Vacuum leak detector

VLX .. Ex

Documentation VLX .. Ex

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Please read
the instructions
before commencing
any work!

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1. Subject

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

CAUTION! The protection of the device can be impaired if it is not used as specified by the manufacturer.

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[1]/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 vapour-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)[2]or 1.4571[3], as well as the material used for the connecting lines, must be sufficiently resistant to the stored product [4] .

[1] Double-walled armatures may be integrated into the pipes. Double-walled armatures can also be monitored for themselves with this leak detector; use corresponding installation examples for pipes.

[2] See DIN 6601, center section

[3] See DIN 6601, right section

[4] 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[5].

(3) Comply with relevant regulations regarding electric installation[6], (e.g. EN 60 079-14) explosion protection[7] (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.

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

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 vapour-air mixture (work should be performed only at a concentration of 50% below the lower explosion limit)[8].
- 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.

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[5] For Germany: Specialist firms according to the Federal Water Act, which have verified their qualification for the installation of leak detection systems including those required for working in hazardous areas.
For Europe: Authorisation from the manufacturer.

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

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

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

(3) If the leak detector is 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) Colour 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)[9]:
Type 330: L_{max} 8 m
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.

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

(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 6 mm inside clearance: **35 m (F 501 + F 502)**
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.
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[10], 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[11] 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.

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

[10] Et al not open to the public/people

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

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 “mute” button.)
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 „mute“ button 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 (classified) 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[12].

(2) Once a year [13] to ensure functional and operational safety.

[12] For Germany: Expertise or under the responsibility of a qualified person.
For Europe: Authorization from the manufacturer.

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

(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 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) The pump has to be changed after 30000 h (working hours (rotation) of the pump).

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.

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

(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 „mute“ button.

(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 > 550 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 litre	**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 „mute“ button, if available.

(5) Inform the installation company.

(6) The installation company must detect the cause and correct it.
CAUTION: Depending on the tank, 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 precaution 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).

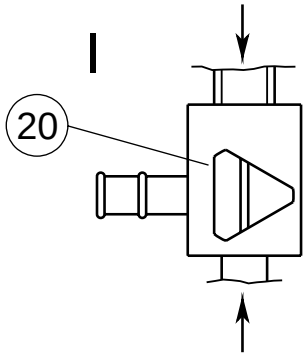
8. Marking

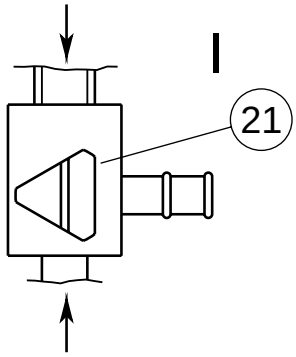
- Type
- Electrical data
- Manufacturer or manufacturer symbol
- Date of manufacture (month/year)
- Serial number
- Symbol specified by law
- Explosion data

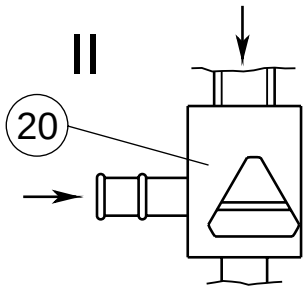
9. Index Used

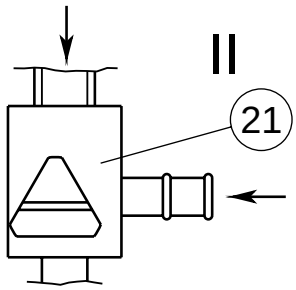
01 ”Alarm” signal light, red
02 Stop cock
03 Exhaust line
09 ”Operating” signal light, green
11 Vacuum switch
18 Explosion protection device
20 Three-way valve in suction line
21 Three-way valve in measuring line
24.1 Fuse, motor, MT 1 A
24.2 Fuse, external signal, MT 0.1 A
27 Liquid stop valve
27* Liquid stop valve, installed against direction of flow
30 Housing

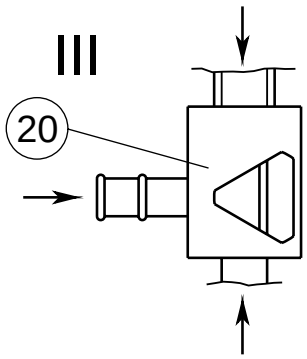
33 Condensate trap
41 Alarm switch in 11
42 Pump switch in 11
43 Measuring line
57 Test valve
59 Relay
60 Vacuum pump
68 Suction line
69 Buzzer
71 „Mute“ button
73 Interstitial space
74 Connecting line
82 Installation pump connection
88 Double-walled pipe
95 Pressure-compensating vessel
96 Node point
101 Suction line leading to the low point

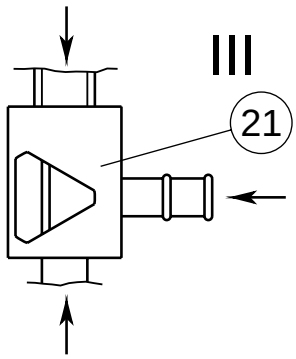


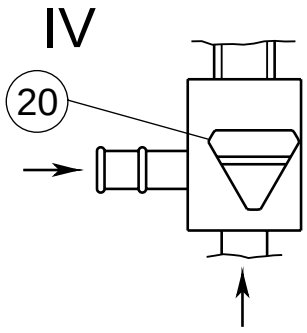


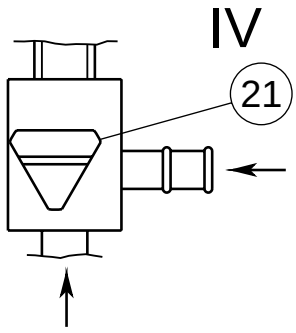












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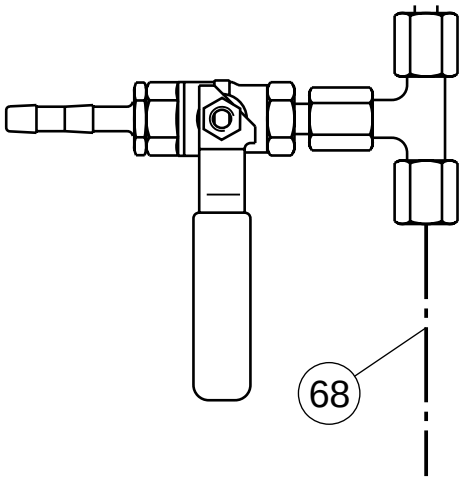

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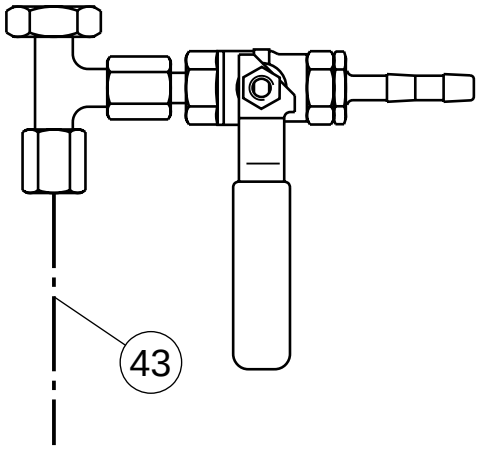

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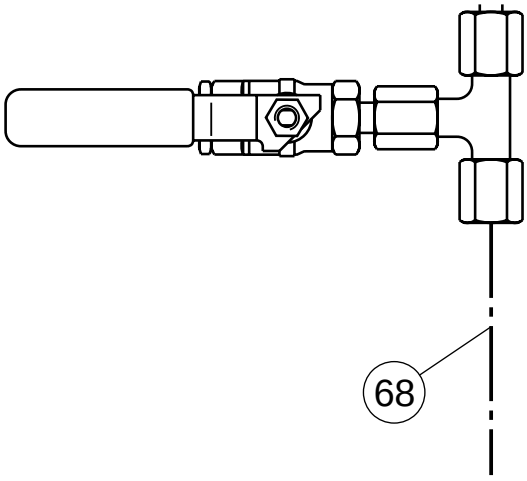

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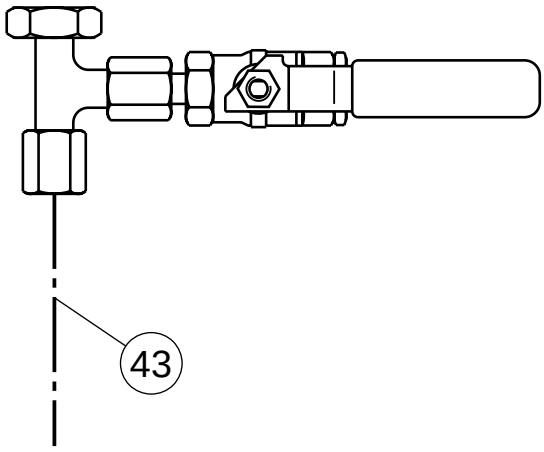

