

Rotronic in the Field:
Providing Humidity Solutions
for Industries Worldwide

rotronic
MEASUREMENT SOLUTIONS

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Rotronic Provides Humidity Measurement Solutions for Varied Industries & Applications

Rotronic's comprehensive line of measurement instruments for monitoring humidity is crucial for a wide array of industries, from pharmaceuticals to food production. The following case studies demonstrate how Rotronic humidity probes, data loggers and other products have become critical components to the success of endeavors taking place around the world. From helping to collect meteorological research data in the Swiss Alps and preserving fine cheese, to conserving Egyptian antiquities and European rare books, Rotronic humidity measurement instruments are becoming indispensable to a growing collection of companies and government agencies.

The case studies presented here showcase solutions devised over the past decade, highlighting the longevity, experience, and time-tested reliability of Rotronic humidity measurement instruments.





Meteorology

AgriMet:

Conserving Energy Through Crop-Specific Water Use

The US Bureau of Reclamation, in cooperation with other sponsors, has developed an agricultural weather information system in the Pacific Northwest called “AgriMet” to promote energy and water conservation. A contraction of the words agriculture and meteorology, AgriMet is a network of more than 50 automated weather stations that collect and transmit site-specific weather data.

AgriMet’s primary purpose is to model evapotranspiration (ET), the amount of water lost to the atmosphere by direct evaporation from soil and plant surfaces. The network also generates data used for pest management, frost protection and other crop management activities. Each AgriMet station features a data collection platform that samples sensors every 15 minutes and stores the data until a computer accesses it via cellular modem. Each station monitors factors such as air temperature, solar radiation, and relative humidity. Some stations feature additional sensors that measure crop canopy temperature, pan evaporation and soil temperature at various depths. AgriMet stations don’t require external power, as they’re powered by storage batteries and recharged by solar energy.

Problem:

Without ET measurements, it’s impossible to know how much water is evaporated in certain growing environments, and that limits agricultural operations’ ability to ensure efficient water use. Since agriculture accounts for 80 to 90 percent of all water use in the Western States, the inability

to accurately measure ET would amount to a vast missed opportunity for conservation.

Solution:

Accurate air temperature and humidity measurements are essential to compute ET, so the AgriMet program uses a Rotronic Hygroclip HC2-S3 sensor at every station and a Hygrogen humidity chamber for calibration. The technology allows irrigators to compute precise measurements, and it’s low-maintenance: The filter caps on the sensor are changed every year. Every other year, the entire head is swapped with a new, freshly calibrated probe.

With accurate humidity, temperature, and ET measurements for particular crops at their disposal, irrigators can schedule water applications accordingly. By knowing the water-holding capacity of soil and tracking crop water use, they know when and when not to irrigate, enabling significant savings in water, pumping costs and fertilizer use.





Switzerland's Jungfrauoch: Scientific Instruments Installed and Operating in Harsh Conditions

The Jungfrauoch, the highest rail station in Europe at 3,454 meters (11,333 feet) above sea level, is one of the most popular excursion destinations in the Swiss Alps. It's also the site of a sophisticated scientific laboratory. Since 1931, astronomers and astrophysicists, geologists and meteorologists, have worked in high alpine conditions to collect avalanche research data and general weather information.

Problem:

At the Jungfrauoch, instruments for measuring relative humidity and temperature must be able to withstand direct sun and high UV radiation during the day, bitter cold at night and throughout winter, as well as high altitude blizzards complete with thunderstorms, heavy snow, and high winds.

Solution:

The Rotronic sensors installed on Jungfrauoch are so durable that aside from occasional calibration recommended once a year, there is almost no maintenance required.



Scientific instruments at the Jungfrauoch, the highest rail station in Europe, must be able to withstand extreme weather conditions. Durable Rotronic sensors are the perfect solution.



Researching the Climate of Kilimanjaro

Kilimanjaro, the equatorial volcano in Tanzania that boasts a summit elevation of 5895 meters (19,341 feet), supported an estimated 20 km² of glaciers until the late nineteenth century. By the current century, however, the ice-covered area that Johannes Rebmann described as, “dazzling whiteness,” in 1848 had decreased by around 90 percent, to just 2.2km².

