



## BRIEF INFORMATION

### Road condition sensor (RCS)

- Detects moisture on roads early and reliably day and night
- Enables warning to be given on wet roads in order to avoid aquaplaning
- Input variable for friction coefficient calculation in brake and control systems
- Robust measuring principle of airborne and structure-borne sound analysis in the wheel well, tried and tested over many years

## PRODUCT FEATURES

### Application

The road condition sensor (RCS) is a sensor capable of providing an input variable (wetness) for driver assistance systems.

If the sensor is positioned in the wheel arch (application-specific on each front wheel arch cover), it measures the amount of water pooling on the road. This information can be made available to the driver or to the appropriate systems in order to draw attention to a possible aquaplaning scenario. In this way, driving behaviour can be adapted so as to avoid causing accidents.

By measuring the wetness of the road at a constant driving speed, the RCS gives an extension to the dynamic friction coefficient calculation (e.g. ABS, ESP).

Depending on customer requirements, different vehicle reactions can be triggered whenever road moisture is detected:

- Warning given to driver when level of moisture on road / speed becomes critical
- Prediction of braking distance depending on road wetness
- Adjusting distance to the vehicle ahead on wet roads (ACC)
- Influence on control systems of longitudinal and transverse dynamics

# PRODUCT FEATURES

## Design and function

When road moisture occurs, the sensor detects vibrations and noises from water swirling around in the wheel arch. Specific algorithms free the signal from disturbance variables and calculate the water film height.

The signal is processed by the embedded electronics and software of the sensor and sent via a LIN interface (bidirectional) to the vehicle control unit (ECU). Details on the sensor communication can be customised. The RCS sensor can contribute to better driving stability by lowering, for example, the activation thresholds for ABS and traction control. The sensor signals can also be used to adjust the drive train control in order to ensure stability during acceleration – especially when cornering.

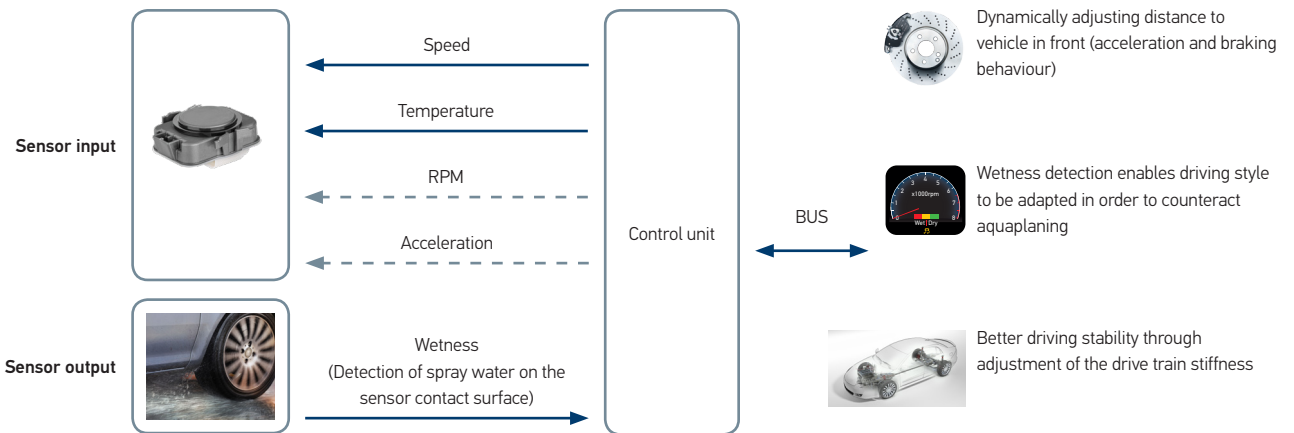
If the road condition sensor is used for partially or highly automated driving, the information about the degree of wetness can also be used to dynamically adjust the distance to the vehicle in front.

In order to fix the sensor to the wheel arch cover, its housing is connected to a bracket. This can either be injected directly into the wheel arch by the manufacturer or a special, separate fastening element can be used.