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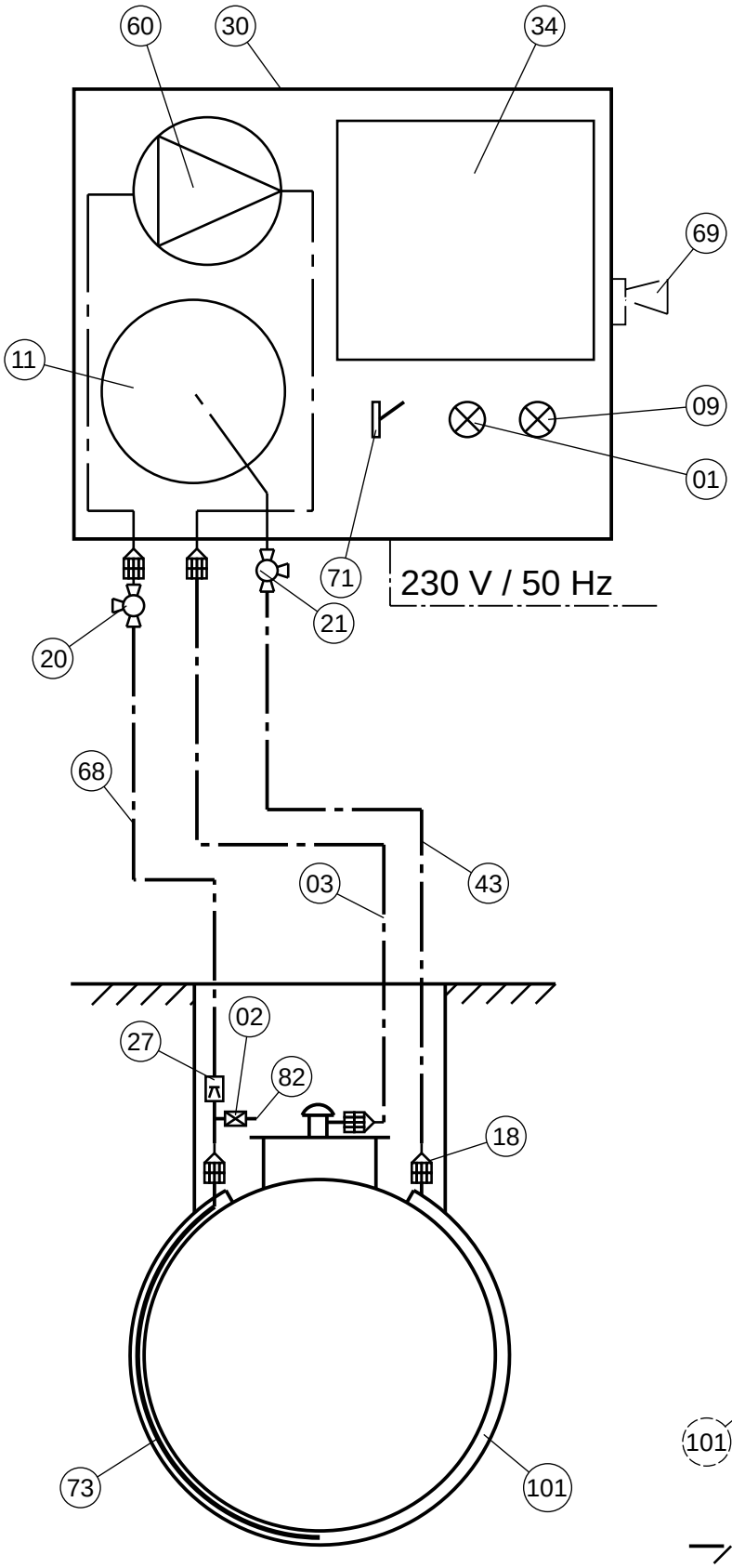
60
30
34
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11
09
01
71
230 V / 50 Hz
21
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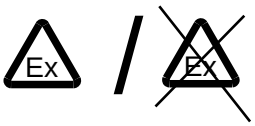
68
43
03
02
27
82
18
73
101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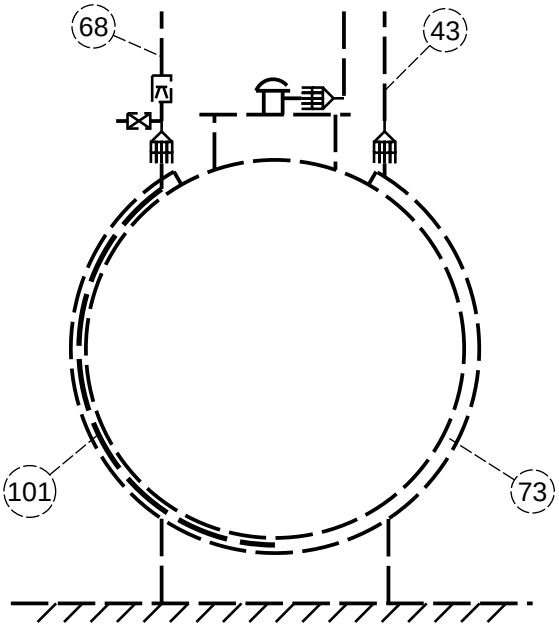
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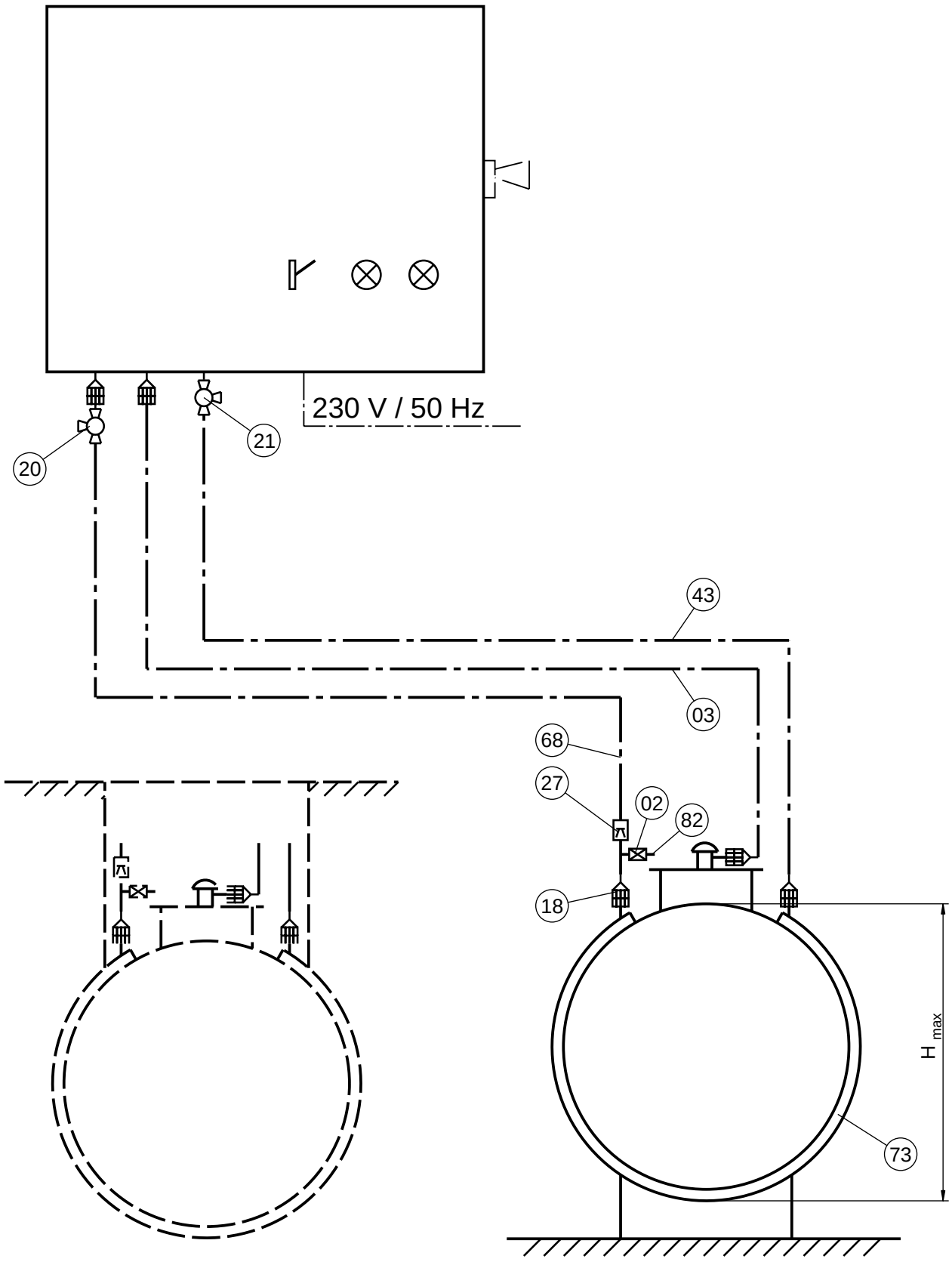

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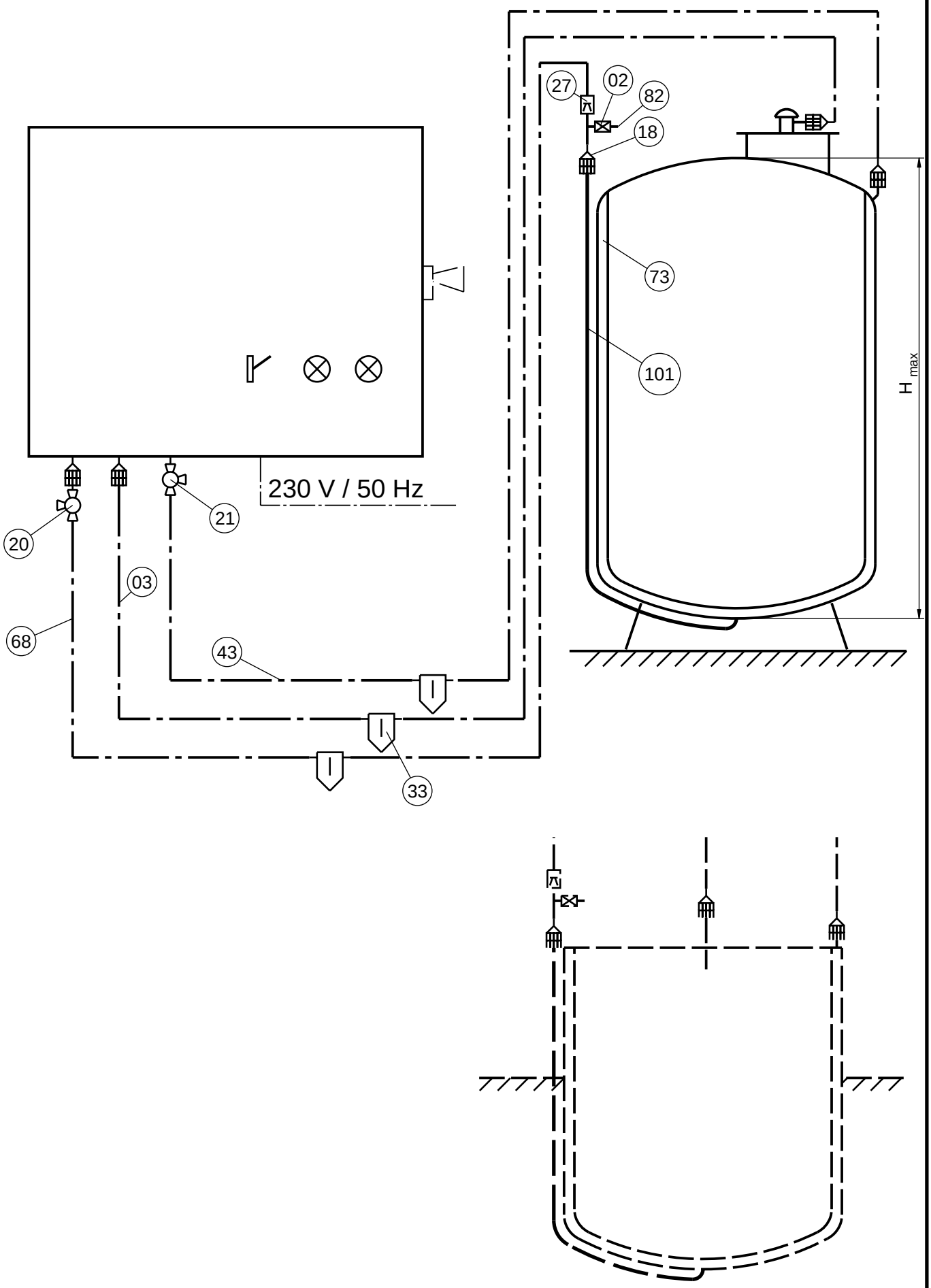

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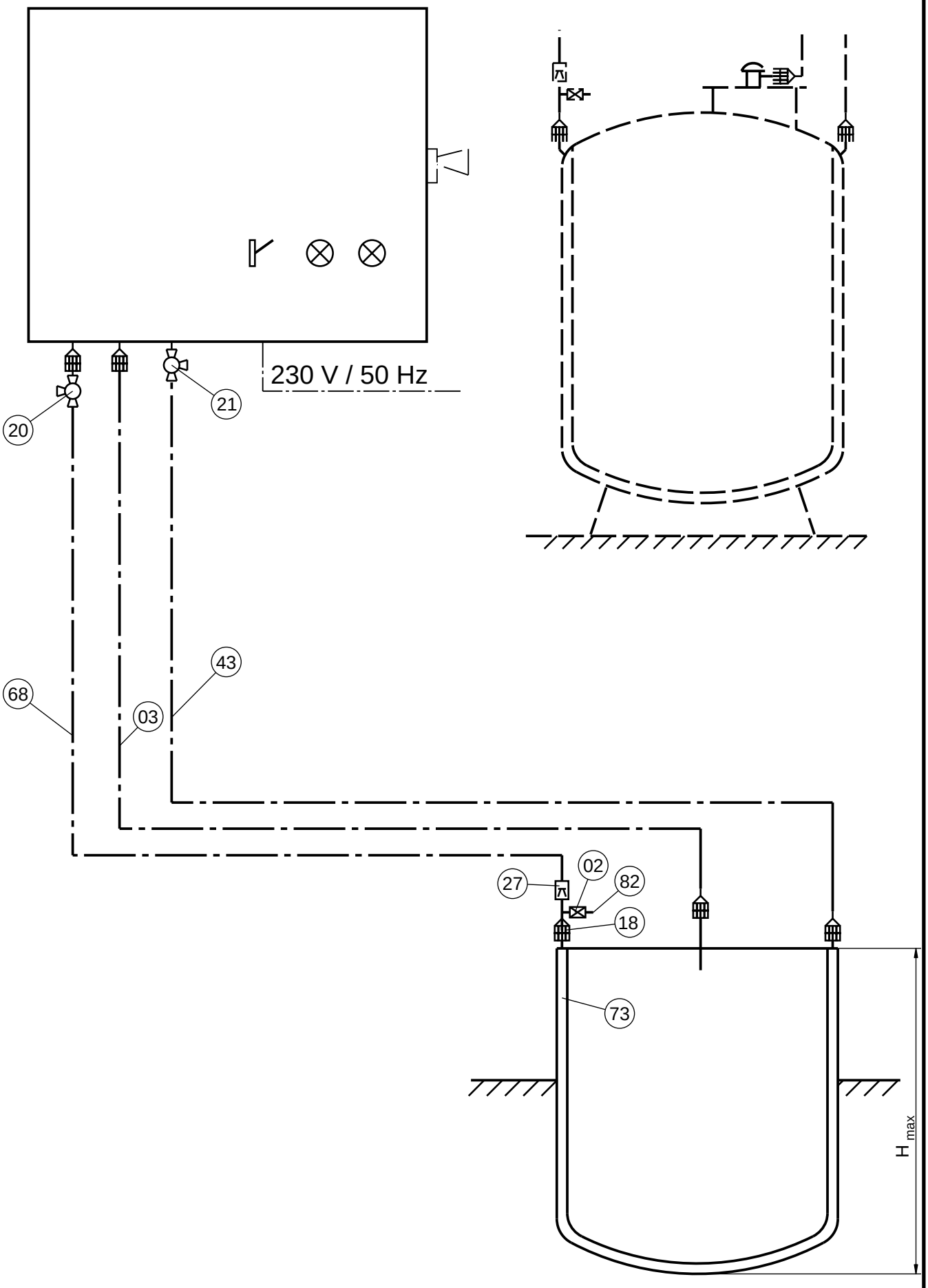

