LECKANZEIGETECHNIK

SGB

Overpressure leak detector

D-FFL 10

Z – 65.26 - 221

Documentation D-FFL 10

Art. Nr.: 607 102
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SICHERUNGS**G**ERÄTE**B**AU GMBH
Hofstraße 10
57076 Siegen

LLOYDS REGISTER QUALITY ASSURANCE ISO9001

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Drawings

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1. Object

Overpressure leak detector forming part of a leak detection system for double-walled pipes used for the transport of flammable liquids incompatible with water.

2. Type

Leak detector type D-FFL 10/.. For the exact designation of the type of leak detector to be used as a function of the delivery pressure, see no. 4.1 (2) of this description.

3. Field of application

3.1. Pipes

FLEXWELL FILLING PIPES by ke Rohrsysteme und Umwelttechnik GmbH, D - 30162 Hanover

type FFL 80

with PTB approval no. III B/S ...

3.2. Liquid to be stored

Flammable liquids of hazard classes AI, AII, A III and B.

4. Functional description

4.1. Basic function

(1) In the case of double-walled pipes which are fitted with a D–FFL 10/... leak detection system, any leakage in the pipe walls is automatically indicated, under all operational conditions, by a pressure loss, which activates an optical and audible alarm.

The alarm is activated when a pressure is reached which is at least 1.0 bar higher than the maximum delivery pressure in the operational pipe.

(2) The **required operational pressure, i.e. reference pressure** in the interstitial space is built up

- either by **pressure-controlled backfeed** from a **stationary** nitrogen pressure accumulator connected to the interstitial space **(operating mode S)**

or

- by backfeed from a **mobile** pressure accumulator which is only connected for **commissioning and functional checking (operating mode M)**.

The operating mode S or M can be selected using the flip switch (mode selector switch BS) in the lid of the housing of the leak detector. The selected mode is indicated by the position of the flip switch. If a subsequent change in the operating mode is required, mode selector switch BS can be switched into the desired position and fitted with a lead seal. (Compare chapter 6.4 'Changing the operating mode'.)

Depending on the delivery pressure of the operational pipe, the pressures quoted in tables 1 and 2 are reached.

Table 1: Reference and alarm activation pressures in bar, leak detector type

Delivery pressure of the operational pipe	Type	Pressure in the interstitial space				Overpressure protection		Set pressure on pressure reducer	Pressure range of pres. reducer
		ALARM		BACKFEED					
		ON	OFF	ON	OFF Reference pressure	Trip pressure	Reseat presure		
≤ 1,0	/1	$2{,}2^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$3{,}0^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	3,5±0,2	10[1]
≤ 3,0	/3	$4{,}2^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$5{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	5,7±0,2	10[1]
≤ 5,0	/5	$6{,}2^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$7{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	7,7±0,2	10[1]

Table 2: Trip pressure of the safety valve for the interstitial space

Safety valve	
Trip pressure	Reseat pressure
9.0±0.5	7.8

(3) The overpressure built up in the interstitial space is measured by means of pressure switches PUE-A and PUE-N, which are connected to the interstitial space by the VL connecting line. The ACTUAL pressure in the interstitial space is shown as standard value on the pressure gauge installed in the lid of the housing of the leak detector. For exact measurement, a separate, suitable measuring device must be connected to the PK test socket.

[1] Suitable pressure reducers with constant pressure supply are available from Brugg Rohrsysteme GmbH, Wunsdorf (compare general approval PTB no.: III B/S 1236 'FLEXWELL FILLING LINE

(4) If due to leakage, the pressure drops below the trip value 'Alarm On' in the interstitial space, an alarm is activated, which comprises an optical alarm with a red signal lamp and an audible alarm through buzzer SU. The audible alarm may be switched off by switch T which is fitted with a lead seal under normal operating conditions.

In the event of an alarm, a potential free contact is available for possible further external use of the alarm signal.

When installing additional potential free contacts, the trip value 'Backfeed ON' (which means 'Backfeed required' for operating mode M or 'Automatic backfeed' for operating mode S) may be remotely transmitted .

(5) In the event of an alarm, feed pumps should be stopped. This may be carried out using the relay with potential free contacts installed in the leak detector, when the pumps are connected to the related terminals of terminal strip RA.

(6) Excess overpressure in the system is prevented by the trip pressure (compare table 2) set on safety valve SV 1 (interstitial space).

(7) The leak detector is designed for an electrical supply of 230V ~ 50 Hz AC. Once the electrical supply has been connected the green signal lamp B (*Betrieb = Operation*) will light up.

(8) A short-term power failure has no negative effect on the system. After return of the electrical supply the leak detector will restart operation.

4.2. Function in operating mode S

In this operating mode, the overpressure in the interstitial space is controlled by a pressure-controlled backfeed from a stationary nitrogen pressure accumulator (DS) with a pressure reducer installed downstream. This stationary nitrogen pressure accumulator is permanently connected to the interstitial space.

The backfeed of gas for building up the overpressure is controlled by pressure switch PUE-N.

If the pressure in the interstitial space falls to the trip value 'Backfeed ON' specified in table 1, pressure switch PUE-N opens solenoid valve NSM, and the reference overpressure is restored by applying a max. backfeed of 100 l/h through throttle valve DR.

During backfeed signal lamp N (automatic backfeed) will light up. Only once solenoid valve NSM (automatic backfeed) has been closed the signal lamp will go out.

This compensates for a pressure drop when the alarm triggering pressure has not yet been reached.

If the supply pressure of the pressure accumulator is not sufficient to build up the required operating overpressure (e.g. when the accumulator is empty), solenoid valve NSM remains open. A further pressure drop will trigger an alarm.

Leakage at a rate of more than 100 l/h results in pressure drop which will trigger an alarm.

4.3. Function in operating mode M

The pressure specified in table 1 as 'reference pressure' is applied to the interstitial space only once by backfeed from a mobile pressure accumulator with a pressure reducer installed downstream (compare drawings no. 7.0593 to 9.0593). In absence of a permanently installed pressure accumulator there is no automatic backfeed of inert gas activated by the leak detector.

A pressure fall to the trip pressure 'Backfeed ON' is indicated by signal lamp N ('Backfeed required') (compare table 1). This allows backfeed with inert gas to take place before the leak detector has reached the alarm condition. When installing additional potential free contacts (terminal strip RN), this signal may be remotely transmitted (compare 3.0593, 11.0593 and 12.0593).

After the reference pressure has been reached again, the leak detector continues to control the connected system as described in 4.1.

In the event of an alarm, backfeed with inert gas can be carried out using the mobile pressure accumulator until the value set on the leak detector (see table 1) has been reached. The general operating instructions as per chapter 8 should be adhered to.

In order to ensure trouble-free operation of the system for one year, the tightness of the double-walled pipe being controlled by using overpressure without backfeed is of utmost importance. If perfect tightness cannot be ensured, a leak detector as used in operating mode S should be installed.

5. Structure of the leak detector

The leak detector consists of a housing comprising:

- pressure switch PUE-A for controlling the alarm signal
- pressure switch PUE-N for controlling automatic backfeed
- solenoid valve NSM for backfeed through throttle valve DR
- solenoid valve FM for more rapid filling of the interstitial space, activated using push-button FT 'Filling' on the lid of the housing
- throttle valve DR for limiting the max. backfeed volume
- pressure gauge for indicating the actual value (standard value) in the interstitial space
- check valves RSP for maintaining the pressure in the interstitial space, even if no supply pressure is available (e.g. empty pressure accumulator, change of cylinders)
- connecting fittings
- terminal strip K for electrical connection
- terminal strip RA (potential free relay contacts, ALARM)
- *terminal strip RN (potential free relay contacts, BACKFEED) (optional extra)*
- electrical switchgear
- safety valve SV 1
- operating mode selector switch

6. Installation instructions

6.1. General information

(1) The leak detector D-FFL 10/... should only be installed by specialists qualified to § 19 I WHG who have submitted proof of their qualifications to TRbF 503 and to TRbF 180/280 no. 1.7.

(2) **Leak detectors in operating mode M shall be used exclusively for double-walled pipes laid underground. Leak detectors in operating mode S may be used for double-walled pipes laid below and above ground.**

(3) The relevant rules for the prevention of accidents must be observed.

6.2. Installation of the leak detector

(1) The leak detector should be installed in a closed, dry room inaccessible to unauthorised persons. **The leak detector must not be installed in potentially explosive locations.**

(2) If the leak detector is situated outdoors or installed in a humid area as per VDE specification, it must be provided with a weather-proof box with a clear lid (DIN 40 050 IP 55). In this case, an additional external signal (horn) should be installed in a suitable location.

(3) The leak detector is designed for wall fastening. The distance between the interstitial space and the leak detector should be kept to a minimum.

6.3. Electrical installation

(1) The leak detector is designed for electrical supply of 230V ~ 50 Hz AC. It must be connected to the related terminals of terminal strip K by qualified electricians (compare drawings 3.0593; 11.0593 and 12.0593). It must be permanently connected, plug-in or switch-type connections are not permitted.

(2) The instructions of the local electric supply company are to be observed.

(3) It is possible to connect an additional external audible alarm signal to the terminals indicated on the leak detector. The power rating of this external signal should not exceed 50 VA.

(4) If requested, potential free relay contacts can be connected to the terminals of terminal strip RA, so that the feed pumps are automatically disconnected in the event of an alarm. The maximum permissible switch contact load of 230 V, 16A must not be exceeded.

(5) For transmitting the signal 'Backfeed ON', the additional potential free relay contacts may be connected to the terminals of terminal strip RN. The maximum permissible switch contact load of 230 V, 16A must not be exceeded.

6.4. Changing the operating mode

(1) The operating mode of the leak detector can be selected on site using operating mode selector switch BS.

(2) In operating mode S, the nitrogen pressure accumulator must be permanently connected to the leak detector. Operating mode selector switch BS must be fitted with a lead seal (compare drawings 1.0593, 2.0593 and 10.0593).

(3) When selecting operating mode M, the nitrogen pressure accumulator is only to be connected as indicated in chapter 8.3. Operating mode selector switch BS must be fitted with a lead seal in position M.

(4) When the operating mode is changed subsequently, make sure that the relevant operational conditions are complied with.

6.5. Installation of the connecting pipework

(1) The pipework VL between the leak detector and the interstitial space of the double-walled pipe and the backfeed pipework NSL must be made from commercially available copper pipes to DIN 17671 sheet 1 or metallic precision pipes or plastic pipes designed for pressure rating PN 10.

The pipes must have a clear internal diameter of 4 mm minimum and a wall thickness of 1 mm minimum.

If installed underground at a depth of less than 30 cm or outdoors above ground, the connecting pipes must have the dimensions 8 x 1.

(2) The cross section areas of pipes must be maintained over their full length. Compression or kinking is not permitted.

(3) Installation of the connecting pipework VL and the backfeed pipe NSL to the leak detector must be carried out as shown on drawing 10.0593.

(4) The installation instructions of the manufacturer of the double-walled pipes are not affected by the above.

(5) Check valve PV and other fittings in the connecting pipework must be designed for pressure rating PN 10.

7. Commissioning of the leak detection system

7.1. General

(1) In the manufacturer's plant, the leak detector has been submitted to a leakage test by applying the overpressure quoted in table 1 as 'Reference pressure'. Consequently, no leakage test is required on site.

(2) By means of connecting pipe VL the leak detector is connected in a pressure-tight manner to the interstitial space of the double-walled pipe, and through backfeed pipe NSL it is connected in a pressure-tight manner to the pressure accumulator used for filling the interstitial space, depending on the operating mode.

(3) After that, the electrical connection is carried out. The green signal lamp B 'Betrieb' (*operation*) and the red signal lamp A 'Alarm' will light up and an audible alarm will be triggered. Using switch T 'Ton Aus' (*alarm off*) the audible alarm can be cancelled. In addition, the yellow signal lamp 'automatisches Nachspeisen' (*automatic backfeed*) will light up.

(4) The pressure reducer used should have a setting range of 10 bar.

7.2. Commissioning in operating mode S

(1) The operating mode selector switch must be fitted with a lead seal in position S.

(2) After opening cylinder locking valve FAV on the pressure accumulator, inert gas N_2 will flow through the permanently installed backfeed pipe NSL as far as solenoid valves NSM and FM in the leak detector.

(3) Set the reducing valve on pressure reducer DM of the pressure accumulator to the values quoted in the table for the supply pressure.

Check the setting of the pressure reducer shortly before backfeed is completed (i.e. reaching REFERENCE pressure).

A pressure rise on the pressure reducer after completion of the backfeed operation has no effect on the monitoring system. When a solenoid valve opens once again (automatic backfeed), the pressure on the pressure reducer will decrease to the set value.

(4) Solenoid valve NSM is opened by pressure switch PUE-N, signal lamp N lights up.

(5) For opening solenoid valve FM, press push-button FT 'ON'. Filling through both solenoid valves NSM and FM will commence. When the trip point 'Alarm OFF' is reached, the optical and audible alarms will be reset. When reaching the 'reference pressure', solenoid valves NSM and FM will close and signal lamps N and F will go out. The leak detector will commence normal monitoring pressure-controlled, backfeed will be carried out through solenoid valve NSM with a throttle valve installed downstream. Further filling using push-button FT is no longer possible.

