

EFLS-A

Analog Fuel Level Sensor



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Attention



Before using the device we strongly recommend reading this manual first.



Do not rip open the device. Do not touch the device if the device block is broken.



The device should only be serviced by qualified personal.



The device is water-resistant (IP67) and can be mounted outdoor, though power adapter must be kept dry.



WEEE - Waste Electrical and Electronic Equipment Directives

In 2003, the European Parliament passed the Waste Electrical and Electronic Equipment (WEEE) directives to encourage the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Member states were required to adopt legislation by August 13, 2005. National Instruments is actively working with our European branch offices and subsidiaries to fully comply with these regulations as local legislation is passed. The regulations apply to all electrical and electronic equipment on the European Union market in that falls into any of 10 categories.



CE - European Union EMC & Safety Compliance Declaration

The CE-marking is the manufacturer's statement to the EU authorities that his product complies with all relevant CE-marking Directives. It is important to emphasise that the CE-marking is not a quality mark or a guarantee to consumers in EU.



Restriction of Hazardous Substances - RoHS

European Union RoHS (2011/65/EU) directive restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) in electrical and electronic equipment put on the market in the European Union. The EU RoHS directive currently applies to eight categories of electrical and electronic equipment. Products in Category 9, Industrial Monitoring and Control Instruments are excluded from the RoHS directive until July 2017. Consequently, most of NI's products are outside the scope of the RoHS directive. Per the EU RoHS Directive, the CE



marking shall be the only marking which attests the conformity of the product with the requirements of RoHS 2. NI regularly releases RoHS-compliant products as part of the NI Hazardous Substances Reduction initiative, a voluntary program modeled after the EU RoHS Directive.

SAFETY INFORMATION

In this document you will be introduced on how to use the sensor safely. We suggest you to adhere to the following recommendations in order to avoid personal injuries and or property damage.

You have to be familiar with the safety requirements before using the device!

To avoid burning and voltage caused traumas, of the personnel working with the device, please follow these safety requirements.



1A fuse must be disconnected, during any operation (8pic).



The device is intended for supply from a Limited Power Source (LPS) that power consumption should not exceed 0.3VA.



Do not mount or service the device during a thunderstorm.



Turn off all system power supply, before opening corps.



The motor vehicle battery must be disconnected from all system, during recharge from AC mains procedure.



Device should be mounted in limited access area. Only authorized and responsible person can do service and mounting work.



Any wires polarity changes are strictly forbidden. Wires polarity are specified in 8 pic.



Without individual permission from manufacturer, user must strictly use only 1A fuse, which is specified by the manufacturer in table 3.



To avoid mechanical damages to the device it is recommended to transport it packed in a damage-proof pack.



Protection against overcurrent, short circuiting and earth faults should be provided as a part of the building installation.

Signal level of the device depends on the environment in which it is working. In case the device starts working insufficiently, please refer to qualified personnel in order to repair this product. We recommend forwarding it to a repair center or the manufacturer. There are no exchangeable parts inside the device.

General

Analog, fuel level sensor **EFLS-A-XXX** (“XXX” marking is described in the table below.), hereafter referred to as “sensor”, detects the level of the fuel in the fuel tank of the motor vehicle, or motor fuel storage/transportation tank and convert information about current level to output voltage in range 0.2V...9V. This voltage can be converted in the digital form by the external device (ECU, data logger, or telematics module).

The connection wires are protected by metal-plastic flexible corrugated tube.

Sensor suits the requirements of:

EU Dir. 72/245 up to 2006/ 96;

EN61326.

EN 590

EN 228- 1993

Table 1—marking description

	Temperature compensation	Length
	X	XX
EFLS-A-	N	07
	T	15
		30
		CL

*N-no temperature compensation; T-with temperature compensation

07 - length 0,75m; 15 - length 1,5m; 30 - length 3 m; CL - custom length.