Problem:

Researchers are investigating the meteorological conditions of Kilimanjaro to better understand the relationship between the mountain’s climate and the demise of its tropical glaciers. To collect accurate data that can enhance the evolving understanding of a complex set of meteorological factors, those researchers require probes that can provide precise measurements amid constant sub-zero temperatures and high solar radiation levels (above 1200 W m²).

Solution:

In February 2000, Rotronic MP101A probes were installed at the automated weather station near the summit of Kilimanjaro to measure area humidity and temperature levels. Data is stored on-site and transmitted via Argos telemetry to the University of Massachusetts. The Rotronic probes continue to provide accurate measurements amid harsh conditions, contributing to the growing body of research into the shifts in the environment of one of the world’s natural treasures.



Rotronic probes measure humidity and temperature levels on Mount Kilimanjaro, helping researchers to collect data on the volcano’s melting tropical glaciers.



Research & Education

In the Service of Dentistry

When dentists and oral surgeons conduct dental treatments and surgical procedures, it's important to use a drainage and isolation system to minimize saliva and humidity so they don't interfere with the procedure in question. Historically, dental professionals used a coffer dam or basic swabs and gauze.

With the recent advent of a new drainage and isolation system called Isolite™, a team of students at the University of the Pacific Arthur A. Dugoni School of Dentistry in Stockton, California conducted a study to compare the new technology to the old gold standard, the coffer dam.

Problem:

As they set out to measure the anti-humidity properties of both technologies, the student-professor team realized that they would need the most precise tools available to measure and compare the humidity levels in the mouth during procedures when each system was used. Without the proper equipment, inaccurate measurements would compromise their study and waste the funds they'd received for the study.

Solution:

The research team selected Rotronic HygroLogNTs and HygroClip SC05 probes to measure mouth humidity levels during the study. The hand-held HygroLog NT was chosen because of its mobility and logging capability, and the HygroClip SC05 probe because of its slim profile and stainless-steel housing, which makes it easier to use.

In the study, the HygroClip probe was placed over the isolated teeth for at least 30 seconds in order to record the measurement, and the parameters were entered in the HygroLog NT and analyzed by the Rotronic HW4 software. Using the Rotronic probes, the research team found that the Isolite™ system more effectively monitored humidity in the mouth during dental surgeries and dental research. While the coffer-dam method achieved humidity values of 47 to 57 percent rh, the Isolite system achieved between 47 and 52 percent rh (that's similar to room humidity, while mouth humidity levels are generally in the upper 90s).

The Rotronic probes were a key contributing factor in achieving accurate data that will enhance the quality of dental treatments, oral surgery, and dental research for years to come.





Keeping Airplane Air Fresh

As more people fly commercial airplanes each year, the airlines are in greater need of measurement instruments to maintain the atmosphere of the cabins for crew and passengers. Forecasts predict annual passenger growth of 5 percent through 2020, which will necessitate an additional 15,000 aircraft. That means airlines will be making additional investments in optimizing cabin air to ensure passenger comfort and safeguard health, as well as provide acceptable working conditions for the crew.

Problem:

Ensuring that the temperature and humidity levels in airplane cabins are safe for passengers and crew is a complex science. If done incorrectly, fluctuating air pressure during takeoff and landing can lead to headaches and other symptoms, while low humidity in-flight at high altitudes can cause dehydration. Flight attendants and pilots, who spend long periods of time onboard, can be particularly affected by irregular air pressure, temperature, and humidity.

Low humidity is especially common in aircraft cabins due to the outside air, which at altitude generally has a mere 2 percent relative humidity level. In long-distance flights, humidity levels average around 15 percent.

Solution:

Rotronic measurement sensors such as the HygroClip2 provide accurate readings of temperature and humidity, even at humidity levels as low as 5 and 20 percent, which are more difficult to measure. The HygroClip2 features the latest Airchip3000 technology and provides precise and repeatable measurements for relative humidity, temperature and dew point, helping keep cabin air safe.



Rotronic measurement sensors help airlines maintain safe humidity and temperature levels inside airplanes by continuously providing accurate readings.



Humidity and Space Missions:

The European Deep Space Antenna Project

The European Space Agency operates and maintains a network of ground stations, some of which use antennas that support spacecraft operations through telemetry, tracking and command (TT&C). Telemetry is the science of gathering information from a remote location and transmitting it to a different location to be examined. Tracking refers to an antenna recording data transmitted by satellite and issuing commands. Commanding means controlling a device remotely.

