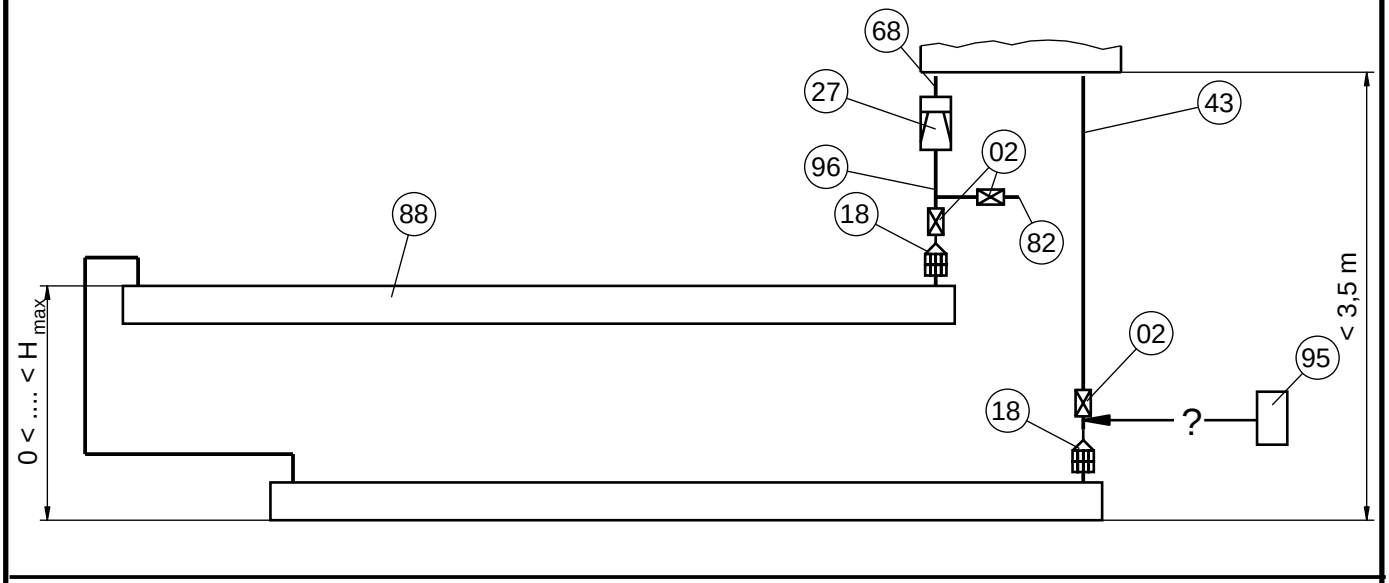

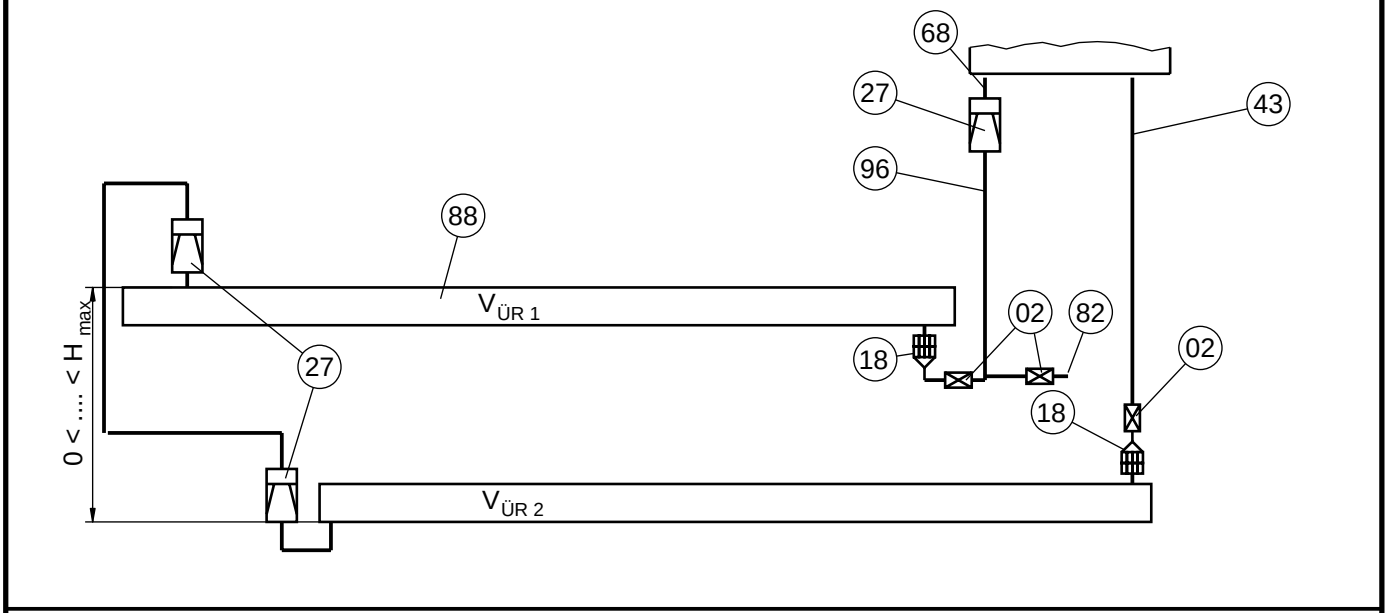

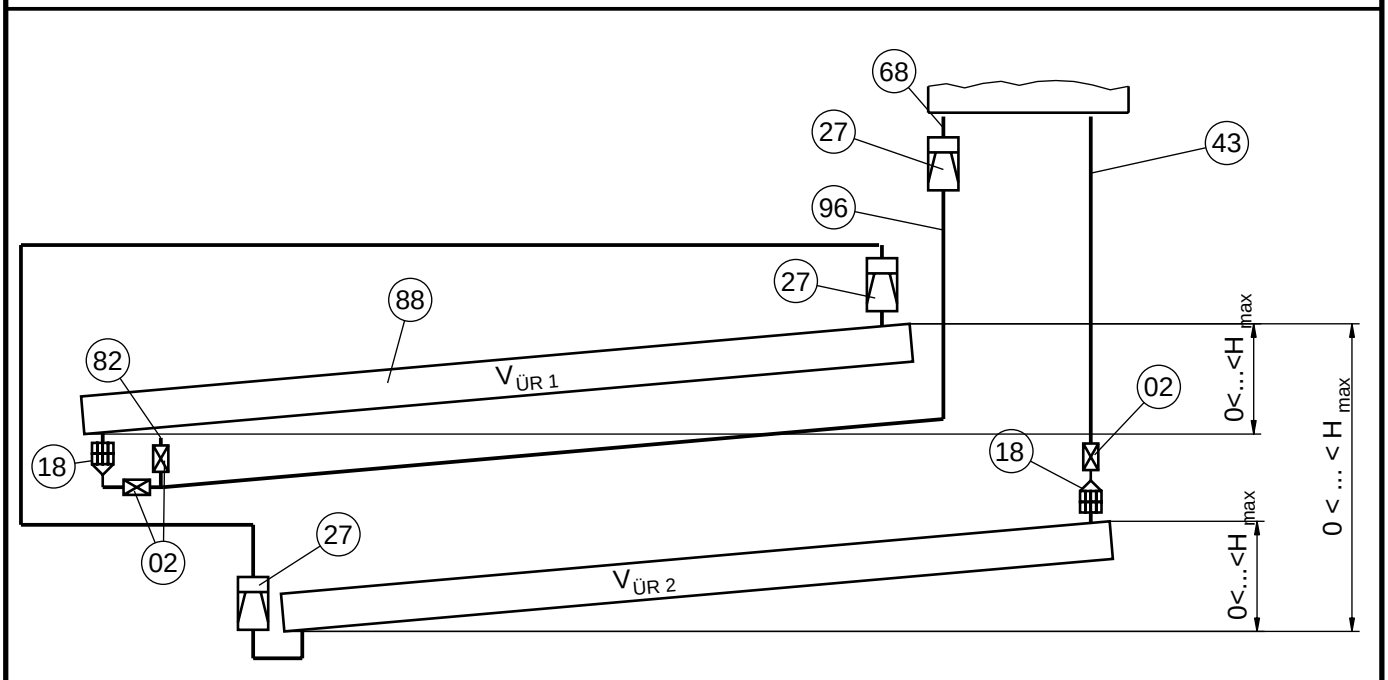

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