

# Road Condition Monitor RCM511



Road Condition Monitor RCM511 is designed for a quality control and optimization tool for winter maintenance. The sensor is also suitable for runway condition reporting. The RCM511 features improved surface analysis and layer thickness measurement combined with a small physical size. The sensor can be installed onto a moving vehicle to follow surface conditions and friction in real time. RCM511 detects all typical surface states like:

- Dry (green line color)
- Moist (dark blue)
- Wet (light blue)
- Slushy (magenta)
- Snowy (white/grey)
- Icy (red)

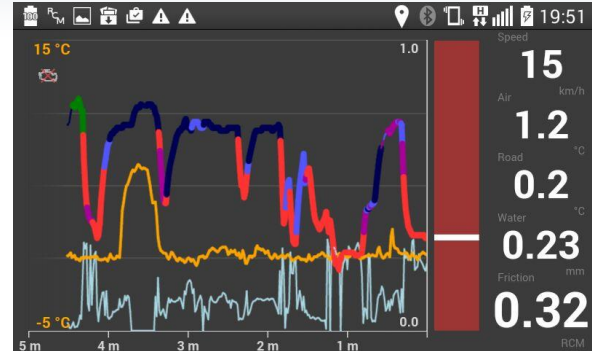
The RCM511 sensor also measures water layer thickness in fractions of millimeters up to 5 mm. Measurements of the surface condition and water/ice amount are used to estimate **coefficient of friction**. A braking friction measurement application is integrated into the same user interface on a cell phone to validate the friction model. The results are communicated to selected servers. All the data can be explored at <https://roadweather.online> on a map interface.

## Features and benefits:

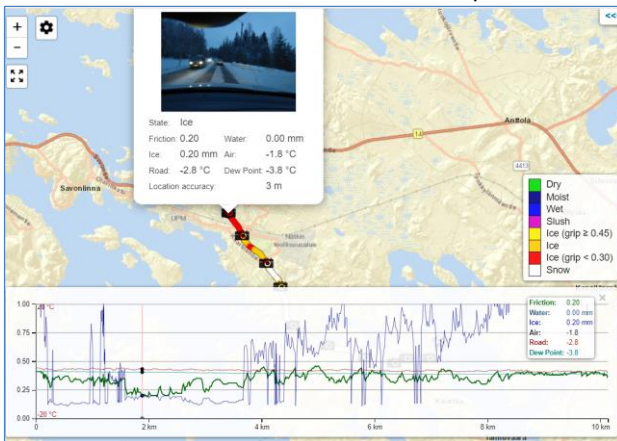
- mobile friction with an optical remote sensor
- high accuracy and resolution
- measurements
  - surface state
  - contamination layer thickness
  - friction
  - surface temperature (optional)
  - dew point temperature (optional)
  - air temperature (optional)
- solid state design
  - no moving nor wearing parts
- small size makes the installation easy
- output
  - serial RS-232 or Bluetooth
- power input 9-30 VDC
- data communication to a cell phone, PC or other systems
- photographs of the road surface taken manually, at preselected intervals and at preselected locations.



Screen shot of a cell phone user interface during snowy (grey), icy (red), slushy (magenta), wet (blue) and moist (dark blue) surface conditions. The yellow dots have been measured by an acceleration based Friction Meter installed in the same cell phone.



Screen shot of the Android user interface during slushy, icy, wet and dry surface conditions (thick magenta/blue/red/green line for surface condition). The yellow line shows the surface temperature and the blue line water layer. The number 0.32 is the current friction value. The color bar indicates the status of either road condition or friction.



Colour coded surface states measured by RCM511 on 19.1.2021 as displayed at the server <https://roadweather.online>. The graph in the lower part of the screen shows the development of different parameters. The photograph evidencing an icy surface state is taken automatically with the mobile application and can be clicked to get a bigger image shown on the map display.

## RCM511 Specifications:

Sensor type:	Road Condition Monitor RCM511
Measures:	length 70 mm, diameter 50 mm, weight 230 g (sensor part only)
Material:	aluminum housing
Cable:	four pin M8 connector for power and data
Power supply:	9 ... 30 VDC, power from trailer light connector or cigarette lighter
Power consumption:	about 1 W
Temperature range:	-40 ... 60 °C
Resolution of thickness:	0.01 mm, range 0 mm to 5 mm
Accuracy of thickness:	0.10 up to 1.0 mm, 10 % above 1.0 mm
Resolution of friction:	0.01
Accuracy of friction:	0.10 as standard deviation compared to a braking friction reference
Output:	RS-232 serial interface or Bluetooth
Installation:	to a trailer hitch ball joint, using magnetic fixing, to front tow hook or using bolts
User interface:	Bluetooth connection to a cell phone. The same phone is used to run a braking friction measurement application to measure absolute friction for reference. Data is communicated to Road Condition Map at <a href="https://roadweather.online">https://roadweather.online</a> and/or to a local server.