Vacuum leak detector

VL(R) ..

AUSTRALIAN INSTALLATION MANUAL

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Overview of the design variants

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

VL(R) …. /E PM

“Manometer“, the leak detector is equipped with a digital pressure display in the housing cover.

“Protected”, construction of the leak detector in a weatherproof housing.

„Enlarged functions“, with this design there is the option to connect and control additional equipment like magnetic valves and/or sensor.

“Numerical value”, for the alarm-vacuum of the leak detector.

The alarm pressures range from 34 mbar to 570 mbar.

“Rohrleitung” (= Pipe), this type of the vacuum leak detector is applied to double-walled pipes.

“Vacuum leak detector“, the leak detector operates with negative pressure towards the atmosphere.

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1. Object

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

a) VL .. and VLR ..

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

2. Area of application

2.1. Interstitial space requirements

- Vacuum resistance to the operating vacuum of the leak detector, also taking fluctuations in temperature into account.
- Assurance of the suitability of the interstitial space as part of a leak detection system (e.g. DIN standards, proofs of usability issued by the building inspection authorities, determination of suitability etc.)
- No leak detection liquid in the interstitial space (see App. A if this is nevertheless the case)
- The tanks/pipes listed under sections 2.4 and 2.5 meet the above requirements according to App. E.
- The volume of the space monitored by the leak detector may not exceed 8 m^3 for tanks and 10 m^3 for pipes. The manufacturer recommends not exceeding 4 m^3.

2.2. Material to be stored / conveyed

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

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

2.3. Resistance / materials

For the leak detector VL .. the material polyamide (PA) in connection with brass (MS-58) or (1.4301, 1.4306, 1.4541) or 1.4571, as well as the material of the connecting tubes used has to be resistant to the material to be stored/conveyed.

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

2.4. Tanks with up to 0.5 bar superimposed pressure

Group	Tank design	Installation example	Suitable leak detector type	Use limits
B	As A, but without suction line to the low point	B – 01	VL 330 and VL 570	Appendix E, No. E.1
C	Double-walled, horizontal, cylindrical (below / above ground) tanks or spherical tanks			

2.5. Double-walled pipes (up to 5 bar)

Group	Type of pipe	Installation example	Suitable leak detector type	Use limits
P	Double-walled pipes made in the factory or on site with up to 5 bar pressure in the primary pipe (conveying pressure)	P – 01	VLR 410/E	Appendix E, No. E.1

3. Functional description

3.1. Normal operation

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

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

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

3.2. Air leak

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

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

3.3. Liquid leak

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

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

Due to the vacuum still present in the measuring line, further leak liquid is sucked into the interstitial space and the measuring pipe. This leads to reduction of the vacuum until the pressure has reached the “alarm ON” level. The optical and audible alarm signal is triggered.

3.4. Switching values of the leak detector in mbar

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

Type	**alarm ON**	**Pump OFF**	Use on **Group:**
VL 330	> 330	< 450	According to 2.4
VLR 410, VLR 410/E	> 410	< 540	According to 2.4
VL 570, VLR 570/E	> 570	< 700	According to 2.4

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

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

3.5. Description of the display and operating elements

3.5.1 States of the display elements (signal lamps)

Signal lamp	Operating state	Start-up	Start-up, alarm acknowledges	Alarm, vacuum below the "alarm ON" level	Alarm, as left-hand column, acknowledged	Alarm probe	Alarm probe, acknowledged	Alarm solenoid valve	Alarm solenoid valve, acknowledged	Device malfunction
OPERATION: green	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
ALARM: red	OFF	BLINKING	BLINKING	ON	BLINKING	OFF	OFF	ON	BLINKING	ON[1]
ALARM 2[2]: red	OFF	BLINKING	BLINKING	OFF	OFF	ON	BLINKING	ON	ON	OFF

Description:

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

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

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

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

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

3.5.2 Operating functions via buttons

- Switch off audible alarm signal:
  Press the "audible alarm signal" button briefly once, the audible signal is switched off, the red LED blinks.
  If the button is pressed again, the audible signal is switched back on.
  This function is not available during normal operation and in the event of a malfunction.
- Testing the optical and audible alarm signal
  Press the "audible alarm signal" button and keep it pressed (approx. 10 seconds), the alarm signal is triggered until the button is released again.

[1] The button "audible alarm" is without function

[2] Only applies to VL ../E and VLR ../E

This scan is only possible if the pressure in the system has exceeded the "alarm OFF" pressure.

- Scanning the tightness of the system monitored
  Press the "audible alarm signal" button and keep it pressed until the signal lamp "alarm" blinks quickly after approx. 5 seconds, then release the button. The "alarm" signal lamp displays a value for tightness on the basis of the number of blinks (see Appendix DP)
  10 seconds after this value has been displayed the signal lamp returns to normal operation.
  The leak detector must have carried out at least 1 automatic post-feed interval in normal operation (i.e. without external assembly pump) to achieve a valid statement.

- Zero point adjustment
  Three way valve 21 in position “II”. (see P-060 000)
  Press the "audible alarm signal" button and keep it pressed until the "alarm" signal lamp blinks quickly after approx. 5 seconds, then release the button. Press the button again immediately and then release it again. Adjustment is confirmed by 3 optical and audible signals.
  Before repeating zero point adjustment the "pump OFF" switching value must be reached.

4. Mounting instructions

4.1. General notes

(1) Heed manufacturers' approval for the tanks/pipes and the interstitial space.

(2) Installation and start-up must be carried out by a qualified company.

(3) Heed relevant regulations concerning electrical installation.

(4) Heed and observe accident prevention regulations.

(5) Pneumatic connections, connection lines and fittings must be able to withstand the pressure (static pressure plus superimposed pressure) which could occur in the case of a leak, for the whole temperature range possible.

(6) Before anyone enters a dome or control shaft, the oxygen content must be checked and the shaft flushed out if necessary.

4.2. Mounting the leak detector

(1) Wall mounting, within a building

(2) Wall mounting in the open, using a suitable protective box.
If the detector is to be mounted in a protective box, at least one of the following points must be observed:
- Signal lamps for operation must be visible from the outside (protective box with transparent lid or signal lamps mounted on the outside)
- Use of potential-free contacts to extend alarm - if these contacts are not used, additional external signal

(3) OUTSIDE potentially explosive areas.

(4) As near to the tank/pipe as possible (cf. section (6) of the following chapter).

4.3. Mounting the (pneumatic) connecting lines

(1) Plastic hoses (e.g. PVC) or tubes made of plastic or metal.
Pressure resistance, see requirements specified in chapter 4.1.

(2) Clearance at least 4 mm for underground pipe laying and/or inside buildings
at least 6 mm for all other applications.

(3) Resistant to the product to be stored.

(4) Colour marking:
Measuring line: RED;
Suction line: WHITE or TRANSPARENT,
Exhaust line: GREEN.

(5) The full cross-section must be retained.

(6) The length of the lines between the interstitial space and the leak detector should not exceed 50 m. If the distance is bigger, a larger pipe cross-section must be used.

(7) Routing lines with lowest points: mounting of condensate traps at each lowest point (heed pressure resistance specified in 4.1).

(8) Mount the liquid stop valve in the suction line (heed pressure resistance specified in 4.1).

(9) Exhaust line must lead with slope to the tank ventilation outlet. In the case of laying with lowest points, use condensate traps.

Alternatively: The exhaust line can terminate out in the open, at a non-dangerous spot. In this case, provide for a condensate trap and liquid stop valve in the exhaust line[3].

(10) Conduits for connecting lines have to be sealed gas- and liquid tight at the inlet and outlet points.

(11) For applications using a pressure compensating vessel in the measuring line, if suction and measuring line are connected together in a node point, the following shall apply:
Per 0.1 litre volume[4] of the pressure compensating vessel, the length of the measuring line (L_{max}) may only be a maximum of

VL(R) 410	12 m	28 m
VL(R) 570	8 m	18 m

NOTE: The lower edge of the pressure compensating vessel must not be lower than the node point, the upper edge of the pressure compensating vessel must not be more than 30 cm above the node point.
Per 10 ml of the condensate trap(s) mounted in the measuring line between pressure compensating vessel and leak detector, **L_{max} is reduced by**:
0.5 m (6 mm clearance)
1 m (4 mm clearance).

