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Operating instructions

Leak detector
LAG-14 ER

BRL A part 1
(DIBt)
Annex 15.24

+ Read instructions before using product!
+ Observe all safety information!
+ Keep instructions for future use!

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Table of contents

1 This instruction manual

This instruction manual is part of the product.

- ▶ Read this manual before using the product.
- ▶ Keep this manual during the entire service life of the product and always have it readily available for reference.
- ▶ Always hand this manual over to future owners or users of the product.

1.1 Precautions

WARNING TERM Type and source of the danger are shown here.

- ▶ Precautions to take in order to avoid the danger are shown here.

There are three different levels of warnings:

Warning term	Meaning
DANGER	Immediately imminent danger! Failure to observe the information will result in death or severe injuries.
WARNING	Possibly imminent danger! Failure to observe the information may result in death or severe injuries.
CAUTION	Dangerous situation! Failure to observe the information may result in minor or severe injuries as well as damage to property.

2 Safety

2.1 Intended use

The leak detector LAG-14 is a leak detector for liquid-based systems as per EN 13160-1, class II (EN 13160-3).

The LAG-14 ER leak detector may only be used to monitor double-walled containers (tanks) as per chapter 3.1, page 9 containing leak detection fluid in the interstitial space and used for the aboveground storage of:

- Water-polluting liquids
- Flammable liquids with a flash point of > or ≤ 55 °C.

Since July 2003, the LAG-14 ER leak detector may only be used for replacement deliveries for underground, double-walled tanks as a result of the reclassification of water-polluting liquids in Germany.

Leaks in the container (tank) are detected and signalled when the level of the leak detection fluid falls.

Only black containers may be installed in hazardous areas (Ex).

Any use other than the application explicitly permitted in this instruction manual is not permitted.

2.2 Predictable incorrect application

The **control unit** must never be used in the following cases:

- Hazardous area (Ex)
  If the product is operated in hazardous areas, sparks may cause deflagrations, fires or explosions.

The intrinsically safe circuit and the corresponding probe may be operated in hazardous areas (EX), zone 0, zone 1 and zone 2.

White containers must not be installed in hazardous areas (Ex).

2.3 Safe handling

The leak detector LAG-14 ER represents state-of-the-art technology and is made according to the pertinent safety regulations. Each product is subjected to a function and safety test prior to shipping.

▶ Operate the leak detector LAG-14 ER only when it is in perfect condition. Always observe the operating instructions, all pertinent local and national directives and guidelines as well as the applicable safety regulations and directives concerning the prevention of accidents.

WARNING

Severe burns or death caused by mains voltage (AC 230 V, 50 Hz) in the control unit.

▶ Do not expose the control unit to water.

▶ Disconnect the mains voltage supply before opening the control unit or before performing maintenance and cleaning work and make sure it cannot be switched on by accident.

▶ Do not tamper with the control unit in any way whatsoever.

▶ Observe the instructions in DIN VDE 0165.

▶ Malfunctions which may have an adverse effect on safety must be immediately repaired!

2.4 Staff qualification

The product may only be mounted, commissioned, operated, maintained, decommissioned and disposed of by specially qualified companies. These are specialised companies as per § 3 of the German Ordinance on Installations for Handling Water-Polluting Substances March 31, 2010 (German Federal Law Gazette (BGBl.) I p. 377).

These activities do not have to be performed by specialised companies if this obligation does not apply according to the applicable local directives or if AFRISO performs these activities with AFRISO's own, trained staff.

If handling tanks containing liquids with a flash point of ≤ 55° C, the staff must also be knowledgeable in fire and explosion protection.

Electrical work may only be performed by trained electricians and in compliance with all applicable local and national directives.

2.5 Modifications to the product

Changes or modifications made to the product by unauthorised persons may lead to malfunctions and are prohibited for safety reasons.

2.6 Usage of spare parts and accessories

Usage of unsuitable spare parts and accessories may cause damage to the product.

▶ Use only genuine spare parts and accessories of the manufacturer (see chapter 13, page 40).

2.7 Liability information

The manufacturer shall not be liable in any form whatsoever for direct or consequential damage resulting from failure to observe the technical instructions, guidelines and recommendations.

The manufacturer or the sales company shall not be liable for costs or damages incurred by the user or by third parties in the usage or application of this product, in particular in case of improper use of the product, misuse or malfunction of the connection, malfunction of the product or of connected products. The manufacturer or the sales company shall not be liable for damage whatsoever resulting from any use other than the use explicitly permitted in this instruction manual.

The manufacturer shall not be liable for misprints.

3 Product description

The leak detector consists of a control unit, a probe and a container for leak detection fluid (black LAG container).

The control unit and the probe are connected by means of a two-wire signal cable with a maximum length of 50 m.

The probe is plugged into the top of the black LAG container. In the case of a leak in the interstitial space, the leak detection fluid level in the black LAG container falls. The electrode rods of the probe are no longer submerged in the leak detection fluid. The control unit detects the change in resistance and generates an alarm.

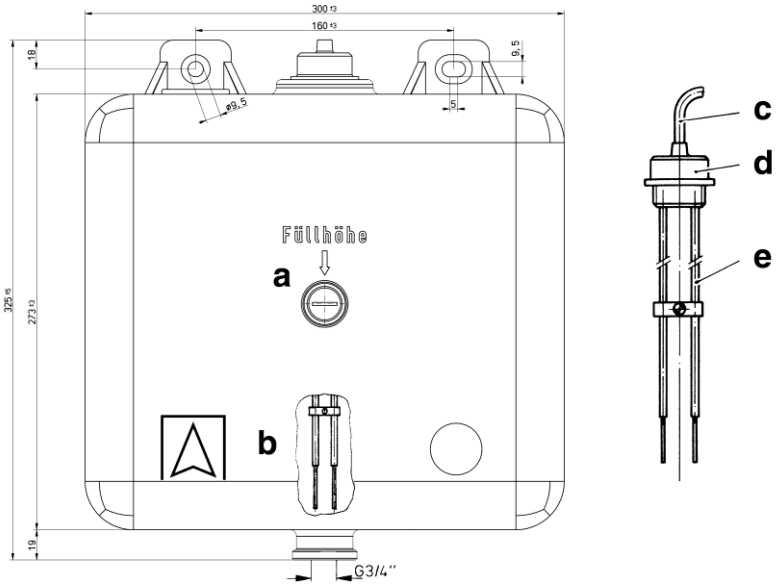


Fig. 1: Container for leak detection fluid (black LAG container) with probe

a Liquid level

b Company and approval mark

c Signal cable

d Housing

e Electrode rods

Probe

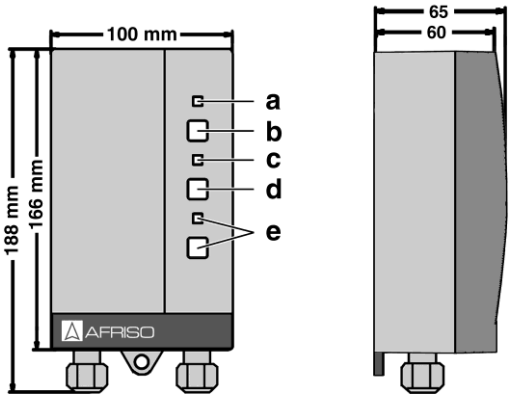
The probe consists of two metallic electrode rods which are installed at a specific distance from each other.

The two electrode rods are contained in a housing with a diameter of 34 mm which also holds the probe in the black LAG container. The probe is equipped with a 2-wire signal cable, length 1 m.

Control unit

The control unit SE2 contains the following elements in an impact-resistant plastic housing: display elements and controls as well as all electronic components for signal processing and conversion of the probe signal into a digital output signal.

The output signal is available as a voltage-free relay contact.



- **a** Green pilot lamp
- **b** Test button
- **c** Red alarm lamp
- **d** Acknowledge button
- **e** Without function

Fig. 2: Control unit

Depending on the order, the leak detector LAG-14 ER features an optional EnOcean® wireless module.

3.1 Application area

Tanks

Only the following tanks are approved: double-walled containers (tanks) which are operated under atmospheric conditions and which comply with the standards DIN 6616 type A, DIN 6623-2, DIN 6624-2, EN 12285-2 (type D) and EN 12285-1 (type D) or which have an approval that the interstitial space is suitable for connection of a liquid-based leak detection system.

The interstitial space volume of the system must not exceed 1 m³.

Stored liquids

Only the following liquids are approved:

- Water-polluting liquids.
- Flammable liquids with a flash point of > or ≤ 55 °C.

