

Smartbox MINI

electronic remote level gauge
for unpressurized tanks



Level gauge type FSA-E

Digital display unit

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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.



- These instructions explain how to install and operate the SmartBox MINI digital display unit.
- Separate installation and operating instructions are available for the mechanical level gauge type FSA-E. Observe the installation and operating instructions for "FSA-E level gauge" part no. 15 276 51.

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



⚠ 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.

GENERAL PRODUCT INFORMATION

SmartBox MINI is an electronic remote level gauge for unpressurised tanks, consisting of a digital display unit with electronic interface for the mechanical FSA-E level gauge, simply referred to as FSA-E below.



By touching the sensor depending on your settings, the display shows the contents in the tank in litres, percentage by volume or as filling height in centimetres for seven seconds.



With the individual setting "litres", the display changes after seven seconds to the free capacity display and the maximum number of litres that may be filled into the tank during the next filling is displayed for four seconds.

The measurement data is output in a 16-character, single-row LCD display on the digital display unit.

The scale of the FSA-E, which is mounted directly on the tank, also shows the level in the tank continuously in centimetres.

The FSA-E 0 – 160 cm is suitable for all unpressurised tanks to a level of 150 cm, for levels up to 240 cm, use the FSA-E 0 – 250 cm.

The indicated measurements are not calibrated for invoicing.

INTENDED USE

Operating media

NOTICE

Intended use in the operating media refers to the level gauge type FSA-E.

- Fuel oil
- Bio fuel oil
- Waste oil
- Diesel fuel
- FAME
- Vegetable oil
- Rainwater
- Urea solution (AdBlue®)
- Other water-hazardous, non-flammable liquids

Other operating media upon request.



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.



Place of operation

Display unit:

- with type of protection IP30, in protected and dry rooms

FSA-E:

- for installation in non-pressurised tanks indoors and outdoors

INAPPROPRIATE USE

All uses exceeding the concept of intended use:

Display unit:

- changes to the product or parts of the product
- installation in a potentially explosive area

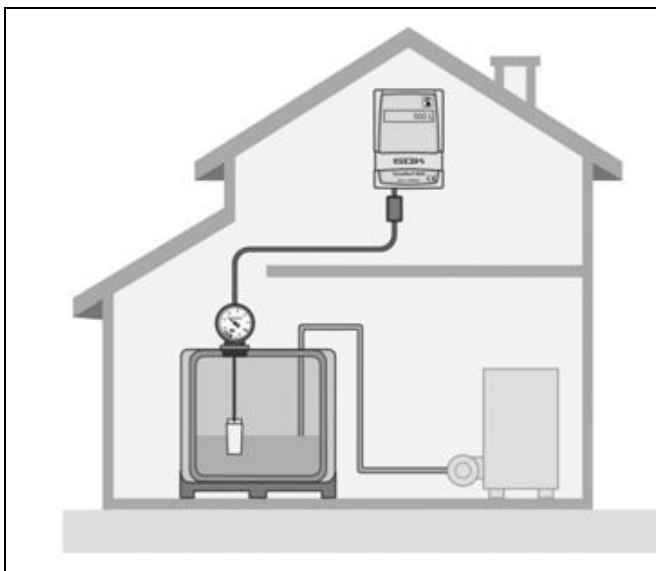
FSA-E:

- installation in pressurised tanks and containers

FUNCTION DESCRIPTION

The content of the tank is determined by measuring the level on the basis of the float principle. With an electronic interface, the measurement from the FSA-E is sent via a connection cable to the **SmartBox MINI** digital display unit, where it is converted into the set output value and shown on the display.

Installation example - standard installation of SmartBox MINI

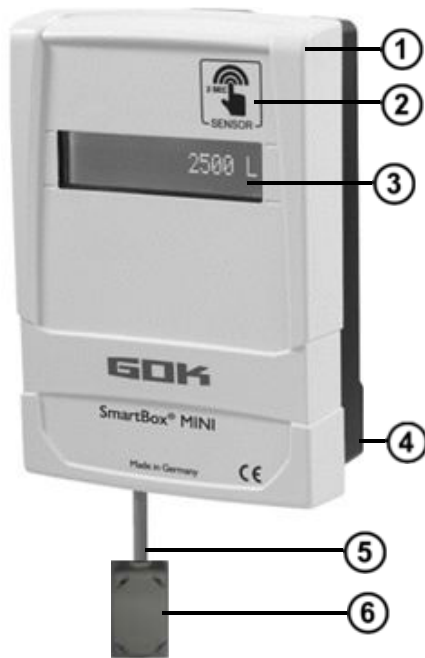


The FSA-E with electronic interface is set to the maximum permitted level and is installed in an existing G 1 1/2 tank connection opening.

