






Produkcja Przemysłowej Aparatury
Pomiarowej i Elementów Automatyki

INSTRUCTION MANUAL

CS-27/W; CS-27/BAK

HYDROSTATIC FUEL LEVEL PROBE
FOR INSTALLATION ON THE FUEL FILLER

Symbols used

Symbol	Description
	Carefully follow the information in this document to ensure safety and full functionality of the device.
	Information particularly useful for the installation and use of the device.
	Information particularly useful for the installation and use of the device by Ex.
	Information on the disposal of used equipment.

BASIC REQUIREMENTS AND SAFETY OF USE



- The producer takes no liability for damage resulting from incorrect installation of the device, neglecting to keep the device in proper technical condition, and using the device for purposes other than its intended purpose.
- Installation should be conducted by qualified personnel, authorized for installation of electrical equipment and measuring devices. The installer is responsible to conduct the installation according to this manual as well as laws and standards of safety and electromagnetic compatibility applicable for this kind of installation.
- In any installation equipped with measuring devices, there is an injury hazard from compressed agent in case of a leak. Follow all safety requirements during the installation, use, and inspection of the device.
- In case of malfunction, disconnect the device and return it to the producer or an authorized service unit for repair.



- In order to minimize the possibility of malfunction and the resulting hazard to personnel, avoid installing the device in dangerous environment where there is a possibility of the following:
- Mechanical impact, excess shock and vibration.
 - Excessive temperature fluctuation.
 - Steam condensation, dusting, icing.



Installation of intrinsically safe devices must be conducted very carefully, following all standards and laws applicable for installations of this kind.

Changes and alterations introduced in production documents may anticipate the update of user's paper documents. Up-to-date instruction manuals are available on producer's website at www.aplisens.pl

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1. INTRODUCTION

The subject of this instruction manual is the CS-27/W and CS-27/BAK hydrostatic fuel level probe for installation on the fuel filler.

The manual includes data, hints, and recommended action for installation and usage of the device, as well as troubleshooting tips.

2. SAFETY

- Read this instruction carefully prior to installation, startup, or any other work.
- Installation and maintenance can only be conducted by qualified personnel, authorized to install electrical equipment and measuring devices.



- Use the device according to its intended use, without exceeding maximum acceptable parameters.
- Prior to assembly or disassembly of the device, be sure to disconnect the power source.
- It is not acceptable to conduct any repair or otherwise tamper with the electronic circuit of the device. Damage assessment and possible repair can only be made by the producer or an authorized unit.
- Do not use the device when it is damaged. If malfunction occurs, disconnect the device.

1. SET LIST

Along with the device, the user receives the following:

- a) Product certificate, functioning as a warranty card;
- b) Declaration of conformity (on customer's request);
- c) Instruction Manual designated "IO.CS-27/W.CS-27/BAK"

Items b), c) are available from the website www.aplisens.pl

1. TRANSPORT AND STORAGE

1.1. Transport

When transported, the devices should be packed in individual and/or group packaging and carried on a covered means of transport. The packaging should be secured from moving and protected against weather effects.

1.2. Storage

The device should be stored in the manufacturer's packaging, in a covered room, free of vapor and corrosive agents, where temperature and relative humidity do not exceed maximum acceptable limits.

2. WARRANTY

The producer grants warranty under the conditions specified in Product Certificate that works as a warranty card.

Warranty will be void if the device is not used according to its intended use, the user does not follow this instruction manual, the device is handled by unqualified personnel or the device has been tampered with.

3. STRUCTURE

3.1. Purpose and features

The CS-27/W hydrostatic fuel probe is designed for fuel level measurement in fuel tanks on vehicles, machinery and locomotives. The CS-27/BAK is a combination of the CS-27/W probe with a BAK filler security for monitoring access to the fuel filler on trucks, machinery, construction vehicles and others, optionally with additional event signaling system for the driver.

