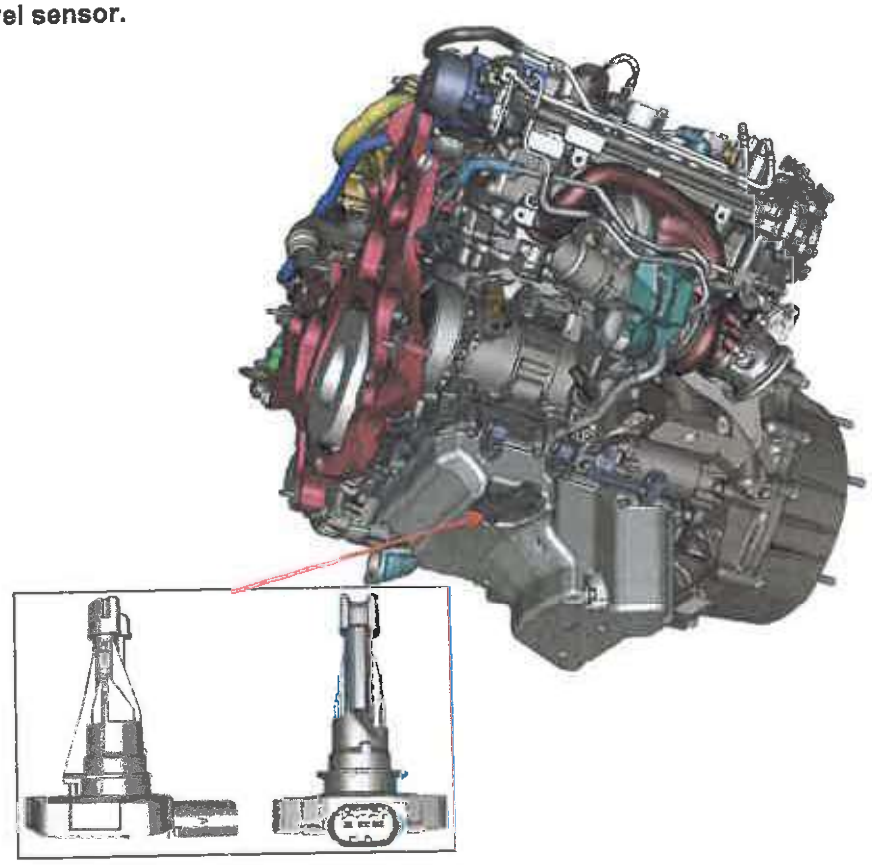
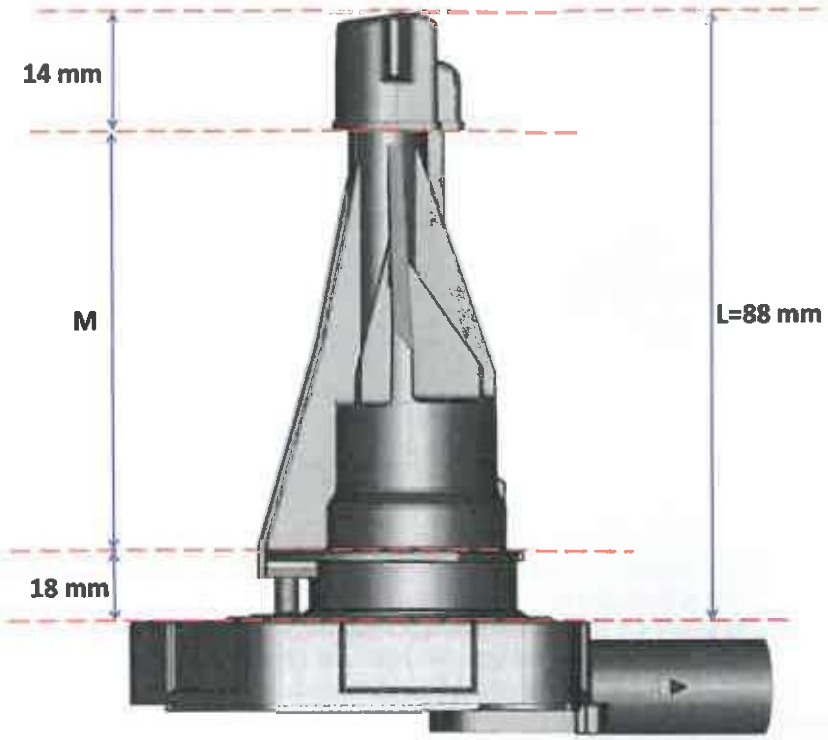
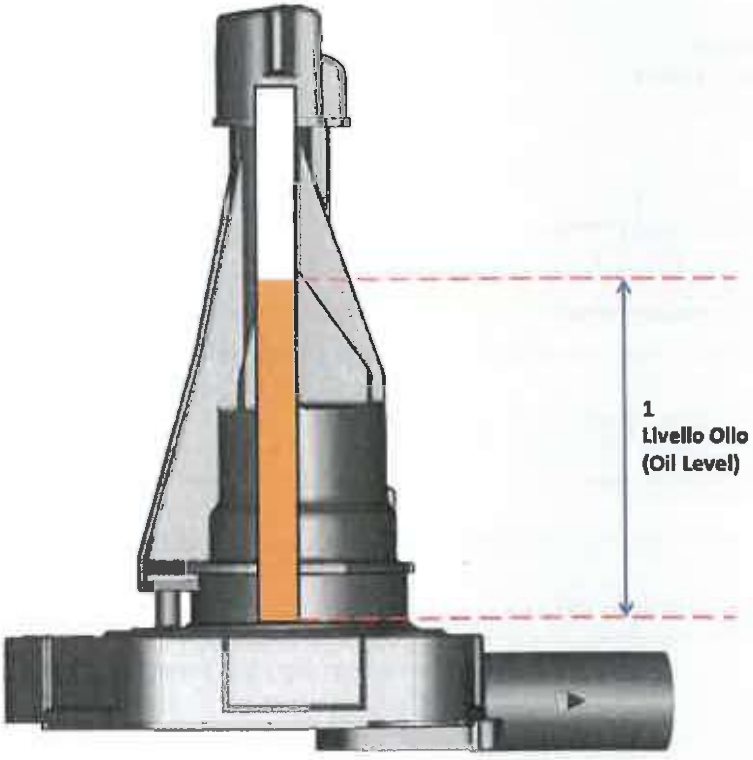
Engine oil level sensor.



