

ATU Audi Technical Updates
Oil Level Display

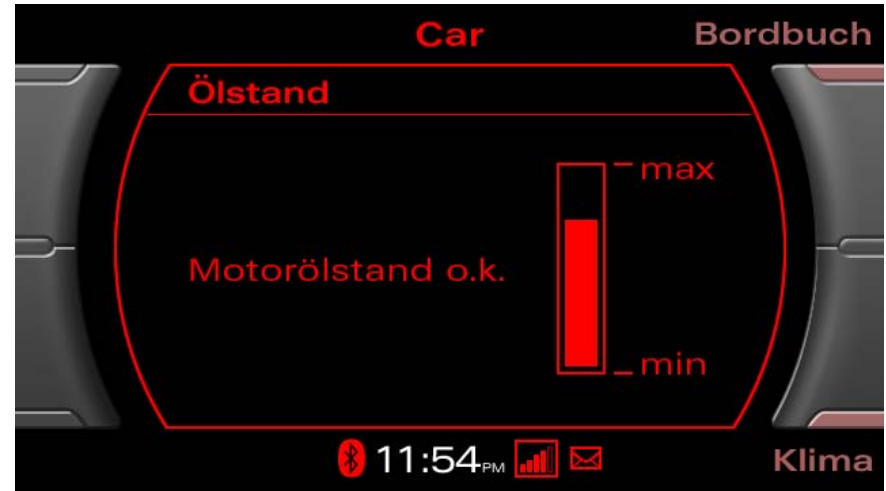
Oil Level Display

No.	Event	Topic	Type/model
1	11/09	The electronic oil level display	A4 (8K), A5 (8T, 8F)

The electronic oil level display

System description

In the case of vehicles with electronic oil level monitoring (engines without an oil dipstick), specific information about the oil level can be shown in the MMI or radio display. The oil level messages that currently appear in the dash panel insert (e.g. minimum oil warning) are retained.



The oil level and oil temperature sender (PLUS = Packaged Ultrasonic Level Sensor) sends signals (PWM = Pulse Width Modulation) to the engine control unit relating to engine oil temperature and oil level; the oil level is displayed as mm above the mounting surface.

The signals are calculated in the engine control unit and the results are sent to the CAN bus system. From there, the DIS and MMI/radio retrieve the information and display it.

The electronic oil level display

Description of "Dynamic measurement" system

- ▶ Measurement takes place while the car is in motion
- ▶ Conditions required: $v > 5$ km/h, $n < 3000$ diesel, 4000 petrol, engine oil temperature (TOEL) $> 60^{\circ}\text{C}$, distance travelled min. 50 km (100 km for 4-cyl. diesel engines), 1000 measured values
- ▶ Quality characteristic map for longitudinal and lateral acceleration; signals are weighted differently (factor 0–3)
"Good" signals are rated 3-fold; "bad" ones 0–1-fold (when accelerating quickly)
- ▶ Minimum of 2 characteristic maps for engaged oil pump
- ▶ Gradient filter for sensor raw signal (suppress if the sensor signal changes too quickly)
- ▶ Difference between sensor value and characteristic map (n/TOEL) causes a value x mm over min.
- ▶ A summation across X measured values shows a new measured value every approx. 50 km or 100 km
- ▶ Display in the MMI remains unchanged until a new measured value has been formed or the bonnet has been open for more than 30 secs. A measured value < 0 triggers a min. warning, which is displayed in the DIS and MMI
- ▶ Opening the bonnet triggers a min. warning reset; if more than 0.25 l has been added, the min. warning will be permanently withdrawn, in all other cases it will be triggered again after 50 km (100 km for 4-cyl. diesel engines) (refill hysteresis)

The electronic oil level display

Description of "Static measurement" system

Conditions required for static measurement:

- ▶ TOEL > 40°C, engine idle > 60 secs and ignition (Te15) on > 10 secs **(200 secs for 4-cyl. diesel engines)**
- ▶ Difference between sensor signal and drip-off characteristic map (t, TOEL) >>> measured value in mm above min; this static measured value is calculated with an existing dynamic measured value at a ratio of 10:90 to a value that results in display
- ▶ If no dynamic measured value is available (bonnet was open), the static value shows as 100% in the display

Display in the DIS:

- ▶ If the bonnet was open, one of the current values will be shown in the DIS once for approx. 2 secs the next time the ignition is turned on.