Actuation of push-button FT and consequently opening of solenoid valve FM is only possible when pressure switch PUE-N triggers automatic backfeed.

(6) If the trip value 'Alarm OFF' (resetting the audible and optical alarm) or the reference pressure (signal lamps F and N) is not reached, the cause of the failure must be found (empty pressure accumulator, leakage in the system) and eliminated. After that, filling can be continued.

(7) After reaching the reference pressure, the tightness of the complete system must be checked. All connections on the leak detector, on the pressure accumulator and on the interstitial space must be checked for tightness using a gas leakage detector.

The overpressure applied to the system which is indicated on the pressure gauge must not drop significantly during the next 120 minutes. Any leakage found must be eliminated, and the leakage test must be repeated.

(8) After completion of the leakage test a functional check as provided in paragraph 8.3 must be carried out.

7.3. Commissioning in operating mode M

(1) The operating mode selector switch must be fitted with a lead seal in position M.

(2) Connect a mobile pressure accumulator with pressure reducer and integral safety valve to the leak detector connector coupling AVK and set the pressure reducer to the value indicated in table 1.

(3) On opening cylinder locking valve FAV on the pressure accumulator inert gas will flow through the high-pressure hose as far as solenoid valves FM and NSM in the leak detector.

(4) Solenoid valve NSM is not activated in this operating mode.

(5) For opening solenoid valve FM press push-button FT for filling.

(6) When the trip value 'Alarm OFF' is reached, the optical and audible alarms will be cancelled. Solenoid valve FM will close after the reference pressure has been reached, and signal lamp F will go out.

(7) For checking the tightness of the complete system, pressure accumulator DS must be disconnected from coupling AVK. All connections on the leak detector, on the pressure accumulator and on the interstitial space must be checked for tightness using a gas leakage detector.

The overpressure applied to the system which is indicated on the pressure gauge must not drop significantly during the next 120 minutes. Any leakage found must be eliminated, and the leakage test must be repeated.

(8) After completion of the leakage test a functional check as provided in paragraph 8.3 must be carried out.

(9) For changing the operating mode, see paragraph 6.4 .

8. Operating instructions

8.1. General instructions

(1) When the leak detection system has been properly installed in a pressure tight manner (interstitial space, connecting line(s), leak detector), the leak detector will work without any trouble.

(2) In the case of systems operated in mode M (i.e. no inert gas backfeed), only slight leakages in the system will lead to activation of the alarm.

(3) In systems operated in mode S, pressure drop will only activate the alarm when it cannot be compensated for by pressure-controlled backfeed.

(4) In the event of an alarm, the cause must be established and eliminated as soon as possible.

8.2. Maintenance

(1) Once a year, the leak detector D-FFL 10/... should be checked for operational safety by an expert from a specialist company or by the user's internal expert.

(2) The extent of the annual check is described in subparagraph 8.3.

(3) It should be ascertained whether the provisions of paragraph 6 are still complied with.

(4) In any case,

- the test valves at the end of the double-walled pipe must be checked for tightness and cleanliness, and
- the pressure accumulator must be checked for sufficient inert gas content.

8.3. Functional check of the leak detector and the leak detection system

The operational safety and the reliability of the leak detector and of the leak detection system should be checked.

- **each time they are recommissioned**
- **at intervals as specified in paragraph 8.2**

and

- **after each incident of trouble shooting**.

Reduction of the pressure for carrying out the functional check shall **generally** be carried out using the test valve(s) PV installed at the end of the double-walled pipe. Pressure drop must be monitored on the pressure gauge of the leak detector and on an additional measuring instrument connected to the PK test socket. In this way, every functional check includes checking of free passage between the end of the interstitial space(s) and the pressure switches of the leak detector.

The functional check should **at least comprise:**

(1) Bleeding the system through test valve(s) PV provided at the end of the double-walled pipe(s) in such a way that the trip value of the pressure switch for backfeed 'ON' is indicated on the pressure gauge after the pressure drop and that the trip value for alarm 'ON' is indicated on the pressure gauge after a further pressure drop. For checking purposes, a measuring instrument of accuracy class 1.6 should be connected to the test socket of the leak detector.

(2) The optical and audible alarms of the leak detector should be checked and reset by actuation push-button T (Ton aus = *alarm off*).

The alarm must be triggered upon reaching the pressure value specified in table 1 for the leak detector concerned.

(3) After checking the alarms, the test valve should be closed, and the overpressure as per paragraph 7.2, subparagraphs (4) and (5) for operating mode S and as per paragraph 7.3, subparagraphs (2) to (6) for operating mode M shall be restored to the REFERENCE pressure.

(4) The leak detector will commence normal monitoring.

(5) The fittings and system components shall be checked for good function and reliability. Housing G and switch T for alarm cancellation shall be fitted with lead seals.

(6) A report on the checks must be written.

8.4. Pressure test of the double-walled pipe

The interstitial space of the double-walled pipe must be submitted to a pressure test on site. The extent of this pressure test depends on the provisions for approval for the pipe structure used. The specialist company charged with the installation of the double-walled pipeline shall inform the specialist company responsible for the installation of the leak detector in writing in the form of a test report, that the interstitial space of the double-walled pipe has been successfully tested. Such a report must be given before installation of the leak detector is commenced.

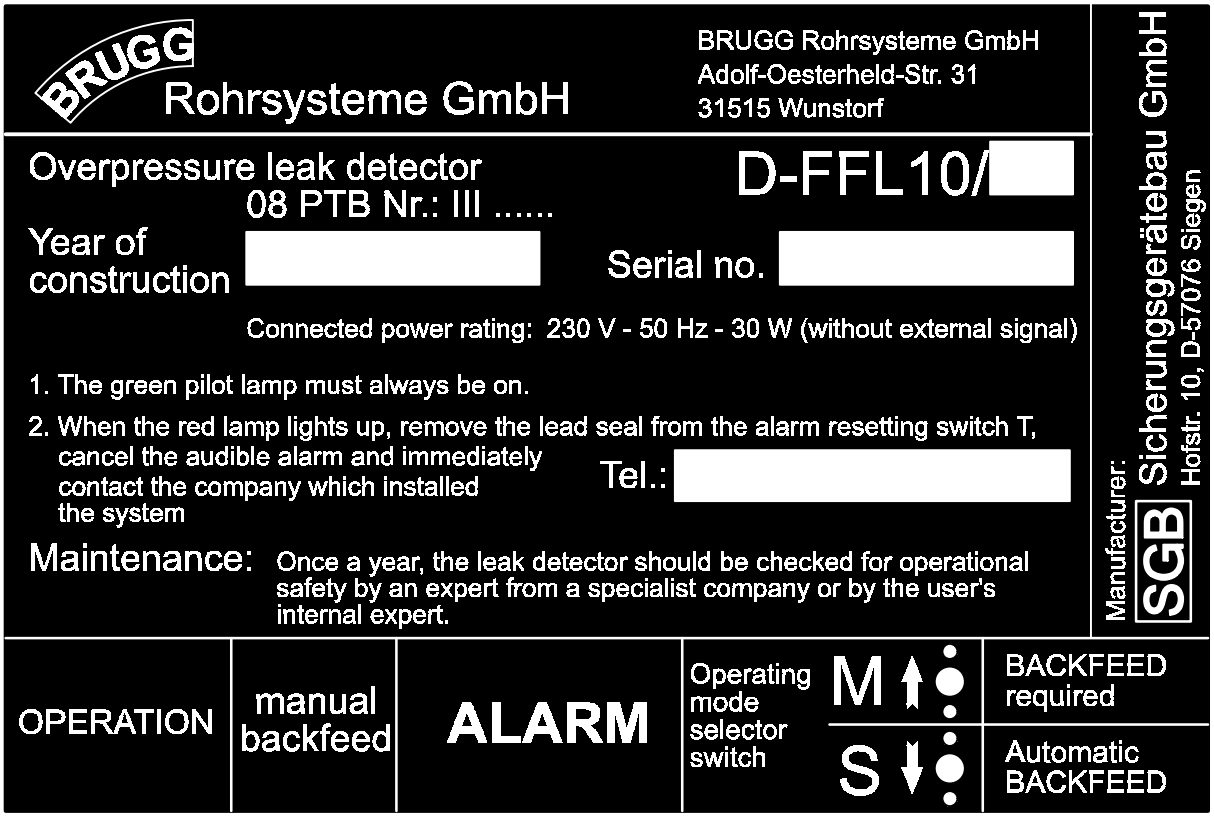
8.5. Activation of an alarm

(1) In the event of an alarm, the red alarm lamp A lights up, and the audible signal sounds. This applies to both modes of operation S and M.

(2) Remove the lead seal from the alarm resetting switch T, cancel the audible alarm and immediately contact the company which installed the system.

(3) Feed pumps which are not controlled by the leak detector shall be stopped.

(4) An expert from the specialised company or the tank user's internal expert must establish the cause of the alarm, take remedial action and restart the leak detector as per paragraph 7.2 (operating mode S) and as per paragraph 7.3 (operating mode M), respectively, and carry out a functional check as per paragraph 8.3.



Nameplate

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dated May 16, 1994

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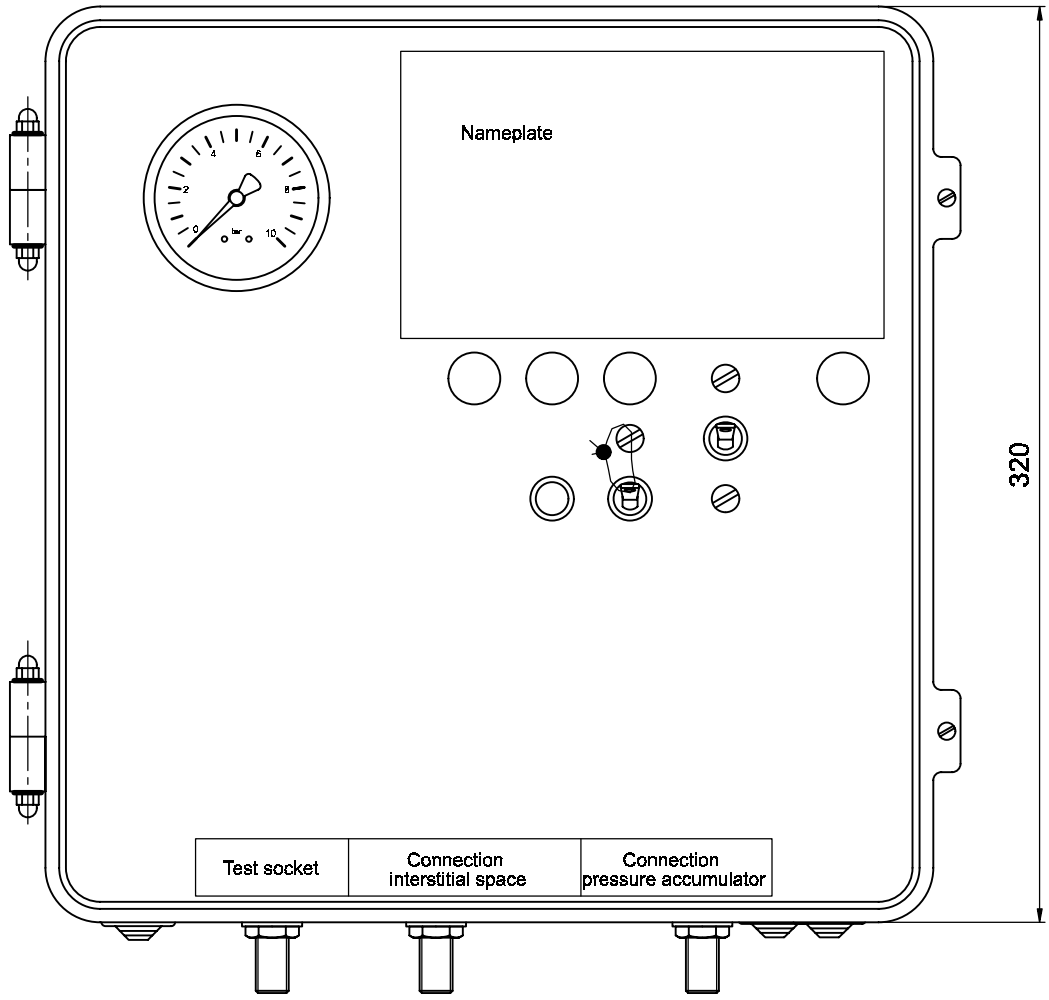

