Operating instructions

Digital tank contents indicator

DIT 10

CE

Version: 04.2016.0
ID: 900.000.0740

1   About these operating instructions

These operating instructions describe the digital tank contents indicator "DIT 10" (also referred to as "product" in these operating instructions). These operating instructions are part of the product.

- You may only use the product if you have fully read and understood these operating instructions.

- Verify that these operating instructions are always accessible for any type of work performed on or with the product.

- Pass these operating instructions as well as all other product-related documents on to all owners of the product.

- If you feel that these operating instructions contain errors, inconsistencies, ambiguities or other issues, contact the manufacturer prior to using the product.

There operating instructions are protected by copyright and may only be used as provided for by the corresponding copyright legislation. We reserve the right to modifications.

The manufacturer shall not be liable in any form whatsoever for direct or consequential damage resulting from failure to observe these operating instructions or from failure to comply with directives, regulations and standards and any other statutory requirements applicable at the installation site of the product.

2 Information on safety

2.1 Safety messages and hazard categories

These operating instructions contain safety messages to alert you to potential hazards and risks. In addition to the instructions provided in these operating instructions, you must comply with all directives, standards and safety regulations applicable at the installation site of the product. Verify that you are familiar with all directives, standards and safety regulations and ensure compliance with them prior to using the product.

Safety messages in these operating instructions are highlighted with warning symbols and warning words. Depending on the severity of a hazard, the safety messages are classified according to different hazard categories.

NOTICE

NOTICE indicates a hazardous situation, which, if not avoided, can result in equipment damage.

2.2 Intended use

This product may only be used for measuring the level in fuel oil tanks with a height of up to 4.5 metres and in water tanks with a height of up to 4 metres.

Any use other than the application explicitly permitted in these operating instructions is not permitted and causes hazards.

Verify that the product is suitable for the application planned by you prior to using the product. In doing so, take into account at least the following:

- All directives, standards and safety regulations applicable at the installation site of the product
- All conditions and data specified for the product
- The conditions of the planned application

In addition, perform a risk assessment in view of the planned application, according to an approved risk assessment method, and implement the appropriate safety measures, based on the results of the risk assessment. Take into account the consequences of installing or integrating the product into a system or a plant.

When using the product, perform all work and all other activities in conjunction with the product in compliance with the conditions specified in the operating instructions and on the nameplate, as well as with all directives, standards and safety regulations applicable at the installation site of the product

2.3 Predictable incorrect application

The product must never be used in the following cases and for the following purposes:

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

2.4 Qualification of personnel

Only appropriately trained persons who are familiar with and understand the contents of these operating instructions and all other pertinent product documentation are authorized to work on and with this product.

These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product

All persons working on and with the product must be fully familiar with all directives, standards and safety regulations that must be observed for performing such work.

2.5 Personal protective equipment.

Always wear the required personal protective equipment. When performing work on and with the product, take into account that hazards may be present at the installation site which do not directly result from the product itself.

2.6 Modifications to the product

Only perform work on and with the product which is explicitly described in these operating instructions. Do not make any modifications to the product which are not described in these operating instructions.

3 Transport and storage

The product may be damaged as a result of improper transport or storage.

NOTICE

DAMAGE TO THE PRODUCT
- Verify compliance with the specified ambient conditions during transport or storage of the product.
- Use the original packaging when transporting the product.
- Store the product in a clean and dry environment.
- Verify that the product is protected against shocks and impact during transport and storage.

Failure to follow these instructions can result in equipment damage.

4   Product description

4.1   Overview

A. Display

B. Programming keys

C. Function key

D. Cable gland

E. Cable

Fig. 1: Control unit

F. Cable with vent hose

G. Pressure sensor
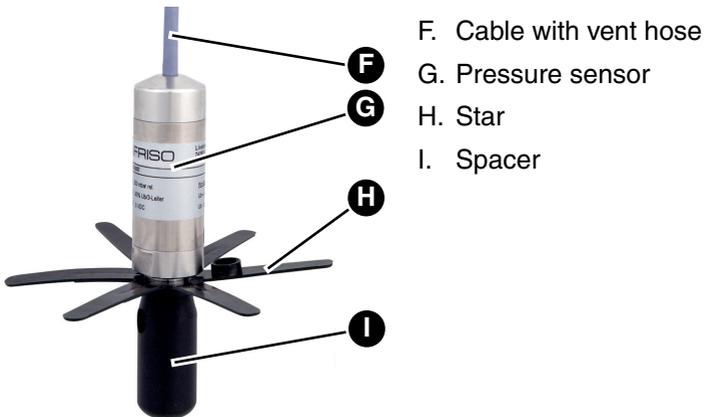
H. Star

I. Spacer

Fig. 2: Pressure sensor with spacer

4.2 Scope of delivery

Scope of delivery:

- Control unit with digital display
- 5 m connection cable to probe (can be extended by up to 10 m)
- Moisture-proof junction box
- Submersible probe with 6 m submersible cable
- Cable gland kit G1 x G1$\frac{1}{2}$ x G2
- Mounting kit for withdrawal flange (PG 9 cable gland)
- Wall mounting
- Operating instructions

4.3 Application example(s)
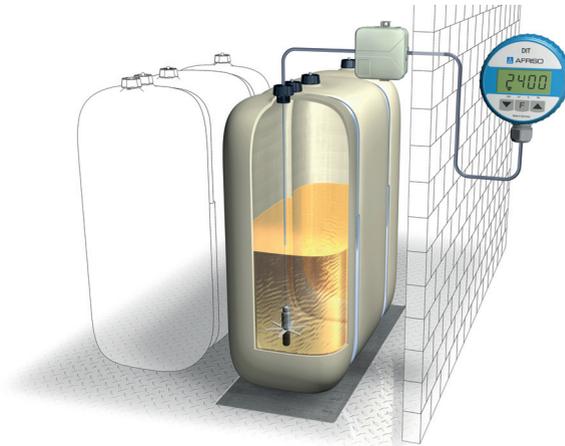
4.4 Function

The product consists of an electronic pressure sensor and a microprocessor-controlled control unit integrated into a robust plastic housing. A four-digit LC display indicates the measured values. The function key F switches the product on and allows you to select the display mode in litres, cubic metres, percentage and liquid level. The two programming keys are used to program the product. The housing of the display unit contains a lithium battery. The product is delivered without the battery connected.

The free cable end of the control unit is connected to the pressure sensor. The pressure sensor is inserted into the tank from the top and fastened and sealed with a cable gland.

The pressure sensor is equipped with a spacer intended to keep the measuring hole above a sludge layer that may be present on the tank bottom.

The pressure sensor comes with several cable glands that can be used to seal the pressure sensor cable into the tank.

The pressure sensor is located at the lowest point of the tank and converts the hydrostatic pressure of the fuel/water into a voltage signal. The voltage signal is transmitted to the control unit via the cable. The electronic system of the control unit calculates the tank contents on the basis of this voltage signal.

4.5 Approvals, conformities, certifications

The product complies with:

- EMC Directive (2014/30/EU)

4.6 Technical specifications

4.6.1 Control unit

Parameter	Value
General specifications	
Dimensions (Ø x L)	75 x 50 mm
Weight	380 g
Cable length	5 m
Housing material	PA6 15 % glass ball reinforced
Supply	3.6 V lithium battery
Service life of battery	Max. 8 years (if function key is pressed once per month)
Display	4-digit LC display
Resolution	14 bits
Measurement input	0 - 3.6 V
Measuring accuracy*	± 1.5 % FSO, IEC 60770
Functions	Push-to-read, selection of units, calculation of total volume
Operating temperature range	
Ambient	0/+45 °C
Medium	-5/+70 °C
Storage	-5/+80 °C
Electrical safety	
Degree of protection	IP 51 (EN 60529)
Electromagnetic compatibility (EMC)	
Emitted interference	EN 50081-1
Noise immunity	EN 50082-1

* Accuracy of the complete system with reference to the indication of the liquid level in mm: ±1.5 % FSO, IEC 60770.

