PMB25 RAIN GAUGE

The rain gauge PMB25 is designed and built entirely by CAE. It is a tipping bucket rain sensor that represents the state of the art for this type of technology by integrating high-quality mechanics and electronics with specialized software algorithms.

The PMB25/R edition is equipped with distributed heaters allowing use of the instrument to measure the water content of frozen precipitations too.

Each type is also available in its UNI version, which includes a calibration certificate produced according to the Italian UNI 11452:2012 standard. CAE rain gauges are classified as “Class A”, that is they are included in the top (most precise and accurate) category of sensors for rain intensity measurement available on the market.

THE PMB25 RAIN GAUGE

CAE has been producing rain gauges at the top of their category for over 30 years. An example is the PMB2 that the WMO has recognized as one of the best worldwide products. PMB25 is the latest evolution of PMB2.

The most important innovation of the new PMB25 sensor is the introduction of integrated logic directly into the rain gauge.

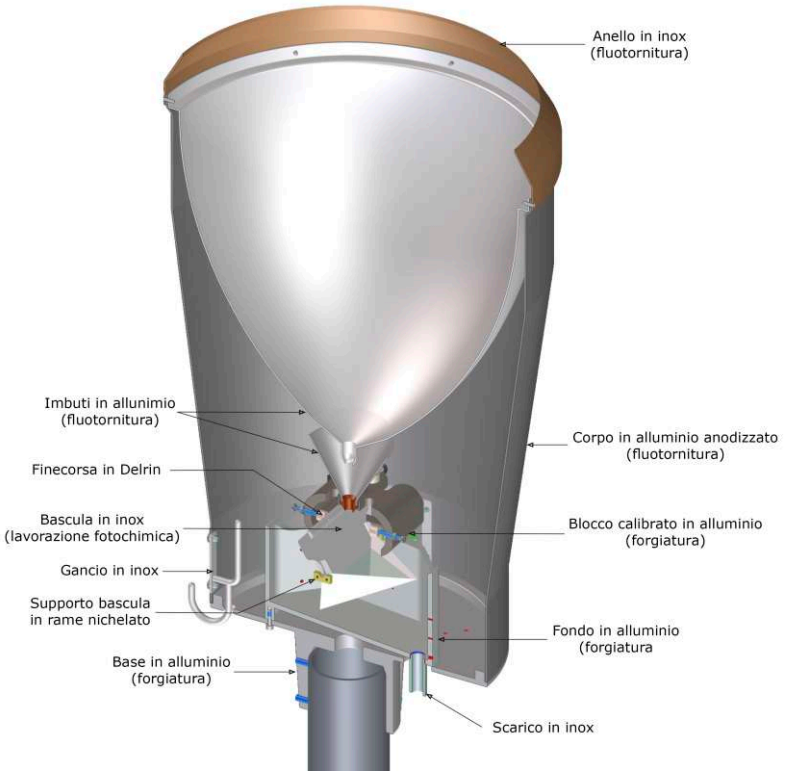
The microprocessor hardware architecture allows precise calculation and provides certified rain intensity values, ranging between 2 mm and 500 mm/h.

CAE
innovation for a safer world.

Particular care has been paid to the choice of construction materials. The stainless steel collector is placed at a right angle to the support made in antifriction material; this type of construction allows an accurate and much more stable calibration over time compared to a traditional tipping bucket with pivot support.

The magnetic-type transducer with sealed reed contact ensures a virtually unlimited number of operations.

The new funnel provides better water collection, since the perpendicular bounce trajectories of rain remain within the funnel, avoiding any loss of rainfall. Moreover, the funnel is designed and shaped to minimize the influence of the strong winds, which may have an adverse impact on measurement.



The calibrated collecting funnel and the outer container are made of anodized aluminium and they are both installed on a sturdy support frame also made of anodized aluminium. Equipment and installation procedures are designed and built to achieve the highest possible quality.

The electronic control unit associates each tipping movement of the mechanism with the exact time when it occurs. This allows measurement correction during intense rainfall and implementation of diagnostic functions, in addition to calculation of the intensity of rainfall per minute.

The board is equipped with a microcontroller based on ARM9 core with 4 MB external data flash for data logging and diagnostics, able to store several years of data.

CUMULATED RAINFALL MEASUREMENT

The PMB25 rain gauge enables an accurate measurement of cumulated rainfall.

During the precipitation, water caught in the funnel flows into a container. Once this container has been filled, it starts to tip. As in all tipping bucket rain gauges, the mechanical system requires a certain amount of time to complete the movement. During this short time, water keeps falling, so that a normal tipping bucket rain gauge underestimates precipitations.

PMB25 RAIN GAUGE

Thanks to the quality of materials and production processes used by our company for sensor production, CAE has been able to verify the systematic nature of the phenomenon and calculate the exact error curve of the instrument due to the kinematic effect.