Main specifications

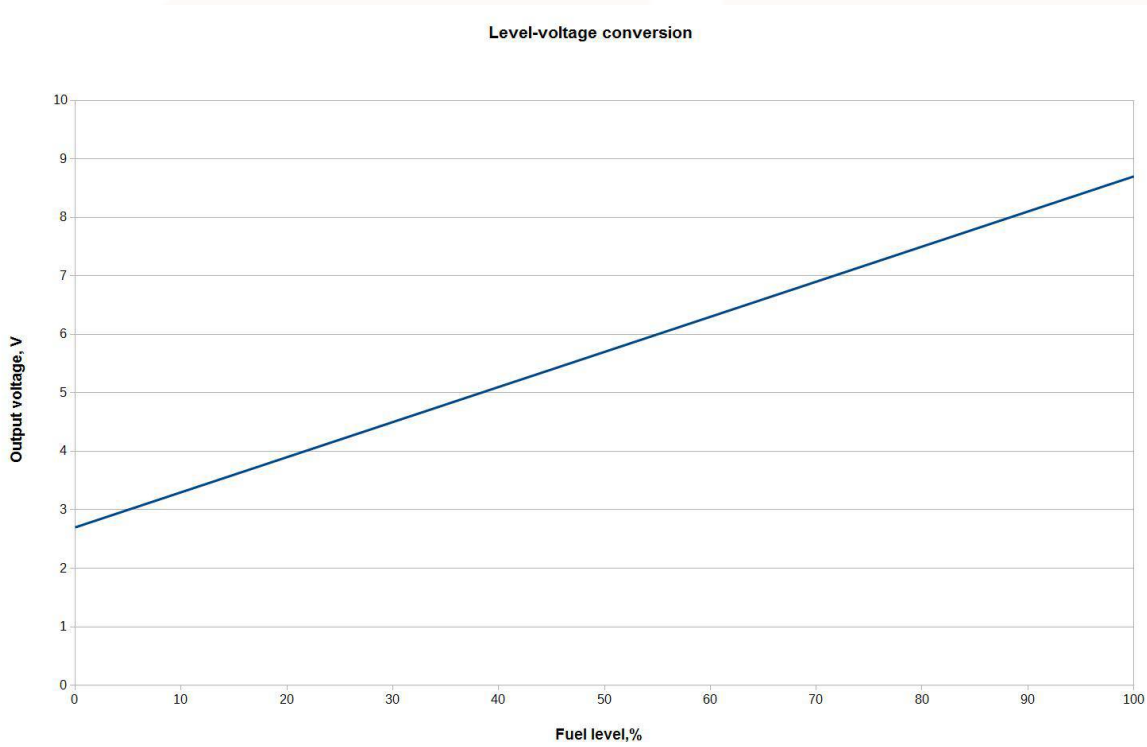
Table 2—main specifications

Parameter, measuring unit	Value
Operating principle	capacitive
Supply voltage, Volts DC	11.0 — 30,0
Relative measuring error (to the length of the measuring part), %, not more than	±1
Power, W	max 0.2
Output interface –DC voltage, V	0.2V...9V*
Operation temperature, C	–40,0 ... +80,0
Relative humidity, below:	95%
Dust and water protection	IP67

*depends on sensor length.