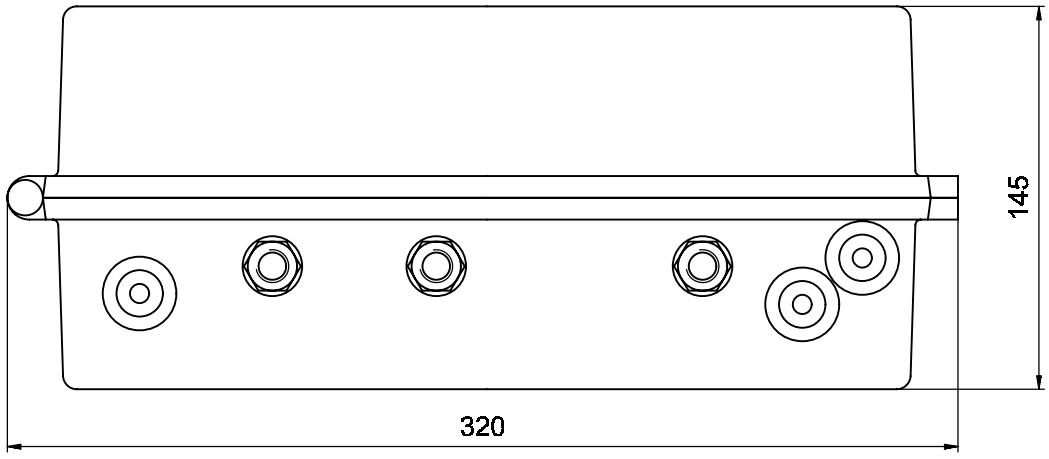

Outside view

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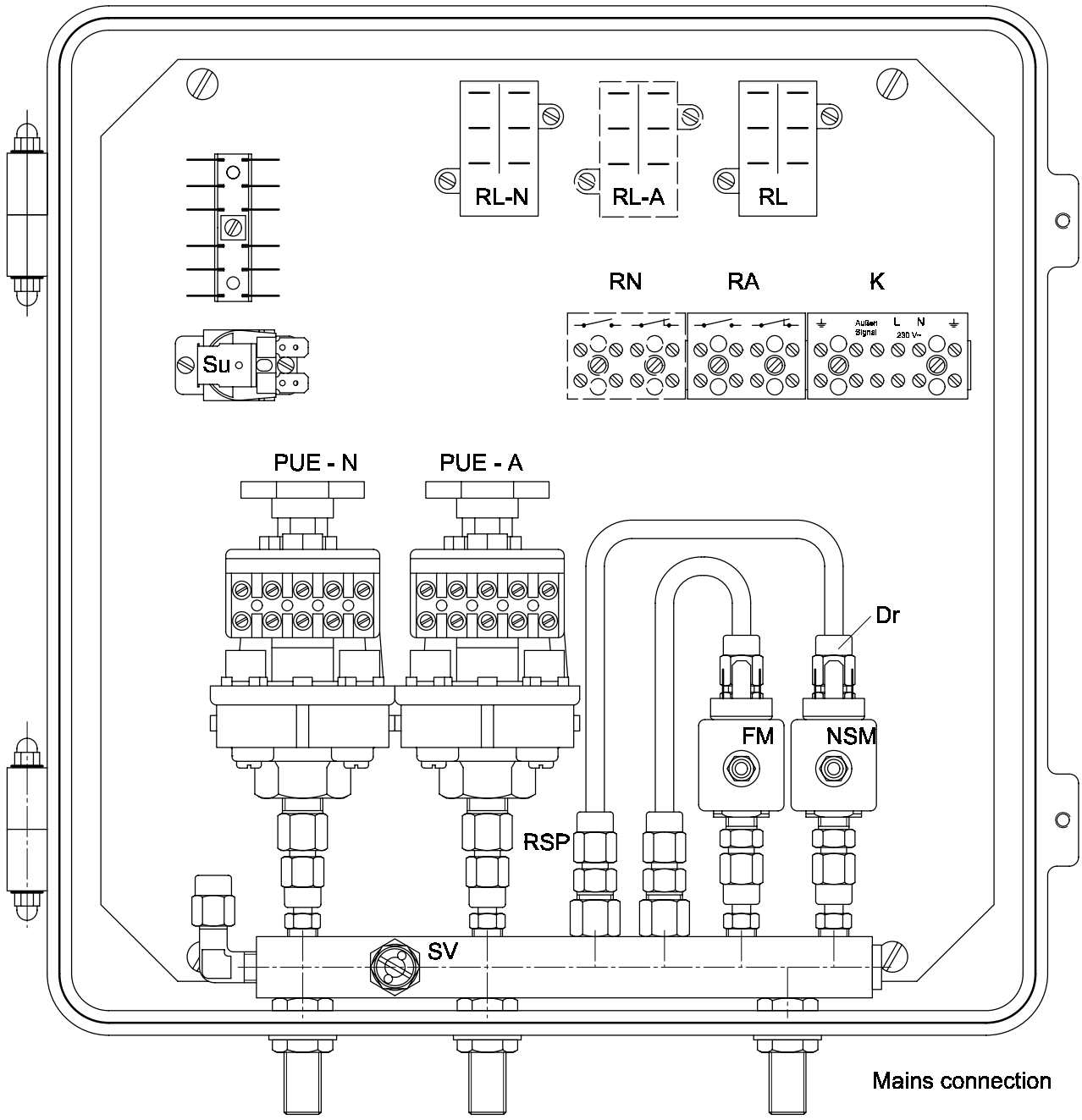

Inside view and overview of components

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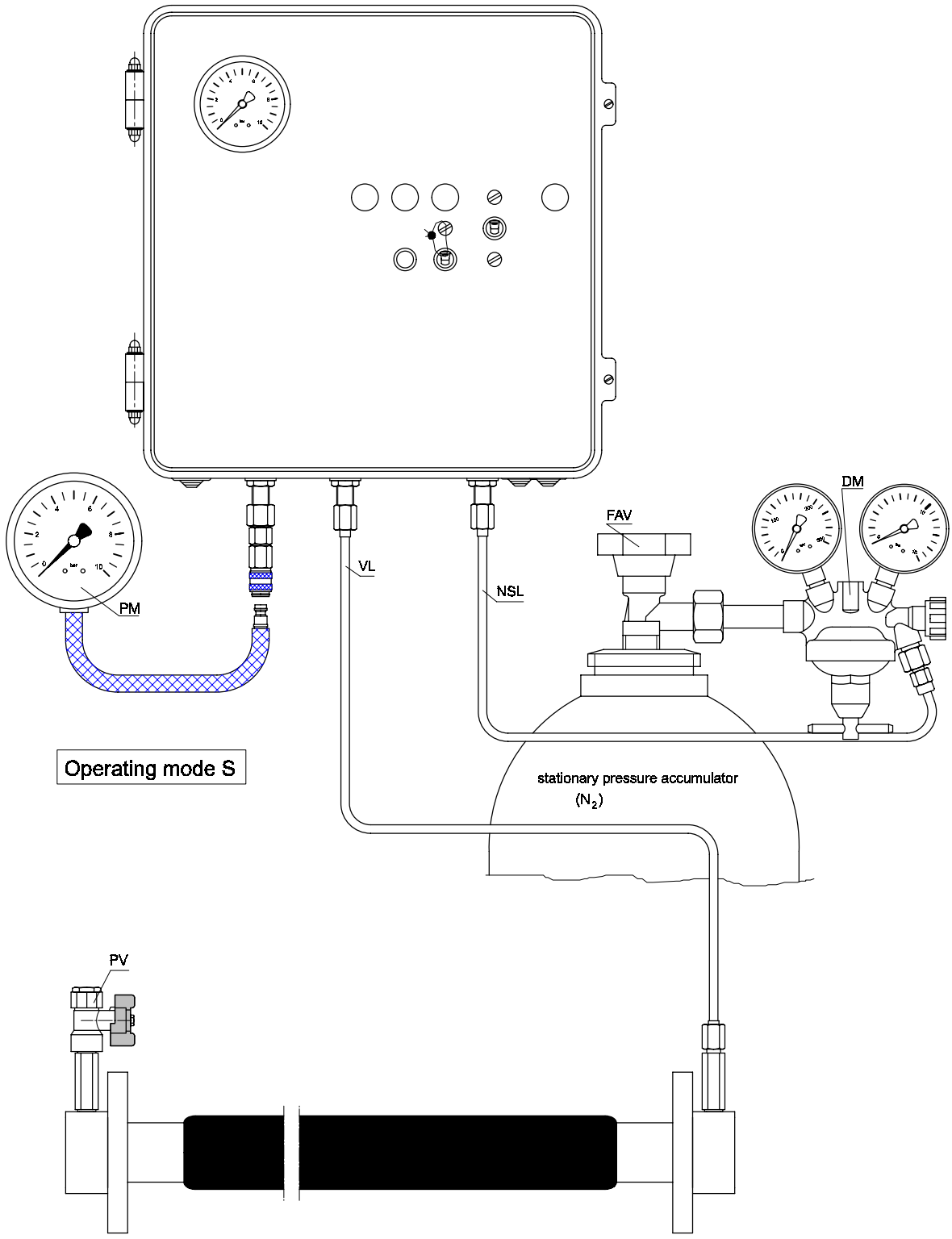

Installation example: Single-train system, operating mode S

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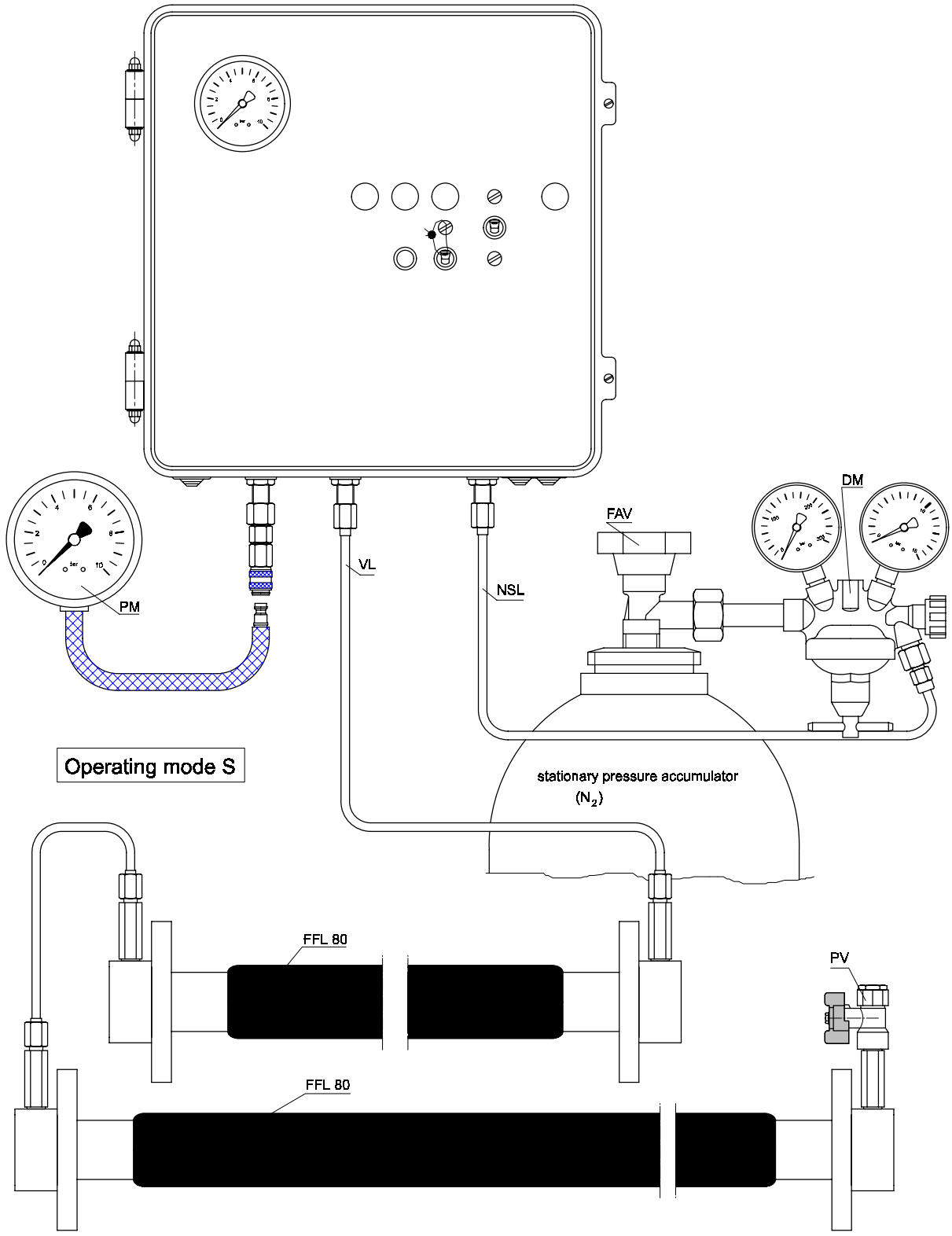