Warning messages:

- ▶ In addition to the min. warning, static measurement also produces overfill and underfill oil warnings. If there is far too much or too little oil in the engine, both warnings will be shown in the MMI; currently the DIS only shows the underfill warning

The electronic oil level display

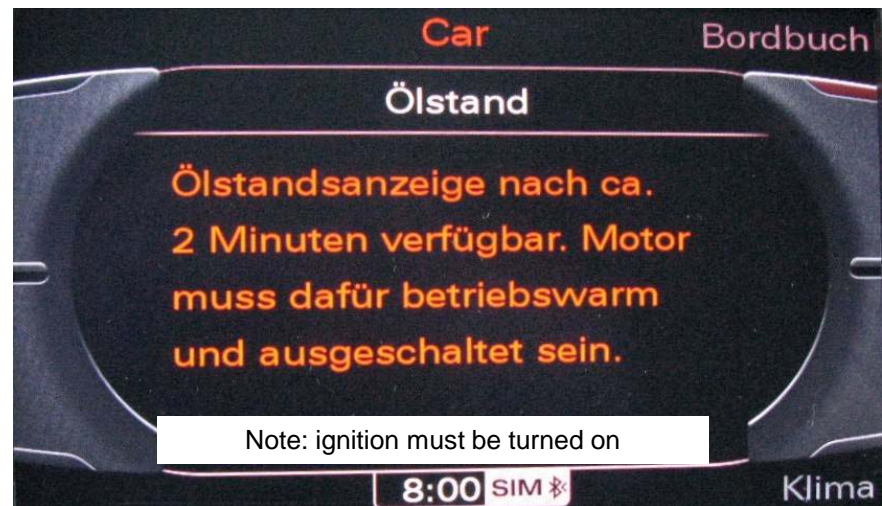
Description of measurement system

Function limitations:

- ▶ Measurement not possible at temperatures below 40°C (oil change)
- ▶ Measurement not accurate when vehicle is on incline (note in the MMI)
- ▶ Dynamic measurement is subject to at least 50 km being travelled (100 km for 4-cyl. diesel engines); it may be considerably longer with a heavy driving style. This is also the case for short-distance drivers who frequently open the bonnet

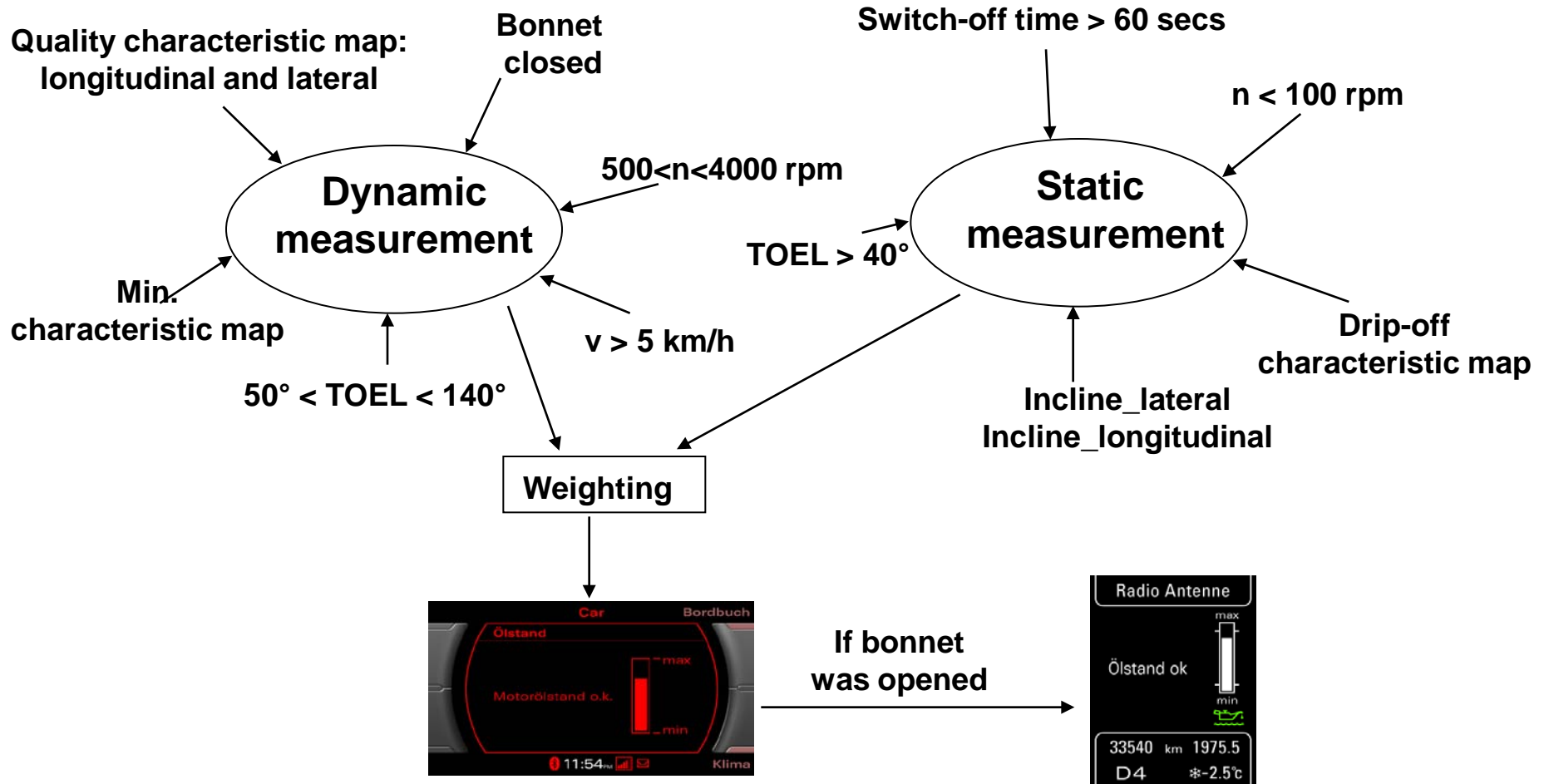
Summary: The customer will not see any oil level display!