Metrological characteristics

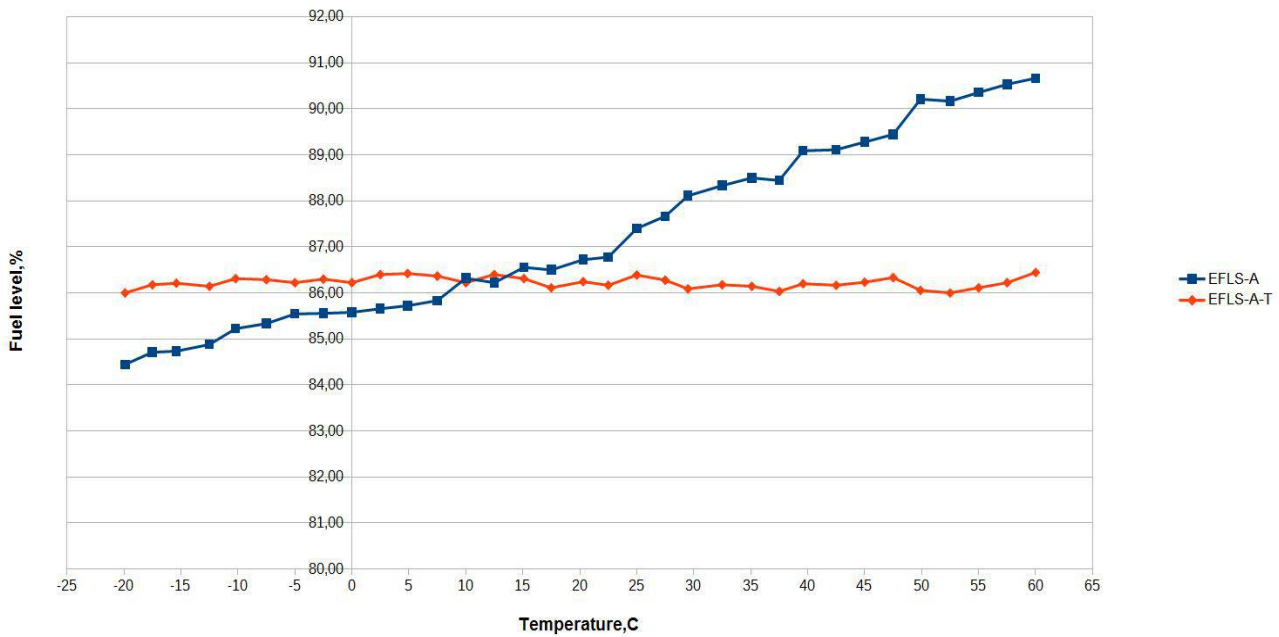
The function of the LEVEL-VOLTAGE conversion is linear.



Picture 1. Level-voltage conversion

EFLS-A and EFLS-A-T measuring was made in real conditions. EFLS-A-T graphic shows that compensation works. These test were made at random choice level sensors. Deviation is less than 1% in both measuring.

EFLS-A and EFLS-A-T measuring in different temperatures



Picture 2. EFLS-A and EFLS-A-T measuring in different temperatures.

Installation procedure

Fuel level sensor can be shortened 50-55% of basic length you ordered. It doesn't matter if you shortened level sensor or not **insulation cap must be placed** at the end of the probe.

Installation kit:

- 4 screws DIN7504 K4 4,8×32;
- 1 screw DIN7504 K4 4,8×32 with additional hole for sealing;
- 1 rubber gasket;
- 2 seals;
- 2 stainless steel cables for sealing, approx. 15-20cm. length;
- 1 insulation cap which is fitted on the end of the probe.

Recommendation 1: stainless steel tank or other material tanks with wall thickness more than 3,0 mm.

Central hole has to be drilled with 32 mm. diameter crown. Then sensor is placed to the tank and additional holes places can be marked. Then you can drill 5 marked holes with 3 mm. diameter drill bit and make a full fitting procedure. Sealing screw is recommended to be screwed near cable for easier sealing procedure.

Recommendation 2: aluminum or plastic tanks with wall thickness less than 3,0 mm.

Central hole has to be drilled with 32 mm. diameter crown. Then sensor is placed to the tank and you can make full fitting procedure without additional hole drilling. Sealing screw is recommended to be screwed near cable for easier sealing procedure.

Calibration procedure

Calibration requirements:

- I. The vehicle should be in horizontal position by x and y axis;
- II. Fuel tank should be filled from empty to full by equal parts. To do more precise calibration you should fill it with smaller quantities.
- III. At a regular shaped tank without curves, infill should be performed every 5 – 10 l. In case fuel tank is shaped with curves it is recommended to pour every 1 – 2 l. After each dose infill allow fuel to settle for 10 – 15 s. and capture the voltage.
- IV. Write down all voltages and liters in to the table, for example:

Liters	mV
10	321
20	423
30	569
40	679
50	812
60	922
70	1036
80	1199

- V. Then input all the data from the table to your system.

