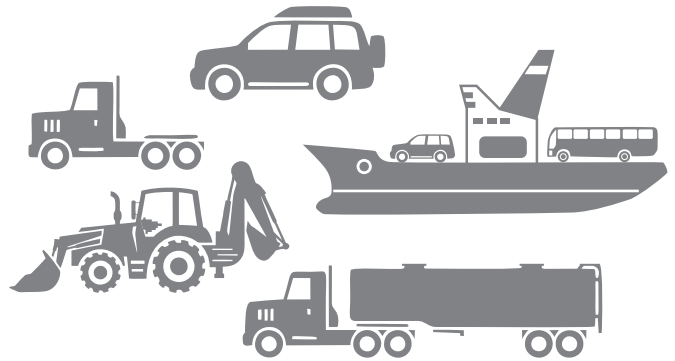




WHICH TYPE of fuel sensor is better for me?

Vehicle list
from customer



Tank shape
is symmetric,
inclination angles
are not big?

Yes

Capacitive fuel
level sensor can
be installed?

Yes

**Eurosens
Dominator**



No

Diesel fuel?

No

Yes

**Eurosens
Delta**



No

**Eurosens
Dizzi**



CHOOSING SUITABLE FUEL SENSOR



Can we use CAN bus data?

SAE J1939

New generation trucks use special electronic communication protocol between onboard electronic modules – **CAN J1939**. For example – **Scania, Volvo, DAF, MAN, Mercedes**. It contains information about speed, RPM, temperatures of coolant and oil, instant fuel consumption and total fuel consumed. You can read this information with a GPS tracker which supports CAN bus interface.

CAN bus fuel consumption data can be found not only at trucks. It can be special machinery, buses, agriculture tractors, diesel generators.

PROS:



1. No need to buy extra fuel monitoring sensor.
2. Simple connection (if you know how to find CAN bus wires).

CONS:



1. Fuel consumption data is not always present in the CAN bus.
2. Instant fuel consumption value is other parameter and cannot be used for total fuel consumption calculation.
3. CAN bus fuel consumption data may have 1-10% error.
4. CAN bus fuel consumption value may be lower than real.
That means we can suspect innocent driver. This is no good.
5. You can't monitor fuel tank. (in fact, you can find fuel level messages in the CAN bus but precision is very bad).

CONCLUSION:

check if CAN bus total fuel consumption data are available. If they are present – use them but with calibration procedure. Make a pilot vehicle run, measure real fuel consumption and calculate error of CAN bus data. Then use scale factor in software to minimize this error.



HINT:
BCE tracker



FMS CAN (protocol J1939)
Volvo/Renault CAN (protocol J1708, without adapters)
OBDII (diagnostic protocol of light vehicles,
SAE-1979 w/o adapters)
CAN protocols of light vehicles (without adapters)



Fuel level tank monitoring by special precise sensor



Special fuel sensor (usually capacitive) is installed in the tank. You need to drill a hole in the fuel tank.

Sensor will provide you the fuel level data. Resolution of capacitive fuel level sensor Dominator is 0.1 mm.

PROS:



High precision monitoring of refuelings and fuel thefts from the tank (approx. 1 % accuracy from the tank volume).

Can measure gasoline or diesel consumption at any vehicle or diesel generator.

Can be used with most GPS trackers.

Most AVL tracking software can calculate the volume of refueling or theft in automatic mode based on the fuel level sensor data.

Not expensive.

CONS:

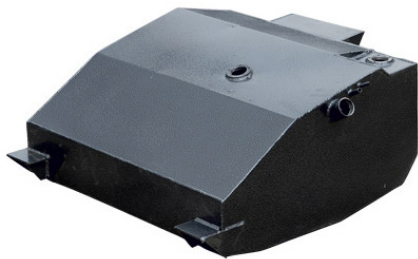


- As fuel level sensor measures the fuel level, you need to convert these values to fuel volume. Special tank calibration procedure is used. It takes about 1 hour.

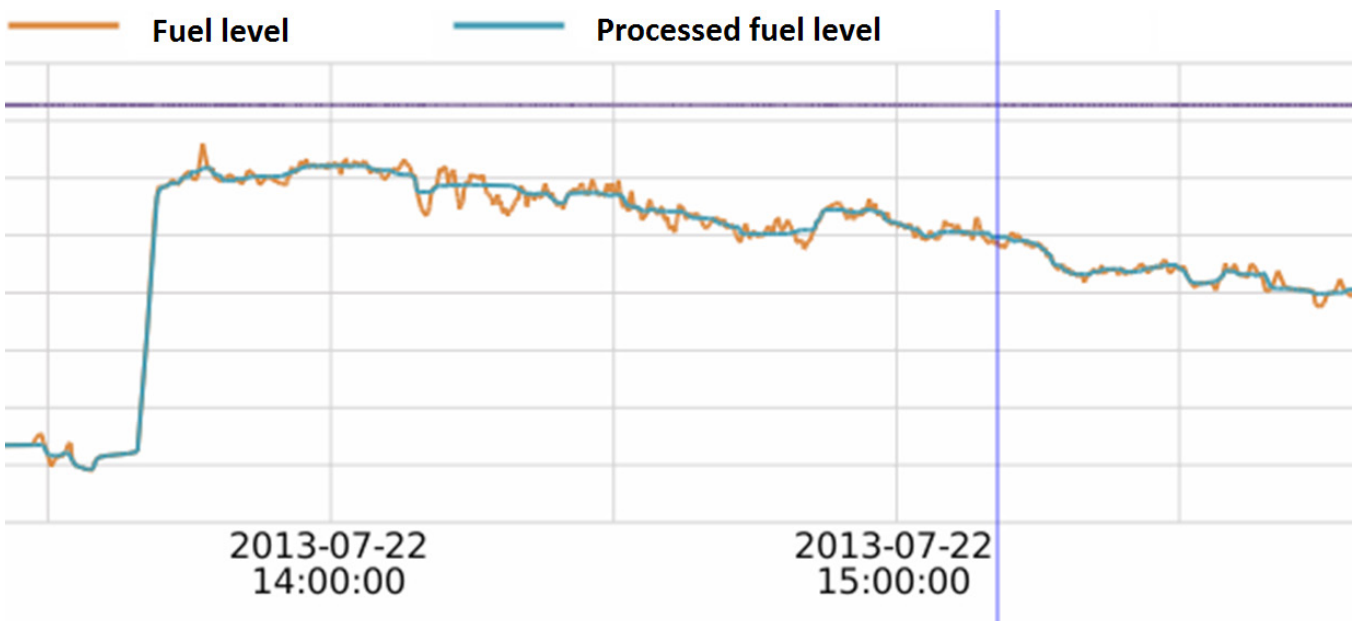
- Fuel level values always have fluctuations during vehicle operation. These fluctuations are highly depend on the tank shape and mode of vehicle operation.

