Mess-, Regel- und
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für Haustechnik,
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Operating Instructions

Digital Tank Contents Indicator
Type: DIT 01

DIT 01	Product No.: 52122
DIT 01-E	Product No.: 52123

☞ Read instructions before using device!

☞ Observe all safety information!

☞ Keep instructions for future use!

CE

Version: 05.2011 0
ID no.: 854.001.0335

Contents

1 About this 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 is 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 serious injuries.
WARNING	Possibly imminent danger! Failure to observe the information may result in death or serious injuries.
CAUTION	Dangerous situation! Failure to observe the information may result in minor or serious injuries as well as damage to property.

1.2 Explanation of symbols and typeface

Symbol	Meaning
☑	Prerequisite for an activity
▶	Activity consisting of a single step
1.	Activity consisting of several steps
↳	Result of an activity
•	Bulleted list
`Text`	Indication on a display
Highlighting	Highlighting

2 Safety

2.1 Intended use

The DIT 01 digital tank contents indicator is exclusively suitable for the measurement of filling levels in heating oil tanks with heights up to 3 metres.

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

2.2 Predictable incorrect application

The DIT 01 digital tank contents indicator must never be used in the following cases:

- Hazardous areas (ex)

2.3 Safe handling

The DIT 01 digital tank contents indicator represents state-of-the-art technology and is made according to the pertinent safety regulations. Each device is subjected to a function and safety test prior to shipping.

- ▶ Operate the DIT 01 digital tank contents indicator 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.
- ▶ The DIT 01 digital tank contents indicator is not a safety device. It does not replace the function of a limit value transducer at the heating oil tank.
- ▶ The DIT 01 digital tank contents indicator may only be installed in unpressurised heating oil tanks. A tank vent installed in accordance with the pertinent regulations as well as a limit value transducer are required.
- ▶ The cable entry point of the pressure sensor into the heating oil tank must be significantly higher than the maximum filling level and must be sealed with the enclosed screw connections in such a way that no oil vapours can escape and that the pressure sensor cannot move vertically
- ▶ The measured values displayed, especially the litre indication values, must not be used for billing purposes. The accuracy of the measured values displayed depends on the accuracy of the tank data determined and entered. Therefore, the manufacturer cannot guarantee the accuracy required for billing purposes.

Extreme environmental conditions have negative effects on the function of the product.

- ▶ Protect the DIT 01 from shocks.
- ▶ Only use the digital unit in rooms.
- ▶ Protect the digital unit from humidity.

2.4 Staff qualification

The product may only be mounted, commissioned, operated, maintained, shut down and disposed of by qualified, specially trained staff.

Electrical work may only be performed by trained electricians qualified in accordance with the local and national directives.

2.5 Modifications to the product

Changes or modifications made to the product by unauthorised persons may lead to incorrect readings 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 (refer to chapter 11, page 23).

2.7 Liability information

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

The manufacturer and 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 device, in particular in case of improper use of the device, misuse or malfunction of the connection, malfunction of the device or of connected devices. The manufacturer or the sales company shall not be liable for damages 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 DIT 01 digital tank contents indicator consists of an electronic pressure sensor and a microprocessor-controlled digital unit contained in a sturdy plastic housing. The measured values are shown on a 4-digit liquid crystal display (LCD). The function key F allows you to switch on the device and select the display modes litres, cubic

metres, percentage and filling level. The device is programmed via the two keys ▼▲. A lithium battery is contained in the housing of the digital unit. The battery is not connected when the device is shipped.

The free end of the cable is connected to the pressure sensor. The pressure sensor and the digital unit form one unit. The pressure sensor is placed in the tank from the top and is mounted either with a connection and sealed.

The pressure sensor includes a spacer so that the measuring hole of the pressure sensor remains above the oil sludge level.

Different screw connections are shipped with the pressure sensor which are used to mount the pressure sensor cable to the tank and seal it.