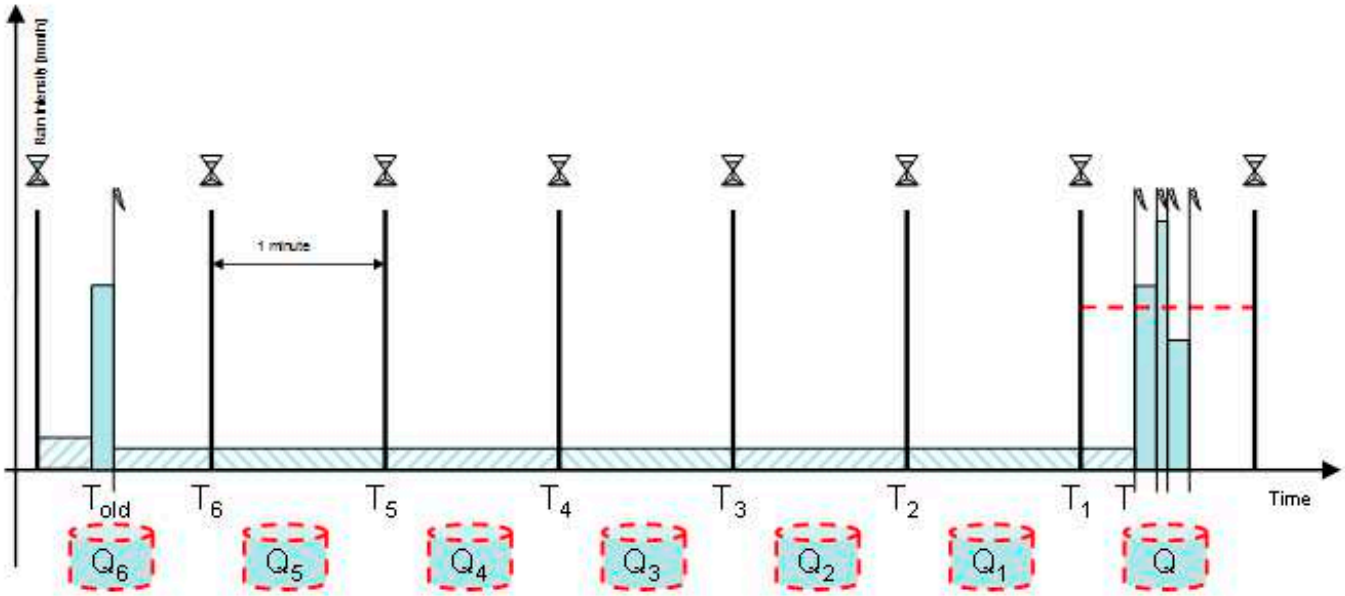
On-board electronics calculate the correction factor to be applied each time the container tips, in order to obtain the correct rain intensity value. At low rain intensity the correction factor is close to 0, while it increases when intensity reaches 50 mm/h or higher; this correction by the software makes it possible to compensate the inherent error of tipping bucket rain gauges up to high intensities (even beyond 500 mm/h).

RAIN INTENSITY MEASUREMENT

The intensity of rain, measured by the sensor based on the tipping of the container, indicates the real intensity of rain every minute, expressed in mm/h, with a resolution of 0.1 mm/h.

The intensity reading calculated by the instrument is based on the average intensity in a minute, then referred to an hour to calculate the mm/h.

In this case too, the algorithm within the rain gauge, by measuring the time between each tip and the next, calculates the correction factor to be applied and provides the most accurate rainfall intensity output every 60 seconds.



Sensor type	Tipping bucket rain gauge with right angle support
Collecting area	1.000 cm^2
Measurement range	0-500 mm/h
Resolution	0.1 mm
Accuracy	Better than 3% in the measurement range
Certified Overall Precision	Better than 3% up to 500 mm/h (available selection at 2%)
Environmental operating range	0 to 60°C ; with heater -30 to 60°C
Connection with datalogger Interface	CAENet or RS-485 with NMEA protocol

PMB25 COMPLIANCY TO ITALIAN UNI STANDARD

In July 2012 the UNI 11452:2012 standard was approved as part of the national standards, regulating the metrological requirements for sensors dedicated to measuring intensity of liquid precipitation at ground level. It defines a classification criterion for sensors, based on the assessment of measuring accuracy.

This standard is the first national reference for defining the performance of rain gauge sensors. It is the result of the experience gained by the Italian Air Force Meteorological Service and the University of Genoa during the activities performed within the framework of World Meteorological Organization (WMO).

According to UNI 11452:2012, each rain gauge sensor can be classified in a specific category based on specific performance accuracy, expressed in terms of maximum error detected.

The standard defines 3 reference classes: A, B and C. PMB25 models manufactured and tested by CAE in accordance with such procedures are all included in class A category, thus representing the best available technology on the market.

THE TESTING MACHINE

The "General UNI-CEN Metrology Commission" has set up an internal Working Group on Hydrometry of which CAE is an active member. As part of the standard, the working group has also defined the main characteristics of the equipment to be used for testing the accuracy of each sensor.

In order to certify the effective and correct calibration of its rain gauges in compliance with the new standard, CAE has produced an "automatic" machine for calibration of rain gauges that implements the provisions of the UNI EN ISO 10012:2004 standard.

First of all, thanks to a reference generator, that is device that generates constant water flows, the machine makes it possible to know the exact time taken to tip each container, thereby allowing a perfect balancing of the two pans.

Therefore, it is possible to verify the output of the rain gauge at constant flows, setting the machine at several different intensities of simulated rain, as stated in the standard. The testing machine allows CAE to certify every rain gauge delivered to its clients with a complete calibration certificate and consequently provide clients with the certainty that they are buying a high quality, precise and reliable sensor.

innovation for a safer world.
CAE S.p.A-Via Colunga 20
40068 San Lazzaro di Savena (BO) - Italy
tel.: +39 051 4992711|fax: +39 051 4992709
www.cae.it