Approved storage media

If the containers (tanks) are operated under atmospheric conditions and depending on the design of the containers (tanks), water-polluting liquids with the following densities may be stored in the containers (tanks):

- Tanks as per DIN 6616 type A, DIN 6623-2 and DIN 6624-2
  ≤ 2.5 m Ø permissible density ≤ 1.90 g/cm³
  ≤ 2.9 m Ø permissible density ≤ 1.85 g/cm³

CAUTION

Danger of reaction of leak detection fluid and stored liquid if unsuitable leak detection fluid is used.

▶ The leak detection fluid and the stored liquid may not react. Proven compatibility is required.

▶ Observe the information on the intended use in chapter 2.1, page 4.

3.2 Function

The LAG-14 ER leak detector monitors the interstitial space of double-walled tanks filled with leak detection fluid. In the case of a leak in the inner or outer wall of the container (tank), above or below the levels of the stored liquid or the ground water, the leak detection fluid escapes. This causes the level of the leak detection fluid to fall. The electrode rods of the probe are no longer submerged in the leak detection fluid. The control unit detects the change in resistance, generates visual and audible alarms and actuates the output relay.

Probe

The black LAG container is installed above the interstitial space. The bottom side of the black LAG container is connected to the top of the interstitial space via a hose. This way, the black LAG container is the top part of the interstitial space. The interstitial space is filled with leak detection fluid to the middle of the black LAG container. The probe is installed from the top of the black LAG container so that the electrode tips are covered by the leak detection fluid. Both electrodes are connected to the control unit by a two-wire cable.

Control unit

The control unit continuously monitors the electrical resistance between the two electrodes of the probe. The green pilot lamp lights up when the device is ready for operation. If the probe resistance is less than 5 kΩ, there is no alarm condition: The red alarm lamp is off, the relay is:

- De-energised (in the operating mode Eco)
- Energised (in the operating mode FailSafe)

If the resistance is greater than 5 kΩ, an alarm condition, i.e. a leak has been detected by the control unit: The red alarm lamp and the audible alarm are on and the relay is:

- Energised (in the operating mode Eco)
- De-energised (in the operating mode FailSafe)

The audible alarm can be muted with the "Acknowledge" button in the case of an alarm.

No alarm is triggered in case of a power failure. When mains power is available again, the product immediately resumes operation. If a leak has occurred in the meantime, this is signalled.

The green pilot lamp lights up as soon as the leak detector is supplied with mains voltage. The Test button allows you to simulate an alarm condition in order to perform a function check.

Products with EnOcean® wireless module

In the case of an alarm, the wireless module transmits the alarm message via EnOcean® wireless technology in addition to the visual and audible signals.

3.3 Operating modes

Eco:

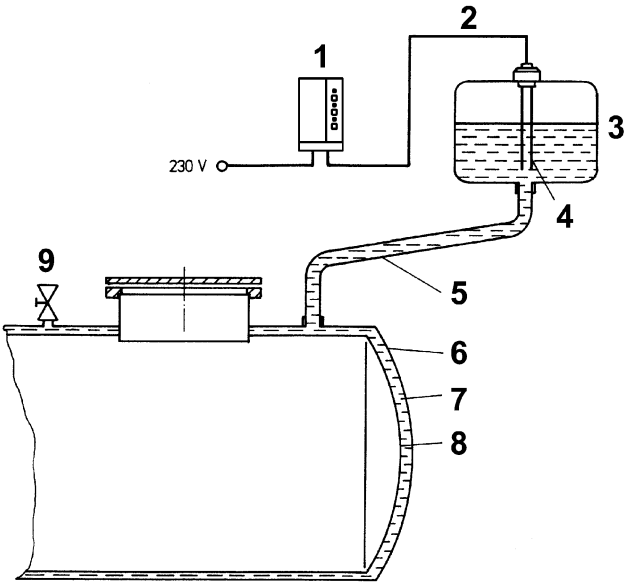
The LAG-14 ER leak detector is equipped with an output relay to transmit the alarm signal to additional external devices. If no error condition is present, the relay is de-energised; in case of an alarm, the relay is energised.

FailSafe:

The LAG-14 ER leak detector is equipped with an output relay to transmit the alarm signal to additional external devices. If no error condition is present, the relay is energised; in case of an alarm, the relay is de-energised.

The leak detector LAG-14 ER can be operated with or without additional external devices. External devices include units for audible and visual alarm signal or remote alarm devices, building control systems, etc.

3.4 Application examples



1 Control unit
2 Probe cable
3 Black LAG container
4 Probe
5 Connection line
6 Outer wall
7 Interstitial space
8 Inner wall
9 Test valve

Fig. 3: Standard application

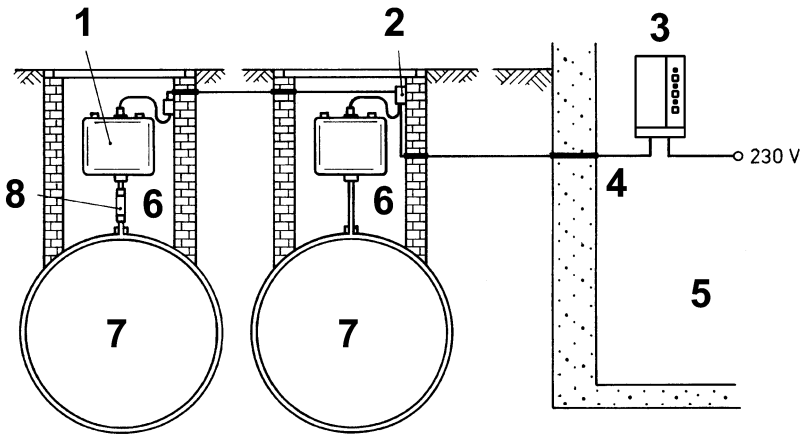


*Fig. 4: **Two** black LAG containers at a **single** control unit (different locations)*

1 Black LAG containers, install in recess, if possible

2 Permanently installed junction boxes, connect both probes in series

3 Control unit

4 All ducts gastight in protective pipe

5 Non-hazardous (safe) area

6 Hazardous (Ex) area

7 Stored liquid, compatible with leak detection fluids

8 Transparent piece, sealed installation

No more than two black LAG containers with probes may be connected in series to one control unit.

4 Technical specifications

Table 1: Technical specifications probe and container

Parameter	Value
General specifications	
Dimensions housing (W x H x D)	300 x 325 x 145 mm
Space requirements (W x H x D)	500 x 700 x 200 mm
Weight	1.0 kg

Parameter	Value
Electrode housing	Plastic, Ø 34 mm
Electrode rods	V 2 A, Ø 3 mm
Resistance	Leak detection fluid
Connection cable: Standard length Max. length	H05VV-F, 2 x 1 mm² 1 m 50 m (shielded)
Container (conductive) black	Hostalen / Vestolen
Surface resistance	< 10^9 Ohm as per DIN 53486
Active volume	4.5 litres
Total volume	10 litres
Connecting hose	EPDM hose 14 x 3 (ID 14)
Operating temperature range	
Ambient	-25 °C to +50 °C, depending on mixing ratio
Storage	-25 °C to +60 °C, depending on mixing ratio
Supply voltage	
Probe voltage	Max. 17 V, AC
Electrical safety	
Degree of protection	IP 20 (EN 60529)

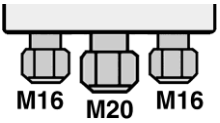
Table 2: Technical specifications control unit SE2

Parameter	Value
General specifications	
Dimensions housing (W x H x D)	100 x 188 x 65 mm
Weight	0.4 kg

Parameter	Value
Equipment group (94/9/EC) Category (94/9/EC) Type of protection Protection class Supply voltage Safety-related maximum voltage U_m Degree of protection	II (1) G [Ex ia] IIC II 230 V, 50 Hz 253 V IP 30
Response delay	< 1 second
Additional connections	1 output relay (1 changeover contact)
Breaking capacity output relay	Max. 250 V. 2 A, resistive load
Relay fuse	T 2 A
Emissions	The A-evaluated sound level of the audible alarm is at least 70 dB(A) at a distance of one metre.
Operating temperature range	
Ambient	-5 °C to +50 °C
Supply voltage	
Nominal voltage	AC 230 V ± 10 %, 50/60 Hz
Nominal power	5 VA
Mains fuse	T 100 mA H (1.5 kA)
Electrical safety	
Protection class	II (EN 60730-1)
Degree of protection	IP 40 (EN 60529)
Electromagnetic compatibility (EMC)	
Interference	EN 60730-1:2011
Noise immunity	EN 60730-1:2011

Parameter	Value
Probe circuits	
Probe circuit	ia
Maximum values	U_0 = 16.8 V, I_k = 57 mA, P = 240 mW, linear characteristic
Maximum permissible external capacitance	180 nF for IIC, 675 nF for IIB
Maximum permissible external inductance	1 mH for IIC, 8 mH for IIB
Effective internal capacitance and inductance	Negligible
EnOcean® wireless	
Frequency	868.3 MHZ
Transmission power	Max. 10 mW
Range	See chapter 12.1, page 36.
EnOcean Equipment Profile (EEP)	A5-30-04
Telecommunications Directive 1999/5/EC	EN 301489-3, EN 300220-1, EN 300220-2, EN 50371

Cable glands at control unit



The centre blind piece can be replaced with a cable gland M20.