3.2. Structure and operation

The CS-27/W fuel level probe measures the hydrostatic pressure of liquid, whose values is proportional to the height of the column of liquid. The measuring element is a piezoresistive sensor separated from the medium with a separating membrane. Pressure measurement is done at the separating membrane of the submerged probe (5÷10mm above tank bottom) and related to atmospheric pressure or pressure inside the tank using a hose located inside a conduit. The electronic system is located in a steel housing of the sensor. The sensor is mounted with an extendable arm to aluminum housing which can be sealed. The CS-27/BAK itself has additional BAK fuel filler security. It is secured with monitoring of the presence of a transponder located in the fuel cap, above the CS-27/W probe mounted on the filler. The system alerts of removing the fuel cap as a change of output status, as well as sabotaging,

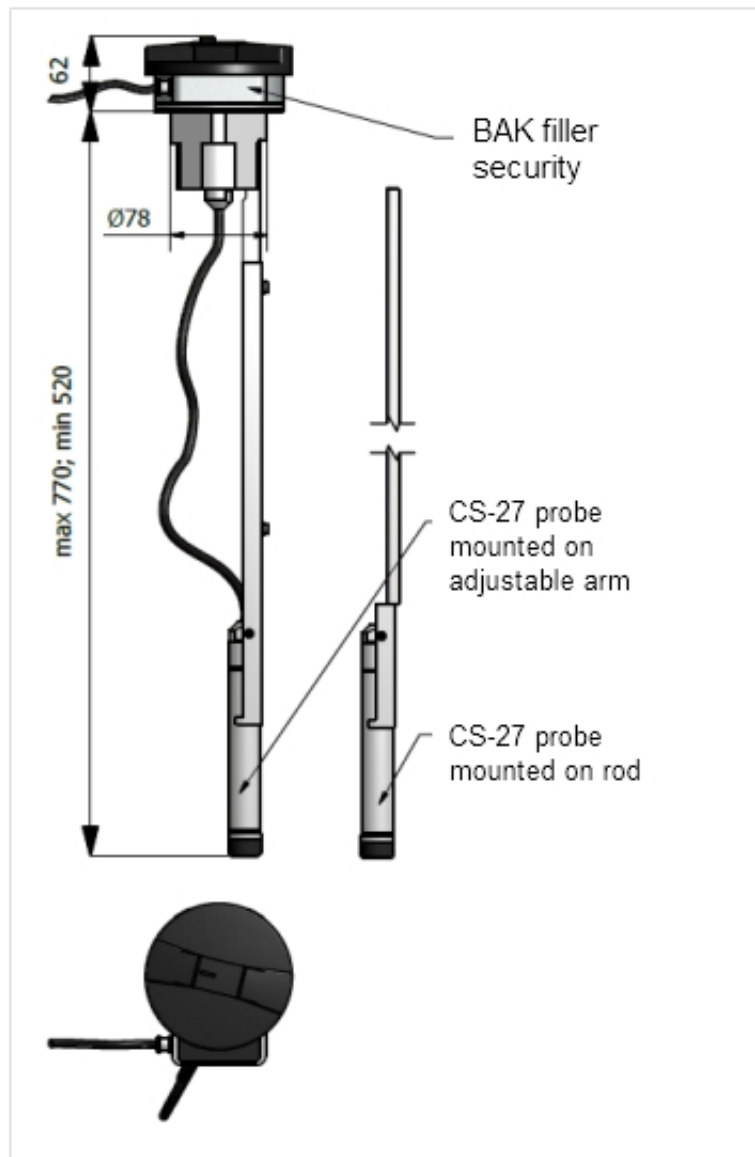
cutting the wire, through signal loss in the communication conduit which can be connected to a monitoring system and/or to 'CABIN SIGNALLING MODULE'.

The 'CABIN SIGNALLING MODULE' signals the removal of the fuel cap (sabotage – cutting the wire) with a LED and sound alarm in driver's cabin and can be connected to a monitoring system that records the ongoing events. The 'CABIN SIGNALLING MODULE' is equipped with a SILENT OPEN feature (removing the cap without the sound alarm in the cabin) and ALARM MEMORY (information on tampering with fuel cap when the driver is not present in the cabin).