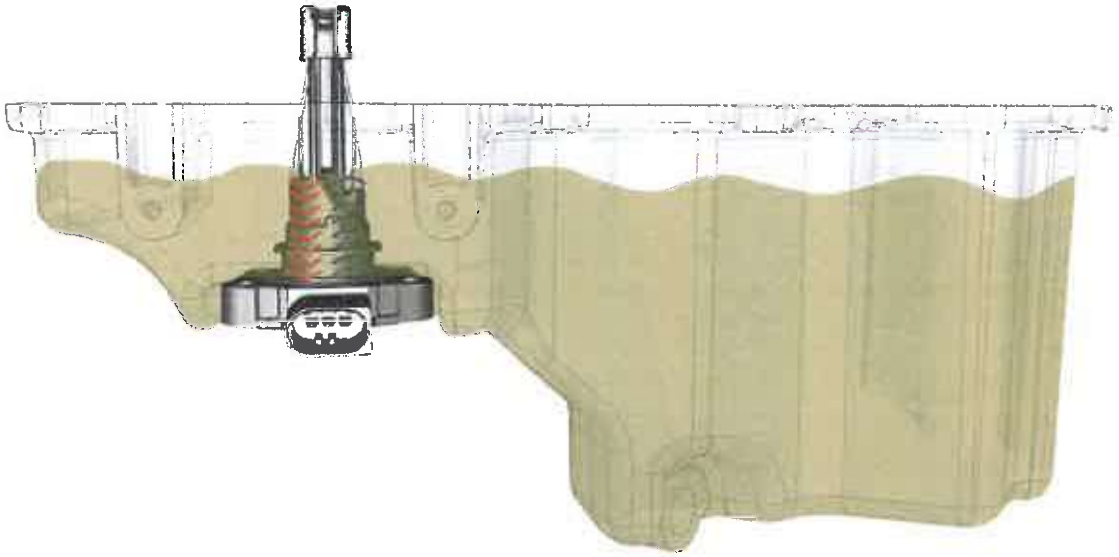
The oil level sensor is located in the engine oil sump. The sensor uses ultrasound technology to measure the oil level deposited in the sump.



