SmartBox 1 / SmartBox 2 / SmartBox 3

Electronic remote level gauge for non-pressurized tanks with liquid operating medium

SmartBox 1

SmartBox 2

SmartBox 3

CONTENTS

ABOUT THE MANUAL

- This manual is part of the product.
- This manual must be observed and handed over to the operator to ensure that the component operates as intended and to comply with the warranty terms.
- Keep it in a safe place while you are using the product.
- In addition to this manual, please also observe national regulations, laws and installation guidelines.

This assembly and operating manual is aimed at users and operators of this product. These persons must have read and understood the assembly and operating manual. ⚠ The physical and psychical requirements for proper and safe handling of the product must be ensured at all times!

GENERAL PRODUCT INFORMATION

The electronic tank management system **SmartBox 1, 2 and 3** can be used for monitoring of the liquids contained in unpressurized liquids tanks.
In addition to the registration of tank content, other functions can be implemented by system enhancements, e. g. temperature measurement, data telecommunication, system fault or connection to master control systems of the building.

SmartBox 1, 2 and 3 has a 2-line LCD display and a measuring input for connecting the probe.

The **SmartBox 2** has additional 2 programmable relay control functions with make and break switching output, e. g. for activating external alarm devices, solenoid valves, or the dry-run protection function of pumps.

The **SmartBox 3** has a programmable relay control functions with make and break switching output and an audible alarm for minimum or maximum level indication. When the acoustic alarm sounds, it can be switched off by pressing the 'Quit' key.
Because of its modular design, the system can be modified to suit many different applications.
The indicated measurements are not calibrated for invoicing.
By default, the measuring probe can be installed with tank connecting threads G1, G1 1/2 or G2.

SAFETY ADVICE

Your safety and the safety of others are very important to us. We have provided many important safety messages in this assembly and operating manual.

✓ Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others. All safety messages will follow the safety alert symbol and either the word "DANGER", "WARNING", or "CAUTION". These words mean:

⚠DANGER
describes a **personal hazard** with a **high degree of risk**.
➜ May result in **death or serious injury**.

⚠WARNING
describes a **personal hazard** with a **medium degree of risk**.
➜ May result in **death or serious injury**.

⚠CAUTION
describes a **personal hazard** with a **low degree of risk**.
➜ May result in **minor or moderate injury**.

NOTICE describes **material damage**.
➜ Has an **effect** on ongoing operation.

ⓘ describes a piece of information ✓ describes a call to action

INTENDED USE

NOTICE Operating media with consideration of the otherwise suitable probe type and accessories, see:

ⓘ Please comply with the "Level gauge type FSA-W 4-20 mA for SmartBox 1 – 4" assembly and operating manual!

Comply with the “Level probe” assembly and operating manual!

⚠WARNING Escaping, liquid operating media:

- are hazardous to the aquatic environment
- are inflammable category 1, 2 or 3 liquids
- can ignite and cause burning
- can cause injury through people falling or slipping

✓ Capture operating media during maintenance work.

You will find a **list of operating media** with descriptions, the relevant standards and the country in which they are used in the Internet at **www.gok.de/liste-der-betriebsmedien.**

Installation location

⚠DANGER May not be used in potentially explosive areas.

Can cause an explosion or serious injuries.

✓ Must be installed by a specialised company in accordance with local industrial health and safety regulations.

✓ Installation outside the defined EX protection zone.

- **SmartBox 1, 2** ➜ IP54; **SmartBox 3** ➜ IP30
- with protection type IP54, indoors and outdoors, if protected against the weather
- with type of protection IP30, in protected and dry rooms

NOTICE Malfunctions caused by flooding!

The product is not designed for installation in areas prone to flooding or risk areas.

✓ Following flooding, the product must be replaced!

INAPPROPRIATE USE

All uses exceeding the concept of intended use:

Display unit:

- weather-protected outdoor use without protection type IP54
- changes to the product or parts of the product
- installation in a potentially explosive area

Probe:

- e.g. operation with different operating media
- operation with inflammable operating media of categories 1, 2 or 3 with a flash point ≤ 55°C[1)]
- installation in pressurised tanks and containers

[1)] It is also necessary to comply with the divergent provisions/regulations of the EU member states concerning areas at risk of explosion and the flash point of the operating medium!

USER QUALIFICATION

This product may be installed only by qualified experts. These are personnel who are familiar with setting up, installing, starting up, operating and maintaining this product. Equipment and systems requiring supervision may be operated only by persons aged at least 18, who are physically capable and who have the necessary specialist knowledge or who have been instructed by a competent person. Instruction at regular intervals, but at least once per year, is recommended.

