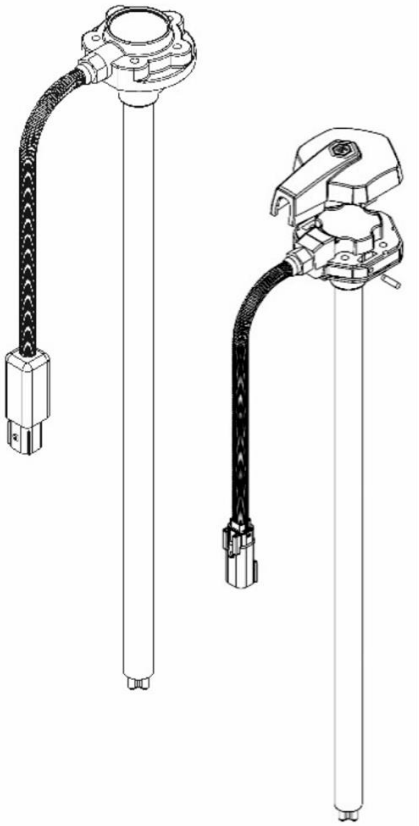


Capacitive Fuel Level Sensor ESCORT TD-500

TEMG.407622.500 DS

DATASHEET

Serial number S
Date D

1 GENERAL PRODUCT INFORMATION

1.1 Capacitive fuel level sensor ESCORT TD-500 (hereinafter referred to as 'Sensor', 'ESCORT TD-500', 'TD-500', 'Device'), measures the level of light oil derivatives in vehicle or stationary (bulk storage) tanks. The Device is designed to measure and monitor the fuel and similar light oil derivatives in the tanks of vehicles, machinery units and storage tanks.

1.2 The ESCORT TD-500 measures the level of light oil derivatives based on the dielectric permittivity of the liquid. The Sensor's measurement part or the measurement tubes function as two electrodes. The tubes are coaxial and have different diameters. When the space between the tubes is filled with any liquid, the Sensor registers that based on the change in the difference between the electric potential of both tubes. When any liquid that has low dielectric permitiivity fills the space between the Sensor's measurement tubes, the capacity of the TD-500's capacitor increases. The measured capacity level is then transmitted to an external device either via the digital interface RS-485 or as frequency or analog output.

1.3 The TD-500 has an additional analog output suitable for connection to certain default fuel indicators of vehicles and a discrete output that can be used for connection with an external alarm device (f.e. Buzzer or signal light).

1.4 The ESCORT TD-500 is designed to work with external devices that comply with the safety requirements for electronic devices used in explosive environments stated. The anti-explosion markings are shown and explained further below.

1.5 The X symbol in the Ex mark (see Table 1) confirms that when operating the sensor the following rules and requirements are to be followed and met:

• the Sensors can be connected only to the devices that are certified as safe for use in hazardous and/or explosive areas and that comply with the requirements of the TP TC 012/2011. The output voltage, amperage and wattage of such devices must not exceed that maximum input characteristics of the Sensor. The external permissible inductance and electrical capacitance of intrinsically safe circuits of such devices must not be less than the maximum values of internal inductance and electrical capacitance of intrinsically safe circuits of the Sensor, taking into account the characteristics of the communication line (cable);

• connection of the Sensor's cable in the hazardous area in a box with an appropriate level of explosion protection. The extension cable of the Sensor must be protected from any physical damage;

• the extension cable must be installed at a safe distance from any moving parts of vehicles or machinery units. In the absence of additional insulation of extension cable's wires, use non-combustible polymeric corrugated tubes used in motor vehicle equipment.