Installation example: Closed circular pipeline, operating mode S

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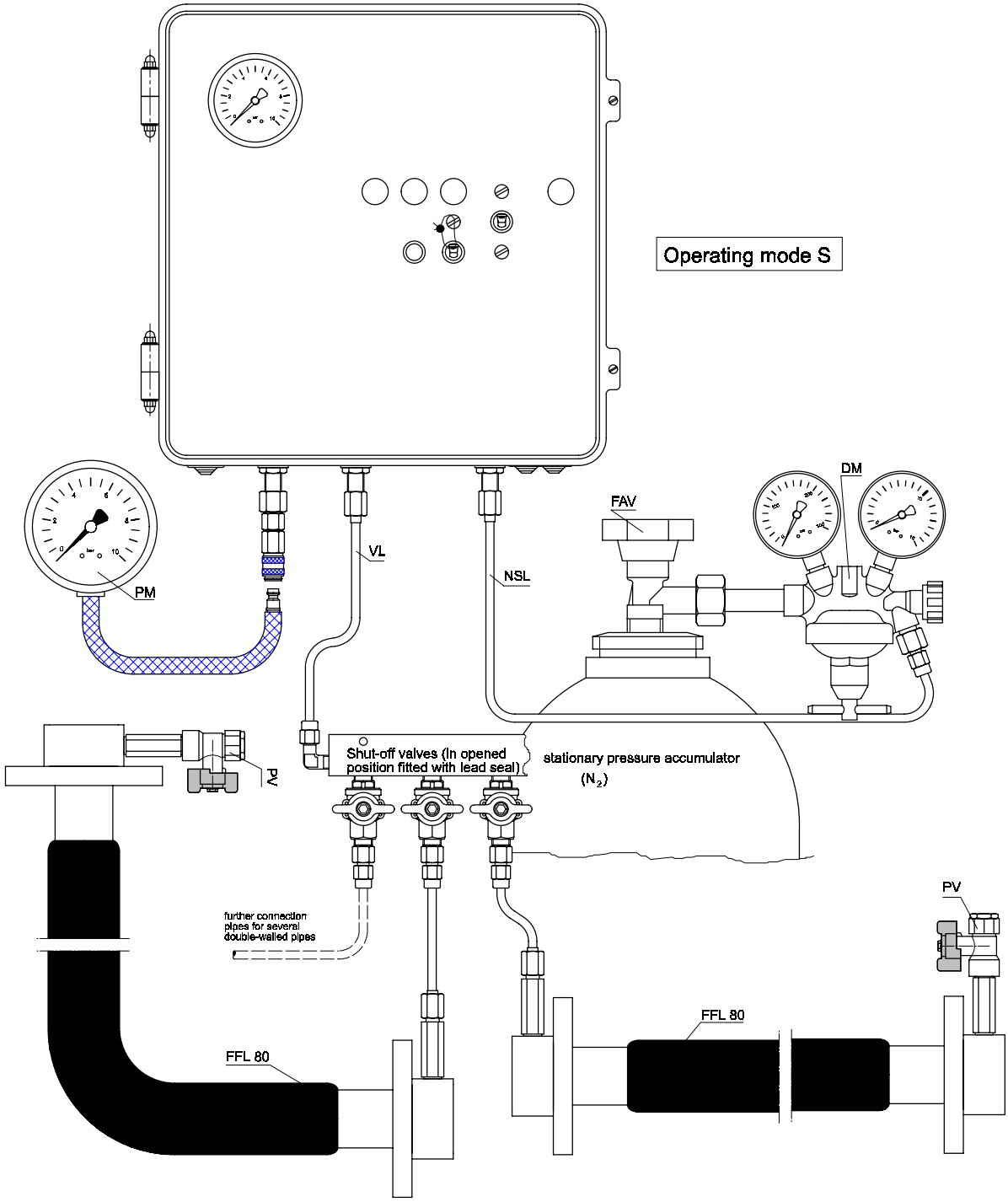

Installation example: Multiple-train system, operating mode S

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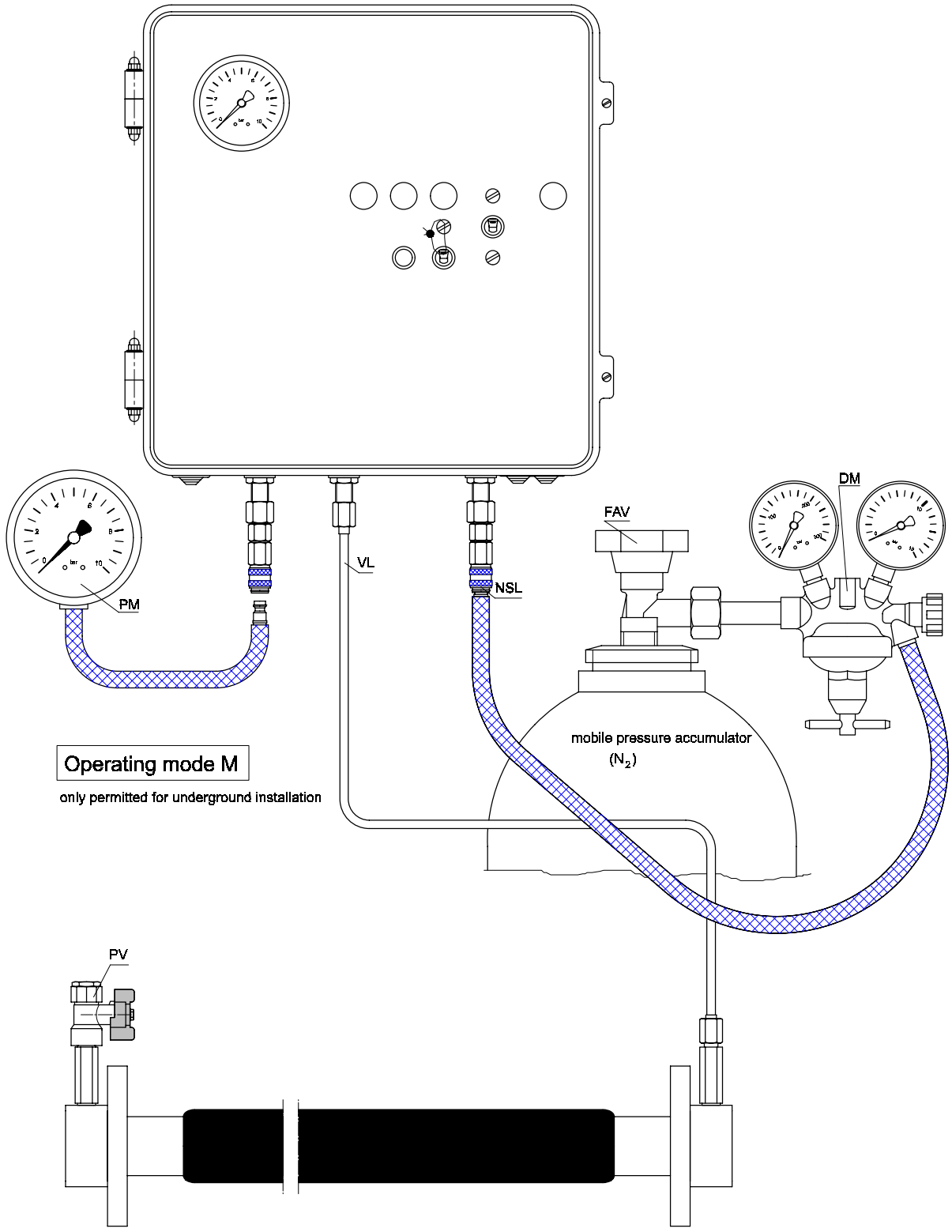

Installation example: Single-train system, operating mode M

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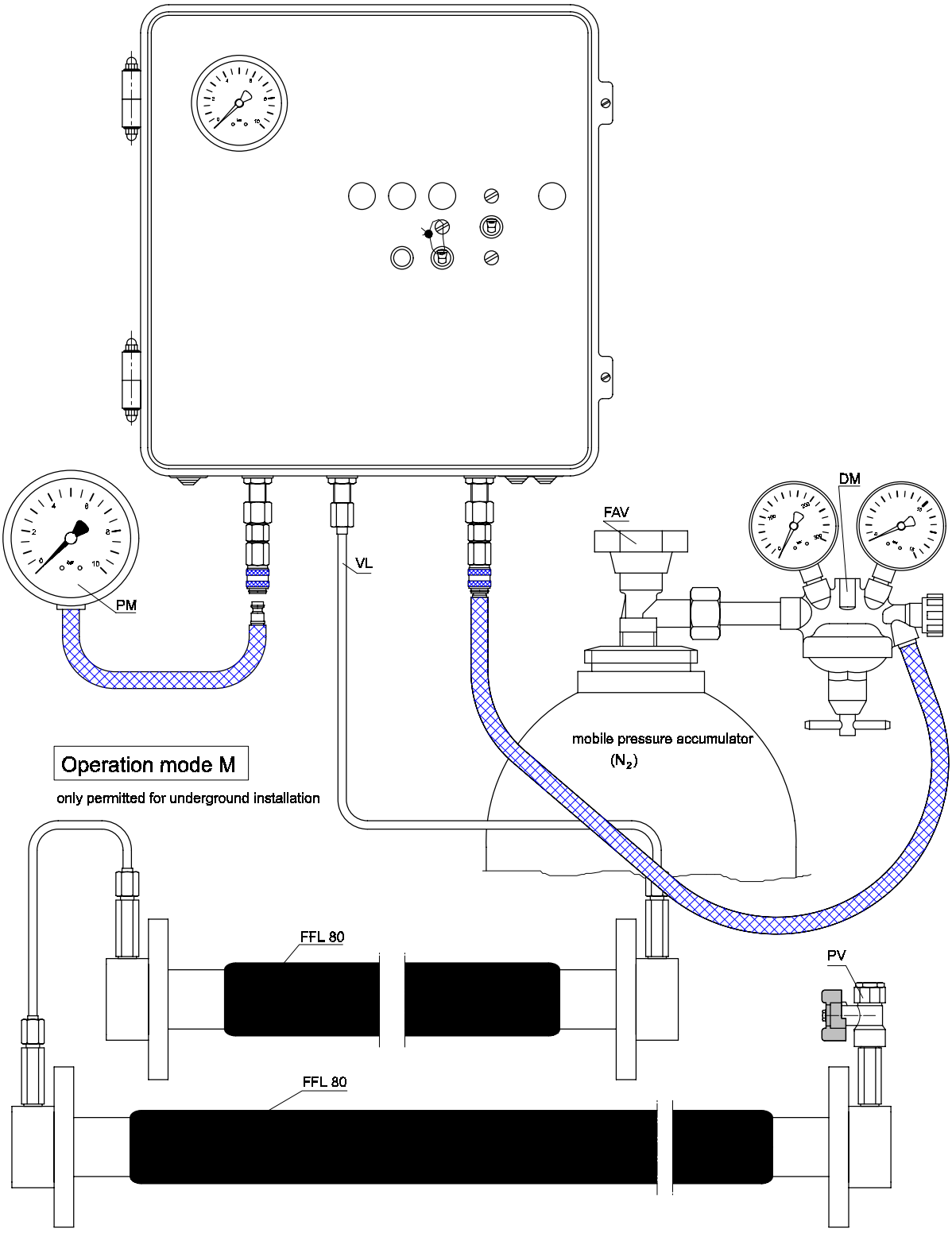

Installation example: Closed circular pipeline, operating mode M

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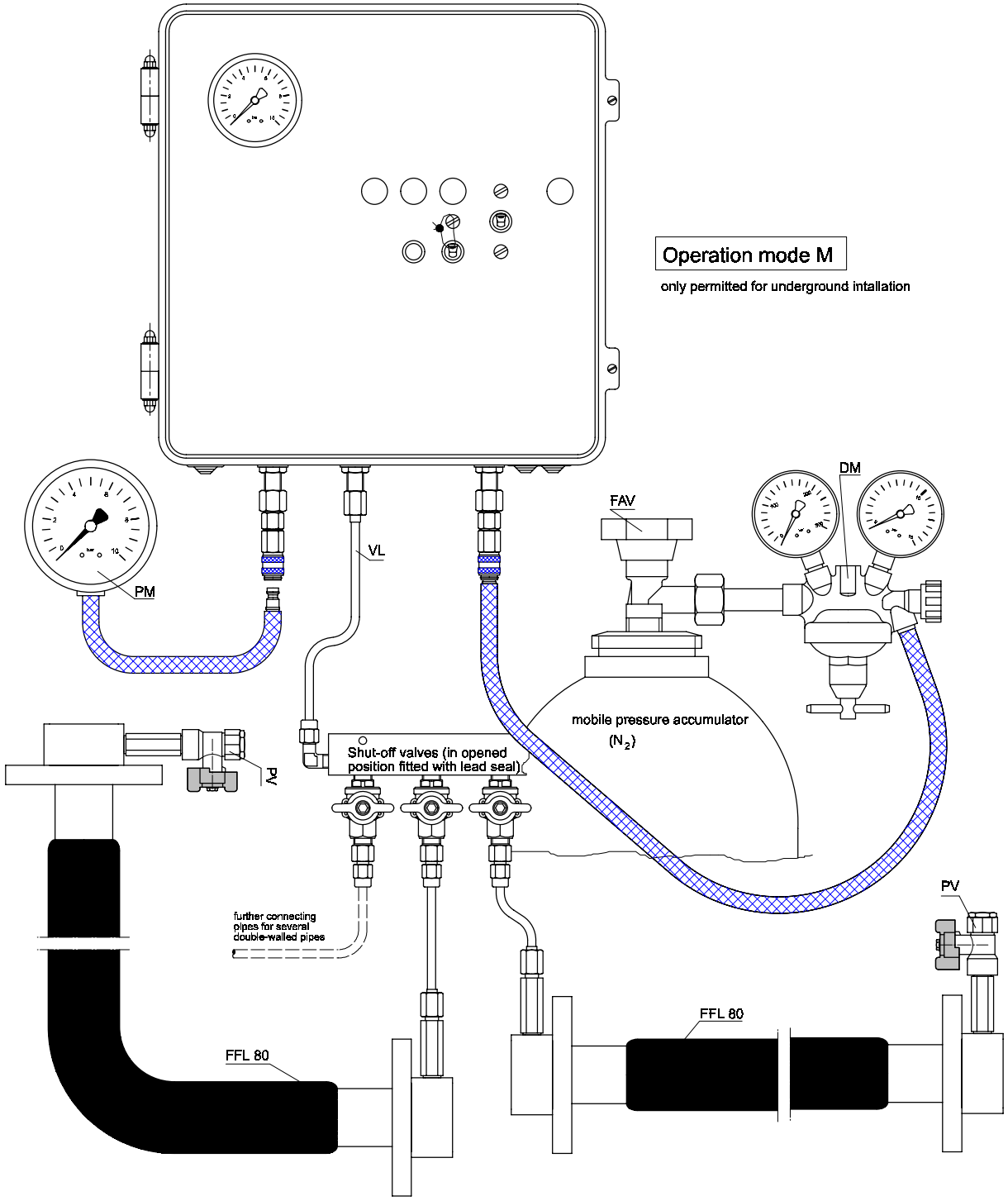