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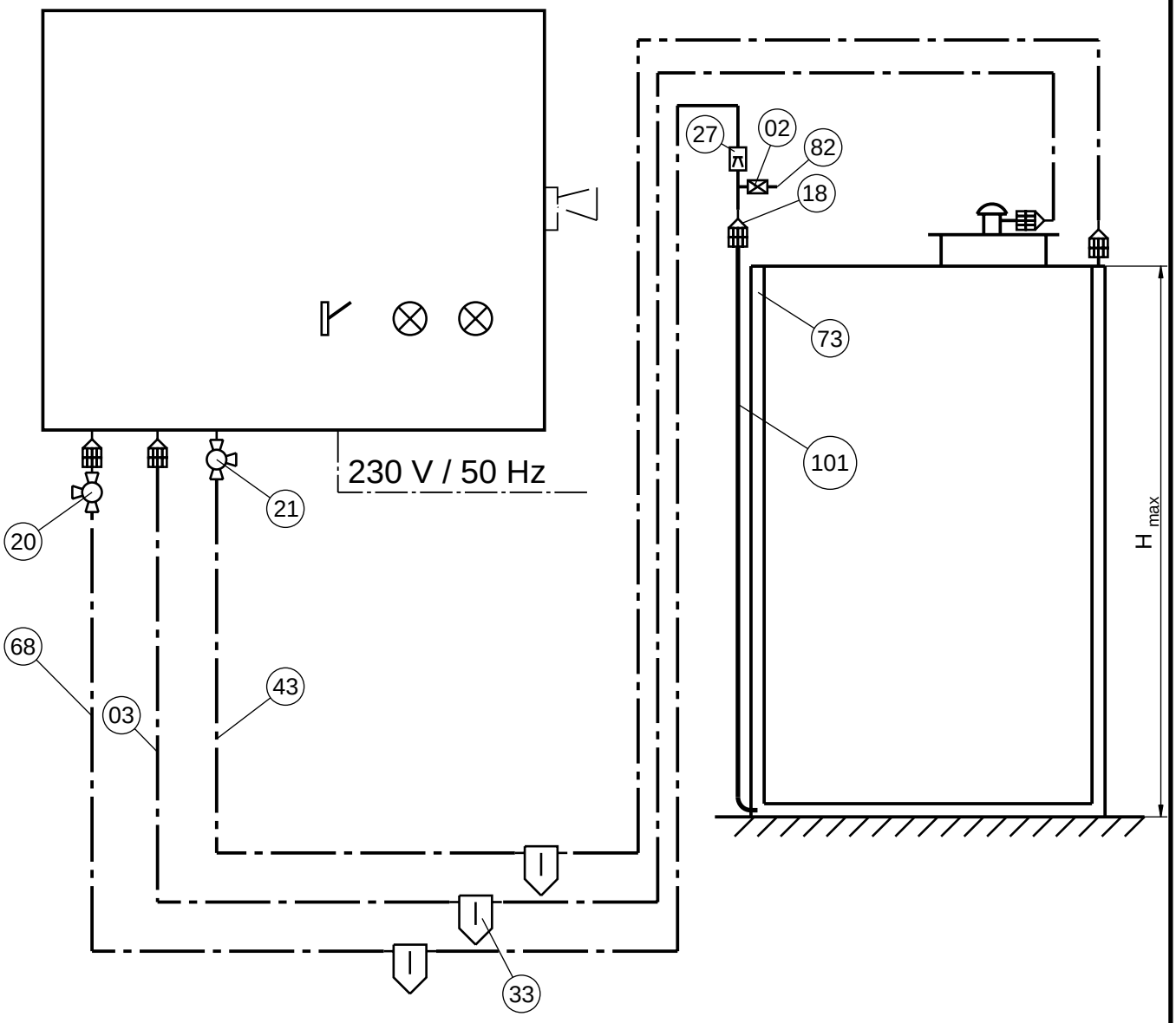

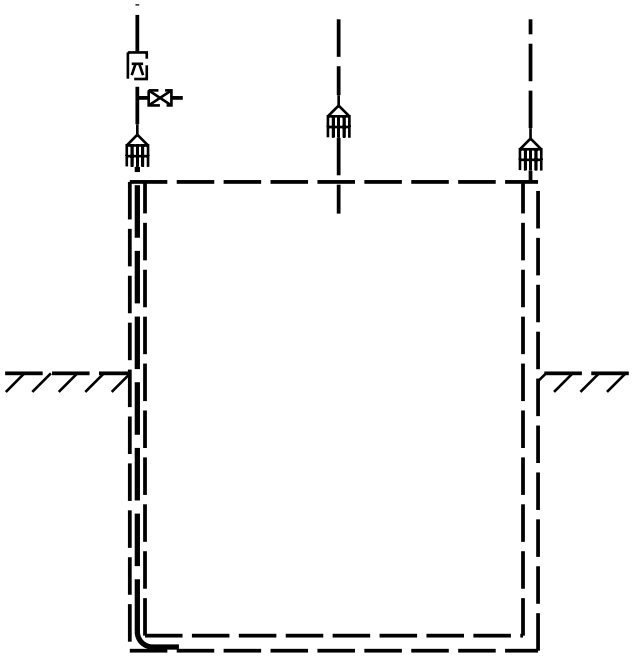

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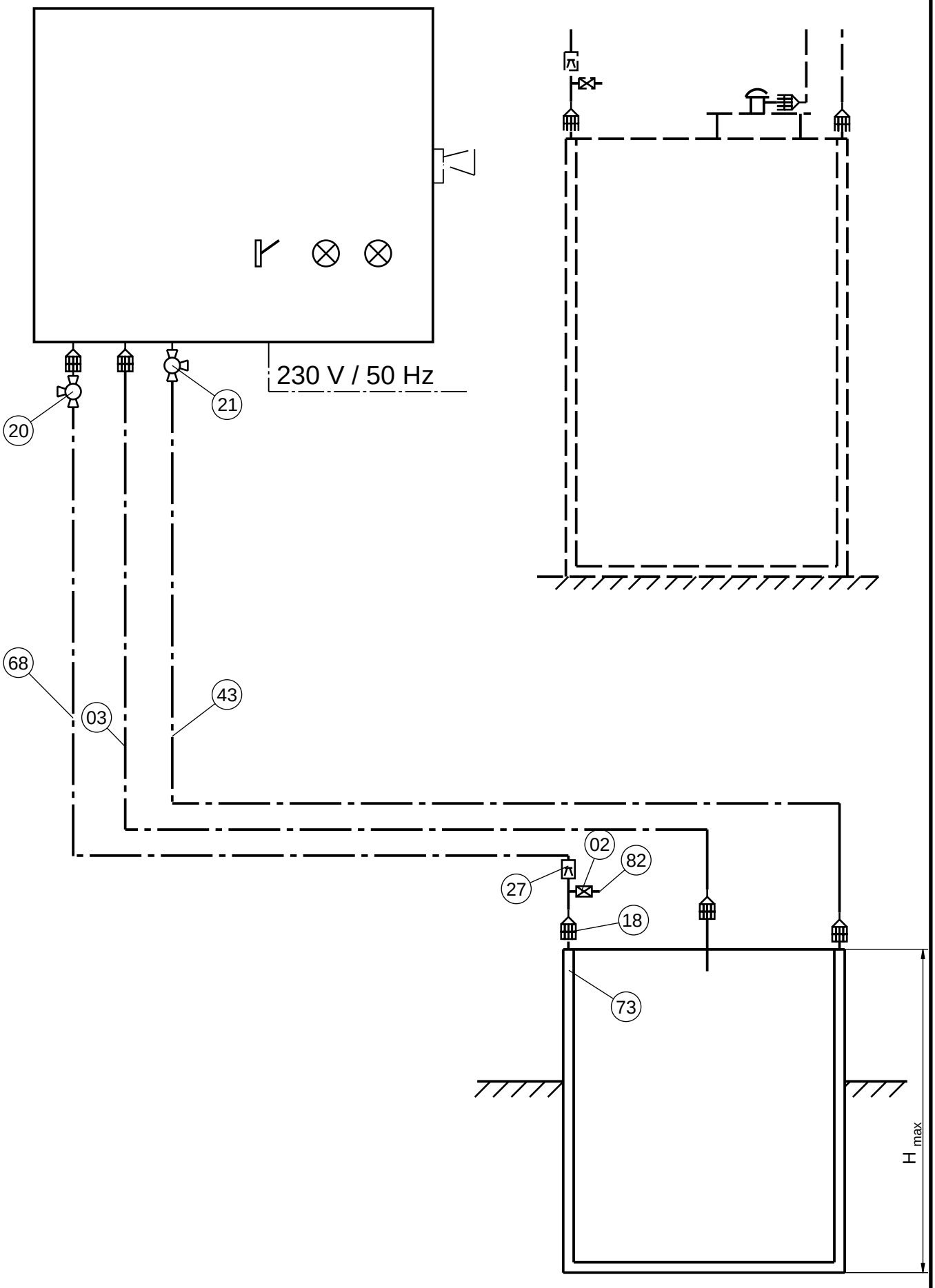