Activity	Qualification
storing, transporting, unpacking, OPERATION	trained personnel
ASSEMBLY, START-UP, PROGRAMMING, MAINTENANCE, FUNCTION CHECK, DISPOSAL, TROUBLESHOOTING, RESTORATION,	qualified personnel, customer service
ELECTRICAL INSTALLATION	qualified electrician

ASSEMBLY

Before assembly, check that the product is complete and has not suffered any damage during transport.

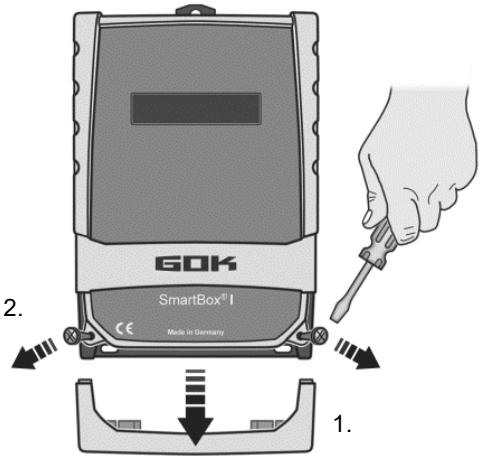
ASSEMBLY must be carried out by a specialised company.

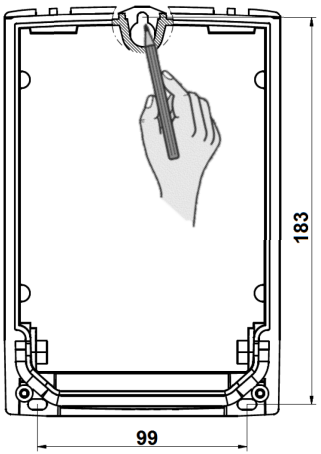
The specialised company and the operator must observe, comply with and understand all of the following instructions in this assembly and operating manual. For the system to function as intended, it must be installed professionally in compliance with the technical rules applicable to the planning, construction and operation of the entire system.

These regulations also include the accident prevention regulations of the employers' liability insurance associations, the VDE regulations, and the installation and operating instructions.

NOTICE The housing of the display unit is suitable for wall mounting and is connected to the 230 V mains supply. Under normal circumstances, the display unit must be operated with the housing cover closed.

⚠ It is installed and started up by a qualified technician while the unit is open.





Installation of the display unit: Mount the display unit to the wall in a suitable position.

1. Open the display unit by removing the bottom cover.
2. After loosening the 2 screws, open the display unit by removing the cover.
3. Mount the display unit to a smooth vertical wall by means of dowels. Mount the housing of the display unit by the four fixing holes with the enclosed screws and anchors. Take care not to damage the housing.
4. After connecting the terminals and setting the unit up, replace the covers.

Installing the level probe

See assembly and operating instruction "Level probe".

Installing the probe

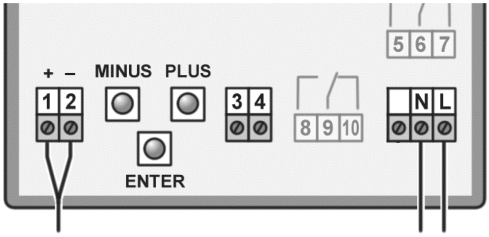
See assembly and operating instruction
„FSA-W 4-20 mA level gauge for SmartBox 1 – 4“.

ELECTRICAL INSTALLATION see corresponding instruction
„FSA-W 4-20 mA level gauge for SmartBox 1 – 4“.

⚠DANGER May not be used in potentially explosive areas.
Can cause an explosion or serious injuries.
- ✓ Must be installed by a specialised company in accordance with local industrial health and safety regulations.
- ✓ Installation outside the defined EX protection zone.

Product name	Usage information	Order no.
Level probe 0 up to 250 mbar Accuracy class 1%	for non-pressurized tanks with liquid operating medium	28 801 00
Level probe 0 up to 250 mbar Accuracy class 0.5%	for non-pressurized storage tanks with liquid operating medium	28 891 10
Mechanical level gauge type FSA-W 4-20 mA Measuring accuracy: ± 3%	for non-pressurized tanks with liquid operating medium, measurement range: 0 to 2.40 m tank height	28 903 00

ELECTRICAL INSTALLATION



Connection of supply voltage:
Voltage: 230 V AC 50 Hz
Connection: Terminals **N** + **L** to the display unit (cable not included in the delivery)

