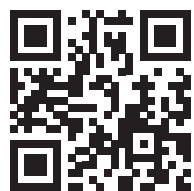


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PROFESSIONAL FLEET MANAGEMENT EQUIPMENT AND SOFTWARE

Sensors and peripherals



TKLS FUEL LEVEL SENSORS

History of TKLS fuel level sensors (TechnoKom Level Sensor) began in 2013 when Corporate Group TechnoKom had come to strategic decision to develop and manufacture own fuel level sensors. It wasn't an eventual decision, long years of third party fuel level sensors integration with own fleet trackers preceded it. For this time we have tested a great many of fuel level sensors and each of them to various extents had essential faults such as lack of functionality; weak protection of the enclosure, fastening and connectors from environmental loads and acts of vandalism; low reliability for the reason of using low-quality cheap components and materials – connectors, cables, flexible conduit and etc.; unstable output readings in different operation modes as the result of low-quality components application characterized with high sensitive of output readings to temperature and power supply voltage as well as low interference protection.

Communication with manufactures of fuel level sensors regarding further development in order to fix mentioned bugs and failures was unsuccessful. Still the most of fuel level sensors presented in the market had high price but didn't offer enough functionality and provided low reliability.

Eventually, in 2014 the TKLS fuel level sensor was brought into commercial operation. Before that for more than half a year the sensor was tested under actual operating conditions in different regions with the coldest and hottest climate. During tests, among other things, carried out in different types of machinery we collected and then implemented feedback from testers regarding further development and improvement of the sensor functionality.

Our long-term experience applied in design and development of the TKLS sensor as well as its long-time test operation and next enhancement made it possible to issue actually high-quality and functional product.

TKLS-L FUEL LEVEL SENSOR

Being the most cost effective variant for fuel control, this model still provides more capability as compared to the majority of analogue sensors in the market. Compact form factor makes the sensor perfectly suitable for installation on a wide variety of vehicles even in case of limited space between a fuel tank and a vehicle body as well as an extended scope of supply sufficiently simplifies the sensor installation. The TKLS-L sensor is produced in two modifications with different output interfaces: frequency output and RS-485 bus; analogue output and RS-232 bus.



Description \ Model	TKLS-L	
	F-RS485	A-RS232
Operating voltage, V	7...60	7...60
Operating temperature, °C	-40...+85	-40...+85
Fuel level measuring accuracy, at least %	± 1	± 1
Probe length variants, mm	750 / 1000 / 1500 / 2000	750 / 1000 / 1500 / 2000
Output interfaces	RS-485 / frequency	RS-232 / analogue
Communication protocols	LLS / ModBus / AGHIP	LLS
Inclination angle measuring range, degrees	-	-
Temperature measuring range, °C	-40...+85	-40...+85
Case protection class	IP69K	IP69K
Auto volume calibration	yes	-
Remote configuration and diagnostics via Bluetooth	-	-
Self-diagnostics	yes	yes
Inbuilt event logging	yes	yes
Settings protection by password	yes	yes

Description \ Model	TKLS
Operating voltage, V	7...60
Operating temperature, °C	-40...+85
Fuel level measuring accuracy, at least %	± 1
Probe length variants, mm	750 / 1000 / 1500 / 2000
Output interfaces	RS-485 / frequency
Communication protocols	LLS / ModBus / AGHIP
Inclination angle measuring range, degrees	0...180
Temperature measuring range, °C	-40...+85
Case protection class	IP69K
Auto volume calibration	yes
Remote configuration and diagnostics via Bluetooth	yes
Self-diagnostics	yes
Inbuilt event logging	yes
Settings protection by password	yes



Bluetooth Low Energy



TKLS FUEL LEVEL SENSOR

This is a premium class sensor with extremely wide functionality. An inbuilt Bluetooth module allows remote sensor configuration and diagnostics using the application on a smartphone without wire connections break and seals removal. With TKLS sensors you won't have to use additional equipment, the configuration and diagnostics will be easy and fast in any conditions! Besides that TKLS sensor is equipped with inbuilt accelerometer and inclinometer allowing transmission of fuel tank inclination angle for further analysis in fleet management software in order to exclude false fuel draining and filling.