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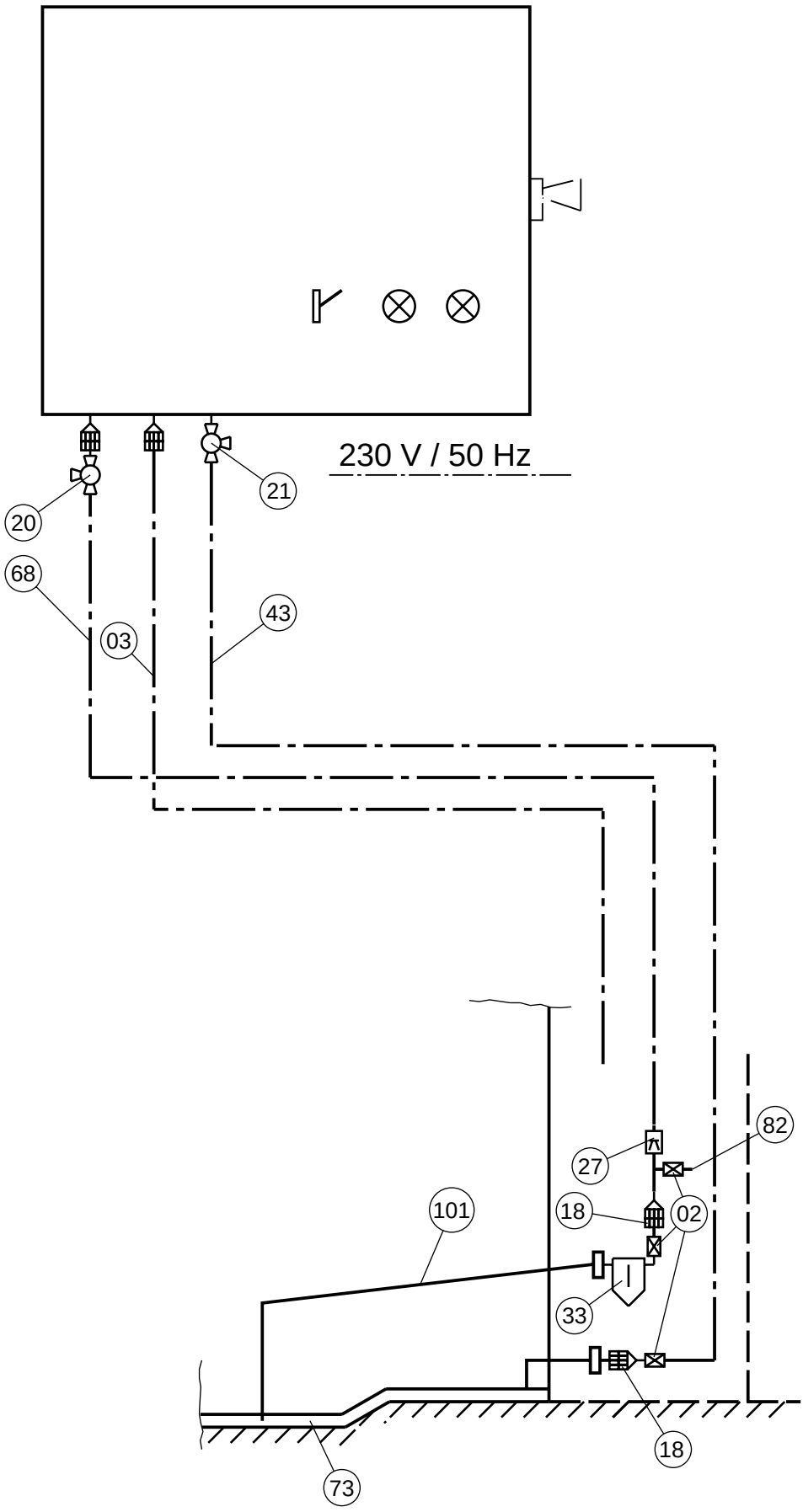

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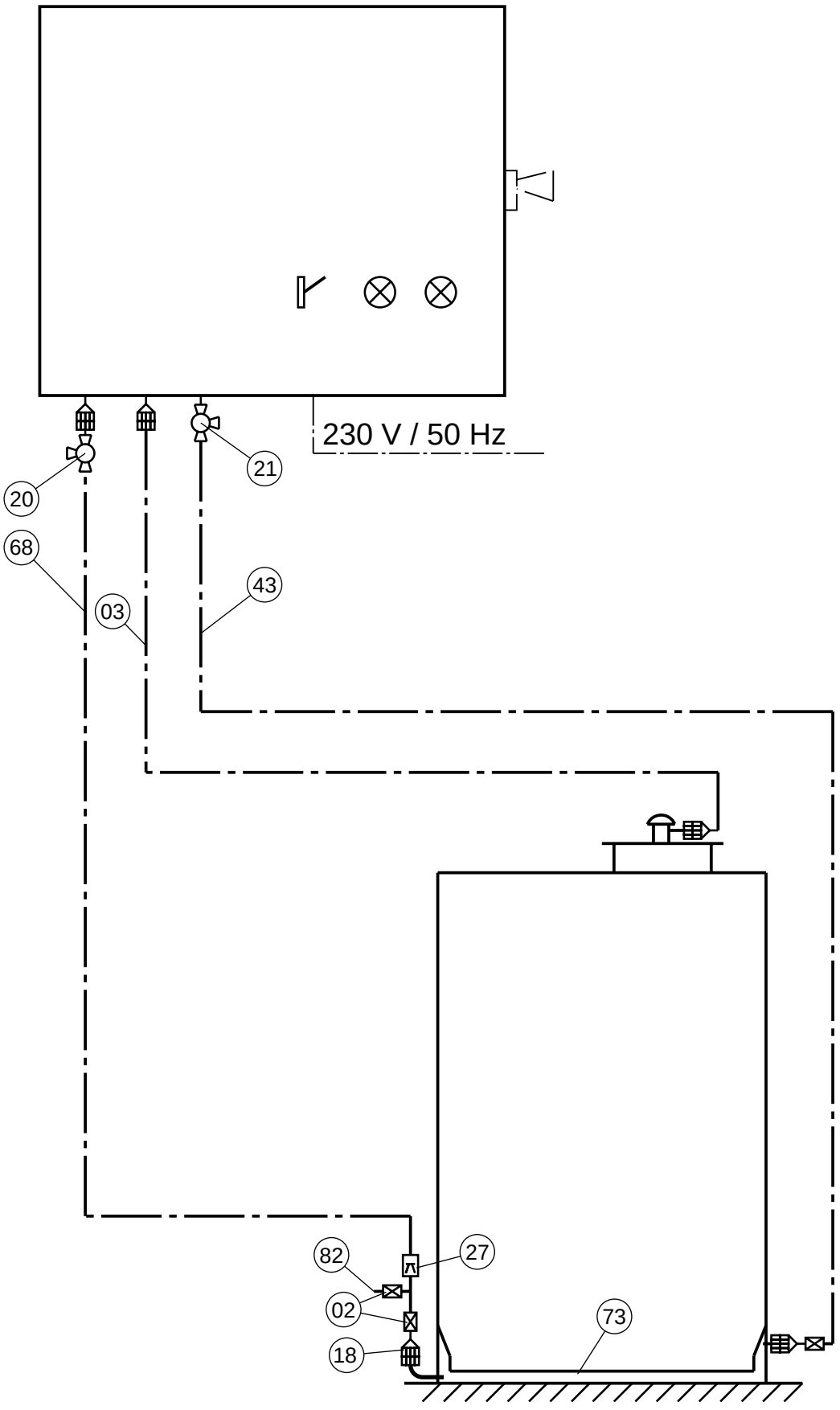

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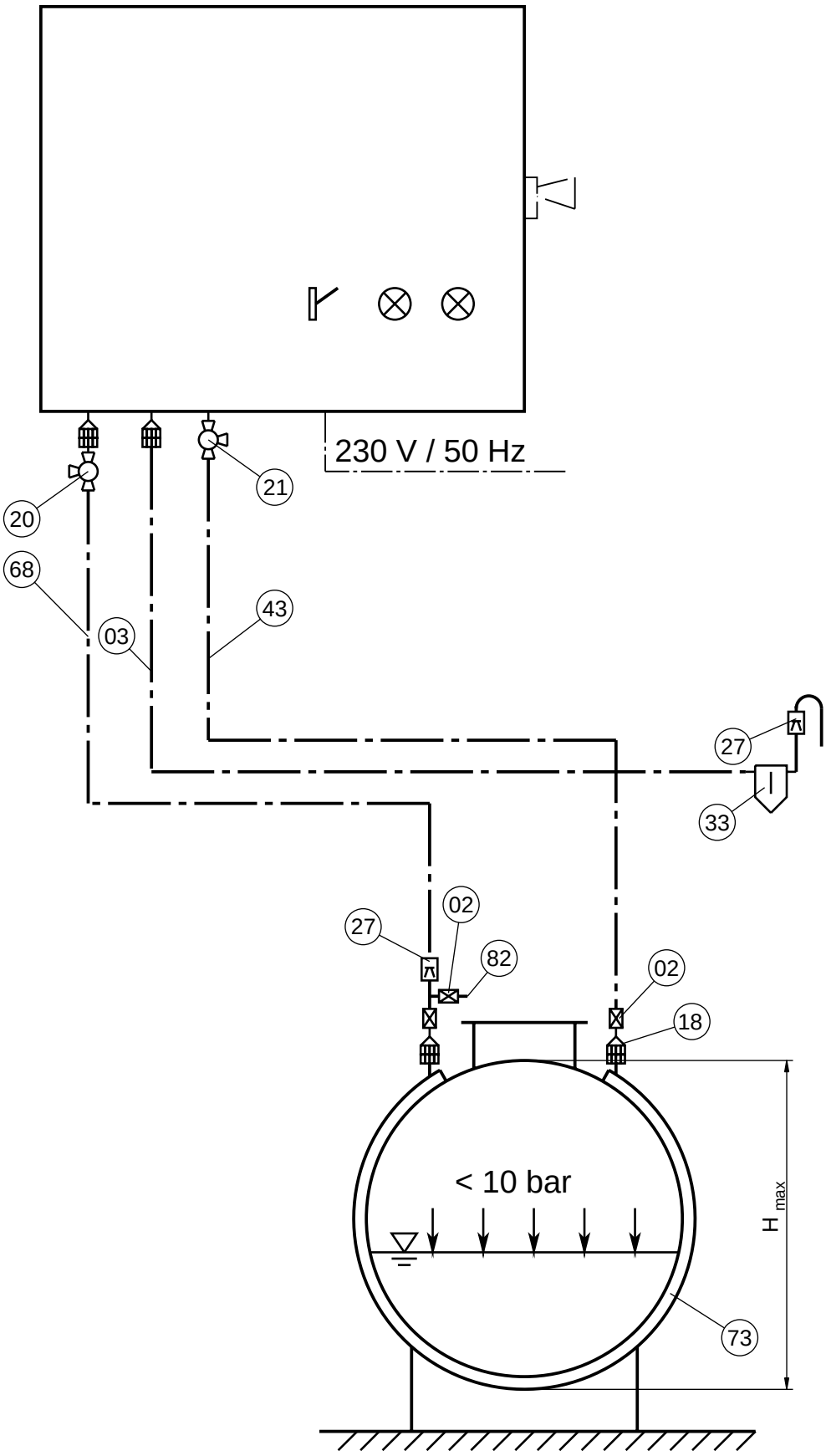

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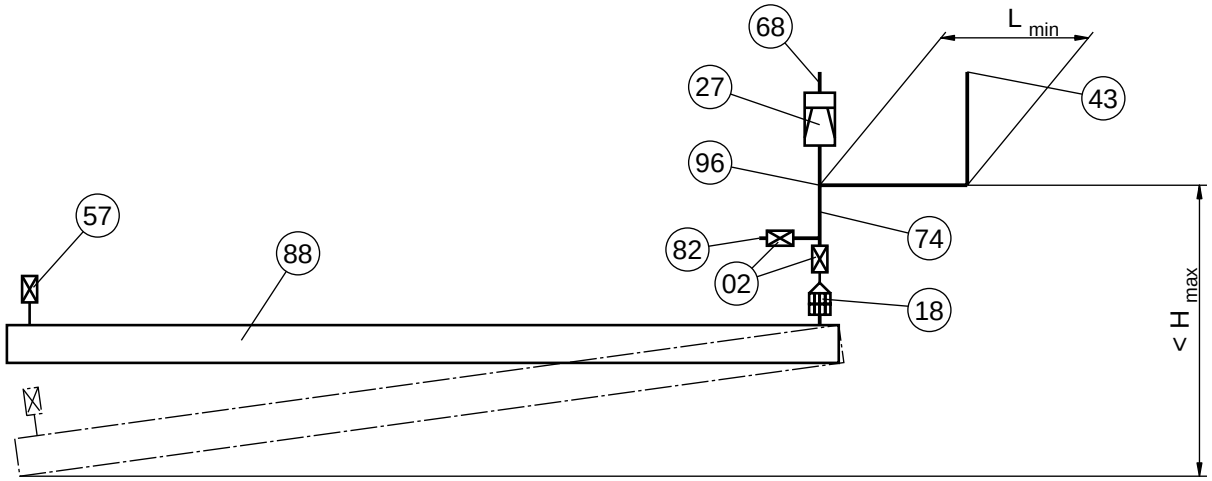