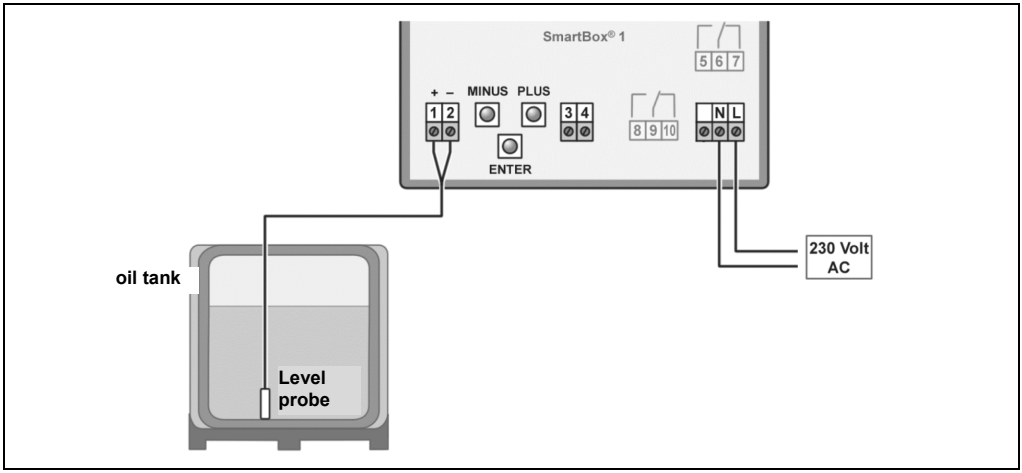
Connection line between display unit and level probe

Voltage	Probe supply 20 V DC			
Connection	Level probe connection cable	**+**	**–**	
SmartBox	Level probe - terminals	1	2	➜ Tank 1

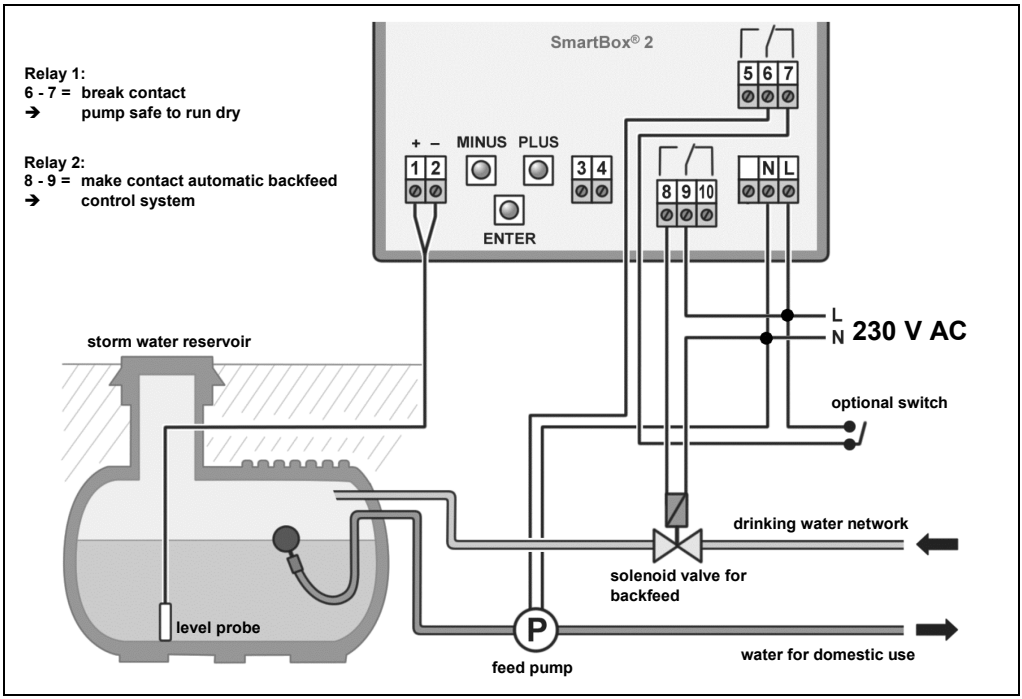
⚠WARNING Do not use this device for safety applications or emergency stop mechanisms or misuse it!
Injuries and damage to health and property through misuse.
- ✓ You must observe the information contained in these instructions, especially regarding installation, start-up and maintenance.

⚠DANGER Damaged or destroyed insulation!
Can result in short circuit or electric shock.
- ✓ Do not use the device if the insulation is damaged!
- ✓ Have new insulation installed by a specialised company!