Less error: symmetric tank, plain surface

Bigger error: not-symmetric tank shape, many uphill/downhill operations.



As fuel level data have fluctuations, it is hard to analyze this data.



AVL tracking software during processing can create “fake” events of refuelings or fuel thefts. And these events affect to fuel consumption values. Customer can waste a lot of time to analyze and will not trust to GPS tracking system.

- You can't see instant fuel consumption values. Sometimes it is very important for the analysis of quality. For example – during construction or agriculture works.
- Slow fuel drain from the return line can't be detected.

CONCLUSION:

**Use fuel level sensors at vehicles that do transport job: trucks, buses.
If possible – together with CAN Bus data.**



HINT

For special machinery with irregular tank shape fuel level sensor will provide questionable results

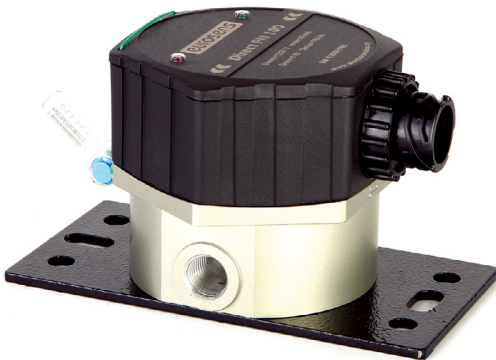
Fuel level monitoring issue	Standard sensor	Eurosens Dominator
Fuel level sensor replacement (remote offsite request)	Visit the customer, replace the sensor	Eurosens Dominator head is sent to the customer. Simple one-step replacement, no training is required.
Re-calibrate tank after the sensor is replaced	Required	Not required
There is a plenty of short-cutted sensors (200 mm, 300 mm length etc)	Not possible for bigger tanks	Just order some new electrodes
Dirt inside sensor electrodes...	Hard to remove	Easy disassembling and cleaning
Cable inlet damage (typical reason for sensor failure)	Sensor replacement is required	Sensor does not have a cable inlet. Connector is in the sensor body
100V onboard voltage peaks can damage the sensor. (Can be generated with disconnected vehicle battery)	Yes	No (up to 170V)



Fuel flow meter

The most reliable method of remote fuel consumption monitoring

Some engines have a return fuel line from engine to tank, so it is impossible to measure the fuel consumption without much re-engineering of the fuel supply system. Mechatronics has two types of fuel flow meters – dingle-channel Direct and different Delta. With two metering chambers Delta measures both supply and return fuel lines and calculates the difference wich is the real fuel consumption.



PROS:



- Precise fuel consumption measurement for any diesel engine in any operations.
- Instant fuel consumption data
- Engine operation time
- Engine operation mode autodetection: idling, nominal, overload modes and intervention attempts.
- Fuel drains prohibition.

CONS:



- Price (for differential flow meter)
- Can be installed only at diesel engine.
- No information about refuelings is provided.

Special fuel consumption flow meters are well-known in Russia for the real fuel consumption monitoring. But almost not used in the other countries.

Why it happens? There are some stereotypes:

1. Price. Differential fuel meter Eurosens Delta price as 3 fuel level sensor Dominator.

But can you calculate also customer (and technical support) time wasted for data analysis?

For several years you can waste about 100 hours for fuel level sensor data analysis from special machinery with irregular tank shape. This time costs more than fuel flow meter.

2. Difficult installation. For the differential fuel flow meter – NO. It is simple as installation of fuel filter. (only difference that Eurosens Delta has 2 channels).

CONCLUSION:

Use fuel flow meters at special machinery, construction vehicles, boats and agriculture vehicles with irregular-shaped fuel tanks. When there no CAN bus data available. Only diesel engines.



This ultrasonic sensor was made for special tasks.

- Fuel consumption monitoring of cars
- LPG level monitoring
- Fuel tankers monitoring



PROS:



- No tank drilling is required.
- Can measure any transparent liquids.
- Precision is the same with capacitive level sensor.
- Refuelings and fuel thefts from tank are under control.

CONS:



- More expensive than capacitive fuel level sensor.
- Vandalism-prone installation near road surface.
- Can't make measurements when fuel tank is not parallel to the ground.
- + all CONS of the capacitive level sensor.

CONCLUSION:

If no any method can be applied – try Eurosens Dizzi.

www.mechatronics.by



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