The FSA-E with electronic interface is connected to the digital display unit with a 10 m cable or a suitable extension cable up to a distance of 50 metres (see cable extension option).

DESIGN

Design of the digital display unit



- ① Housing top
- ② Sensor
- ③ Display
- ④ Bottom part of housing
- ⑤ Connection cable
- ⑥ Clip-on ferrite core

CONNECTIONS

Connecting the cable to the digital display unit

⚠ CAUTION Malfunction if cable is touched when live.

Permanent damage to the digital display unit cannot be ruled out.

✓ Insert the batteries **only after** you have connected the cable.

⚠ CAUTION Malfunction as a result of incorrect wiring.

The proper function is no longer guaranteed.

✓ Check the terminal assignment.

NOTICE

With the power disconnected, remove the top of the housing to connect the cable.

Connect the cable to the digital display unit:

- Carefully pierce the white membrane to feed the cable through.
- Insert the connection cable through the cable opening on the bottom part of the housing.
- Connect the coloured cable cores according to the terminal assignment.



Terminal assignment from left to right:

1	2	3	4	5
ws = White	bn = Brown	gn = Green	gb = Yellow	gr = Grey

Connecting the cable:

- Depress the spring clamp with a suitable screwdriver.
- Insert the coloured cable cores into the openings of the terminal block.
- Release the spring clamp.
- Check that the connection is firm. Assemble the cable relief.
- Position the clip-on ferrite core ⑥ near the housing.
- Insert the batteries in the battery compartment of the digital display unit.

Cable extension/wall duct options

NOTICE Recommended cable extension with a LIYY cable, cable cross-section $5 \times 0.25 \text{ mm}^2$; cable diameter 4.5 to 6 mm (up to 50 m extension possible).

Extend the connection cable and/or pass through a wall:

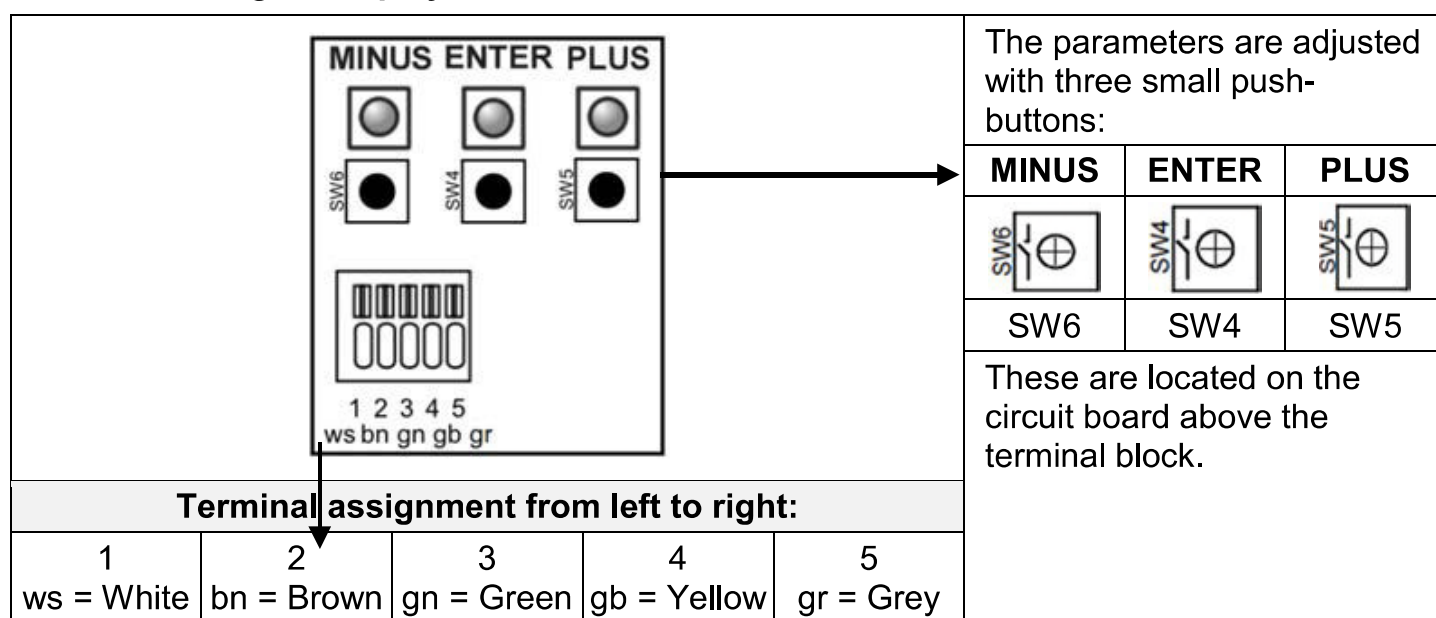
- Remove the clip-on ferrite core ⑥ from the cable.
- Extend the connection cable or pass it through a wall:
- Replace the clip-on ferrite core ⑥ on the cable.
- Connect the cable to the digital display unit (**see above**).
- Position the clip-on ferrite core near the housing.