4.3.1 When running several lines connected in parallel to a leak detector. (see P-01)

(1) Where possible run connecting lines sloping down to the pipes. If connecting lines are run in the open, mount condensate traps at all the lowest points.

(2) Mount the manifold below the installation kit/ VLR410/E, If this is not possible, use condensate traps at all the lowest points.

(3) Always use a manifold with liquid stop valve and gauge for multiple lines (see Typical installation of the VLR410/E)
These prevent leaked liquid entering the interstitial spaces of the other double walled pipe.

4.4. Electrical connection

(1) Voltage supply: see type plate.

(2) Hard wired, i.e. no plug or switch connectors.

(3) Terminal assignment (see SL-854 800 (VL(R)../E):

1	Phase
2	Neutral
3/4	Occupied (leak detector pump)
5/6	External signal (voltage supply in case of alarm, is switched off using "audible alarm signal" button.
7/8	VL(R) ../E ONLY connection of the solenoid valve(s)
11/12	Dry relay contacts, open in case of alarm and power failure

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

[4] Multiplying this volume leads to a multiplication of L_{max}. Dividing this volume leads to a division of L_{max}.

21/22 VL(R) ../E ONLY connection of the dry relay probe contacts (contacts have to be open in case of alarm and power failure)[5]
NOTE: When the device is delivered a bridge is used which must be removed when the probe is connected

X/X Serial data transmission (no. 106 in the circuit diagrams)

4.5. Installation examples

Installation examples are given in the appendix.

The following notes must always be heeded:

Note: The connection of interstitial spaces is only permitted pipework UNDER the following conditions.

4.5.1 Installation example P – 01:

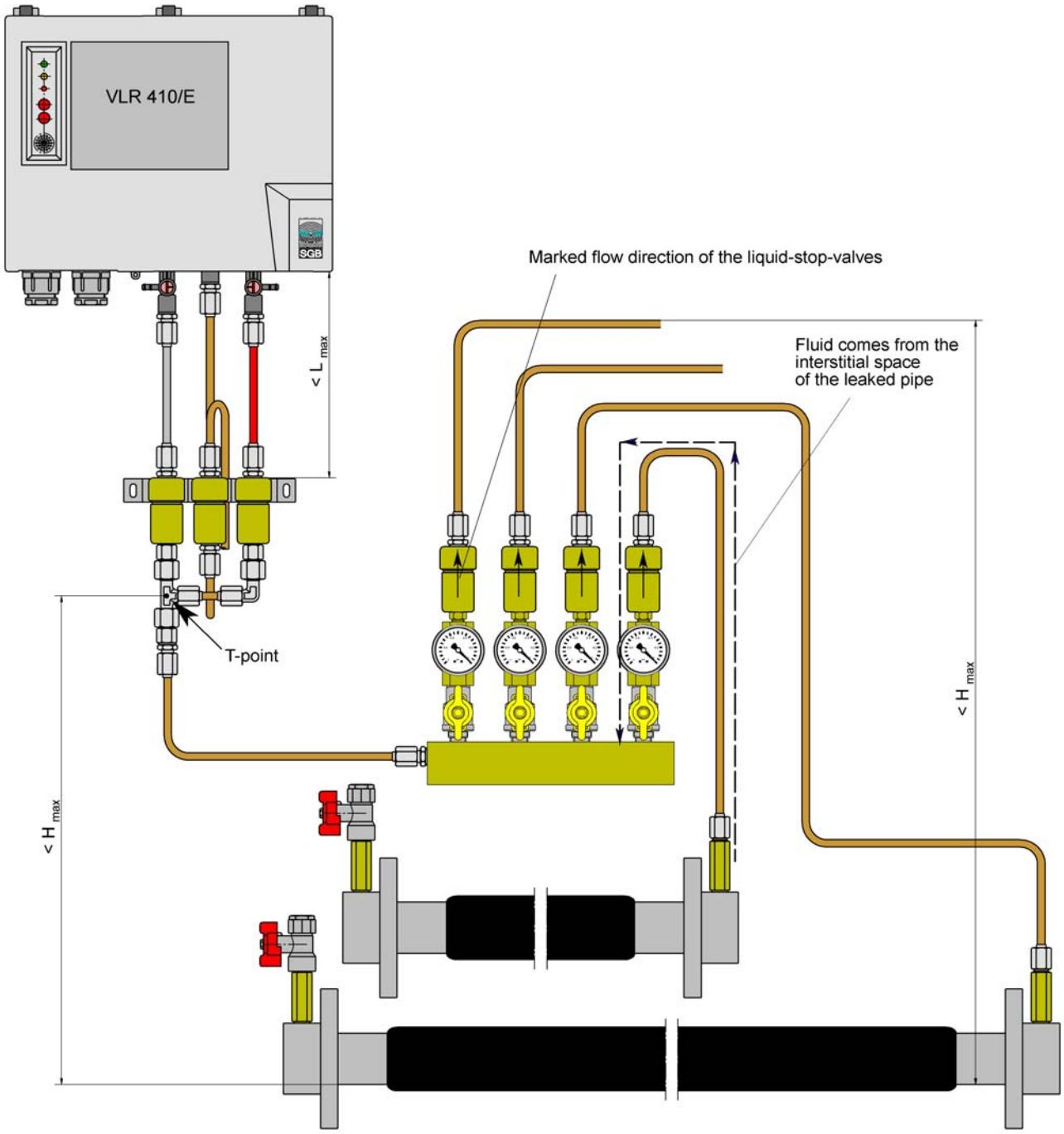
The lowest point to the highest point must not exceed the dimension H_{max}. (see Appendix E.1) The pipe may also vary in height SO LONG AS the difference in height between the highest point and lowest point is not above H_{max}.

4.5.2 Typical installation of the VLR 410/E (see picture on following page)

- In the case of a leakage the interstitial space of the pipe will be filled with liquid. The leak detector begins to suck the liquid into the manifold.
- The sucked liquid passes the liquid-stop-valve of the manifold **against** the normal flow direction. The manifold will be filled with liquid till the liquid-stop-valves above the manometers close.
- The liquid passes the T-point of the installation kit and will be sucked forward to the liquid-stop-valve (suction line).
- The liquid-stop-valve closes and cut the leak detector from the interstitial space. So the leak detector cannot build up more under-pressure in the system.
- Because more and more liquid leaks out of the pipe the liquid will enter the measuring line so that the pressure increases. The leak detector measures the pressure rise and gives the alarm.

Important hint: In the case of a leakage at first the liquid-stop-valve at the manifold will be passed by the liquid **against** the normal flow direction. After that the liquid-stop-valves close because the manifold will be filled with liquid. So all other interstitial spaces are cut off and no liquid can enter the interstitial spaces of the other supervised pipes. The most important thing is that the liquid must pass the T-point so that an alarm can be guaranteed.

[5] 9/10 ONLY for probes requiring a voltage supply. E.g. not for floating switches.


VLR 410/E
SGB
Marked flow direction of the liquid-stop-valves
Fluid comes from the interstitial space of the leaked pipe
< L max
T-point
< H max
< H max

5. Start-up

(1) Heed and observe specifications in chapter 4.

(2) Carry out pneumatic connection.

(3) Set up electrical connection, **DO NOT apply** supply voltage yet.

(4) Close the housing cover.

(5) Ensure all valves on manifold and lines are closed.

(6) Apply supply voltage **ONLY WHEN READY TO COMMISSION SYSTEM**.

(7) Establish lighting up of operating and alarm lamp as well as the audible alarm signal. Press the "audible alarm signal" button, the signal lamp "alarm" will blink.