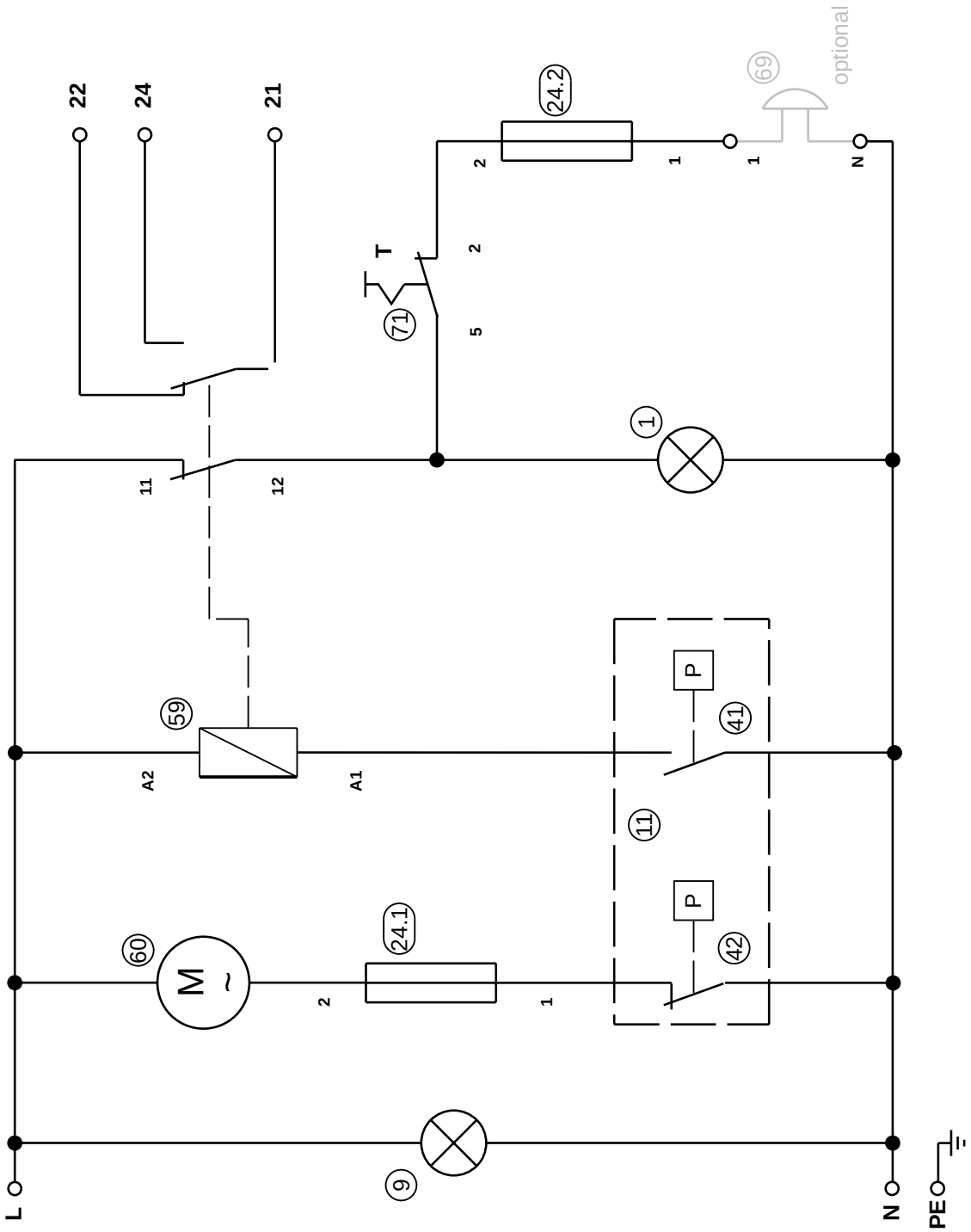

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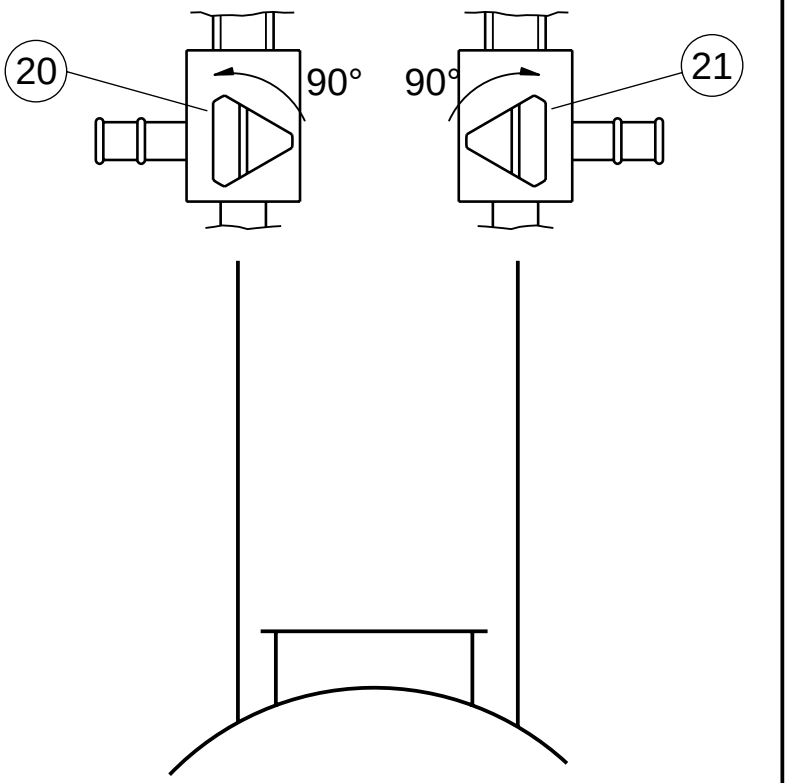

