

**Capacitive level
sensor ESCORT TD-150**

TD.150012.000 DS

DATASHEET



1 GENERAL PRODUCT INFORMATION

Full product name: Capacitive level sensors
ESCORT TD-150

Short product name: TD-150

Design documentation designation: TD.150012.000

Device serial number:

Product version:

Date of manufacture:

Manufacturer:

2 MAIN CHARACTERISTICS

2.1 The capacitive level sensor ESCORT TD-150-(BLE) (hereinafter referred to as TD-150 or the sensor) determines the level of light oil derivatives in reservoirs (storage tanks). It is used as a fuel level sensor in vehicle and storage tanks.

2.2 The sensor converts the calculated fuel level into a digital code, frequency or analog signals.

2.3 The sensor is a complete, finished solution intended for use in hazardous areas of Zones 0, 1 and 2 according to IEC 60079-10-1, with explosive gas groups IIA and IIB according to IEC 60079-20-1, in accordance with the explosion-protection marking.

2.4 To ensure explosion protection, it is necessary to connect a resistor of the appropriate rating to the power supply circuit; the inclusion of a resistor into the installation kit depends on the scope of delivery.

2.5 To prevent unauthorized access, the sensor must be sealed. Sensor sealing methods are shown in Appendix 1.

2.6 DO NOT USE THE SENSOR TO MEASURE THE LEVEL OF ELECTRICALLY CONDUCTIVE LIQUIDS IN A RESERVOIR (E.G. WATER OR DAIRY PRODUCTS).

2.7 DO NOT DISASSEMBLE THE SENSOR!

2.8 DO NOT EXCEED THE OPERATING CHARACTERISTICS SPECIFIED IN THIS DATASHEET!

2.9 PREVENT MECHANICAL DAMAGE TO SENSOR COMPONENTS, INSTALLATION WIRES AND CABLES DURING INSTALLATION AND OPERATION.

3 SPECIFICATIONS

Table 1 - Technical characteristics of ESCORT TD-150

Parameter	Value / units
Power supply voltage, V	7 to 80 ¹⁾
Current consumption, mA, no more than	30
Power consumption, W, no more than	0.4
Reduced measurement error in the effective range	no more than 1% UML ²⁾
Operating modes: 1) Digital modes: a) wired communication channel: - interface - data communication protocol - data communication rate, bps - LLS output signal range, units b) wireless communication channel: - interface - data communication protocol 2) Frequency mode: - output signal range, Hz 3) Analog mode: - output signal range, V - output signal range, $\sqrt{3}$	RS-485 LLS 19200 0 to 1023 or 4095 Bluetooth LE (BLE) ³⁾ Escort BLE ³⁾ 300 to 1323 or 4395 0.2 to 9 0.02 to 20
Receiver sensitivity /transmitter power, dBm	-96 ³⁾ / 4 ³⁾
Operating frequency range of the wireless communication channel, GHz	2.402 to 2.480 ³⁾
1) the maximum permissible voltage value for intrinsically safe electrical equipment installed in a hazardous area is 40 V; 2) UML - upper measurement limit; 3) for sensors with the additional wireless data transmission option.	

Continuation of Table 1

Parameter	Value / units
Ingress protection rating according to IEC 60529	IP69S
Electric shock protection class according to IEC 61140	Class III
Type of explosion protection	intrinsically safe electrical circuit, level "ia"
Explosion proof mark	0Ex ia IIB T6 Ga X
Explosive mixture groups according to IEC 60079-20-1	categories IIA, IIB
Hazardous areas according to IEC 60079-10-1	0; 1 and 2
Operating conditions: - ambient temperature, °C - extreme ambient temperature, °C - air pressure, kPa	-45 to +50 -60 to +85 84 to 106.7
Dimensions, mm, no more than	80 x 80 x (L+21), where L is the sensor length in mm
Nominal sensor length	is indicated on the label (pasted in the datasheet)
Weight, kg, no more than	$0.35 + 0.4 \times L$, where L is the sensor length in meters

The X sign after the Ex marking means that the following special conditions must be observed during operation:

- Devices connected to the sensors must have the appropriate explosion-protection marking and certification in accordance with applicable international explosion-protection requirements. The output voltage, current and power of such devices must not exceed the corresponding maximum input values of the sensors.