(8) Connect measuring gauge to three way valve 21 in position "III",. (cf. P-060 000)

(9) Apply vacuum to the system.
To do this, the installation pump can be connected to the muff on three way valve 20, position “IV”.

(10) Switch on the installation pump.

(11) Open valve/s on manifold **ONE** line at a time. The interstitial space will be evacuated. Monitor the vacuum build-up on the measuring gauge.
NOTE: If no pressure is built up with the installation pump connected, the leak must be located and eliminated (if necessary check the feed capacity of the pump and/or the position of the three way valve).

(12) Once the leak detector has reached operating vacuum (pump in the leak detector switches off), Close the valve on the manifold and repeat procedure for all lines.

(13) When all lines have reached operating vacuum, open valves on manifold and allow lines to balance.

(14) Set the three way valve 20 to position “I”, switch off installation pump and remove.

(15) Set three way valve 21 to position "I", remove the measuring gauge.

(16) Carry out the functional test according to section 6.4.

(17) Standard units are supplied with jumper bridge installed to suit solenoid valve applications. Please ensure jumper bridge is installed correctly for your application; **see photo**

6. Operating instructions

6.1. General instructions

(1) If the leak detection system is installed tightly and correctly then it can be assumed that the leak detector is working in the range of control.

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

(3) In the case of an alarm there is always either a major leak or a fault. The cause must be established quickly and the problem eliminated.

(4) The leak detector **MUST** be disconnected from the mains for any repair work.

Current interruptions are indicated by the "operation" signal lamp going out. The alarm signal is triggered via the dry relay contacts (if used to extend the alarm).
Following the current interruption the green signal lamp lights up again, the alarm signal is switched off via the potential-free contacts (unless the pressure has fallen below the alarm pressure during power failure).

6.2. Intended use

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

6.3. Maintenance

(1) Maintenance work and functional tests may only be carried out by trained staff.

(2) Work is carried out once a year to assure functional and operating safety.

(3) Extent of the tests is described in chapter 6.4.

(4) It must be checked whether the conditions described in chapters 4 to 6.3 are being observed.

(5) Disconnect from the mains before opening the leak detector housing.

6.4. Functional test

Tests of the functional and operating safety must be carried out

- after every start-up,
- acc. to chapter 6.3,
- after every case of troubleshooting.

6.4.1 Extent of the test

(1) If necessary, discuss the tasks to be carried out with the person responsible on-site.

(2) Heed the safety instructions regarding contact with the stored products present.

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

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

(5) Test the switching values with the interstitial space (chapter 6.4.4).
Alternatively: test the switching values using the test device (chapter 6.4.5).

(6) Test the lift of the vacuum pump (chapter 6.4.6).

(7) Check tightness of the leak detection system (chapter 6.4.7).

(8) Set up operating state (chapter 6.4.8).

(9) A qualified person must fill out a test report confirming function and operational safety.

6.4.2 Checking and emptying the condensate traps if necessary

(1) If there are shut-off cocks on the interstitial space, close these.

(2) Three way valve 20 and 21 to position “IV” to ensure aeration of the connecting lines.

(3) Open condensate traps and empty them.
NOTE: Condensate traps can contain storage/conveying product(s), make sure you take suitable precautions.

(4) Close condensate traps.

(5) Three way valves 20 and 21 to position “I”.

(6) Open shut-off cocks on the interstitial space.

6.4.3 Checking the free passage of air in the interstitial space

(1) Connect the measuring gauge to three way valve 21, then position “III”.

(2) <u>For pipes according to installation examples P-01:</u> Open the test valve at the end of the interstitial space away from the leak detector. If there are several lines, close valves on manifold and test one line at a time.

(3) Determine the drop in pressure on the measuring gauge. If there is no drop in pressure, establish the cause and eliminate it.

(4) Three way valve 21 to position “I”.

(5) Remove measuring gauge.

6.4.4 Testing the switching values using the interstitial space

(1) Connect the measuring gauge to three way valve 21 then position “III”.

(2) <u>For tanks and pipes acc. to Installation examples P-01:</u> Open the test valve at the end of the interstitial space away from the leak detector. If there are several lines, do this one line at a time.

(3) Determine switching values "pump ON" and "alarm ON" (with optical and audible alarm signal). Note values.

(4) Press the "audible alarm signal" button if necessary.

(5) Three way valve 20 to position “I”, or close test valve and determine switching values "alarm OFF" and "pump OFF". Note values.

(6) The test is considered passed if the switching values measured are within the specified values.

(7) Open the shut-off cocks previously closed, if appropriate.

(8) Three way valve 21 to position “I”. If necessary, press "audible alarm signal" button again.

(9) Remove the measuring gauge.

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

(1) Connect the testing device with both hose ends on one of the free muffs of three way valves 20 and 21 respectively.

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

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

(4) Three way valves 20 and 21 to position “II”. Operating pressure is built up in the test tank.

(5) Aerate using the needle valve, determine the "pump ON" and "alarm ON" (optical and audible) switching values. Note values.

(6) Press the "audible alarm signal" button if necessary.

(7) Slowly close the needle valve and determine the switching values "alarm OFF" and "pump OFF".

(8) The test is considered passed if the switching values measured are within the specified values.

(9) Three way valves 20 and 21 to position “I”. Press the "audible alarm signal" button if appropriate.

(10) Remove the testing device.

6.4.6 Testing the lift of the vacuum pump

(1) Connect a measuring gauge to three way valve 20. Three way valve 20 to position “II”.

(2) Three way valve 21 to position “II”, thus aeration of the pressure switch, the alarm is triggered, the pump runs

(3) Read off the lift of the pump on the measuring gauge.

(4) The test is considered passed when the pressure value reached is
> 500 mbar (Type 330),
> 600 mbar (Type 410),
> 750 mbar (Type 570).

(5) Three way valve 20 and 21 to position “I”.

(6) Remove the measuring gauge.

6.4.7 Tightness test on the leak detection system

(1) Check that all the shut-off valves between the leak detector and interstitial space are open.

(2) Connect the measuring gauge to three way valve 21, position “III”.

(3) For the tightness test, the vacuum pump must have reached the "pump OFF" switching value. Wait for possible pressure compensation and then begin with the tightness test.

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

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

(5) Three way valve 21 to position “I”, remove measuring gauge.

6.4.8 Setting up the operating condition

(1) Seal the housing

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

6.5. Alarm

(1) In case of alarm the "alarm" signal lamp lights up and the audible signal sounds.

(2) If available, close the shut-off valves in the connection line between interstitial space and leak detector.

(3) Switch off the audible signal by pressing the "audible alarm signal" button. The button will light up.

(4) Determine the cause of the alarm signal according to the table in chapter 3.5.1.

(5) Inform the installation company (detailing the cause of the problem if possible).

(6) The installation company has to determine and eliminate the cause.

(7) Carry out the functional test according to chapter 6.4, observing the conditions specified in chapters 4 to 6.2.