1.6 DO NOT USE THE SENSOR IN CONDUCTIVE LIQUIDS (WATER, DAIRY PRODUCS).

1.7 DO NOT DISASSEMBLE THE SENSOR!

1.8 DO NOT USE THE DEVICE UNDER THE OPERATING CONDITIONS DIFFERENT FROM THE STATED IN THE PRESENT DATASHEET!

1.9 AVOID PHYSICAL DAMAGE TO THE DEVICE, ITS PARTS OR WIRES DURING THE INSTALLATION AND USE.

2 TECHNICAL CHARACTERISTICS

Table 1 – Technical characteristics ESCORT TD-500

Parameter	Value / units
Power supply voltage, V	7 ... 40
Power consumption (current) , mA, not more than	30
Discrete output's voltage,	0 ... 40
Alarm signal output's voltage, V	0 ... 40
The margin of error within the measurable range,%	±1
Operating mode	Digital, frequency and analog
Digital outputs: - Communication interface - Data exchange protocol - data exchange baud rate, bps	 RS-485 LLS 19200
Output data range: - digital data, c.u. - frequency, Hz - analog output, V	 1 ... 4095 300 ...4395 ± 100 0 ... 5
Ingress protection markings	IP 69S
Electric shock resistance rating	Class III
Explosion protection type	«ia» level intrinsically safe circuit
Explosion proof mark	0Ex ia IIB T6 Ga X
Operating hazardous environment	categories IIA, IIB,
Operating conditions: - operating temperature range, °C - extreme operating temperature range, °C - operating atmosphere pressure, kPa - extreme operating atmosphere pressure, kPa	 from -45 °C to 50 °C from -50 °C to 60 °C from 84 to 106.7 from 57 to 110
Length of measurement part, mm	from 150 to 6000
Dimensions, mm, not more than Housing's diameter Housing's height Housing's height with protecting cap Sensor's length	 design 1 - Ø 75 design 2 - Ø 80 design 1 - 27 design 2 - 32 design 1 - 27+L* design 2 - 32+L*
Weight, not more than, kg	0,35+0,4xL
* L - length of sensor's measurement tubes	

Table 2 - Parameters of intrinsically safe circuits

Item	Value		
Clamps	x3-x4 +Upow and GND	x12-x13 A and B RS-485	Analog output (for default vehicle's indicator) (S)
Max input voltage Ui, V	40	from -7 to 7	40
Max input amperage Ii, mA	30	125	90
Max input power Pi, W	1.2	1.75	1.2
Max input capacity Ci	0,27 μF	0,01 nF	0.01 nF
Max input inductance Li, mH	0.01	0.01	0.01
Cable's specific inductance Lc, нН/m	7		
Cable's specific inductance Lc, pF/m	1.4		
Max extension cable's lenght, m	7		

3 SCOPE

Table 3 – Scope ESCORT TD-500

Item	Nr.	S/ № of the	Notes:
Ver.1:			
Sensor ESCORT TD-500 TEMG.407622.500	1		
Installation kit TEMG.407911.004	1		
Datasheet TEMG.407622.500 DS	1		
Ver.2:			
Sensor ESCORT TD-500 TEMG.407622.500-01	1		
Installation kit TEMG.407911.005	1		
Datasheet TEMG.407622.500 DS	1		

4 SAFETY PRECAUTIONS

Observe general safety instructions for works with electrical devices during the sensor installation, operation and maintenance.

5 SERVICE AND SHELF LIFE, WARRANTY

5.1 Guaranteed service life is 5 years from the date of shipping from the factory.

5.2 Service life - 10 years.

5.3 The manufacturer guarantees compliance of the sensor with specification requirements, provided that the operation, transportation and storage conditions are observed by the Customer.

5.4 In case of any failure detection, contact the manufacturer.

5.5 Products with defects caused by the Customer's fault due to failure to observe the operation, transportation and storage conditions are not covered by the warranty.

5.6 The manufacturer reserves the right to change product design and scope of delivery without prior notice.

6 ACCEPTANCE CERTIFICATE

The capacitive fuel level sensor ESCORT TD-500 serial number _____S_____ is manufactured in accordance with the requirements of TEMG.407622.500 TU and the current technical documentation and is recognized as suitable for operation.

7 PACKING CERTIFICATE

The capacitive fuel level sensor ESCORT TD-500 serial number _____S_____ is packed_____D____ in accordance with the current technical documentation.

8 INSTALLATION CERTIFICATE

Capacitive fuel level sensor ESCORT TD-500 serial number _____S_____ is installed in accordance with the current technical documentation for the device:

name	identification number / state number	
signature	/ Full Name /	day, month, year
remarks		

9 VERIFICATION INFORMATION

9.1 Primary verification

DATE	RESULTS	VERIFICATION OFFICER SIGNATURE	VERIFICATION OFFICER SEAL

9.2 Recurrent verification

DATE	RESULTS	VERIFICATION OFFICER SIGNATURE	VERIFICATION OFFICER SEAL

10 TRANSPORTATION AND STORAGE

The sensor shall be transported in the original packaging in enclosed vehicles. To store in a dry place at a temperature of -20 to +30°C and humidity up to 75%. Conductive dust, aggressive substances and their vapors causing corrosion of parts and destruction of electrical insulation of the product are not allowed in storage rooms.

11 DISPOSAL

11.1 Device shall be disposed of by the customer in accordance with the regulations applicable in the Russian Federation.

