innovation for a safer world.

CAE MAGAZINE
n.42 · *May 2026*

INDEX

The CAEtech PG10 rain gauge has been updated

PG10 and **PG10R** are **CAEtech rain gauges** with a **1000 cm²** collection area. They measure both rainfall **intensity** and **accumulated liquid precipitation** and, in the heated version (PG10R), also the water equivalent of solid precipitation, with a **final resolution of 0.1 mm**.

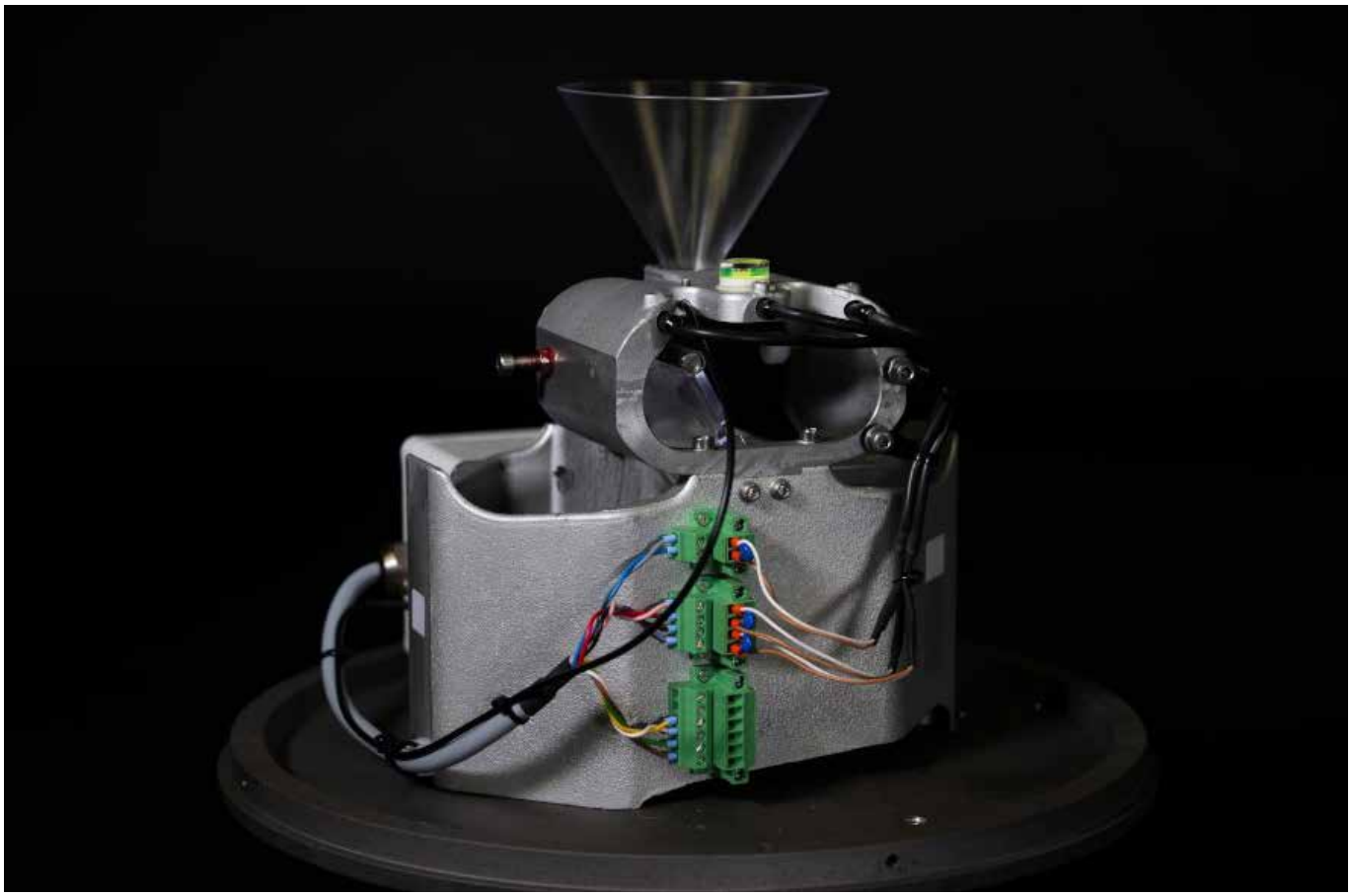
The measurement error of the PG10 product class is less than 3% up to 800 mm/h and it is certifiable as **Class A according to the UNI EN 17277:2020 standard**. For this reason, it ranks among the most precise and accurate sensors available on the market for rainfall intensity measurement.