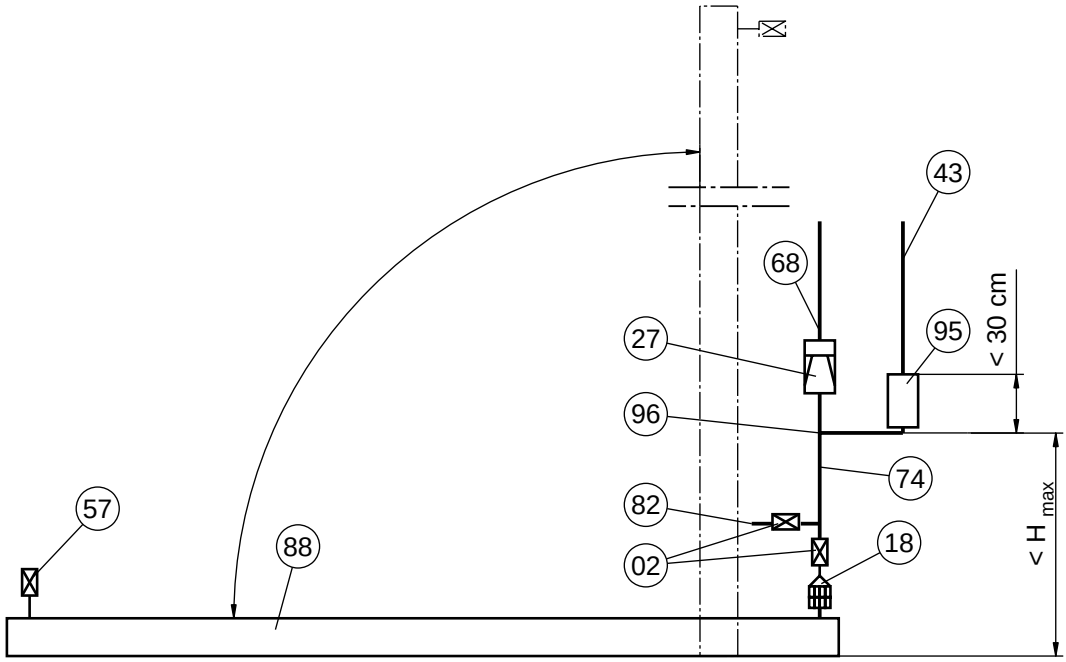

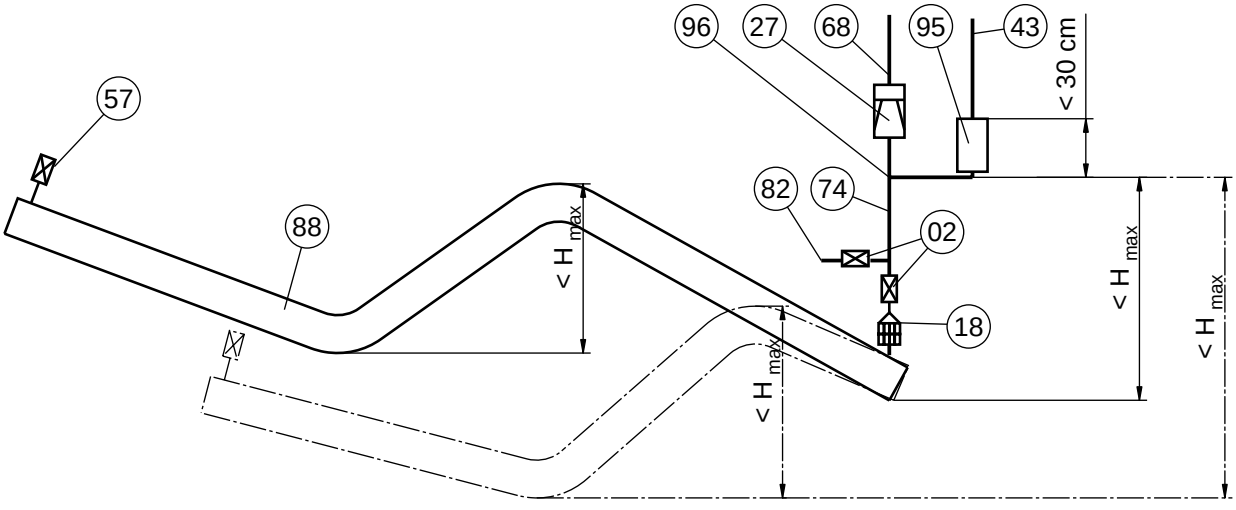

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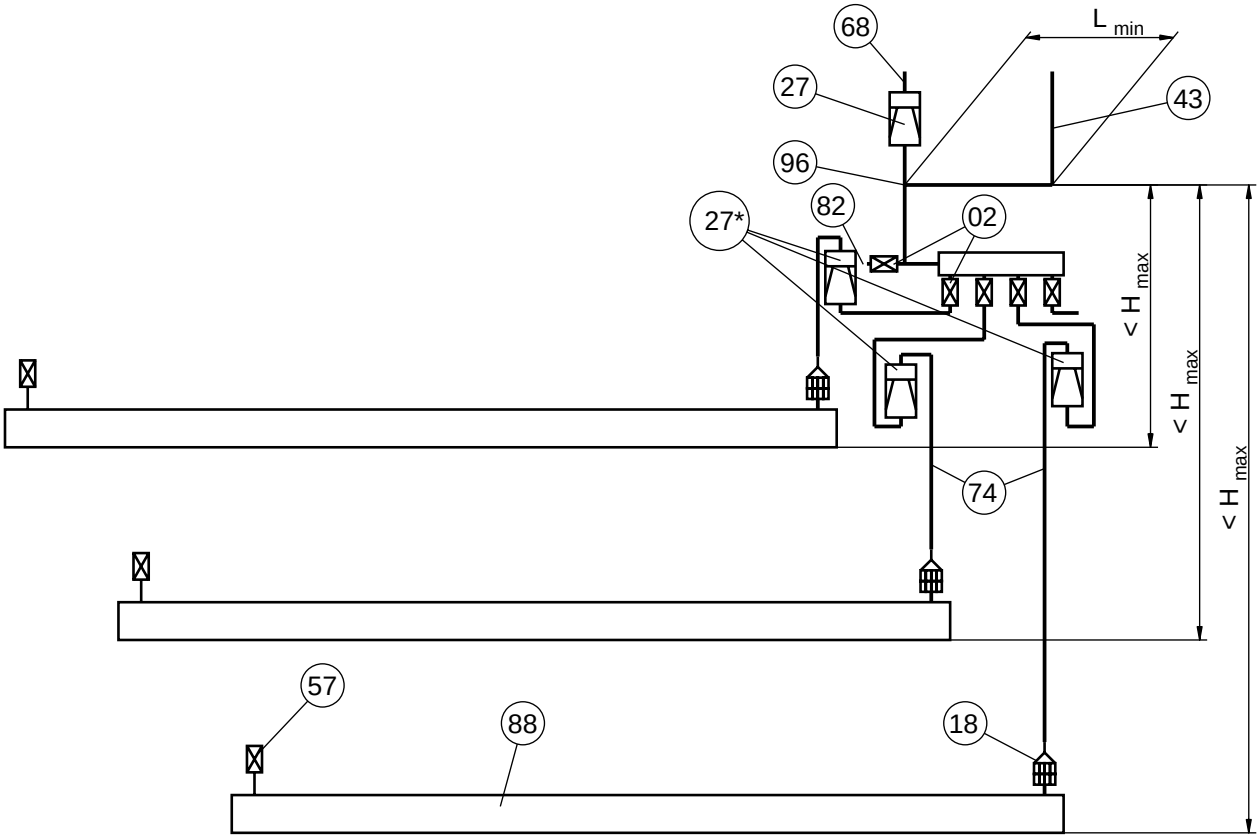

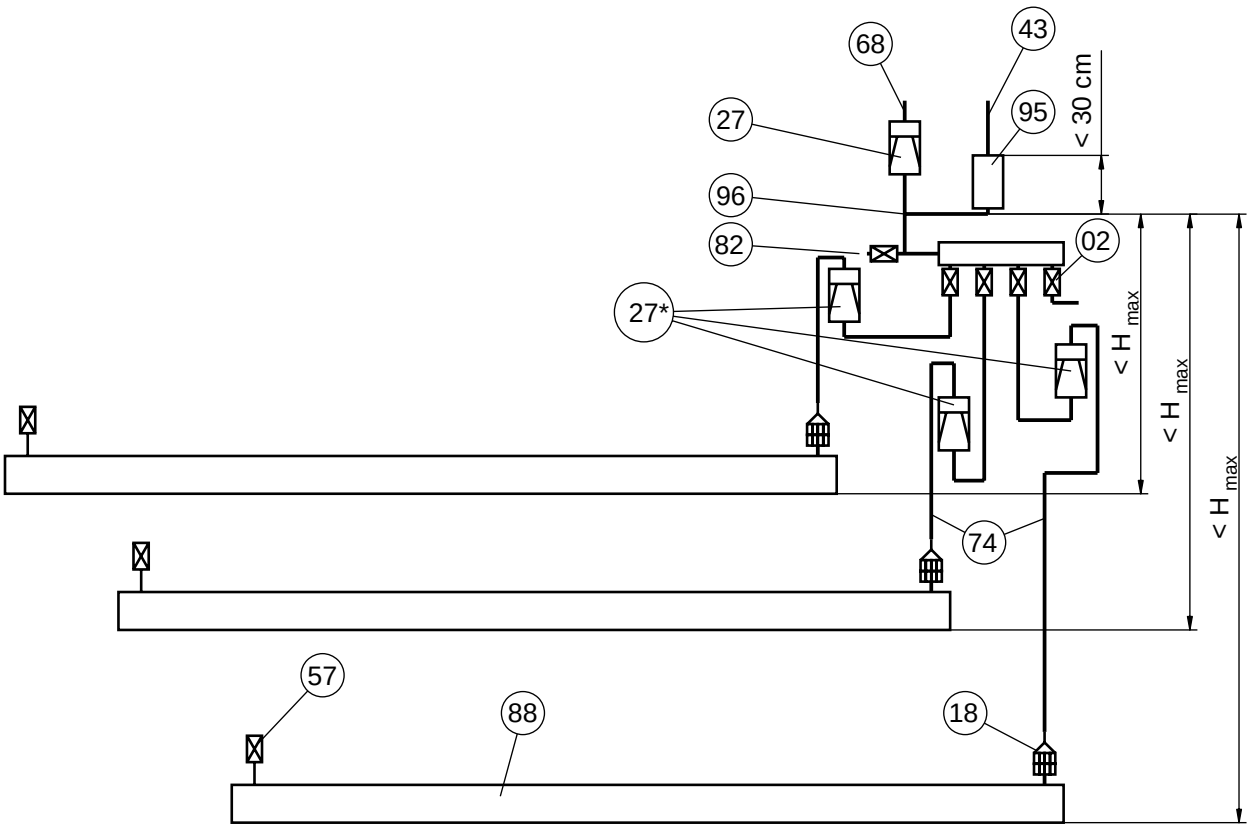

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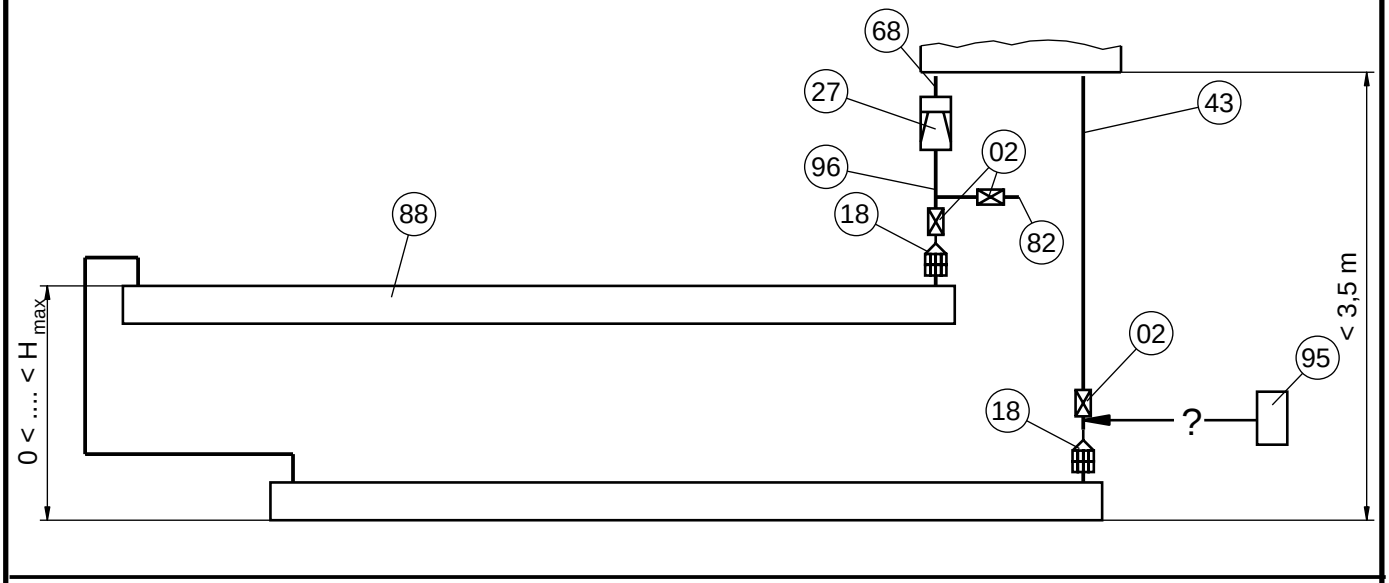