The level sensor enters the oil sump by about 88 mm. The sensor's electronics can measure the level only within measurement range M.

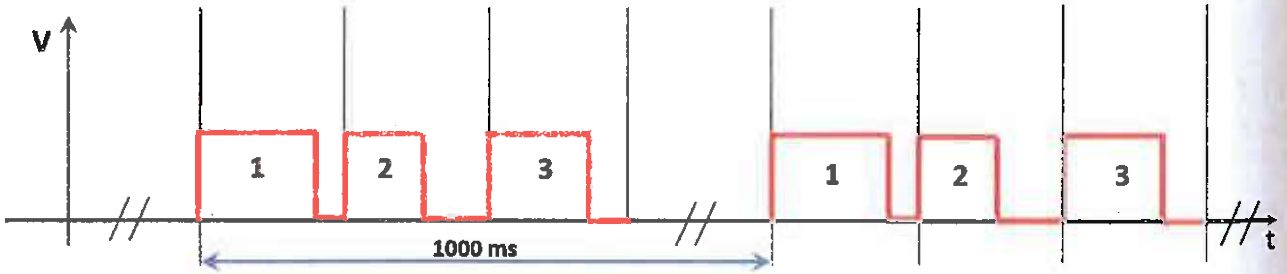


Inside the sensor there is a channel where the oil present in the sump goes into. Inside this channel, the oil reaches the same level as in the sump. The channel represents the measurement environment of the sensor. The sensor's electronics measure the level present in the measurement channel.



The oil level sensor emits an ultrasound signal. The signal is reflected the moment it meets a surface delimiting a change in matter phase (oil/air). Depending on the time the waves take to reach the free surface of the oil, reflect and return to the sensor's probe, the sensor's microchip prepares a PWM signal to send to the ECM_2 Slave engine control module. Depending on the duty cycle of the PWM signal, the ECM_2 Slave module calculates the level of oil present.
The sensor's electronics also process the oil temperature signal. The reading operating range of the sensor is: -40°C - 160°C.
Every 1000 ms, the sensor sends the ECM_2 Slave three PWM signals concerning the following three variables:

- Oil level
- Oil temperature
- Self-diagnostics data



Key:
1 – PWM on engine Oil Temperature variable.
2 – PWM on engine Oil Level variable.
3 – PWM on self-diagnostics data.