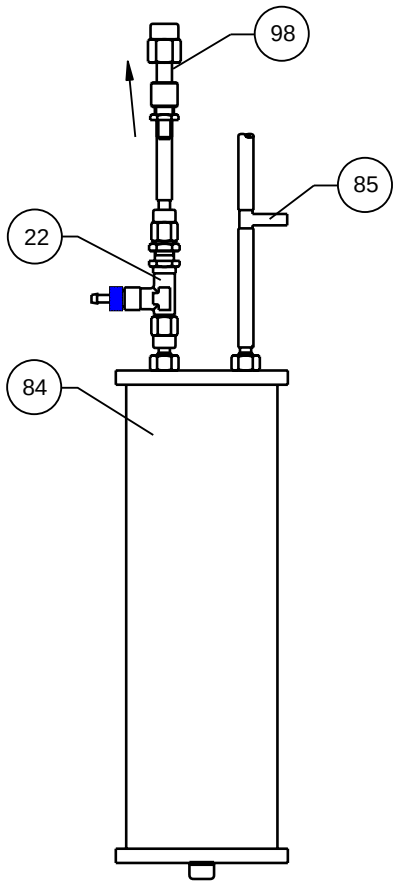

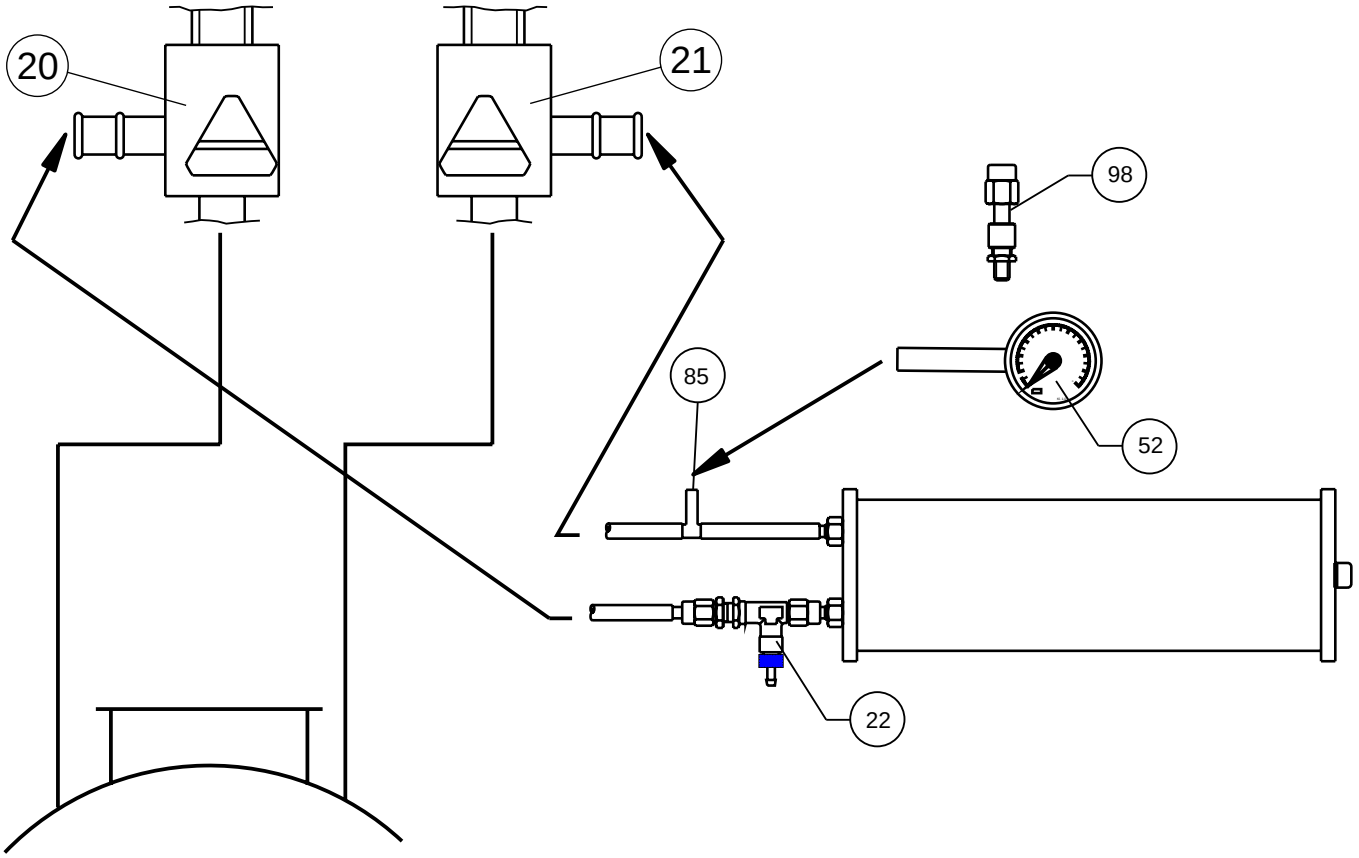

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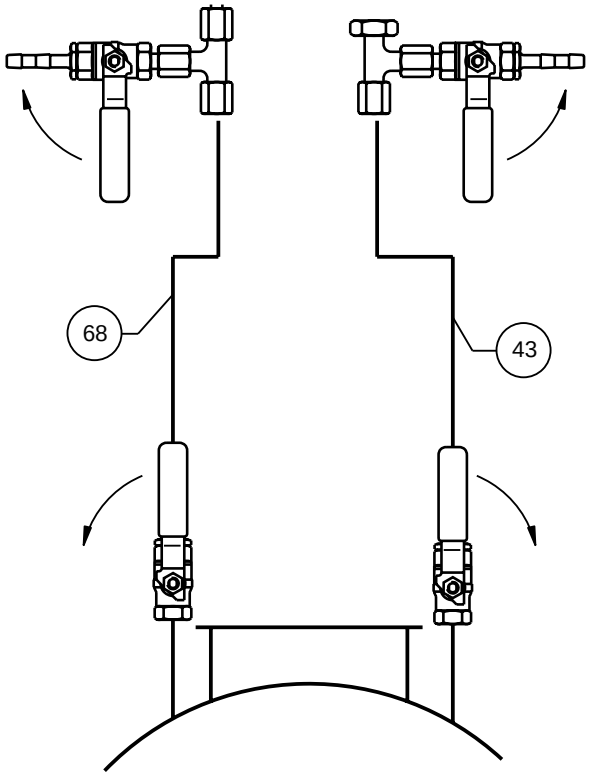

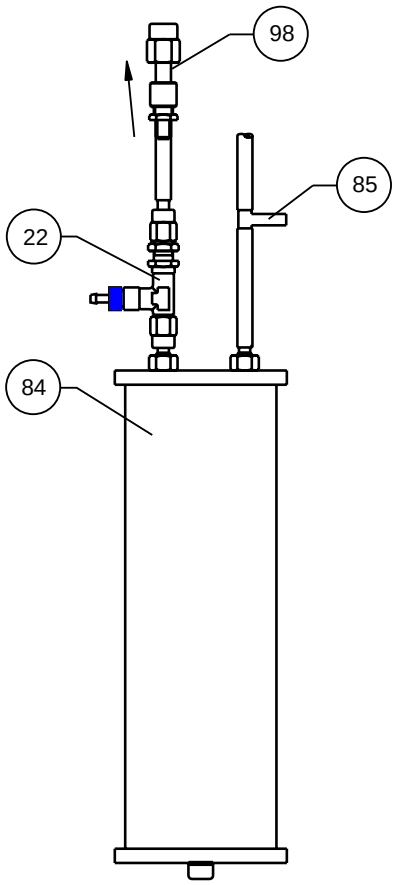

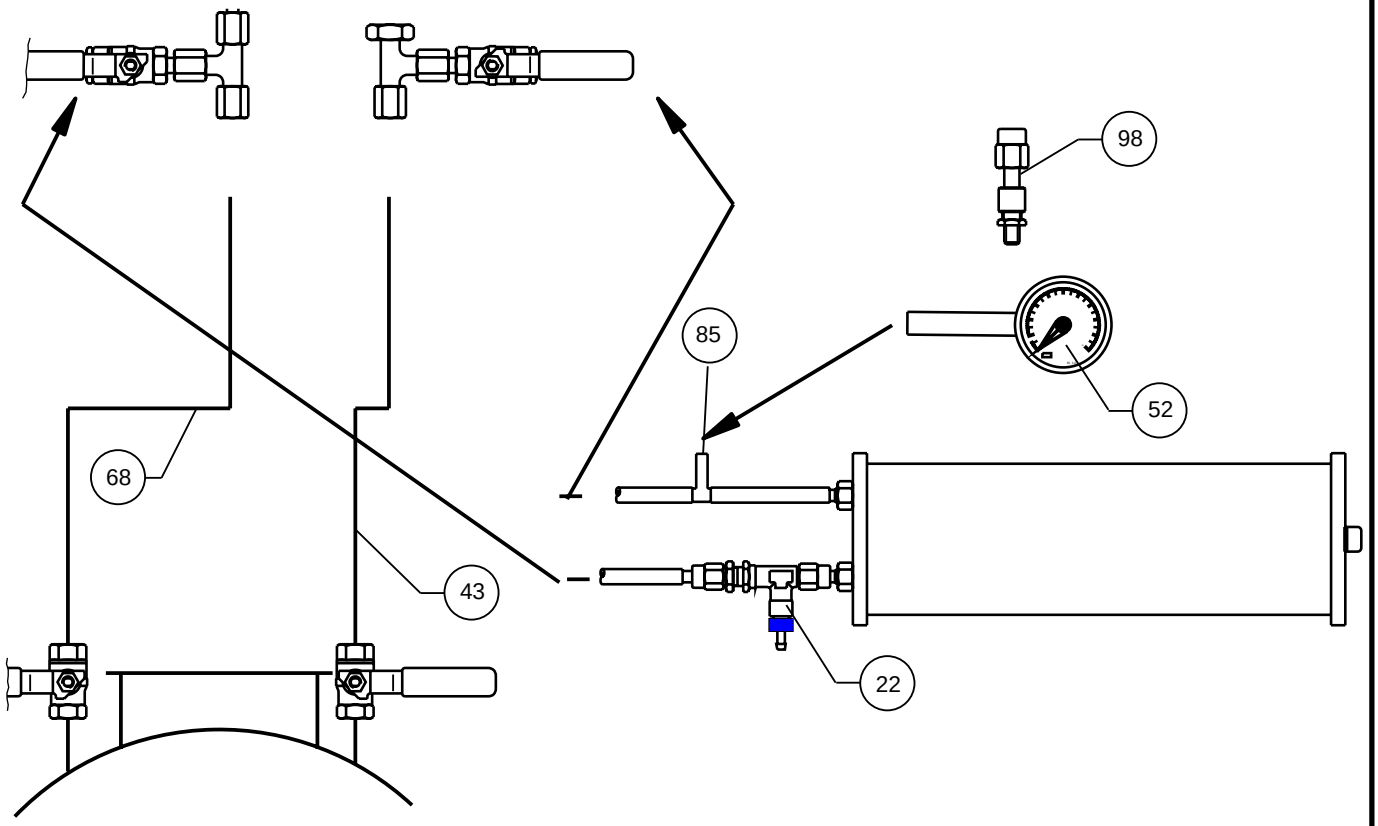

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Using the VLX ../EX Vacuum Leak Detector on Interstitial Spaces Filled with Leak Detection Liquid

A.1 Prerequisites

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

(2) The procedure described below is intended for tanks as defined per DIN 6608.

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

A.2 Preparation

(1) Remove the liquid-based leak detector

(2) Remove the leak detection liquid from the interstitial space by suction:

(3) Suction procedure:
- Install the connections for the suction and measuring lines
- Connect the installation pump to the suction line connection via the intermediate container[1]
- **Apply suction until there is no more liquid to remove**
- Connect the vacuum gauge to the measuring line connection
- Continue the evacuation process (at approx. 500 mbar) until there is no more liquid to remove
- Repeat the evacuation process if necessary to ensure that a gas cushion is created above the remaining leak detection liquid.

A.3 Installation and Start Up of the Leak Detector

(1) The suctioning of the leak-detection liquid creates a gas cushion above the leak detection liquid.

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

(3) Perform a function test on the leak detector.

A.4 Alarms

(1) An alarm can occur if insufficient leak detection liquid has been removed and the liquid in the interstitial space has risen due to increased heat.
Remedy:
Regenerate the air cushion above the leak detection liquid.

(2) An alarm can also occur in case of penetration of groundwater/stored product or air into the interstitial space and an associated rise in the liquid.
Remedy:
Locate the leak and correct it if necessary, then restart the leak detector.
If the leak cannot be located or repaired, consult the locally responsible expert for further instructions.

[1] The liquid to be suctioned out is collected in this container.

