

HDI

Hail sensor



The HDI is a very low-power, maintenance-free, totally sealed and mechanically ultra-robust acoustic instrument with no mobile parts. It is able to detect hailstones between 0.5 and 7.5 cm diameter and will survive the most extreme hail episodes. The sensing part of the instrument is a three layer polished stainless disc supported by an unbreakable stainless-steel arm. Impacts of hailstones (or any other lithometeors in the same range of kinetic energy) induce a measurable change in internal acoustic pressure.

It features continuous or pulse analog voltage outputs and supports SDI-12 communication, serial RS-232, and Modbus RTU RS485 (using an optional adapter). The full configuration of the sensor can be customized at any time with a Plug-and-Play PC connection or remotely, using serial commands.

Versions

| Art | Version |
|-------|---|
| 21446 | Hail sensor with mounting kit and 3m signal cable |

Scope of delivery

| Ref. | Description | Quantity |
|-------|--|----------|
| HDI | Rain disdrometer and hail detection sensor | 1 |
| - | Mounting arm | 1 |
| UDONG | USB dongle | 1 |

Accessories

| Art | Accessory |
|-------|--|
| 21423 | Signal converter 0-10 VDC to 4-20 mA |
| 21431 | RS-232-ModbusRTU adapter |
| - | Extension cable in custom length per meter |

Specifications

Measurement characteristics

| | |
|--------------------------------------|---|
| Measuring surface | 200 mm outer diameter disc |
| Precipitation detected by the sensor | Solid only (hail). 15 classes, from 0.5 cm (minimal detectable diameter) to ≥ 7.5 cm (possible saturation of the instrument). Counting of the number of hailstone impacts up to 25 impacts per second. |
| Measurement accuracy | For a given controlled elastic momentum impact (such as spheres of equal diameter, density, Young modulus, falling speed and incidence angle), the response of the sensor varies typically by $\pm 10\%$, depending on the spatial position of the impact on the disc and on the sensor ($\pm 10\%$ variability between two sensors). |
| Particle velocity | Not measured. |

Voltage ranges and measurement scales

| | |
|-----------------|--|
| Voltage outputs | Continuous analogue voltage or pulse analog voltage, user selectable +0 to +2.5V or +0 to +5V are available. Pulse threshold, integrator timeout and duration are also user selectable. The continuous analog voltage persists on the outputs so that output voltages can be read at any time. |
| Hail scaling | Sensitivity @voltage range +2.5V: [100 mV/(hits/s)] i.e. +2.5V corresponds to 25 hits/s Sensitivity @voltage range +5V: [200 mV/(hits/s)] i.e. +5V corresponds to 25 hits/s |

Power supply

| Supply | Ratings |
|---------|---|
| Voltage | 6 V to 30 V DC (9.6 V and 16 V DC in case of powering through the SDI-12 terminals) |
| Current | < 1 mA in stand-by mode and 20 mA max in acquisition mode. For a typical nominal duty-cycle of 10%: 2.1 mA (20 mA for duty-cycle of 100%). |

Interfaces

| Mode | Description |
|--------------------|--|
| Analog | Pulse and continuous (and persistent) voltages, 0-2.5V or 0-5V |
| SDI-12 | Yes, V1.3 (distrometer output via extended SDI-12 commands) |
| RS-232 | Yes |
| Modbus RTU (RS485) | Yes (Note: requires the Modbus adapter accessory) |

Physical properties

| | |
|-----------------------|--|
| Material | Stainless steel and aluminium Ematal anodized (breakdown voltage > 40 V/μm). |
| Weight | 3.2 kg without mounting kit 5.4 kg with mounting kit |
| Dimension (H x W x D) | 260 mm x 450 mm x 200 mm (with mounting kit) |
| Installation | Universal mounting kit provided |

Environmental conditions

| | |
|-------------------|--|
| Temperature range | -40°C to +80°C |
| Relative humidity | 0 to 100% |
| Protection | IP68, survive to 3 m immersion in salt water |
| Standards | EN 61326-1: 2013, CE compliant 2014/30/EU, CE compliant |