The sensor is mechanically robust against:

- Dirt / dust
- Ice / ice build-up
- Stones / impact of objects
- Distortion of the wheel arch liner during driving (dynamic and fast)

# FUNCTIONAL DIAGRAM



## Key

Required information



Optional information – if available, it can be used to improve performance during dynamic driving

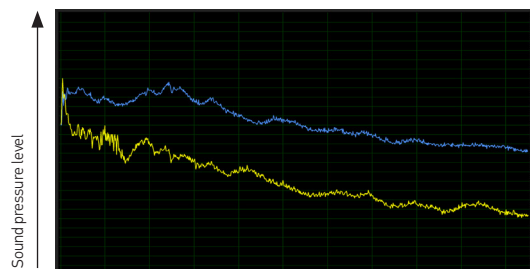


# FUNCTIONAL PRINCIPLE / STRUCTURE-BORNE SOUND RECOGNITION

Raw signal



Sensitivity sound pressure



- Wet
- Dry

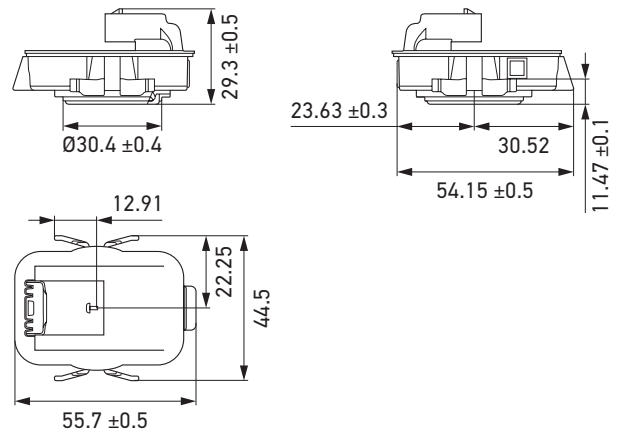
# TECHNICAL DETAILS

## Technical data

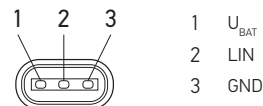
Operating voltage	9 – 16 V
Operating temperature	-40°C to +90°C
Current consumption	~ 20 mA at 12 V
Protection class	IP 6K9K
$V_{max}$	180 km/h*
Minimum detection limit (road wetness)	250 µm
Interface	LIN 2.1
Weight	< 30 g

\*The wetness detection has been validated by HELLA up to a speed of 180 km/h. As wet roads pose a risk to life and limb, beyond this the ultimate responsibility lies with the customer. The dryness detection functions up to a speed of 300 km/h.

## Technical drawing



## Pin assignment



## Mounting in the wheel arch

The road condition sensor (RCS) may only be connected directly to the wheel arch via the bracket and the decoupling element. A clearance of 10 mm to adjacent components must be guaranteed.

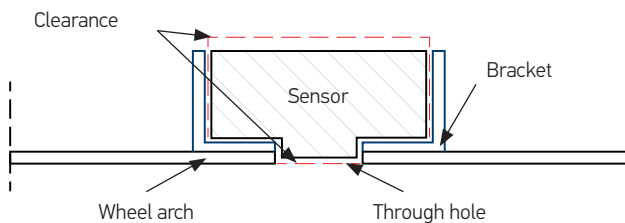
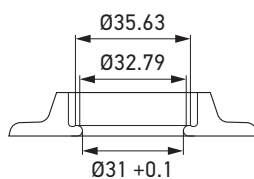


Illustration showing a bracket for the wheel arch

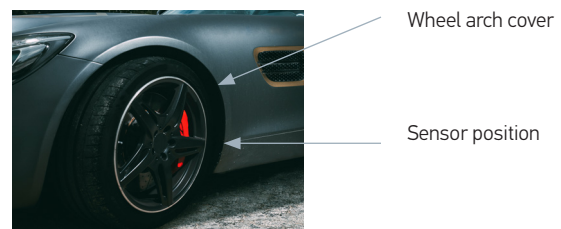


## Mounting hole


Example showing cross section of the wheel arch through hole



Optimum positioning of the road condition sensor (RCS) in the wheel arch




# PROGRAMME OVERVIEW

Product image	Description	Part number
	Road condition sensor (RCS)	On request*

\* The sensors must be specially applied to suit each vehicle model. All part numbers are therefore assigned on a customer-specific basis.

# ACCESSORIES

Product image	Description	Part number
	Fastening element	On request