Liters

10

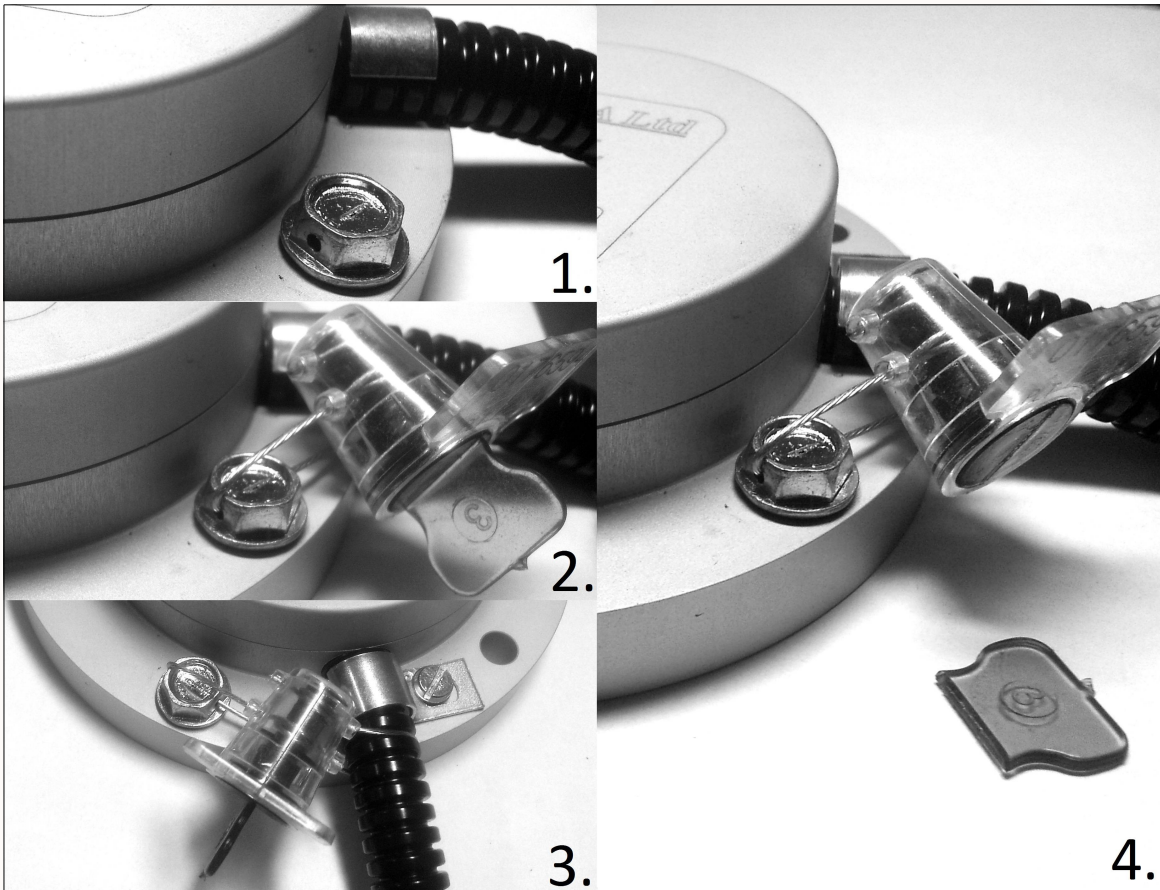