Cable gland	Cable diameter
M16	4.0-8.8 mm
M20	8.0-12.5 mm

4.1 Approvals, tests and conformities

LAG-14 ER complies with the EMC Directive (2014/30/EU), the Low Voltage Directive (2014/35/EU), the ATEX Directive (2014/34/EU), the RoHS Directive (2011/65/EU), EC Type Examination Certificate no EX5 11 02 15639 011 and the Construction Products Directive 305/2011 (EN 13160-3:2003).

LAG-14 ER with EnOcean® wireless module also complies with the Telecommunication Directive 1999/5/EC.

5 Transport and storage

CAUTION **Damage to the product due to improper transport.**

- ▶ Do not throw or drop the product.
- ▶ Protect the product from wetness, humidity, dirt and dust.

CAUTION **Damage to the product due to improper storage.**

- ▶ Protect the product from shock when storing it.
- ▶ Store the product packaged in this film.
- ▶ Store the product in a clean and dry environment.
- ▶ Protect the product from wetness, humidity, dirt and dust.
- ▶ Only store the product within the permissible temperature range.

6 Mounting and commissioning

6.1 Calculation fundamentals

LAG-14 ER at underground container (tank)

The effective capacity of the black LAG container is limited by the liquid level screw in the centre of the container; it amounts to 4.5 litres.

For underground containers (tanks), 1 litre of leak detection fluid is required in the black LAG container per 100 litres of interstitial space volume.

The black LAG container is sufficient for 450 litres of interstitial space volume. This corresponds to containers (tanks) with a storage volume of up to 60,000 litres.

Together with additional containers with an effective capacity of 4.5 litres each, the LAG-14 ER leak detector can also be used for tanks with a greater interstitial space volume.

The additional containers are connected to each other and to the black LAG container by means of EPDM hoses.

Leak detection fluid in the interstitial space of the tank as per nameplate on the tank [litres]	Number of required black LAG containers with probe	Number of required additional containers (without probe)
0-450	1	0
450-900	1	1
900-1350	1	2
1350-1800	1	3
1800-2250	1	4

In the case of new installations, the interstitial space volume of the system must not exceed 1000 l.

LAG-14 ER at aboveground container (tank)

For aboveground containers (tanks), 1 litre of leak detection fluid is required in the black LAG container per 35 litres of interstitial space volume.

One black LAG container is sufficient for 157.5 litres of interstitial space volume. This corresponds to containers (tanks) with a storage volume of up to 20,000 litres.

Together with additional containers with an effective capacity of 4.5 litres each, the LAG-14 ER leak detector can also be used for tanks with a greater interstitial space volume.

The additional containers are connected to each other and to the black LAG container by means of EPDM hoses.

Leak detection fluid in the interstitial space of the tank as per nameplate on the tank [litres]	Number of required black LAG containers with probe	Number of required additional containers (without probe)
0-157.5	1	0
157.5-315	1	1
315-472.5	1	2
472.5-30	1	3
630-787.5	1	4

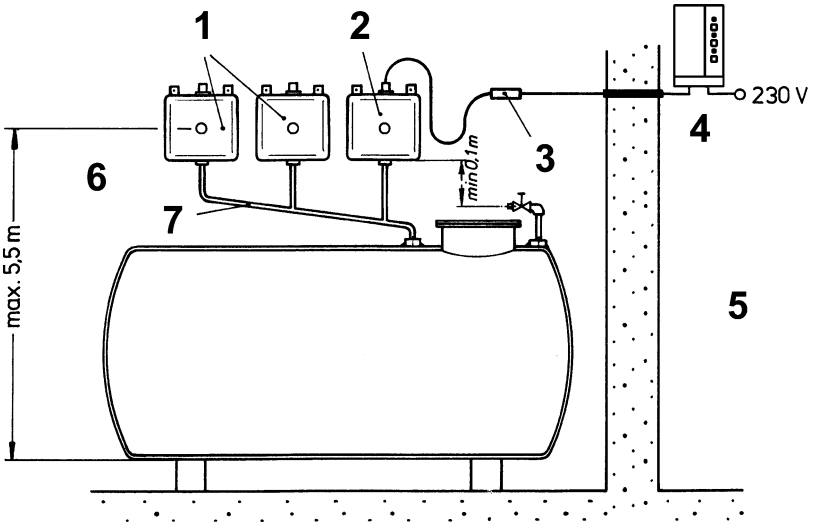


Fig. 5: Additional container

1 Additional black container

2 Black LAG container with probe

3 Junction box, permanently installed

4 Control unit

5 Non-hazardous (safe) area

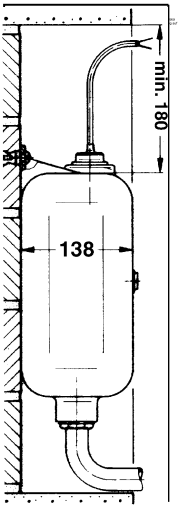
6 Hazardous (EX) area or non-hazardous (safe) area

7 Communicating connection

6.2 Installing the container for the leak detection fluid

- Verify the volume of leak detection fluid required (check the nameplate at the tank (container)) and determine the number of required black LAG containers as described in chapter 6.1, page 16).

The black LAG container can be mounted directly next to the control unit or in the vicinity of the container (tank) to be monitored in hazardous areas (Ex) zone 1 and zone 2 (e.g. in the manhole).



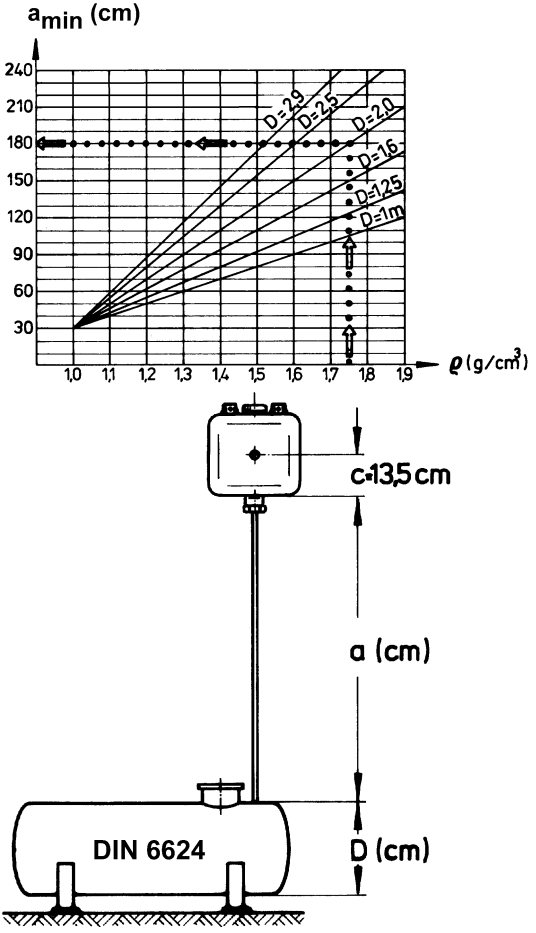
- When installing the LAG container in the hazardous area (Ex), in the manhole or outdoors, make sure neither surface water no rain nor dirt nor airborne sand can get into the container or into the cable junction box.
- Mount the black LAG container high enough above the interstitial space for the static pressure of the leak detection fluid to be sufficient at all points of the interstitial space to cause the leak detection fluid to escape and the leak detection fluid level in the black LAG container to fall in the case of a leak so that an alarm can be triggered.
- The minimum distance between the tank top and the bottom of the black LAG container primarily depends on the density of the stored medium and, in the case of underground tanks, on the possible level of the ground water or backflow above the tank top. Mount the black LAG container at least 30 cm above the tank top.
- If the test pressure for the interstitial space of the tank is 0.6 bar, the black LAG containers (with reference to the liquid level screw) may be no higher than 5.5 m above the bottom of the tank.