E.1 $H_{max.}$ Depending on Density

Density of the stored material [kg/dm³]	$H_{max.}$ [m] Type 330	
0,8	3.8	Only aboveground tanks / pipeline(s)
0,9	3.4	
1,0	3.1	Aboveground and underground tanks / pipeline(s)
1,1	2.8	
1,2	2.6	
1,3	2.4	
1,4	2.2	
1,5	2.0	
1,6	1.9	
1,7	1.8	
1,8	1.7	
1,9	1.6	

E.2 Max. Tank Height, Depending on Density

Density of the stored material [kg/dm³]	$H_{max.}$ [m] Type 34	Type 330	
0,8	4,7	13,6	Aboveground tanks only
0,9	4,2	12,1	
1,0	3,8	10,9	Aboveground or underground tanks
1,1	3,5	9,9	
1,2	3,2	9,1	
1,3	2,9	8,4	
1,4	2,7	7,8	
1,5	2,5	7,2	
1,6	2,4	6,8	
1,7	2,2	6,4	
1,8	2,1	6,0	
1,9	2,0	5,7	

E.3 Tank according to DIN 6618 T2: 1989 and vats with dished floors and same dimensions

Diameter [mm]	Height [mm]	Max. density of the stored material [kg/dm^3]	
		Type 34	Type 330
1600	≤ 2 820	≤ 1,9	≤ 1,9
	≤ 3 740	≤ 1,6	≤ 1,9
	≤ 5 350	≤ 1,2	≤ 1,9
	≤ 6 960	≤ 0,8	≤ 1,8
2000	≤ 5 400	≤ 1,0	≤ 1,9
	≤ 6 960	≤ 0,9	≤ 1,8
	≤ 8 540	-	≤ 1,4
2500	≤ 6 665	≤ 0,9	≤ 1,9
	≤ 8 800	-	≤ 1,4
2900	≤ 8 400	≤ 0,8	≤ 1,4
	≤ 9 585	-	≤ 1,2
	≤ 12 750	-	≤ 0,9

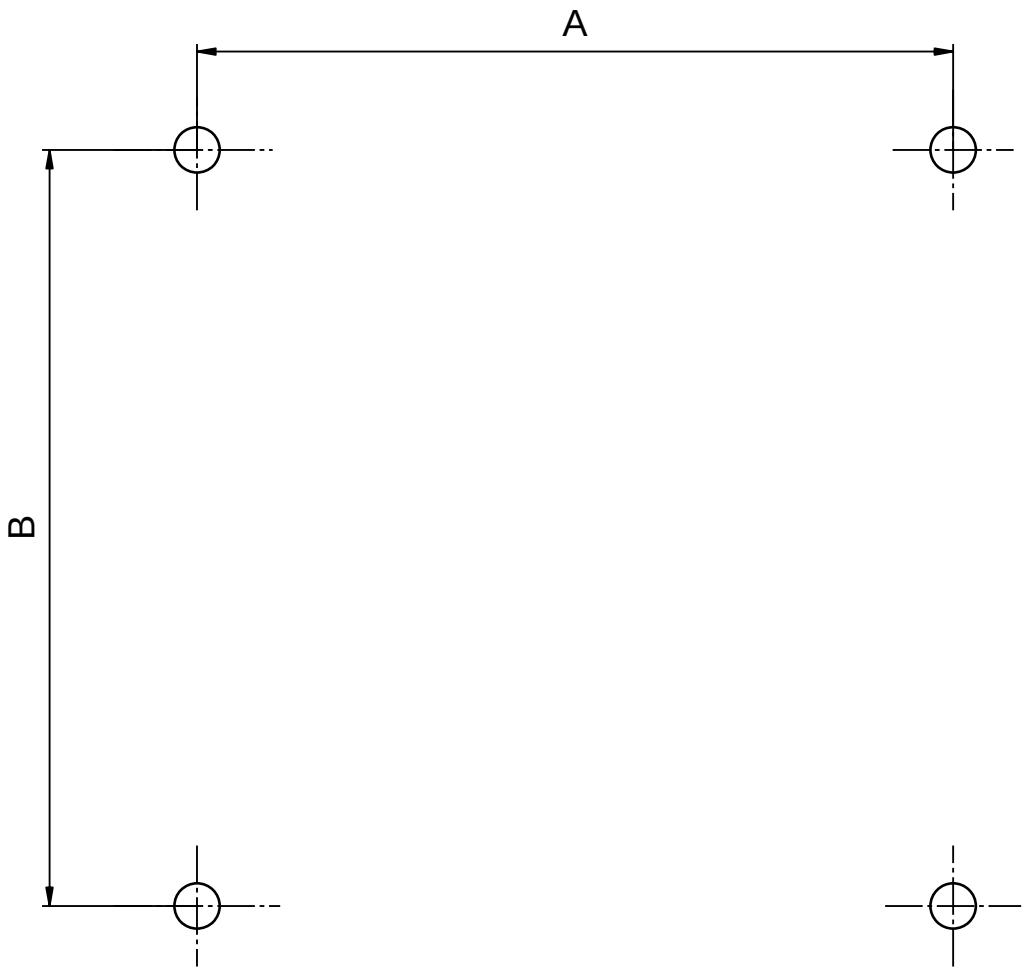
Technical Data

1. Electrical data

Input capacity (without external signal)		230~ V - 50 Hz - 50 W
Switch contact load, terminals AS (4 and 5)		230~ V - 50 Hz - 50 VA
Switch contact load, voltage-free contacts, (Terminals 21 to 24)	max: min:	230~ V - 50 Hz - 5 A 6 V / 10 mA
External fuse protection of the leak detector		max. 10 A
Over-voltage category		2

2. Pneumatic Data (Requirements for the Test Measuring Instrument)

Nominal size	at least 100
Class precision	at least 1,6
End scale value	-600 mbar/-1000 mbar



Type	Housing Dimension (B x H x T)	Hole pattern			
		Width A (side straps)	Height B	Diameter of strap	Bore diameter vor dowel
VLX ../Ex	380x300x210	400	260	8	10
VLX ../A-Ex	200x300x160	220	260	8	10
VLX ../A-MV-Ex	380x300x210	400	260	8	10
VLX ../ ME	120x200x90	89	188	6	8
VLX ../ ME-MV	120x200x90	89	188	6	8
VLX ../ ZME	300x400x155	320	360	8	10

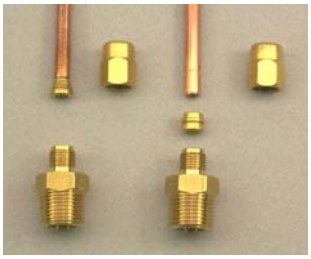
Work sheet: AB-820 500

Installation of screw connections

1 Flanged screw connection for flanged pipes

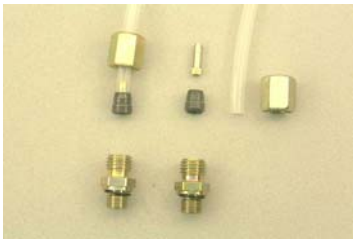
1. Oil O-rings
2. Place the intermediate ring loosely in the screw connection sleve
3. Push the union nut and pressure ring over the pipe
4. Tighten the union nut by hand
5. Tighten the union nut until there is a noticeable increase in force
6. Final installation: Turn ¼ turn further

2 Clamping ring screw connection for plastic and metal pipes



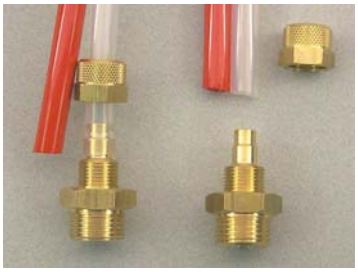
1. Insert support sleeve into the pipe end
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the screw connection until stronger resistance can be felt
4. Unfasten the nut slightly
5. Tighten the nut until there is noticeable resistance (The nut must match the thread on the base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

3 Cutting ring screw connection for plastic and metal pipes



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

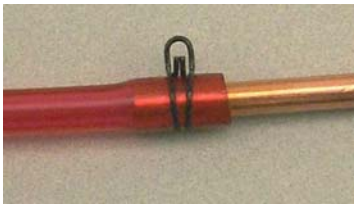
4 Quick-release screw connection for PA and PUR hose



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

NOT suitable for PE hose

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



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

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

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

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

EC DECLARATION OF CONFORMITY

We,

SGB GmbH
Hofstraße 10
D- 57076 Siegen

hereby declare in sole responsibility that the leak detectors

VLX ../A-Ex and VLX ../Ex
(assembly concerning the Directive 94/9 EEC)

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

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

Number / short title	**Satisfied regulations**
2004/108/EC EMC Directive	EN 55 014-1: 2006; -2:1997 EN 61 000-3-2: 2006; -3-3: 1995 + A1: 2001 + A2: 2005
2006/95/EC Low Voltage Directive	EN 60 335-1: 2007 EN 61 010-1: 2001 EN 60 730-1: 2005
89/106/EEC Construction Products Directive 93/68/EEC	EN 13 160-1-2: 2003 Approved body: TÜV-Nord, Hamburg
94/9 EEC Equipment in Potentially Explosive Atmospheres	EN 1127-1: 2007 EN 13 160-1-2: 2003 EN 13463-1: 2001 PTB 04 ATEX 2112 X with: EN 60 079-0:2006; -1:2008; -7:2007; -18:2004; -26:2008 PTB 01 ATEX 1104 with: EN 60 079-0:2006; -7:2003; -11:2007; EN 60 439-1; EN 60 947-7-1 PTB 01 ATEX 1005 X with: EN 60 079-0:2006; -1:2008 PTB 03 ATEX 4041 X with: EN 13463-1:2001; EN 12874:2001 Ex5 05 12 57496 001 with: EN 60 079-7:2007; -18:2004 PTB 03 ATEX 2086 X (NUR VLX../A-MV-Ex) with: IEC 60079-18: 1992; -0:2000 ZELM 02 ATEX 0113 (NUR VLX../Ex) with: EN 60 079-0:2006; -1:2008 ZELM 02 ATEX 0092 (NUR VLX../Ex) with: EN 60 079-0:2006; -18:2004 The ignition hazard analysis did not result in any additional hazards, taking into account the EC type examination certificates for the components used.

