Automatic Sensing and Classification of Hail

HailSens is an advanced sensor system for monitoring hail events in real-time. The detection of hail impacts (as opposed to other types of icy or watery precipitation) relies on vibration measurement. HailSens provides accurate, reliable results both quickly and automatically. A practical tool that saves time and prevents false measurements.

HailSens revolutionizes the technology for sensing hail: It combines sophisticated measuring technology with online provision of data. HailSens automatically detects hail, and classifies individual hailstones with respect to their size and damage potential. The sensing area of approximately 0.2 m² ensures that a representative sample of hail pellets generates impacts on the vibrating plate thereby increasing measurement reliability. HailSens saves data, transfers it in real-time to evaluation software for statistical evaluations and display of impact results in graphics and tables, and - last but not least - provides early warnings using web technology.

The HailSens is available either as stand-alone unit R&D/INS or as the sensor SYNOP integrated in an automatic weather station.

Unique Key Features

- **Online hail detection including kinetic energy and hail diameter.** Compared to the established hail pads, HailSens is more accurate, more reliable, faster, and automatic.
- **Large measurement surface produces statistically relevant results** for any given hail event. The design of the transducer system takes into account the relatively large distance between neighboring pellets in a hail shower.
- **Stand-alone system.** HailSens can be used as a sensor connected to a local data acquisition device or send data over wireless mobile communication channels to the hailsens.online cloud application.
- **Smart sensor with local intelligence,** processing power and the user’s choice of IP or non-IP communication, ranging from RS-485 serial and UMTS/3G/4G to LoRa; with new communication standards added in due time.

- **Online warning system reacting instantly to hail impacts.** Warnings and alerts can be issued through hailsens.online with little delay to prevent damage in locations not yet struck by the hail storm.
- **Specific alert mechanisms** (optional): switching relays via digital output, serial datagrams to control systems, ...
Two Options: R&D/INS and SYNOP

Option 1: R&D/INS
HailSens R&D/INS units operate autonomously sending data over UMTS/3G/4G with every single impact to the cloud-based hailsens.online application. This is the optimal tool for network operators with a strong interest in collecting large amounts of data on individual hail events and pellet impacts. HailSens forwards the data via remote wireless communication. The data can be classified into hail damage classes by hailsens.online cloud application.

Option 2: SYNOP
HailSens SYNOP systems send serial data telegrams (statistical summary of the past minute) over RS-485 connections to a local data acquisition system. This device is ideally suited for Met Office’s monitoring network stations reporting to the WMO. HailSens provides output via RS-485 and data telegram providing both hail YES/NO and quantity information for external generation of SYNOP/METAR codes (i.e. ice pellets > 5 mm according to WMO).

Applications

HailSens is particularly efficient in three areas: First, as an early warning system ensuring preventative protection. Secondly, in the real-time control of mobile infrastructure parts (closing open roof of a sports stadium, alerting drivers on a highway, closing shutters, turning solar panels into upright position, etc.), and thirdly, simply in the recording of individual hail impacts. The rapid and accurate sensing of hail incidents and the ability to immediately forward collected data to a central location where it can be evaluated makes HailSens ideal for:

- Weather Services & Met Offices
- (Re-)Insurance Companies
- Universities, Research Institutes
- Hail Suppression
- Large-Scale Solar System Operators
- Agriculture & Farming
- Civilian and Military Aviation
- Automotive Sector
- Industry and Commerce
- Traffic Security

Technical Data

Dimensions

- transducer plate: Ø 500 mm (19.685")
- ground plate (optional): 500 x 500 mm
- sensor height: 500 mm
- mass: <= 15 kg (non-packaged net-weight)

Operating range

- temperature: 0 °C to +60 °C (storage: -40 °C to +70 °C)
- relative humidity 0 to 100 % RH

Power supply/consumption

- 10-18 VDC
- serial comms: 30 mA @ 12 V (0.4 W)
- wireless IP:
  - typical 60 mA @ 12 V (0.7 W)
  - peak (when comms active): 120 mA @ 12 V (1.4 W)

International Protection Marking

IP67

Specification subject to change without notice.

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