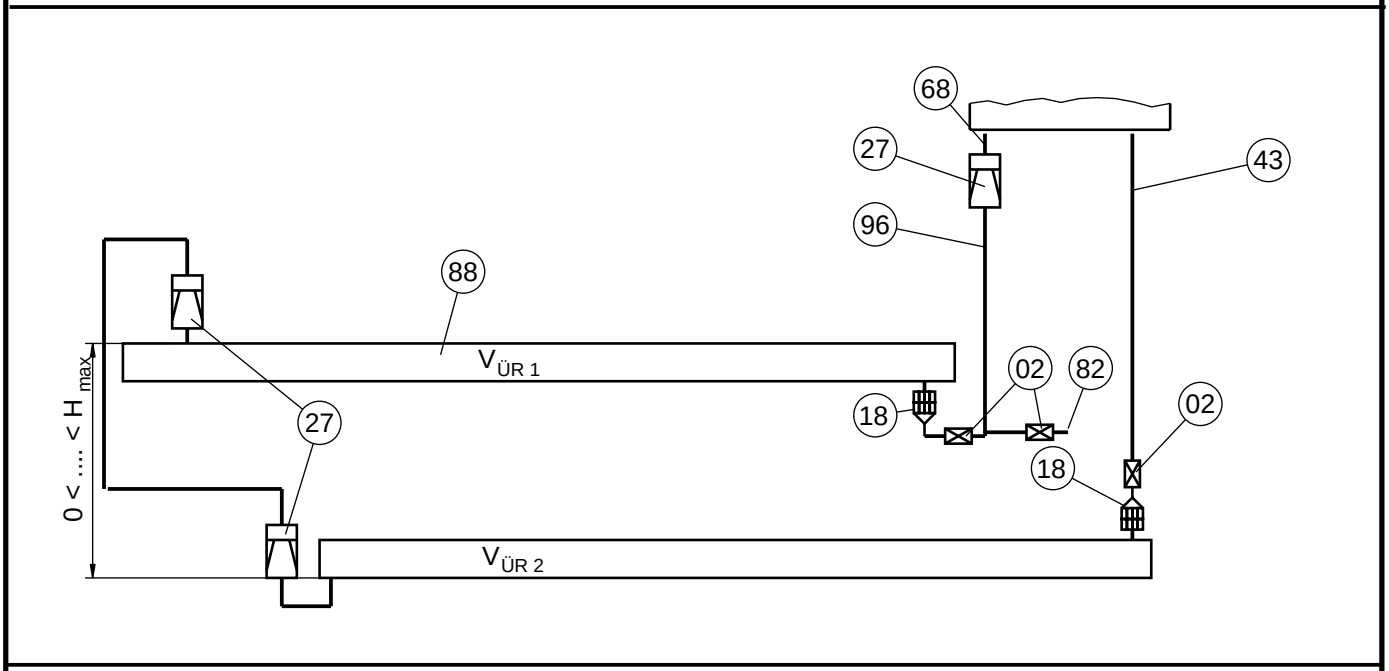

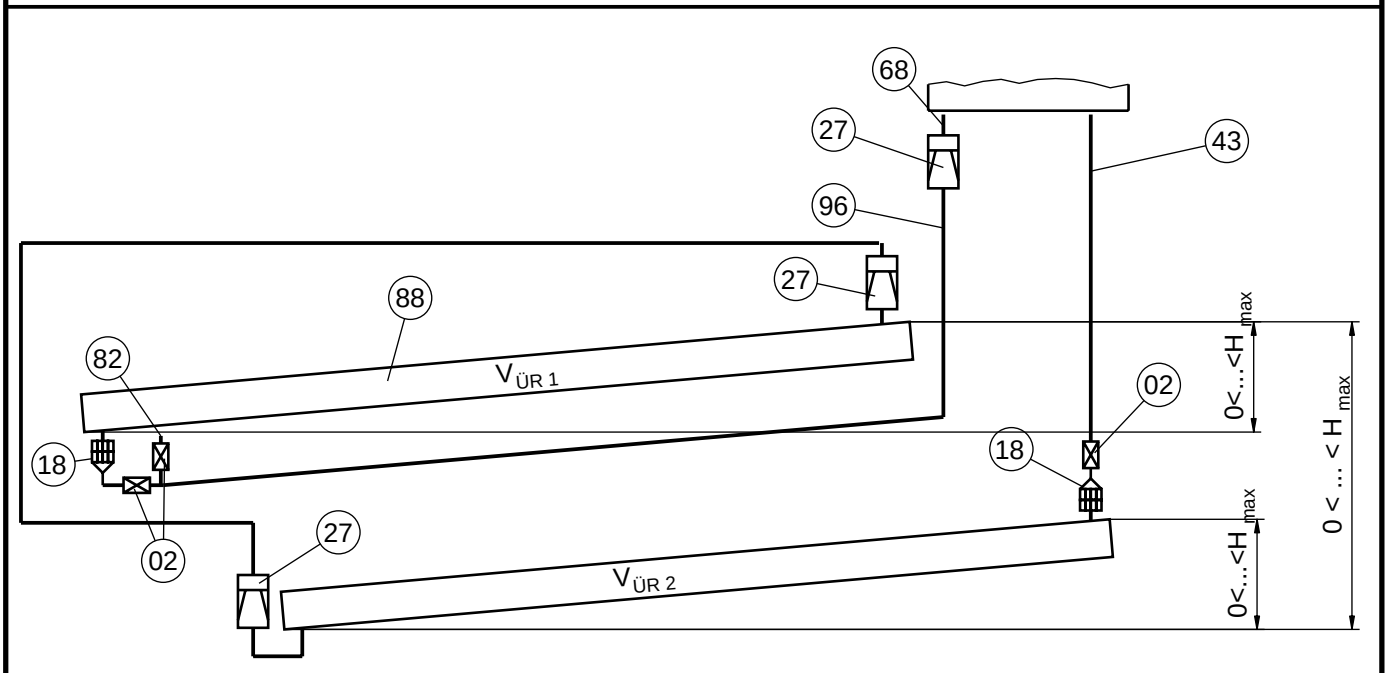

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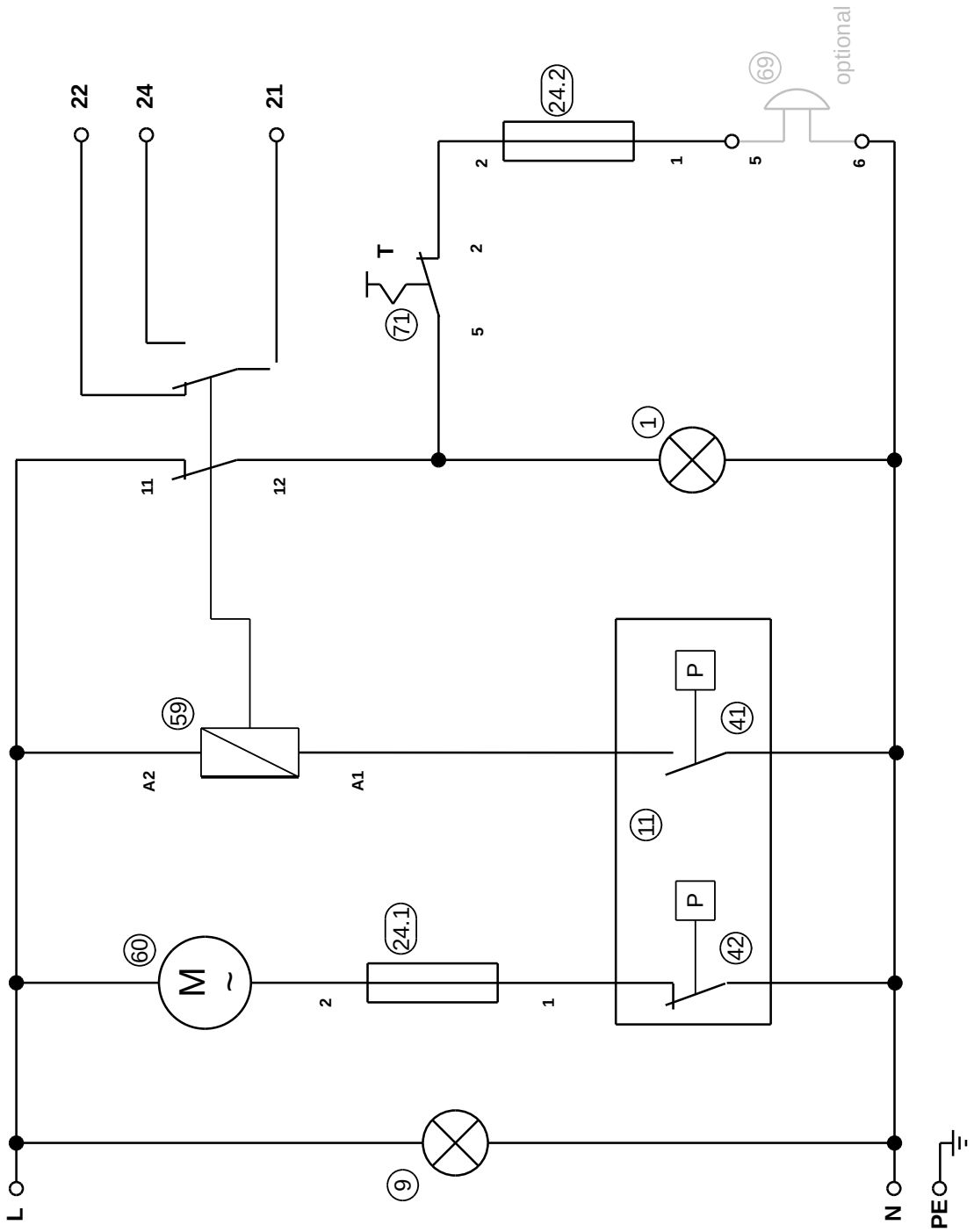