4.6.2   Pressure sensor

Parameter	Value
General specifications	
Dimensions (Ø x L)	24 x 64.5 mm
Weight	350 g
Cable length	6 m
Pressure range	0-400 mbar
Measuring accuracy*	< ± 0.5 % FSO, IEC 60770
Temperature error	< ± 0.3 % FSO, 10 K in compensated range 0/+70 °C
Materials	
Housing	Stainless steel 1.4301
Cable	PVC (fuel oil-resistant)
Spacer	POM, PE
Other wetted parts	Stainless steel 1.4301, 1.4435, FKM
Operating temperature range	
Medium	-5/+70 °C
Storage	-5/+70 °C
Electrical safety	
Degree of protection	IP 68 (EN 60529)
Electromagnetic compatibility (EMC)	
Emitted interference	EN 61000-6-4
Noise immunity	EN 61000-6-2

* Accuracy of the complete system with reference to the indication of the liquid level in mm: ±1.5 % FSO, IEC 60770.

5   Mounting

The optimum point in time for the installation of the product is when the tank has the maximum filling level. This achieves the highest accuracy.

If the product is not installed when the level in the tank has the maximum value, you can correct the tank data at maximum level to further increase the accuracy of the product.

5.1   Determining the tank data

You must determine the tank data before installing the product.

1. Document the tank data you have determined in the form below.

5.1.1   Tank shape

1. Determine the tank shape code using the table below.

Tank shape code	Tank shape	Description
1	Linear tank	Rectangular tanks, upright cylinders, steel tanks welded in the basement and all other linear measuring applications
2	Cylindrical tank	Vertically mounted cylinders
3	Spherical tank	Spherical tank
4	Plastic battery tank	Plastic battery type tanks with straps or bulges
5	Oval tank	Oval basement tanks, for example, glass-fibre reinforced tanks or sheet metal tanks
6	Plastic tank with recess	Plastic tanks with larger recesses in the tank centre (manufacturers: for example, Roth, Werit)

Determined tank shape code: _____

5.1.2   Tank volume

1. Determine the total volume of the tank system in litres (this information can be found in the technical data of the tank).

Determined tank volume: _____ litres

5.1.3 Tank height (max. liquid level)

1. Determine the tank height in mm (this information can be found in the technical data of the tank).
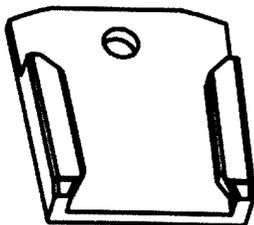
Determined tank height: _____ mm

5.1.4 Current liquid level

1. Determine the current liquid level in mm (for example, use a dipstick to determine the liquid level).

Determined liquid level: _____ mm

5.2 Mounting the wall bracket

1. Mount the wall bracket at a suitable location using the enclosed screws (4 x 30 mm).

5.3 Mounting the junction box

The enclosed moisture-proof junction box is not suitable for outdoor applications.

1. Use the outdoor junction box for outdoor applications.

2. Mount the moisture-proof junction box at a suitable location using the enclosed screws.
   - Verify that the cable length is sufficient because the control unit must be removed from the wall bracket if you need to replace the battery.

3. Fit the control unit into the wall bracket.

4. Route the cable (pressure sensor cable and cable of the control unit) into the moisture-proof junction box.

5. Push the cable gland required for the tank onto the cable of the pressure sensor; verify correct orientation.

5.4 Electrical connection

5.4.1 Connection diagram

1. Route the cable of the pressure sensor to the moisture-proof junction box.

2. Connect the two cables using the enclosed terminal strip.
   - Only connect wires with identical wire colours.
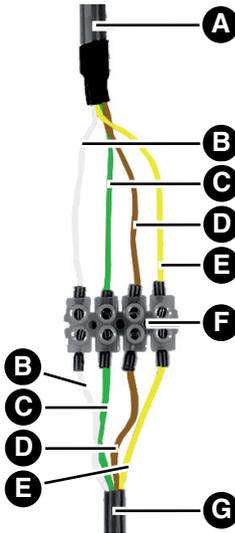
A. Cable from control unit

B. White (U+)

C. Green (signal)

D. Brown (U-)

E. Yellow/black (shield)

F. Terminal strip

G. Cable from pressure sensor

A transparent hose protrudes from the cable end of the pressure sensor. This hose provides the pressure sensor with the atmospheric pressure. Do not close or bend the hose. If the hose is closed or bent, this results in incorrect measurements.