3.1 Design

Fig. 1: Digital unit

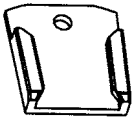
1. Display
2. Programming keys
3. PG screw connection
4. Cable
5. Function key

Fig. 2: Pressure sensor with spacer

1. Cable with vent tube
2. Pressure sensor
3. Star
4. Spacer

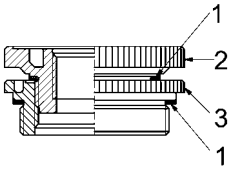
3.2 Scope of delivery

- Digital unit
- Pressure sensor with spacer
- Moisture-proof junction box
- Insulating screw joint, 4 poles
- Wall holder for DIT 01:



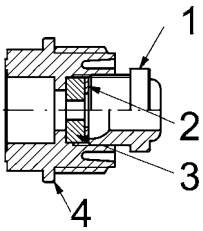
Screw connection DIT 01

- Connection set 2" x 1½" x 1":



1 Flat packing NBR
2 Adapter G1½ - Rp1
3 Adapter G2 - G1½

- Screw connection 1":



1 Gland
2 Washer Ø 17
3 Plug
4 Screw fitting

- Connection PG9 with hex nut:

Connection DIT 01-E

- Euroflex combination withdrawal fitting with 3.1 m suction tube, 2 O rings (6.5 x 1.5 mm) and pressure screw:

3.3 Function

The pressure sensor is located at the lowest point of the heating oil tank and transforms the hydrostatic pressure of the heating oil into an electrical signal. The measuring signal is transmitted to the digital unit via the cable. The electronic system of the digital unit uses this signal to calculate the tank contents, which it displays in litres, cubic metres, percentage or filling level. The display mode is selected by means of the F function key. The tank data is entered via the two programming keys.

4 Specifications

Table 1: Digital unit

Parameter	Value
General	
Dimensions (ø x L)	75 x 50 mm
Weight	380 g
Cable length	5 m
Housing material	PA6 15 % glass ball reinforced
Power supply	3,6 V lithium battery
Battery life	Max. 8 years (pressing the F key 1 x per month)
Display	4-digit LCD

Parameter	Value
Resolution	14 bit
Measuring input	0-3,6 V
Accuracy*	< ± 1,0 % FSO, IEC 60770
Operating temperature range	
Ambient	0 °C to +45 °C
Storage	-5 °C to +80 °C
Electrical safety	
Protection	IP 51 EN 60529
Electromagnetic compatibility (EMC)	
Noise suppression	According to EN 50081-1
Noise immunity	According to EN 50082-1

Table 2: Pressure sensor

Parameter	Wert
General	
Dimensions (ø x L)	25 x 107 mm
Weight	410 g
Cable length	5 m
Pressure range	0-300 mbar
Accuracy*	< ± 1,0 % FSO, IEC 60770
Temperature error	< ± 2 % FSO, 0-60 °C
Material	
Housing	Stainless steel 1.4305
Cable	Heating oil-resistant PVC
Spacer	POM, PE
Additional parts coming into contact with the medium	Ceramiks, silicon, silicone glue, Viton
Operating temperature range	
Medium	0 °C to +60 °C

Parameter	Wert
Storage	-5 °C to +80 °C
Electrical safety	
Protection	IP 68 EN 60529
Electromagnetic compatibility (EMC)	
Noise suppression	According to EN 50081-2
Noise immunity	According to EN 50082-2

Accuracy of complete system*: < ± 1,5% FSO, IEC 60770

* With reference to the filling level indication in mm.

4.1 Approvals, tests and conformities

The device meets complies with the European directive Electromagnetic compatibility (89/336/EEC and 92/31/EEC).

5 Transportation and storage

CAUTION **Damage to the device due to improper transportation.**

- ▶ Do not throw or drop the device.

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

- ▶ Protect the device against shock when storing it.
- ▶ Store device in a clean and dry environment.
- ▶ Store device only within the admissible temperature range.

6 Mounting and commissioning

6.1 Tank data determination

Before the DIT 01 tank contents indicator is installed, you must determine the appropriate tank data. Please document the tank data on this page for safety reasons and to allow for subsequent checks.