Installation example: Multiple train system, operating mode M

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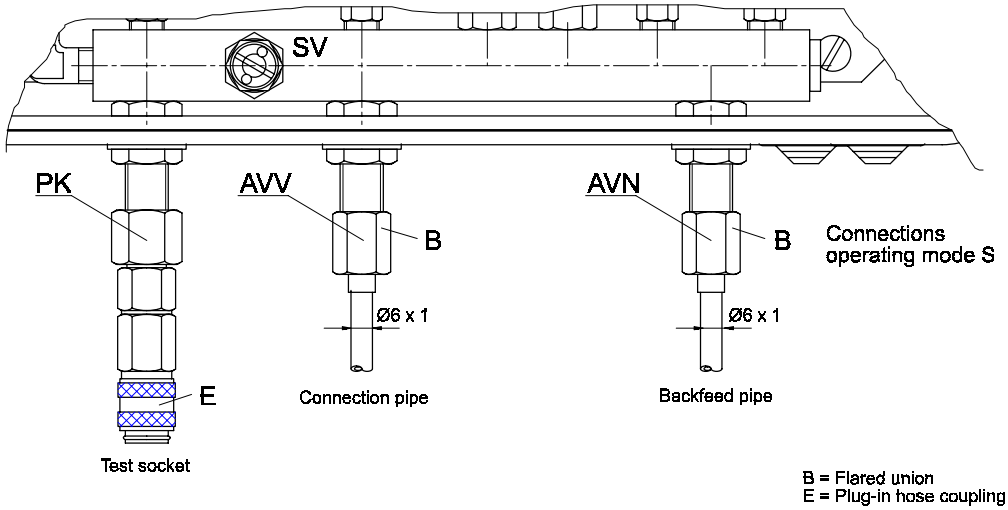
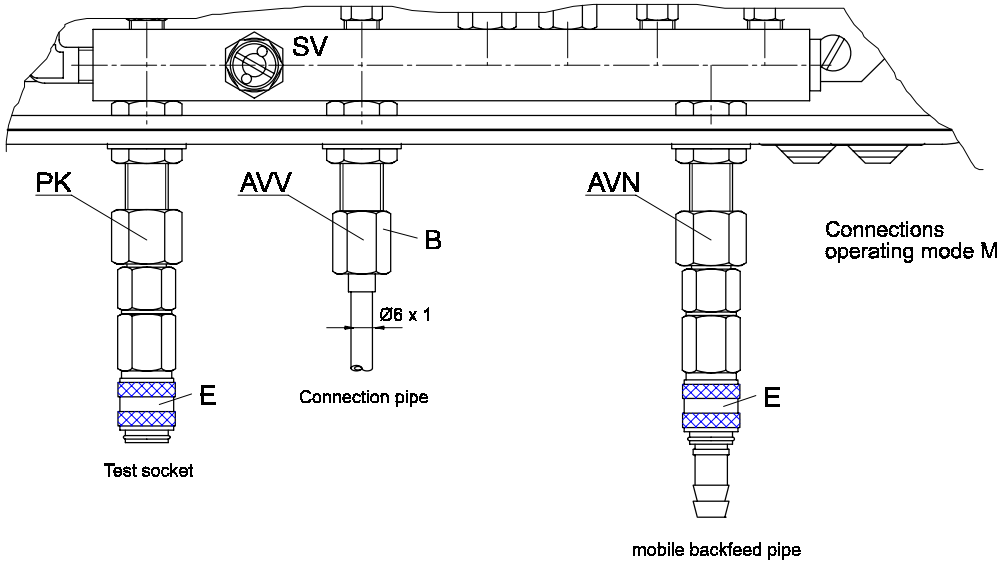
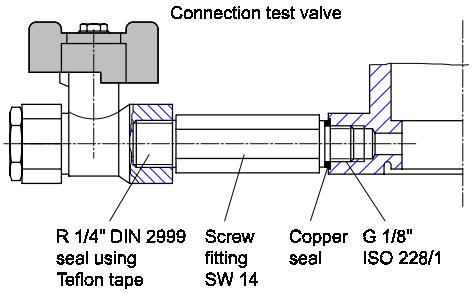


If installed underground at a depth of less than 30 cm or outdoors above ground, the connecting pipes must have the dimensions 8x1 mm.





Connections of the connecting lines

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dated May 16, 1994

Enclosure to test certificate
no. PTB no. III B/S 2254 dated March 25, 1994
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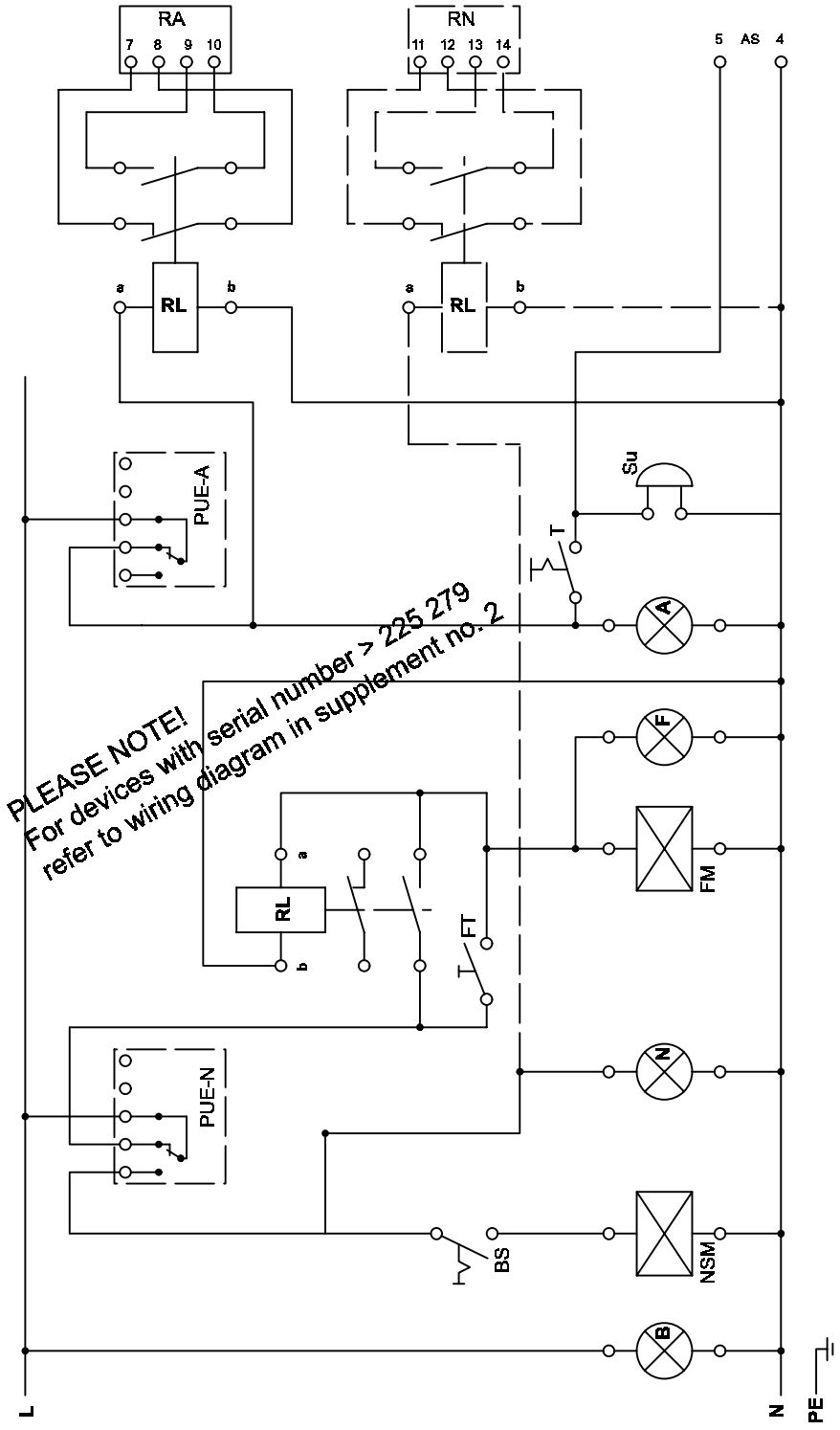

Compare sheet 12.0593 "Designation of terminals"

Flow diagram

Appendix to approval BAZ no.
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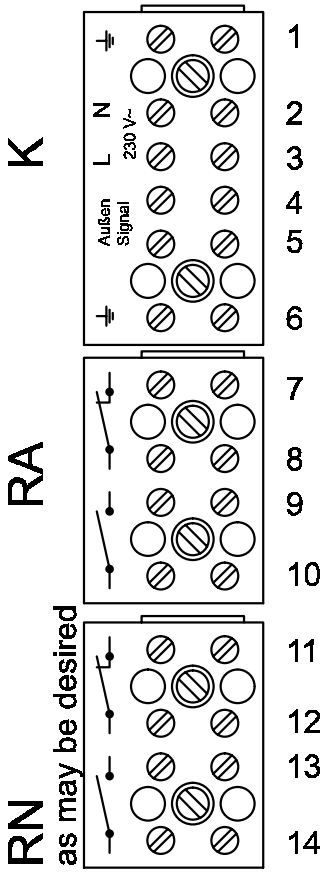

1, 2, 3	Current supply 230 V, 50 Hz
4, 5	Connection of an additional external signal
6	Earthing
7, 8	Potential free contacts, alarm, NC
9,10	Potential free contacts, alarm, NO
11, 12	Potential free contacts, backfeed, NC)
13, 14	Potential free contacts, backfeed, NO) if installed

Designation of terminals

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A.1 Legend of abbreviations used

A Lamp 'Alarm', red
AVK Connector coupling backfeed pipe
AVN Connection backfeed pipe
AVV Installation connecting pipework
B Pilot lamp 'Operation', green
BS Operating mode selector switch
DM Pressure reducer
DR Throttle valve
DS Pressure accumulator
F Signal lamp 'Filling', yellow
FAV Cylinder locking valve
FM Solenoid valve for quicker filling of the pipe
FFL Flexwell filling pipe
FT Filling push-button
G Housing
K Terminal strip
N Signal lamp 'Automatic Backfeed', yellow
NSM Solenoid valve, for backfeed
NSL Backfeed line from accumulator to leak detector
PK Test socket
PM Measuring instrument
PS Screw fitted with lead seal
PUE-A Pressure switch for controlling alarm activation
PUE-N Pressure switch for controlling backfeed
PV Test valve
RA Terminal strip RA, potential free relay contacts, alarm
RL Relay
RL-A Relay, alarm
RL-N Relay, backfeed
RN Terminal strip, potential free rely contacts, backfeed

Legend of abbreviations used - cont'd

RSP Check valve
SV Safety valve
T Switch for alarm cancelling
Su Buzzer
VL Connecting pipework between leak detector and pipe

Components printed in italics are available as optional extras.

Appendix to approval
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A.2 Bill of materials - leak detector D-FFL 10

Index	Component	Designation / Material	Manufacturer
A	Signal lamp	Glow lamp 250 V, red	Hurst+Schröder, suitable
B	Signal lamp	Glow lamp 250 V, green	Hurst+Schröder, suitable
BS	Operating mode selector switch	Flip switch 1620-0401	Marquardt, suitable
DR	Throttle valve	Type 1 for D-FFL-10/1 Type 3 for D-FFL-10/3 Type 5 for D-FFL-10/5	SGB
F	Signal lamp	Glow lamp 250 V, yellow	Hurst+Schröder, suitable
FM	Solenoid valve	MA 222-001 P-27	Staiger, suitable
G	Housing	320x320x145mm, GRP, IP 43, to DIN 40050	SGB
K	Terminal strip	Polyamide 6.6, 6-pole	commercially available
M	Pressure gauge	111.10; 0-10 bar, class 1.6	Wika, suitable
N	Signal lamp	Glow lamp 250 V, yellow	Hurst+Schröder, suitable
NSM	Solenoid valve	MA 222-001 P-27	Staiger, suitable
RA	Terminal strip	potential free relay output, 4-pole	commercially available
RL	Relay	E 3252	Eichhoff, suitable
RL-A	Relay	E 3252	Eichhoff, suitable
RL-N	*Relay*	*E 3252*	*Eichhoff, suitable*
RN	*Terminal strip*	*potential free relay output, 4-pole*	*commercially available*
RSP	Check valve	SO.41121	Jacob, suitable
T	Alarm switch	Flip switch 1620-0401	Marquardt, suitable
PUE-A	Pressure switch	MCS 11	Klöckner, Möller, suitable
PUE-N	Pressure switch	MCS 11	Klöckner, Möller, suitable
SU	Buzzer	E 2772, BV01	Eichhoff, suitable
SV	Safety valve	6 - 12 bar 218.13	Riegler or Drukon, suitable

Components printed in italics are available as optional extras.