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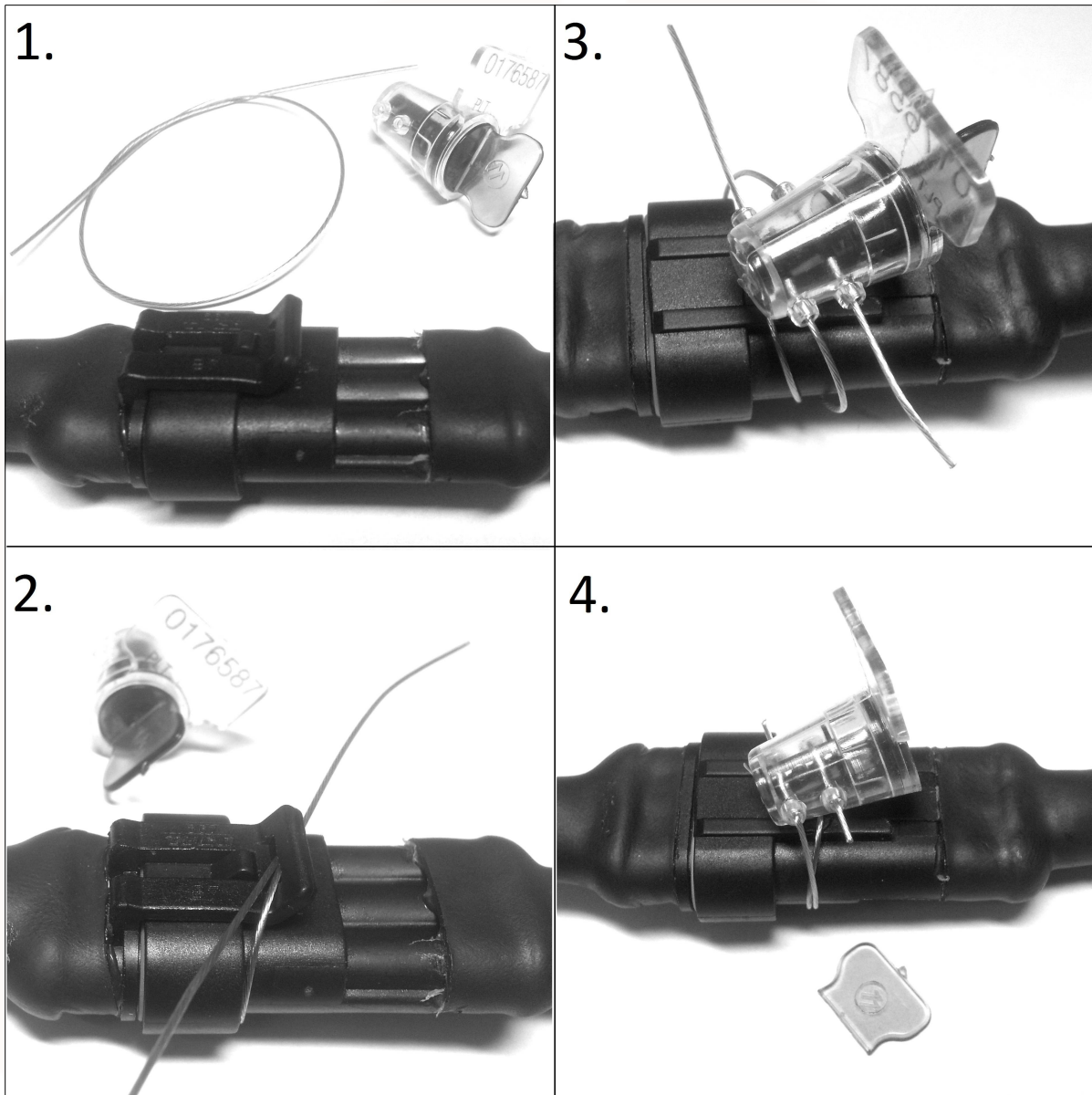
40