Tank shape

▶ Refer to the table below to find the appropriate code for the tank shape. If you want a linear indication, use the code 1.

Tank shape code	Tank shape	Description
1	Linear tank	Rectangular tanks, upright, cylinders, steel tanks welded in base ments, all other linear measuring applications.
2	Tubular tank	Vertical cylinder
3	Ball-shaped tank	Ball-shaped tank
4	Plastic battery tank	Plastic battery tanks with armouring or arches
5	Oval tank	Oval basement tanks, e.g glass-fibre reinforced tanksor steel sheet tanks
6	Plastic tank with recess	Plastic tanks with major recess major in the centre (manufacturers: e.g. Roth, Werit)

Determined tank shape code: _____

Tank volume

▶ Determine the total volume of the tank facility in litres.

Determined tank volume: _____ litres

Tank height (max. filling level)

▶ Determine the tank height in mm.

Determined tank height: _____ mm

Current filling level

▶ Determine the current filling level as exactly as possible in mm.

Determined filling level: _____ mm

6.2 Mounting the wall holder

▶ Use the enclosed screw (4 x 30 mm) and, if necessary, a dowel (6 mm) to mount the wall holder for the DIT 01 tank contents indicator at the desired location.

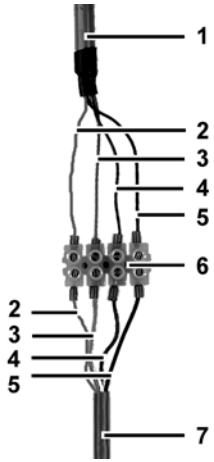
6.3 Mounting the junction box

The provided moisture-proof junction box is not suitable for exterior application.

1. For exterior application use the exterior junction box, refer to chapter 11, page 23.
2. Use the enclosed screws and, if necessary, dowels, to mount the junction box for connecting the pressure sensor cable and the cable of the digital unit at the desired location. Make sure to provide sufficient cable length. The digital unit must be able to be removed from the wall holder, e.g. if you need to replace the battery.
2. Place the digital unit into the wall holder and route the cable into the junction box.
3. Push the connection elements required for the tank connection (PG connection, screw connection or Euroflex) onto the pressure sensor cable in the correct sequence and orientation.

6.4 Cable connection

1. Route the cable of the pressure sensor to the junction box and connect the two cables by means of the insulating screw joint. Make sure to connect the wires of the same colour, respectively.



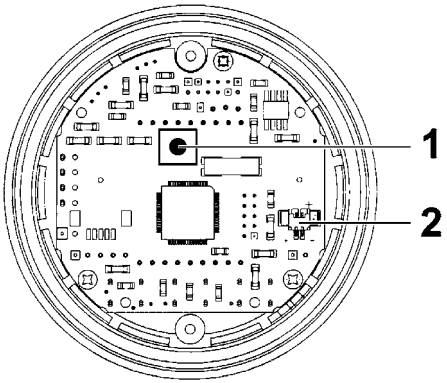
1 Digital unit
2 White (U+)
3 Green (signal)
4 Brown (U-)
5 Yellow/black (screen)
6 Insulating screw joints
7 Pressure sensor

Fig. 3: Cable connection

4. A transparent tube can be seen at the cable end of the pressure sensor. This tube provides the pressure sensor with atmospheric pressure. Make sure not to close or bend this tube in order to avoid incorrect measurements.
   The junction box must be closed in such a way that it is watertight but not completely airtight.

6.5 Connecting the battery

1. After you have electrically connected the pressure sensor and the digital unit, open the housing of the digital unit by turning the upper part of the housing all the way to the stop and pulling it up.
5. Press the miniature button (1) and keep holding it down. Plug the 2-pole battery plug into the 2-pole socket (2) on the printed circuit board.



1 Miniature button

2 2-pole socket

Fig. 4: Printed circuit board

WARNING **Danger of explosion in case of short circuit of the lithium battery.**

▶ Do not short-circuit the lithium battery.