7. Marking

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

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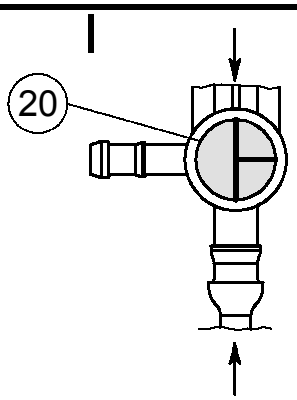

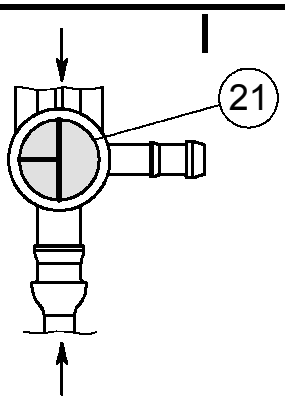

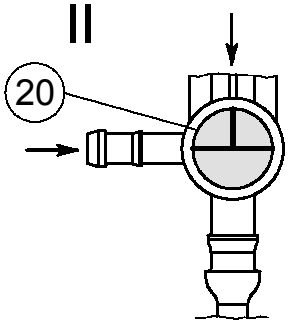

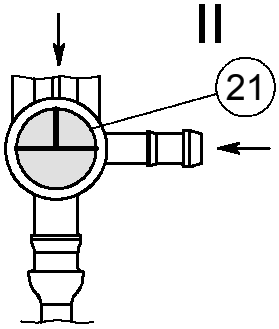

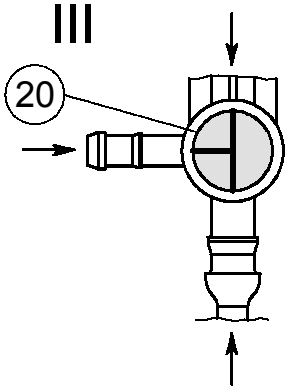

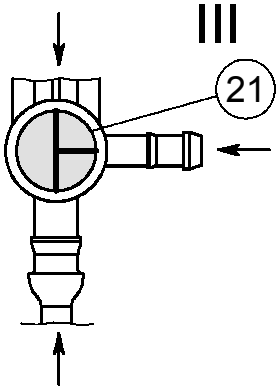

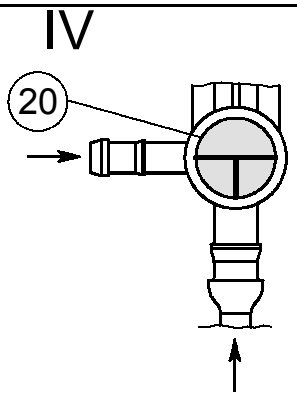

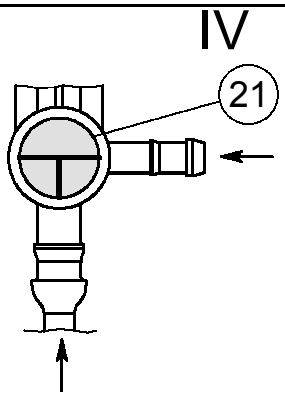

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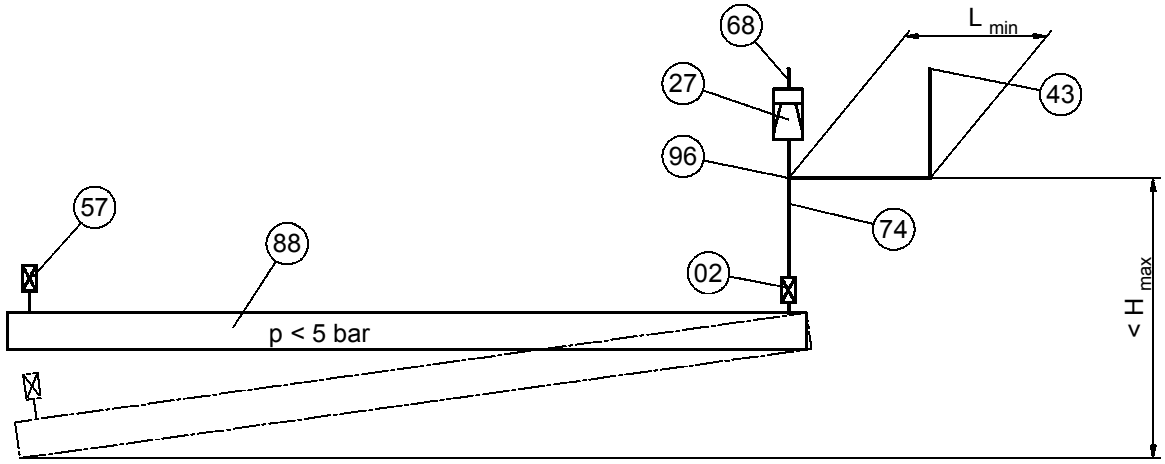
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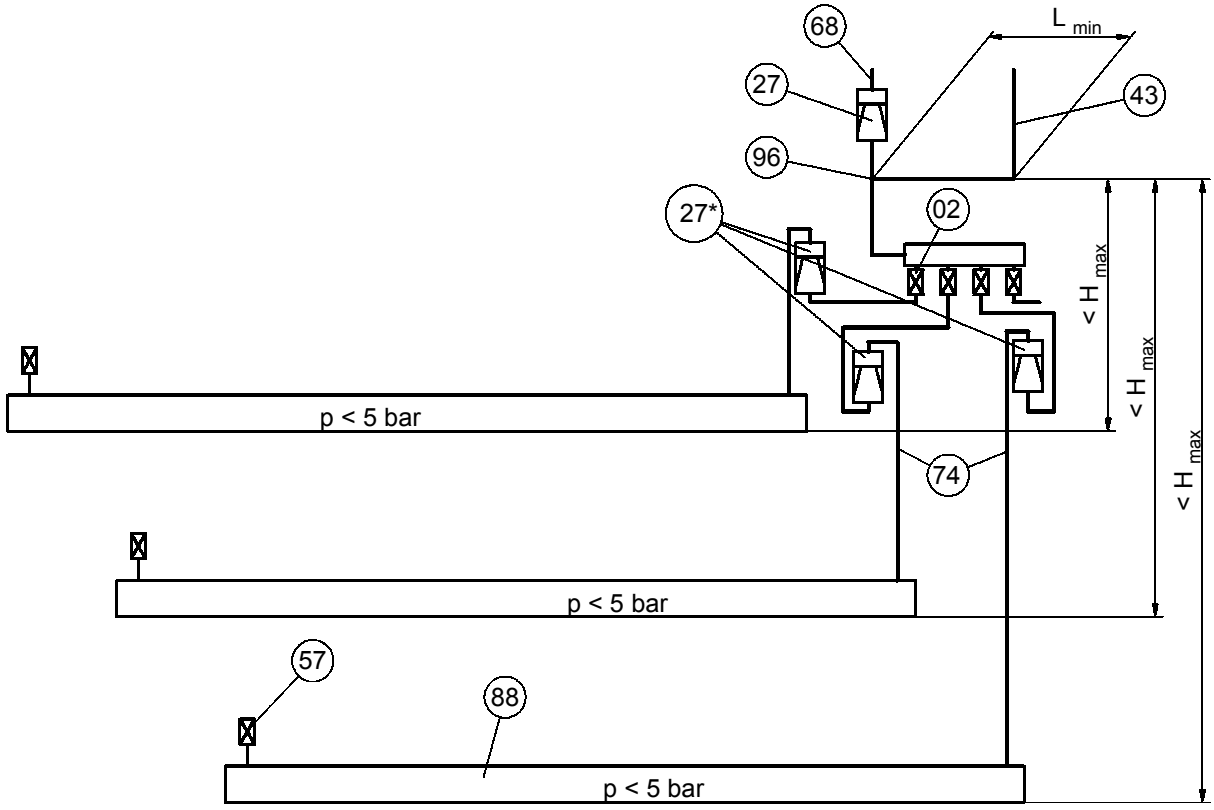
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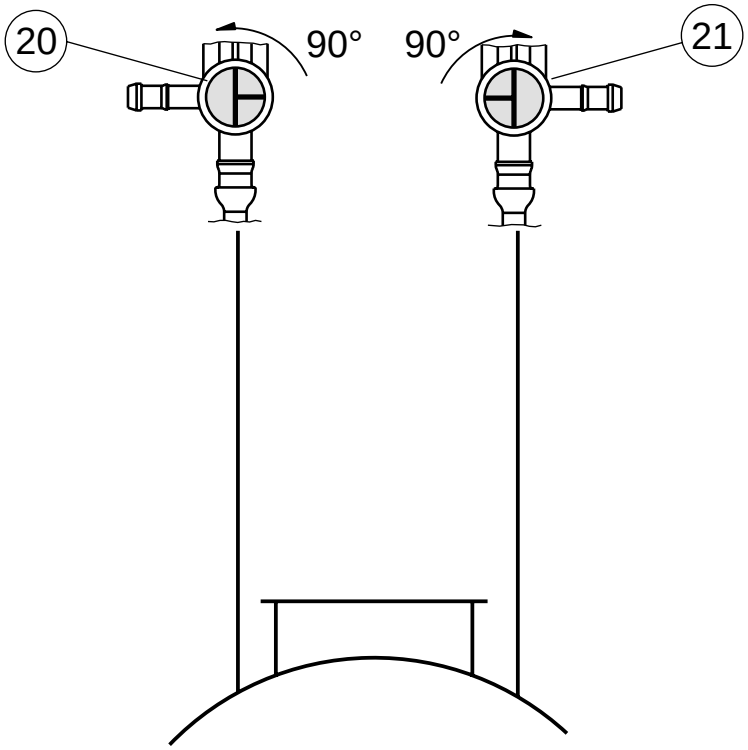
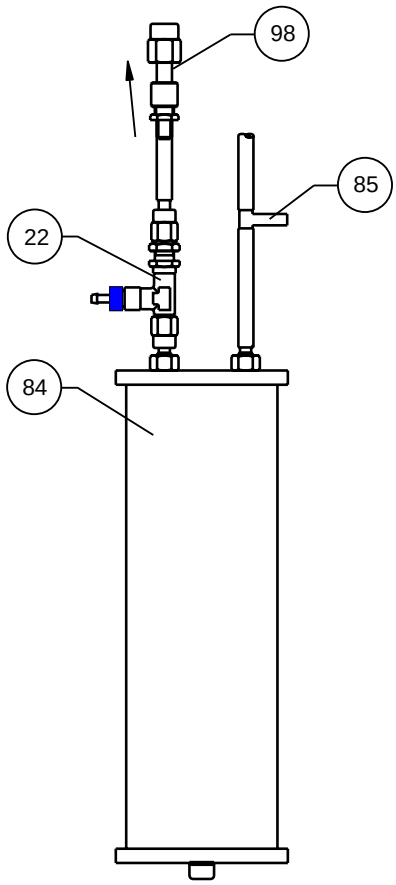
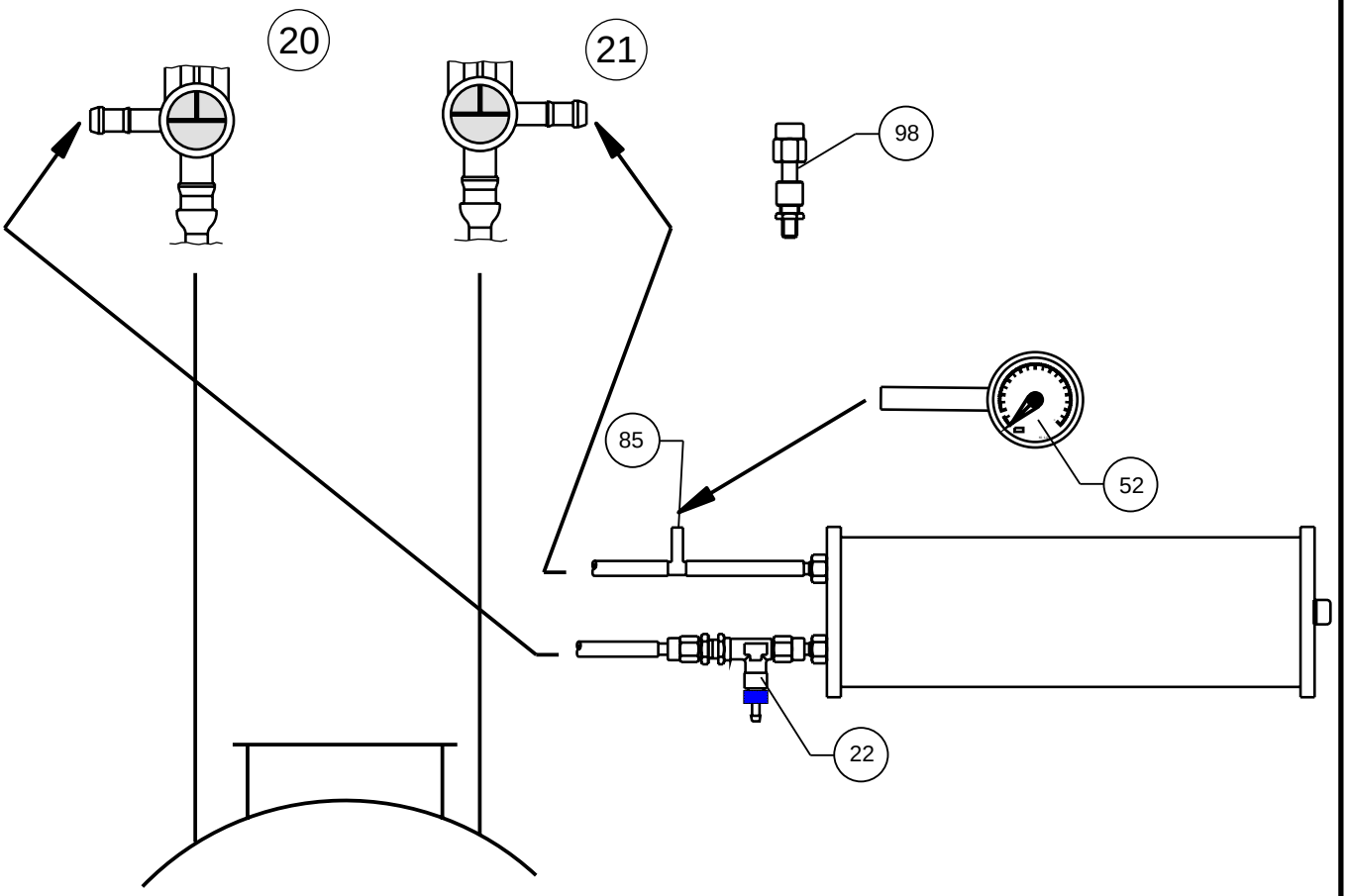
88
p < 5 bar