START-UP

Operating elements and screen of the digital display unit

The device is adjusted once when it is put into operation. The digital display unit is put into operation after the cable has been connected and the batteries have been inserted. When it has been started, the digital display unit works in display mode. The readings are shown in a 1-line LCD display with 16 characters. The display has background lighting so that the readings can be seen in all lighting conditions.

View of the digital display circuit board-sectional view,



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.

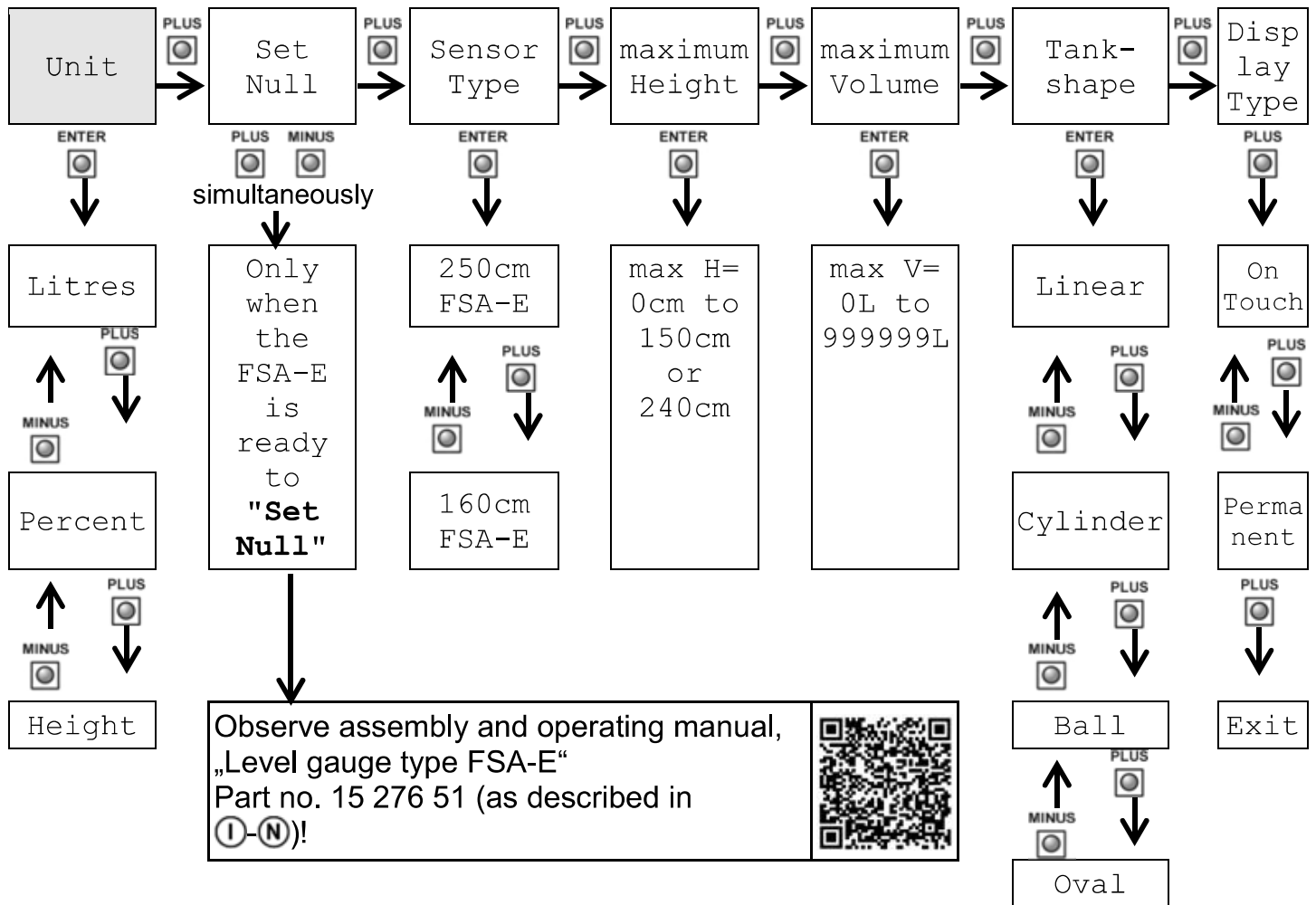
Programming 1st steps

	<ol style="list-style-type: none"> 1. Touch the sensor bar to activate the display. 2. Press [Enter] button. 3. The 1st menu item "Unit" is displayed.
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i You can enter the parameters before the "Set Null" zero offset adjustment between the digital display unit and the FSA-E or also after "Set Null".

PROGRAMMING

Before programming, determine the required tank data.

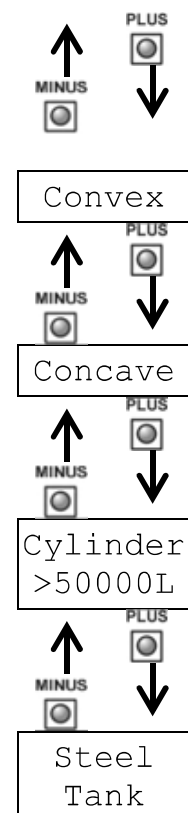


Having already set the zero point at "Set Null", the other menu items can be checked if the menu item "Set Null" is skipped with the PLUS command.