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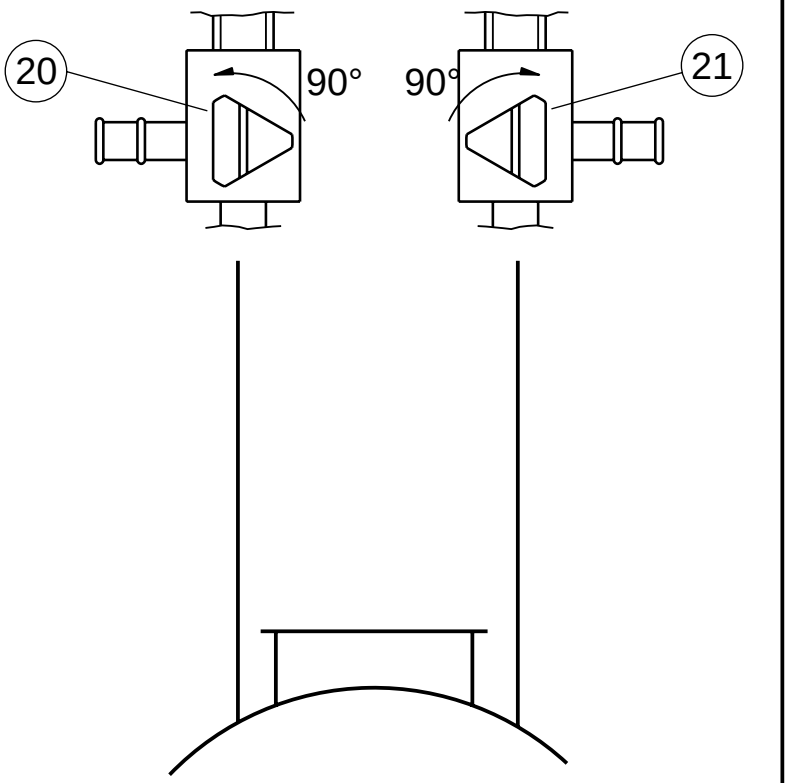

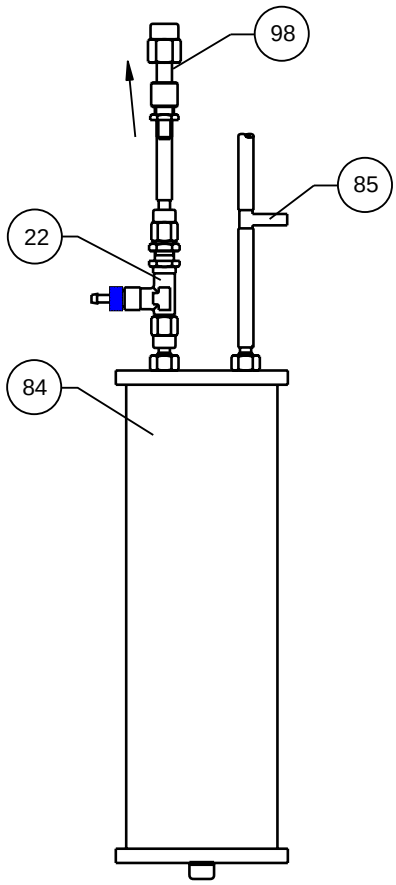

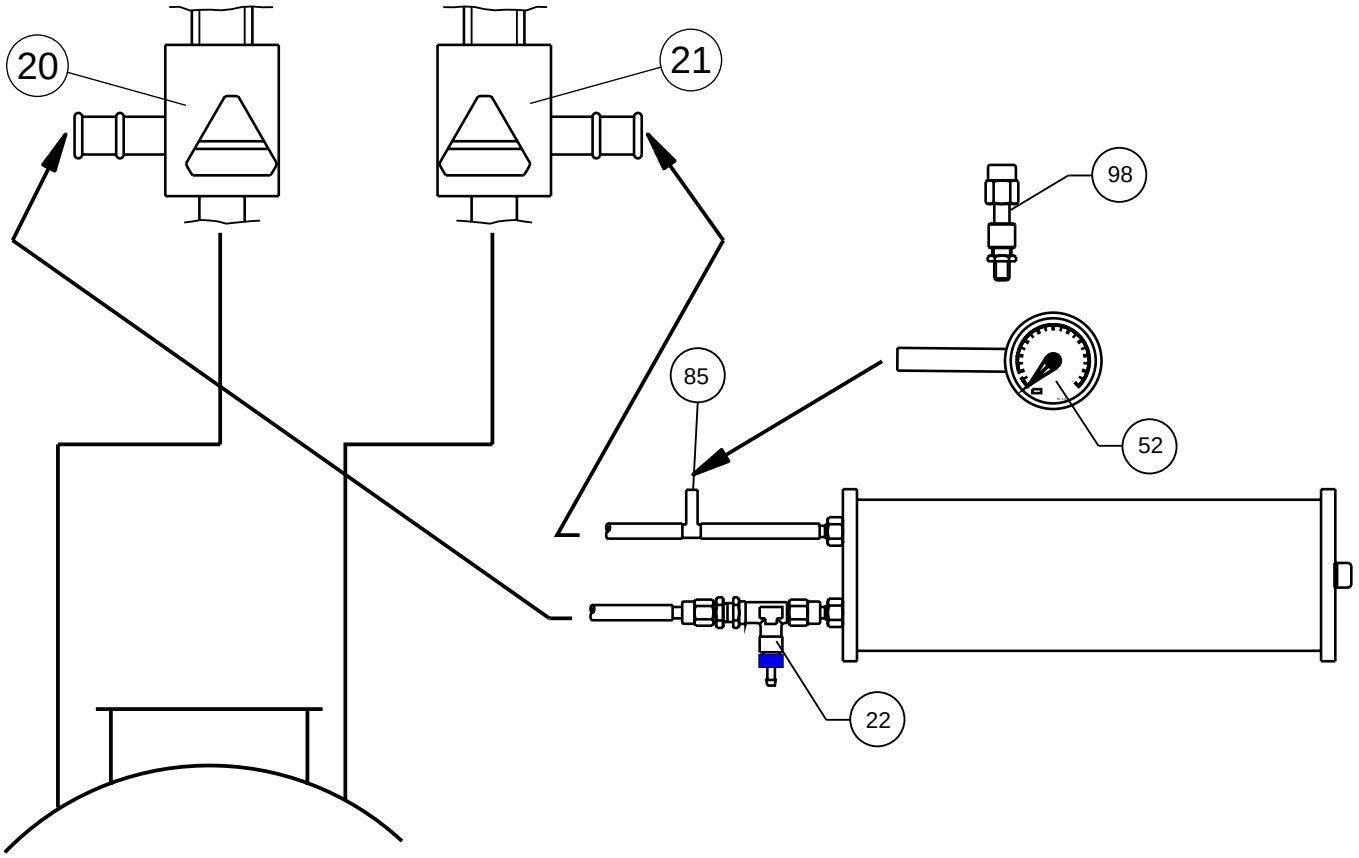

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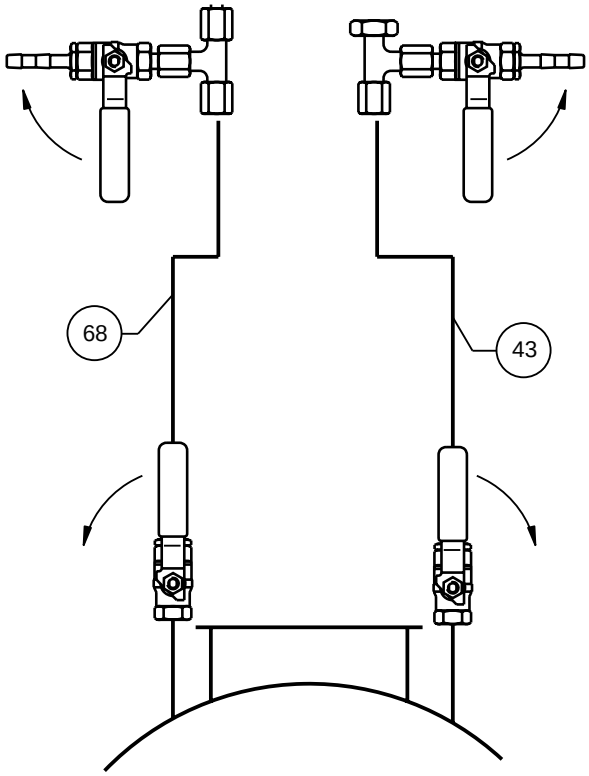

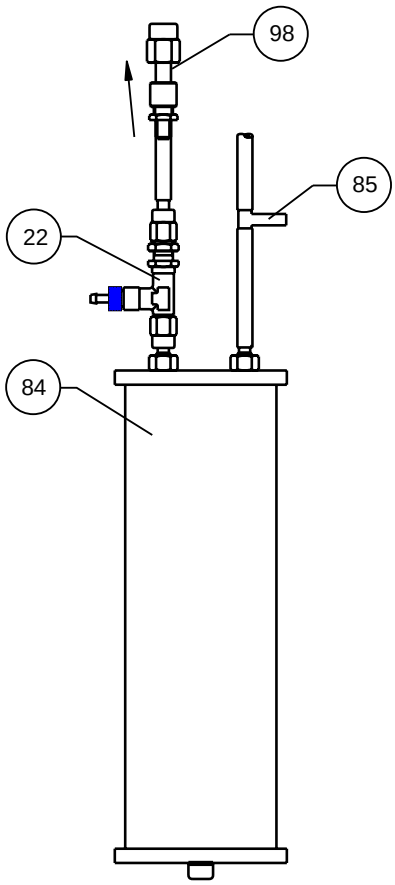

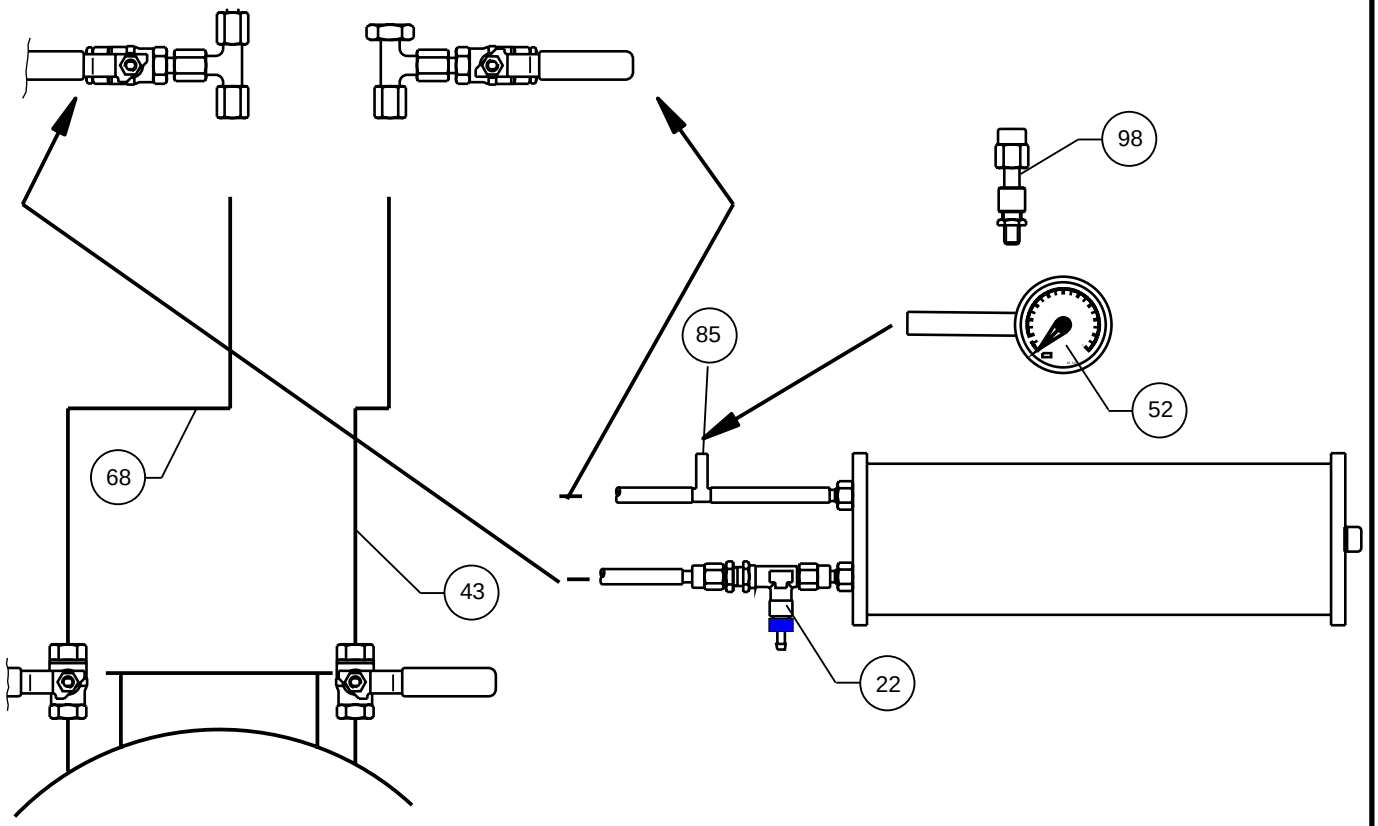

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Using the VLX ../EX Vacuum Leak Detector on Interstitial Spaces Filled with Leak Detection Liquid

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. General data

Use temperature range	T3:	-20 °C … +60 °C
	T4:	-20 °C … +45 °C
Max. height for safe operation	≤ 2000 above sea level	
Max. relative humidity for safe operation	95 %	
Protection rating of housing	IP 54	

2. Electrical data

Input capacity (without external signal)		230 V - 50 Hz - 50 W
Max. input capacity of the external signal (terminals 5 and 6)		230 V - 50 Hz - 22 VA
Switch contact load, voltage-free contacts,	max:	230 V - 50 Hz - 5 A
(Terminals 21 to 24)	min:	6 V / 10 mA
External fuse protection of the leak detector		max. 10 A
- with a breaking capacity of		1500 A
Over-voltage category		2

3. Data for applications that fall under the PED Pressure equipment directive in the event of an error

Note: The leak detector, installation kits, and manifolds are pressure accessories (in the event that the system being monitored leaks) without a safety function.