6.3 Minimum distance

The minimum distance between the top of the container (tank) and the black LAG container depends on the density of the stored liquid and is shown in the diagrams below.

$a_{min} = D(\rho-1)+30$ (cm); $a_{max} = 550\text{-c-}D$ (cm)

Tank: DIN 6616 type A, DIN 6623-2 and DIN 6624-2



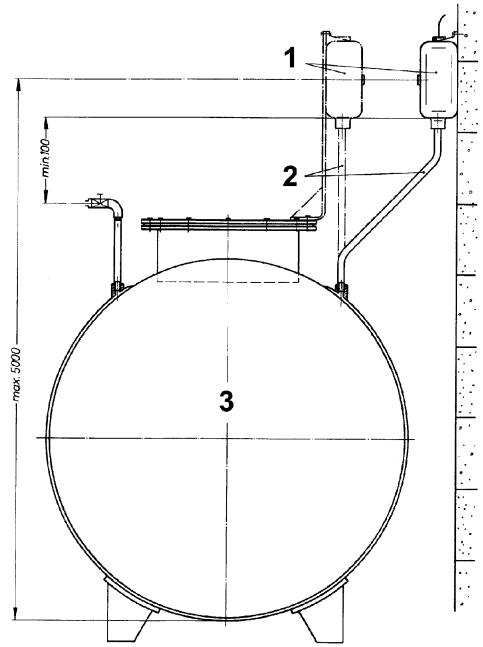
a_{min} Minimum distance

ρ Density

Example: DIN 6624, 60 x 2500; ρ = 1.7; a_{min} = 175 cm

Tank Ø ≤ 2.5 m: Permissible density ≤ 1.9

Tank Ø ≤ 2.9 m: Permissible density ≤ 1.85



1 Black LAG container

2 The connection line may not be the only support for the black LAG container.

3 DIN 6624 double-walled

Stored liquids danger classes A I, A II, A III, B

6.4 Pipe installation

CAUTION

The inside walls of pipes and fittings must not be galvanised since zinc and the approved leak detections fluids form compounds which may cause deposits and lead to clogging.

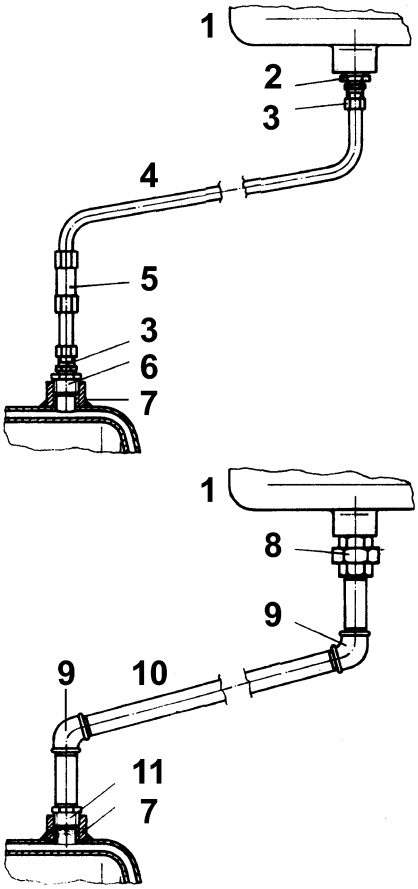
▶ Use only connection pipes and fittings whose inside walls are not galvanised.

The connection between the container (tank) and the black LAG container must have a steady gradient towards the tank; it must not be possible to shut it off. All connections must be tight. The inside walls of pipes and fittings must not be galvanised. The connection line may not be the only support for the black LAG container. Mount the black LAG container to a nearby wall, a cabinet for fittings or to a support made of flat steel or steel brackets in the manhole.

The following types of connections may be used:

- Steel pipes ND 3/4“
  With surface protection, inside not galvanised.
  Fittings the same. Insolate the outside if the pipes are underground.

- Copper or brass pipe with factory-isolation; install with separate isolating piece upstream of the tank connection.
  Inside diameter at least 13 mm. Recommendation: 15 x 1 mm.
- Only hose connections provided by the manufacturer are permissible. The EPDM hose supplied is not petrol-resistant and fuel oil resistant. A petrol-resistant and fuel oil-resistant hose (LC 16 x 3), see chapter 13, page 40.



1 Black LAG container
2 Adapter nipple ¾" x ½ – N 4 DIN 2950
3 Screw connection D 15 DIN 2353
4 Connection line brass or Cu pipe 15 x 1
5 Isolation piece "System-Frey"
6 Screw connection D 15 DIN 2353
7 Adapter nipple 1" x ½ – N 4 DIN 2950
8 Screw connection ¾" – U 2 DIN 2950
9 Elbow ¾" A 1 DIN 2950
10 Connection made of steel pipe ¾" DIN 2440
11 Adapter nipple 1" x ¾" – N 4 DIN 2950

Fig. 6: Installation example LAG piping

Cast fittings and steel connection pipes **not** galvanised inside, but with surface protection on the outside.

6.5 Mounting the test valve

The LAG mounting kit from AFRISO contains a test valve with 1" female thread and a hose connection piece for 12 x 2 mm hoses as well as all other connection parts required for installing the leak detector.

The test vale should be mounted to the connection point opposing connection point of the black LAG container.

Mount the test valve at least 100 mm below the bottom edge of the LAG fluid container at the tank.

There must be sufficient space below the test valve for a container to collect leak detection fluid escaping during the function test.

The leak detection fluid must escape at the test valve with a flow rate of approx. 0.5 l/min during the function test.

6.6 Mounting the control unit

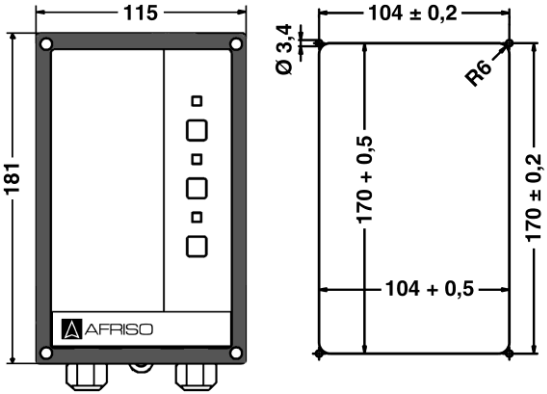
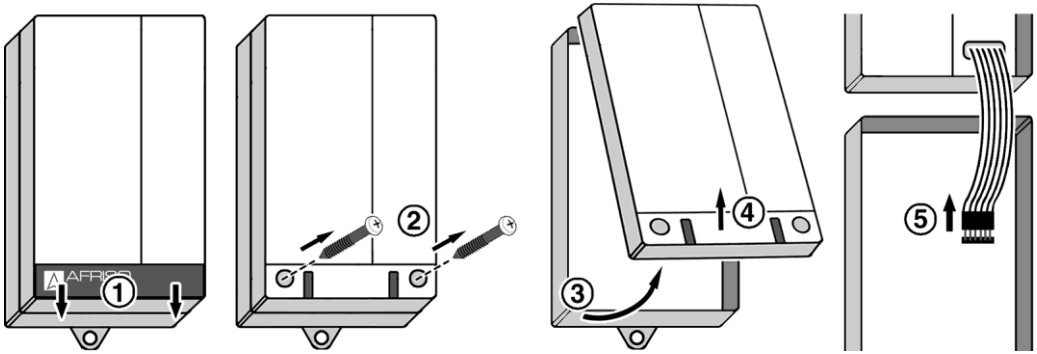


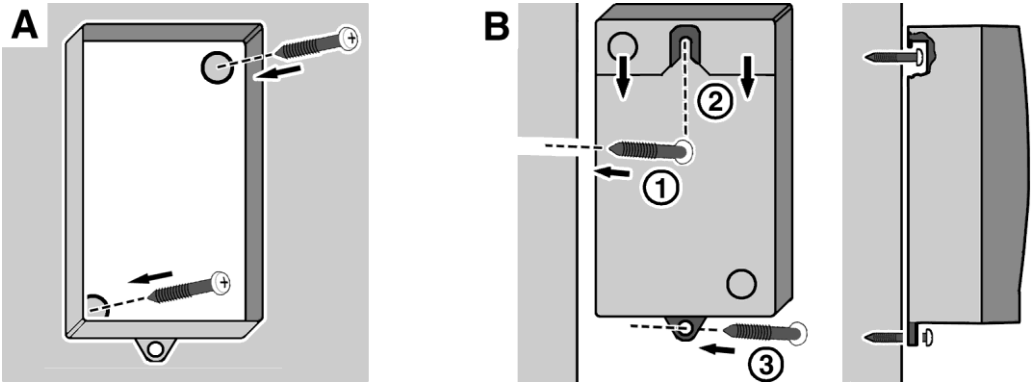
Fig. 7: Control unit with mounting frame for panel mounting; right: control panel cut out

- ☑ Do not install the control unit in hazardous areas (EX areas).
- ☑ Mount the control unit to an even, rigid and dry wall at eye level.
- ☑ The control unit must be accessible and visible at all times.
- ☑ The control unit must not be exposed to water or splash water.
- ☑ The control unit must not be installed in damp rooms.
- ☑ The permissible ambient temperature at the control unit must not be exceeded, see table 2, page 13.
- ☑ Protect the control unit from direct atmospheric influences if it is installed outdoors.