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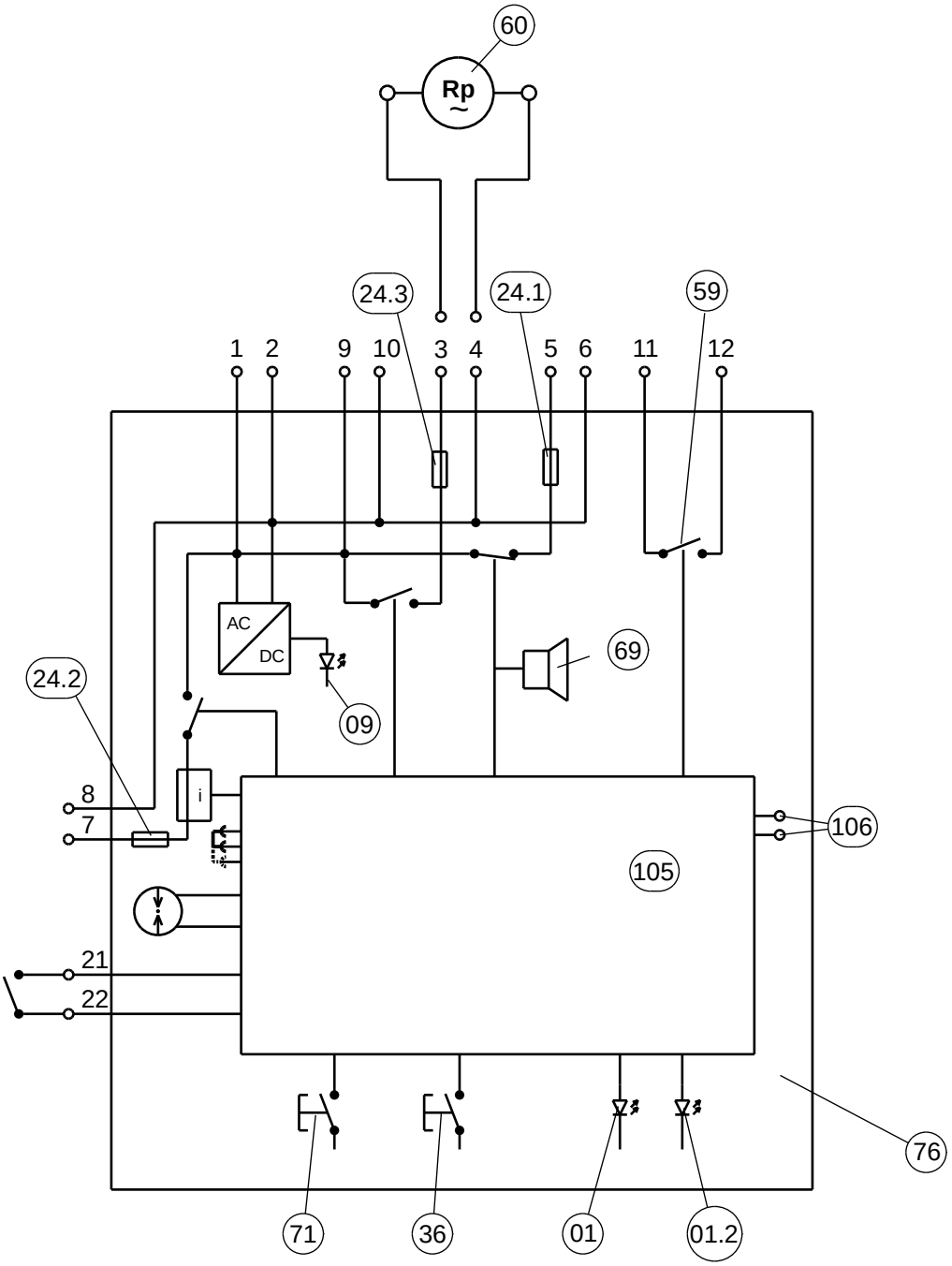
60
Rp
24.3
24.1
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DC
69
24.2
09
8
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i
106
105
21
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71
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01
01.2