50

Sealing procedure



Picture 4. fuel level sensor sealing



Picture 5. connection sealing

Main view, pinout and wire colors

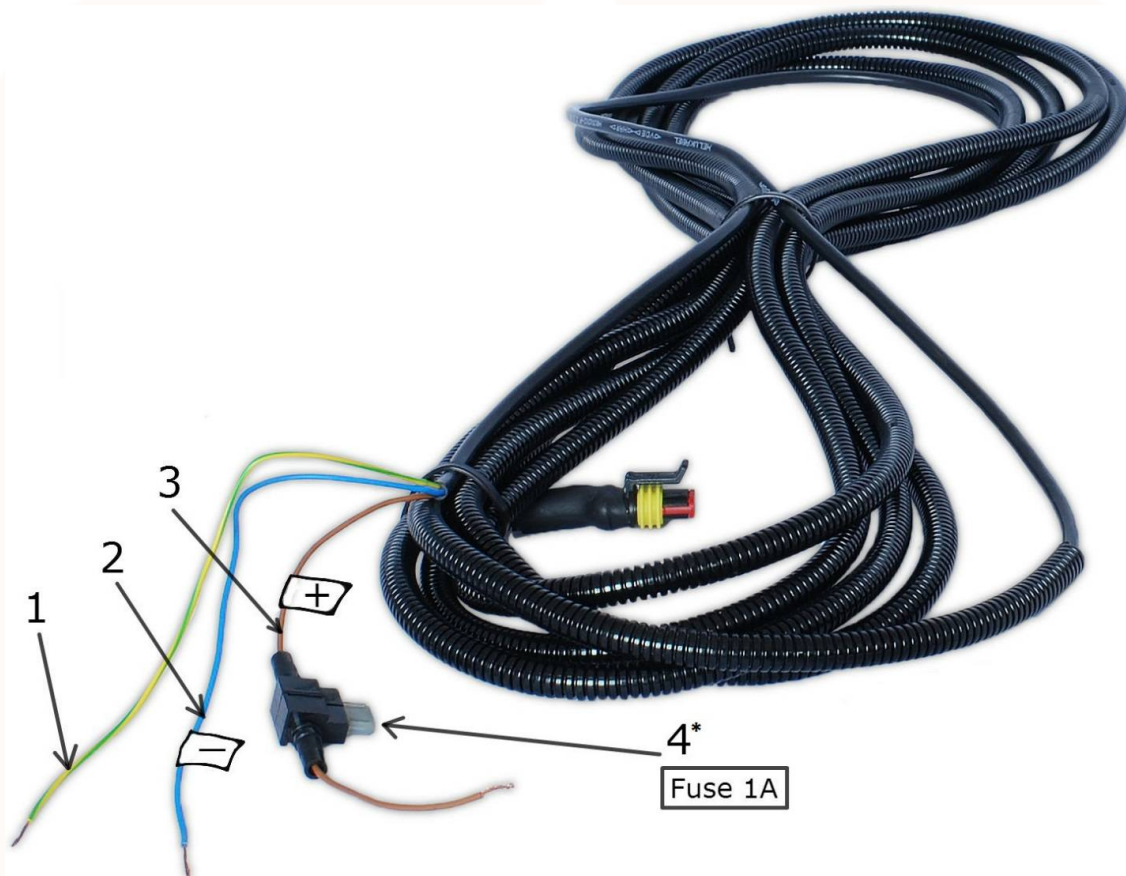


Picture 6. EFLS-A model view and pigtail with 3-pin male part connector



Picture 7. EFLS-A connector terminals location view.