Fuel oil tank - wiring example SmartBox 1



Rain water reservoir - wiring example SmartBox 2



CAUTION The functions and operating safety of the device are guaranteed only under the climatic conditions that are specified in TECHNICAL DATA. If the device is transported from a cold to a warm environment, condensation may cause the device to malfunction or may even destroy the device. Because of this, you must ensure that the device has acclimatised to the ambient temperature before using it.

⚠CAUTION If you have any doubts that the device can be operated safely, do not operate it. Your safety may be adversely affected by the device, if for example:

- it is obviously damaged
- it no longer works as specified
- it has been stored in unsuitable conditions for some time, if in doubt, send the device to the manufacturer for repair or maintenance

Connection of the relay contacts at the indicator SmartBox 2 und SmartBox 3

The indicator SmartBox 2 has two relay contact pairs (SmartBox 3 ➞ one relay) for the connection of external control circuits or for activating external alarm or signal devices. In case of failure of the unit and if the fill level (or optionally the temperature) is above / below the selected limit, the contacts of relay terminals **6 + 7** and **9 + 10** are closed. Contacts of relay terminals **5 + 6** and **8 + 9** are open - see the legend on the PCB in the unit.

⚠CAUTION

Switching voltage: max. 250 V AC
Switching current : max.I 3.5 A

⚠WARNING Excess voltage!

Damage to components and device defect.

✓ No 230 V AC connections may be made to terminals **3** + **4** or probe input terminals **1** + **2**!

⚠WARNING Activating power supply:

Keep away from the area of the 230 V terminal!

Connection	normally open (NO)	normally closed (NC)	only SmartBox
Relay 1	terminals **5 + 6**	terminals **6 + 7**	2
Relay 2	terminals **8 + 9**	terminals **9 + 10**	2 + 3

Connection of interface to SmartBox 4, SmartBox 5

The measured values can be transmitted to the SmartBox 4, SmartBox 5 set via the integrated interface “SERIAL LINK OUTPUT” (terminals **3 + 4)**.

START-UP

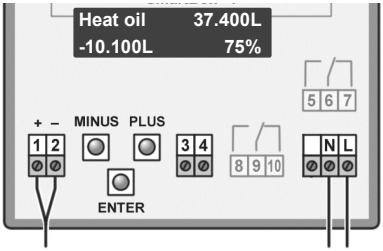
Operation elements and display

After the level indicator has been installed, it can be started up. The device is adjusted once when it is put into operation. After start-up the device operates in display mode with the top closed.

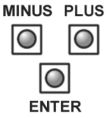
The display is a two-line LCD display with 2 x 16 characters.

The display has blue background lighting for best readability in all lighting conditions.

SmartBox 1, 2 and 3 has the following display:



The device is adjusted via the three small blue buttons:



These are located on the motherboard between the terminals.

Select the language (German, English, French or Spanish) in menu step 18.Language.

PROGRAMMING

⚠WARNING Overfilling of the tank due to incorrect entry values.
Operating media may leak. These:
- are hazardous to water,
- are category 1,2 and 3 inflammable liquids,
- can ignite and cause burning,
- may cause falling injuries due to slipping.

✓ Enter these values with care!

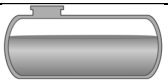
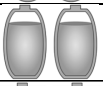
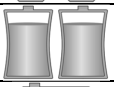
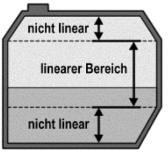
The entry values are also retained in the event of the failure of the supply voltage.

Before PROGRAMMING, you need to ascertain the tank data and enter the values into the right column input value of the following table. Then, enter the values for the individual entry steps.

Setting a parameter:	Press [ENTER] to open setup mode. Select the desired setting parameter via [PLUS]. Press [ENTER] to call up the value selection for the parameter. Set the value with [MINUS]/[PLUS], press [ENTER] to save.
Quitting the setup mode:	You can quit the setup mode at any time. Select “Exit“ and press [ENTER] ➜ to go back to the standard display mode.