6. Release the miniature button.

6.6 Zero balancing

1. Close the housing of the digital unit by pushing the two housing parts together.

Since the battery was connected, the digital unit was switched on. The display switches between "Zero" and the current offset of the pressure sensor (indication in hPa = mbar). The top left corner of the

display shows the arrows ▼▲ to indicate that you are in calibration mode.

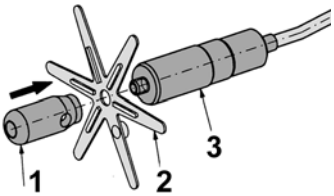
7. Press the keys ▼ and ▲ simultaneously to correct the offset to the value 0.00.
   When you do this, the **pressure sensor must not be in the tank**.
   In this state, you can zero the system any number of times.
8. Press the F key in order to exit the zero balancing mode.

↳ An arrow is shown at the bottom of the display pointing to the unit Litres.

6.7 Mounting the pressure sensor

☑ The unit is zeroed.

1. Plug the star onto the sensor, observe the position of the fins at the star.
9. Screw the star to the probe by means og the spacer.



1 Spacer
2 Star
3 Pressure sensor

Fig. 5: Mounting the pressure sensor

10. Bend the arms of the star to the front.
11. Push the probe through the tank connection thread.

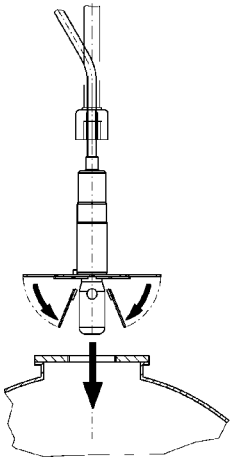


Fig. 6: Pushing the probe in the tank

12. Move the cable in the connection until the probe tip just reaches the tank bottom. The measuring hole of the pressure sensor must not be immersed in the oil sludge. The oil volume below the level of the measuring hole is not detected by the pressure sensor.
13. Insert the withdrawal hose after you have inserted the pressure sensor.

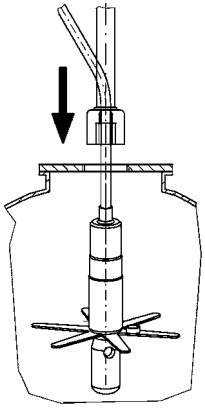


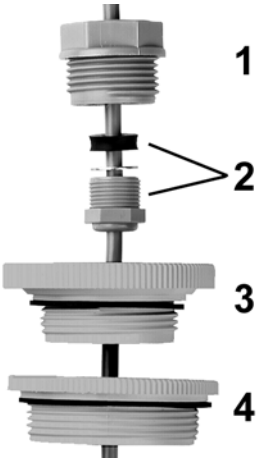
Fig. 7: Inserting the withdrawal hose

14. Seal the connection in the tank cover to make the connection smell-tight and tighten the connection to prevent the cable from moving.

Mounting with screw connection

Using a free 1", 1½" or 2" connection in the tank:

1. Insert the cable of the pressure sensor into the 1" screw connection and use parts of the 2“ x 1½“ x 1 “ screw connection set to seal it in the tank.



1 1“ thread
2 Connections elements to fixate the cable
3 1½“ thread
4 2“ thread

Fig. 8: Mounting with screw connection

15. Determine the required cable length as described above.
16. Then tighten the screw connection in such a way that the cable can no longer move and that the connection is smell-tight.

Mounting with PG 9 connection

In an installation flange with union nut, in a screw cap or in a free blind connection:

1. Remove the installation flange, the screw cap or the blind connection and drill a 15 mm hole.
   Never drill directly into the tank.
   When drilling, make sure that chips do not fall into the tank.

1 PG 9 connection
2 Installation flange

Fig. 9: Mounting with PG 9 connection

17. Insert the enclosed PG9 connection and fasten it with the enclosed nut.

18. Insert the cable of the pressure sensor into the PG connection, determine the required length as described above and fixate it in a smell-tight way.

