

## GENERAL DESCRIPTION

**The RainFlow RF4 sensor is a low-cost, high precision, ultra-robust rain gauge instrument.**

- It is a very low-power, maintenance-free and totally sealed acoustic instrument with no mobile parts.
- The sensing part of the instrument is a polished stainless steel hemisphere supported by a strong stainless steel arm.
- Impact of raindrops or hailstones induces change in internal acoustic pressure.
- In addition to the rain and hail intensity data, the disdrometer function also provides information about the drop size distribution.
- The instrument includes a dedicated analog conditioning module, a digital I/O module and an analog restitution module that can be connected conveniently to almost any external central unit (data logger, industrial module interface, instrumentation DAQ, USB port). It features continuous or pulse analog voltage outputs, SDI-12 communication (meteorological standard communication protocol); serial RS-232, RS-485 (with adaptor).
- You can customize the full configuration of the sensor, in a non-volatile memory, with a Plug-and-Play computer connection thanks to a universal USB LINK accessory.

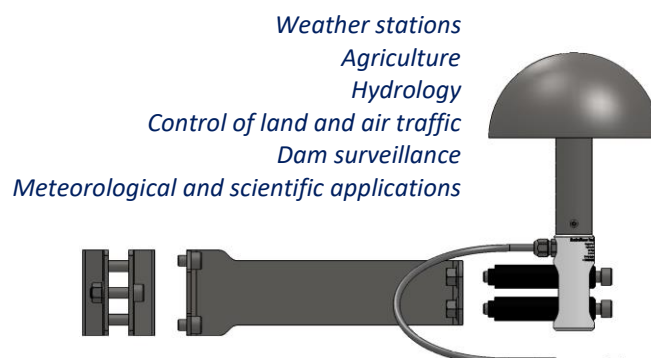


## KEY FEATURES

- Maintenance-free & special design and construction to resist the highest winds, extreme temperatures, rime, sunlight and abrasion.
- Lightweight, corrosion free, UV/Ozone stable, non-obstructable. Resistant to shock, vibration, lightning, ashes, 100% RH and even to temporary submersion. Operating temperature from  $-40\text{ }^{\circ}\text{C}$  to  $80\text{ }^{\circ}\text{C}$  ( $-50\text{ }^{\circ}\text{C}$  to  $100\text{ }^{\circ}\text{C}$  extended).
- Plug-and-Play or totally configurable to fit any application.
- Very low power consumption: 2.1 mA continuous for a nominal operation (10% duty-cycle).
- Adaptable to any structure thanks to a range of very high standard stainless steel clamping accessories.
- Directly connect the sensor to your central unit or configure any analog or digital communication through the USB LINK accessory.
- IoT compatible.
- Possibility to connect the sensor with a very long cable (typ. up to 150 m) with very high information robustness and under very low current drain, thanks to the SDI-12 multi-drop interface, or using an RS485 adapter.

## TYPICAL APPLICATIONS

- Monitoring of rain and hail precipitation
- High-resolution disdrometry (number and size of raindrops)
- Offshore weather buoys
- Forecast of soil erosion



## SPECIFICATIONS

### ■ SETTINGS POSSIBILITIES

Wire	Signal	User selectable	Plug and Play default factory settings
White	Power	No	Positive power supply (6 to 30) VDC
Brown	Signals GND	No	OUT1 GND, OUT2 GND and SDI-12 GND
Green	OUT1	<ol style="list-style-type: none"> <li>1. Disabled</li> <li>2. Rain intensity (Persistent, +0V to full-scale +2.5V or +5V)</li> <li>3. Rain intensity (Pulse, +0V to full-scale +2.5V or +5V)</li> </ol>	3. Rain intensity, persistent, +0V to +5V
Yellow	OUT2	<ol style="list-style-type: none"> <li>1. Disabled</li> <li>2. Rain intensity (Persistent, +0V to full-scale +2.5V or +5V)</li> <li>3. Rain intensity (Pulse, +0V to full-scale +2.5V or +5V)</li> <li>4. Raw signal (<math>\pm 2.5V</math>) (Note: direct, unfiltered AC output of the sensor)</li> </ol>	1. Disabled
Blue	SDI-12	<ol style="list-style-type: none"> <li>1. Disabled</li> <li>2. Rain intensity</li> </ol>	4. SDI 12 bus active, address: 0, rain intensity
Grey	RX	<ol style="list-style-type: none"> <li>1. Disabled</li> <li>2. Rain intensity with/without disdrometer output</li> </ol>	4. RS-232 active, rain intensity with disdrometer output
Pink	TX		
Black	Power GND (0V)	No	Power GND (0V)

### ■ MAXIMUM RATINGS

#### 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: [50 mV/(mm/h)] i.e. +2.5V corresponds to 50 mm/h
	Sensitivity @voltage range +5V: [100 mV/(mm/h)] i.e. +5V corresponds to 50 mm/h