1. Close the moisture-proof junction box in such a way that it is water-tight, but not completely air-tight.
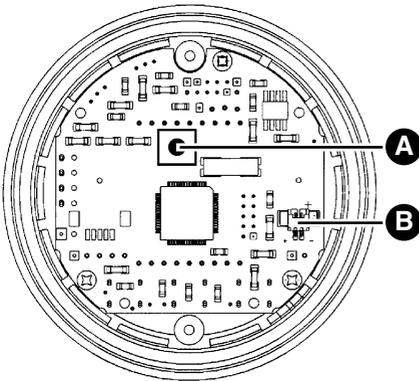
5.4.2   Inserting/connecting the battery

NOTICE

DAMAGE TO THE PRODUCT
- Do not short-circuit the lithium battery.
- Verify correct polarity when plugging the battery connector into the socket on the PCB in order to avoid a short circuit.

Failure to follow these instructions can result in equipment damage.

After the pressure sensor and the control unit have been electrically connected, open the housing of the control unit.

1. To do so, turn the upper part of the housing vis-à-vis the lower part all the way to the stop and then pull the upper part of the housing off of the lower part.

2. Press the mini pushbutton (A) and hold it down.

3. Plug the two-pole battery connector into the two-pole socket (B) on the PCB.
   - Verify correct polarity when plugging in the connector.

4. Release the mini pushbutton (A).

5.5   Zero calibration

1. Close the control unit by pressing the upper part of the housing onto the lower part of the housing.

The control unit was switched on when the battery was connected. The display toggles between "Zero" and the current offset of the pressure sensor (indication in hPa = mbar). The arrows on the display indicate that the control unit in calibration mode.

2. Press the two programming keys simultaneously to correct the offset to the value 0.00.
    - The pressure sensor must not be in the tank during zero calibration.
    - In this state, zero calibration can be performed any number of times.

3. Press the function key to terminate zero calibration.
    - An arrow pointing to the unit "Litres" is displayed at the bottom of the display.
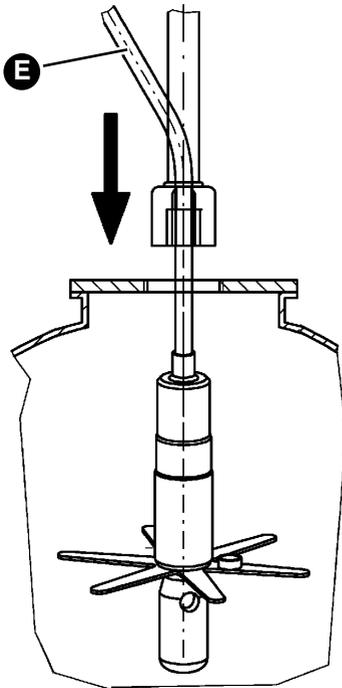
5.6   Mounting the pressure sensor

⇨ Zero calibration has been performed.
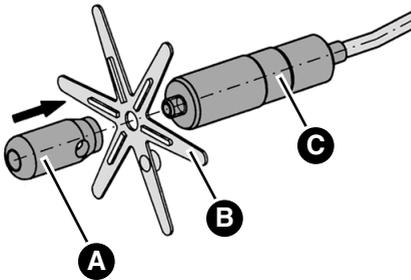
1. Plug the star (B) onto the pressure sensor (C). Note the position of the ribs at the star.

2. Use the spacer (A) to screw the star (B) to the pressure sensor (C).
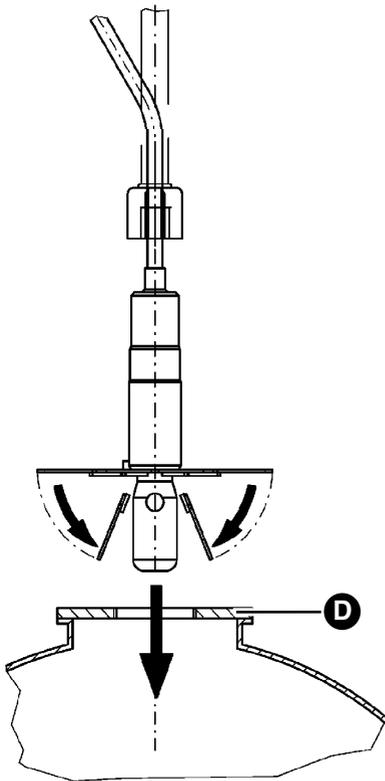
3. Bend the arms of the star over the spacer.