One of the largest antennas in the world used for TT&C is the 115ft Deep Space Ground Station at New Norcia in Western Australia, which is part of the European Space Agency Network. It has been vital to high-performance communications with deep space and high elliptical orbit missions.

Problem:

Reliable long distance communications between the antennas, such as between the New Norcia ground station and spacecraft, are essential to acquiring scientific data using the instruments on board the spacecraft. Without sufficient communication capability, it would be impossible for the operations center to remotely control the spacecraft and its instruments over distances of up to 900 million kilometers, which is more than six times the distance from Earth to the sun. In turn, all of the ground stations must be remotely controlled and operated from the European Space Operations Centre (ESOC) at Darmstadt, Germany, which requires high-level satellite communication capability.



Solution:

Rotronic HygroFlex 2 temperature and humidity transmitters at the ground stations send climatic humidity and temperature data via an RS 232 interface directly to the ESOC. The sensors are mounted within Rotronic VHTS2 ventilated radiation shields on a collapsible aerial mast, with the HygroFlex transmitters installed in an enclosure underneath. They're powered by a solar panel and battery. The weather data collected with help from the transmitters is used to improve the directional accuracy required for deep space missions, which is integral to the data collected during the mission. Directional errors caused by weather-dependent atmospheric refraction can be corrected by the so-called refraction model. Rotronic instruments provide critical measurement to deriving the refraction index since it is a function of temperature, humidity, atmospheric pressure and antenna elevation. The antenna is calibrated using stars as signal sources and positional references, provided there is no wind load on the mechanical structure. Wind speed information provided by Rotronic anemometers is used to determine if the correction process should be disabled when a certain wind speed is exceeded.



Rotronic transmitters installed on the Deep Space Ground Station at New Norcia in Australia help collect weather data used to improve the directional accuracy required for deep space missions.



Humidity and Fuel Cell Research

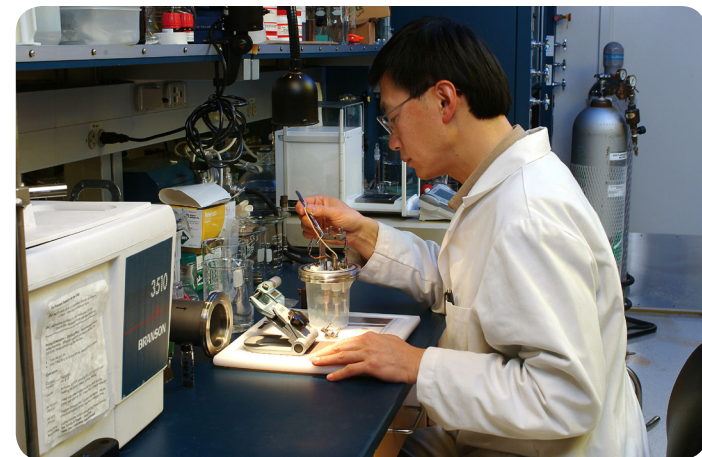
A fuel cell is a power-generating device that uses materials such as natural gas, petroleum, coal or biomass as its fuel source. Since the fuel cell is based on the reverse reaction of electrolysis of water, it doesn't require the combustion of fuel like typical thermal power generation methods. This makes it a high-efficiency power generator with low environmental impact. In addition, since heat is produced by the chemical reaction, the fuel cell can supply both electricity and heat simultaneously. Fuel cells are intended not only for large-scale power plants, but also as a power source for homes, office buildings, hospitals and vehicles. As fuel cell technology has become popular, various industries, from car manufacturers to power companies to universities, have rushed into the development phase. Rotronic provides customized humidity and temperature measurement instruments to fuel cell testing machine manufacturers so they can offer quality testing to fuel cell developers.

Problem:

A fuel cell requires high temperature and high dew point values for efficient power generation, which means that when testing fuel cells, monitoring temperature and dew point is essential to determining the best atmosphere for power generation. Since fuel cell testing machines are operated at between 80 and 150°C and 90 and 100 percent relative humidity, with the dew point sometimes reaching 90°C, the humidity sensors are exposed to extreme conditions. In order for the measurement instruments to perform adequately, they must be able to withstand the harsh conditions of high humidity and high temperature combined under a positive pressure. Fuel cell testing machines supply minute molecular gases like hydrogen, which can leak out of the process, leading to pressure changes that distort the fuel cell test results. Therefore, it's also crucial that the probes are pressure-tight.