DESIGN ADVANTAGES

At an early development stage one of the main tasks was the design of a reliable construction resist to vibrations and impact loads during exploitation, different environmental loads as well as acts of vandalism from persons uninterested in correct sensor operation.

MEASURING UNIT PROTECTION

An impact-proof thermal-resistant plastic cover supplied with the sensor provides additional protection from mechanical impacts and unauthorized access.

HIGH INGRESS PROTECTION RATE

The sensor form factor is absolutely sealed and provides IP69K ingress protection rate. Moreover unlike some analogue products in the market the TKLS sensor has a solid case excluding possibility of unauthorized access to electronic parts of the device.

EXTRA REINFORCEMENT OF CABLE FASTENING

Extra reinforcement of cable fastening is provided to exclude corrugated pipe tension and break at a point of connection to the sensor body during installation and exploitation.

ENVIRONMENTAL CABLE PROTECTION

Reliable protection and long life time of signal and power cables are provided due to the PVC coated interlock stainless steel flexible conduit and the Helukabel® polyurethane cables.

ADDITIONAL SPRING-LOADED BOTTOM STOP

Possibility to mount a spring-loaded bottom stop is provided in order to fix the measuring probes relative to tank bottom for the construction reinforcement.

RELIABLE PROTECTION OF CONNECTION CONTACTS

The most of existing fuel level sensors are characterized by weak connection plug not providing sufficient dust and moisture protection of connection contacts. In a while it produces sensor failure and transmitted data corruption. The TKLS sensor is equipped with the Molex® connector providing IP67 ingress protection rate and fulfilling tough automotive specifications.



FUNCTIONAL ADVANTAGES



CONFIGURATION AND DIAGNOSTICS VIA BLUETOOTH

This function is perfectly suitable for configuration and calibration of a sensor mounted on inconvenient and hard-to-get-at area of fuel tank (tractors, buses, special vehicles and etc.).

Due to this the sensor can be connected to a cable routing upon the installation then the following configuration and volume calibration can be carried out remotely via Bluetooth without any connection of the sensor to the programming tool and a laptop. There is no need in additional equipment, it's quite enough to install free application on iOS or Android smartphone or tablet.

Similarly, the remote diagnostics procedure is carried out during the sensor operation – ease and quickly, without laptop or tablet, with no need of seals removal and cable connections break.

SELF-DIAGNOSTICS

The inbuilt self-diagnostics procedure of the sensors allows detection of possible errors and failures. An error code is transferred in the temperature record to an external device (e.g. a fleet tracker) via RS-485 bus. Due to such capability possible reasons of the sensor failure can be detected without its demounting. In particular, water existence in a vehicle tank causing short circuit of the sensor measuring probes can be detected in the same way.