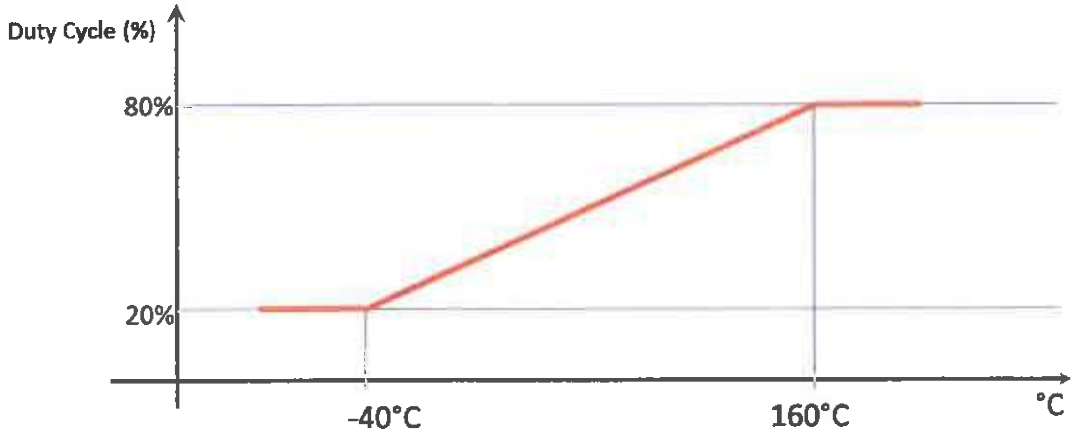
The ECM_2 Slave control module calculates the oil level and temperature if and only if the following conditions have occurred:

- Engine off and "Key" at ON
- Engine oil temperature when the engine is switched off in the range 80°C-90°C.
- Engine running in the previous cycle for no less than 5 minutes*
- Time for which the engine remained off not less than 3 minutes*
- Current temperature (meaning the oil temperature at the KEY ON time. The useable range is very wide.)
- Longitudinal and lateral accelerations below certain thresholds (any slopes on which the car is parked are interpreted by the control unit as lateral or longitudinal accelerations)

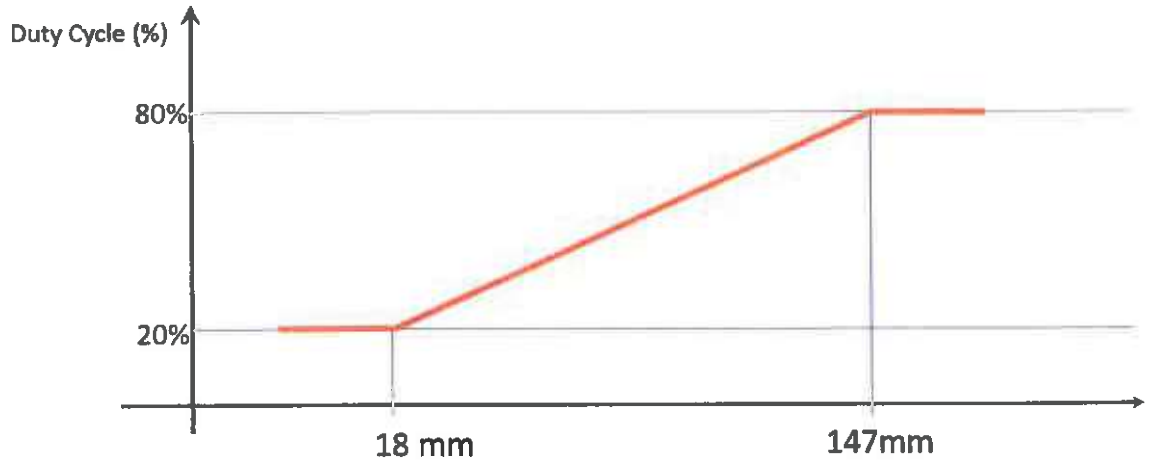
**The indicated values can be calibrated, therefore could be subject to change. At the time of writing this document, the sensor measurement strategy had already been developed but the threshold values were still subject to possible changes.*

The sensor sends a packet every 1000 ms. For every 5 packets received, the ECM_2 Slave module takes the average of the data (oil level and temperature) and provides on CAN the updated datum (data average value).
If the conditions necessary to take an average and update the data on CAN have not been fulfilled, the calculation will not be made.