The permissible external inductance and capacitance of the intrinsically safe circuits of such devices must be not less than the maximum internal inductance and capacitance of the intrinsically safe circuits of the sensors, taking into account the parameters of the communication line (cable);

- the free end of the sensor cable in a hazardous area must be connected inside a junction box with the appropriate explosion-protection level. The cable must be protected from mechanical damage;

- connecting cables must be routed away from moving parts and parts heated during operation of the equipment. If the connecting cable wires do not have additional insulation, use flame-retardant corrugated polymer tubing suitable for automotive engineering.

Table 2 - Metrological characteristics of the TD-150 level sensor

Parameter	Value
Level measurement range depending on the length of the sensing element (the tubes), mm	
- vehicles	0 to 2500
- stationary tanks	0 to 6000
Sensing element length (the tubes), mm	150 to 6000
Limits of permissible reduced error of level measurement relative to the measurement range (0 to 1023 or 4095), %	± 1

Table 3 - Parameters of intrinsically safe circuits

Parameter	Value		
Terminals	x3-x4 +Upow and GND	x12-x13 A and B	x5-x4 Analog out- put
Maximum input voltage U_i , V	40	12.5	10
Maximum input current I_i , mA	30	2.5	50
Maximum input power P_i , W	1.2	0.08	0.01
Maximum internal capacitance C_i	0.27 μF	0.01 nF	0.01 nF
Maximum internal inductance L_i , mH	0.01	0.01	0.01
Specific inductance of the cable L_c , nH/m	7		
Specific capacitance of the cable C_c , pF/m	1.4		
Maximum cable length, m	7		

4 SCOPE OF DELIVERY

Table 4 - Scope of delivery of ESCORT TD-150

Parameter	Qty.	Ser. No.	Notes
Capacitive level sensor ESCORT TD-150	1 pc.		
Configuration device ESCORT C-200	1 pc.		
Installation kit TEMG.407911.001	1 set		
Datasheet TD.150012.000 DS	1 copy		In electronic form
Operating Manual TD.150012.000 OM	1 copy		
Notes: - The composition of the installation kit is determined when placing an order; - Configuration device ESCORT C-200M2 is supplied at a request; - The Operating Manual is supplied at a srequest.			

5 SAFETY PRECAUTIONS

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

6 LIFE CYCLES, SERVICE AND SHELF LIFE, WARRANTY

6.1 Guaranteed service life is 5 years from the date of shipment from the factory.

6.2 Service life - 10 years.

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

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

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

6.6 The manufacturer reserves the right to make changes in the design and scope of delivery of the product without prior notice to the customer.

7 ACCEPTANCE CERTIFICATE

Capacitive level sensor ESCORT TD-150(-BLE) ser. No. _____ is manufactured in accordance with the current technical documentation and qualified for operation.

Date of release _____

QC manager

Seal

_____/_____
signature full name

year, month, day

cut line for export supply

Company manager

document designation,
under which delivery is performed

Seal

_____/_____
signature full name

year, month, day

Customer (if applicable)

Seal

_____/_____
signature full name

year, month, day

8 PACKING CERTIFICATE

Capacitive level sensor ESCORT TD-150(-BLE) ser. No. _____

Packed by _____
manufacturer name or code

in accordance with the requirements provided in the current technical documentation.

Date of packing _____

Packed by
_____/_____
position signature full name_____
year, month, dayPacking accepted by
_____/_____
position signature full name_____
year, month, day

9 INSTALLATION CERTIFICATE

Capacitive level sensor ESCORT TD-150 ser. No. _____

is installed in accordance with the current technical documentation on the equipment:

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

10 VERIFICATION INFORMATION

10.1 10.1 Initial verification

Date	Conclusion	Verification officer signature	Verification officer seal

10.2 10.2 Periodic verification

Date	Conclusion	Verification officer signature	Verification officer seal

11 TRANSPORTATION AND STORAGE

The sensor is transported in factory packaging by enclosed transport. Store in dry rooms with humidity not more than 75% at a temperature from -20 to +30°C. Storage rooms must not contain current-conducting dust, aggressive substances or their vapors that cause corrosion of parts and destruction of electrical insulation of the sensors.