11.2 The Device does not contain any hazardous materials.

11.3 The Device does not contain precious metals in the amount to be declared and accounted for.

12 INSTALLATION SPECIFICS (ON VEHICLES)

12.1 The length of the measurement tubes of the Sensor must be specified when placing the order.

12.2 If necessary, the tubes can be cut with a hacksaw, however, avoid metal shaving getting inside the tubes. The min length to cut the Sensor must be not shorter than 150 mm. If the Sensor is cut shorter, it will still work just fine, however, in case of installing the Sensor that short in a vehicle's tanks getting comprehensible reports is highly unlikely due to the magnitude of fuel fluctuations inside such Sensor's tubes during the movement.

12.3 Be sure to insert the plastic centrator into the tubes (see. Annex 8).

12.4 Set max and min level (calibrate the sensor at full and empty tubes) using a USB-RS485 interface converter and the ESCORT configuration tool or mobile app. Find more information in the User Manual.

12.5 Install the Sensor in the tank placing the gasket from the installation kit between the sensor's flange and the tank's top surface. If necessary, apply automotive neutral (non-acidic) oil-resistant sealer.

12.6 When installing the Sensor be sure to check the recommendations provided in the User Manual and the Annex 8.

12.7 In case the Sensor’s wires and the extension cable are not fitted with a corrugated hose or other means of additional insulation, be sure to provide them with such by covering them with a corrugated hose or any other means of insulation. Avoid placing the cables close to any sources of heat.

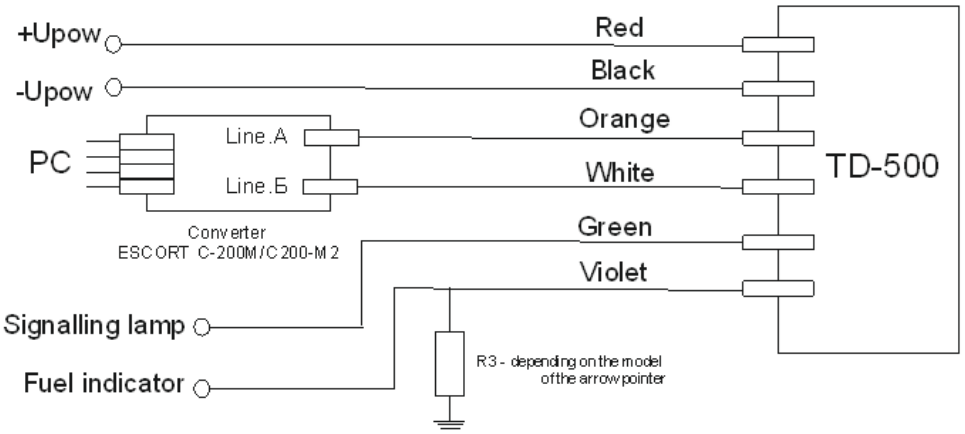
12.8 To connect the Sensor to the vehicle's default fuel indicator or to the min level alarm device (signal light or buzzer), use the default wires of the device to which the Sensor is to be connected.

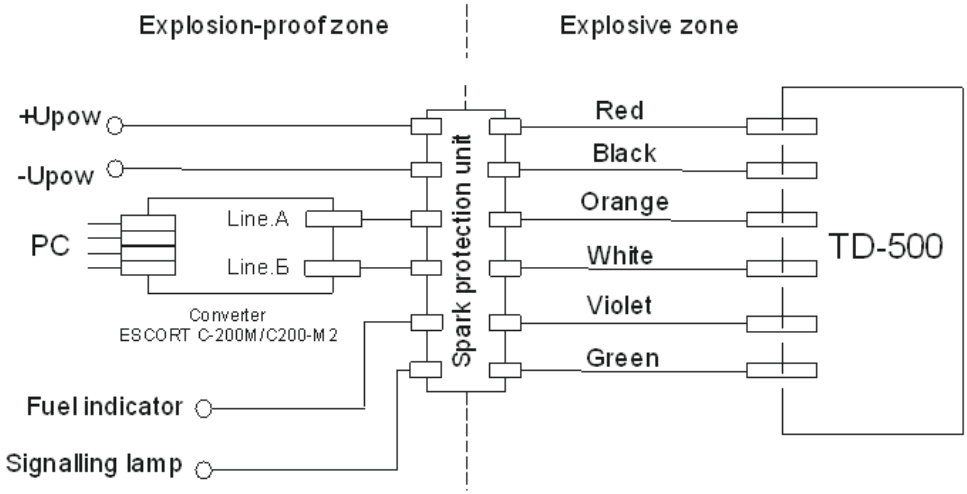
12.9 For more information about the Device see the Annexes 1 - 9.