1. Open the control unit.



2. Mount the control unit to the wall.



A Drill the fixing holes in the bottom part with a Ø 5 mm drill.

Mount the bottom part to the wall with the screws shipped with the unit.

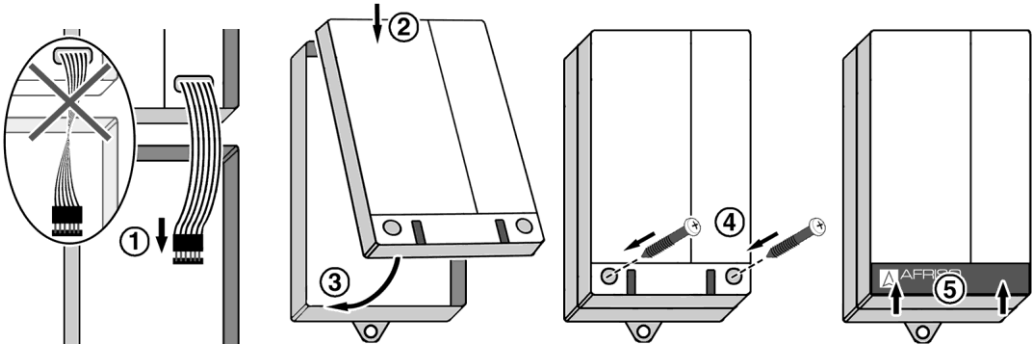
B

1 Mount the screw to the wall.

2 Fit the bottom part.

3 Fixate the bottom part by screwing the bottom lug to the wall.

3. Connect the unit electrically, see chapter 6.7, page 25.
4. Close the control unit.

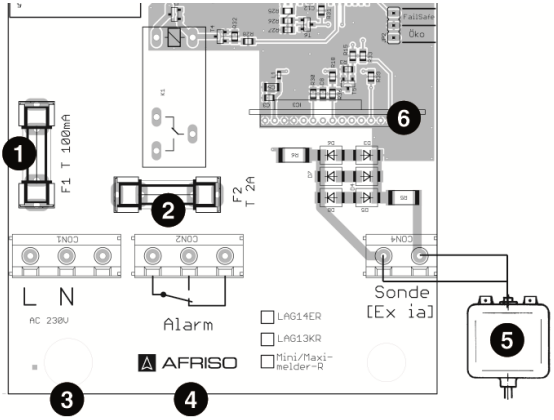


6.7 Electrical connection

☑ Mains voltage is interrupted and cannot be switched on.

Observe the VDE regulations, the pertinent regulations concerning the prevention of accidents, the operating instructions for the leak detector and the container (tank) as well as all other applicable national and local regulations.

Connect the control unit directly to the 230 V supply mains without a switch and without a plug.



1 Mains fuse F1
2 Relay fuse F2
3 Mains voltage
4 Relay for additional alarm
5 Probe
6 Female connector for EnOcean® wireless module

Fig. 8: Electrical connection

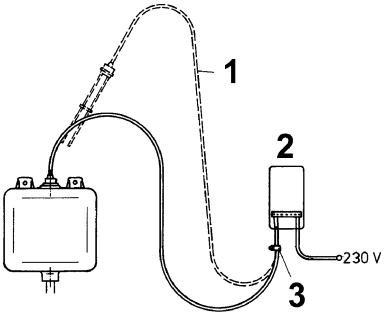
Power supply

Connect the leak detector to mains by means of a permanently installed cable such as NYM-J 3 x 1.5 mm².

1. Route the power supply cable through the cable gland at the left into the control unit.
2. The phase must be connected to terminal L1, the neutral conductor to terminal N.
3. Use a separate fuse as per EN 60127-2 for the cable to the control unit (nominal rating 10 A, breaking capacity at least 1.5 kA).

Probe

If the control unit and the black LAG container are mounted next to each other, the signal cable can be directly connected to the control unit. Make sure the probe can easily be removed from the container for the leak detection fluid for function tests. Do not shorten the signal cable.

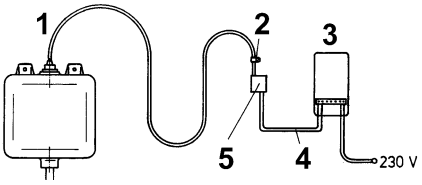


1 Do not shorten the signal cable

2 Control unit

3 Place a cable clamp

Fig. 9: Black LAG container and control unit mounted directly next to each other. Control unit loose so that the probe can be removed.



1 Do not shorten the signal cable

2 Place a cable clamp

3 Control unit

4 Signal cable extension

5 Junction box, permanently installed

Fig. 10: Black LAG container and control unit at different locations. Signal cable loosely connected to the underground cable via a junction box so that the probe can be removed..

In the case of greater distances, mount a cable junction box with degree of protection IP 55 next to the top of the black LAG container. Make sure the probe can easily be removed from the container for the leak detection fluid for function tests. Do not shorten the signal cable.

- Use control cables with 2 x 1 mm² with blue cable jacket for intrinsically safe current circuits to extend the signal cable. Use shielded cables for lengths of more than 5 m.
- The total length of the signal cable must not exceed 50 m. Use underground cables such as NYY 2 x 1.5 mm² for underground cable installation.
- Do not route intrinsically safe circuits and circuits that are not intrinsically safe in the same cable duct. Observe VDE 0165 and all other regulations applicable at the installation site.
- Do not route the signal cable next to mains cables; danger of interference.
- Protect the signal cable from damage; use a metal pipe, if required.
- Route the signal cable from the probe through the left cable gland into the control unit and connect it to the blue 2-pole terminal with the designation "Probe" in the control unit. You do not have to ensure a specific polarity.

No more than two black LAG containers with a probe each may be connected in series to one control unit.

Output

The output signal of the leak detector is made available via a voltage-free relay contact (normally open contact). The relay contact is fused with a T 2 A fuse (slow-blow).

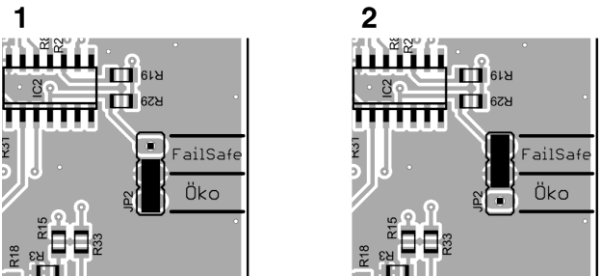
CAUTION

Electrical systems may be impacted and the switching contact may be destroyed by voltage peaks when inductive consumers are switched off.

- Use commercially available standard RC combinations such as 0.1 µF/100 Ohm for inductive consumers.

Setting the operating mode Eco/failsafe

▶ Set the jumper as required:



1 Eco

2 Failsafe

Fig. 11: Jumper

Table 3: Operating mode

Operating mode	Normal operation	Alarm condition
Eco	Relay de-energised.	Relay energises
Failsafe	Relay energised	Relay de-energises

6.8 Retrofitting an EnOcean® wireless module (optional)

☑ Disconnect LAG-14 ER from mains voltage.

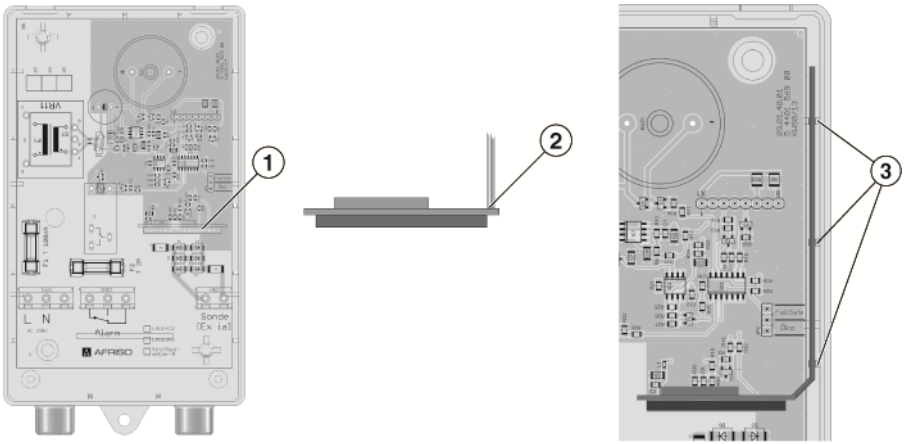
1. Open the cover of the control unit (see chapter 6.6, page 23).