12 DISPOSAL

12.1 The sensor should be disposed of by the operating company in accordance with the codes and regulations applicable in the country of operation.

12.2 The sensor does not include environmentally hazardous components.

12.3 The sensor does not contain precious metals in the amounts to be recorded.

13 CONSIDERATIONS RELATING TO INSTALLATION ON AUTOMOTIVE EQUIPMENT

13.1 Sensor length should be specified when placing an order.

13.2 If necessary, cut the measuring tubes with a hacksaw, avoiding chips in the measuring part. The minimum residual length of the measuring part should be at least 150 mm (recommended for mobile units).

13.3 Install the centralizer from the installation kit according to Appendix 2.

13.4 Set the upper and lower limit levels (perform full and empty calibration) using an interface converter (or via Bluetooth for the TD.150012.000-01 or TD-150-BLE variant). Detailed calibration information is provided in the Operating Manual on the wiki page.



13.5 Install the sensor using a sealing gasket between the sensor flange and the tank surface.

13.6 If there is no additional insulation (corrugated tube) on the sensor cable and connecting cable, lay them in additional insulation (corrugated tube), avoiding contact with heated parts of automotive equipment units.

13.7 When installing the sensor beyond the proper location, perform mounting according to Appendix 3.

13.8 The sensor connection diagrams are given in Appendices 4-8, where:

Fuse FU1 is intended to protect the power supply circuit of the product against short-circuit currents and overloads arising when permissible current values are exceeded.

Ballast resistor R1 is intended to limit current in the power supply circuit and ensure intrinsic safety. Depending on the requirements, resistors of the appropriate rating are used: a red resistor with resistance of 600 Ohm and supply voltage of 24 V, or a black resistor with resistance of 120 Ohm.

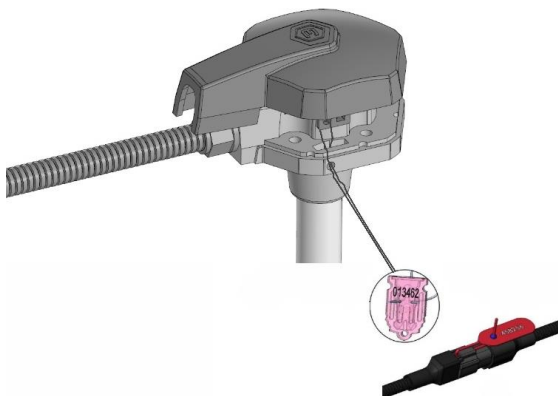
R2 is a pull-up resistor intended to form a stable signal level in the circuit.

ATTENTION! The fuel calibration of the sensor should be calibrated filling the sensor up to its drainage hole (10 mm from the sensor housing should be left free).

IMPORTANT! When installing a sensor with a length of 2 m or more, use the bottom detent from the installation kit according to Appendix 2.

14 AUTHORIZED SUPPORT

For technical support, contact your supplier or authorized representative.

