

Runway Condition Monitor RCM511



Runway Condition Monitor RCM511 has been designed to be a quality control and optimization tool for winter maintenance. RCM511 is also suitable for road 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 contaminant types like:

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

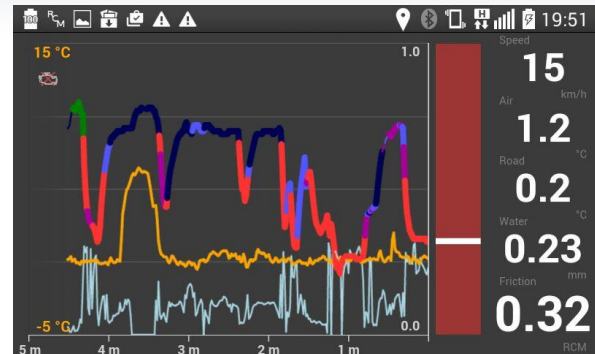
RCM511 measures water layer thickness in fractions of millimeters up to 5 mm. Measurements of the surface condition and water/ice amount are used to estimate **coefficient of friction**. A braking friction measurement application is integrated into the same user interface on a cell phone to validate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

Features and benefits:

- mobile friction measurement with an optical remote sensor
- high accuracy and resolution
- measurements
 - contaminant type
 - water/ice layer thickness
 - friction
 - surface temperature (optional)
 - dew point temperature (optional)
- solid state design
 - no moving nor wearing parts
- small size makes installation easy
- output serial RS-232 or Bluetooth
- power input 9-30 VDC
- data communication to a mobile phone, PC or other systems
- photographs of the surface manually, at preselected intervals and at preselected locations
- measurements of Runway Surface Conditions for Global Reporting Format (GRF)



Screenshot 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.



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



Color-coded friction values measured by RCM411 (the previous sensor version) on 11.01.2017 at Minneapolis St. Paul International Airport as displayed at roadweather.online. Hues of red, yellow and green correspond to friction from 0.20 to 0.80. The section below the map shows measured numerical parameters in a graph.

RCM511 Specifications:

Sensor type:	Runway/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 with a ball joint or to another location by bolts
User interface:	Bluetooth connection to a mobile phone. The same phone is used to run a braking friction measurement application to measure absolute friction for reference. The data is communicated to Friction Road Map at https://roadweather.online and/or to a local server.