ATTENTION! Full calibration value must be set when the measurement tubes of the Sensor are filled with fuel up to the drainage holes.

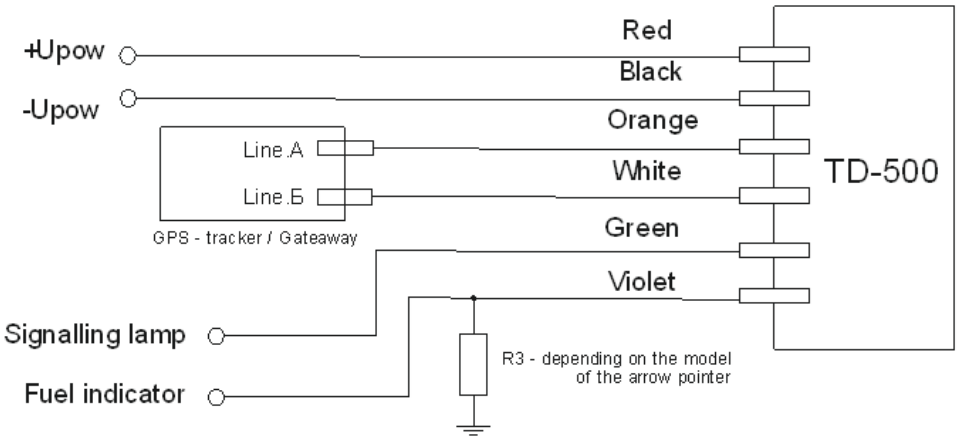
ATTENTION! The sensor longer than 2 m must be installed with a bottom detent included in the installation kit.

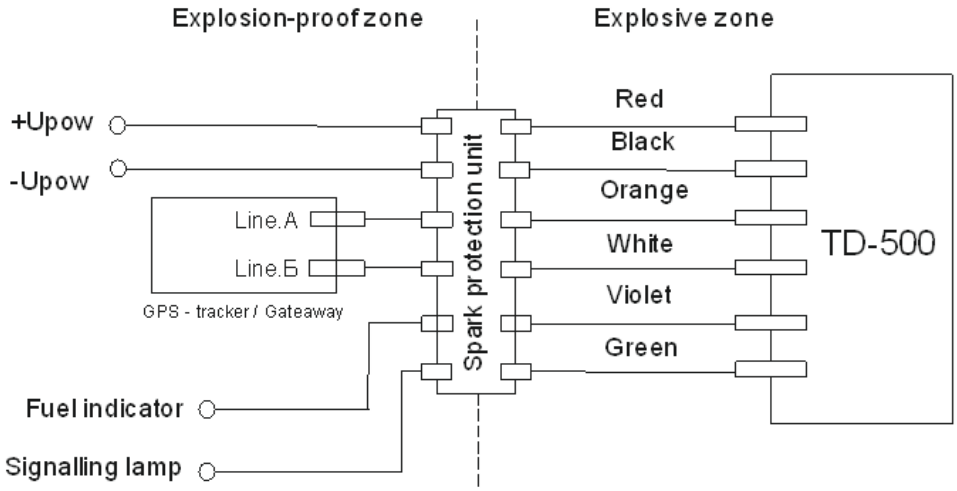
ANNEX 1. Wiring graph of the Sensor's connection to PC



