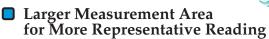# MODEL 5433
IceSight 2020E/EW
Remote Road Surface Condition Sensor

- No Road Surface Cutting
- Long Optical Range
- Open Architecture Communications
- Larger Measurement Area for More Representative Reading

APPLICATIONS:

- **Surface condition related traffic safety hazards**
  - ◇ Highways and surface streets
  - ◇ Bridge decks and elevated roadways
  - ◇ Intersections

- **Weather Responsive Traffic Management**
  - ◇ Modified signal timing when slippery
  - ◇ Black ice warning
  - ◇ Hydroplaning risk warning
  - ◇ Message sign control

- **Parking lot safety**
- **Automatic spray anti-icing systems**
- **Traveler information systems**
- **Aircraft runways and taxiways**

DESCRIPTION:

The Model 5433 RWIS "IceSight" Remote Road Surface Condition Sensor is a non-intrusive surface condition sensor that uses laser and infrared electro-optical technology to read surface condition, temperature and reduction of surface grip due to water, snow and ice. Mounted easily on nearby traffic, luminary, camera poles or on RWIS towers, this rugged all-weather sensor provides an economical means of gathering road condition information for ATMS, MDSS and Weather Responsive Traffic Management applications to improve traffic safety and road maintenance programs.

When used in conjunction with our Model 5470 NTCIP MiniRWIS Remote Processing Unit, the IceSight sensor provides NTCIP 1204 ESS standards compliant open architecture communications.

The IceSight sensor monitors the near infrared spectral differences of the roadway surface to determine the condition of the surface. Data is analyzed in real-time and a road condition state is reported enabling road management personnel to take immediate action as roads become hazardous. Using special signal processing techniques and comprehensive data analysis, the sensor is immune to passing traffic and various road treatment chemicals. Surface condition information eliminates road-treatment guesswork and supports more effective allocation of limited treatment resources.

02-5433-00(E)

Environmental Monitoring Solutions

MODEL 5433
Description and Specifications

DESCRIPTION:

Standard open-architecture data output includes air temperature (at the sensor), surface temperature, surface state and a surface grip coefficient. Surface states reported include 1 dry indication, 3 wet, 2 snow, and 2 ice indications. In addition, a surface grip coefficient is provided in 2 formats. The first, surface grip indication is provided as a numerical coefficient, indicating relative grip on a scale of 0 (worst) to 100 (best). The second classifies surface grip as good, fair and poor, which is useful for stating the grip condition in terms understandable to the motorist. Finally, a comprehensive internal algorithm checks 3 different behavioral parameters to evaluate and report the optical condition of the easily cleaned flat laser window.

Connections are made in a convenient breakout box that houses the unit's optional Hardened Wireless Access Point (WAP). This WAP allows for convenient access to various set-up and calibration functions from ground level without making any direct electrical connections. An "Auto-Cal" function is provided to simplify and automate field calibration to the target road surface.

SPECIFICATIONS:

Voltage Range.	12 VDC
Power Consumption	4.2 Watts
Operating Temp.	-40º C. to 65º C. (-40º F. to 149º F.)
Surface	Asphalt or Concrete
Range	3-15 meters (10-50') @ 45º (concrete)
	3-10 meters (10- 33') @ 45º (black asphalt)
Measurement Area.	0.25mm (12") diameter @ 10 m (30')
Elevation Angle	30º-90º from road surface
Sensitivity	±0.5ºC (±1ºF), Ambient
	0.01" Ice/Water, 0.05" Snow
Air Temperature.	±0.8º C., -40 to +55º C.
Surface Temperature	±0.8º C., -5 to +5º C. ambient ±3.3ºC, -40 to +55ºC ambient)
Surface States	Dry
	Wet (3) - damp, wet, standing water
	Snow (2) - snow, un-compacted snow
	Ice (2) ice, black ice
Surface Grip	Relative grip on a scale of 100 (best) to 0 (worst)
	Classified surface grip (good, fair, poor)
Optics Condition	Internal algorithm evaluates and reports the optical condition of optical window, indicating cleaning or maintenance required.
Communication	EIA-485, multi-drop capable (up tp 8 addresses), EIA-232, Ethernet
Targeting	Removable High Visibility Green Laser
Safety	Eye Safe Class 1 Lasers
Diagnostics	Start-up BIT, One Digital Test Signal
Cable	1.5 m (5') to IP67 rated connector. Optional 7.5 m (25') cable extension
Mounting.	Standard flat camera mount foot (3x ¼"/20 holes)
Dimensions	45 cm x 13 cm (17.75" x 5.25")
Weight	3.6 kg (8 lb)
Shipping Weight	4.5 kg (10 lb)
Warranty	1 year, extendible year by year

CE

This equipment is in compliance with the essential requirements and other provisions of EU Directives: Electromagnetic Compatibility Directive 2004/108/EC R& TTE Directive 1999/5/EC and further conform with the with the following EU Harmonized Standards: EN 55022:2010 EN 55024:2010 EN60825-1:2007 EN 301 489-7 V1.3.1

02-5433-00(E)

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● The IceSight sensor's larger measurement area (than embedded sensors) provides for more representative and reliable results. The actual measurement area of an embedded sensor is a 1 sq. inch or smaller spot. Compare that to the 1 foot diameter spot (at typical 30 foot range) for the IceSight sensor.