Mounting with Euroflex

1. Lower the pressure sensor into the tank.
19. Determine the required cable length as described above.
20. Tightly screw the black plastic screw (pressure screw) into the body of the Euroflex fitting. This applies pressure to the two O rings between the cable and the body of the Euroflex fitting, fixates the cable and assures a pressure-tight connection.

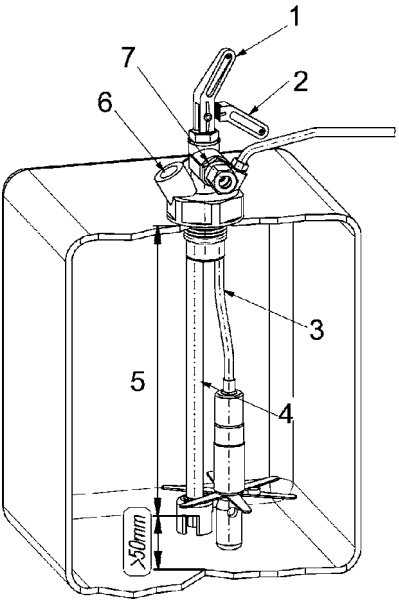


Fig. 10: Mounting with Euroflex

1 Valve open

2 Valve closed

3 Measuring tube for el. hydrostatic level measurement

4 Suction tube

5 Tube or probe length

6 Return connection G 3/8 IG

7 Suction connection G 3/8 IG

6.8 Entering the tank data

☑ The unit is zeroed.

☑ The pressure sensor is installed in the tank.

Tank shape

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

☑ The display shows the tank shape code of the currently selected tank shape. When the unit is commissioned for the first time, the

display show the tank shape code 0. The 0 indicates that no tank shape code has yet been selected.

1. Use the ▼ and ▲ keys to set the previously determined tank shape code (see chapter 6.1, page 12).
21. Press the F key to confirm the tank shape setting and continue with the tank volume data.

Tank volume

☑ The arrow at the bottom of the display points to the unit m^3.

☑ The display shows the currently selected tank volume. If the display shows 0000 this means that no tank volume has yet been entered.

1. Use the ▼ and ▲ keys to set the previously determined total volume of the tank facility. Press ▲ to select the digit to be modified. Press ▼ to change the selected digit in the range from 0 to 9 Volumes of up to 9999 litres are entered without a comma digit.
2. Volumes greater than 9999 litres are entered as cubic- metres (1000 litres = 1 cubicmetre) with a comma digit. Press ▲ to move the comma digit.
3. Press the F key to confirm the volume setting and continue with the tank height data.

Tank height

☑ The arrow at the bottom of the display points to the unit Percentage. The display shows the currently selected tank height. If the display shows 0000 this means that no tank height has yet been entered.

1. Use the ▼ and ▲ keys to set the previously determined tank height. Press ▲ to select the digit to be modified. Press ▼ to change the selected digit in the range from 0 to 9.
2. Press the F key to confirm the volume setting and continue with the current filling level data.

Current filling level

☑ The arrow at the bottom of the display points to the unit Filling Level (FH). The display shows the filling level currently measured by the probe.

If you measure heating oil, the reading should be pretty close to the actual filling level. If you need a greater accuracy, enter the previously determined filling level. Please note: the fuller the heating oil tank, the greater the accuracy. The maximum accuracy is obtained if

the tank is completely full. At levels of less than 50 %, a correction of the value indicated is not meaningful. In order to correct the current filling level, you can overwrite the displayed value.

1. Use the ▼ and ▲ keys to set the previously determined filling level. Press ▲ to select the digit to be modified. Press ▼ to change the selected digit in the range from 0 to 9.
2. Press the F key to confirm the filling level setting.

↳ All required tank data are entered and the digital unit switches to normal measuring mode.

↳ The ▼▲ symbol in the top left corner of the display is no longer shown.

7 Operation

7.1 Switching on and off

▶ Press the F key to switch on the display of the digital unit. The digital unit is automatically switched off approx. 2.5 minutes after you press a key.