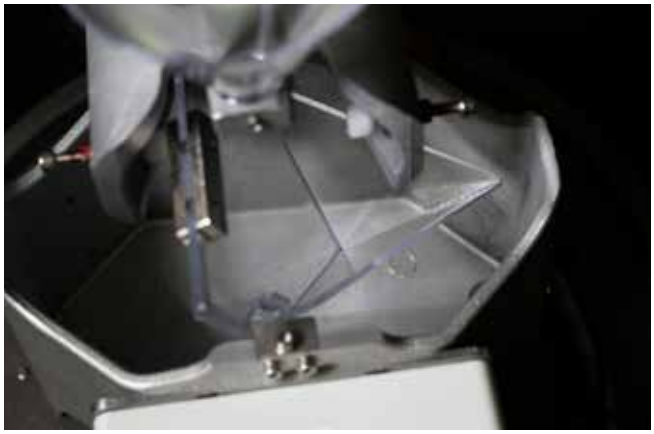
Unlike most used weighing-based sensors, the PG10 delivers this **level of accuracy from the very first minute after the detected event**, making it particularly suitable for the timely measurement of heavy downpours.

This product is based on **patented technology** and ensures a high level of innovation and accuracy. It can detect potential malfunctions before they cause interruptions in measure-

ment, thanks to the implementation of diagnostic checks to verify:

- the cleanliness of the funnel that channels water to the tipping buckets;
- the correct levelling of the instrument's orifice;
- the proper operation of the sensing elements;
- the proper condition of the tipping bucket assembly and moving parts;
- the correct operation of the heating system (PG10R).





The real question is: what has changed? From a **firmware** perspective, the **diagnostic functions and related messages have been redesigned to make them more useful, clear, and user-friendly.** Specifically:

1. The status sensor has been refined to provide users with increasingly meaningful, straightforward, and easy-to-understand diagnostics and messages;
2. The operation of the reed switches has been updated to improve data quality in the presence of strong vibrations or wind gusts;
3. In the heated version, the operation of the heating elements has been optimized, making the ring heater unnecessary and improving the instrument's overall energy balance.

In addition, the **production process** of these instruments and their components has been revised and, as a result, they now feature a slightly updated design.

"*This improvement involves a redesign of the housing, funnel, and tipping bucket materials. This change will allow us to provide an even better service to our customers, in true CAE style, ensuring faster time-to-market, as well as* ***greater standardization and repeatability of components***", says Luca Benati, CAE Operations Director.

The excellent performance that distinguishes the product remains unchanged.

To learn more, click here. ■

BACK TO INDEX

Between present and future: artificial intelligence and machine learning supporting risk mitigation

Artificial Intelligence and Machine Learning are increasingly permeating everyday life, but what **impact** can these **new processing techniques have on risk mitigation**? We introduce a new magazine column that will present some of the advantages these techniques already offer, and will increasingly offer in the future, to users of monitoring systems.

The impact is not limited to greater data availability or improved data quality but extends to providing new tools to support data interpretation, the early detection of anomalous phenomena, and the ability to hypothesize their evolution or even the associated risk.

The technologies and application areas involved are numerous; therefore, starting from the next release, a dedicated space within CAE Magazine will explore this topic in depth.