Menu	**Input function**			**Input value**
0.Exit	Press [ENTER] to return to display mode			
1.Probe	Select probe measuring range **see type label of the probe** - **default setting** 250 mbar			**_____mbar**
	Standard probe	**max. tank height for**		
		fuel oil	**water**	
	100mbar	1.20 m	1.00 m	
	150mbar	1.80 m	1.50 m	
	160mbar	1.90 m	1.60 m	
	200mbar	2.40 m	2.00 m	
	250mbar	2.90 m	2.50 m	
	400mbar	4.70 m	4.00 m	
	500mbar	6.00 m	5.00 m	
	1.000mbar	12.00 m	10.00 m	
	2.000mbar	24.00 m	20.00 m	
	3.000mbar	36.00 m	30.00 m	
	5.000mbar	60.00 m	50.00 m	
	set mbar			

Menu	Input function		Input value
2.Liquid	Select the **medium**		_____kg/m³
	Medium	**Density value kg/m³ (15 °C)**	If the density of the stored medium is unknown, the reference height can be entered in menu item “10.Trim height”
	Fuel oil	845 kg/m³ - **default setting**	
	Water	999 kg/m³	
	Diesel	830 kg/m³	
	Biodiesel	880 kg/m³	
	RME, FAME	880 kg/m³	
	Rape oil	915 kg/m³	
	Palm oil	910 kg/m³	
	Motor oil	865 kg/m³	
	AdBlue	1090 kg/m³	
	Premium petrol	750 kg/m³	
	Premium E10	750 kg/m³	
	Density value	Enter a special density value	

Menu	Input function	Input value
3.Tank shape	Select Tank shape with [Enter]	
Linear	**Default setting** linear tank, rectangular tanks, vertical cylinders, basement-welded steel tanks.	
Cylinder horizontal	**cylindrical** tank with arched ends horizontal tanks, tubular tanks typical shape for steel outdoor or buried tanks.	
Ball-shaped	**spherical** tank; buried tanks with spherical basic shape; frequently plastic buried tank (GRP).	
Oval	**oval** basement tanks; typical shape of GRP tanks and single-walled sheet metal tanks.	
Convex	Plastic battery tanks, **convex,** slightly convex shape, alternative to linear.	
Concave	Plastic battery tanks, **concave,** slightly concave shape, alternative to linear.	
Holed plastic	Plastic tank with recess, plastic tank with a large recess (hollow) in the center (without tape bindings).	
Tube w. flat ends	**Lying cylindrical** tank with flat ends, tube segment with straight end plates. Typical tank shape for smaller diesel tanks.	
Metal oil tanks	**Plate tank or plate tank battery** linear side walls, with semicircular arc top and bottom.	
Bearing chart	Enter a special tank shape from existing bearing chart. For this purpose, up to 16 value pairs (height in cm + volume in L) can be entered. Before the value pairs are entered, the values for the tank volumes **must** be entered in in steps "4.Tank volume" and "5. Internal tank height".	

Index: 0 ➜ 0 cm ➜ 0 L ➜ Index: 1 ➜ xxx.x cm ➜ xxxx L Index: 2 ➜ . cm ➜ L Index: 3 ➜ . cm ➜ L max. ➜ Index:16➜ max. cm ➜ max. L	Specified value pair (do not have to be entered). first value pair entered max. inside height of tank ➜ the max. tank volume menu step “5.Internal tank height” is allocated automatically and does not have to be entered.

Not all 15 intermediate value pairs (Index: 1 - 15) have to be entered.
A linear interpolation is made between 2 interpolation values. For a linear range of the tank geometry it is sufficient to enter a lower and an upper value pair.

Menu	Input function	Input value
4.Tank volume	Adjust the tank volume with [+] / [-] (100%). The default setting is 0 L. The value must be set. ⚠ Please see a volume table for the highest value, if available. For a 100 m³ cyl. buried tank, this may for example be the value 100600 litres.	**_____L**
5.Tank height	Enter inner tank height in millimetres: e. g.: 249 cm (max. value = 999,9 cm) (height without dome) ⚠ Please see a volume table for the highest value, if available. For a 100 m³ cyl. buried tank, this may for example be the value 288 cm.	**_____mm**
5b.Filling limit	Set the filling limit of the tank with [+]/ [-]: With fuel oil tanks, that is the shut-off point of the limit indicator. The default setting is 95% e.g. 95%=237cm. For tanks which can be filled to the very top (e.g. water tanks), it is necessary to set the highest value of 99%.	**_____%**
6.View Tank	In the 1st line of the display, the tank name/medium and contents are displayed (e.g. in litres). The display in the 2nd line can be selected: View details e.g. Single/detailed: Fillspace+Percent a) / Fillspace+Level b) / Percent+Level c) For fuel oil tanks in Germany, a free capacity display is required according to TRwS 791. This is possible with selection a) and b).	_____

ⓘ Steps 7 is only required for SmartBox 2 and SmartBox 3

⚠WARNING Entering incorrect switching points and mixing up the switch-on and shut-off point can lead to the overfilling of the tank or the dry running of a pump!