● Flexible mounting options. The sensor uses an industry standard camera mount, much like you'd find on a high quality video camera. Many mounting options are available from standard industry sources for pole mount, tower mount, signal arm mount, or just about any other configuration.

● Simple to change the location measured. The camera style mount means it is a simple matter to re-aim the unit if needed. The convenient red dot laser helps confirm the target area.

● Low power consumption is easy on your power budget and is suitable for solar and wind powered sites.

● The lenses for the IceSight sensor are housed behind a clear optical window, eliminating the need for power consumptive lens heaters. There are no moving parts to fail or degrade.

● Relocating the sensor to a new location is straight forward too, and entails unbolting the sensor from its mount, disconnecting the cable and moving it to a new location. Relocating an in-road sensor once its epoxied in place is cumbersome and expensive. Many in-road sensors can't be reused, or the warranty is voided if it is. Sometimes, construction of bridge road surfaces just doesn't allow enough space between reinforcement bars for an in-road sensor.

● The IceSight sensor can often be installed without the need for expensive and hazardous lane closures. Frequently mounted to existing ITS structures, remote surface sensors can often be installed an maintained without lane closure, and are well away from risks imposed by road work. The higher initial purchase cost of a Remote Surface Sensor is offset by the high construction and on-going maintenance and repair costs of embedded (in-road) sensors.

● Eliminates risk of expensive damage by milling, snow plows, paint striping, and high traffic volume.

● Remote surface sensors are susceptible to degraded performance due to soiled optics over time, just as surface sensors need to be periodically cleaned. Unlike other remote sensors that use exposed convex lenses, or flat plate face designs that are easily soiled and difficult to clean, the IceSight sensor uses a specially designed passive lens protection system (Spray Guard) to help protect it from accumulation of road spray and dust. Once the sensor reports that its lens needs to be cleaned, the Spray Guard is easily removed with thumbscrews and cleaning the flat window is simple. We even provide a retention chain so the Spray Guard is not accidentally dropped during cleaning.

● American made. The IceSight sensor is designed, built and supported in the U.S. High Sierra Electronics, Inc.is a ISO9001:2008 Certified company.

● HSE offers an annual off-season, ship-in, factory calibration and "parts included" tune-up plan to make on-going maintenance worry-free.
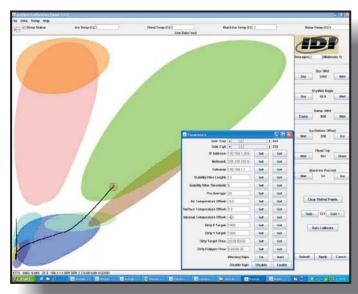
MODEL 5433
Calibration Panel and Ordering Guide

CALIBRATION PANEL:

The IceSight Calibration Panel Java applet provides a simple and intuitive user interface for setup and calibration. It is run on a notebook or laptop PC from ground level by connecting to the hardened Wireless Access Point (WAP) or via wired Ethernet to the equipment cabinet.

The distinct surface conditions measured by the sensor are represented by the colored ellipses shown graphically on the screen of the Ice Sight Calibration Panel. The current measurement is shown graphically (red dot) with a trail showing the changes in road surface conditions over time. Using this intuitive graphical interface, changes in surface condition can be locally or remotely observed in real-time.

The stream of ASCII data received from the sensor is shown on the calibration panel and reports all the parameters measured by the sensor. This provides for a clear method of understanding the sensor's interpretation of current and recent surface conditions during set-up and maintenance activities.

Parameters such as IP address and surface and pavement temperature calibrations are configured using this applet panel as well. The included Auto-Cal routine provides automated calibration to the current road surface, simplifying the set-up process. Any configuration changes are then saved to the sensor. The Calibration Panel allows for loading and saving the IceSight sensor's configuration file in the field, and provides local data logging on an attached PC. All this is done from ground level via wireless connection to the WAP, or via direct Ethernet connection without the need for direct access to the sensor itself.

ORDERING GUIDE:

Model 5433-15.	IceSight 2020EW with Wireless LAN in NEMA Termination Box, 6 foot cable
Model 5433-16.	IceSight 2020E with Wired LAN in NEMA Termination Box, 30 foot cable
Model 5433-18.	IceSight 2020 EW with Wireless LAN in NEMA Termination Box, 2 foot cable
Model 5433-60.	30 Foot Extension Cable (Male to Female connectors) for Model 5433-15/18
Model 5433-65.	30 Foot Extension Cable (Female connector on sensor end) for Model 5433-16
Model 5433-66.	Additional Extension Cable, Per Foot
Model 5433-70.	Mounting Bracket (3" to 8" Pole)
Model 5433-80.	Annual Service Plan
	(Ship-in one time per year, clean, refurbish and calibrate. Includes all necessary parts, including laser and optical parts, if needed. Warranty terms apply.)

02-5433-00(E)