APPENDIX 1**Sensor head and cable connection sealing methods**

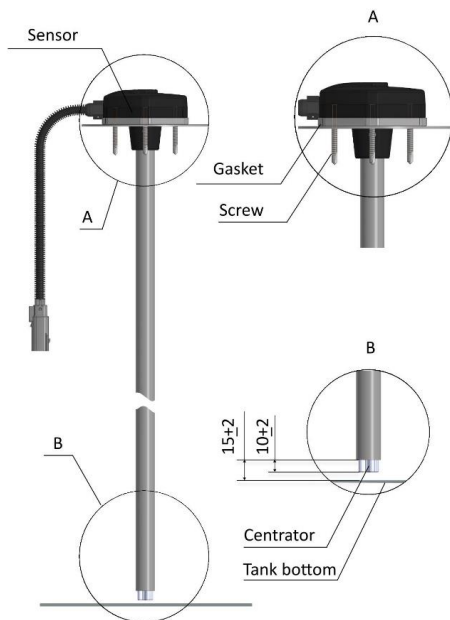
APPENDIX 1

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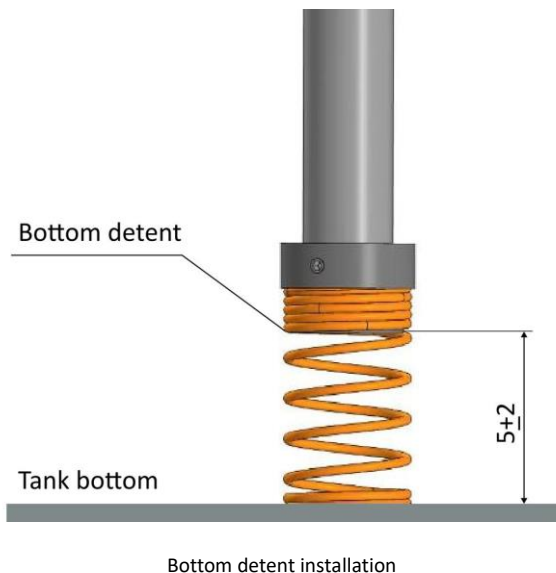
APPENDIX 2

Sensor installation on the tank



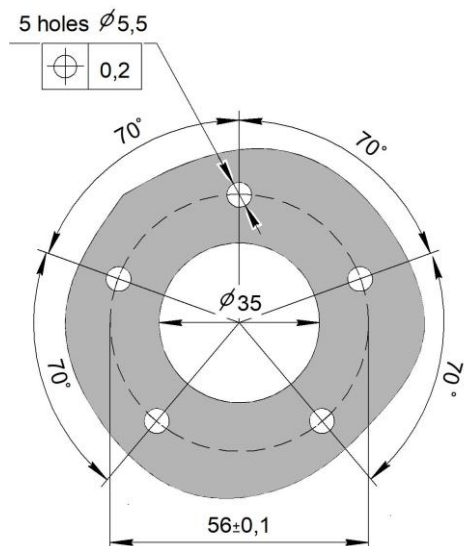
APPENDIX 2

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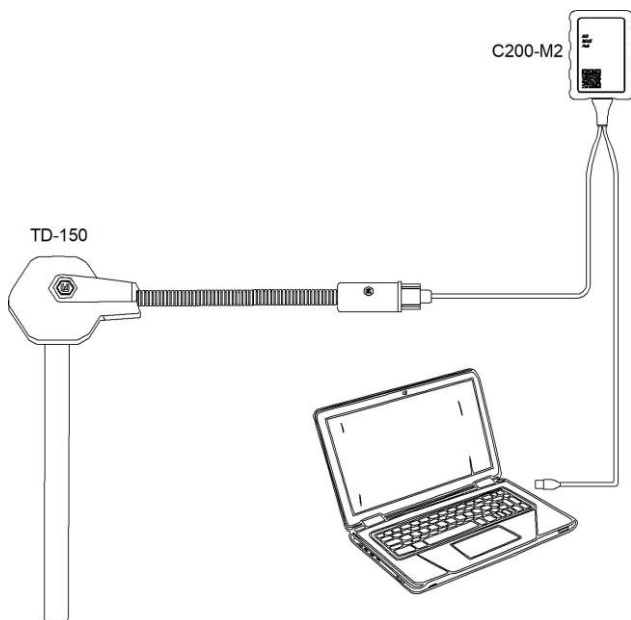
APPENDIX 3

