

Smartbox® MINI

electronic remote level gauge for unpressurized tanks



**mechanical level
gauge type FSA-E**

digital display unit

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ABOUT THESE INSTRUCTIONS






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





NOTE

Observe the installation and operating instructions for "FSA-E level gauge" part no. 15 276 50.

SAFETY ADVICE

	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 .

ADDITIONAL SAFETY ADVICE

	NOTICE describes material damage . → Has an effect on ongoing operation.
	NOTE describes general information.

PRODUCT-RELATED SAFETY ADVICE



DANGER

May not be used in explosion-prone areas.

May cause an explosion or fatal injuries.

- ✓ Must be installed by a specialist company in accordance with local industrial health and safety regulations.
- ✓ Installation outside the defined ex zone.

GENERALLY

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 a few 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.



NOTE

The **SmartBox® MINI** is rated as Protection Class IP30 and is approved for indoor use only.

The indicated measurements are not gauged for invoicing.

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

INTENDED USE



NOTE

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

Operating media

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



NOTE

You will find a **list of operating media** with descriptions, the relevant standards and the country in which they are used at [www.gok-online.de/en/downloads/technical dokumentation/ list of operating mediums](http://www.gok-online.de/en/downloads/technical_dokumentation/list_of_operating_mediums).



Other media on request!

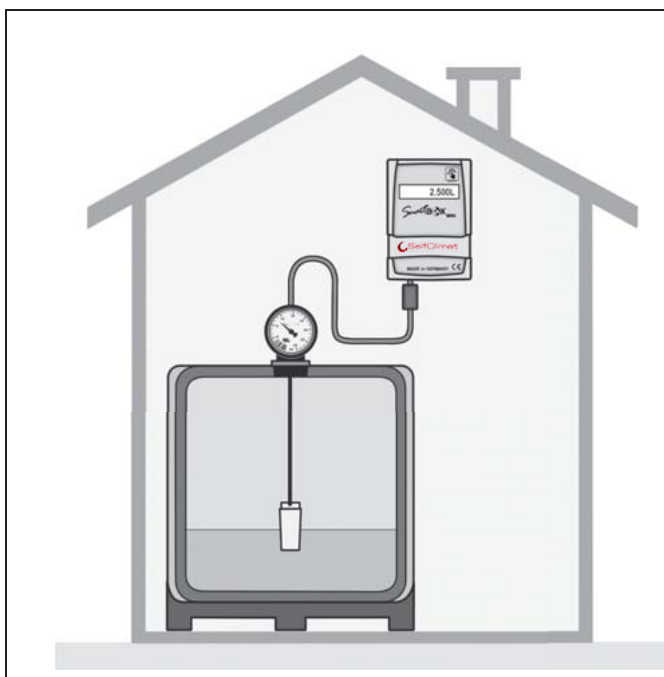
Place of operation

- Not suitable for outdoor use.

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).

CONNECTIONS

Connecting the cable to the digital display unit

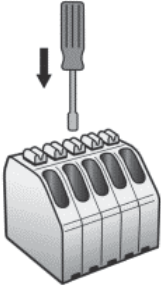


NOTE

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 ws = White	2 bn = Brown	3 gn = Green	4 gb = Yellow	5 gr = Grey
	Connecting the cable: <ul style="list-style-type: none"> • 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. 				



NOTICE

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.



NOTICE

Malfunction as a result of incorrect wiring.

The proper function is no longer guaranteed.

- ✓ Check the terminal assignment.

Cable extension/wall duct options



NOTE

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

Activate the display on the sensor bar

The parameters are adjusted with three small push-buttons:

MINUS	ENTER	PLUS
SW6	SW4	SW5

These are located on the circuit board above the terminal block.

Terminal assignment from left to right:

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

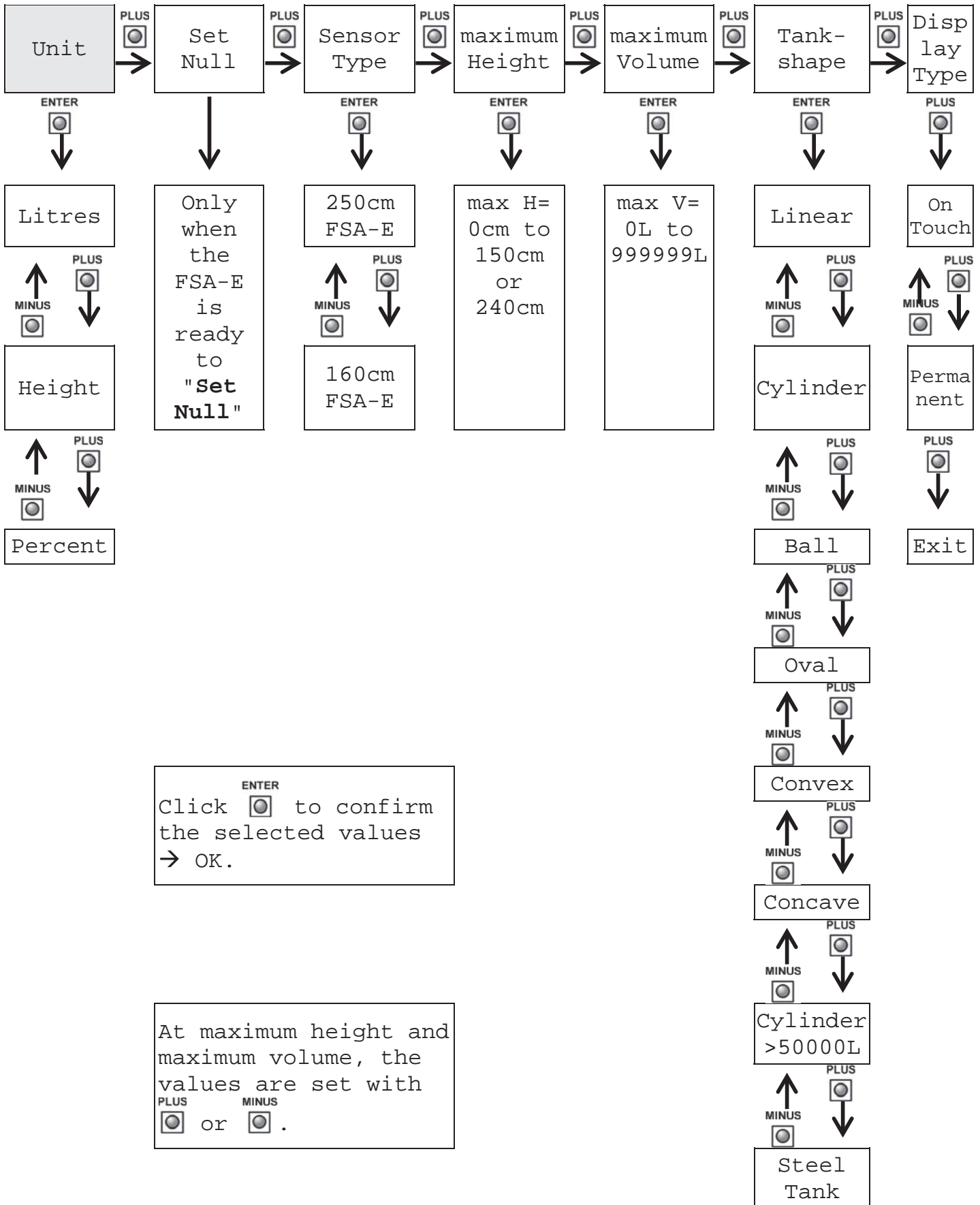
Setting a parameter:	Press [Enter] to open setup mode. Select the desired setting parameter via PLUS [+]. Press [Enter] to call up the value selection for the parameter. Set the value with MINUS [-] / PLUS [+], press [Enter] to save.
Quitting the setup mode:	You can quit the setup mode at any time. Select "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. The 1st menu item "Unit" is displayed.
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PROGRAMMING

Before programming, determine the required tank data.





NOTE

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".

Factory settings

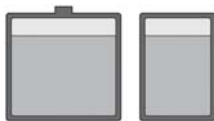
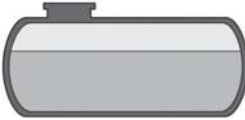



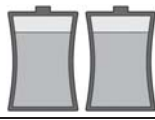
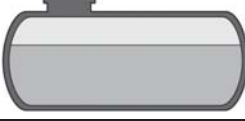

Menu item	Default parameters
Unit	Litre
Sensor Type	250 cm FSA-E
maximum Height	250 cm
maximum Volume	2500 L
Tank shape	Linear
Display Type	OnTouch

Menu item	Entry function	Entry value
Unit	Choice of display unit	
Litre	Select a setting and confirm with [Enter]. Ok is displayed.	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	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 (height without dome)	
250 cm FSA-E	Enter with (+)/(-) and press [Enter] to confirm. Ok is displayed.	Max H ≤ 240 cm
160 cm FSA-E		Max H ≤ 150 cm
maximum Volume	Enter the tank volume	
	Enter with (+)/(-) and press [Enter] to confirm. Ok is displayed.	Max V ≤ 999999 L



NOTE

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 m ³ (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	
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 m ³ ; >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	



NOTE

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



NOTE

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

INSTALLING THE SMARTBOX MINI

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

ASSEMBLY, START-UP and MAINTENANCE are to be carried out by a specialised company in terms of water law.

For the system to function as intended it must be installed professionally in compliance with the technical instructions 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

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.



NOTICE

Do not damage electronic components.

- ✓ Use a suitable tool to pierce the openings.

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
Error 0002	Connection cable on the digital display unit not connected ✓ Connect the cable

REPAIRS

If the measures explained above under TROUBLESHOOTING do not result in regular START-UP, and if there is no dimensioning problem, the product must be sent to the manufacturer for a check. 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.



NOTE

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:



NOTICE

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.



NOTE

Stored data is not lost when you take the device out of service.

DISPOSAL



To protect the environment, our products may not be disposed of along with household waste.

The product must be disposed of via a local collection station or a recycling station. Discharged batteries should be deposited at collection stations or in shops with collection facilities. Stored data is not lost when you replace the battery.

WARRANTY

We guarantee that the product will function as intended and will not leak during the legally specified period. The warranty term begins when the product is handed over to the customer. 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 these installation and operation instructions 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.

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
Accuracy	+/- 2 % of upper range value
Measuring range FSA-E0 - 160 cm	Level 0 to 150 cm
Measuring range FSA-E0 - 250 cm	Level 0 to 240 cm
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	250 cm FSA-E	<input type="checkbox"/>
	160 cm FSA-E	<input type="checkbox"/>
maximum Height	Value Max H ≤ 240 cm	___ cm
	Value Max H ≤ 150 cm	___ cm
maximum Volume	Max V ≤ 999999 L	_____ L
Tank shape	Linear	<input type="checkbox"/>
	Cylinder to 50 m ³	<input type="checkbox"/>
	Ball	<input type="checkbox"/>
	Oval	<input type="checkbox"/>
	Convex	<input type="checkbox"/>
	Concave	<input type="checkbox"/>
	Cylinder >50 m ³	<input type="checkbox"/>
	Steel Tank	<input type="checkbox"/>