RainFlow RF4

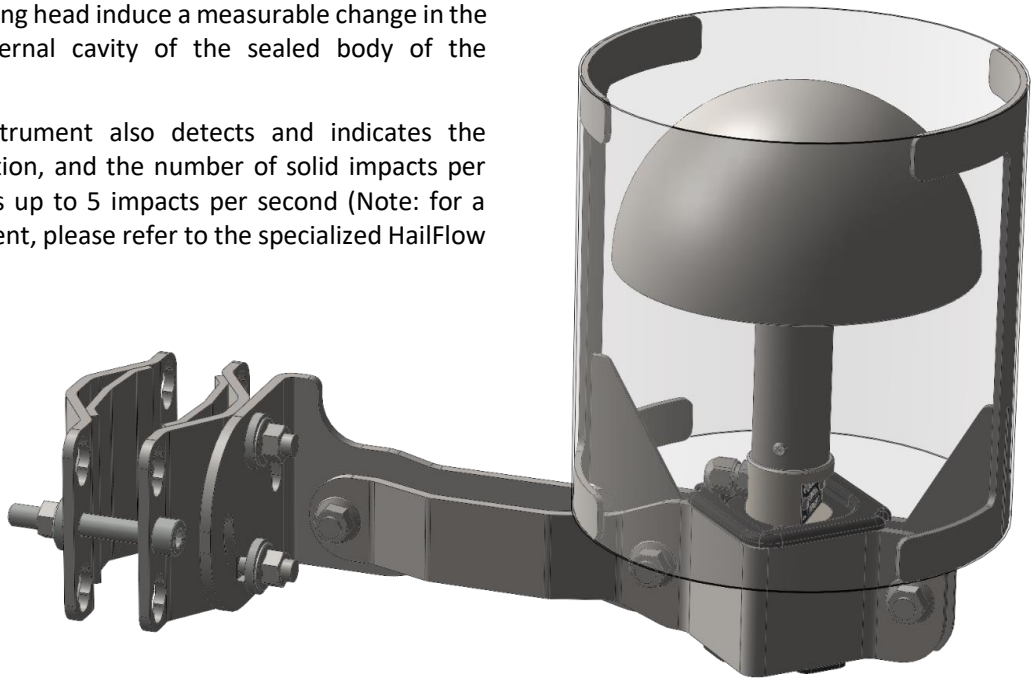
Precipitation Monitoring Sensor

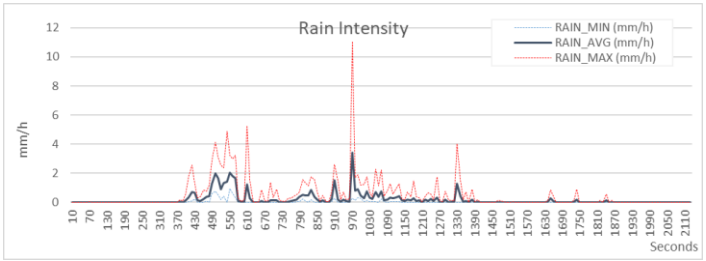
RainFlow™ RF4 is an acoustic sensing instrument which operating principle is the detection of the impacts of raindrops on its sensing hemispheric head. It is an extremely robust and reliable instrument for the monitoring of rain and the characterization of raindrop sizes.

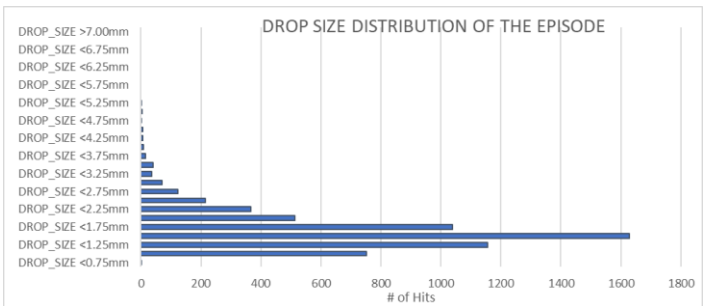
KEY FEATURES

- It detects and classifies raindrops from 0.75 mm up to 7 mm diameter and will survive the most extreme environmental conditions, including off-shore and extreme wind situations.
- The universal fastening mounting kit is an unbreakable plain high grade stainless-steel arm and tiltable V¬ Bracket.
- The sensing element of this non-moving-part instrument is a plain high grade stainless-steel head.
- Impacts of raindrops (or any other lithometeors in the same range of kinetic energy) on this sensing head induce a measurable change in the acoustic pressure of an internal cavity of the sealed body of the instrument.
- Hail indication: the instrument also detects and indicates the occurrence of solid precipitation, and the number of solid impacts per second during the event (this up to 5 impacts per second (Note: for a more specialized hail instrument, please refer to the specialized HailFlow HF4 instrument).

Hydrology
Agriculture
Dam surveillance
Weather stations
Control of land and air traffic







TYPICAL APPLICATIONS

- Monitoring of rain and hail precipitation
- High-resolution disdrometry (number and size of raindrops)
- Forecast of soil erosion, land management
- Building and infrastructure surveillance and insurance
- Maritime and offshore applications (wind turbines, buoys)
- Roadside, railway, airport protection
- Applied scientific research

SPECIFICATIONS

Measuring characteristics	
Measuring surface	160 mm outer diameter hemisphere (402 cm^2).
Precipitation detected by the instrument	Liquid (undifferentiated): rain, drizzle/rain, mixed rain/snow, sleet. Solid: hail.
Rain Intensity accuracy	± 15% at 100% duty-cycle (most global precision and accuracy criteria).
Rain DSD	27 classes from ≤ 0.75 mm to ≥ 7.0 mm with a detection threshold (minimum detectable diameter) of about 0.5 mm.
Measurement accuracy (liquid only)	A spatially distributed flux of controlled drops of a nominal diameter equal to the center diameter of the class ± 20% produces an output centered in the corresponding class with typically ± 50% of the flux concentrated into the two lateral size-classes.
Hail detection*	Counting of the number of hailstone impacts up to 5 impacts per second and for hailstone diameter detection threshold of 0.5 cm.
Particle velocity	Not measured.

* For more specific hail detection, use the HailFlow HF4 instrument, variant of the RF4 specialized in hail detection.

Voltage ranges and measuring 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.
Rain intensity scaling	Sensitivity @voltage range +2.5V: [10 mV/(mm/h)] i.e. +2.5V corresponds to 250 mm/h
	Sensitivity @voltage range +5V: [20 mV/(mm/h)] i.e. +5V corresponds to 250 mm/h
Hail	Sensitivity @voltage range +2.5V or +5V: 5 hit/s

Mechanical data	
Material	Stainless steel, plastic and anodized aluminum (breakdown voltage > 40 V/µm)
Installation	Universal mounting kit provided (ordering reference: RFBRA)
Weight	1.4 kg without mounting kit
Dimensions (H×W×D)	260 mm × 430 mm × 160 mm with mounting kit

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	
Analog	Pulse and continuous (and persistent) voltages, 0-2.5V or 0-5V
SDI-12	Yes, 1.3 certified (fully complies with the NR Systems SDI-12 Verifier)
Serial 3V3 TTL	Yes
Modbus RTU (RS485)	Yes, with the Modbus adapter accessory

Environmental conditions	
Temperature range	-40°C to +80°C. Can even operate over this range.
Relative humidity	0 to 100%
Protection	IP67, survive to 1 m temporary immersion in salt water
Standards	EN 61326-1: 2013, CE compliant 2014/30/EU, CE compliant

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