### ■ 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%).

## ADDITIONAL INFORMATION

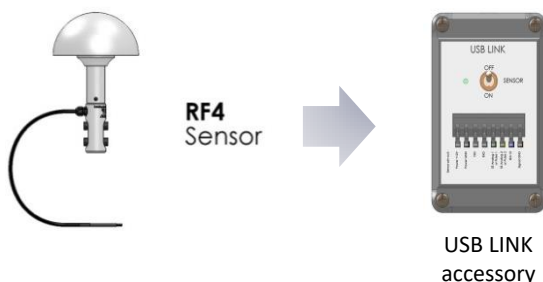
- All ISAW sensors are ultra-robust, high performance sensors for environmental monitoring. Their construction with no mobile parts makes them ideal for a wide range of meteorological, industrial and scientific applications even in the harshest environments. The ISAW Catalogue lists all available ISAW equipment and the ISAW User Guide provides all the required information and instructions to operate the sensors.
- The sensors can simply be used by reading DC outputs (+0 to +2.5V or +0 to +5V continuous or pulse analog voltages available). Note that the continuous DC analog voltages are persistent on the outputs so that output voltages can be read at any time (the reading interval from your peripheral is independent from the duration of the time integration of the sensor).
- The USB LINK accessory and the ISAW-toolbox software suite allow you to get introduced to the sensor by immediately establishing a connection with a computer or laptop, realizing a quick and simple communication start test, accessing all settings menus and seeing live data with a simple scope utility. You also have permanent access to the configuration and communication setups of the sensor directly in a terminal console mode. Remote access is also possible using other standard serial communication modes (RS232, RS 485 or extended SDI-12 commands).

- Configuration includes measuring settings (e.g. averaging durations), power settings, communication and mapping settings (e.g. analog and/or digital outputs, voltage scales, duty-cycle, bus address, etc.). Following the instructions in the ISAW User Guide you can adapt the default configuration at any time to almost any mode of use. The sensors are compatible with both analog and/or digital peripherals. The default configuration, as well as any other customized configuration, is non-volatile, ensuring that your sensor remains in the desired operating configuration whatever the powering scenarios. Thus, even in case of repeated power failures, the sensor will always restart automatically in the desired configuration mode.
- When adding or replacing an ISAW sensor, it is possible to pre-configure it in order to achieve Plug and Play functionality without any on-site configurations. The sensor is totally stand-alone, so that the full lifetime operation of the sensor on your installation doesn't require any software installation or maintenance.
- When choosing an SDI-12 interface for your sensor, you can configure the data frame content you need, set the sensor address of your choice, connect more than one ISAW sensor (as well as other SDI sensors) to a single data recorder and use extension cables up to typically 150 m with a very low current drain.

## SOFTWARE

- For advanced use requiring a customized setting of the sensor, or simply to adjust some factory default settings (e.g. changing voltage range, pulse duration, SDI address, etc.), the non-intrusive and standalone freeware ISAW-Toolbox allows you to immediately configure the sensor exactly to your needs and load this configuration permanently in the non-volatile memory of the sensor.

- Free download the ISAW-Toolbox software suite at [www.isaw-products.com](http://www.isaw-products.com). Connect the sensor to your computer using the USB Link accessory. The USB Link accessory has an 8-PIN quick connector for the sensor's wires, a built-in power converter, and a USB plug for direct connection to a Windows, Linux, or Mac OS machine.



## GENERAL CONDITIONS

### ■ ORDERING & SHIPPING

The RainFlow RF4 sensor is available with or without mounting kit. Three different mounting kits, as well as a range of complementary spare parts and accessories, allow you to select the equipment that perfectly matches your operating situation. A complete list of references and descriptions is available in the *ISAW Catalogue*.

ORDER REF.	Description
<b>RF4</b>	RainFlow sensor only
<b>RFBRA</b>	RainFlow sensor with mounting kit
<b>RFMAS</b>	RainFlow sensor fastened on a tripod mast

Worldwide shipping within 2-5 days a.r.o. in a wood-free cardboard box.



### ■ CONDITIONS OF USE

Always remember that ISAW sensors are acoustic instruments and could thus potentially be affected by structure-borne vibrations issuing from the supporting structure (for example, a steel cable impacting repetitively on a metal mast when subjected to wind); or to a lesser extent by parasitic low-frequency noise from the immediate environment (for example, excessive proximity to heavy traffic or machinery could lead to parasitic signals). It is recommended that you pay attention to avoiding possible parasitic noise when mounting the project.

### ■ DISCLAIMER

When using ISAW sensors, IAV Technologies SARL is not responsible for the choice, selection, relevance and usage appropriateness of the sensor's installation site; nor for the usage, interpretation, and extrapolation of the information made available to the users. Any known system issues that may induce dysfunction or skew the measurements are reported to the users through documentation updates. To continually improve the system, the ISAW Products division of IAV Technologies SARL reserves the option to continuously evolve the sensor's hardware, software, and user recommendations.

### ■ WARRANTY

Two-year warranty. The sensor, the USB link accessory and the mounting accessories are designed and produced with the highest standards. The equipment has a total of more than 100 mechanical and electrical spare parts and 250 electronic components. In case of failure, DO NOT TRY to open the sensor. Opening is destructive unless it is done at the factory for repair. None of the moving or user-serviceable parts require routine maintenance. Opening the unit will void the warranty. In the event of failure, before returning the unit, we recommend that you:

1. Check all cables and connectors for continuity, bad contacts, corrosion, etc.
2. Conduct a bench test e.g. using the Scope utility.
3. Contact us directly for advice.

#### Factory return address:

IAV TECHNOLOGIES SARL  
 ISAW Products Division  
 Chemin des Coulevres 4A  
 1295 TANNAY  
 SWITZERLAND

#### Assistance:

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[www.isaw-products.com](http://www.isaw-products.com)