CAUTION

Damage to the electronic components due to electrostatic discharge

Take precautions when handling components that can be damaged by electrostatic discharge.

- ▶ Always earth yourself before touching electronic components.
- ▶ Do not touch the EnOcean® wireless module to plug it in; use the anti-electrostatic film to plug the wireless module for the timer module into the slot.

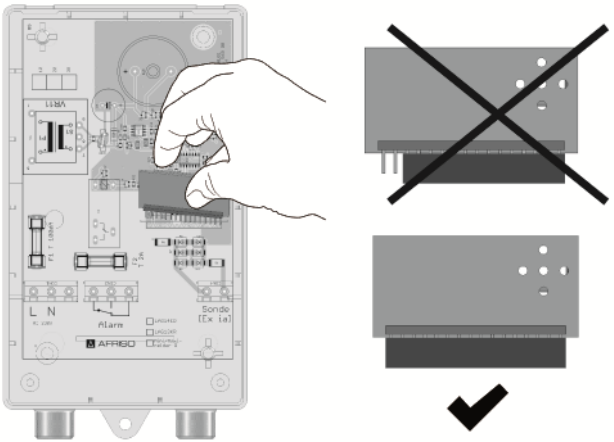


1 Female connector for EnOcean® wireless module

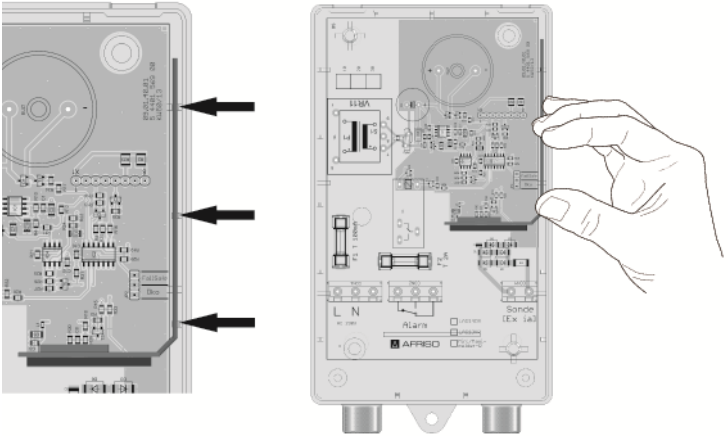
2 Position antenna

3 Housing opening (for fastening the antenna)

2. Connect the EnOcean® wireless module to the female connector.
   When connecting the wireless module, ensure the following:
   - The position of the antenna must be at the right side (close to the housing wall).
   - All pins must be inserted into the female connector.
   - Do not bend the pins.



3. Push the antenna of the EnOcean® wireless module into the three housing openings of the control unit.



4. Close the cover of the control unit (see chapter 6.6, page 23).

6.9 Commissioning the product

- ☑ The number of required black LAG containers has been determined.
- ☑ The black LAG containers have been mounted as per chapter 6.2, page 19.
- ☑ The pipes have been installed as per chapter 6.4, page 21.
- ☑ The test valve has been mounted as per chapter 6.5, page 23.
- ☑ The control unit has been installed as per chapter 6.6, page 23.
- ☑ The unit has been connected electrically as per chapter 6.7, page 25.
- ☑ The probe has been connected to the control unit.
- ☑ Output relay has been wired (if required).
- ☑ The unit has been connected to mains.
- ☑ The flat cable has been connected to the printed circuit board.
- ☑ The control unit has been closed.

If all requirements are met, you can fill leak detection fluid.

Filling

Double-walled containers (tanks) are delivered with leak detection fluid already filled into the interstitial space. The volume of leak detection fluid filled must be known and indicated on the nameplate of the tank. Only refill the specified leak detection fluid, mixed with water in the specified mixing ratio unless you have a certificate of the BAM (German Federal Institute for Materials Research and Testing) to the effect that the leak detection fluid you want to fill can be mixed with the leak detection fluid contained in the interstitial space.

1. For commissioning, open the test valve, place a collection receptacle below it and remove the probe from the black LAG container.
2. Remove the filling screw at the black LAG container and fill.
3. Do not close the test valve until leak detection fluid escapes.
4. Fill leak detection fluid up to the overflow opening of the liquid level mark.
5. Close the opening with the filling screw and refit the probe.

The vent hole Ø 5 mm at the neck of the black LAG container must remain open.

↳ The system is ready for operation.

6. Switch on the power supply via the on-site mains fuse.

↳ The green pilot lamp lights up.

7. Have the specialised company certify the installation, commissioning and test of the leak detector using the form in chapter 19.1, page 42.

7 Teaching in the EnOcean® wireless module (optional)

☑ LAG-14 ER is close to the EnOcean® centre.

1. Set the EnOcean® centre to the Learn mode (LRNMOD).
2. Briefly press lowest button of LAG-14 ER.

↳ LAG-14 ER sends a Learn telegram (LRNTEL).

↳ LAG-14 ER is connected to the EnOcean® centre.

8 Operation

LAG-14 ER monitors double-walled containers (tanks). In the case of a leak, leak detection fluid escapes and LAG-14 ER triggers an alarm. The operation of LAG-14 ER is limited to its regular monitoring:

- The green pilot lamp is on.
- The red alarm lamp is not on.
- The audible alarm is off.

8.1 Alarm condition

▶ In the case of an alarm, refill leak detection fluid (mixed with water in the specified mixing ratio) up to the indicated level. If the alarm repeats, there is a leak.

▶ The audible alarm can be muted with the Acknowledge button. The red alarm lamp remains on.

▶ Immediately notify the installation company.

8.2 Function test

▶ Perform a function test once per year and after each repair and maintenance.

Simulation

1. Open the test valve and collect the escaping leak detection fluid using a suitable receptacle.

↳ The leak detection fluid must escape at a flow rate of approx. 0.5 l/min.

↳ As soon as the black LAG container is empty, the unit must trigger visual and audible alarms.

2. Close the test valve and refill the drained leak detection fluid into the black LAG container.

↳ The alarm signals must switch off automatically.

At the probe

1. Remove the probe from the black LAG container.

↳ The red alarm lamp must light up and the audible alarm must sound.

2. Refit the probe.

↳ The alarm signals must immediately switch off.

At the control unit

▶ Press the Test button.

↳ The supply to the probe is interrupted.

↳ The red alarm lamp must light up and the audible alarm must sound.

9 Maintenance

Leak detectors are safety equipment; if damaged, they may only be repaired by the manufacturer.

9.1 Maintenance times

It is recommended to close a maintenance agreement with a company specialised/certified according to the applicable water protection regulations.

Table 4: Maintenance times

When	Activity
Annually	▶ Perform a function test by simulating an alarm condition

When	Activity
At regular intervals	▶ Verify that the leak detector and its environment are always clean, accessible and easy to oversee.

9.2 Maintenance activities

Replacing the mains fuse F1

☑ Mains voltage is interrupted and cannot be switched on.

1. Open the control unit, see chapter 6.6, page 23.
2. Remove the transparent cover from the mains fuse F1.
3. Replace the mains fuse F1, see table 2, page 13.
4. Snap the transparent cover onto the mains fuse F1.
5. Connect the flat cable to the connector.
6. Close the control unit, see chapter 6.6, page 23.
7. Switch on the mains voltage.

Replacing the relay fuse F2

☑ Mains voltage is interrupted and cannot be switched on.

1. Open the control unit, see chapter 6.6, page 23.
2. Remove the transparent cover from the mains fuse F2.
3. Replace the mains fuse F2, see table 2, page 13.
4. Snap the transparent cover onto the mains fuse F2.
5. Connect the flat cable to the connector.
6. Close the control unit, see chapter 6.6, page 23.
7. Switch on the mains voltage.

10 Troubleshooting

Repairs may only be performed by specially trained, qualified staff.