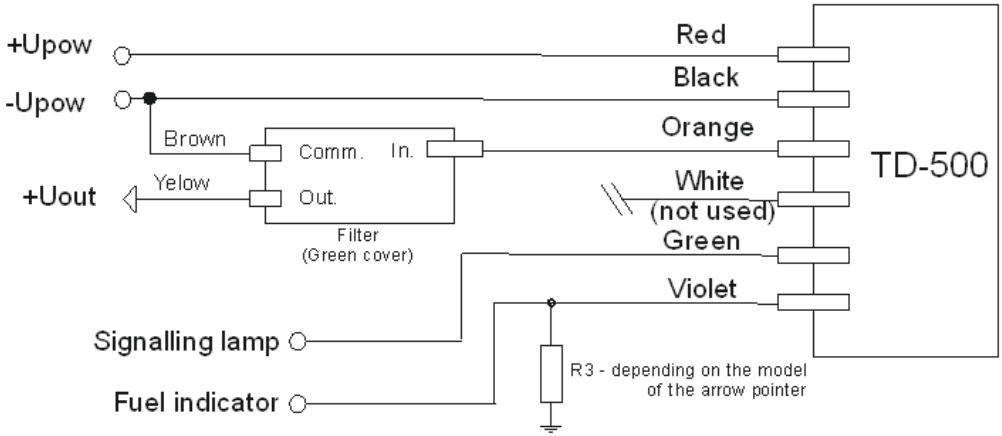


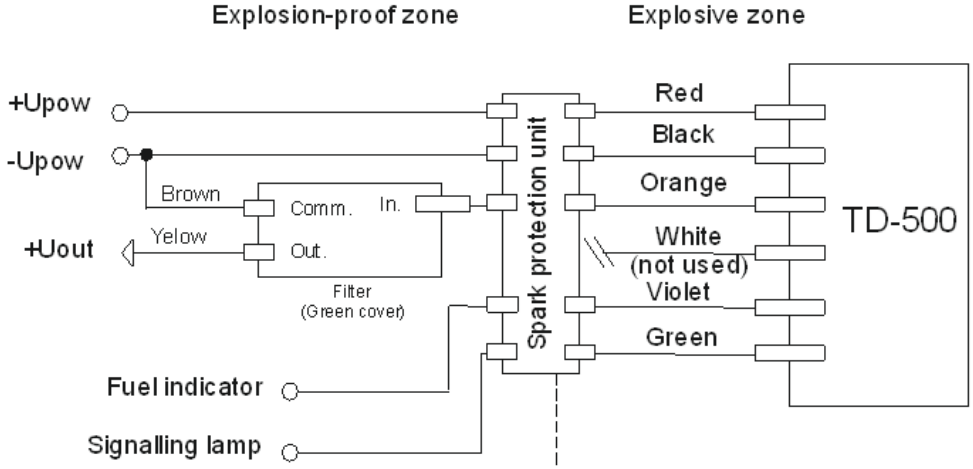
ANNEX 2. Wiring graph of the Sensor's connection via RS-485 interface



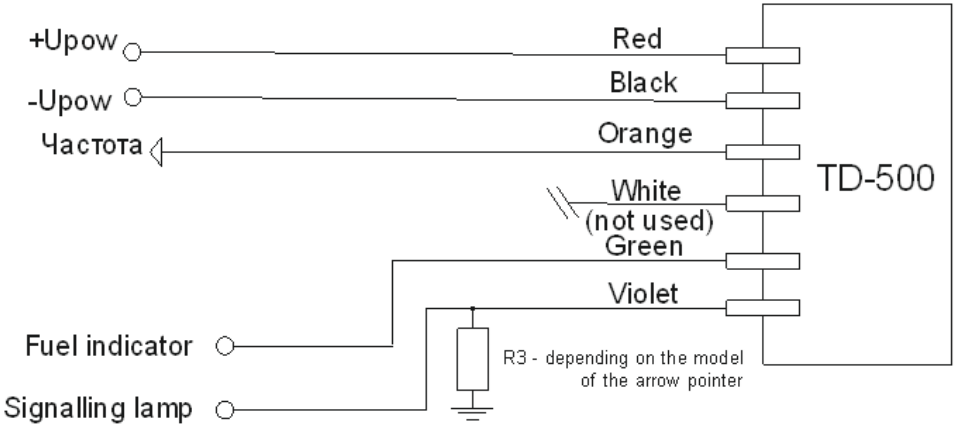


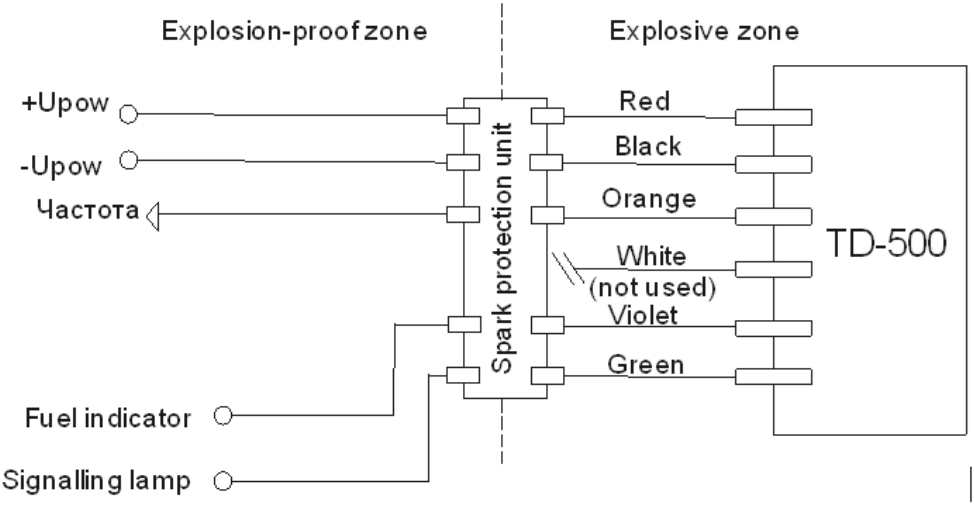
ANNEX 3. Wiring graph of the Sensor's connection via analog output