Compliance is declared by

Martin Hücking
(Technical Director)

PLANT ENGINEERING

Hamburg, May 07, 2002
2102-Stb
File: 8237 BL SGB/VLX
Order no.: 8237 BM 00120

Certificate of Approval

of the Design of a Leak Detector
as Part of a Leak Detection Unit

1 Subject

A vacuum leak detector with or without a pressure switch-controlled evacuation pump

2 Client

Sicherungsgerätebau GmbH
Hofstraße 10
57076 Siegen

3 Information on the Leak Detector

3.1 Manufacturer
See Client

3.2 Type

VLX...

3.3 Operative Range

- Pressureless tanks and pressureless pipelines according to section 2.2 of the technical description dated 28-Mar-2002.

Tanks and pipelines with overlay/feed pressures according to

- section 2.4 of the technical description dated 28-Mar-2002

3.4 Design

A vacuum-based leak detector that monitors the vacuum in the interstitial space of the above-mentioned tanks and pipelines by means of a pressure measuring device. Depending on the design version, the leak detector is manufactured with the pressure-measuring device and signal part (leak detection unit) only, or with the pressure-controlled evacuation pump. The VLX... leak detector is used in the design types described below:

VLX ... vacuum leak detector

This version of the device comes with 4 different alarm switch values and is principally intended to be connected to the interstitial spaces of tanks or pipelines with flammable liquids with a flash point above 55 °C and non-flammable liquids. For use of the leak detector on pressureless tanks or pipelines with flammable liquids with a flash point < 55 °C, the limitations listed under no. 2.5 in the technical description apply. The device must be installed outside an explosion zone.

The following alarm switch values are used:

Device type	Alarm switch value
VLX 34	-34 mbar
VLX 330	-330 mbar
VLX 500	-500 mbar
VLX 570	-570 mbar

VLX... /Ex vacuum leak detector

This version of the device is intended to be connected to the interstitial spaces of tanks or pipelines with flammable liquids of all hazard classes or non-flammable liquids, whereby the device can be installed completely in potentially explosive atmospheres (zones 1 and 2). The energy supply comes directly through a 230-V feed line.

Device type	Alarm switch value
VLX 34/Ex	-34 mbar
VLX 330/Ex	-330 mbar

VLX.../A- Ex vacuum leak detector

This version of the device consists of a leak detection unit and a leak detector. The leak detector is intended for installation in potentially explosive atmospheres (zones 1 und 2), whereby the leak indicating unit must be installed outside the explosion zone. This version of the device is thus suitable for monitoring tanks/pipelines with flammable liquids of all hazard classes and non-flammable liquids. This version of the device is also available with two different alarm switch values as needed:

Device type	Alarm switch value
VLX 34/A-Ex	-34 mbar
VLX 330/A-Ex	-330 mbar

VLX../SA-Ex vacuum leak detector

This version of the device does not have its own vacuum generator and consists of a leak detection unit and a leak detector. As a pressure-measuring device, the leak detector is intended for installation in potentially explosive atmospheres (zones 1 und 2), whereby the leak detection unit must be installed outside the explosion zone. This version of the device is suitable for monitoring tanks/pipelines with flammable liquids of all hazard classes and non-flammable liquids. The alarm switch value in this version of the device is set to a fixed -350 mbar.

4 Test Basis

Draft standard prEN 13160 Part 2.

5 Test Documents

5.1 Technical description of the VLX leak detector dated 28-Mar-2002 with flow diagram, parts list and system drawings

6 Sample Device

Sample device, Type VLX 330

7 Tests

The sample design of the leak detector was tested, taking the technical description with design drawings and flow diagrams into account as well as the installation and operating instructions of the manufacturer, and in compliance with the requirements of prEN 13160:2001.

The following individual tests were performed:

1. Electrical equipment test (not including the explosion protection device)
2. Switching cycles at different limit temperatures
3. Visual and acoustic alarm test
4. Recording the pump characteristic curve, taking the connecting lines and add-ons into account
5. Pressure and leak test of the add-ons

8 Test Results

The leak detector fulfills the basic principles established in prEN 13160-2. The components of the VLX 330 sample device correspond with the technical description and the drawings. The function tests of the sample device have shown that the device withstands the loads and remains functional.

The mechanical function tests had positive results. The leak detector is able to meet the demands placed on it as regards the monitoring of the vacuum generated in the vacuum space and the automatic alarm upon reaching the alarm vacuum. The evacuation pump is able to compensate for pressure fluctuations such as may occur due to temperature changes. The switch values of the pressure switch are maintained as indicated in the technical description. Even in the vicinity of the limit temperatures of -25 °C and +70 °C, the pressure switch values remain within the specified tolerance ranges.

The overall evaluation of the long-term operation of the device – the device was subjected to 10,000 load cycles – also did not result in any noteworthy deviations from the pressure switch values.

Measurement of the flow rate using a suspended solid particle flowmeter has shown that at the specified alarm vacuum value of 330 mbar, the flow rate is 85 ± 15 l/h. The feed rate of the evacuation pump is sufficient. (See Figures 1 and 2)

Figure 1: Pump characteristic curve for VLX... leak detectors with no explosion protection device

Figure 2: Pump characteristic curve for VLX.. leak detectors with explosion protection devices

The switching operations were performed at the upper limit temperature of +70 °C and the lower limit temperature of -25 °C, and were set so that an alarm sequence occurred within 5 minutes.

The alarm test likewise had positive results. The acoustic alarm signal emits a sound level of > 73 dB(A) at a distance of 1 m with the switch cabinet closed after 24 hours of continuous operation. The visual signal can be considered adequate.

A pressure test of the components of the device that are subjected to overpressure in case of leaks has shown that the device can withstand the stresses of a leak. The components were subjected to 25 bar pressure and withstood the test pressure without leaking.

The electrical installation in the fittings box meets the DIN VDE specifications. An external transmission of an alarm was secured by switching a voltage-free relay, such that the device is fuse-protected with respect to the external alarm circuit and through the in-line connection of an additional fuse.
Based on the successful tests, the leak detection system – consisting of the VLX… leak detector with leak detection unit and the interstitial spaces listed in the technical description – can be classified as a leak detection system of Class II according to prEN 13160-1. The interstitial spaces must meet the requirements of prEN 13160 Parts 1 and 7.

9 Evaluation

The Type VLX... leak detector is suitable to be part of a leak detection unit and meets the requirements of prEN 13160-2, if the following conditions are met:

1. The leak detector must be made according to device versions as per the technical description of the manufacturer. The alarm switch pressures must be determined with the operator according to the operative range. The devices must be marked with the factory-set alarm switch pressures.
2. The leak detector may be used only for the types of tanks specified in the technical description under section 2 – taking into consideration the permissible density of the stored material, the specific operating pressures and the layout of the suction line.

3. If the leak detector is connected to the interstitial spaces of aboveground tanks or tanks/pipelines with flammable liquids of hazard classes AI, AII or B, permanent connecting lines that correspond to at least pressure classification PN 10 must be provided. Before startup, the connecting lines must be subjected to a test pressure with 1.1 times the static pressure of the stored liquid, taking into consideration an overlay pressure – with at least 5 bar.

4. The leak detector should be attached so that radiated heat does not cause the housing temperature to rise to ≥ 50 °C (do not install directly adjacent to a heat source) or, with stored media at a temperature ≥ 40 °C, so that the heat from the incoming air is not transferred to the leak detector. This can be accomplished, for example, using cooling sections between the interstitial space and the leak detector in the form of the copper pipelines with a length of at least 1.5 m.

5. Each leak detector must have permanent, easily readable identification with at least the following information:

   Manufacturer or manufacturer symbol,
   Year of manufacture,
   Approval symbol, type designation

6. The quality assurance measures according to prEN 13160 Part 1 must be followed in the manufacture of the leak detector.

7. A copy of the installation and operating instructions and of the approval certificate must be included with each leak detector.