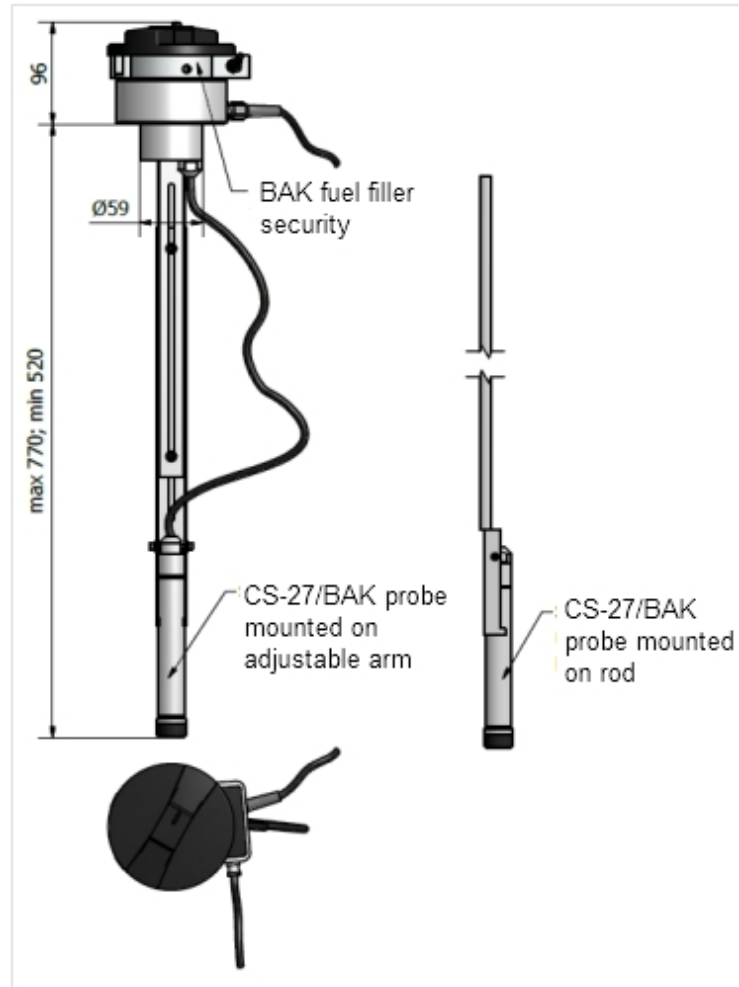
The 'CABIN SIGNALLING MODULE' generates two signals for removing the cap: normal open NO and normal connected NC.

All signals are OC type (open collector).

3.3. Overall dimensions



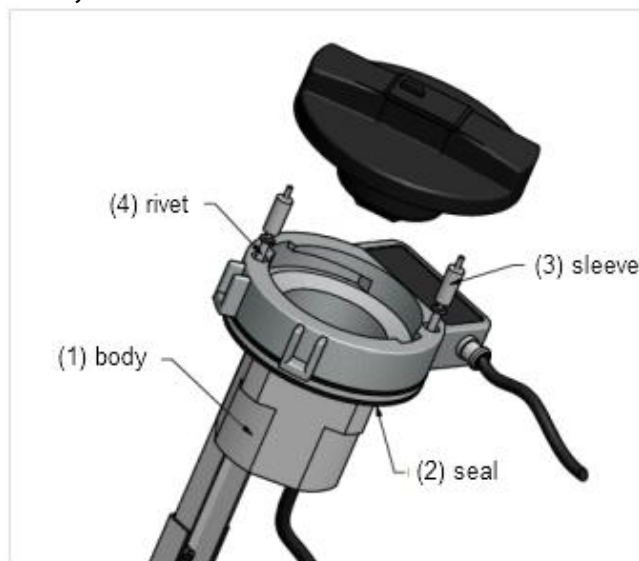
Pic. 1. CS-27/BAK/80, CS-27/W/80 hydrostatic fuel level probe – overall dimensions



Pic. 2. CS-27/BAK/60, CS-27/W/60 hydrostatic fuel level probe – overall dimensions

4. INSTALLATION

7.1 CS-27/BAK/80; CS-27/W/80 mechanical installation



- Unscrew the original filler cap.
- Degrease the filler surface and probe body (1) with a cloth included in installation kit.
- Apply silicone to filler surface and body (1).
- Mount seal (2) on body (1).
- Mount body (1) with seal (2) on filler. It is recommended to install the flange in such a way, so that the wire does not protrude outside the vehicle.
- Carefully drill Ø 4 mm openings in filler through mounting openings.
- Place installation sleeve (3) onto blind rivet (4) and embed in riveter. Rivet both openings.
- Secure the wire with protective pipe, clamp the pipe at wire outlet with cable tie, lead the wire into driver's cabin in such a way as to minimize possible thermal and mechanical damage resulting from regular usage of vehicle.
- Thread the sealing cord with bead through sealing openings so that it does not screen the rivet head, wrap the cord around the protective pipe and seal it.
- Insert silicone into mounting openings and push in rubber plugs.
- Cut off the protruding part of plug.
- Screw the cap on. Unscrew and screw the cap back on several times to verify the stability of mounting on the tank filler.

