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WHEN MEASUREMENTS MATTER

Wintersense

Smart, Non-Invasive Road-Temperature Sensor

Cost-Effective Network Densification

With an Internet of Things approach

Overview

Wintersense uses smart-sensor technology coupled with IoT communications and a cloud-hosted data solution to enable rapid densification of road weather networks. The Wintersense smart sensor is a completely integrated smart sensor providing non-invasive surface temperature, air temperature, relative humidity, and dew point measurements in a compact, self-powered unit with integrated communications.

Wintersense provides consistent data 24/7, which can be easily ingested by forecast agencies to improve route-based forecasting services. Road authorities can minimize expenses through smarter route-based treatment decisions with the additional confidence that Wintersense data provides.

Data from Wintersense smart sensors is delivered wirelessly via IoT networks to a cloud-hosted web application. Via the web application, users can create and manage networks of sensors; set quality control rules and automatic alerts on incoming data; and export data via FTP, API, or Datex II polling.

Benefits and Features

- Quick and easy to install; mounts to existing roadside infrastructure
- Semi-mobile; can easily be moved and redeployed across a network
- Easily monitor troublesome areas, such as bridge decks
- Cost-effective method of densifying RWIS networks
- Open-platform web application with API to easily export data
- Consistent 24/7 data for integration with route-based forecasting services
- Ideal for multiple uses, including roads, bridges, parking lots, cycleways, and sidewalks
- Simple to maintain

Technical Description

Wintersense smart sensors use infrared thermopile technology to measure road-surface temperature non-invasively. The sensors provide additional air temperature, humidity, and dew point measurements using an advanced digital sensor. A stainless-steel mesh filter on the integrated temperature and humidity sensor minimizes the effects of dust and dirt on the sensor, allows air exchange around the sensor element, and reduces the likelihood that condensation remains inside the filter cap. A small PTFE membrane filter is bonded to the surface of the element, which prevents any finer dust or mold from directly influencing the measurement.

Wintersense smart sensors are self powered via a user-replaceable 3.6 V 19 Ah non-rechargeable lithium thionyl chloride D-cell battery. Integrated communications within the smart sensor allow complete end-to-end data delivery to the cloud-hosted Wintersense web application.

Specifications

Road-Surface Temperature

Measurement Range	-40 to +70°C (-40 to +158°F)
Accuracy at -40 to +60°C	±0.5°C *Note: Accuracy is temperature dependent. The quoted accuracy is against a blackbody source within the ambient temperature range of -20 to +50°C and object temperature range of -40 to +60°C.*
Resolution	±0.01°C
Field of View (FOV)	*Note: Use our field-of-view tool to make your calculations and install your Wintersense appropriately.* 10° (at 50% normalized signal)
Distance to Target	2 to 15 m (6.6 to 49.2 ft)

Dew Point Temperature (Calculated)

Measurement Range	-40 to +70°C (-40 to +158°F)
Accuracy	±1°C *Note: The calculated dew point temperature is found from Tetens' equation solved for dew point with coefficients optimized for the temperature range -35 to +50°C.*
Resolution	0.1°C

Air Temperature

Measurement Range	-40 to +70°C (-40 to +158°F)
Accuracy	*Note: Inaccuracy can be higher under moderate-to-high solar radiation.* ±0.4°C
Resolution	±0.01°C

Relative Humidity

Measurement Range	0 to 100%
Accuracy	< ±3%
Resolution	±0.1%

General Specifications

Operating Temperature Range	-40 to +70°C
Operating Humidity Range	0 to 100%
Power Consumption	< 1 mA (typical)
Replaceable Internal Battery	3.6 V 19 Ah non-rechargeable lithium thionyl chloride D-cell battery
Recommended Replacement Battery	Tadiran SL-2780/TL-5930, available from Campbell Scientific (Any alternative battery must comply with IEC 60086-4 to ensure safe operation.)
Battery Life	1 year minimum
Dimensions	350 x 100 x 200 mm (13.8 x 4.0 x 7.9 in.) excluding band clamp
Weight	1.4 kg (3.1 lb)

Radio Communication

Transmission Frequency	868.130 MHz
Transmission Power	25 mW ERP
Data Transmission Frequency	15 minutes

Web Application

User Rights	Basic, engineer, and admin levels
Data Export	FTP, web API, and Datex II

CAMPBELL SCIENTIFIC
80 Hathern Road, Shepshed, LE12 9GX UK | +(0)1509 828888 | sales@campbellsci.co.uk | www.campbellsci.eu
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