INTERNAL EVENT LOG

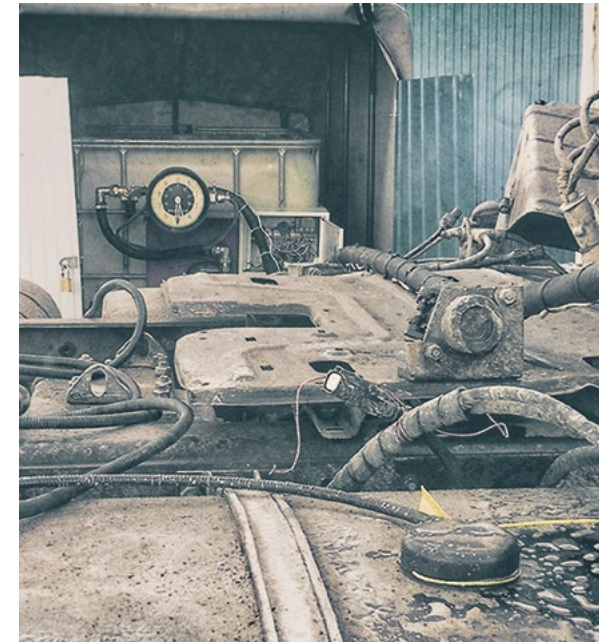
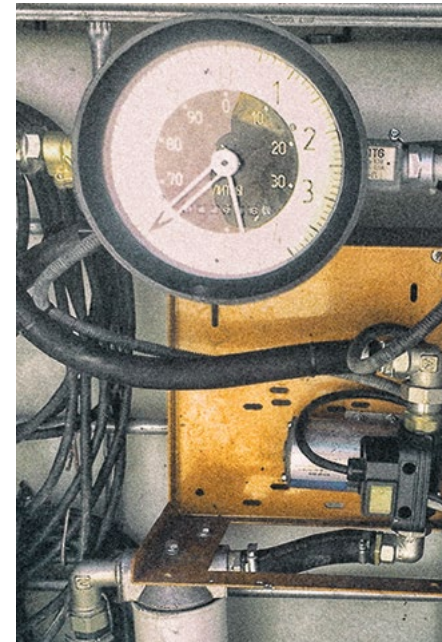
The sensor keeps a chronological log of all important events in an internal memory including an unauthorized change of the configuration which can facilitate possible conflicts resolution.

AUTO VOLUME CALIBRATION

The automated calibration function allows the sensor to control independently a whole process of the calibration of a fuel tank or other volume by means of a calibration unit generally consisting of a pump module, a pulse fuel flowmeter, a fuel pistol and a stop valve.

The auto volume calibration offers significant advantages:

- ① Throughout the calibration process not requiring any manual operation the installation staff can be engaged in other tasks, e.g. installation of a fleet tracker, routing of connection cables or equipping of other vehicle.
- ② The auto calibration takes considerably less time than manual volume calibration because the sensor determines fuel fluctuation stop rather faster than an installation engineer waits for it and runs next fuel dose filling during manual calibration.
- ③ The auto calibration provides precise calibration table due to the certain delay between doses required for definitive stop of fuel fluctuation and level stabilizing which is not guaranteed during manual calibration.





PERIPHERALS

Many of you played at constructors in childhood and probably remember that the more details you had, the more opportunities were available to implement your idea. Such analogue is applicable in fleet management. Nowadays the fleet management is not only the monitoring of asset current position and fuel level control, but it is a wide and almost unlimited idea offering big opportunities for various task. And the more tools – sensors and peripherals are available for application, the more solutions can be realized for fleet management. Those who understand and apply this idea in real life gain undeniable competitive advantages and good capacity for business development in the meantime.

Corporate Group TechnoKom produces variety of sensors and peripheral devices for application as part of solutions for fleet management. Additional sensors make it possible to monitor states of implements and other equipment, account operation time, collect the data which can be used for integrated efficiency assessment of equipment. Due to this customer obtains the accurate data independent from the human factor which makes possible to perform next optimization of fleet operation and implement management solutions to maximize economic benefit of the fleet management system application.

Corporate Group TechnoKom continuously expands the range of produced peripheral devices as well as those functionality – monitors trends of telematics market and implements feedback from its customers and partners.

AUTOGRAPH-INFO-MINI DISPLAY

Intended to display data from up to 8 fuel level sensors supporting LLS protocol. Furthermore, volume calibration tables of the sensors can be loaded in the display. Setup of low fuel level alert (in %) for a tank, fuel level indication in the form of a graphic scale are also provided. A digital output of the display allows control of different external devices and actuators, e.g. LED turning ON. The device configuration is protected with a password from unauthorized access.