E.1 H_{max} Depending on density

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

Density of the product stored [kg/dm³]	$H_{max.}$ [m]						
	VL 230	VL 255	VL 330	VL 410	VL 500	VL 570	
0.8	2.6	2.9	3.8	4.8	6.0	6.9	Aboveground tank(s) and pipe(s)
0.9	2.3	2.6	3.4	4.3	5.3	6.1	
1.0	2.0	2.3	3.1	3.9	4.8	5.5	Above- and under-ground tank(s) / pipe(s)
1.1	1.9	2.1	2.8	3.5	4.4	5.0	
1.2	1.7	1.9	2.6	3.2	4.0	4.6	
1.3	1.6	1.8	2.4	3.0	3.7	4.2	
1.4	1.5	1.6	2.2	2.8	3.4	3.9	
1.5	1.4	1.5	2.0	2.6	3.2	3.7	
1.6	1.3	1.4	1.9	2.4	3.0	3.4	
1.7	1.2	1.4	1.8	2.3	2.8	3.2	
1.8	1.1	1.3	1.7	2.2	2.7	3.1	
1.9	1.1	1.2	1.6	2.0	2.5	2.9	

E.2 Max. Tank height depending on density

Density of the product stored [kg/dm³]	$H_{max.}$ [m]							
	VL 34	VL 230	VL 255	VL 330	VL 410	VL 500	VL 570	
0.8	7.5	17.3	19.1	23.4	23.8	24.5	24.2	Above-ground tanks
0.9	6.6	15.3	17.0	20.8	21.1	21.8	21.5	
1.0	6.0	13.8	15.3	18.7	19.0	19.6	19.4	Above- and underground tanks
1.1	5.4	12.6	13.9	17.0	17.3	17.8	17.6	
1.2	5.0	11.5	12.8	15.6	15.8	16.4	16.2	
1.3	4.6	10.6	11.8	14.4	14.6	15.1	14.9	
1.4	4.3	9.9	10.9	13.4	13.6	14.0	13.8	
1.5	4.0	9.2	10.2	12.5	12.7	13.1	12.9	
1.6	3.7	8.6	9.6	11.7	11.9	12.3	12.1	
1.7	3.5	8.1	9.0	11.0	11.2	11.5	11.4	
1.8	3.3	7.7	8.5	10.4	10.6	10.9	10.8	
1.9	3.1	7.3	8.1	9.8	10.0	10.3	10.2	

Technical data

1. Electrical data

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

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

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

Evaluating the display for the function "Tightness test"

Chapter 3.5.2 described "Checking the tightness of the monitored system". This function can be used to obtain an indication of the tightness of the monitored system.

This is only possible if the switching value "Alarm OFF" has been exceeded. It can be repeated several times in succession.

This check is advisable **before** carrying out a recurrent function test on a leak detector, to see directly whether there is any need to look for leaks.

After pressing the button, this is confirmed by a brief audible signal which can be heard once, followed by a flashing signal, i.e. the Alarm LED flashes briefly to indicate the tightness as follows:

Number or flashes	Evaluation of the tightness
0	Very tight
1 to 3	Tight
4 to 6	Sufficient tight
7 to 8	Maintenance recommended
9 to 10	Maintenance highly recommended

The smaller the above value, the more tight is the system. The meaningfulness of this value naturally also depends on temperature fluctuations and should therefore be considered to be an indicative value.

1. Subject

ZD … = Zusätzlicher Druckschalter (German) that is "Additional pressure switch" for applications in which this equipment is required, e.g. when certain piping lengths are exceeded (see approval for double-walled pipes e.g. Brugg).

2. Area of application

(1) ZD … can be installed outdoors

(2) Components in contact with the conveyed product are made of V4A, PE and PP

(3) Pressure-resistant up to 25 bar

3. Electrical connections

Connect terminals 10 / 11 of the VL-HFw2 and terminals 21 / 22 of the VLR …/E to the terminals with the same names on the ZD ….

4. Start-up

After installation and electrical connections are complete:

4.1. In conjunction with the VL-HFw2 leak detector

Connect the ZD to terminals 10 and 11 of leak detector VL-HFw2.

(1) Press button on the ZD (so that it latches).

(2) Press start-up button on the VL-HFw2 and generate underpressure in the system.

(3) After the operating underpressure is reached, press the start-up button again (also see documentation for the above-mentioned leak detector).

4.2. In conjunction with the VLR …/E leak detector

Connect the ZD as a "sensor" to terminals 21 and 22 in leak detector VLR …/E.

4.2.1 VLR …/E WITHOUT connected solenoid valve

(1) Do not press button (not latched).

(2) Generate operating underpressure in the system.

(3) When the switching value "Alarm OFF" of the ZD … is reached, the "Sensor alarm" on the leak detector is cleared.

4.2.2 VLR …/E WITH connected solenoid valve

(1) Press button on the ZD (so that it latches). This causes the "Sensor alarm" on the leak detector to go out.

(2) Execute start-up sequence in accordance with the documentation for leak detector VLR …/E until the "Alarm OFF" pressure is reached.

(3) As soon as this underpressure is reached, the sensor alarm is triggered again, the solenoid valve closes, the pump of the leak detector stops.[1]

(4) Press button on the ZD (so that it unlatches). This causes the "Sensor alarm" on the leak detector to go out again, and an additional start-up operation (underpressure build-up) can be carried out until the operating underpressure is reached.

5. Normal operation

In normal operation the button on the ZD …
must be pressed (latched) for the VL-HFw2, and
not pressed (not latched) for the VLR …/E.

6. Functional tests

6.1. Testing the electrical connection

(1) Press the button on the ZD …, triggering the alarm on the leak detector.

(2) Press the button on the ZD … again; the alarm goes out

6.2. Testing the switching values

(1) Connect measuring instrument to the 3-way valve in the measuring line (below the leak detector).

(2) Turn the valve 90° anti-clockwise, thus "blinding" the pressure switch in the lead detector.

