

Application

Road Integrated Meteorological station (SIM) enables the measuring and evaluation of meteorological data applicable for restricted location.

SIM is installed in locations with characteristic climatic conditions.

It is used particularly for optimizing winter maintenance; it can also be used for increasing the traffic safety in the monitored road section, potentially for establishing other traffic data – see the extension option.

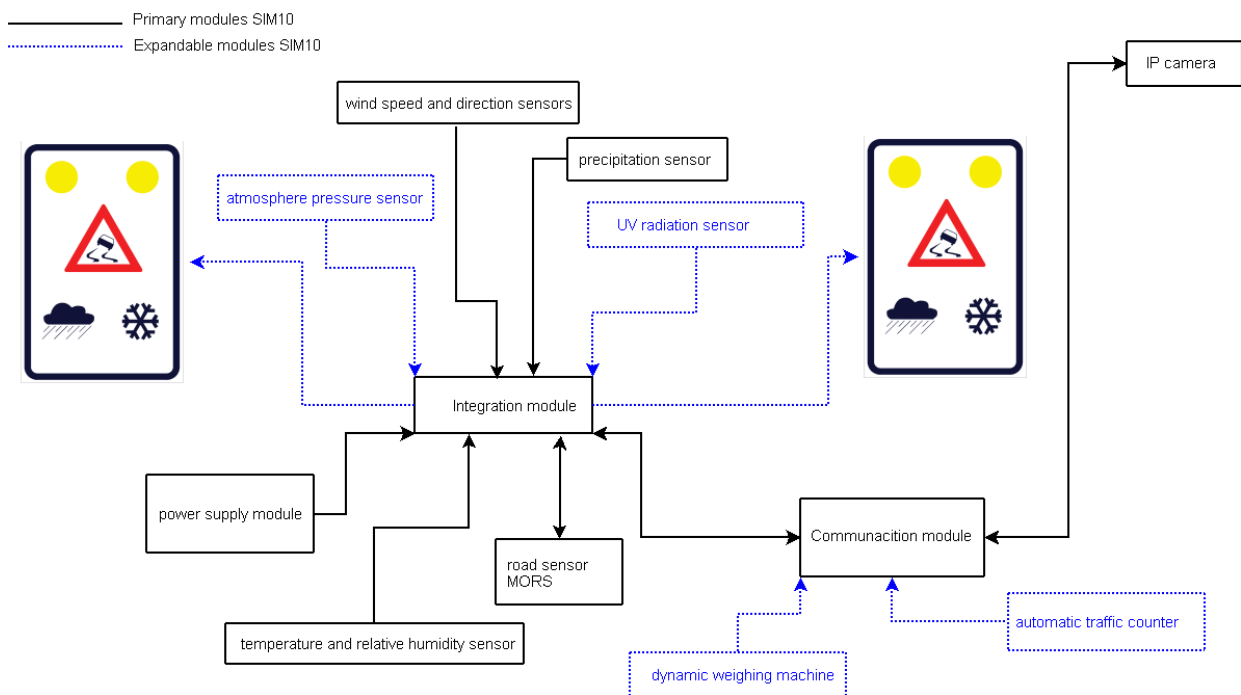
SIM output includes information required for winter road maintenance, particularly the necessity to apply salt on the road.

- Periodically transmitted by means of data server into the superior information systems,
- Delivered to the local authorized organization performing the road maintenance,



In basic configuration, SIM system comprises of:

- Road sensor MORS with integration module,
- Moisture content and air temperature sensor, sensor for amount and type of rainfall, and sensor for wind speed and direction,
- IP camera,
- Common road modules as per the connection type,
- Power supply module – power supply from LV lines, potentially from PV panels or public light distribution in combination with batteries.



SIM system module scheme

SIM core is the intelligent road sensor which measures with high accuracy and evaluates with sophisticated algorithm the data measured and data from other sensors required for the definition of the road surface condition and meteorological situation in the specified location.

Description

SIM integrates and processes meteorological data defined in various sensors. In basic configuration it is further equipped with IP camera for visual supervision of the road condition and elements for data and video transmission to the superior systems. Power supply method can be adapted to the possibilities in the installation location, however due to the necessary input the supply from LV lines is ideal. Any available connection (GSM, Wi-Fi, radio network ...) with sufficient data transmission capacity can be used for the information transmission between the meteorological station, data server, superior systems, organization performing the road maintenance and servicing company.


Established values and transmitted information

SIM differentiates the road conditions in 9 categories and evaluated the black ice risk in 5 categories. It also establishes the temperature of road surface freezing depending on the type and amount of salt application.

Information on the meteorological situation and road condition including the IP camera display is transmitted to the superior system. At the same time, information on the road surface condition can be transmitted by means of SMS to the local authorized organization providing the winter road maintenance.

If it is completed with traffic signs covering the road hazardous section, it provides information on hazardous conditions for the signs. In such case, reflexive warning yellow lights flash on the signs until the dangerous condition is over.


Basic measured values

Road surface temperature:	-40°C to +80°C, accuracy ± 0.1°C	
Air Temperature:	-40°C to +60°C, accuracy ± 0.3°C	
Air humidity:	0% to 100% RH, accuracy ± 1.5% RH	
Speed and wind direction:	0° to 360°, accuracy ±5°, 0.7 to 50m/s, accuracy ±2% FS	
Type and amount of rainfall:	Without rainfall, rain with snow, snow, amount differentiable in 6 levels	
Freezing point temperature:	-20°C to 0°C	
Road surface condition:	Dry, damp, wet, flooded, damp and covered with salt, wet and covered with salt, ice, snow, black ice	
Black ice occurrence risk:	None, low, medium, high, very likely	
Detected spread composition:	NaCl, MgCl, CaCl, urea, saltpeper, acetate, potassium	

Installation and construction design

The construction design fully enables using the options of the applied sensors and respects the respective standards and laws. The road sensor cuts directly into the bituminous road layer. Other sensors are installed on vertical column with horizontal beams as per the technical and construction options of the column in order to prevent mutual affects. Optimum installation of wind speed and direction sensor is to the highest point of the attachment (approx. 10 m above the road). Temperature and air moisture content sensor with the rainfall detection sensor are installed at the same level at approx. 4 m above the road. Other technology is located in the respective cabinet.

Technical Parameters

Dimensions of the switchboard cabinet:	500x400x230, specific dimension is specified by the selected equipment	
Rated supply voltage:	12V DC	
Power input:	Meteorological station <100W	
Scope of operating temperatures:	-25°C to +60°C	
Air moisture content:	0% to 100% RH, non-condensing	
IP protection min.:	54	
EMC as per ČSN EN 55022, 61000		
Detailed data on the construction and technical parameters are specified in the descriptions of applied sensors and result from the specific power supply method and data transmission.		

Maintenance and service

All elements of the SIM system are designed to minimize the maintenance necessity directly in the installation location. The servicing includes the server operation for data processing and remote supervision over the SIM function.

Extension options

As required SIM can integrate other elements, e.g. sensors for measuring further meteorological data, loops for vehicle classification, dynamic weights, video detection and reading the vehicle registration plates, potentially reading the tables of ADR hazardous loads, traffic signs 'skid hazard' completed with 2 warning 'interrupted yellow lights'.