10 Note

Compliance with explosion protection and electromagnetic compatibility requirements or the low-voltage guidelines was not included in the testing.

[TÜV Official Seal: “Technischer Überwachungs-Verein Nord e.V.”]
[Signature]

Straube
Official Expert of the Technical Inspection Association for North Germany
Leak Detection Device Testing Center

This is to certify that the above is a complete and correct translation of the German original.
The translation comprises 6 pages.
Document No. TLR0007909/20

Reutlingen, May 24, 2002

Ilka Strobel
Commissioned Sworn Translator for English in Baden-Württemberg
“Öffentlich bestellter und beeidigter Urkundenübersetzer der englischen Sprache für Baden-Württemberg”

GERMAN INSTITUTE FOR CONSTRUCTION ENGINEERING
(DIBT)
Statutory Body

10829 Berlin, 23rd November 2007
Kolonnenstraße 30 L
Phone: 030 78730-364
Fax: 030 78730 – 320
Office: III 14 – 1.65.25-51/02

National Technical Approval

[translation]

Approval number: Z-65.25-341

Applicant: Sicherungsgerätebau GmbH
Hofstraße 10
57076 Siegen

Approved object: Leak detector based on the vacuum system of the VLX model for double wall pipes and flexible pipes (tubing) as well as fittings for water polluting liquids, with and without integrated vacuum generators.

Expiry of approval: 30th November 2012

The above-specified approved object is hereby granted the national technical approval certificate. This national technical approval comprises six pages and a two-page annex.

[stamp: German Institute for Construction Engineering]

II. PARTICULAR SPECIFICATIONS

1 Subject of approval and field of application

1.1 The approved object of this national technical approval are leak detectors based on the vacuum system of the VLX model, with alarm pressure switch values of ≥ 330 mbar, ≥ 500 mbar and ≥ 570 mbar with an integrated vacuum generator in the non-explosion-proof models VLX 330, VLX 500, VLX 570, in the completely explosion-proof model VLX 330/Ex, in the partly explosion-proof model VLX 330/A-Ex or VLX 330/A-MV-Ex in conjunction with the signalling module VLX/ME-MV-LS and in the partly explosion-proof model without an integrated vacuum generator, VLX 350/SA-Ex. The leak detectors may be installed to double wall pipes, flexible double wall pipes (tubing) and double wall fittings in accordance with section 1.2. Leaks in the walls of the interstitial space is established by the increase in pressure and is indicated visually and acoustically (see annex 1 for a model construction of the leak detector device).

1.2 The field of application encompasses double wall pipes in plant- and site-manufactured form, flexible double wall pipes (tubing) and double wall fittings in a plant-manufactured form for the extraction of water polluting liquid, as long as the interstitial space is suitable, according to the constructional use certificates issued (e.g. national technical approvals), for the integration of the leak detectors models in question with its alarm vacuum.

1.3 The leak detectors are suitable for installation to interstitial spaces whose inner walls are pressurized in the case of installing models VL330, VLX 500 and VLX 570 at a pressure of up to 5 bar, when installing models V330/Ex and VLX330/A-Ex at a pressure of up to 10 bar, and when installing model VLX350 SA/-Ex at a pressure of up to 25 bar.

1.4 The approval of operational reliability certificate of the approved object in the sense of section 1.1 is provided with this national technical approval in accordance with the German Institute for Construction Engineering's "Principles of Approval Procedures for Leak Detector Devices for Double Wall Pipes" (ZG-LAGR) of August 1994.

1.5 The national technical approval is issued irrespective of test- or authorization without prejudice to other legal areas (e.g. first decree from the Equipment Safety Act– Low Voltage Directive – Electromagnetic compatibility Act (EMVG), eleventh decree from the Equipment Safety Act – explosion protection).

1.6 Neither the determination of suitability in alignment with laws relating to water nor qualification approval in accordance with § 19 h of the Water Ecology Act (WHG)[1] apply to the approved object within this national technical approval.

2. Construction product specification

2.1 Composition

2.1.1 The VLX leak detector comprises display and operating elements, the vacuum pump (not in type VLX350/SA-Ex), the pressure switch and the electric control components (incl. output signals). The components and component parts of the respective models are specified in the technical description[2] (see annex 2).

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[1] German law on the management of water resources (Wasserhaushaltsgesetz – WHG) of 11th November 1996.
[2] The applicant's technical description of 28th March 2002 for models VLX…VLX../Ex, VLX…/A-Ex (points stand for the alarm pressure) and VLX350/SA-Ex.

Dependent upon the model of leak detector, no, some or all of the components are supplied in an explosion-proof form (see TÜV Nord [Technical Inspection Association Technischer Überwachungs Verein = Technical Supervising Organisation] approval certificate, file 8237 BL SGB/VLX of 07th May 2002 with replacement page 2 and technical description of the models concerned).

2.2 Manufacture and Labeling

2.2.1 Manufacture

The leak detectors may only be manufactured in the applicant's plants. They must correspond with respect to model, dimensions and materials presented in annex 2 of this national technical approval.

2.2.2 Labeling

The leak detector, its packaging or its delivery note must be labelled by the manufacturer with the compliance symbol (Ü-marking) in accordance with the compliance symbol regulations of the Laender (ÜZVO). Labeling may only be carried out if the preconditions of section 2.3 have been fulfilled. In addition to this, the leak detector is to be supplied with the following specifications:

- description of type
- approval number

2.3 Compliance certificate

2.3.1 General

Each manufacturing plant must confirm the compliance of the leak detectors with the specifications contained within this national technical approval by means of a manufacturer's declaration of compliance based on in-house production testing and an initial check of the leak detector using a by an inspection body recognized for this purpose.

2.3.2 In-house production testing

An in-house production test is to be arranged and carried out at the manufacturer's plant. A routine check test of each leak detector is to be carried out within the framework of the production test. Through a routine check test, the manufacturer is to guarantee that the materials, dimensions and fits as well as the design corresponds to the type model and that the leak detector operates reliably. The results of the in-house production tests are to be recorded and evaluated. The records must at least contain the following information:

- Description of the leak detector
- Type of test or check
- Date of manufacture and leak detector test
- Results of the tests or checks
- Signature of those responsible for the in-house production test.

The records are to be retained for at least 5 years. They are to be presented to the German Institute for Construction Engineering or the highest construction supervising authorities upon request.

If the test results are unsatisfactory, the measures necessary for eliminating the deficiency are to be carried out immediately by the manufacturer. The approved object which does not correspond to the specifications is to be handled in such a way that there can be no confusion with respect to compliant objects. After the deficiency has been eliminated, as far as is technically possible and upon proof of the elimination of the deficiencies, the test in question is to be repeated immediately.

2.3.3 Initial test by a recognized inspection body

The operational tests cited in “Principles of Approval Procedures for Leak Detectors for Double Wall Pipes” are to be carried out within the framework of the initial test. If the basic test certificates were issued for the national technical approval on the basis of running production, these tests replace the initial test.

3 Design specifications

3.1 In order to guarantee the alarm functioning, the leak detectors’ parameters for application, with respect to the height, dependent upon the method of installation of the pipes and upon the leak detector model and device variant (alarm switch value), and dependent upon the density of the conveyed product, are to be taken from the specifications in the technical description for the respective leak detector models (VLX…, VLX…/Ex, VLX…/A-Ex or VLX…/SA-Ex). If leak detectors are being used for underground pipes or flexible pipes (tubing), a density of 1.0 kg/dm³ is always to be assumed.

3.2 The leak detectors’ parameters for application with respect to the permissible pressure on the inner walls of the interstitial spaces are to be observed in accordance with section 1.3.

3.3 The leak detectors may only be used on double wall pipes, flexible pipes (tubing) and fittings whose liquid flow does not have a tendency towards either a high viscosity or deposits of solid matter.

When selecting the leak detector, it must be ensured that the materials of the respective leak detector model (dependent upon the model, either brass Ms 58 or stainless steel material no. 1.4301, 1.4306 or 1.4541, or other material for connecting lines is used) are sufficiently resistant to the liquid flow (see footnote[3] for stainless steel). When selecting the leak detector, the field of application specified in the technical descriptions of the respective leak detector model should also be observed concerning the liquid flow with respect to the flashpoint, to potentially explosive vapor-air mixtures, to its gas group classification (II A, II B or II C), as well as to temperature codes (T 1 to T 6).

If, in individual pipes being monitored by a shared leak detector, water polluting liquids are extracted which differ in composition and character, the monitoring of the individual pipes with a shared leak detector is only permissible if it can be established or proven that these liquids do not cause dangerous chemical reactions together.

4 Installation specifications

4.1 (1) The leak detector must be installed in accordance with section 4 of the technical description for the respective model and must be put into operation in accordance with section 5. Only those companies which are specialist companies, according to § 19 1 Water Ecology Act (WHG), with respect to the installation, maintenance, set-up and cleaning of the leak detector may be commissioned to carry out these tasks.

