

# 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
21437	Hail sensor with mounting kit and 3m signal cable

## Scope of delivery

Ref.	Description	Quantity
HDI	Hail detection sensor	1
-	Mounting arm	1

## Accessories

Art	
21423	Signal converter 0-10 VDC to 4-20 mA
21431	RS-232-ModbusRTU adapter
21521	Extension cable in custom length per meter, min. 10 m

Art	
21520	Junction box for cable extension
21921	USB Dongle for acoustic sensors

## 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 $\geq 7.5$ 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 @ +2.5V: [100 mV/(hits/s)] i.e. +2.5V corresponds to 25 hits/s Sensitivity @ +5V: [200 mV/(hits/s)] i.e. +5V corresponds to 25 hits/s

Power 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	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 TTL	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, 2014/30/EU, CE compliant