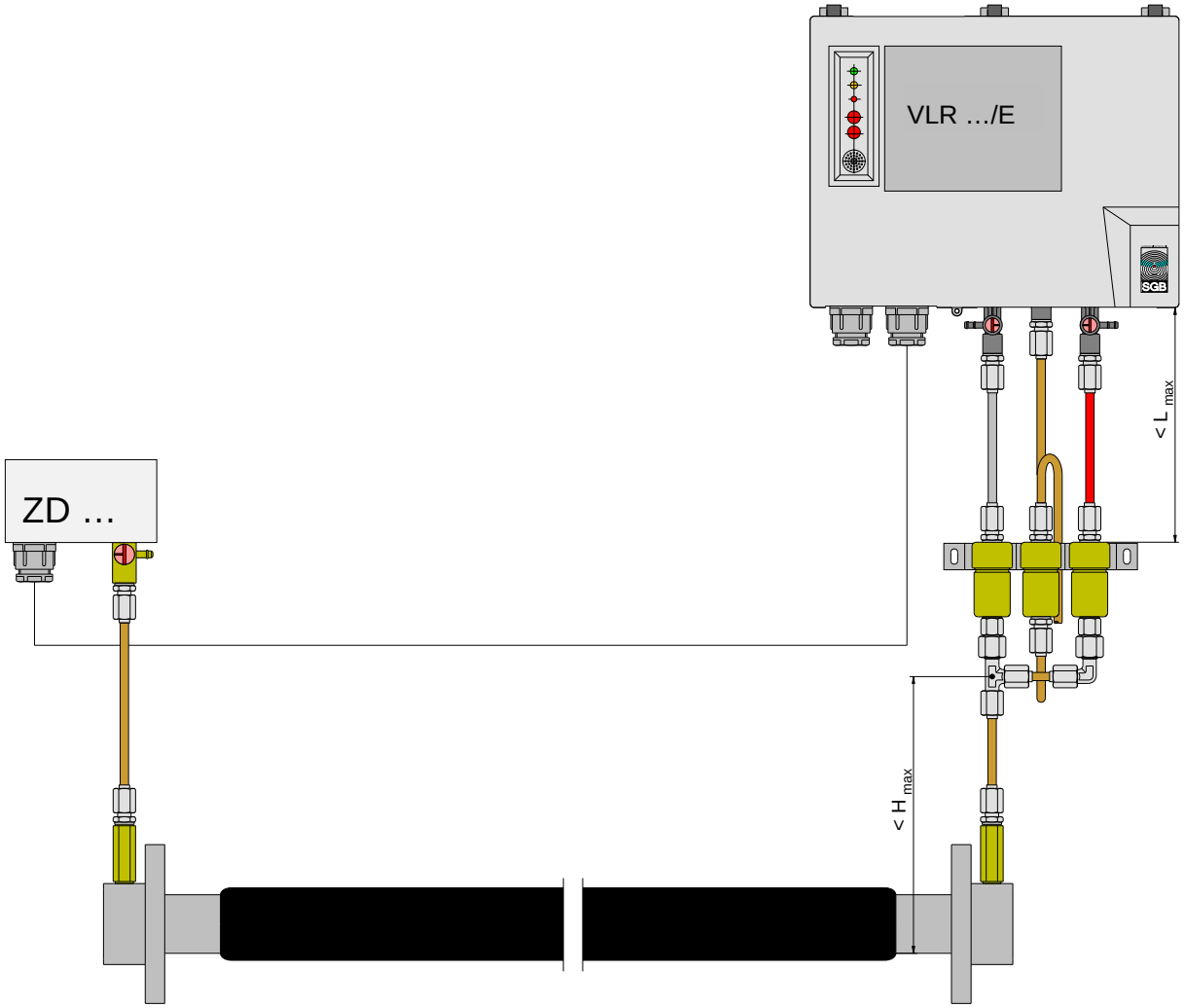
(3) Ventilate the system at the leak detector using the ventilation unit and the 3-way valve in the suction line until the alarm is activated.

(4) The switching value for "Alarm ON" must correspond to column 2, chapter 3.4.

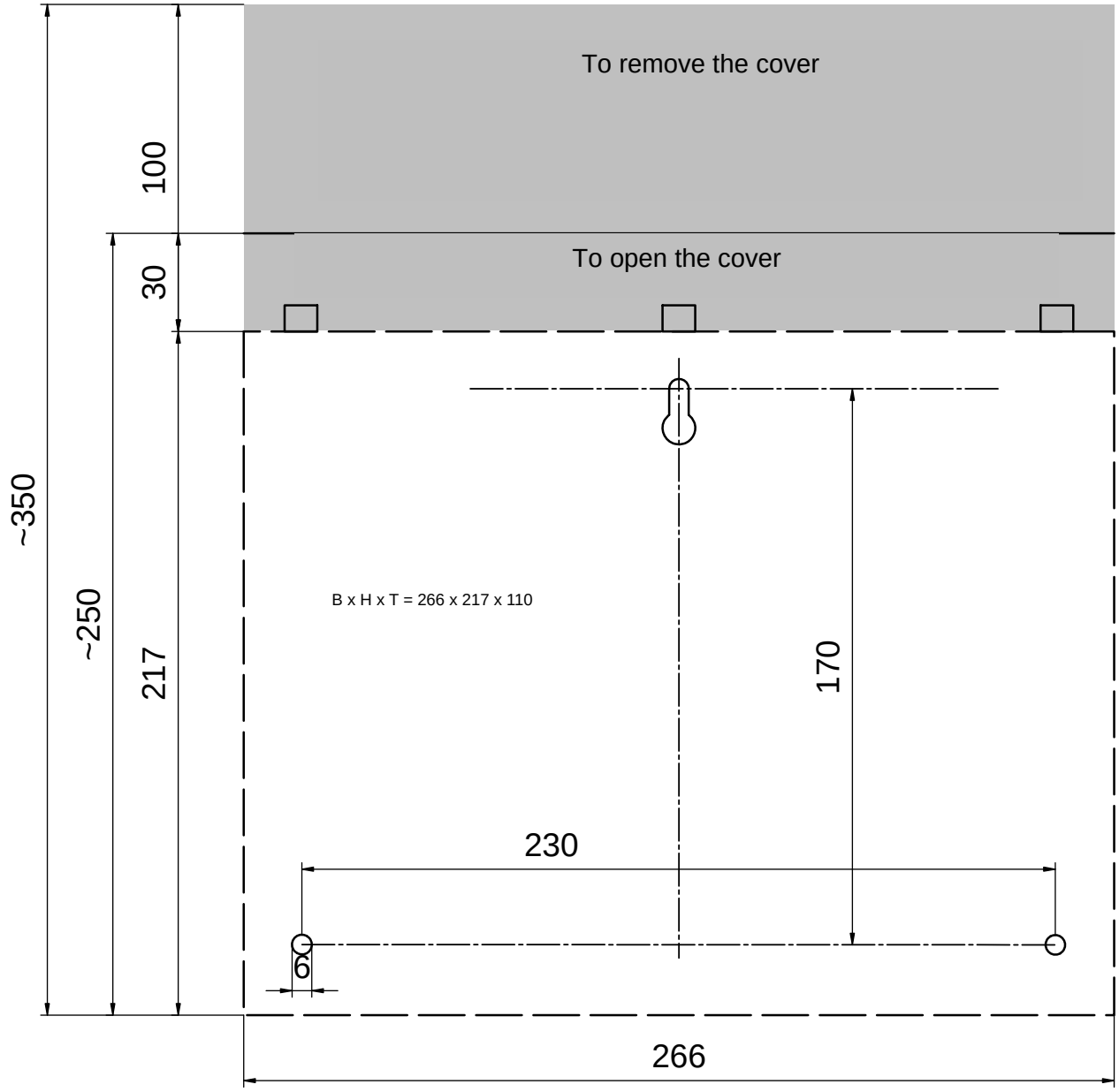
(5) Build up underpressure in accordance with Chapter 4 of this appendix.