Solution:

The Rotronic HygroFlex 3 transmitter with the HygroClip IE – X/M screw-in pressure probe is ideal for fuel cell testing applications. The HygroClip probe features high resistance to high humidity, high temperature and saturation conditions, making it the perfect solution for fuel cell testing. The customized HygroClip IE-X/M screw-in pressure probe boasts an operating range of between 50 and 200°C., and is able to withstand both high temperature and pressure up to 50 bar. To ensure that the application is successfully measured, the probe should be heated to prevent condensation. If condensation does occur, a special filter designed for the probe causes the condensation to flow off of the probe.





Manufacturing

Land O'Lakes:

Perfecting Powdered Milk

For 25 years, Land O'Lakes, in Minnesota, has been investing in the research and development of milk production. The company uses spray drying, the most common technique for dewatering milk products. The process doesn't require extreme temperatures and allows for product storage at room temperature.

Problem:

Each milk product has specific drying parameters according to its physical and chemical characteristics, which tend to be unpredictable. Because of the complexity of factors in each milk product, the company used to use a time-intensive and costly process to determine the drying parameters on an empirical basis.

Solution:

One Land O'Lakes researcher, Glenn Ward, developed a new method of demonstrating and verifying the drying process. His research showed that it's possible to deduce the optimal dryer parameters for the desired water content and water-activity value by monitoring the inlet and outlet flow to and from the dryers, as well as measuring the air temperature and the relative humidity. This streamlined the process has made drying more efficient and less expensive.

To measure the drying temperature and the absolute and relative humidity, Ward chose the Rotronic HygroFlex5 series with HC2-IM sensors. He and his team selected Rotronic technology because of its precision and reliability. The dryers now operate at higher throughput and with improved product quality. Ward has installed the Rotronic transmitters in a growing number of Land O'Lakes spray dryers at many facilities around the country.





Environment in a Box: Simulating Environmental Variables

When it comes to testing new products before they're released onto the market, the design and development must include the consideration of all possible stresses encountered during the life of the product. If developers fail to do that, the product will likely fail to meet consumers' expectations.

Problem:

In order to investigate a product's long-term behavior and resilience in "real time," the product in question must be observed as it ages in its natural environment. However, such a lengthy process isn't practical in a time of ever-shorter innovation cycles.

Solution:

To test products' reliability over time, developers use accelerated artificial aging through targeted environmental simulation. By simulating an environment, the typical failure probability of a technical system over time (bathtub curve) is compressed, enabling the cause-effect relationships between environmental stresses and product quality to be studied in a shorter period.

Climate chambers offer precise environmental conditions that quickly reveal their effects on product quality. Environment simulations include various variables, of which humidity and temperature are among the most important. Rotronic's high-precision industrial sensors supply reliable measurements for relative humidity, air temperature and carbon dioxide. Once those variables are determined, additional values can be derived, as well.



In climate chambers, which enable developers to test product durability by simulating environmental degradation over time, Rotronic's industrial sensors supply accurate measurements for relative humidity, air temperature and carbon dioxide.

In the conventional climate chamber, sensors are used to measure the prevailing temperature and humidity conditions, which are then maintained at the nominal values prescribed using electric heat, compression refrigeration machines, and vaporizers.

The German company CTS Clima Temperatur Systeme GmbH designs equipment for environmental simulation. Because humidity and temperature sensors for industrial applications must fulfill stringent criteria with regard to accuracy, long-term stability and reliability, manufacturers have the highest standards when it comes to fast-responding humidity sensors with hygroscopic polymer dielectric material.

To ensure high product quality, CTS uses Rotronic measurement instruments and sensors to gauge humidity and temperature. With a wide operating temperature range, resistance to aggressive atmospheres, and minimal maintenance needs, Rotronic sensors guarantee maximum accuracy and long-term stability.



Emmi AG:

Storing Cheese at the Proper Temperature

Emmi AG is the biggest Swiss milk processor and one of the most innovative premium dairies in Europe. Emmi concentrates on the development, production and marketing of a full range of dairy and chilled products in Switzerland, as well as specialties for the European and North American markets.