Accuracy: 250 ml



The electronic oil level display

System overview



The electronic oil level display

Checking the oil level

The oil level can be checked in the radio display or MMI.

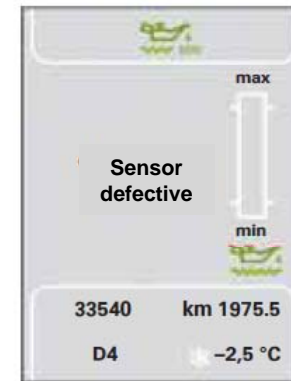
- ▶ Vehicle is in on a flat surface
- ▶ Engine oil temperature > 40°C
- ▶ Switch off engine
- ▶ Turn on ignition (terminal 15)
- ▶ "CAR" function button > **oil level**
- ▶ Wait approx. 2 minutes (4 minutes for 4-cyl. diesel engines)
- ▶ The current oil level will then be shown in the display.

The electronic oil level display

Dash panel insert sample display messages

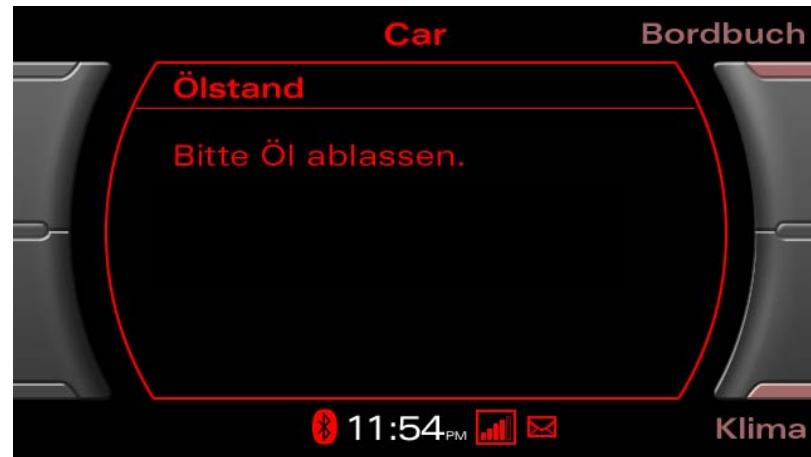
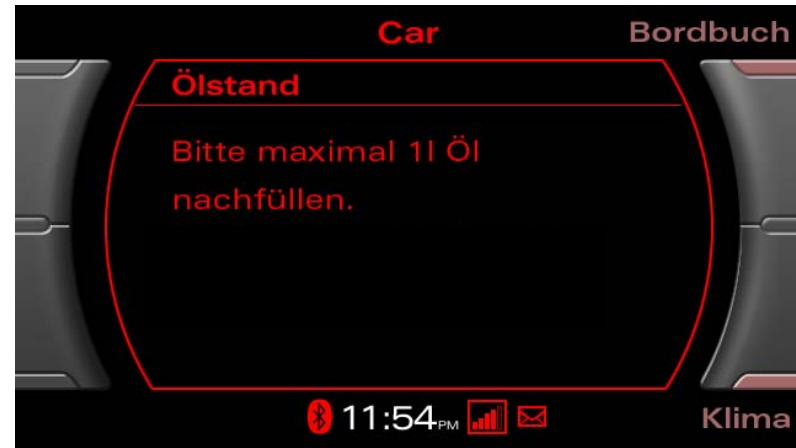
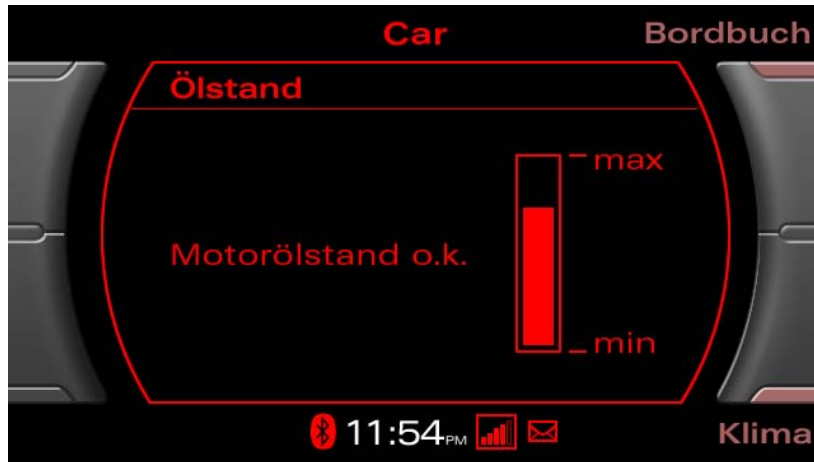
Various displays are possible, depending on the engine:

- ▶ Normal oil level (green symbol) with note "Ölstand o. k." (Oil level OK)
- ▶ Minimum oil level (yellow symbol) with note "Bitte max. 1 Liter nachfüllen, Weiterfahrt möglich" (Please add max. 1 litre, onward travel possible)
- ▶ Underfill (red symbol) with note "Bitte dringend öl nachfüllen" (Please top up oil immediately)
- ▶ Defective oil level and oil temperature sender (yellow symbol) with note "Sensor defekt" (Sensor defective)



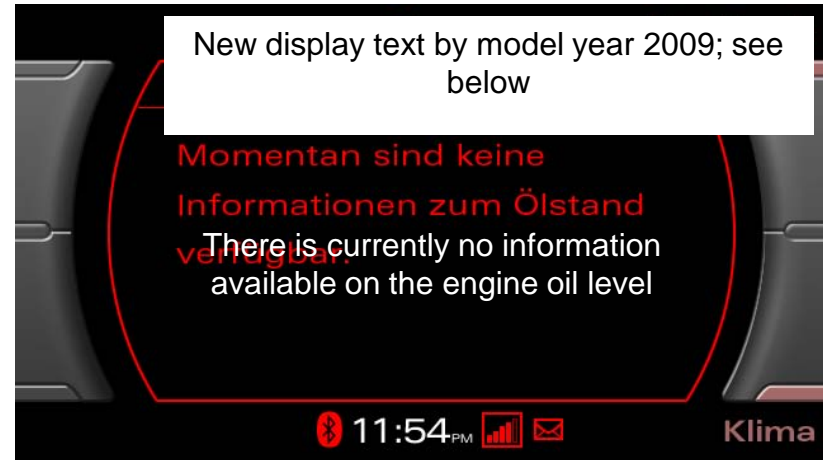
The electronic oil level display

MMI or radio sample display messages



The electronic oil level display

MMI or radio sample display messages



The electronic oil level display

Diagnosis and fault finding

The following measured values are available for diagnosis.

In Guided Functions:

- ▶ Engine oil temperature in °C
- ▶ Oil level in mm, based on mounting surface
- ▶ Oil warning threshold in mm, based on mounting surface

Note:

The oil warning threshold is a dynamic value. If both values, oil level and oil warning threshold, are read under the conditions required for dynamic measurement, the oil level value minus the oil warning threshold value is the same as the min. oil level.

Example:

Oil level 60 mm — oil warning threshold 41 mm =
19 mm above min. oil level
(same as display for oil dipstick)



411_105

The electronic oil level display

Diagnosis and fault finding

In the event of a complaint with an entry in the ECU (engine control unit) fault memory, fault finding must be executed according to the Guided Fault Finding test plan or TPI (technical product information).

Fault finding in the event of complaints with no entry in the engine control unit:

Complaint:

Minimum oil level display (yellow symbol)
with note "Bitte max. 1 Liter nachfüllen,
Weiterfahrt möglich" (Please add max. 1 litre, onward travel possible)
lights up even though the oil level is OK.

Cause:

Bonnet contact switch does not register; reset not performed
in engine control unit for min. oil warning.

Action:

Check that the bonnet contact switch is working.

Engines affected:

All



The electronic oil level display

Diagnosis and fault finding

Complaint:

Underfill display (red symbol)
with note "Bitte dringend öl nachfüllen" (Please top up oil immediately)
or overfill display
with note "Bitte Ölstand reduzieren" (Please reduce oil level).

Cause:

Warning message reset not performed in engine control unit
when bonnet is opened. This display
is only reset when a static oil level within the min.
and max. limits has been
detected again.

Action:

See "Checking the oil level" slide.

Engines affected:

Only 2.0-I CR-TDI



Thank you.