Sensor installation dimensions beyond the proper location



APPENDIX 4

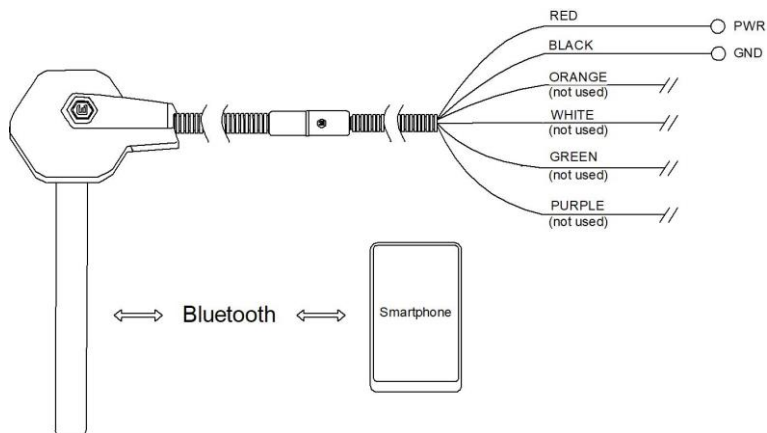
Sensor connection diagram in configuration mode



APPENDIX 4

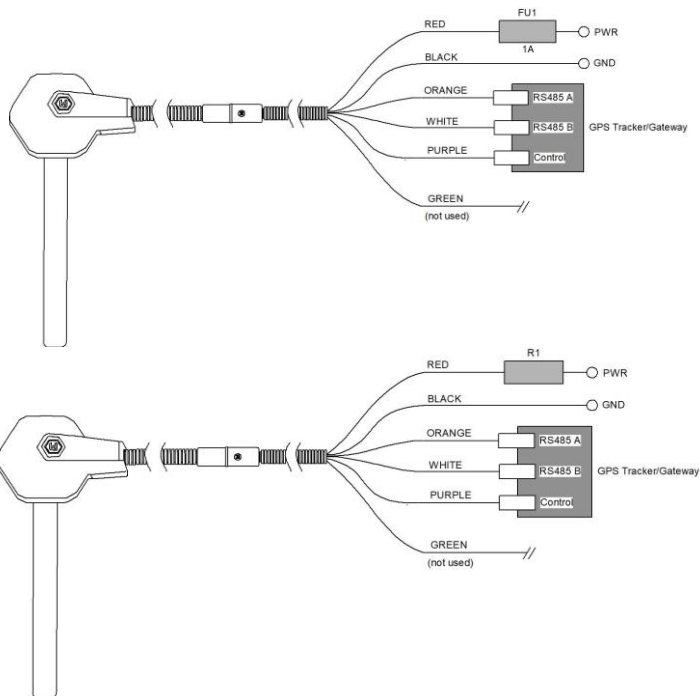
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For execution TD.150012.000-01 (TD-150-BLE)



APPENDIX 5

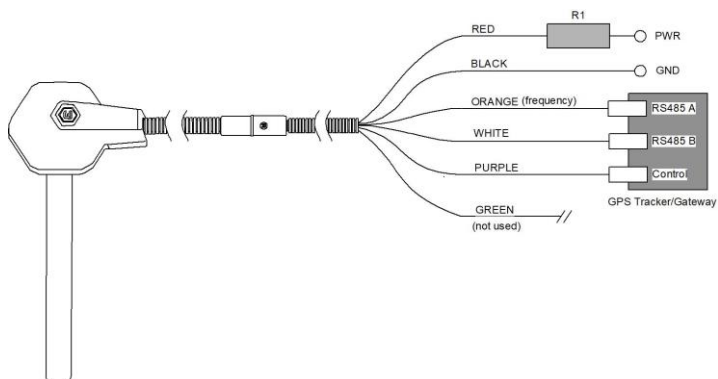
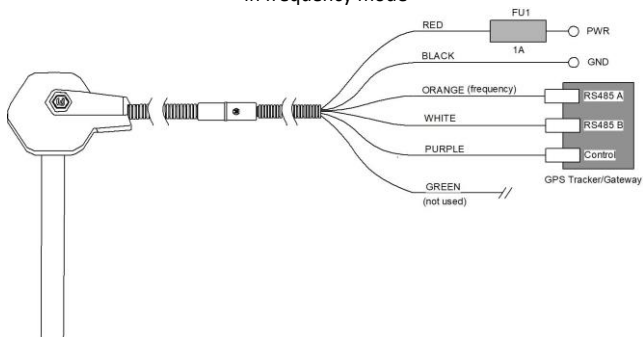
Sensor connection diagram in RS-485 mode to a navigation terminal



* The violet wire is intended for monitoring MOLEX connector state and/or cable breakage.