7.2 CS-27/BAK/60; CS-27/W/60 mechanical installation



- Unscrew the original filler cap.
- Degrease the filler surface and lower body (1) with a cloth included in installation kit.
- Apply silicone to filler surface and lower body (1).
- Mount seal I (3) on body (1).
- Mount body (1) with seal I (3) on filler. It is recommended to install the body in such a way, so that the wire does not protrude outside the vehicle.

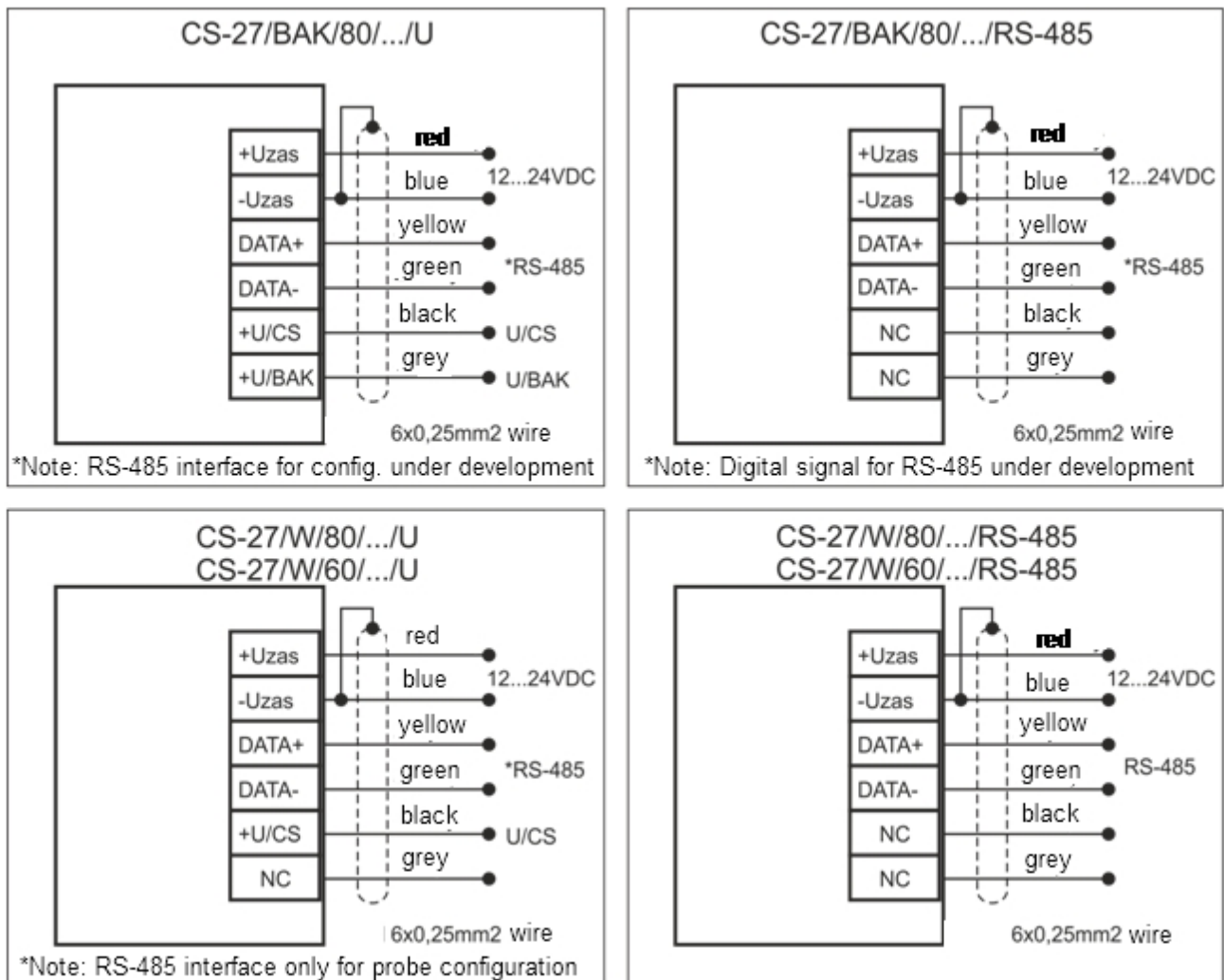
- Screw the bottom body (1) with three screws (5) to tank filler.
- Screw the upper body (2) with seal II (4) to lower body (1) with two M4x25 screws (6).
- Secure the wire with protective pipe, clamp the pipe at wire outlet with cable tie, lead the wire into driver's cabin in such a way as to minimize possible thermal and mechanical damage resulting from regular usage of vehicle.
- Thread the sealing cord through the opening in screw head locking screw, wrap it around the protective pipe and seal it.
- Screw the cap on. Unscrew and screw the cap back on several times to verify the stability of mounting on the tank filler.