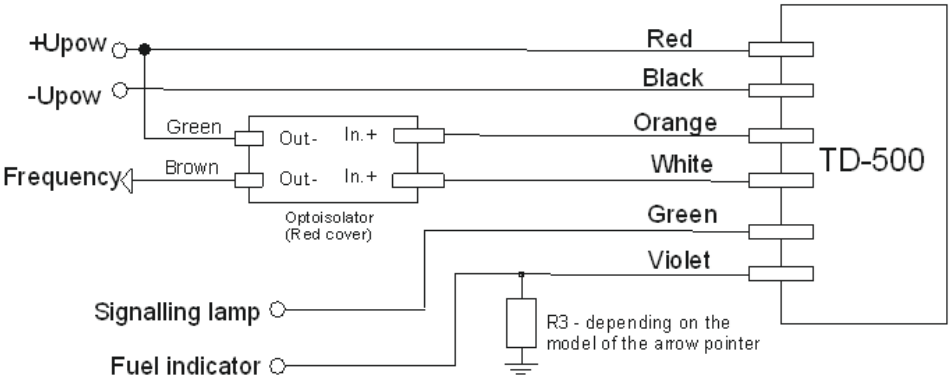


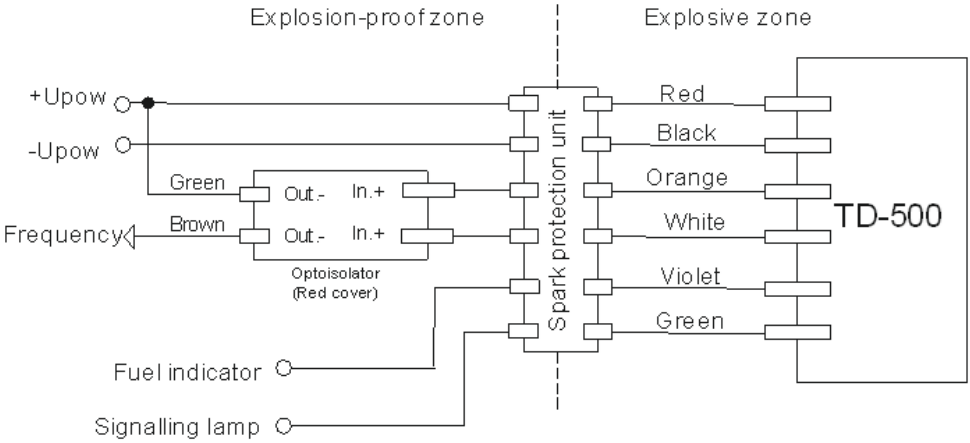
ANNEX 4. Wiring graph of the Sensor's connection via frequency output