Display	128 x 64 pixels
RS-485 bus	1
Digital output	1
Possible number of connected fuel level sensors (LLS protocol)	8
Setup of low fuel level alerting threshold (in %)	yes
Settings protection password	yes
Operating voltage, V	10...60
Operating temperature, °C	-40...+85
Dimensions, mm	105 x 57 x 18



TK-RPM ENGINE REVOLUTIONS SENSOR

Intended to measure engine RPM and transmit it to an external device in the form of an impulse signal with the number of pulses proportional to measured quantity of engine revolutions. Furthermore, the sensor is equipped with a discrete output indicating vehicle engine operation by connecting to ground in case of RPM readings presence and disconnecting in case of no revolutions.

Operating voltage, V	7.5...40
Output pulse peak amplitude, V	45
Digital outputs	2 (open collector)
Outputs assignment	Engine operation indication, output frequency divider (by 10)
Operating temperature, °C	-40...+85
Cable length, m	1.2
Dimensions, mm	31 x 26 x 12



TKAM ANGLE SENSOR

Intended to measure an inclination angle of a mechanism which it is mounted on and then transfer this data to an external device in the digital form via RS-485 bus in LLS or Modbus protocols. Furthermore, the sensor provides angle transmission in the form of a frequency-modulated pulse signal which frequency is proportional to the measured angle or in the form of an analogue signal with voltage level proportional to the measured angle value. In addition to angle the sensor supports measuring of temperature and vibration levels.



Output interfaces	
Digital interface	RS-485
RS-485 interface protocol	LLS / ModBus / AGHIP
Additional output 1	Analogue
Additional output 2	Frequency
Sensor operating parameters	
Measuring accuracy, degrees	1
Operating voltage, V	7...60
Operating temperature, °C	-40...+85
Case protection class	IP67
Dimensions, mm	75 x 75 x 20
Mounting type	SAE 5

CARDREADER-LIGHT READER

Designed for non-touch RFID (EM-Marin) cards reading in order to identify a vehicle owner or a driver, monitor operation, work and rest schedule and then transfer the card identifier to an external device via RS-485 or 1-wire buses. Moreover, the reader allows control of different actuators by means of a built-in digital output. The reader provides storage of up to 1000 cards with possibility to set separate configuration of the digital output for each card.



Supported cards	RFID (EM-Marin), 125 kHz
RS-485 bus	1
1-Wire bus	1
Total number of digital outputs	2
Number of programmable digital outputs	1
Number of digital inputs	1
Operating voltage, V	10...60
Operating temperature, °C	-40...+85
Dimensions, mm	94 x 65 x 18

TK-RFB-485 RADIO BRIDGE

Provides wireless communication based on RS-485 bus between two units equipped with TK-RFB-485 modules. The TK-RFB-485 device is indispensable to construct communication between AutoGRAPH controller and a sensor located at considerable distances from each other (up to 100 meters along direct visibility) or if wired connection is not possible, e.g. on mobile platforms, truck cranes, trailers and etc.

Interface for connection to external device	RS-485
Operation frequency, MHz	433
Operating voltage, V	7...60
Operating temperature, °C	-40...+85
Dimensions, mm	83 x 48 x 16



TK-CAN-LOG ADAPTER

Intended to read technical parameters of vehicles (speed, travelled distance, fuel level and consumption rate, engine rpm, motohours, oil pressure, coolant temperature and etc.) equipped with CAN bus and to transfer received data to a fleet tracking controller via CAN (SAE J1939) bus. The adapter supports update of the available vehicles list.

Supported machinery	Building machinery, agricultural machinery, harvesting machinery, lorry / light vehicle, motor-buses
RS-232 (EIA/TIA-232-E) bus	1
CAN (SAE J1939) bus	2
Operating voltage, V	10...60
Operating temperature, °C	-40...+85
Dimensions, mm	50 x 50 x 20



TK-TMP TEMPERATURE SENSOR

Intended to measure environmental temperature, convert it to a digital signal and transmit to connected device via 1-Wire bus. The sensor provides high accuracy and a wide range of temperature measuring.