(2) The tasks described in (1) need not be carried out by specialist companies if they are exempted from the specialist company obligation according to Laender legislation or if the manufacturer of the approved object carries out the tasks using its own specialist personnel. Health and safety regulations remain unaffected.

[3] Resistance certificate in accordance with DIN 6601 of October 1991 “Material resistance of steel containers/tanks in relation to liquids”.

4.2 The switch values of alarm ON and pump OFF, and the installation of the individual components of the leak detectors in areas which are either not endangered by explosion or are endangered, shall correspond to the specifications of the technical descriptions of the respective leak detector model.

4.3 If the leak detector is installed to interstitial spaces of aboveground or underground pipes containing flammable liquids with a flashpoint of ≤ 55°C, solid connection lines are to be provided which correspond at least to pressure level PN 10 and are supplied in such a way that, in the case of leakage, they resist the system pressure burden (maximum of 25 bar) equally in interstitial spaces of both aboveground and underground pipes containing non-flammable liquids.

4.4 Before setting up the leak detector, its connection lines should undergo a pressure test with 1.1 times the maximum permissible pressure of the liquid flow on the pipe wall (at least 5.0 bar, however). The interstitial space must not be pressurized with excess pressure, unless there is a test certificate for safety against warping of the inner pipe.

4.5 The leak detector should be installed in such a way as to ensure that heat radiation does not lead to an increase in the housing temperature of ≥ 50°C (do not install directly next to heat sources) or that, in the case of storage media with a temperature of ≥ 40°C, the heat is not transferred to the leak detector through the air intake (for example through cooling sections between the interstitial space and the leak detector in the form of copper piping, with a minimum length of 1.5 m).

5. Specification for use, maintenance and repeated testing

5.1 The maintenance work and function tests may only be carried out by the operator's specialist personnel. The function and operating safety of the leak detector is to be tested at least once a year. Maintenance of the leak detector must be carried out in accordance with the specifications for maintenance in section 6 of the technical description for the respective leak detector.

5.2 The technical specification of the model being delivered is to be supplied by the manufacturer.

Strasdas

Authenticated

[stamp:
German Institute for
Construction Engineering]

GERMAN INSTITUTE FOR CONSTRUCTION ENGINEERING (DIBT)

Statutory body

10829 Berlin, 23rd November 2007
Kolonnenstraße 30 L
Phone: 030 78730-364
Fax: 030 78730 – 320
Office: III 14 – 1.65.22-50/02

National Technical Approval

[translation]

Approval number: Z-65.22-340

Applicant: Sicherungsgerätebau GmbH
Hofstraße 10
57076 Siegen

Object of approval: Leak detector based on the vacuum system of the VLX model, with and without integrated vacuum generators for tanks and tubs for storing water polluting liquid.

Expiry of approval: 30th November 2012

The above-specified object is hereby granted national technical approval certificate. This national technical approval comprises six pages and a two-page annex.

[stamp: German Institute for Construction Engineering]

II. PARTICULAR SPECIFICATIONS

1 Subject of approval and field of application

1.1 The subject-matter of this national technical approval are leak detectors based on the vacuum system of the VLX model, with alarm pressure switch values of ≥ 34 mbar, ≥ 330 mbar, ≥ 500 mbar and ≥ 570 mbar with an integrated vacuum generator in the non-explosion-proof models VLX 34, VLX 330, VLX 500, VLX 570, in the completely explosion-proof models VLX 34/Ex and VLX 330/Ex, in the partly explosion-proof models VLX 34/A-Ex or VLX 34/A-MV-Ex in conjunction with signalling module VLX/ME-MV-LS and VLX 330/A-Ex or VLX 330/A-MV-Ex in conjunction with signalling unit VLX/ME-MV-LS and in the partly explosion-proof model without an integrated vacuum generator, VLX 350/SA-Ex. The leak detectors may be installed to double wall tanks and tubs as well as to double wall bottoms of flat-bottom tanks in accordance with DIN 4119[1], section 1.2. Leaks in the walls of the interstitial space is established by the increase in pressure and is indicated visually and acoustically (see annex 1 for a model construction of the leak detector device).

1.2 The field of application is restricted to double wall steel tanks in accordance with the standards: DIN [*Deutsche Industrie Norm* = German Industry Standard] 6608-2[2], DIN 6616[3] Form A, DIN 6618-2[4], DIN 6619-2[5], DIN 6623-2[6], and DIN 6624-2[7] concerning storage, filling and handling of water polluting liquids. The leak detectors can also be used on double wall tanks and tubs, as well as single wall tanks with a leakdetection lining or a leak detection jacketing (e.g. tanks with a leak detection lining in accordance with DIN 6625[8]), as well as with double wall bottoms of flat-bottom tanks in accordance with DIN 4119, as long as the interstitial space is suitable for the integration of the leak detector model with its alarm vacuum, in accordance with its national technical approvals.

1.3 The leak detectors are suitable for installation to interstitial spaces whose inner walls are pressurized in the region of the suction pipe connection in the case of installing model VLX … at a pressure of up to 5 bar, when installing models VLX… /Ex and VLX…/A-Ex at a pressure of up to 10 bar, and when installing model VLX … SA/-Ex at a pressure of up to 25 bar.

1.4 With the exception of model VLX 350/SA-Ex and those with an alarm switch pressure value of ≥ 34 mbar, the field of application of the leak detectors also extends to the replacement of liquid leak detectors in double wall, underground tanks in accordance with standard DIN 6608-2.

1.5 The function safety certificate of the approved object in the sense of section 1.1 is provided in accordance with the German Institute for Construction Engineering's "Principles of Approval Procedures for Leak Detector Devices for Tanks" (ZG-LAGB) of August 1994.

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[1] DIN 4119 Aboveground metallic cylindrical flat-bottom tank structures part 1: Foundation, design, test – June 1979 issue / Part 2: Calculation – February 1980

[2] DIN 6608-2: 1989-09 Horizontal steel tanks, double wall, for underground storage of water polluting, flammable and non-lammable liquids.

[3] DIN 6616: 1989-09 Horizontal steel tanks, double wall, for aboveground storage of water polluting, flammable and non-flammable liquids, form A.

[4] DIN 6618-2: 1989-09 Vertical steel tanks, double wall, without a display of leakage liquid for aboveground storage of water polluting, flammable and non-flammable liquids.

[5] DIN 6619-2: 1989-09 Vertical steel tanks, double wall, for underground storage of water polluting, flammable and non-flammable liquids.

[6] DIN 6623-2: 1989-09 Vertical steel tanks, double wall, volume <1,000 litre, for aboveground storage of water polluting, flammable and non-flammable liquids.

[7] DIN 6624-2: 1989-09 Horizontal steel tanks, double wall, volume between 1,000 and 5,000 litres, for aboveground storage of water polluting, flammable and non-flammable liquids.

[8] DIN 6625: 1989-09 On-site manufactured steel tanks (tanks) for aboveground storage of water polluting, flammable liquids of danger class AIII and water polluting, non-flammable liquids; part 1: Principles of construction and Testing. part 2: Calculation

1.6 The national technical approval is issued irrespective of test- or authorization without prejudice to other legal areas (e.g. first decree from the Equipment Safety Act– Low Voltage Directive – Electromagnetic compatibility Act (EMVG), eleventh decree from the Equipment Safety Act – explosion protection).

1.7 Neither the determination of suitability in alignment with laws relating to water nor qualification approval in accordance with § 19 h of the Water Ecology Act (WHG)[9] apply to the approved object within this national technical approval.

2. Construction product specification

2.1 Composition

2.1.1 The VLX leak detector comprises display and operating elements, the vacuum pump (not included in type VLX…/SA-Ex), the pressure switch and the electric control components (incl. output signals). The components and component parts of the respective models are specified in the technical description[10] (see annex 2). Dependent upon the model of leak detector, no, some or all of the components are supplied in an explosion-proof form (see TÜV-Nord [Technical Inspection Association, Northern Germany] approval certificate, file 8237 BL SGB/VLX of 07th May 2002 with replacement page 2 and technical description of the models concerned).

2.2 Manufacture and Labeling

2.2.1 Manufacture
The leak detectors may only be manufactured in the applicant's plants. They must correspond with respect to model, dimensions and materials presented in annex 2 of this national technical approval.

2.2.2 Labeling
The leak detector, its packaging or its delivery note must be labelled by the manufacturer with the compliance symbol (Ü-marking) in accordance with the compliance symbol regulations of the Laender (ÜZVO). Labeling may only be carried out if the preconditions of section 2.3 have been fulfilled. In addition to this, the leak detector is to be supplied with the following specifications:
- description of type
- approval number

2.3 Compliance certificate

2.3.1 General
Each manufacturing plant must confirm the compliance of the leak detectors with the specifications contained within this national technical approval by means of a manufacturer's declaration of compliance based on in-house production testing and an initial check of the leak detector by an inspection body recognized for this purpose.

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[9] German law on the management of water resources (Wasserhaushaltsgesetz – WHG) of 11th November 1996.
[10] The applicant's technical description of March 2002 for models VLX... VLX../Ex, VLX.../A-EX (points stand for the alarm pressure) and VLX350/SA-EX.