Table 5: Troubleshooting

Problem	Possible reason	Repair
Green pilot lamp is not on	Mains voltage is interrupted	▶ Supply mains voltage
	Mains fuse defective	▶ Replace the mains fuse
	Flat cable not connected to printed circuit board	▶ Connect the flat cable to the printed circuit board

Problem	Possible reason	Repair
Red alarm lamp is on	Alarm condition: leak	▶ Remove cause of alarm ▶ Refill leak detection fluid
	Probe not connected	▶ Connect probe
	Signal cable interrupted	▶ Check signal cable
Red alarm lamp is always on, even when the probe is submerged in leak detection fluid	Interruption in the signal cable, the probe or the control unit	▶ Check signal cable, probe and control unit
Pressing the Test button has no effect	Control unit defective	▶ Replace control unit
Removing the probe from the black LAG container has no effect	Short circuit in the probe, the signal cable or the control unit	▶ Check signal cable, probe and control unit
Other malfunctions	–	▶ Send the product to the manufacturer

11 Decommissioning, disposal

1. Switch off the supply voltage.
2. Dismount the leak detector LAG-14 ER (see chapter 6, page 16, reverse sequence of steps).

3. To protect the environment, this product must **not** be disposed of together with the normal household waste. Dispose of the product according to according to local directives and guidelines.

This product consists of materials that can be reused by recycling firms. The electronic inserts can be easily separated and the device consists of recyclable materials.

If you do not have the opportunity to dispose of the used device in accordance with environmental regulations, please contact us for possibilities to return it.

12 General information on EnOcean® wireless

12.1 Range of EnOcean® wireless

Ranges between transmitters and receivers

Compared to wired systems, EnOcean wireless systems offer a high degree of flexibility as well as simplicity of installation. The following installation information is intended to allow for easy commissioning. Visit www.enocean.com for details on range planning.

Radio signals are electromagnetic waves. The field strength at the receiver decreases with increasing distance from the transmitter, i.e. the range is limited. Materials in the direction of propagation also reduce the range compared to line-of-sight links:

Table 6: Range reduction EnOcean® wireless system 868.3 MHz

Material	Range reduction
Wood, plaster, uncoated glass, without metal	0 – 10 %
Bricks, pressboards	5 – 35 %
Ferro concrete	10 – 90 %
Metal, aluminium lining	See "Shielding"

The geometric shape of a room determines the radio range since the propagation is not in the form of a beam but requires a certain volume of space (ellipsoid with transmitter and receiver at the focal points). Narrow corridors with solid walls are bad for propagation.

External antennas typically have a better radio performance than antennas from in-wall, flush-mounted receivers. The type of antenna installation and distance from ceilings, floors and walls all play a role.

People and obstacles in a room may reduce the range.

Some reserve must therefore be included when planning range to achieve reliable operation of the wireless system even in unfavourable conditions.

A robust and reliable installation in buildings is achieved by sufficient range reserve.

Recommendations from real-life scenarios:

Table 7: Range EnOcean® wireless system 868.3 MHz

Range	Conditions
> 30 m	Under excellent conditions: Large unobstructed room, optimum antenna design and good antenna position
> 20 m (planning reliability)	With furniture and persons in the room, through 5 plasterboard walls or through two 2 brick walls/autoclaved aerated concrete walls: For transmitters and receivers with good antenna design and good antenna position.
> 10 m (planning reliability)	With furniture and persons in the room, through 5 plasterboard walls or through two 2 brick walls/autoclaved aerated concrete walls: For receivers installed in walls or corners of a room. Or small receiver with internal antenna. Also together with switch/wired antenna on/near metal. Or narrow corridor.
Depending on reinforcement and antenna design	Vertical through 1 to 2 ceilings

The values stated for transmission range are approximate values only.

Shielding

So-called radio shadows form behind metal surfaces, e.g. behind metal partition walls and metal ceilings, behind metal foil of heat insulation and solid reinforcements in concrete walls. Single thin metal strips have very little influence, for example the profiles in a plasterboard wall.

It has been observed that radio communication also works with metal room dividers. This occurs by reflections: metal and concrete walls reflect radio waves and they travel to neighbouring corridors or rooms through openings, e.g. in a wooden door or glass partition. However, the range may be considerably reduced, depending on the location. An additional repeater at a suitable location can offer alternative radio paths.

Main factors that reduce radio range:

- Metal partition walls or hollow walls filled with insulation wool backed by metal foil
- Suspended ceilings with panels made of metal or carbon fibre

- Steel furniture or glass with metal coating
- Installation of pushbutton on a metal wall (typical range loss: 30%)
- Use of metal pushbutton frames (typical range loss: 30%)
- Transmitters that emit high frequency signals

Firewalls, lift shafts, staircases and building service areas should be regarded as shielding.

Shielding can be avoided by repositioning the transmitter or receiver antenna away from the radio shadow or by using a repeater.

Penetration angle

The angle at which a transmitted signal hits the wall plays a key role. If possible, signals should penetrate walls perpendicularly. Wall niches must be avoided.

Antenna installation

The receiving antenna or a receiver with an integrated antenna should not be installed on the same side of the wall as the transmitter. It is better to install the antenna on the adjacent or opposite wall. Antennas should be at a distance of > 10 cm from the corner of the room, if possible.

The ideal installation location for the receiving antenna is a central position in the room.

A magnetic antenna must be placed on a metal surface as large as possible to create an adequate counter pole. It can be easily placed on a ventilation pipe, for example.

Distance of receivers from other sources of interference

The distance of the receivers from other transmitters (such as GSM / DECT / Wireless LAN) and high-frequency sources of interference(computers, audio and video equipment) should be > 50 cm.

Transmitters, on the other hand, can be installed without any problem next to other transmitters and interference sources.

Use of repeaters

In the case of poor reception, it may be helpful to use a repeater.

It receives the radio signal and passes it on which can almost double the range. Repeaters which can be switched to a 2-level function allow for cascading two repeaters.

Field strength meter

A field strength meter helps to find the best position for transmitter and receiver.

In addition, it can be used to check interfered connections between devices already installed and even identify an interfering transmitter.

Installation in residential buildings

In residential buildings, there is usually no need to cover long radio distances. If necessary, a central wireless repeater can be installed for signal amplification.

Installation in commercial buildings

To cover large premises, central radio gateways to the automation bus (TCP/IP, EIB/KNX, LON, etc.) are usually used. Planning with a range radius of 10-12 m offers sufficient reliability, even in view of the changes to the environmental conditions that usually occur later on.

12.2 Additional information on EnOcean® wireless systems

Additional information on planning, installation and operation of EnOcean® wireless systems can be found at:

www.enocean.com/de

- Wireless standard
- Wireless technology
- AN001
- AN102
- AN103

12.3 Features of the EnOcean® technology

Visit www.afriso.de/afrisolab for a brochure on the EnOcean® technology.

Visit AFRISO's YouTube channel for additional videos on AFRISO products.

13 Spare parts and accessories

Part	Part no.
Leak detector LAG-14 ER	43401
LAG-14 ER control unit	40652
LAG container (black)	40731
LAG probe	40510
LAG mounting kit	40540
LAG mounting kit (additional container)	40541
Hose nipple 3/4" (LAG container)	40558
Hose connection piece 1"	40557
Test valve 1"	40560
EPDM hose 14 x 3 mm	40543
Leak detection fluid, concentrate	43645
Cable extension fitting KVA	40041
Mounting frame for control unit	43521
IP54 kit with cable gland M20	43416
RC combination (0.1 µF/100 Ohm)	618.001.5100
Mains fuse F1 (T 100 mA H; 1.5 kA)	960.127.0100
Relay fuse (T 2 A)	960.127.2000
Petrol-resistant and fuel oil-resistant hose LC 16 x 3	820.000.0004
EnOcean® wireless module	78082

14 Leak detection fluids for leak detector

The leak detection fluids listed have been tested by the German "Bundesanstalt für Materialforschung und -prüfung" BAM (Federal Institute for Materials Research and Testing) and may be used for liquid-based leak detectors. They have been tested for their fungicidal effect and their compatibility with flammable liquids: fuel oil, diesel fuel and carburettor fuel. Other leak detection fluids may no longer be used in the interstitial spaces of double-walled containers (tanks).

The leak detector LAG-14 ER is suitable for the leak detection fluids listed below.

Table 8: Leak detection fluid

Company	Product	BAM reference
Clariant SE Am Unisys Park 1 65843 Sulzbach	Antifrogen N leak detection fluid Leckanzeige-Clariant	1.3/9790 – 5.1/3436 1.3/10723-N1 - 5.1/3833-N1

In existing systems with approved leak detection fluids, the leak detector LAG-14 ER may continue to be used as a replacement device.