4. Push the pressure sensor from the top though the tank connection thread (D).
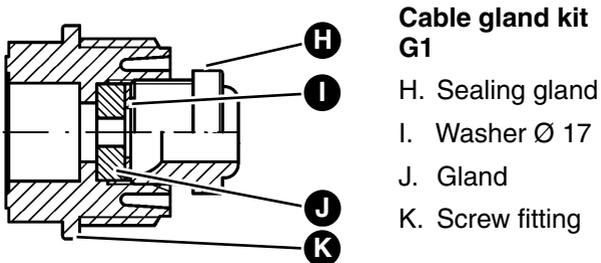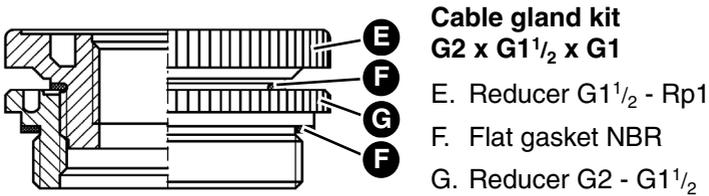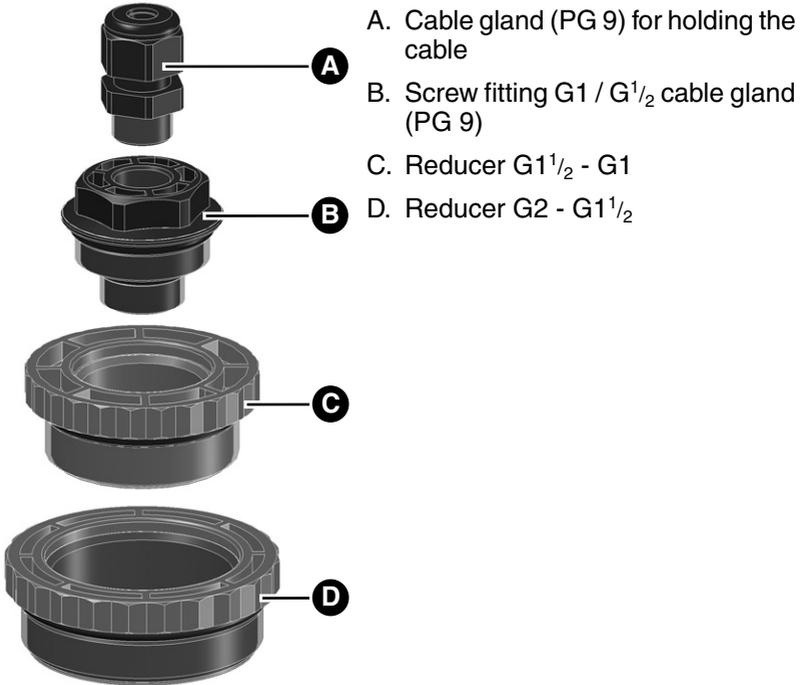
5. At the cable gland, adjust the cable length of the sensor cable in such a way that the tip of the pressure sensor reaches the tank bottom. The measuring hole of the pressure sensor must not be immersed in sludge that may be present at the tank bottom. Any liquid below the measuring hole of the pressure sensor is not detected by the pressure sensor.

6. Only fit the withdrawal hose (E) after you have inserted the pressure sensor.

7. Tighten the cable gland so that the cable can no longer be moved and that the connection is odour-tight.

5.7 Mounting with cable gland kit

Mounting to a free G1, G1$\frac{1}{2}$ or G2 threaded socket in the tank.

1. Route the cable of the pressure sensor trough the G1 cable gland. For mounting to the tank, use the appropriate parts of the cable gland kit required for your specific tank.