We hope that these insightful updates related to artificial intelligence and machine learning supporting risk mitigation will be a useful and engaging resource. Stay tuned and don't miss the next release! ■

BACK TO INDEX

CAE S.p.A. awarded the maintenance of the hydrometeorological network in Sicily

The three-year maintenance service of the Sicilian hydrometeorological network, aimed at Civil Protection purposes, has been awarded to CAE: a strategic and significant achievement that confirms the company's role as a key technical partner in the management of environmental monitoring networks.

The **Regional Civil Protection Department, through the Decentralized Functional Hydro-Centre**, serves as the reference structure for ensuring the **management of the regional alert system for meteorological-hydrological and hydrogeological risks**. Its forecasting activity is based on the assessment, supported by modelling, of expected meteorological, snow-related, hydrological, hydraulic, and geomorphological conditions and their ground impacts. This activity is made possible by a network of **ground-based monitoring stations** distributed across the regional territory, which enable real-time observation of rainfall, water levels, wind, temperature, snow, and other essential parameters required to predict and manage critical situations and emergencies.

The **network to be maintained** is among the most extensive in Italy, with **397 heterogeneous stations** and a dual communication system (UHF radio links and GPRS/UMTS devices), re-

quiring careful intervention and coordinated management to **ensure high performance and data availability**. To date, it is composed as follows:

- **49 hydrometric monitoring stations** (17 of which downstream of dams);
- **32 hydro-pluviometric monitoring stations** (including 29 reservoir level gauges);
- **27 hydro-thermo-pluviometric monitoring stations**;
- **249 thermo-pluviometric monitoring stations**;
- **25 anemo-thermo-pluviometric monitoring stations**;
- **14 nivo-thermo-pluviometric monitoring stations**;
- **56 UHF** radio repeaters, all equipped with backup repeater units with hot-switching management between the primary and backup systems;
- **1 control center** located at the headquarters

of the Regional Functional Centre of the Civil Protection Department in Palermo (CFD-Idro). The service entrusted to CAE is primarily distinguished by:

- **Planned routine maintenance**: aimed at preserving the proper functioning of the network at the level of stations, repeaters, and the control center. All activities carried out must be accurately reported and cover every aspect of the network, including infrastructure, measurement sites, electronics, power supply, communication systems, and instrumentation;
- **Corrective maintenance**: providing rapid intervention in the event of faults, with restora-

tion times ranging between 48 and 96 hours;

- **Supplementary maintenance**: including remote maintenance, 24/7 emergency on-call availability, customized support, and maintenance of transmission systems.

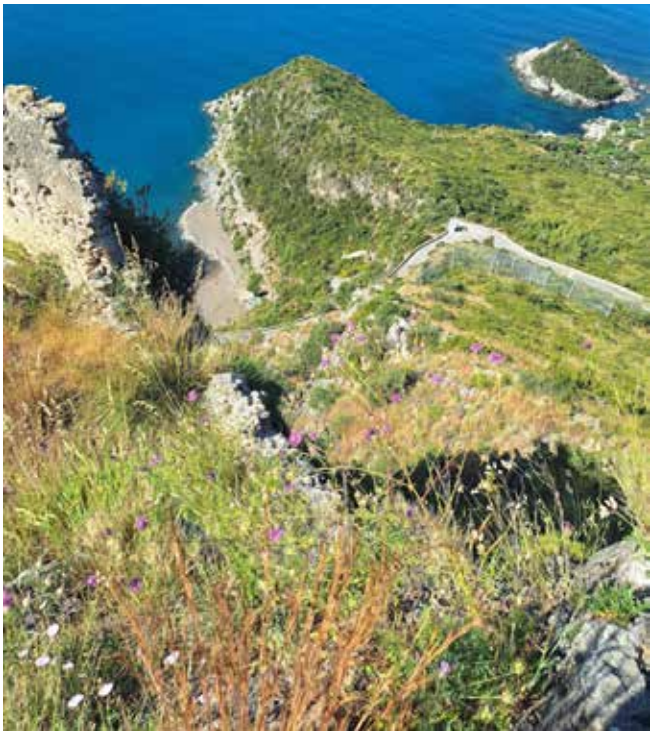
With this assignment, CAE will guarantee to the Regional Civil Protection a reliable, efficient, and always operational tool: a fundamental asset for the safety of the territory and Sicilian communities. ■