Menu	Input function	Input value
7.Relay 2 SmartBox 2 or 7.Relay SmartBox 3	See 7. Relay 1 for the data for Relay 2 (or Relays)	**on _____%** **off _____%** **on _____°C** **off _____°C**

Menu	Input function		Input value
7.Relay ➜7.Relay 1 SmartBox 2 or 7.Beeper Acoustic alarm SmartBox 3	Switch function of relay 1 or beeper (acoustic alarm):		
	Deactive	The relay does not switch	
	Active	The relay switches	
	Example of switch point setting for Active (with hysteresis): Enter switching points as % values from 01-99 (and/or enter as °C value from -99 to +99 only for probe **with temperature measurement**) Deactive ➜ activate with [+] / [-] to Active ➜ press Enter to confirm ➜ Switch-on 10% ➜ set with [+] / [-] ➜ [Enter] Switch-off 12% ➜ set with [+] / [-] ➜ [Enter] Switch-on +0°C ➜ set with [+] / [-] ➜ [Enter] Switch-off +0°C ➜ set with [+] / [-] ➜ [Enter] **Deactivate** the relay or beeperr via Deactive or input of 0% or 0°C (for Switch-on and -off).		**on _____%** **off _____%** **on _____°C** **off _____°C**
8.Exit	Press [Enter] to return to display mode		

After performing entry steps 1 - 7, the programming process is completed. After confirmation of step “8.Exit“, the device automatically returns to default display mode; the current tank content is shown in the display.
Special functions are available under entry steps 9 to 24.
After the end of setup, do not forget to replace the housing cover!
After completing the ASSEMBLY and PROGRAMMING, carrying out a function check is recommended (FUNCTION CHECK section).

EXAMPLES FOR PROGRAMMING

Example 1: Basement tank for 6000 litres heating oil, litre indication, linear steel tank
Inner height 165cm, (fill level 125cm)
SmartBox 1 Standard probe 0 - 250mbar

Step	Entries / selection
1.Measure probe	250mbar
2.Liquid	Heat oil
3.Tank shape	Linear
4.Tank volume	6000L (set with [+] / [-] keys)
5.Filling limit	165.0cm (set with [+] / [-] keys)
5b.Filling limit	95%=157cm (set with [+] / [-] keys)
6.View ➜ View details	Fillspace+Percnt display 2. line - (set with [+] / [-] keys)
7.Exit ➜ press [Enter] to see the indication	Heat oil 4.550L -1.150L 76%

Example 2: Well, 7.50m maximum water level from ground of the well, Display m
(fill level 4.20m)
SmartBox 2 Probe 0 - 1000mbar, indication in m water column
Relay 1 has to protect the pump against running dry (switch off)
Relay 1- on at 11% - off at < 10%

Step	Entries / selection
1.Measure probe	1000mbar (set with [+] / [-] keys)
2.Liquid	Water (set with [+] / [-] keys)
3.Tank shape	Linear
4.Tank volume	7500L (set with [+] / [-] keys)
5.Tank height	750cm (set with [+] / [-] keys)
5b.Filling limit	99%=743cm (set with [+] / [-] keys)
6.View ➜ View details	Percent+Level display 2. line - (set with [+] / [-] keys)
7.Relay 1	Active ➜ Switch-on: 11% ➜ Switch-off: 10% (set with [+] / [-] keys)
7.Relay 2	Deactive
8.Exit ➜ press [Enter] to see the indication	Water 4.200L 56% 420cm

Example 3: Buried tank, cylindrical, horizontal, for 100600 litres diesel oil
Inner height 288.6cm, (fill level 54cm)
SmartBox 3 Standard probe 0 - 250mbar
Limit value message on the device at minimum level <25%
Acoustic alarm - on at <25% - off at >27%

Step	Entries / selection
1.Measure probe	250mbar (set with [+] / [-] keys)
2.Liquid	Diesel (set with [+] / [-] keys)
3.Tank shape	Cyl. horizontal (set with [+] / [-] keys)
4.Tank volume	100.600L (exact value from volume table set with [+] / [-] keys)
5.Tank height	288.6cm (exact value from volume table set with [+] / [-] keys)
5b.Filling limit	99%=743cm (set with [+] / [-] keys)
6.View ➜ View details	Percent+Level display 2. line - (set with [+] / [-] keys)
6.Beeper	Active ➜ Switch-on: 25% ➜ Switch-off 27% (set with [+] / [-] keys)
7.Relay	Deactive
8.Exit ➜ press [Enter] to see the indication	Diesel 13.000L 13% 54cm

For **tanks with an inner shell** (e.g. cylindrical horizontal or tanks welded together in the basement) the data in steps "4.Tank volume" and "5.Internal tank height" must be corrected.
Examples:

- ➜ Wall thickness of inner casing 0.5cm ➜ reduce value for inner height by approx. 1cm, reduce volume for 10m³ by 1.3%, for 20m³ by 1 %, for 50m³ by 0.8% and for 100m³ by 0.7 %.
- ➜ Wall thickness of inner casing 2cm ➜ reduce value for inner height by approx. 4cm, reduce volume for 10m³ by 5%, for 20m³ by 4%, for 50m³ by 3% and for 100m³ by 2.5%.