Problem:

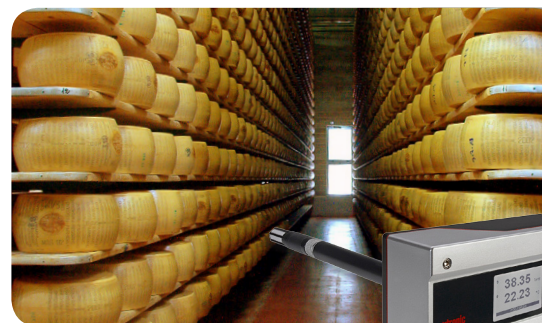
In order to develop the right taste, cheese must be stored at specific temperatures and typically high humidity levels for a certain number of months. High humidity causes problems for many sensors, which may prevent them from monitoring and controlling the temperature and humidity. Each sensor needs to be precisely calibrated to perform correctly.

At Kirchberg, an estimated 18,000 wheels of Emmentaler are maturing in storage at any given time. If the temperature and air humidity levels in the hall aren't optimal, the cheese could sweat or exude fat during the process, which would ruin its quality and taste.

Solution:

Rotronic sensors enable the Emmi cellarers to keep cheese at the proper humidity and temperature levels (temperature at a constant 11.5 °C and relative humidity at 74 percent rh). Rotronic HygroFlex5 transmitters are user-friendly, since you can replace the sensors without removing the entire housing. When the regular calibration time comes around, all the operator must do is replace the sensor with a newly calibrated one.

The HygroFlex5 series is the latest development of HVAC transmitters for the measurement of relative humidity, temperature and dew point. With freely selectable analog outputs, the HygroFlex5 is suitable for a wide range of applications and stands out for its high level of repeatability. At its heart is the HygroClip2 probe, which records temperature and humidity, can store up to 2,000 data sets and calculate the current dew point.



Rotronic humidity measurement sensors help maintain the perfect environment for cheese at Emmi AG, the largest Swiss milk processor.

Sensor calibration is especially important for a cheese warehouse. Humidity sensors are normally calibrated at 23 °C with relative humidity of 10, 35 and 80 percent, which means that the greater the deviation from 23 °C, the greater the potential aberration in calibration. Incorrectly calibrated systems can give rise to faults – and spoiled cheese. To avoid that, Emmi calls in the Rotronic calibration vehicle to recalibrate the sensors, which also provide uninterrupted monitoring of temperature and air humidity, even when the technician is not present. If the values exceed the optimal levels for more than an hour, an alarm sounds.



In the Service of Health:

Dr. R. Pflieger, GmbH Pharmaceuticals

The pharmaceutical company Dr. R. Pflieger, GmbH is one of the leading medium-sized manufacturers of medicinal products in Germany. The company produces and markets a wide range of medical devices, primarily in the fields of urology and dermatology, as well as over-the-counter pharmaceuticals and body care products.

Problem:

Like most pharmaceutical manufacturers, Dr. R. Pflieger, GmbH uses cleanrooms, environments where contaminants such as dust, chemicals, and microbes are contained. To guarantee the safety and quality of its products, the company must constantly monitor and verify its cleanrooms' pressure conditions, as well as humidity and temperature measurement data. If this monitoring fails, large batches of products developed for medical and cosmetic use could be contaminated and become unsafe.

Solution:

To ensure its cleanrooms stay clean, Dr. R. Pflieger, GmbH uses Rotronic HygroLog-NT data loggers. Together with Rotronic's certified HW4 monitoring software, these data loggers deliver important information on the environments that influences the production of pharmaceuticals. The logger provides digital inputs for HygroClip2 humidity and temperature probes and is equipped with a memory card on which not only the measurement data, but also events in the instrument itself, are stored. All calibration and adjustment data is stored in the probes, which are known for precision and long-term reliability.

The HW4 software visualizes and saves all of the collected data, configurations and user events, as well as triggers alarms. Since all main and secondary installations - and the monitoring system itself - are integrated in the management system, they can be monitored and controlled via a central software platform. In addition to monitoring and controlling the sensors from the central system, it's possible to remotely control the outdoor lighting and access to the building.

Rotronic's time-tested monitoring system makes it easy to control and monitor a complex network of cleanrooms – and a complex array of products - from one centralized location, ensuring that the company's products remain clean and safe.