(6) The switching value for "Alarm OFF" must be lower than the "Pump OFF" switching value of the leak detector.

[1] The "Sensor alarm" is a priority circuit, i.e. this alarm has the topmost priority, because it originally comes from an application in which a sensor was used in connection with a solenoid valve to replace the hydraulic seal.



- NO need for a liquid stop valve underneath ZD …
- NO need for a solenoid valve underneath ZD … (ZD … is pressure-resistant up to 25 bar)



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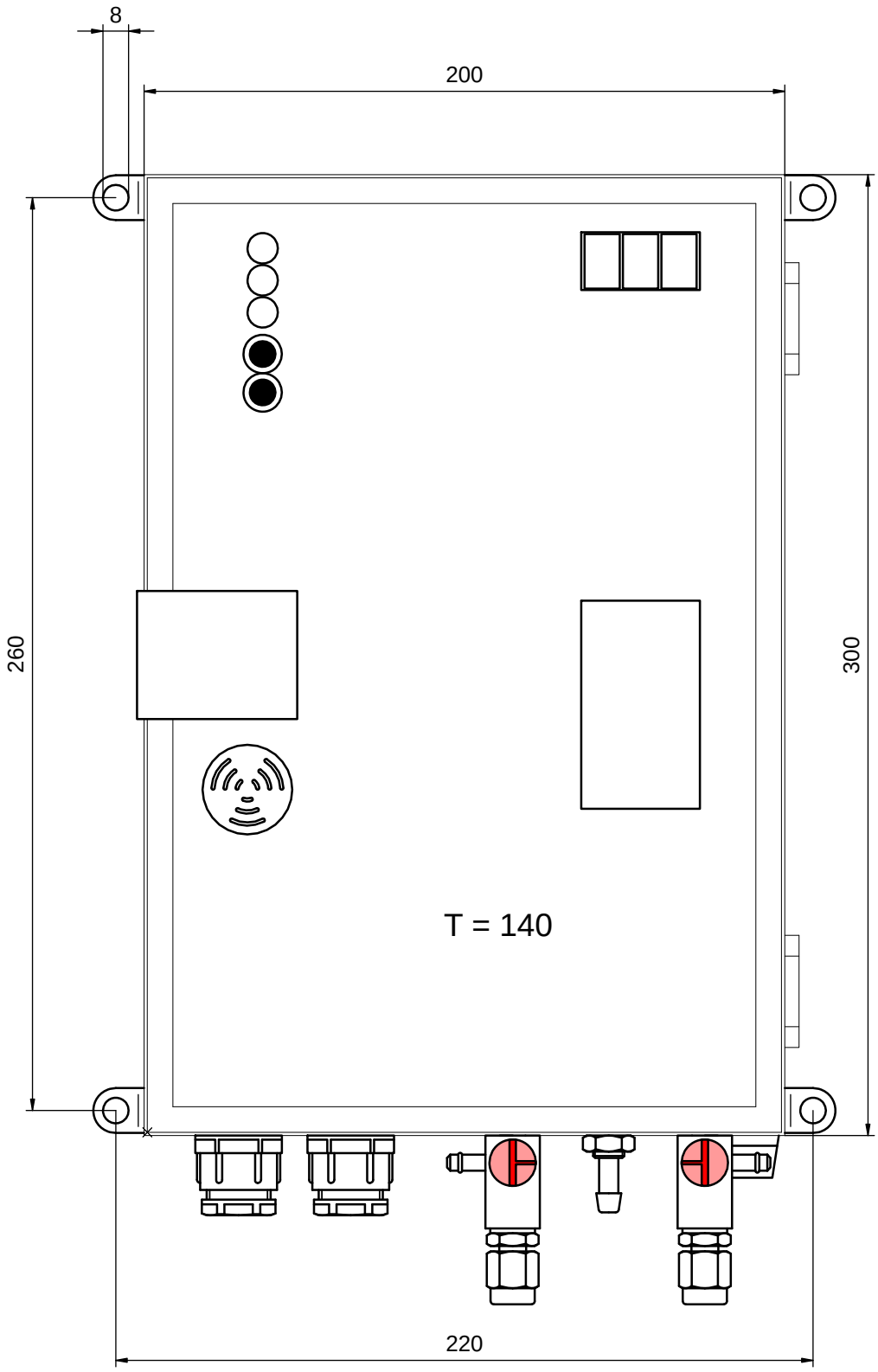
Dimension/Drilling
VLR 410/E



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Dimension/Drilling
VLR 410/E weather protected housing

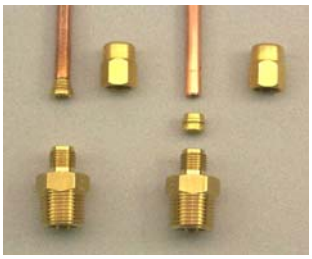
Work Sheet: AB-820 500

Pneumatic connections

1 Flare type fitting for flare type pipes

1. Lubricate the O-rings
2. Place the intermediate ring loosely in the threaded connection piece
3. Push the union nut and the thrust collar over the pipe
4. Tighten the union nut manually
5. Tighten the union nut until clearly increased force is needed
6. Finished assembly: turn by a further ¼ of a revolution

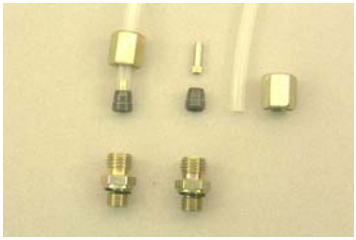
2 Clamping ring threaded fitting for plastic and metal pipes



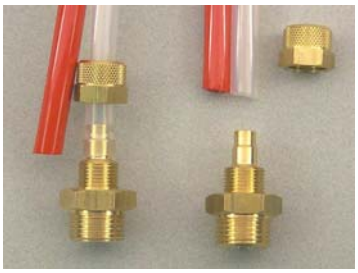
1. Insert the support sleeve into the end of the pipe
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the thread until strong resistance can be clearly felt
4. Lightly loosen the nut
5. Tighten the nut until resistance can be felt (nut must exactly match the thread of the basic body)

3 Olive threaded fitting for plastic and metal pipes

1. Insert the reinforcing sleeve into the end of the pipe
2. Knock in the reinforcing sleeve
3. Push the union nut and the olive over the end of the pipe
4. Screw the union nut by hand until you feel a stop
5. Press the pipe against the stop in the inner cone
6. Tighten the union nut by approx. 1.5 revolutions (pipe must not turn)
7. Loosen the union nut: check whether the pipe visibly projects from under the cutting ring (it doesn't matter if the clamping ring can be turned)
8. Retighten the union nut using normal force



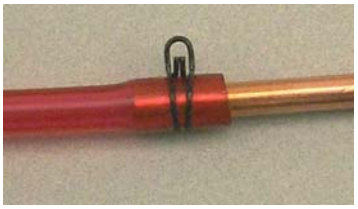
4 Quick-action fitting for PA- and PUR-tubes



1. Make a right-angled cut in the PA pipe
2. Loosen the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to where the thread begins
4. Tighten the union nut by hand
5. Further tighten the union nut using a wrench until clearly increased force is needed (approx. 1 to 2 revolutions)

NOT suitable for PE-pipes

5 Tube connections (socket 4 and 6 mm for EXCESS PRESSURE)



1. Push wire or screw clip over the tube
2. Push the tube onto the Cu pipe or the tube socket (if necessary heat or dampen PVC tube), tube must fit tightly all the way round
3. Wire clip: clamp tightly using pliers and push onto the joint
   Screw clip: push the clip over the joint and tighten it using a screwdriver, care must be taken that the clip is a smooth tight fit.

6 Tube connections (socket 4 and 6 mm for VACUUM)

For vacuum applications where there is no excess pressure on the connection lines even in the case of a leakage proceed as in item 5, but without clips.

For vacuum applications where excess pressure could arise in the case of a leakage, proceed as in Item 5.

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:

SERVICE, QUALITY & INNOVATION

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Yours sincerely

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