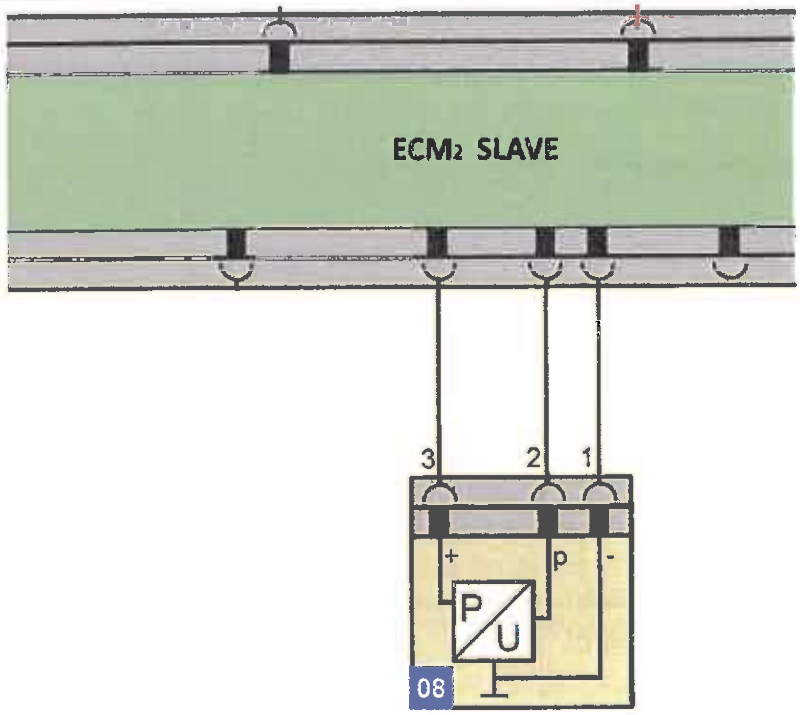
PWM on Temperature variable.

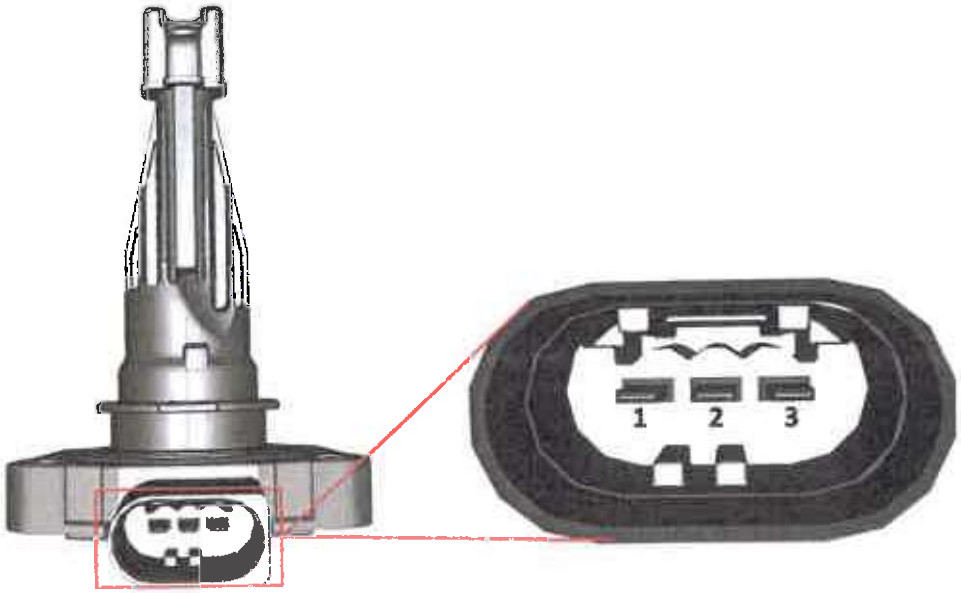


PWM on engine oil Level variable.



Oil level and temperature sensor wiring diagram.





Pinout

1 – 12V Vbatt power supply

2 – Earth

3 - PWM signal