NOTES ON PROGRAMMING

Menu	Setting	Description
9.Offset probe	from	• probe zero point, electric • position / Distance from base • unusable capacity that is not to be displayed
	ESC	Exit the menu
	Offset calibr.	New measurement of probe zero point (electric) ⚠ Lift **level probe** out of the liquid beforehand.
	Probe bottom gap	Probe pos: x cm; normal reference is x = 0cm, max = 99cm
	Bottom deadstock	Sucker position: ycm Normal reference is 0cm = capacity completely displayed. y > 0 cm means corresponding unusable capacity.
	Default values	Reset values from menu step 9 to **factory settings**
10.Trim height	xxx.x cm	Entry option for the reference height for the 2-point measurement, for other probe measurement range or for an unknown density. Subtract 1.0cm from the actual measured level and enter this value.
	Calibrate:No Calibrate:Yes	If activated (Yes), the display in menu steps "1.Measure probe" and "2.Liquid" is then "by Calibration". **NOTICE** If this is entered with an almost empty tank, it is recommended that you make a correction the next time it is filled.
11.Exit		Press [Enter] to return to display mode
12.Unit	L default setting m³ % m kg IG UG t mbar kPa	liter: 999900L cubic meters: 2.50m³ percent: 99.50% meter: 2.50m kilogram: 999900kg imperial Gallon: 219750IG US liquid gallon: 263900UG ton: 2.50t millibar: 500mbar kilopascals: 50kPa
13.Rounding	Automatically Without rounding 20L, 50L, 100L 200L, 500L 1.000L	Default settings minimal increments Rounding increments in relation to the set volume set with [+] / [-] keys
14.–17.Exit		Press [Enter] to return to display mode
18.Language + name	Language: Name:	German, English, French, Spanish [+] / [-] / [Enter] ESC [+] / [-] / [Enter] Name Tank 1: Suggested name ➜ Letters can be changed with [+] / [-] / [Enter] Name alarm: ➜ Letters can be changed with [+] / [-] / [Enter]

Menu	Setting	Description
19.Exit		Press [Enter] to return to display mode
20.LCD display	Contrast: 90	Set the contrast of the LCD display
21.Device info		Software version: V8.00 (e. g.) Serial number: Tank 1: SN=2758 (e. g.) Offset + Gain: X0 = 4.05mA; B = 1268
22.Test current		Test function for the current mA value of the **probe**: ADC = 7400 = 11.40mA If **level probe** is not submerged, the value should be close to 4mA. Tolerance range is 3.8..4.2mA.
	⚠WARNING Furthermore, devices connected on the relay contact will also be switched on and/or off! • Connected devices can be damaged (dry running). • Operating media may leak. ✓ Disconnect the devices connected before test relay.. ✓ Only reconnect the devices again **after** test relay.	
23.Test relay ➜SBox 2+3	Relay 1 or Beeper =Off/On Relay 2=Off/On	Test function for the switch function of relay and beeper
24.Reset	ESC	Exit this function without executing it.
	Restart	Initialisation. The device software restarts and keeps all device settings.
	Factory settings	Complete reset of all parameters to the original delivery status.
26.Exit		Press [Enter] to return to display mode

OPERATION

The product requires no operation while it is running.

FUNCTION CHECK / MAINTENANCE

We recommend that you check the displayed litre values once per year to make sure that they are correct. For a simple check, pull the level probe up by its cable so that it hangs above the liquid. In this status the display device should show 0 litres (+ tolerance).

The probe signal can be checked with menu step "22. Test Current"
At 0 cm fill level ➜ approx. 3.8 – 4.2 mA.
In the event of a considerable deviation, we recommend a replacement.➜ New probe.

New probe/ replacement of the operating medium
If the installation of a new probe is required and/or a change in the medium takes place, then firstly, all of the “standard values” under menu step “9th zero point probe“ must be reset to the **factory setting**! It is also necessary to check, and if required, correct all further set values.