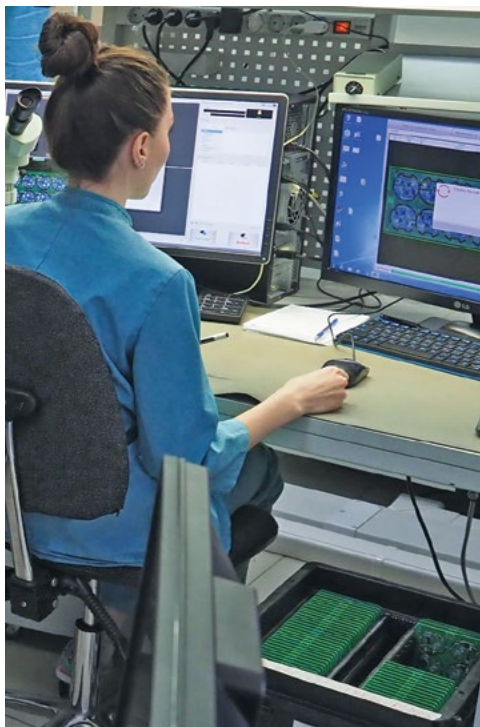
Temperature measuring range, °C	-55...+125
Temperature measuring accuracy, °C	0,5
Operating voltage, V	10...40
Operating temperature, °C	-40...+85
Distance to sensitive element, m	5...15
Dimensions, mm	30 x 25 x 13



NICAN NONCONTACT READER

Provides noncontact connection of TK-CAN-LOG adapter to CAN bus of a vehicle.

Output interface	CAN (SAE J1939)
Operating voltage, V	7...36
Operating temperature, °C	-40...+60
Required CAN bus characteristics	Differential baudrate 100 - 750 kbit/s



ABOUT COMPANY

TechnoKom Corporate Group has more than 25 years of experience in professional development and serial production of hardware equipment and software. Over the years of ongoing development our specialists accumulated extensive practical knowledge and a small production company developed into a concern of companies with own R&D department and production facilities on the basis of the cutting edge European and Japanese equipment.

Nowadays we are a recognized leader in manufacturing of on-board controllers, fuel level sensors and peripheral devices for tracking and monitoring of vehicles, personnel and stationary objects. Today TechnoKom products are operating on more than 700.000 vehicles in various industries: agricultural equipment, trucks, quarry and building machinery, railroad transport, logistics. Full automation of all production processes, direct operating with global distributors and component manufactures as well as full quality control at every production steps ensure state of the art and the highest quality of equipment produced under TechnoKom trademark.

TechnoKom quality management system conforms to ISO 9001:2008 requirements and all product produced by TechnoKom has E-mark certificates.

OUR PRODUCTION LINE

The serial production of every unit starts with professional process engineers who study in depth and optimize technical process at every production steps. The first step on the production is the application of solder paste to PCB using screen and stencil printer integrated in the production line.

The next step is provided with MYDATA automatic and precision high-speed chip mounters. Optimal task assignment between mounters provides dramatic performance increase of production line. Due to careful timing, PCBs are delivered from one mounter into the next mounter without interruption of operating process for a moment.

TechnoKom is one of the first manufacturers in Russia using Vapour Phase Soldering Technology in production. Nowadays it is the most innovative and advanced technology, which is used for soldering. In our production we use the ASSCON VP1000 vapour phase MANUFACTURE soldering system. Due to this fact the optimum temperature is ensured at all component positions, excluding over- and underheatings, which is typical for conventional soldering systems. Application of vapour phase soldering system provides fault-free soldering of complex components and PCBs.

Automated conveyor connecting all units of the production line together is responsible for automatic waiting queue and delivery of printed boards from one unit to others. The assembling quality control is the essential part of our production. Application of automated optical inspection machine by NORDSON reliably minimizes the risk of manufacturing defect. When any fault or unreliable joint is captured it is shown on the display of the computer, as well as the fault is reported to an operator. In complex conditions, we use XT V 160 electronics X-ray inspection machine, which allows to look inside the PCB and its components.

The last step – multiphase PCB test using hi-tech equipment is guaranty of the high quality of TechnoKom products.