15 Warranty

The manufacturer's warranty for this product is 24 months after the date of purchase. This warranty shall be good in all countries in which this product is sold by the manufacturer or its authorised dealers.

16 Copyright

17 Customer satisfaction

Customer satisfaction is our prime objective. Please get in touch with us if you have any questions, suggestions or problems concerning your product.

18 Addresses

The addresses of our worldwide representations and offices can be found on the Internet at www.afriso.com.

19 Appendix

19.1 Certification of specialised company (according to applicable water regulations)

I hereby confirm the installation of the leak detector and performance of a function test of the leak detector according to these operating instructions:

Tank: _____

according to or as per standard: _____

Manufact. number: _____

Volume in litres: _____

Leak detection fluid designation: _____

Volume in litres: _____ (in interstitial space)

Volume in litres: _____

Owner/Operator + location of system:	Specialised company:

Date, stamp + signature: _____

19.2 Approval documents

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

EG-Baumusterprüfbescheinigung

Nr. EX5 11 02 15639 011

Zertifikatsinhaber: **AFRISO-EURO-INDEX GmbH**
Lindenstr. 20
74363 Güglingen
DEUTSCHLAND

Produkt: **Leckanzeigen**
Gerätegruppe II, Kategorie 1

Modell(e): **Leckanzeigegerät**
LAG-14ER

Kenndaten:

Gerätegruppe II, Kategorie (1) G,
Zündschutzart [Ex ia] IIC bzw. [Ex ia] IIB

Kennzeichnung Ex II (1) G

Typ:	LAG-14 ER
Abmessung	
Gehäuse:	100 x 188 x 65 mm
Gewicht:	0,4 kg
Nennleistung:	5 VA
Netzsicherung:	M 32 mA Ex
Relaisstromkreis	
Klemme 2:	250 V, 3 A, cos phi <= 0,7
Relaissicherung:	T 2 A
Geberstromkreis:	ia
Höchstwerte:	Uo = 16,8 V, Ik = 57 mA, P = 240 mW, Kennlinie linear
Höchstzul. äuß. Kapazität:	180 nF für IIC, 675 nF für IIB
Höchstzul. äuß. Induktivität:	1 mH für IIC, 8 mH für IIB

Innere wirksame Kapazitäten und Induktivitäten sind vernachlässigbar.

Diese EG-Baumusterprüfbescheinigung bestätigt die Übereinstimmung des bezeichneten Produktes mit den einschlägigen Vorschriften gemäß Anhang III der Richtlinie des Rates Nr. 94/9/EG für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen (ATEX). Prüfgrundlage ist ausschließlich das zur Prüfung und Zertifizierung vorgestellte Prüfmuster sowie dessen technische Dokumentation. Umseitige Hinweise sind zu beachten.

Prüfbericht Nr.: 71379414

Datum, 2011-02-23 (Andreas Pfeil)

TÜV SÜD Product Service GmbH ist benannte Stelle gemäß der Richtlinie des Rates Nr. 94/9/EG für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen mit der Kennnummer 0123.

Seite 1 von 1

TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstraße 65 · 80339 München · Germany TÜV®

19.3 EU Declaration of Conformity

AFRISO

Technik für Umweltschutz

Messen. Regeln. Überwachen.

EU – Konformitätserklärung

EU-Declaration of Conformity / Déclaration EU de conformité
Declaratión de conformidad CE / Declaração de confirmidade CE

CE

Formblatt
FB 27 - 03

Name und Anschrift des Herstellers: AFRISO-EURO-INDEX GmbH, Lindenstr. 20, 74363 Güglingen
Manufacturer / Fabricant / Fabricante / Nome e endereço do fabricante:

Erzeugnis: Leckanzeiger LAG-14 ER
Product / Produit / Producto / Produto:

Typenbezeichnung: Steuerteil SE 2
Type / Type / Tipo / Tipo:

Betriebsdaten: 230V, 50Hz, 5VA, IP30
Techn. Details:
Caractéristiques / Características / Detalhes técnicos:

Das bezeichnete Erzeugnis stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:
The above mentioned product meets the requirements of the following European Directives
Le produit mentionné est conforme aux prescriptions des Directives Européennes suivantes
El producto indicado cumple con las prescripciones de las Directivas Europeas siguientes
O produto indicado cumpre com as prescrições das seguintes Diretivas Europeias:

Elektromagnetische Verträglichkeit (2014/30/EU)
Directive Electromagnetic Compatibility / Directive compatibilité électromagnétique / Directiva compatibilidad electromagnética / Diretiva sobre compatibilidade eletromagnética

- DIN EN 60730-1:2011

Niederspannungsrichtlinie (2014/35/EU)
Low Voltage Directive / Directive basse tension / Directiva baja tensión / Diretiva sobre baixa tensão

- DIN EN 60730-1:2011

Explosionsschutz- Richtlinie (2014/34/EU)
ATEX Directive / Directive ATEX / Directiva ATEX / Diretiva ATEX

- DIN EN 60079-0:2012, EN 60079-0:2012/A11:2013

- DIN EN 60079-11:2012

- EG-Baumusterbescheinigung-Nr.: EX5 11 02 15639 011

- TÜV SÜD Product Service GmbH, Ridlestr. 65, 80339 München, Kennnummer 0123

Bauprodukte Verordnung (EU) Nr. 305/2011 + Nr. 574/2014
Construction Products Diretive / Examen CE de Type / Certificado CE de tipo / Examo do tipo construtivo

- EN 13160-1:2003, EN 13160-3:2003

RoHS-Richtlinie (2011/65/EU)
RoHS Directive / Directive RoHS / Directiva RoHS / Diretiva RoHS

Unterzeichner: Dr. Aldinger, Geschäftsführer Technik
Signed / Signataire / Firmante / Assinado por: *Technical Director / Director Técnico*

20.4.2016
Datum / *Date / Fecha / Data*

Unterschrift / *Signature / Firma / Assinatura*

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19.4 Declaration of Performance (DoP)

LEISTUNGSERKLÄRUNG (DoP)

Nr.: LAG14-EU-BauPVO-DE-2014

nach Verordnung (EU) Nr. 305/2011 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 9.März 2011 zur Festlegung harmonisierter Bedingungen für die Vermarktung von Bauprodukten und zur Aufhebung der Richtlinie 89/106/EWG des Rates

1. Eindeutiger Kenncode des Produkttyps:
   Leckanzeiger Typ LAG 14 ER
   Flüssigkeitssysteme für Tanks

2. Verwendungszweck:
   Leckanzeigesystem der Klasse II für den Einsatz in doppelwandigen Tanks für wassergefährdende Flüssigkeiten

3. Hersteller:
   AFRISO
   AFRISO-EURO-INDEX GmbH
   Lindenstraße 20, 74363 Güglingen
   Tel.-Nr.: +49 7135 102-0 Fax: +49 7135 102 212
   e-Mail: info@afriso.de www.afriso.de

4. Bevollmächtigter: N.A.

5. System zur Bewertung und Überprüfung der Leistungsbeständigkeit:
   System 3

6. Harmonisierte Norm: EN 13160-1:2003, EN 13160-3:2003
   Notifizierte Stelle:
   TÜV Nord Systems GmbH & Co KG, Competence Center Tankanlagen, Große Bahnstraße 31, 22525 Hamburg, Deutschland
   Kennummer des notifizierten Prüflabors: 0045

7. Erklärung Leistungen:

Wesentliche Merkmale	Leistung
Erkennung von Pegeländerungen	bestanden
Anforderungen an die Software	bestanden
Dauerhaftigkeit gegen Temperatur	bestanden
Dauerhaftigkeit gegen Chemikalienangriff	bestanden
Dauerhaftigkeit gegen mikrobiellen Bewuchs	bestanden

8. Unterzeichnet für den Hersteller und im Namen des Herstellers von:
   Dr. U. Aldinger
   Güglingen, 17.07.2014

19.5 CE Marking

CE

AFRISO-EURO-INDEX GmbH, Lindenstr. 20
74363 Güglingen, Germany

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EN 13160:2003

Leckanzeigesystem der Klasse II
Typ: LAG 14 ER

Für den Einsatz in doppelwandigen Tanks für wassergefährdende Flüssigkeiten.

Installation nach Betriebsanleitung 854.000.0153

Betriebsweise: elektrischer Sensor zur Überwachung des Pegelstands der leitfähigen Leckanzeigeflüssigkeit im Leckanzeigebehälter

Leckanzeigeflüssigkeit: Antifrogen N
Temperaturbegrenzung: -5°C bis +50°C
Schalt-/Rückstellzeit Sensor: < 1 s