APPENDIX 6

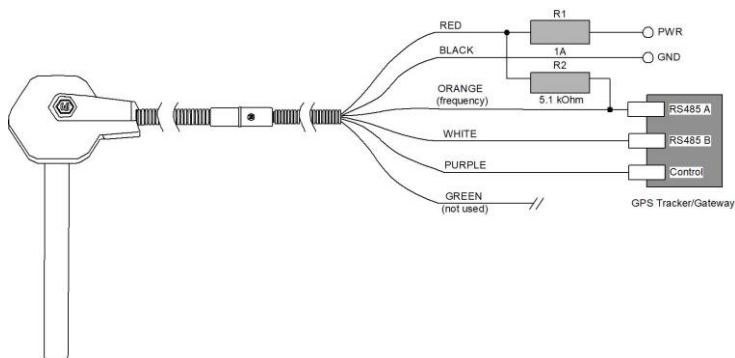
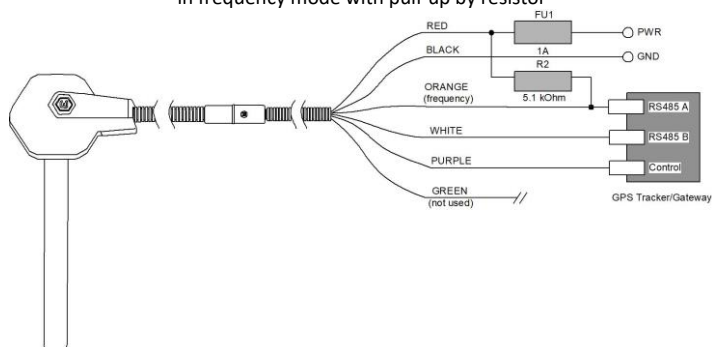
Sensor connection diagram to a navigation terminal in frequency mode



* The violet wire is intended for monitoring MOLEX connector state and/or cable breakage.

APPENDIX 7

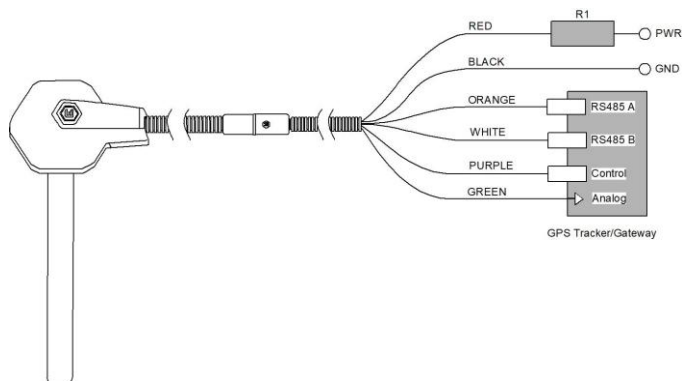
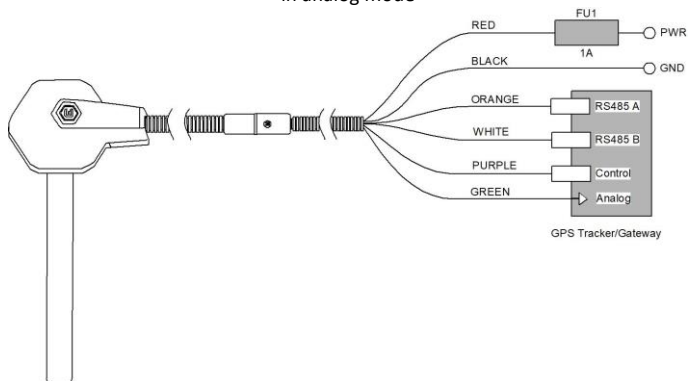
Sensor connection diagram to a navigation terminal
in frequency mode with pull-up by resistor



* The violet wire is intended for monitoring MOLEX connector state and/or cable breakage.

APPENDIX 8

Sensor connection diagram to a navigation terminal in analog mode



* The violet wire is intended for monitoring MOLEX connector state and/or cable breakage.

SPECIAL NOTES