When PLUS and MINUS are pressed simultaneously the zero point would again be set at a wrong measurement result.

ENTER
Click to confirm the selected values → OK.

At maximum height and maximum volume, the values are set with or .











Factory settings

Menu item		Default parameters
Unit		Litre
Sensor Type		240cm FSA-E
maximum Height		250cm
maximum Volume		2400L
Tank shape		Linear
Display Type		OnTouch

Menu item	Entry function	Entry value
Unit	Choice of display unit	
Litre	Select a setting and confirm with [Enter]. Ok is displayed.	Filling level and free capacity display in litres
Percent		Display volume in %
Height		Display level in cm
Set Null	Zero offset adjustment between the digital display unit and the FSA-E	Calibrate ... Adjustment with "Set Null"
Sensor Type	Enter the measuring range	
250 cm FSA-E	Select a setting and confirm with [Enter]. Ok is displayed.	0 - 250
160 cm FSA-E		0 - 160
maximum Height	Enter the maximum internal height of the tank	
250 cm FSA-E	Enter with (+)/(-) and press [Enter] to confirm. Ok is displayed.	Max H ≤ 240cm
160 cm FSA-E		Max H ≤ 150cm
maximum Volume	Enter the tank volume	
	Enter with (+)/(-) and press [Enter] to confirm. Ok is displayed.	Max V ≤ 999999L

NOTICE If the selection of the sensor type changes, you have to re-enter this and the maximum tank height.