4.1 Volume

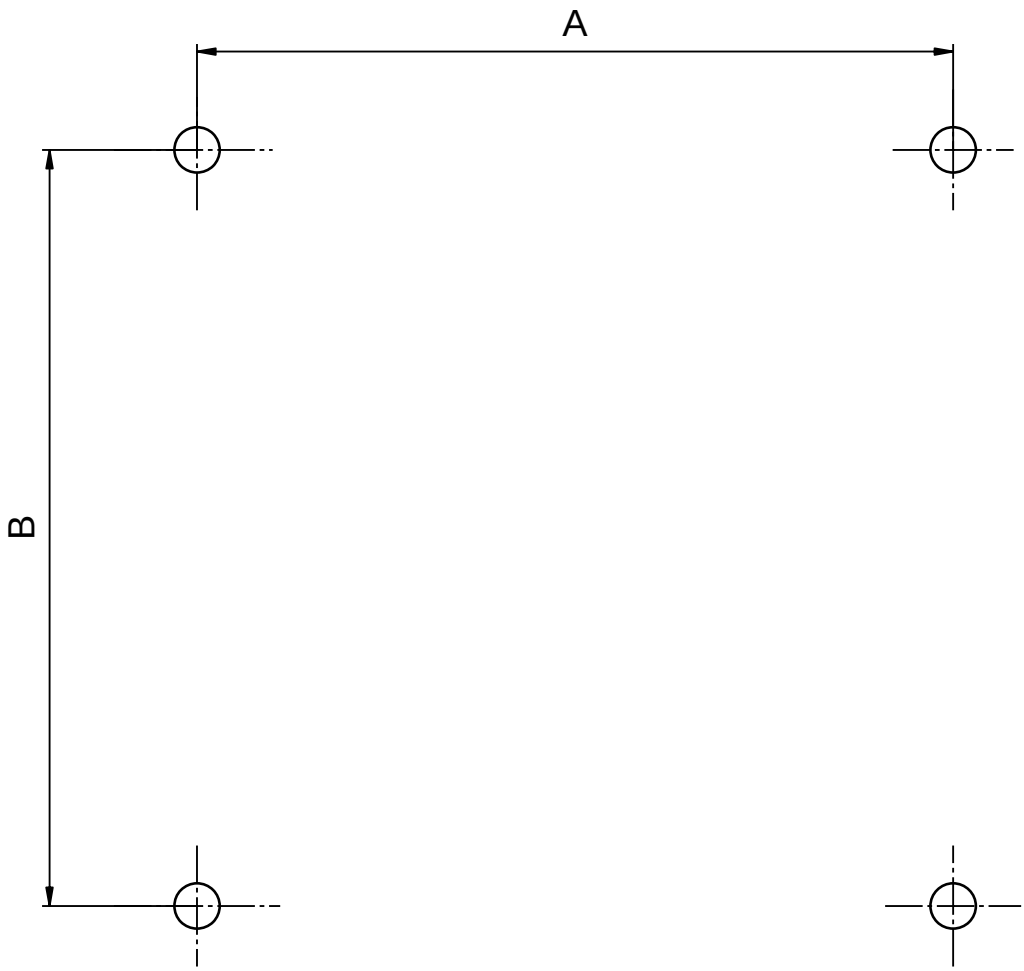
Leak detector	0,08 Liter
Manifold 2…8	0,07…0,27 Liter
Installation kit	< 1,67 Liter

4.2 Maximum operating pressure in the event of an error

Leak detector	5 bar
Manifold 2…8	25 bar
Installation kit	25 bar

4. 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 for 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

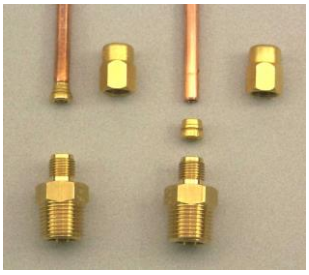
Work sheet: AB-820 500

Installation of screw connections

1 Flanged screw connection for flanged pipes

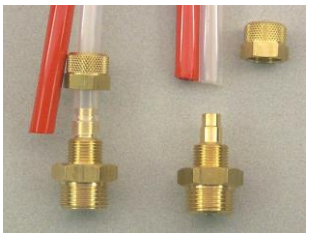
1. Oil o-rings
2. Place the intermediate ring loosely in the screw connection sleeve
3. Push the union nut and pressure ring over the pipe
4. Tighten the union nut by hand
5. Tighten the union nut until there is a noticeable increase in force
6. Final installation: Turn ¼ turn further

2 Clamping ring screw connection for plastic and metal pipes



1. Insert support sleeve (only plastic pipe) into the pipe end
2. Insert the pipe (with support sleeve) as far as it will go
3. Tighten nut of screw connection by hand to the resistance; then turn further 1¾ turns with the wrench
4. Release nut
5. Tighten nut by hand until stronger resistance
6. Final assembly of the screw connection by tightening ¼ turn

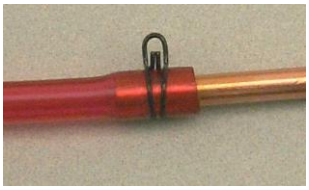
3 Quick-release screw connection for PA and PUR hose

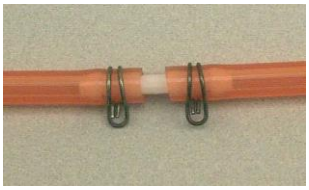


1. Cut the PA pipe to length at a right angle
2. Unfasten the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to the start of the thread
4. Tighten the union nut by hand
5. Re-tighten the union nut with a screwdriver until there is a noticeable increase in force (approximately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

NOT suitable for PE hose

4 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 screw-driver
   Make sure that the clip is an even tight fit.

5 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.

EU DECLARATION OF CONFORMITY

We,

SGB GmbH
Hofstraße 10
57076 Siegen, Germany,

hereby declare in sole responsibility that the leak detectors

VLX .. A-Ex and VLX .. Ex
(Assembly concerning the Directive 2014/34/EU)

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

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

Number/short title	**Satisfied regulations**
2014/30/EU EMC Directive	EN 55 014-1: 2016; -2: 2016 EN 61 000-3-2: 2015; -3-3 : 2014
2014/34/EU Equipment in Potentially Explosive Atmospheres	EN 1127-1: 2019 PTB 08 ATEX 1064 or TPS 07 ATEX 619511 each with: EN 60079-0: 2012 + A11: 2013; EN 60079-7: 2007; EN 60079-31: 2014 EPS 14 ATEX 1689x with: EN 60079-0: 2012; EN 60079-1: 2007 TÜV-A 18 ATEX 0057x with: EN 60079-0: 2012 + A11: 2013; EN 60079-7: 2015; EN 60079-18: 2015 TÜV-A 18 ATEX 0058x with: EN 80079-36: 2016; EN 80079-37: 2016 PTB 03 ATEX 2086 X (only VLX .. A-MV-Ex) with: 60079-0: 2012 + A11: 2013; EN 60079-18: 2015 PTB 02 ATEX 2131x with: EN 60079-0: 2006; EN 60079-1: 2004; EN 60079-7: 2003; EN 60079-11: 2007; EN 60079-18: 2004 PTB 02 ATEX 1057x with: EN 60079-0: 2012 + A11: 2013; EN 60079-1: 2014; EN 60079-7: 2015; EN 60079-31: 2014 The ignition hazard analysis did not result in any additional hazards, taking into account the EU type examination certificates for the components used.
2014/68/EU Pressure Equipment Directive	Pressure accessory without safety function

Compliance is declared by

ppa. Martin Hücking
(Technical Director)

Declaration of Performance (DoP)

Number: **004 EU-BauPVO 2014**

1. Distinct identification code of the product type:

   Vacuum leak detector VLX .. Ex

2. Purpose of use:

   Class I vacuum leak detector for monitoring double-walled tanks and pipes

3. Manufacturer:

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

4. Authorised person:

   n/a

5. System for the evaluation and inspection of the reliability of performance:

   System 3

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

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

7. Declared performance:

Essential features	Performance	Harmonised norm
Pressure switch point	Passed	EN 13160-2: 2003
Reliability	10,000 Cycles	
Pressure test	Passed	
Volume flow rate test in the alarm switch point	Passed	
Function and leak tightness of the leak detection system	Passed	
Temperature resistance	-20°C .. +40°C	

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

   ppa. Dipl.-Ing. M. Hücking, Director of Operations
   Siegen, 02-2021

Declaration of Compliance of the manufacturer (ÜHP)

SGB
MVV TB
Anhang C 2.15.15
TÜV-NORD

Compliance of the leak detector with “Muster-Verwaltungsvorschrift Technische Baubestimmungen“ (sample administrative regulation technical building regulations) is hereby declared.

ppa. Dipl.-Ing. M. Hücking, Director of Operations
Siegen, 02-2021

Note:
Translation of the German original version not checked by TÜV Nord

TÜV NORD Systems GmbH & Co. KG
PÜZ (testing, supervision and certification) — centre for containers, pipelines and pieces of equipment for systems with substances hazardous to water

Große Bahnstraße 31.22525 Hamburg
Tel.: 040 8557-0
Fax: 040 8557-2295
hamburg@tuev-nord.de
www.tuev-nord.de

Certification

Contracting body:
SGB GmbH
Hofstr. 10
D-57076 Siegen

Manufacturer:
see above

Subject of testing:

Leak detector with leak detector system type VLX ... in the versions VLX .../Ex, VLX .../A-Ex according to DIN EN 13160-1:2003 and DIN EN 13160-2:2003 class 1 vacuum monitoring system

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

Testing period: 05/28 - 10/24/2014

Test results:
The leak detector type VLX 330 / Ms as a sample for vacuum systems corresponds to the leak monitoring system class 1 according to EN 13160-1:2003 and meets the requirements of EN 13160-1:2003 in conjunction with the EN 13160-2:2003. Regarding the area of application and the installation of the leak detector, the specifications in the
– operating manual "Vacuum Leak Detector VLX ..", document no. 602.200, updated 10/2014
– operating manual "Vacuum Leak Detector VLX ../A-Ex", document no. 602.205, updated 12/2013
– operating manual "Vacuum Leak Detector VLX ../Ex", document no. 602.408, updated 04/2014 apply

Details on testing can be found in the test report PÜZ PÜZ 8111401078 dated 10/24/2014 for leak detector type VLX....

Hamburg, October 29, 2014

Test laboratory supervisor

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.

The 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.

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

The warranty is also subject to our General Terms and Conditions of business (see these online at: https://sgb.de/en/contact/generaltermsandconditions).

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

Stamp of the specialist company

Yours sincerely

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Germany

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I sgb.de