BACK TO INDEX

Maratea: monitoring of the Castrocucco landslide

In **Castrocucco**, near **Maratea**, in the province of Potenza (Basilicata), on November 30, 2022, a landslide of significant intensity occurred, creating a **serious threat to public safety**. The event caused the collapse of a large portion of the rocky slope below the medieval castle of Castrocucco, resulting in the **destruction of a section of State Road No. 18**, the interruption of traffic, and the suspension of essential services.

This **instability** manifests itself in **accidental and partially retrogressive rockfall phenomena**. The causes of instability can be attributed to a combination of **geological** (predisposing) and **meteorological** (triggering) **factors**. From a geological point of view, the slope already exhibited a predisposition to instability: the rock face was highly fractured, with widespread discontinuities and



fracture planes compromising its integrity. From a hydrogeological perspective, exceptional rainfalls play a decisive role in triggering debris detachment or in widening pre-existing fractures.

The landslide risk mitigation strategy in this context is based on an **integrated engineering approach**, combining **structural interventions** with **remote monitoring and control logics**. Alongside consolidation works on the most unstable blocks, measures to contain rockfall effects, bypass solutions for the existing infrastructure, and traffic management measures, a **continuous monitoring and alerting system of slope phenomena** has been implemented. Landslide monitoring

represents a key element in managing hydrogeological risk and safeguarding public safety and infrastructure.
CAE, working in close collaboration with other appointed companies and professionals, such as the Department of Civil, Building and Environmental Engineering of the University of Naples "Federico II," was commissioned in 2025 to assess the condition of the existing monitoring system, reactivating it, and maintaining it.
Thanks to site inspections and the valuable data collected over the years by the existing system, it

was possible to identify further interventions to enhance the effectiveness and reliability of the system used up to that point.

As the system had to support not only monitoring purposes but also alerting functions, it was essential to restore the proper operation of all components and enhance the system to improve anomaly detection and response capabilities under critical conditions.

The resulting works, including upgrades and new installations, have led to a technologically advanced system composed of:

- **3 dataloggers** managing **more than 100 sensors, including crack meters, inclinometers, accelerometers, and velocimeters**;
- **1 weather station**;
- **2 rainfall stations** used for the climatic characterization of the area triggering rockfall phenomena;
- **1 total station**;
- **traffic restriction devices** at both ends of the at-risk road section, including 2 traffic lights, 2 electromechanical barriers, and 2 sirens for acoustic alerting;
- **1 cloud-based control center** for remote system management, data visualization, and advanced alarm configuration.