Appendix to approval
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Supplement no. 2 to overpressure leak detector D-FFL 10

(General approval 08/PTB no. III B/S 2254 dated May 16, 1994
and supplement no. 1 dated June 07, 1995)

1. Object

- *The field of application (chapter 3 of the SGB documentation dated Dec. 10, 1993) has been revised as follows (including supplement no. 1):*

3.1 Pipes

- FLEXWELL FILLING PIPE by BRUGG Rohrsysteme GmbH, Wunstorf, type FFL 80
- FLEXWELL SAFETY PIPE by BRUGG Rohrsysteme GmbH, Wunstorf, types FSR-16/30, FSR-30/48, FSR 39/60, FSR 48/71, FSR 60/83, FSR 83/120 and FSR 127/175
- STAMANT SAFETY PIPES by BRUGG Rohrsysteme GmbH, Wunstorf
- Generally approved double-walled pipes by BRUGG Rohrsysteme GmbH, Wunstorf with an interstitial space designed for a minimum nominal pressure resistance PN 10, for leak detectors D-FFL 10/1 to D-FFL 10/5.
- Generally approved double-walled pipes by BRUGG Rohrsysteme GmbH, Wunstorf with an interstitial space designed for a minimum nominal pressure resistance PN 25, for leak detectors D-FFL 10/7 to D-FFL 10/16.

3.2 Liquid to be transported

liquids incompatible with water (flammable *and* inflammable)

- *Tables 1 and 2 (chapter 4.1 of the documentation dated Dec. 10, 1993) have been combined, and further pressure ratings have been added*

Delivery pressure of the operational pipe	Type	Pressure in the interstitial space				Overpressure protection		Set pressure on pressure reducer	Pressure range of pres. reducer
		ALARM		BACKFEED					
		ON	OFF	ON	OFF Reference pressure	Trip pressure	Reseat presure		
≤ 1,0	/1	$2{,}2^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$3{,}0^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	3,5±0,2	10[1]
≤ 3,0	/3	$4{,}2^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$5{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	5,7±0,2	10[1]
≤ 5,0	/5	$6{,}2^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$7{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	7,7±0,2	10[1]
≤ 7,0	/7	$8{,}2^{+0{,}1}/_{-0{,}2}$	$8{,}7^{+0{,}1}/_{-0{,}2}$	$8{,}7^{+0{,}1}/_{-0{,}2}$	$9{,}2^{+0{,}1}/_{-0{,}2}$	/	/	9,7±0,2	10[1]
≤ 10,0	/10	$11{,}0^{+0{,}3}/_{-0{,}0}$	$12{,}0^{+0{,}3}/_{-0{,}3}$	$12{,}0^{+0{,}3}/_{-0{,}3}$	$13{,}0^{+0{,}3}/_{-0{,}3}$	/	/	14,0±0,2	16[1]
≤ 13,0	/13	$14{,}0^{+0{,}3}/_{-0{,}0}$	$15{,}0^{+0{,}3}/_{-0{,}3}$	$15{,}0^{+0{,}3}/_{-0{,}3}$	$16{,}0^{+0{,}3}/_{-0{,}3}$	/	/	17,0±0,2	20[1]
≤ 16,0	/16	$17{,}0^{+0{,}3}/_{-0{,}0}$	$18{,}0^{+0{,}3}/_{-0{,}3}$	$18{,}0^{+0{,}3}/_{-0{,}3}$	$19{,}0^{+0{,}3}/_{-0{,}3}$	/	/	20,0±0,2	20[1]

All values in bar

Leak detectors with pressure ratings between 7 and 16 shall only be used on pipes with an interstitial space designed for PN 25.

[1] Suitable pressure reducers with constant pressure supply are available from Brugg Rohrsysteme GmbH, Wunstorf (compare general approval PTB no.: III B/S 1236 „FLEXWELL FILLING LINE“)

- *Chapter 6.2 'Installation of the leak detector', paragraph (2) has been revised as follows:*

  (2) If the leak detector is situated outdoors or installed in a humid area as per VDE specification, it must be provided with a weather-proof box with a clear lid (DIN 40 050 IP 55). In this case, an additional external signal (horn) should be installed in a suitable location. **Instead** of the additional external signal, potential free contacts may be used for transmitting the alarm signal to a central control room (control centre).

- *Chapter 6.5 'Installation of the connecting pipework', paragraphs (1) and (5) have been revised as follows:*

  (1) The pipework VL between the leak detector, the interstitial space of the double-walled pipe and the backfeed pipework NSL must be made from seamless drawn copper pipes to DIN 17671 sheet 1 or metallic precision pipes or plastic pipes designed for pressure rating PN 10 (type 1 to 7) or for pressure rating PN 25 (type 10 to 16). For plastic pipes, the pressure resistance throughout the entire temperature range between -25°C and +70°C is essential.

  The pipes must have a clear internal diameter of 4 mm minimum and a wall thickness of 1 mm minimum.

  (5) Check valve PV and other fittings in the connecting pipework must be designed for pressure rating PN 10 (type 1 to 7) or for pressure rating PN 25 (type 10 to 16).

- *Chapter 7.2 'Commissioning in operating mode S', paragraph (7): phrase no. 2 (tightness check) has been deleted. The paragraph now reads as follows:*

  (7) After reaching the reference pressure, the tightness must be visually checked. All connections on the leak detector, on the pressure accumulator and on the interstitial space must be checked for tightness using a gas leakage detector.

- *Chapter 7.3 'Commissioning in operating mode M', paragraph (7): phrase no. 2 (tightness check) has been deleted. The paragraph now reads as follows:*

  (7) After reaching the reference pressure, the tightness must be visually checked. All connections on the leak detector, on the pressure accumulator and on the interstitial space must be checked for tightness using a gas leakage detector.

- *Chapter 8.3 'Functional check of the leak detector and the leak detection system', has been revised as follows:*

  The operational safety and the reliability of the leak detector and of the leak detection system should be checked.

  - **each time they are recommissioned**
  - **at intervals as specified in paragraph 8.2,** and
  - **after each incident of trouble shooting**.

  The functional check should **at least comprise:**

  (1) General (8.3.1).

  (2) Continuity check in the interstitial space (8.3.2)

  (3) Checking of the trip values (8.3.3)

  (4) Leakage test (8.3.4)

  (5) Establishing the operating condition (8.3.5).

8.3.1 General

(1) Co-ordination of work with the internal personnel responsible, as an alarm will be triggered during the functional check.

(2) Obtain general information on the system, e.g. material to be transported, position of test valves, etc.

(3) Visual check of the system for visible defects (e.g. damaged components) and elimination of any defects found.

8.3.2 Continuity check in the interstitial space

(1) For carrying out a continuity check, the system must be bled through the test valve[2] at the end of the pipe.

(2) As soon as pressure loss is read on the measuring instrument connected to the leak detector, the test valve may be closed.

(3) If several pipe trains or sections are connected to a leak detector in parallel, a continuity check should be carried out for each section.

8.3.3 Checking of the trip values

(1) The trip values can be checked in the complete system. However, it is also possible to check them without including the interstitial space, using a test device. If the check is carried out excluding the interstitial space, it is recommended that a receptacle with a content of 1 l is used.

(2) Connect a suitable test measuring instrument.

(3) Bleed the system so that the trip values can be determined with the pressure going down (Backfeed ON followed by Alarm ON) (connect pressure reducer, if necessary).

(4) After having checked the audible and optical alarms, close the test valve and determine the trip values with the pressure increasing (Alarm Off followed by Backfeed Off). (Compare chapter 7.2 no. (4) and (5) and chapter 7.3 no. (2 to 6).

(5) The test is deemed successful if the values specified in table 1 are achieved.

8.3.4 Leakage test

(1) Before commencing the leakage test, wait for pressure compensation in the system.

(2) A suitable test measuring instrument (accuracy class 0.6 minimum) should be connected to the test socket.

(3) The test is deemed successful if no pressure drop occurs during 2 hours.

8.3.5 Establishing the operating condition

(1) A test report must be written by the qualified technician.

(2) Provide the housing and any shut-off valves (in opened position if a pipe is connected) with lead seals.

[2] Test valve at the end of the pipe (opposite to the leak detector connection)

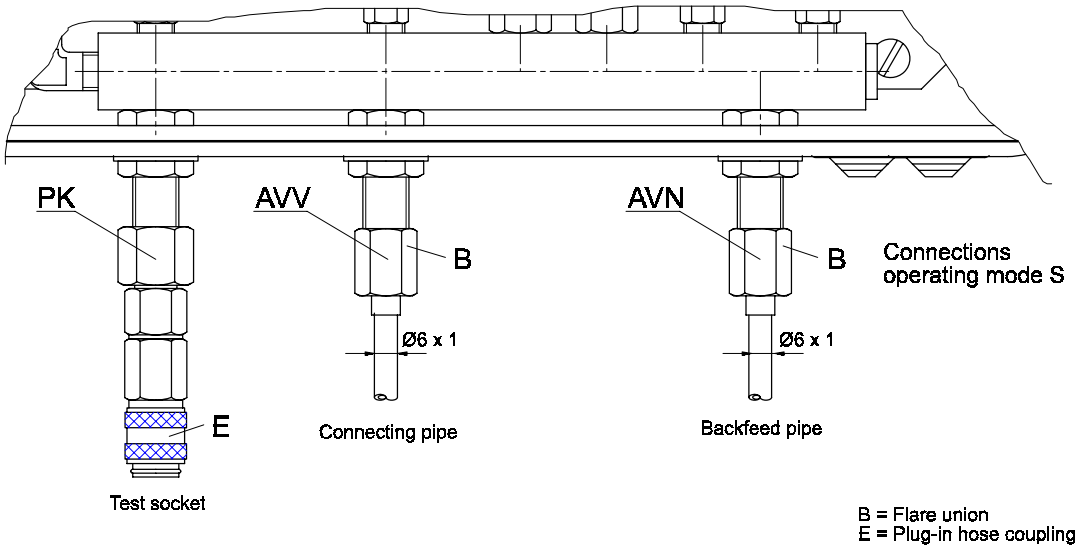
- ***Sheet 10.0593 dated Dec. 10, 1993*** *(Installation of connecting pipework) is* ***replaced*** *by* ***sheet N2-4 dated Oct. 22, 98*** *(Installation of connecting pipework, only 4 mm clear internal diameter).*

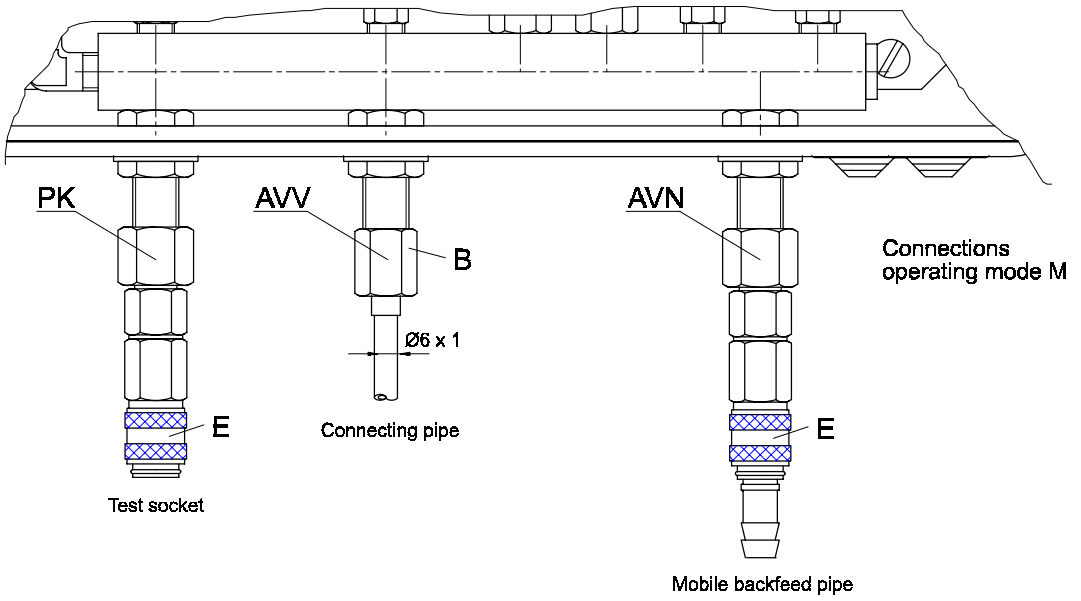
- ***Sheet 11.0593 dated Dec. 10, 1993*** *(Flow diagram) is* ***amended*** *by* ***sheet N2-5 dated Oct. 22, 98*** *(Flow diagram, triggering of an alarm in a safe wiring system)*