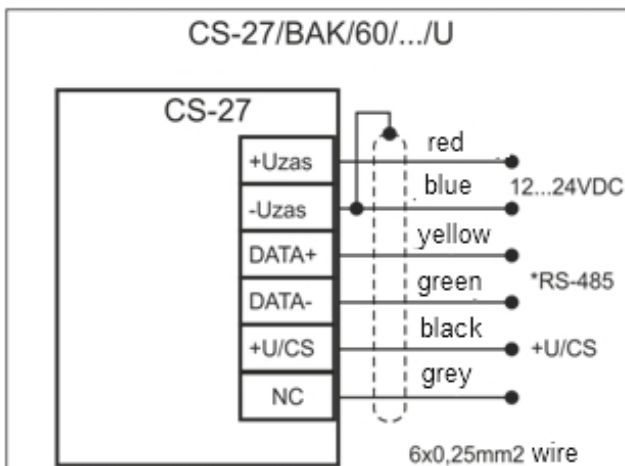
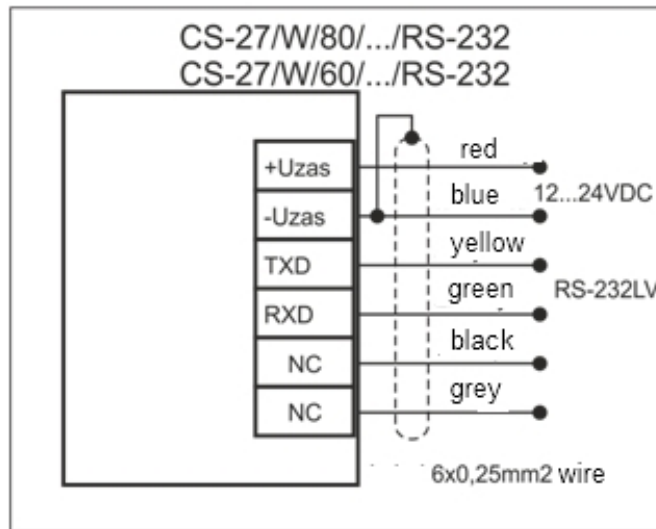
1. CONNECTION



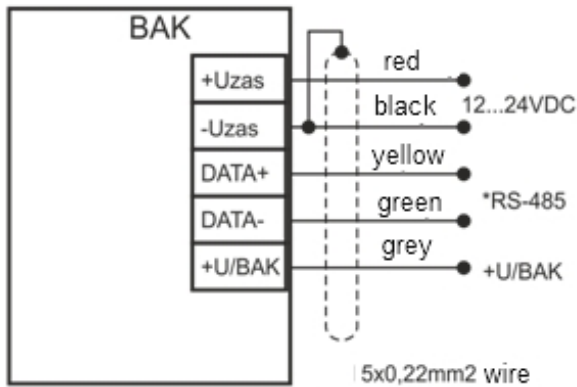
All connection and installation steps must be performed with power disconnected.

Probe electrical outlets diagram:

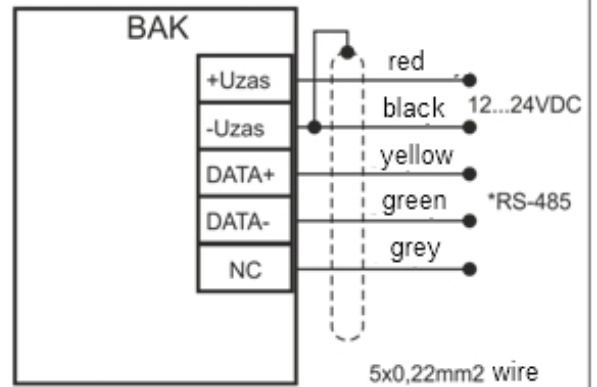
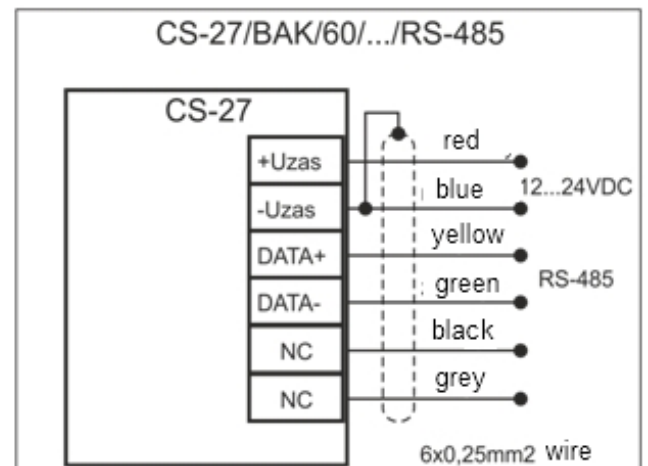