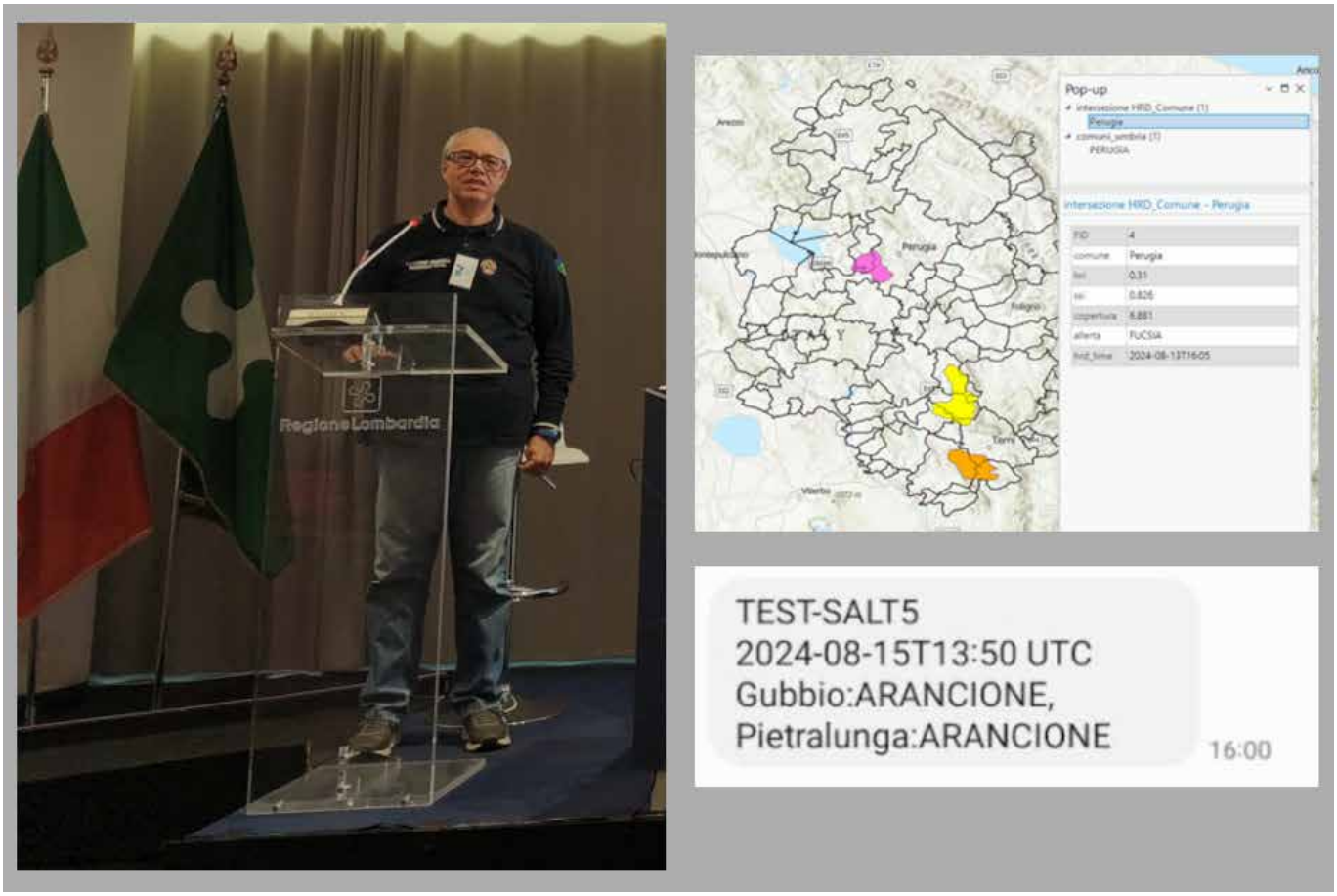
The newly installed technologies, including Compact dataloggers, allow:

- **automatic activation of traffic restriction devices and redundant alarms**, triggered when thresholds defined by the Administration are exceeded;
- reduced need for on-site interventions, thanks to advanced **remote control and remote maintenance functions;**
- **reduced energy consumption**, enabling the adoption of an **autonomous solar power supply system**. This ensures continuous operation

24/7, even in the event of power outages.
Furthermore, thanks to the **implementation of a satellite module**, data transmission has become even more stable and reliable.
Among the technologies used are Compact dataloggers, PG10 rain gauges, THS thermo-hygrometers, the total station, and AEGIS and Sentry software.
This is a complex project that has also required leveraging the specialized expertise of CAE technicians in rope work at height. The proposed upgrade of the monitoring system represents a significant step forward in terms of **reliability, efficiency, and responsiveness to critical events**. The newly introduced features will make it possible to optimize **territorial monitoring**, improve the quality and continuity of data flow, and provide more effective support to operators responsible for hydrogeological risk management.
Thanks to the commitment of all parties involved, under the supervision of the Extraordinary Commissioner for the Castrocucco landslide emergency in Maratea, as well as the Municipal Police Command, and based on a precise management protocol specifically designed for the characteristics of the monitored site, it has been possible to reopen the road, allowing vehicular traffic during specific time slots, with the **possibility of temporary closures** in the event of adverse weather conditions. ■