↳ The display shows OFF.

In this mode, the battery is not used. By pressing the F key again, you reactivate the tank contents indicator for another 2.5 minutes and the current filling level is displayed.

7.2 Display formats

▶ Press the F key several times to select one of the four display formats for the filling level:

- Displaying the volume in litres.
  The arrow at the bottom of the display points to litres.
- Displaying the volume in m³.
  The arrow at the bottom of the display points to m³.
- Displaying the volume in percent of the total contents.
  The arrow at the bottom of the display points to %.
- Displaying the filling level in mm.
  The arrow at the bottom of the display points to FH.

7.3 Correct tank data

If the measured value exceeds the tank entered data (e.g. because you entered incorrect tank data), the display will blink. The display will toggle between the indicated value and “----“. Only the current filling height in mm will be displayed permanently.

▶ Hold down the ▼ and ▲ keys simultaneously for three seconds to activate the "Enter tank data" mode.

↳ The top left corner of the display shows the ▼▲ symbol.

Now you can either check or correct the tank data. If you do not want to change the tank data, press the F key four times in order to return to the normal measuring mode.

↳ The ▼▲ symbol in the top left corner of the display disappears.

7.4 Subsequent zero balancing

☑ The probe is **not** immersed in heating oil.

1. Disconnect the battery plug from the printed circuit board.
22. Connect the battery as described in chapter 6.5, page 14.

↳ By pressing the miniature button when connecting the battery plug, you clear all adjusted tank data.

23. Zero the system as described in chapter 6.6, page 14.
24. Enter the tank data as described in chapter 6.8, page 18.

8 Maintenance

8.1 Maintenance times

When	Activity
appears on the display.	▶ Replace the battery, refer to chapter 8.2, page 21.

8.2 Replacing the battery

1. Remove the old battery and connect a new battery (refer to chapter 6.1, page 12).

25. Batteries may **not** be disposed together with unsorted household waste. Return empty batteries to a collection point or to your dealer for environmentally compatible disposal.

The stored tank data are not lost.

9 Troubleshooting

Repair work may only be performed by qualified, specially trained staff.

Table 3: Troubleshooting

Problem	Possible reason	Repair
„**OFF**“appears on the display.	The device switched off automatically after 2.5 minutes.	▶ Briefly press the F key to display the current filling level reading.

Problem	Possible reason	Repair
appears on the display.	Battery voltage below critical value.	▶ Replace the battery (refer to chapter 8.2, page 21).
Display does not display anything.	Battery is empty.	▶ Connect the battery (refer to chapter 6.5, page 14).
	The battery plug is not properly connected with the printed circuit board.	▶ Check the battery plug.
The display toggles between the indicated value and "**----**".	Incorrect tank data.	▶ Check the tank data (refer to chapter 7.3, page 20).
The filling level indicated differs from the real filling level.		
Display keeps switching between "**9999**" and "**----**".	Cable break or probe is not connected.	▶ Check cable and probe.
The unit displays a "**0**" even if the actual filling level is different.	Short circuit in the connection cable between the pressure sensor and the digital unit.	▶ Check the connection cable.
Other malfunctions.	–	▶ Send the device to the manufacturer.

10 Shutting down and disposal

1. Dismount the device (see chapter 0, page 12, reverse sequence of steps).

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

This device 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 dispose of it or to return it.

11 Spare parts and accessories

Part	Part No.
Digital unit	695 000 0001
3.6 V lithium battery for DIT 01	68309
Wall holder for DIT 01	00 24 000111
Pressure sensor 0-300 mbar	52131
Moisture-proof junction box	639 000 0004
Exterior junction box	31824
Insulating screw joint, 4 poles	690 000 0009
PG9 connection	685 000 0044
Star	11 67 040010
Spacer	11 67 040011
Screw connection 1“	16 00 02 10
Screw connection set 2“ – 1½“ – 1“	10 03 12 01
Screw connection + Screw connection set 1“	52125

12 Warranty

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

13 Copyright

14 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.

15 Adresses

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