Mapping:

Rausch Hair & Body Products

Mapping is the process of scanning storage and work environments for hot and cold spots to determine the right places to install data loggers for monitoring temperature and humidity. Mapping is often performed when installing complex measurement systems and is used mostly in the pharmaceutical and food industries, where climate is critical. One company that uses this technology is Rausch AG in Switzerland. Rausch has been manufacturing high-quality, innovative herbal hair and body products since 1890.

Problem:

Rausch uses fresh and dried herbs, as well as herbal essences, to create many of its products, and it's critical that the raw ingredients and end products are stored in the right places and under ideal environmental conditions. This is as important for legal requirements as it is for product quality. To ensure the company can prove its high product quality in compliance with global, regional and local regulations, it must store at least one reference sample of every production series under optimum conditions for a period of five years. To determine where to install the data loggers, the company must have accurate mapping. Once the loggers are installed, precise climate monitoring and control requires the most reliable and accurate system available.

In addition to protecting the products, the storage environment must ensure that packaging labels don't come off during transport or after opening. The humidity should remain between 40 and 60 percent and the temperature between 16 °C and 24 °C.



Solution:

Rotronic will determine the proper locations for the instruments and install HygroLog-NT data loggers in the high-bay stores. Rotronic will use heat mapping to collect environmental data in various rooms to determine where the loggers should be installed, and in a later phase the satellite site in Bottighofen will also be equipped with new probes and a LAN-based measurement system. The real-time online monitoring system on the LAN will send alarms by SMS or e-mail when temperature or humidity variations move outside the defined tolerance range. This way, the people charged with maintaining the cleanrooms' temperature and humidity levels will know immediately if adjustments must be made to safeguard the products.



Museums & Artifacts

Preserving Tombs in The Chur Funeral Chapel

Chur, a quaint town nestled on the shore of the Rhine River in the Eastern Alps, is one of the oldest towns in Switzerland. Archaeological objects from the Bronze and Iron ages have been found in the city center. For hundreds of years, the remains of religious leaders have been entombed in one of the local chapels. The tombs of the Chur Bishops date from the fifth to the ninth centuries and are conserved under a protective roof.

Problem:

Though the tombs were long protected from damage from objects or external weather events, the climate of the chapel began to wreak havoc on the historical and religious relics. Salt crystallization caused by extreme variations in humidity and temperature was damaging the tombs and the murals.

Solution:

The local government's cultural offices used the Rotronic HygroLog NT3 series to conduct environmental recording and help institute climate control measures such as features that usher in more natural air. Local conservation and restoration specialists recommended Rotronic technology because they'd successfully used it for years to monitor archaeological archives, which also require high reliability and accuracy.



In Chur, a small town in the Swiss Alps, Rotronic technology helps to conserve and protect historic tombs that date to between the fifth and ninth centuries.

Testing showed high humidity levels were caused by someone having closed the natural opening that allowed fresh air into the building. The HygroLog NT3, which is mounted in a docking station, is now used to record temperature and humidity data from three HygroClip2 probes. The docking station transmits the gathered data to the LAN, where it is evaluated using the HW4 software. This system allows constant monitoring of the interaction between the interior climate and the exterior environment via natural drafts of air. If the relative humidity inside drops below 70 percent or rises above 85 percent, for instance, the system sounds an alarm or transmits a message to ensure that the climate can be corrected before salt again damages the tombs or murals.



Preserving the Great Pyramid of Saqqara Egypt

The Great Pyramid at Saqqara, on a desert plateau some 30 kilometers south of Cairo, is the site where the ancient Egyptians first attempted to defeat time and death by building tombs and temples in stone. It was here, 4,500 years ago, where the Egyptians built the world's first pyramid, part of an extensive funerary complex for the Pharaoh Zoser. The Step Pyramid, conceived as a stairway to heaven for the departing Pharaoh, is situated at the center of the complex and rises 62 meters (203 feet) into the air. It's older than the more famous pyramids at Gizeh, and had been standing for more than one thousand years when Tutankhamen came to the throne around 1500 BC.

After 150 years of excavations at the site, a new discovery was made in 1987 by a team of archaeologists from Warsaw University. They found burials spanning nearly 4,000 years, one of which was the well preserved and colorful tomb of a powerful Egyptian politician, a previously obscure vizier name Fefi who lived in the twenty-fourth century BC. The tomb's inscriptions portray him as both powerful and colorful. As he ran financial and administrative affairs for King Teti, the first ruler of the Sixth Dynasty, the inscriptions also show him cavorting with a woman known as "The One Who Loves Life" while his five wives remained at home.