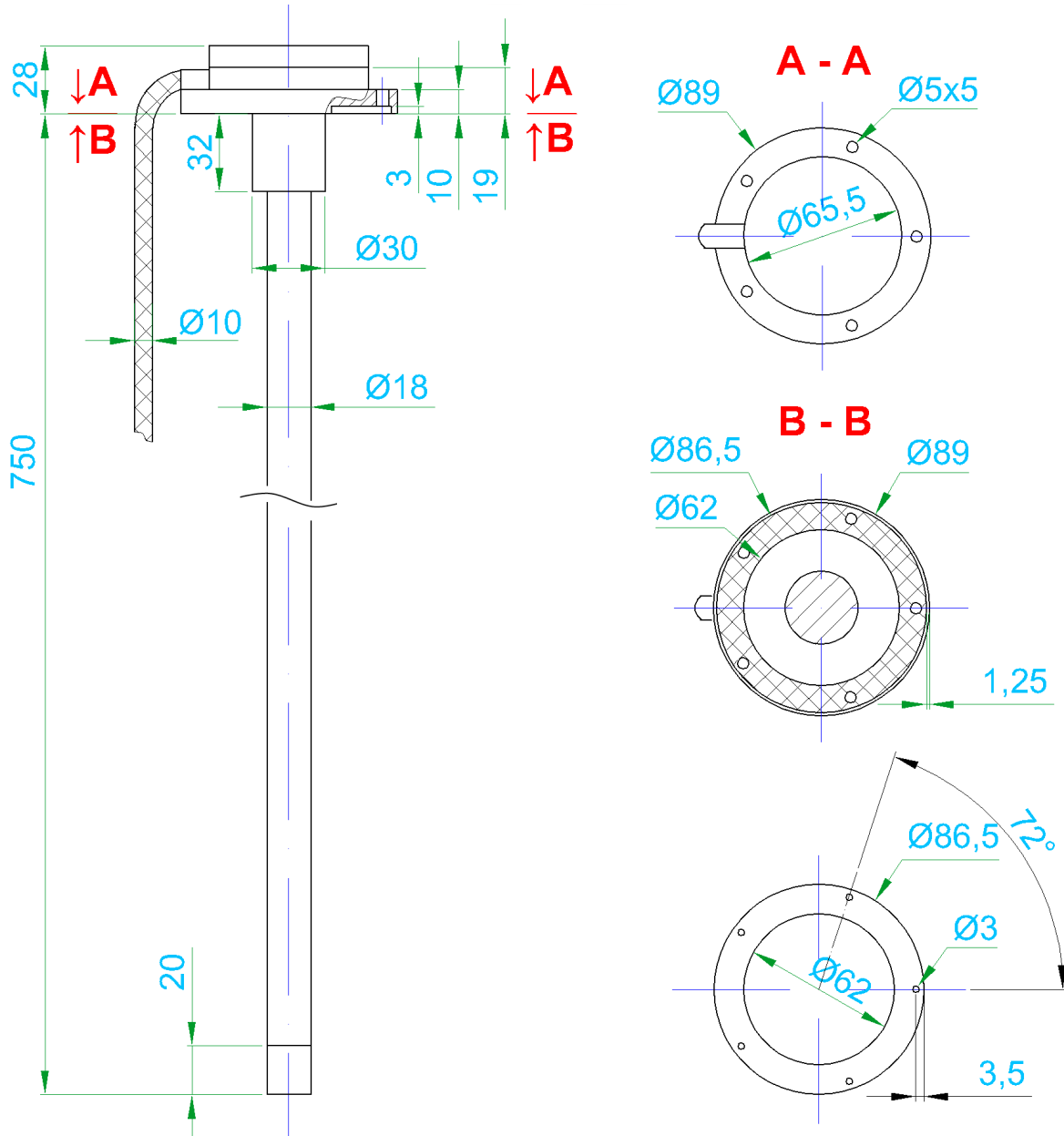
7,2 meters extender cable is supplied in set with EFLS-A sensor. It is protected by plastic corrugated tube with 3-pin female part connector on one side and 3 loose wires on the other side (see picture below).



Picture 8. View of the ends of the extender cable.

Table 3—connection cable wires assignment

Pin number	Wire marking	Wire color*	Assignment
1	GND	Blue	Ground
2	PWR (12-30V)	Brown	Power supply “+”
3	Output	Green/yellow	Output signal
4**	1 A Fuse		
* Manufacturer reserves the right to modify wire colors			
** 1A fuse must be marked with label „ FUSE 1A ”, during the device wiring			



Picture 9. EFLS-A main view with dimensions