Menu step	Entry function	Entry value
Tank shape	Choice of tank shape	
Linear	linear tank; rectangular tank; vertical cylinder; steel tank welded together in the basement	
Cylinder	cylindrical tank to 50 m³ (see also alternative Cyl. > 50000 L) horizontal cylinder; tube-shaped tank; typical design as outdoor tank or underground steel tank	
Ball	spherical tank underground, spherical tank; often a plastic (GRP) underground tank	
Oval	oval tank in basement typical design of GRP tanks and single-walled sheet metal tanks	

Menu step	Entry function	Entry value
Convex	plastic battery tank, convex slightly convex shape, alternative to linear	
Concave	plastic battery tank, concave slightly concave shape, alternative to linear	
Cylinder > 50000 L	cylindrical large outdoor tank >50 m³; >50000 L to 100000 L	
Steel Tank	Sheet steel tank or tank battery Straight side walls with semicircular dome at top and bottom	
Display Type	Set the display	
OnTouch	Select a setting and confirm with [Enter]. Ok is displayed. Value is displayed for a short time.	Sleep mode
Permanent	Select a setting and confirm with [Enter]. Ok is displayed. Continuous display	Continuous display, sensor not in operation
Exit	Programming completed	

NOTICE

Display type "Permanent" is recommended only for short times during battery operation.

NOTICE

After programming, the digital display is ready for "**Set Null**", the zero offset adjustment with the FSA-E.

ASSEMBLY

Before assembly, check that the product is complete and has not suffered any damage during transport. Installation, maintenance and start-up may only be carried out by companies that are **specialist companies** for this work in terms of Section 62 of the German Ordinance on Facilities Handling Substances Hazardous to Water (AwSV).

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.

Installation instructions

The display unit has a wall installation housing and is operated with the top of the housing closed. Installation and start-up by a specialised installer is carried out with the display unit open.

Installation of the digital display unit



CAUTION

Do not damage electronic components.

✓ Use a suitable tool to pierce the openings.

1. Loosen the screw on the bottom of the digital display unit and remove the top of the housing.
2. Place the digital display unit on a suitable position on a smooth, vertical wall and pierce the pre-cut holes on the inside back wall of the housing. Mark the points for installation.
3. Place the digital display unit on the marks and fix it in place using the supplied anchors and screws.
4. Close the top of the housing and tighten the screw on the bottom of the digital display unit.

TROUBLESHOOTING

Fault cause	Action
Battery warning Battery __% when remaining capacity is low	→ Constant check
No display Batteries empty	→ Replace batteries

Error code	Meaning
Error 0001	No contact with FSA-E: ✓ Check the connection between the magnetic sensor and the magnetic encoder in the connection plug on the FSA-E. ✓ Reset.
Error 0002	Connection cable on the digital display unit not connected: ✓ Connect the cable. ✓ Reset.



Reset: remove/insert batteries

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.

MAINTENANCE

Replacing the batteries

1. Loosen the screw on the top of the housing, remove empty batteries from the display unit and insert new batteries (3 x AA 1.5V batteries) paying attention to the "+" and "-" poles.
2. Replace the top and tighten the screw.



Stored data is not lost when you replace the batteries.

SHUT-DOWN

Pay attention to the following when you take the digital display unit out of service:



CAUTION Damage to device from leaking batteries

Can damage the device.

- ✓ If the digital display device will not be used for some time, remove the batteries.

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.

DISPOSAL



Discharged batteries should be deposited at collection stations or in shops with collection facilities. Stored data is not lost when you replace the battery.

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 DATA

SmartBox MINI digital display unit	
Supply voltage	3 batteries, AA, 1.5V
Dimensions H/W/D in mm	144 x 99 x 45
LCD display	16 characters / 1-line
Display accuracy	+/- 2%
Measuring range FSA-E0 - 160 cm	0 to 150cm
Measuring range FSA-E0 - 250 cm	0 to 240cm
Ambient temperature	0°C to +50°C
Housing material	ABS / PC
Type of protection	IP30 acc. to EN 60529

Notes for required tank data

Menu step	Entry function	Entry value
Sensor Type	250cm FSA-E	<input type="checkbox"/>
	160cm FSA-E	<input type="checkbox"/>
maximum Height	Value Max H ≤ 240cm	__ __ __ cm
	Value Max H ≤ 150cm	__ __ __ cm
maximum Volume	Max V ≤ 999999L	__ __ __ __ __ L
Tank shape	Linear	<input type="checkbox"/>
	Cylinder to 50m ³	<input type="checkbox"/>
	Ball	<input type="checkbox"/>
	Oval	<input type="checkbox"/>
	Convex	<input type="checkbox"/>
	Concave	<input type="checkbox"/>
	Cylinder >50m ³	<input type="checkbox"/>
	Steel Tank	<input type="checkbox"/>