2. Determine the cable length as described above.

3. Tighten the cable gland so that the cable can no longer be moved and that the connection is odour-tight.

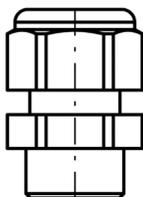A. Cable gland (PG 9) for holding the cable

B. Screw fitting G1 / G$1/_2$ cable gland (PG 9)

C. Reducer G$1^1/_2$ - G1

D. Reducer G2 - G$1^1/_2$

Cable gland kit G2 x G$1^1/_2$ x G1

E. Reducer G$1^1/_2$ - Rp1

F. Flat gasket NBR

G. Reducer G2 - G$1^1/_2$

Cable gland kit G1

H. Sealing gland

I. Washer Ø 17

J. Gland

K. Screw fitting

Cable gland (PG 9) with hex nut

5.8 Mounting with cable gland (PG 9)

NOTICE

DAMAGE TO THE PRODUCT AND THE FACILITY
- Only use existing tank connections to install the product.
- Do not drill directly into the tank, but only into existing mounting flanges, caps or blind connections.
- Verify that no foreign matter such as drilling chips can get into the tank during mounting.

Failure to follow these instructions can result in equipment damage.

Mounting to a mounting flange with union nut, in a screw cap or in a free blind connection.

1. Remove the mounting flange (B), the cap or the blind connection from the tank and drill a 15 mm hole.

2. Insert the enclosed cable gland (PG 9) (A) and fasten it with the enclosed nut.

3. Route the cable of the pressure sensor trough the cable gland (PG 9) (A) and tighten the cable gland so that the cable can no longer be moved and that the connection is odour-tight.

6 Commissioning

6.1 Entering the tank data

⇨ Zero calibration has been performed.

⇨ Pressure sensor has been installed.

6.1.1 Tank shape

⇨The arrow at the bottom of the display points to the unit *Litres*.

⇨The display shows the code of the selected tank shape. When the unit is commissioned for the first time, the displayed code is *0*. Code *0* means that no tank shape has yet been selected.

1. Use the two programming keys to set the code of the tank shape determined, see chapter "Tank shape".

2. Press the function key to confirm the setting. After that, you can enter the tank volume.

6.1.2 Tank volume

⇨The arrow at the bottom of the display points to the unit *m³*.

⇨The display shows the tank volume set. The value *0000* means that no tank volume has yet been entered.

1. Use the programming keys to enter the total volume of the tank facility determined. Press the programming key (arrow up) to select the digit to be changed. Then press the programming key (arrow down) to change the value of the selected digit.

2. Up to a value of 9999 litres, the value is entered in litres without a decimal place. In the case of volumes > 9999 litres, the value is entered in cubic metres (1000 litres = 1 cubic metre) with a decimal place. Use the programming key (arrow up) to move the decimal place.

3. Press the function key to confirm the setting. After that, you can enter the tank height.

6.1.3 Tank height

⇨The arrow at the bottom of the display points to the unit Percent. The display shows the tank height adjusted. The value *0000* means that no tank height has yet been entered.

1. Use the two programming keys to enter the determined tank height in *mm*. Press the programming key (arrow up) to select the digit to be changed. Then press the programming key (arrow down) to change the value of the selected digit.

2. Press the function key to confirm the setting. After that, you can enter the liquid level.

6.1.4 Current liquid level

⇨The arrow at the bottom of the display points to the unit Level (*FH*). The display shows level measured by the probe in mm.

The value shown on the display is based on the tank data you have already entered and on the measurement. Check whether the displayed value corresponds to the value you have determined in chapter "Determining the tank data" to a degree of accuracy that is sufficient for your purposes. If you want to obtain a higher accuracy, you can overwrite the displayed liquid level by the actual liquid level as determined by you.

The higher the filling level at the point in time the tank data is entered, the higher the accuracy. The highest accuracy is achieved if the tank is completely full when you enter the tank data. If the actual liquid level is less than 50 %, it is not meaningful to correct the displayed value. In such a case, you can re-enter the tank data when the tank is completely full, see chapter "Correcting the adjusted tank data".

1. Use the two programming keys to enter the determined liquid level in mm. Press the programming key (arrow up) to select the digit to be changed. Then press the programming key (arrow down) to change the value of the selected digit.

2. Press the function key to confirm the setting.

You have now entered all the tank data and the control unit switches to normal measurement mode.
- The symbol (both arrows) is no longer displayed in the top left corner of the display.