RESTORATION

If the actions described in TROUBLESHOOTING do not lead to a proper restart and if there is no dimensioning problem, the product must be sent to the manufacturer to be checked. Our warranty does not apply in cases of unauthorised interference. If there are continuous fault messages or alarms (only with SmartBox 2 or 3) without the set alarm level on the probe being reached or being undercut, check the connection line between the signal part and the level probe to see whether it is interrupted or there is a short circuit; re-install if necessary.

TROUBLESHOOTING

Error code	Significance
Error E1	The set value is invalid
Error E2	Measured value too small (I < 3.7 mA ➜ probe defective)
Error E3	Measured value too great for zero point calibration (probe must not be immersed)
Error E4	Measured value not plausible. Check menu item “9.Offset probe”
Error E5	Set height is more than the height of the tank. (incorrect entry menu step 10)
Error E6	The current measured value is too low as a reference point. The probe must be submerged. The set height (menu step 10) is too high (the measured value is too low) Check menu item "9. Offset probe". Otherwise, probe fault.
Error E7	The current measured value is too low in relation to the set tank height or to the tank volume. The probe must be submerged.
Error E8	Measured value (probe current) is too high - check electrical connection and measuring range of the probe, switch power supply off and on again. Check menu settings steps 1 to 5. If necessary, Check menu step "9.Offset probe". Otherwise, probe fault.
Error E9	Probe current = 0 mA - no signal current. The probe cable is poled wrongly or interrupted; check cable extension, reconnect if necessary.
Error E10	Calibration error. Disconnect the display device from the power supply, wait 5 s and then reconnect. Otherwise, probe fault.
Error E11	**⚠CAUTION** The liquid level in the tank is actually too low for an exact measurement. You can still press [Enter] to confirm and continue.

DISPOSAL

To protect the environment, our electrical and electronic appliances may not be disposed of along with household waste.
At the end of its lifespan, each end user is obligated to pass old appliances to a district or area collection point, separate from household waste. This ensures that old appliances are disposed of properly and negative effects on the environment are avoided. Our registration number for the electrical old appliances register (EAR) is: WEEE-Reg.-No. DE 78472800.

WARRANTY

We guarantee that the product will function as intended and will not leak during the legally specified period. The scope of our warranty is based on Section 8 of our terms and conditions of delivery and payment.

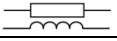
TECHNICAL CHANGES

All the information contained in this assembly and operating manual is the result of product testing and corresponds to the level of knowledge at the time of testing and the relevant legislation and standards at the time of issue. We reserve the right to make technical changes without prior notice. Errors and omissions excepted. All figures are for illustration purposes only and may differ from actual designs.

CERTIFICATE

Our management system is certified according to ISO 9001, ISO 14001 and ISO 50001, see:
www.gok.de/qualitaets-umwelt-und-energiemanagementsystem.

TECHNICAL DATA

Indicator	
Action	Typ 1.B (according to EN 60730-1)
Contamination degree	2 (according to EN 60730-1)
Rated impulse voltage	4000V
Supply voltage	230V AC 50Hz
Power input	max. 2VA
Measuring input	4 to 20mA; U_o = 20 V
Relay output	SmartBox 2 + 3
Switching voltage	max. 250V AC
Switching current	 max. 3.5A
Dimensions W/H/D in mm	194 x 130 x 65mm
Degree of protection acc. to EN 60529	IP30: SmartBox 3; IP54: SmartBox 1, 2
Ambient temperature	-10°C to +50°C
Housing	Polycarbonat (PC)
Optional	Analog output: e.g. 0 to 5V DC; 4 to 20mA
Resolution	12 Bit

Level probe / Standard probe	
Operating voltage	20V DC
Material	V4A; POM; FPM; PUR
Accuracy	± 1 %
Standard version	250mbar
Installation position	vertically suspended, or horizontally supine
Ambiente temperature operating media	-10°C to +50°C
connection cable	6m
Length of standard probe	without cable: 97mm
	Diameter of probe: 22mm
Degree of protection	IP68 acc. to EN 60529

LIST OF ACCESSORIES

Product description	**Information on application**	**Part No.**
Data transmission module 0-5 V DTM-1	Retrofittable module as interface to data transmission, e. g. for the master control system of the building	28 851 00
Data transmission module 4-20 mA DTM-3	Retrofittable module as interface to data transmission, e. g. for the master control system of the building	28 853 00
Data transmission module M-Bus DTM-4	Retrofittable module as interface to data transmission, e. g. for the master control system of the building	28 863 00
Cable junction box IP66, with pressure equalization	To extend the probe cable - e. g. in the dome	28 857 00

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