In addition to Fefi's escapades, the 1987 excavation found deep shafts hewn in the rock, a large number of mummies and a wall running parallel to the pyramid, which turned out to be part of a monumental tomb. When the team returned in 1996 and unearthed the tomb's courtyard, they discovered colorful reliefs on the entrance to a funerary chapel that showed the tomb's owner with a woman.

Problem:

The local limestone is extremely fragile, causing salts to accumulate on the paintings. This poses challenges to conservators from the National Museums in Warsaw and Krakow. As they work on conserving the ancient artwork, the climate could determine their success or failure. If they're unable to adequately monitor changes in humidity and temperature, their work – and the treasures of antiquity – could be irrevocably damaged. Measuring humidity and temperature in desert conditions requires a unique set of tools. Since the weather fluctuates wildly, high humidity and temperature routinely damage electronic instrumentation.

Solution:

To monitor and control the surrounding temperature and humidity, the conservators used the Rotronic HygroLog, a modular logger featuring the interchangeable HygroClip sensor module. When calibration or maintenance is required, the site personnel can simply fit a pre-calibrated new module within seconds. With access to continuous climatic data, the conservation team can monitor the reliefs' surrounding atmosphere and prevent further deterioration in order to preserve this priceless historic art.



The Rotronic HygroLog, a modular logger, helps conservators to protect ancient reliefs at The Great Pyramid at Saqqara, on a desert plateau south of Cairo.



Protecting Books at The Abbey Library of St. Gall

The Abbey Library of St. Gall in Switzerland is one of the oldest and most important monastic libraries in the world. Its unique collection of books chronicles the development of European culture throughout the centuries and documents the cultural achievements of the monastery of St. Gall from the eighth century to the dissolution of the abbey in 1805. The Abbey Library, along with the entire Abbey precinct of St. Gall, was named a UNESCO cultural heritage site in 1983.

Today, the Abbey Library is a museum serving modern scholars specializing in the Medieval period. Every year, an estimated 100,000 visitors from around the world view the exhibition in the renowned baroque hall, considered one of the most beautiful library rooms in the world.

Problem:

To preserve books – especially books that are hundreds of years old and already deteriorated to some degree - constant humidity and temperature conditions are essential. Without a reliable system to monitor and control the climate of a library, its contents cannot be preserved for future generations.

Solution:

The Abbey Library of St. Gall uses the Rotronic HygroLog data logger to memorize humidity and temperature values, and the data is easily downloaded for evaluation. This allows library overseers to keep constant tabs on the humidity and temperature levels in the library and make any needed adjustments over time.



Using Rotronic HygroLog data loggers, overseers at The Abbey Library of St. Gall track the temperature and humidity levels to ensure the historic books are preserved.



The Music Plays On: Preserving Church Organs

The Swiss Company Christoph Metzler Orgelbau, also known as “The Flying Registers,” preserves old organs and restores damaged ones. Located in a Zurich suburb, the company partners with five other companies in Europe and the U.S. to preserve fragile antique organs, which have often been made more fragile through alterations and reconstructions over the decades. “With every change, an organ loses some of its character,” Metzler says. Climate is a vital factor in restoring and preserving these musical treasures.

Problem:

If the moisture content in the environment becomes too high, the organ wood swells, and if the moisture is too low, the wood shrinks. Either extreme can destroy the glued junctions and in severe cases, lead to rips and tears in the wood. This kind of damage makes the organs difficult to play and ruins the sound, as well as the instrument’s monetary value.

Solution:

To prevent the organ wood from being warped, humidity must be kept between 50 and 60 percent. Since 2001, Christoph Metzler has used the Rotronic HygroLog D data logger, which is placed inside the organ and records the climate data over time. By monitoring the data, Metzler and his employees know whether to heat, ventilate, or air-condition the premises.