7   Operation

7.1   Switching the product on and off

1. Press the function key to switch on the display of the control unit.
   - The control unit automatically switches off approximately 2 $\frac{1}{2}$ minutes after the last time a key was pressed. The display shows *OFF*.

In this mode, the battery is not discharged. By pressing the function key, you switch on the control unit for another 2 $\frac{1}{2}$ minutes and the level is indicated.

7.2   Display formats

Keep pressing the function key to select one of the four available units for the level:

- Indication of volume in litres
  - The arrow at the bottom of the display points to *Litres*

- Indication of volume in m³
  - The arrow at the bottom of the display points to *m³*

- Indication of volume in % of total contents
  - The arrow at the bottom of the display points to *%*

- Indication of liquid level in mm
  - The arrow at the bottom of the display points to *FH*

7.3 Correcting the adjusted tank data

If the measured value exceeds the set tank data (for example, because the tank data entered is not correct), the display starts to flash. The display toggles between the displayed value and "----". Only the current level in mm is displayed permanently. In such a case, check and correct the tank data you have entered.

1. Simultaneously press and hold down the two programming keys for a period of three seconds to activate the "Enter Tank Data" mode.
   - The upper left corner of the display shows the symbol (two arrows).

2. Check and/or correct the tank data, see chapter "Determining the tank data".

3. If you do not want to change any of the tank data, press the function key four times to return to the normal measuring mode.
   - The symbol (two arrows) is no longer displayed in the top left corner of the display.

7.4 Zero calibration at a later point in time

⇨ The probe is not submerged in the liquid.

1. Unplug the battery connector from the PCB.

2. Connect the battery (see chapter "Electrical connection").
   - When connecting the battery connector, press the mini button to delete all tank data.

3. Perform zero calibration (see chapter "Zero calibration").

4. Enter the tank data (see chapter "Entering the tank data").

8 Maintenance

8.1 Maintenance intervals

When	Activity
The display shows the battery symbol	Replace the battery.

8.2 Maintenance activities

8.2.1 Replacing the battery

Stored tank data is not lost when the battery is replaced.

1. Remove the old battery and insert a new battery (see chapter "Inserting/connecting the battery").

2. Dispose of the battery in compliance with all applicable directives, standards and safety regulations.

9   Troubleshooting

Any malfunctions that cannot be removed by means of the measures described in this chapter may only be repaired by the manufacturer.

Problem	Possible reason	Repair
The display shows *OFF.*	Automatic switch off after 2 $^1/_2$ minutes	Press the function key to read the liquid level
The display shows the battery symbol	The battery voltage is below critical value	Replace the battery (see chapter "Inserting/ connecting the battery")
Display remains blank	The battery is not connected	Connect the battery (see chapter "Inserting/ connecting the battery")
	The battery connector is not connected to the PCB	Check the battery connector
The display toggles between value and "----"	Incorrect tank data entered	Correct the tank data (see chapter "Entering the tank data")
The displayed level is incorrect	Incorrect tank data entered	Correct the tank data (see chapter "Entering the tank data")
Display toggles between *9999* and "----"	Line interruption or probe not connected	Check the cable and the probe
Display shows *0* even though the level is higher	Short circuit in the connection cable between the pressure sensor and the control unit	Check the cable
Other malfunctions	-	Contact the AFRISO service hotline

10   Decommissioning, disposal

Dispose of the product in compliance with all applicable directives, standards and safety regulations.

Electronic components must not be disposed of together with the normal household waste.

1. Dismount the product (see chapter "Mounting", reverse sequence of steps).

2. Dispose of the product and of the battery separately.

11   Returning the device

Get in touch with us before returning your product.

12   Warranty

See our terms and conditions at www.afriso.com or your purchase contract for information on warranty.

13   Spare parts and accessories

NOTICE

DAMAGE DUE TO UNSUITABLE PARTS
- Only use genuine spare parts and accessories provided by the manufacturer.

Failure to follow these instructions can result in equipment damage.

Product

Product designation	**Part no.**	**Figure**
Digital tank contents indicator "DIT 10"	52150	

Spare parts and accessories

Product designation	**Part no.**	**Figure**
Spare battery	68309	-
Spare submersible probe (0/400 mbar)	52153	-
Outdoor junction box	31824	-
Cable gland kit + cable gland G1	52125	-