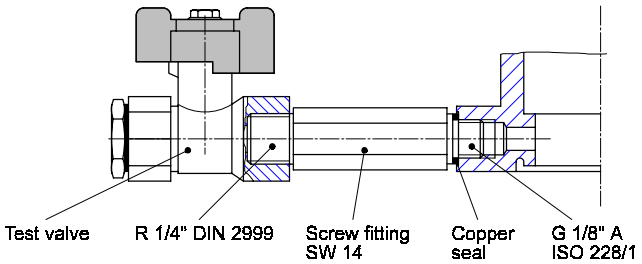
- ***Sheet 12.0593 dated Dec. 10, 1993*** *(Terminal designations) is* ***amended*** *by* ***sheet N2-6 dated Oct. 22, 98*** *(Terminal designations, triggering of an alarm in a safe wiring system).*

2. Conditions of use

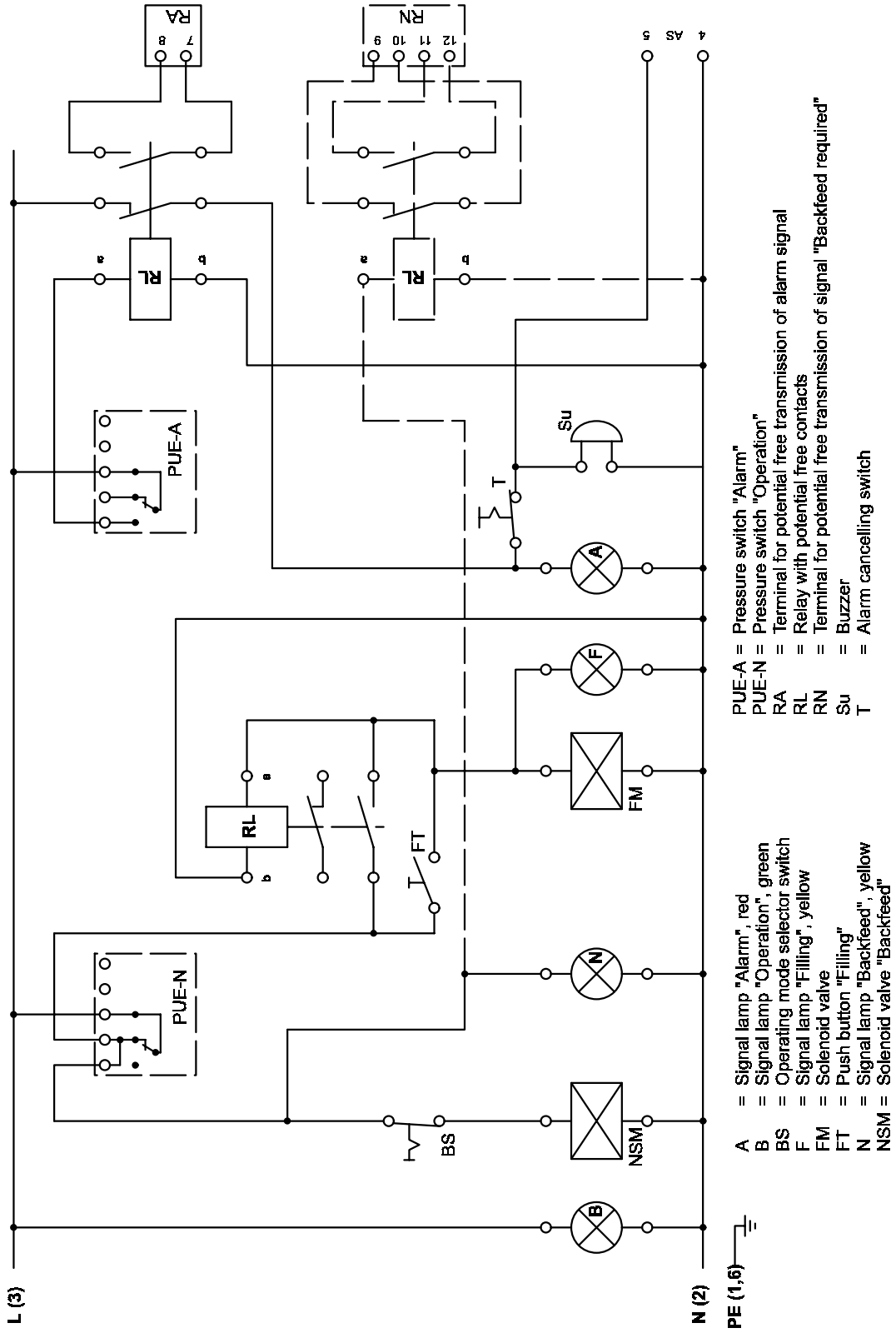
All the other details, descriptions, drawings and conditions of general approval 08/PTB no.III B/S 2254 remain unchanged.



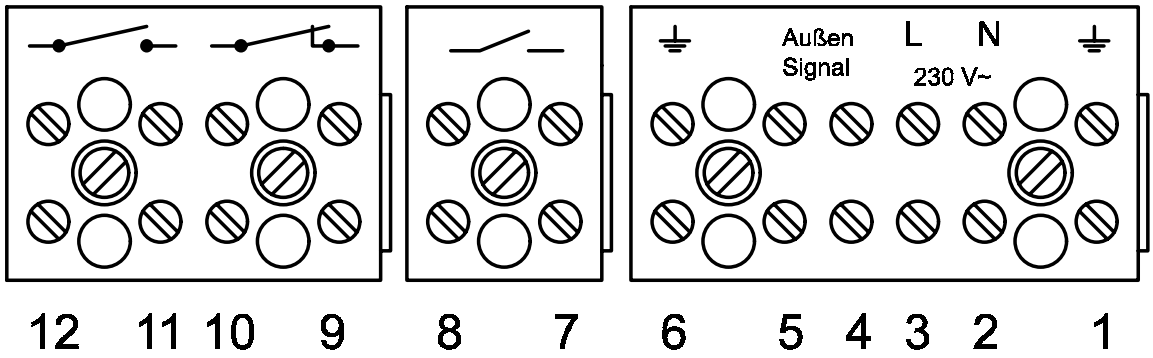




Picture 1: Installation of the connecting lines



Picture 2: Flow diagram



Picture 3: Terminal designations

1, 2, 3	Current supply 230 V, 50 Hz
4, 5	Connection of an additional external signal
6	Earthing
7, 8	Potential free contacts, alarm, NC
9,10	Potential free contacts, backfeed, NO
11, 12	Potential free contacts, backfeed, NC

Contents of Appendix I **Page**

1. Application / Purpose

This Appendix contains additional information to be observed when monitoring double wall pipes for conveying water polluting liquids with flash point < 55°C.

Evaluation of zones in monitoring chambers was accomplished on the basis of Appendix B EN 13 160. Definition of the zones is the obligation of the operator and depends on the operating conditions.

2. Intended Use

In summary, intended use is as follows:

- Above ground and underground double walled pipes, whereby the wall on the side of the storage medium may be permeable or impermeable.
- The alarm pressure of the leak detector must be at least 1 bar higher than the max. conveying pressure in the inner pipe.
- Operating mode M (without continuously connected pressure tank) only on underground pipes,
  in the case of a permeable inner wall on the pipe (zone 3, in combination with operating mode M), possible exiting explosive vapor/air mixtures must be categorized in gas group II B and temperature code T4.
- Grounding and potential compensation according to EN 1127
- The leak detection system is tight according to documentation
- Leak detector installed outside of explosion hazard area.
- Passages for pneumatic pipe/hoses sealed gas-tight.
- Leak detector (electrical) connected so that it cannot be switched off.

3. Explanation on Range of Application

The range of application according to the documentation remains unaffected, however, the following applies in addition:

According to EN 13160-1, Appendix B, there are no limitations and no zone classifications for leak detectors with failsafe replenishment (operating mode S). For leak detectors without failsafe replenishment (operating mode M), there are also no limitations if the inner wall is impermeable (e.g. steel).

In operating mode M in combination with a permeable inner wall (e.g. plastic pipe) or in the event that the operator mix a deviating zone classification, the leak indicators may be connected only to the intestitial space for zone 2 when the following conditions are maintained:

If explosive vapor/air mixtures occur as a result of

- the liquid conveyed
- the liquid conveyed in combination with air / moisture in the air or condensate
- the liquids conveyed in combination with the components (materials) with which the liquids come into contact

they must be categorized in gas group II A or II B and temperature code T1 to T4.

4. Installation Instructions

Supplementary to the installation instructions, the points listed in this Chapter are to be observed.

(1) The applicable explosion regulations are to be observed.

(2) The pneumatic line routing (connection line) must be sealed gas-tight at least at the entry into the manhole chamber or control shaft. Electrostatic charges must be avoided (e.g. when lines enter or pass through).

(3) To determine a power failure (on the leak detector or its power supply) we recommend connecting the floating contacts for relaying the alarm or another safety feature to ensure that extinguishing of the operating lamp (leak detector equipment) is noticed.

(4) If metallic components are installed in plastic connection lines, they must be integrated into the potential compensation inside the explosion hazard area.

(5) Before entering the dome or control shafts, it is always necessary to check the oxygen content and purge the shaft if applicable.

(6) When the leak detector is operated in close rooms, it is necessary to provide for sufficient ventilation, because an increased nitrogen compensation can occur in the event of a leak.

4.1. Personal Equipment

The parts listed here refer exclusively to safety during work on systems which could present an explosion hazard.

If work is performed in the dome or control shaft (zone 1 according to EN 13160-1) (connections to interstitial space, laying of connection lines), particularly for pipes already in operation, the following equipment is required:

- Suitable clothing (danger of electrostatic charging)
- Suitable tools (according to EN 1127)
- Suitable gas warning device calibrated for the vapor/air mixtures present (work should only be accomplished at concentrations 50% below the lower explosion limits)

5. Startup and Repair

(1) The instructions given in the previous chapter are also to be applied here.

(2) If the leak indicator is put into operation on a pipe with permeable inner wall through which the product has already been transported, the interstitial space is to be purged with nitrogen.

(3) Repair to the leak indicator, especially replacement of components should be accomplished only by appropriately trained personnel or in coordination with the SGB.

6. Disassembly

The following points are to be observed particularly for disassembly:

- Ensure that gas is not present before and during the work (see also previous Chapter. 4).
- Openings through which the explosive atmosphere could be entrained are to be sealed gastight.
- If at all possible, do not disassemble with tools which could form sparks (saws, grinders...). If this is not possible, observe EN 1127.
- Avoid electrostatic charges (e.g. from friction).
- Properly disposed of contaminated components (possible gas escape).

7. Identification

The Chapter “Identification” in the documentation is supplemented to include the following point:

- Connection lines can also be connected to the interstitial spaces for which equipment in group II G, Category 3 is required.

Technical data

1. External electrical data

Electrical supply (without external signal)		230V~ - 50 Hz - 30 W
Switch contact load, terminal strip, terminals AS		230V~ - 50 Hz - max. 2 A
Switch contact load, potential free contacts	max:	230V~ - 50 Hz - 8 A
	min:	5 V / 5 mA
Class of overvoltage		2
Max. fusing		10 A

2. Internal electrical data

Switch contact load, alarm cancelling switch	230V~ - 50 Hz - max. 3 A
Power consumption solenoid valve	230V~ - 50 Hz - 8 W
Power consumption relay	230V~ - 50 Hz - 1 W

3. Pneumatic data (leak detector trip values)

Delivery pressure of the operational pipe	Type	Pressure in the interstitial space				Overpressure protection		Set pressure on pressure reducer	Pressure range of press. reducer
		ALARM		BACKFEED					
		ON	OFF	ON	OFF Reference pressure	Trip pressure	Reseat presure		
≤ 1,0	/1	$2{,}2^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$2{,}6^{+0{,}1}/_{-0{,}2}$	$3{,}0^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	3,5±0,2	10[1]
≤ 3,0	/3	$4{,}2^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$4{,}7^{+0{,}1}/_{-0{,}2}$	$5{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	5,7±0,2	10[1]
≤ 5,0	/5	$6{,}2^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$6{,}7^{+0{,}1}/_{-0{,}2}$	$7{,}2^{+0{,}1}/_{-0{,}2}$	9,0±0,5	7,8	7,7±0,2	10[1]
≤ 7,0	/7	$8{,}2^{+0{,}1}/_{-0{,}2}$	$8{,}7^{+0{,}1}/_{-0{,}2}$	$8{,}7^{+0{,}1}/_{-0{,}2}$	$9{,}2^{+0{,}1}/_{-0{,}2}$	/	/	9,7±0,2	10[1]
≤ 10,0	/10	$11{,}0^{+0{,}3}/_{-0{,}0}$	$12{,}0^{+0{,}3}/_{-0{,}3}$	$12{,}0^{+0{,}3}/_{-0{,}3}$	$13{,}0^{+0{,}3}/_{-0{,}3}$	/	/	14,0±0,2	16[1]
≤ 13,0	/13	$14{,}0^{+0{,}3}/_{-0{,}0}$	$15{,}0^{+0{,}3}/_{-0{,}3}$	$15{,}0^{+0{,}3}/_{-0{,}3}$	$16{,}0^{+0{,}3}/_{-0{,}3}$	/	/	17,0±0,2	20[1]
≤ 16,0	/16	$17{,}0^{+0{,}3}/_{-0{,}0}$	$18{,}0^{+0{,}3}/_{-0{,}3}$	$18{,}0^{+0{,}3}/_{-0{,}3}$	$19{,}0^{+0{,}3}/_{-0{,}3}$	/	/	20,0±0,2	20[1]