BACK TO INDEX

Umbria: innovation in early warning systems



For several years now, the Functional Center of the Umbria Region, located in Foligno, has adopted Sentry, CAE's new alert message dissemination software. This product stands out for its **modular structure**, which allows for the seamless addition of a wide variety of communication channels for sending alerts, with a strong focus on achieving **maximum interoperability**. Sentry is **database-independent software** and interfaces with standard systems through the CAP protocol, enabling the **dissemination of alerts even from non-CAE systems that communicate using this standard protocol**. The flexibility of the product has allowed the Umbria Region to create a **CAP system also based on radar products**.

Therefore, the Functional Center **has independently developed a new automatic alert system called SALT: Sistema Allarme Temporali**, presented during the national **radar meteorology** conference RadMEt2025, held in Milan at Palazzo Lombardia, the headquarters of regional offices, sponsored, among others, by CAE.

Our editorial team spoke with **Renato Zauri, meteorologist at the Functional Center of the Umbria Region**, to find out more.

What does the SALT system consist of?

In brief, it is an automatic alert system that notifies the operator or on-call personnel of the Functional Center of the Umbria Region of the presence of precipitation over the regional territory, mainly of

a thunderstorm nature.

The detection of the phenomenon is carried out using the RADAR HRD (Heavy Rain Detection) product, developed by the National Department of Civil Protection and made available in real time to the network of Functional Centers.

A GIS-based geostatistical algorithm calculates the intersections between the polygon generated by the HRD algorithm and the boundaries of municipalities in Umbria, identifying those affected by the thunderstorm event.

The intensity of the phenomenon is represented by a color scale ranging from yellow to purple, passing through orange, red, and fuchsia. This color coding is crucial for the subsequent actions of the Functional Center operator in assessing whether to contact the affected municipality.

Once the involved municipalities and their associated color codes are identified, a message in CAP format is generated and sent to Sentry via API for subsequent dissemination via SMS and voice calls to a set of operators and on-call personnel.

What role did Sentry play in its development?

A fundamental role. First of all, its ability to process XML CAP messages generated from any source and the possibility of sending them directly to the system via API.

It was also possible to **configure contact lists and dissemination profiles in detail**, differentiating users who receive only SMS messages from those who also receive voice calls.

Furthermore, the entire SALT system was deployed within the CAE cluster at the Umbria Functional Center, making it highly robust within a mission-critical platform.

What results have been achieved so far thanks to SALT, and what are the challenges for the future?

It is important to highlight (and this is also the reason that led us to develop it) that SALT is not a nowcasting system, nor a mass alert system, nor a preventive alert system. Rather, it is a **support tool for the operator/on-call staff of the Umbria Functional Center in monitoring intense precipitation, especially for sudden and hard-to-predict events**.

A decision-making process, based on empirically constructed tables, enables the operator to assess the phenomenon and contact the local administrations affected, partially reducing the margin of discretion.

The most significant outcome of this monitoring process is the general appreciation from most of the local administrations contacted during events, as well as the activation of a virtuous cycle of communication and feedback among the various actors of Civil Protection.

We thank Renato Zauri for the time he dedicated to us, confident that we have presented an interesting example of the application and use of technologies designed to be open, customizable, and autonomously managed by the users themselves. ■

The Editorial Team of CAE Magazine ■

CAE MAGAZINE

Managing Editor: Guido Bernardi
Editor-in-Chief: Enrico Paolini
Editorial Staff: Daiana Elena Cical, Armando Di Martino, Gianfranco Geraci, Virginia Samorini
Editorial Assistant: Virginia Samorini

For reference: https://www.cae.it/eng/magazine-hm-30.html?mId=204