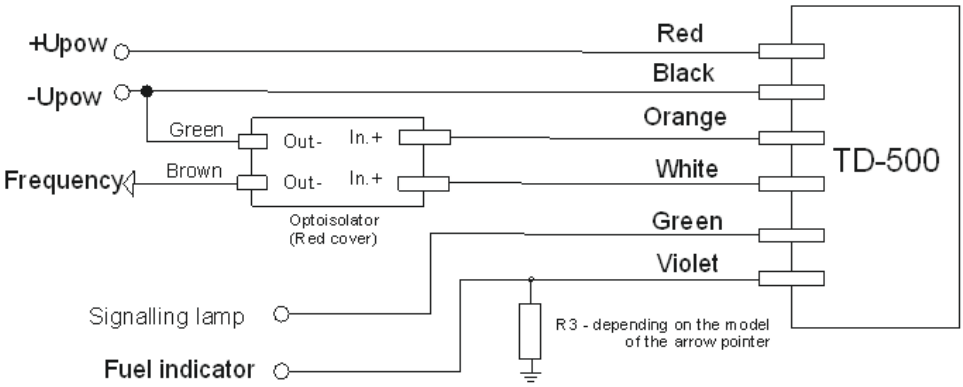


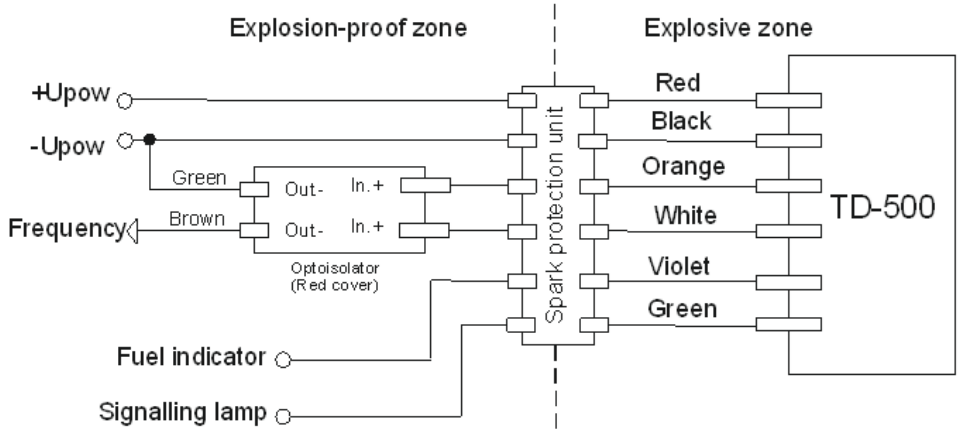
ANNEX 5. Wiring graph of the Sensor's connection via frequency output amplified by the power input



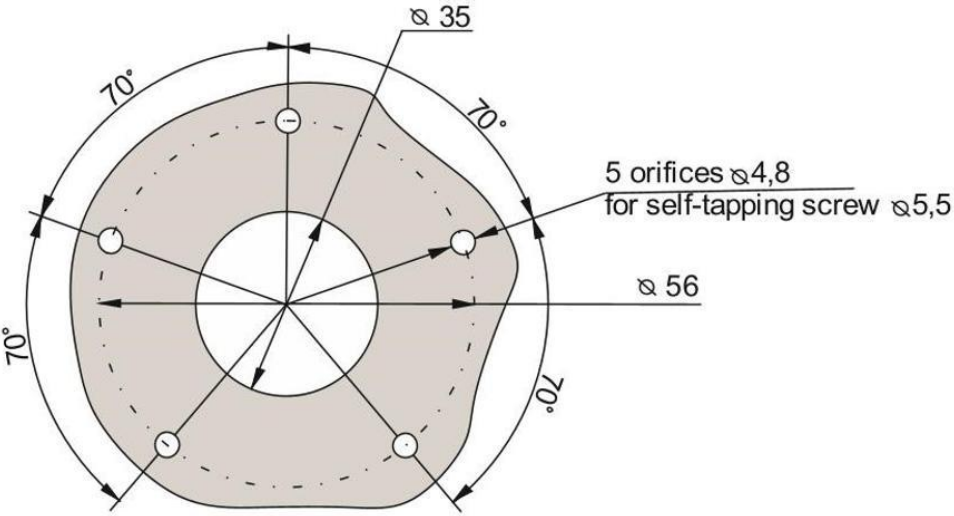


ANNEX 6. Wiring graph of the Sensor's connection via frequency output amplified by the GND



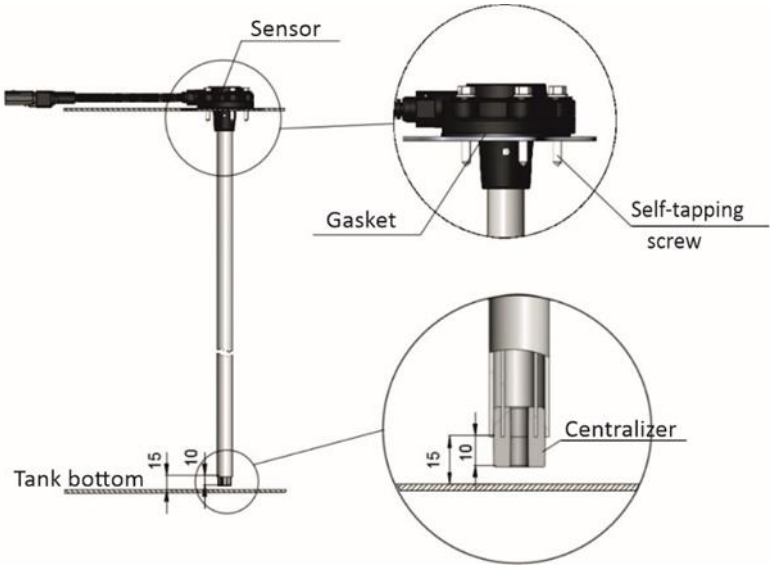


ANNEX 7. Mounting dimensions for the installation in the default installation spot