4. Pneumatic data (requirements concerning the test measuring instrument)

Nominal size	min. 100
Accuracy class	min. 1,6 resp. 0,6 for the leakage test
Scale end value	suitable, depending on pressure rating

[1] Suitable pressure reducers with constant pressure supply are available from Brugg Rohrsysteme GmbH, Wunsdorf (compare general approval PTB no.: III B/S 1236 „FLEXWELL FILLING LINE“)

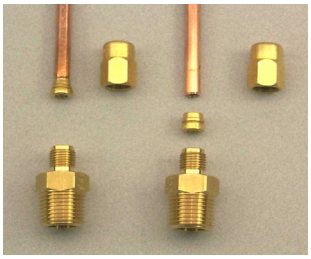
Work Sheet: AB-820 500

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

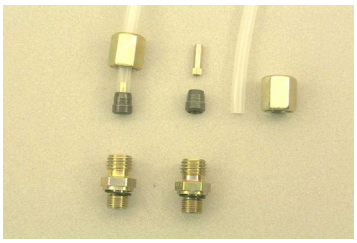
2 Clamping ring threaded fitting for plastic and metal pipes



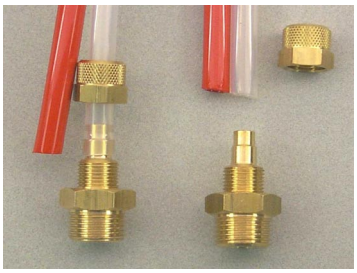
1. Insert the support sleeve into the end of the pipe
2. Insert the pipe with support sleeve as far as it will go
3. Tighten the thread until strong resistance can be clearly felt
4. Lightly loosen the nut
5. Tighten the nut until resistance can be felt (nut must exactly match the thread of the basic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

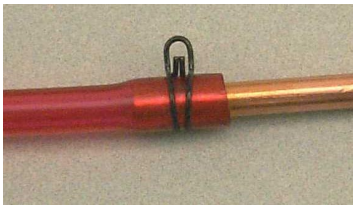
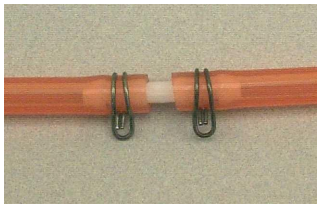
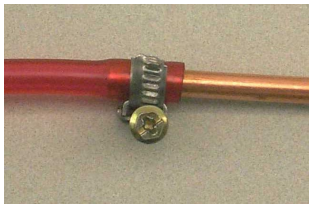


1. Make a right-angled cut in the PA pipe
2. Loosen the union nut and push it over the end of the pipe
3. Push the pipe onto the nipple up to where the thread begins
4. Tighten the union nut by hand
5. Further tighten the union nut using a wrench until clearly increased force is needed (approx. 1 to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

NOT suitable for PE-pipes

Pneumatic connections

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.

DEUTSCHES INSTITUT FÜR BAUTECHNIK

Anstalt des öffentlichen Rechts

(German Institute for Constructional Engineering)

10829 Berlin, June 29, 1999
Reichpietschufer 74 - 76
Telephone: (030) 264 87-315
Telefax: (030) 264 87-320
Ref.: V 16-1.65.26-12/98

General Approval issued by the Building Inspection Authorities

Approval no.:	Z-65.26-221
Applicant:	Sicherungsgerätebau GmbH Hofstr. 10 57076 Siegen
Subject of approval:	Overpressure leak detector type 'D-FFL 10/...' as part of a leak detection working according to the overpressure system for double-walled pipes used for the storage of liquids incompatible with water
Validity:	June 30, 2004

The building inspection authorities herewith issue general approval for the a/m device.

The present approval comprises five pages and 2 appendices.

II. SPECIAL PROVISIONS

1 Subject of approval and field of application

1.1 This general approval applies to an overpressure leak detection system type 'D-FFL 10/... consisting of the leak detector (pressure switch, solenoid valves and check valve) as well as an optical and audible alarm in one housing. In the event of pressure drop of more than 1 bar due to leakage in the walls of the interstitial space, an optical and audible alarm is triggered (for the design of the leak detection system, please refer to appendix 1).

1.2 Overpressure leak detectors of this type may be connected to the interstitial spaces of double-walled pipes used for the storage of liquids incompatible with water. These are interstitial spaces which are officially approved according to the Building Specifications, list no. A, part 1, no. 15.26. These leak detectors may also be connected to FLEXWELL filling pipes type FFL 80 by BRUGG Rohrsysteme GmbH, to FLEXWELL safety pipe type FSR-16/30, FSR-30/48, FSR 39/60, FSR 48/71, FSR 60/83, FSR 83/120 and FSR 127/175 by BRUGG Rohrsysteme GmbH and to STAMANT safety pipes by BRUGG Rohrsysteme GmbH, to officially approved double-walled pipes by BRUGG Rohrsysteme GmbH with an interstitial space designed for a minimum nominal pressure resistance PN 10, for leak detectors D-FFL 10/1 to D-FFL 10/5 and to officially approved double-walled pipes by BRUGG Rohrsysteme GmbH with an interstitial space designed for a minimum nominal pressure resistance PN 25, for leak detectors D-FFL 10/7 to D-FFL 10/16. The leak detection system may be operated in the operating mode S (pressure-controlled backfeed from a permanent pressure accumulator) or in the operating mode M (backfeed from a mobile pressure accumulator using a push-button).

1.3 This general approval only furnishes proof of the functional reliability of the object of approval in the sense of paragraph 1.1.

1.4 This general approval is issued without prejudice to reservations concerning testing and approval in other legal areas (e.g. 1st code on the safety of appliances - low-voltage directive, law on the electromagnetic compatibility of appliances - EMC directive, 11th code of the legal provisions for the safety of devices' - code on protection against explosion).

2 Regulations applicable to the subject of approval

2.1 Composition

The subject of approval consists of an overpressure leak detector, the signalling and control elements, the pressure reducer, the test measuring instrument, the electrical components for producing the output signal as well as the stationary or mobile pressure accumulator.

Type D-FFL/1	for a delivery pressure of 1 bar in the operational pipe
Type D-FFL/3	for a delivery pressure of 3 bar in the operational pipe
Type D-FFL/5	for a delivery pressure of 5 bar in the operational pipe
Type D-FFL/7	for a delivery pressure of 7 bar in the operational pipe
Type D-FFL/10	for a delivery pressure of 10 bar in the operational pipe
Type D-FFL/13	for a delivery pressure of 13 bar in the operational pipe
Type D-FFL/16	for a delivery pressure of 16 bar in the operational pipe

2.1.2 The functional reliability of the object of approval in the sense of paragraph 1.1 has been demonstrated to be in accordance with the 'Approval principles for leak detection systems for double-walled pipes (ZG-LAGR)' issued by the German Institute for Constructional Engineering in August 1994.

2.2 Manufacture and marking

2.2.1 Manufacture

The leak detectors shall be manufactured only in the applicant's own manufacturing shops. Their design, dimensions and materials shall be in accordance with the provisions and conditions described in appendix 2 of this general approval.

2.2.2 Marking

(1) The manufacturer shall place the conformity mark (U) on the leak detector, its packing or its delivery note. The conformity mark shall be in accordance with the relevant codes of the different states. Such marking is only valid if the conditions as per paragraph 2.3 have been complied with. In addition, the leak detector shall be marked with the following data:

Type designation
Approval number.

2.3 Certificate of conformity

2.3.1 General

Conformity of the leak detector with the provisions of this general approval must be confirmed by the manufacturer's certificate of conformity, issued on the basis of in-house inspection and testing and initial testing of the leak detector by an authorised technical control board.

2.3.2 In-house inspection and testing

The manufacturer shall implement and carry out in-house inspection and testing.

In the course of such in-house inspection and testing, every leak detector or its components shall be checked. By means of these individual checks, the manufacturer shall ensure that materials, dimensions, tolerances and design correspond to the approved sample, and that the leak detector is reliable.

The results of in-house inspection and testing shall be recorded and evaluated. The records shall at least contain the following details:

- designation of the overpressure leak detector
- type of control or check
- date of manufacture and testing of the overpressure leak detector
- results of controls or checks
- signature of the person in charge of in-house production control.

The records shall be kept on file for at least 5 years. Upon request, they shall be presented to the German Institute for Constructional Engineering.

If the test results are not satisfactory, the manufacturer shall immediately take the necessary remedial measures. Any non-conforming overpressure leak detector shall be handled in such a way to avoid any possibility of confusion with conforming products. After elimination of the defect, the test shall be repeated, if this is practicable from a technical point of view and necessary for demonstrating that the defect has been eliminated.

2.3.3 Initial testing of the leak detector by an authorised technical control board.

Initial testing shall consist of the functional checks as defined in the building and testing principles for leak detectors on double-walled pipes. If the general approval of the Building Inspection Authorities includes checking of samples from current production, initial testing as described herein can be dispensed with.

3 Conditions relating to the design of leak detectors

An overpressure leak detector type D-FFL 10/... may be used for double-walled pipes with general approval as specified in paragraph 3.1 of the Technical Specification[1].

4. Provisions concerning installation

4.1 (1) The overpressure leak detector shall be installed in accordance with paragraph 5 and commissioned in accordance with paragraph 6 of the Technical Specification[1]. Installation, maintenance, repair and cleaning of this overpressure leak detector shall only be carried out by specialist companies according to § 19 I WHG Water Resources Law.

(2) However, the above work need not be carried out by specialist companies if they have been exempted from this obligation under relevant codes of the different states or if such work is carried out by the manufacturer and his experts. The regulations concerning health and safety at work are not affected.

4.2 The pressure of the overpressure leak detector at which the alarm is triggered must exceed the permissible delivery pressure in the operational pipe by at least 1.0 bar, depending on the type.

4.3 The leak detector shall only be installed in rooms which are protected from frost or in weather-proof boxes to DIN 40 050-10[2] IP 55. In this case, an additional external audible signal (horn) should be installed, and the alarm should be transmitted using a potential free contact.

4.4 The leak detector must not be installed in potentially explosive locations.

4.5 Leak detectors with operating mode M shall only be used for double-walled pipes which are installed underground. The tightness of these pipes must be such that trouble-free operation of the system for one year is ensured. Leak detectors with operating mode S being permanently connected to a nitrogen pressure accumulator may be used on double-walled pipes installed both below and above ground.

5 Provisions concerning use, maintenance and regular checks

Overpressure leak detection systems shall be operated in accordance with paragraph 7 of the Technical Specification[1]. The manufacturer shall supply the Technical Specification[1] together with the overpressure leak detection system.

By order

Dr. Ing. Kanning

Official seal

German Institute for
Constructional Engineering

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[1] Technical Specification 'Overpressure leak detector D-FFL 10/...' of the applicant dated Dec. 10, 1993 and its supplement dated October 22, 1998, checked by TÜV Nord e.V.

[2] DIN 40 050-10 Protective types: protection against accidental contact, protection against foreign substances, water protection, small transformers up to 16kVA

DECLARATION OF CONFORMITY

This declaration applies for

PRESSURE LEAK DETECTORS
DLR-8, D-FFL 10, DLR-S, DLR-2, DLV-WKK

from the Company Sicherungsgerätebau GmbH
Hofstraße 10
D- 57076 Siegen

With this declaration, SGB confirms that the leak detectors specified above fulfill the protection requirements established in

EC Directive 89/336/EEC for alignment of the legal regulations of the member states regarding electro-magnetic compatibility and in the German law on electromagnetic compatibility (EMC) dated 9 November 1992 (§ 4 Para. 1).

This declaration applies for appliances produced according to the documentation (technical description, drawing(s) – which are constituents of this declaration.

The following declarations were used for evaluation of the products in terms of its electromagnetic compatibility:

- EN 50 082-1: 1992
- EN 55 014: 1993
- EN 61 000-3-2: 1995
- EN 61 000-3-3: 1995

EC Directive 73/23/EEC for alignment of the legal regulations of the member states regarding electrical operating equipment for use within certain voltage limits and defined in the 1st Code on the Equipment Protection Law dated 11 June 1979.

This declaration applies for appliances produced according to the documentation (technical description, drawing(s) – which are constituents of this declaration.

The following declarations were used for evaluation of the products in terms of use within certain voltage limits:

- EN 60 335-1:1988
- EN 61 010-1:1993 (IEC 1010-1:1990 + A1:1992, modified)

EC Directive 94/9 EEC for alignment of the legal regulations of the member states for equipment and protective systems for intended use in explosion hazard areas or in the 2nd Code on the Equipment Protection Law dated 12 December 1996.

The leak detector may be connected with its pneumatic components to monitoring chambers of tanks requiring equipment regarding category 3. This declaration applies for appliances produced according to the documentation in accordance with internal QM documentation (technical description with drawings) – which are constituents of this declaration.

Evaluation of the product was accomplished. The following documents were used for this purpose:

- EN 1127-1:1997
- EN 13463-1:2001
- EN 13160-1:2003

The ignition hazard analysis / risk evaluation indicated no further hazards.

Siegen, 4 July 2003

Martin Hücking, Development, Explosion protection representative

Warranty

Dear customer,

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

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

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

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

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

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

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

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

Stamp of the specialist company

Yours sincerely

Sicherungsgerätebau GmbH
Hofstraße 10 - D - 57076 Siegen
☎ +49 / 271 / 48964 - 0
Fax: +49 / 271 / 48964 - 6