Safeguarding Jens Olsen's World Clock at Copenhagen City Hall

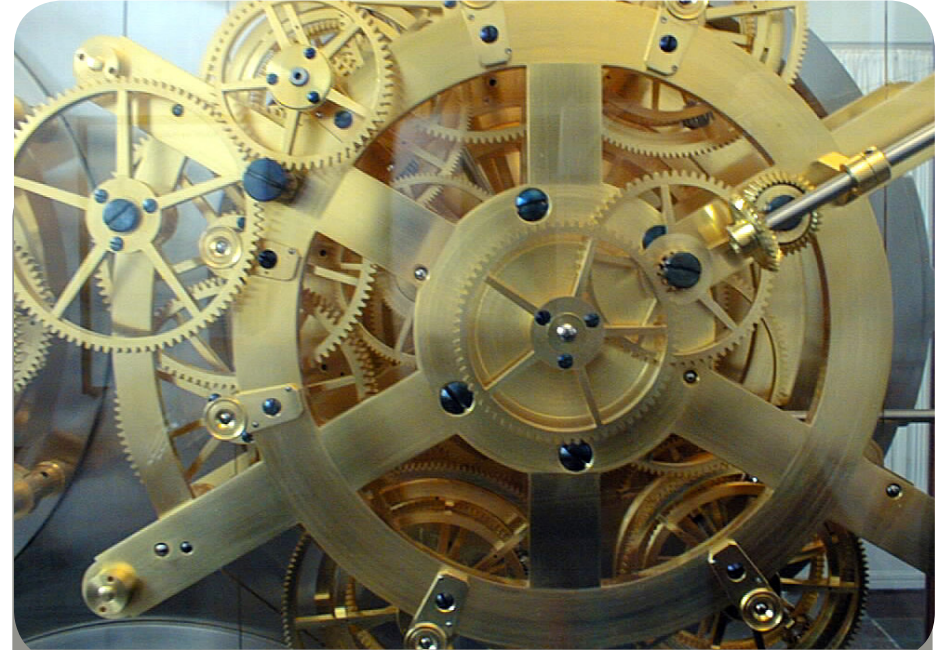
Jens Olsen's World Clock is a world-famous astronomical clock displayed at Copenhagen's City Hall. With 15,448 parts in 12 mechanisms, the clock shows the time of each sunrise and sunset, as well as the year, date and month. It also displays the rotations of the sun and moon and the positions of the planets. Olsen, a skilled locksmith and clock maker, designed the clock and began its construction, but died in 1945, a decade before it was completed.

Problem:

The clock ticked from 1955 to 1995, when corrosion caused the mechanisms to slow and become increasingly inaccurate. After two years of renovations, the clock resumed. Yet once the clock was restored, the last thing its caretakers wanted was for the complex mechanisms to corrode all over again, due to a humid atmosphere.

Solution:

Since the main problem was corrosion caused by high humidity, an absorption dehumidifier was built into the room's ventilation system to keep the humidity in the clock's showcase constant. A stream of air kept at 18°C, with a relative humidity of 40 percent, is pumped in, while the air inside the case is kept at an elevated pressure to prevent outside air from entering. Rotronic humidity and temperature sensors in each side of the clock box monitor the temperature and humidity levels, so that if they dip or rise precariously, the overseers can fix the problem before any damage is done to the clock's delicate mechanisms. With this system, the clock will be protected from corrosion and able to maintain its accuracy for decades to come.



Jens Olsen's World Clock, displayed at Copenhagen's City Hall, is protected from humidity damage with help from Rotronic sensors that constantly monitor the showcase air.

>> About Rotronic

Rotronic offers a comprehensive line of instrumentation for the measurement of key environmental parameters. As a leader in humidity measurement, Rotronic produces an extensive line of reliable humidity probes, humidity indicators and meters, humidity data loggers and fixed installed humidity transmitters to precisely measure relative humidity, dew point, water activity, temperature and other psychrometric parameters. Rotronic also offers a fast Humidity / Temperature generator – calibrator as well as humidity sensors and custom designed modules for OEM customers. Instrumentation from Rotronic also measures the important parameters carbon dioxide and differential pressure.

Applications covered by the wide range of Rotronic instruments range from commercial HVAC and building management systems, to weather stations, test and research laboratories, industrial process measurement and/or control, and product quality control.

From Rotronic you are assured guaranteed reliability: you work with validated software, you work with officially accredited calibration laboratories, and you have access to many products which fulfill international regulations (FDA / EMA / ICH compliance) and no matter where you are, with 9 subsidiaries and more than 40 distributors worldwide, you can rely on a competent and efficient sales and service network.

For more information about the diverse line of Rotronic humidity solutions and to sign up for the e-newsletter, please visit <http://www.rotronic-usa.com/>.