2.3.2 In-house production testing

An in-house production test is to be arranged and carried out at the manufacturer's plant. A routine test of each leak detector is to be carried out within the framework of the production test. Through a routine test, the manufacturer is to guarantee that the materials, dimensions and fits as well as the design corresponds to the type model and that the leak detector operates reliably. The results of the in-house production tests are to be recorded and evaluated. The records must contain at least the following information:

- Description of the leak detector
- Type of test or check
- Date of manufacture and leak detector test
- Results of the tests or checks
- Signature of those responsible for the in-house production test.

The records are to be retained for at least 5 years. They are to be presented to the German Institute for Construction Engineering or to the highest construction supervisory authorities upon request.

If the test results are unsatisfactory, the measures necessary for eliminating the deficiency are to be carried out immediately by the manufacturer. Subject-matter of the approval which does not correspond to the specifications is to be handled in such a way that there can be no with respect to compliant objects. After the deficiency has been eliminated, as far as is technically possible and upon proof of the elimination of the deficiencies, the test in question is to be repeated immediately.

2.3.3 Initial test by a recognized inspection body

The operational tests cited in "Principles of Approval Procedures for Leak Detectors for Tanks" are to be carried out within the framework of the initial test. If the basic test certificates were issued for the national technical approval on the basis of running production, these tests replace the initial test.

3 Design specifications

3.1 In order to guarantee alarm functioning, the leak detectors' parameters for application with respect to the tank height and diameter for the respective tank type, in relation to the density of the stored product and dependent upon the leak detector model and device variant (alarm switch value), are to be taken from the specifications in the technical description for the respective leak detector models (VLX…, VLX…/Ex, VLX…/A-Ex or VLX…/SA-Ex). If leak detectors are being used for tanks stored underground, a density of 1.0 kg/dm³ is always to be assumed.

3.2 The leak detectors' parameters for application with respect to the permissible pressure on the inner walls of the interstitial spaces are to be observed in accordance with section 1.3.

3.3 The leak detectors may only be used in tanks and tubs whose storage liquids do not have a tendency towards either a high viscosity or deposits of solid matter. When selecting the leak detector, it must be ensured that the materials of the respective leak detector model (dependent upon the model, either copper Ms 58 or stainless steel bearing material no. 1.4301, 1.4306 or 1.4541, or other material for connecting lines is used) are sufficiently resistant to the stored product in the tanks (see footnote[8] for stainless steel). When selecting the leak detector, the field of application specified in the technical descriptions of the respective leak detector model should also be observed concerning the stored product in the tanks with respect to the flashpoint, to potentially explosive vapor-air mixtures to its gas group classification (II A, II B or II C), as well as to temperature codes (T 1 to T 6).

[8] Resistance certificate in accordance with DIN 6601 of October 1991 "Material resistance of steel tanks in relation to liquids".

4 Installation specifications

4.1 (1) The leak detector shall be installed in accordance with section 4 of the technical description for the respective model and must be put into operation in accordance with section 5. In accordance with standard DIN 6608-2, Annex A to the technical description of the leak detector concerned is also to be observed when replacing liquid detectors on underground double wall tanks with respect to the approved object. Only those companies which are specialist companies, according to § 19 1 Water Ecology Act (WHG), with respect to the installation, maintenance, repair and cleaning of the leak detector may be commissioned to carry out these tasks.
(2) The tasks described in (1) need not be carried out by specialist companies if they are exempted from the specialist company obligation according to Laender legislation or if the manufacturer of the approved object carries out the tasks using its own specialist personnel. Health and safety regulations remain unaffected.

4.2 The switch values of alarm ON and pump OFF, and the installation of the individual components of the leak detectors in areas which are either not or are potentially explosive, shall correspond to the specifications of the technical descriptions of the respective leak detector model.

4.3 If the leak detector is installed to interstitial spaces of aboveground or underground tanks holding flammable liquids with a flashpoint of ≤ 55°C, solid connection lines are to be provided which correspond at least to pressure level PN 10 and are supplied in such a way that, in the case of leakage, they resist the system pressure burden (at a maximum of 25 bar) equally in interstitial spaces of both aboveground and underground tanks with non-flammable liquids.

4.4 Before setting up the leak detector, its connection lines should undergo a pressure test with 1.1 times the maximum permissible pressure of storage liquid on the tank wall in view of the pressure impact of the tanks (at least 5.0 bar, however). The interstitial space shall not be pressurized with excess pressure.

4.5 The leak detector should be installed in such a way as to ensure that heat radiation does not lead to an increase of the housing temperature of ≥ 50°C (do not install directly next to heat sources) or that, in the case of storage media with a temperature of ≥ 40°C, the heat is not transferred to the leak detector through the air intake, for example through cooling sections between the interstitial space and the leak detector in the form of copper piping, with a minimum length of 1.5 m.

5. Specification for use, maintenance and repeated testing

5.1 The maintenance work and function tests may only be carried out by the operator’s specialist personnel. The function and operating safety of the leak detector is to be tested at least once a year. Maintenance of the leak detector must be carried out in accordance with the specifications for maintenance in section 6 of the technical description for the respective leak detector.

5.2 The technical specification of the model being delivered is to be supplied by the manufacturer.

Strasdas

Authenticated

[stamp:
German Institute for
Construction Engineering]

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 04 ATEX 2112 X

(4) Equipment: Low-pressure leakage indicator, type VLX... or VL-H9...

(5) Manufacturer: Sicherungsgerätebau GmbH

(6) Address: Hofstraße 10, 57076 Siegen, Germany

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

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 04-24280 .

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

EN 50014:1997 + A1 + A2 **EN 50018:2000** **EN 50019:2000**

EN 50028:1987 **EN 50284:1999**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 1/2 G EEx m e d IIB T4 *

with flame arrester: II G IIB3

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, December 13, 2004

* By SGB limited to T3

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 04 ATEX 2112 X

(15) Description of equipment

The low-pressure leakage indicator, type VLX... or VL-H9... is used for the leakage monitoring of containers (tanks) and pipings for the storage and conveyance of flammable liquids which are hazardous to water and which may form gas/vapour/air-mixtures assigned to explosion group IIB3 and temperature class T4 and for which category-1 equipment is required according to equipment group II.

The low-pressure leakage indicator consists of a mounting enclosure into which the following components are installed: A pump and a solenoid of type of protection Encapsulation "m", a housing with two pressure-operated switches of type of protection Flameproof Enclosure "d" and a terminal box of type of protection Increased Safety "e". The pump, the solenoid and the housing for the pressure-operated switches are interconnected with the control room by means of pipings.

Electrical equipment separately certified for category 2, is separated from areas requiring category-1 equipment by means of flame arresters which are approved for explosion group IIB3 according to EN 12874:2001.

Due to its venting measures, the mounting enclosure is suitable for the installation of further equipment which is separately certified for category 2.

Electrical data

Mains supply	230 V, 50 W, 50/60 Hz
Pump	230 V, 28 W, 50/60 Hz
Pressure-operated switch	230 V, 1 A, cos(phi) $\geq$ 0.9
Solenoid	230 V, 8.5 W, 50/60 Hz

(16) Test report PTB Ex 04-24280

(17) Special conditions for safe use

1. The low-pressure leakage indicator, type VLX... or VL-H9... is suitable for the installation in hazardous areas where category-2 equipment is required according to the fixings of equipment group II.

2. The suction and pressure pipes of the diaphragm pump shall be connected to the tank and/or to the tank venting elements by means of suitable flame arresters such as deflagration protection and/or detonation guards.
3. When the gas pipes are applied with test taps, it shall be guaranteed that these are mounted into the gas pipes and shut off, both, with a minimum degree of protection of IP67. Otherwise the test taps shall be secured with flame arresters.
4. Only equipment, which is explosion protected as category-1 equipment according to the fixings of equipment group II, may be connected to the test taps.
5. The low-pressure leakage indicator, type VLX... or VL-H9... shall be installed outdoor or in suitably vented rooms as such, that sufficient venting of the mounting enclosure is guarateed by convection through the breathers.
6. The low-pressure leakage indicator shall be included in the local equipotential bonding system.
7. The low-pressure leakage indicator shall be subject to a recurrent leak test.
8. The low-pressure leakage indicator has been evaluated exclusively concerning its zone-separation. Further requirements to e.g. pipings, tank facilities, function of the leakage indicator, etc. shall be considered separately.

(18) Essential health and safety requirements

met by compliance with the standars mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, December 13, 2004

Warranty

Dear customer,

You have purchased a high-quality leak detector from our company.

All of our leak detectors undergo a 100% quality control examination.

The type plate with the serial number is only affixed after all test criteria have been complied with.

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

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

Our warranty will be effective only if the customer submits to us the functional report or test report on initial putting into service, prepared by a recognised company specialised in water and water protection systems, including the serial number of the leak detector.

Our warranty shall not apply in the event of faulty or improper installation or improper operation, or if modifications or repairs are carried out without the manufacturer's consent.

In case of malfunction, please contact your local specialist company:

Stamp of the specialist company

Yours sincerely

SGB GmbH
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