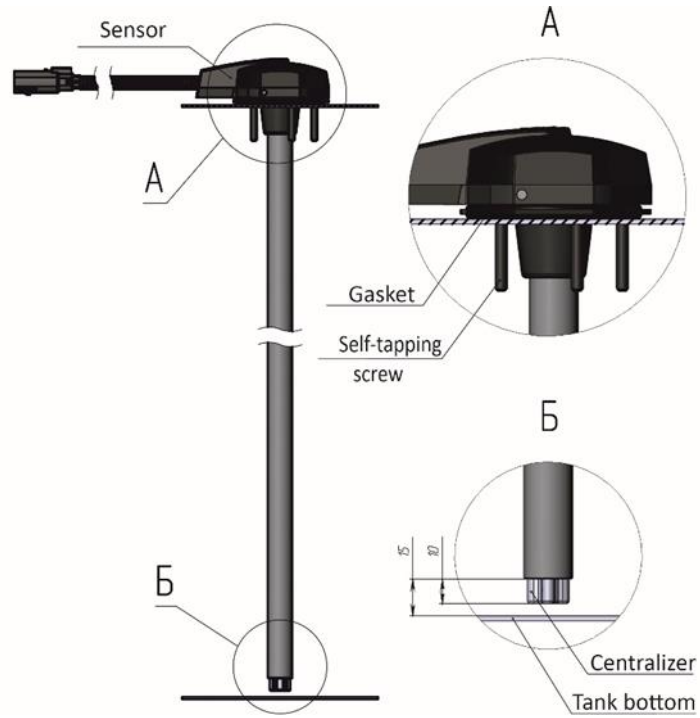


Design 1, 2

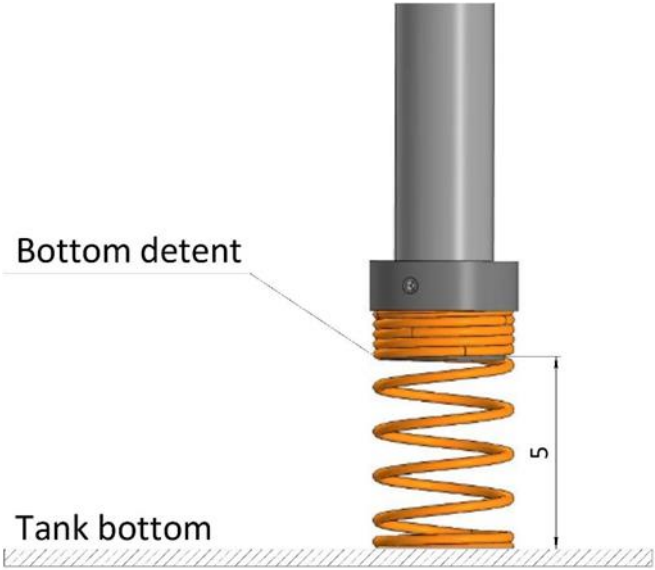
ANNEX 8. Sensor installation in a tank



Design 1

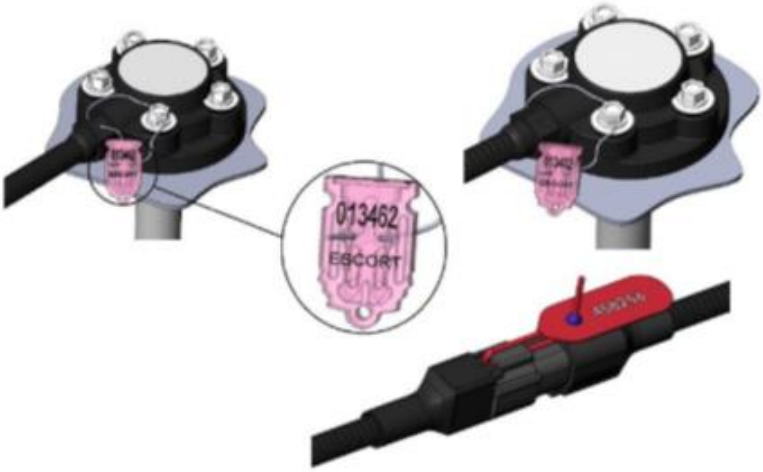


Design 2



Bottom detent installation

APPENDIX 9. Sensor head and cable connection sealing methods



Design 1.

1)

2)

Design 2.

For notes