*Note: Rs-485 interface only for probe configuration



*Note: RS-485 interface only for filler security



*Note: RS-485 digit. signal for filler sec. under development

9. TECHNICAL PARAMETERS

9.1. Electrical parameters

Power voltage	: Uzas = 8...32VDC
Power intake:	
- with BAK fuel filler security	: < 75mA
- without BAK fuel filler security	: < 25mA
Analogue output signal for probe	: U/CS = (0,05...10)V
Binary output signal for fuel filler security	: U/BAK = (0,002...0.9) Uzas
RS-485 input/output signal:	
-differential output voltage	: min. $\pm 1,5V$
-input voltage	: min. $\pm 0,2V$
RS-232LV input/output signal:	
- TXD output signal	: HI > 3,0V; LO < 0,2V
- RXD input signal	: HI > 2,0V; LO < 0,8V

9.2. Maximum ambient and working parameters

Working temperature range	(-25...80) °C (custom made -40 °C ...80 °C)
Compensation temperature range	-25 °C ...50 °C
Relative humidity	30...90%
Atmospheric pressure	80...120kPa
Acceptable levels of vibration	up to 2,5m/s ²
Dusting	Any
Working position	Vertical
Concentration of active components in atmosphere	No corrosive components

9.3. Measurement range data

Measurement range	up to 2000mm H ₂ O
Arm length in tank	Max 770mm (custom made up to 2000mm)
Maximum range overload	≤ 100 kPa

9.4. Processing errors

Fundamental error	$\leq 0,16\%$
Power voltage shift error	0,05%
Hysteresis, repeatability	0,05%
Additional ambient temp. shift error	0,3%/10 °C
Additional electromagnetic field effect error (f=0,02...1GHz)	$\leq 1\%$

9.5 Housing protection class

according to PN-EN 60529:2003 – IP68

9.6 Housing

Type	Cast
Housing material	Aluminum
Width/Length/Height	As in pic.1, 2
Weight	~2,8 kg

9.7 Marking

Ordering method:

CS-27 hydrostatic fuel level probe for installation on fuel filler

CS-27/___ / ___ / ___ / ___ / ___

BAK- with fuel filler security

W- without fuel filler security

80- filler diameter ø80

60- filler diameter ø60

-1- body with gland

-2- body with coupling

RS¹⁾- Digital output signal

U²⁾- Voltage output signal

R- Sensor mounted on adjustable arm

P- Sensor mounted on bendable rod

1) With digital output signal (RS), state interface type: 232 or 485.

2) With voltage output signal (U), state voltage value: 0...10V or other.

Example marking:

CS-27/BAK/80/1/RS-485/R Fuel level probe with filler security, filler diameter ø80, body with gland, with RS-485 digital output, adjustable arm.

CS-27/W/80/2/U-0-10V/P Fuel level probe without filler security, filler diameter ø80, body with coupling, with voltage output 0...10V, bendable rod.

10 INSPECTION

10.1 Periodical inspection

Periodical inspection must be conducted according to standards in force.

While inspecting, check the condition of electrical connections on clamps (firmness of connections) and the stability of device fixing.

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10.2 Non-periodical inspection

If the device is exposed to mechanical damage, electrical overvoltage or it works improperly – conduct inspection as necessary.

If there is no signal on the transmission line or signal value is incorrect, check the condition of the cable, the condition of connections on clamps, etc. Check if the power voltage value and load resistance is correct.

If the line is functional, check the operation of the device.

11 SCRAPPING, DISPOSAL



Used or damaged devices must be scrapped according to EU Directive (2002/96/EU) on used electrical and electronic equipment, or returned to the producer.

12 ADDITIONAL INFORMATION

The producer reserves the right to implement structural and technological alterations that do not impair the device's parameters.