rotronic
MEASUREMENT SOLUTIONS

Edition 2013

MEASUREMENT NEWS

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Gary A. Gähwiler
Head of
Measurement Solutions

Dear Business Partner

Things never stand still at Rotronic! We have responded to a real customer need by expanding our measurement parameters to include CO_2 measurement. Our core expertise of humidity and temperature measurement combined with an ever increasing knowledge of CO_2 measurement makes ROTRONIC your partner for these key parameters.

There's good news from Italy too, where since its foundation in 2010, Rotronic's newest subsidiary has been on course for success with steady growth and many interesting projects. We have been able to hit our targets despite the challenging economic climate. Growth was reported in most product areas and the path paved for additional sales opportunities thanks to the new measurement parameters.

As ever, our main focus is directed towards the development of new and innovative products with which we are aiming to expand our market position. You will discover some interesting details in this connection on **pages 12 and 13.**

One exciting project that benefited from the use of Rotronic sensors is presented on **page 6: the Tuffeau Project,** the restoration solution for buildings constructed of calcareous tufa.

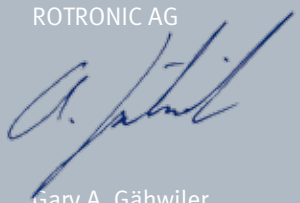
Silence prevails in the noise-free lab at the Binnig and Rohrer Nanotechnology Center in Rüschlikon, and the experiments on new switching elements demand absolute temperature stability. Read more about it on **page 9.**

A note about our corporate presentation. We have redefined our subline under the logo from "Leading in Humidity Measurement" to **"Measurement Solutions"**. While this reflects the above mentioned expansion in our measurement parameters, it has no bearing on the fact that we remain at the forefront of humidity measurement.

And of course our annual competition in which you can win a SWATCH watch has not been omitted. All you have to do is enter and with a little luck, you could be among the winners!

We hope you will find it an interesting read.

ROTRONIC AG



Gary A. Gähwiler

Business Cases

New Products

Rotronic Inside

Competition

Environment in a box

Simulation of environmental variables for quality assurance purposes

Installation of the humidity and temperature sensor as the central component of a climate cabinet.

The development of a high quality product needs to include from the design stage onward all possible stresses encountered during the life of the product. Without such a design strategy the product is most likely to fail to meet the market's expectations.

Don't wait, accelerate!

In order to investigate the long-term behavior of a product in "real time", it needs to be allowed to age in its natural environment, something that is not generally practical in the light of ever shorter innovation cycles. One way around this is the use of accelerated artificial aging through targeted environmental simulation. The typical failure probability of a technical system over time (bathtub curve) is thereby compressed, enabling the cause-effect relationships between environmental stresses and product quality to be studied in a shorter time.

Climate chambers offer precisely definable environmental conditions that quickly reveal their effects on product quality. Environment simulations encompass temperature, humidity, pressure, precipitation, corrosive gases, vibrations, radiation etc.

Core parameters - humidity and temperature

Among the most important product environment parameters are air humidity and temperature. Rotronic's high precision industrial sensors supply reliable measurements for the atmospheric parameters "relative humidity" (%RH), "air temperature" (T in °C or K) and recently also "carbon dioxide" (CO_2 in ppm) as well as many other characteristic values that can be derived from these as main criteria for the climate. In the conventional climate chamber, the prevailing temperature and humidity conditions are measured by

means of sensors and maintained electronically at the nominal values prescribed by the user. Heat is generally supplied by means of electric heating, cooling by means of a compression refrigeration machine or Peltier element, moisture is generated by means of active humidification systems (vaporizers).
CTS Clima Temperatur Systeme GmbH from Hechingen in Swabia (Germany) can draw on decades of experience in the development, manufacture and sales of its extensive equipment program for environmental simulation and for refrigeration and air conditioning technology.

Uncompromising quality

In order to ensure the extremely high product quality, CTS is unwilling to accept any compromises when choosing components. It is therefore only logical that when it comes to climate sensors for humidity and temperature, CTS puts its faith in the industrial designs from the Swiss measurement technology specialist Rotronic. They guarantee maximum accuracy, long-term stability and low maintenance, thereby playing a vital role in the quality rating and competitiveness of CTS products.

Founded in 1996, the company is growing rapidly. It has already delivered more than 12,000 items of equipment and plant in the air conditioning and environment simulation field. DIN EN ISO 9001 certification and DIN EN/ISO 17025 accreditation for humidity and temperature calibration demonstrate that CTS is living up to its high aspirations.

Diversity and individuality

The CTS sales and service programme encompasses temperature and climate test cabinets, environmental stress chambers, shock test chambers with temperature fluctuation rates of up to 100 K per minute, test chambers with horizontal and vertical vibration and temperature and climate ranges from -70°C to 180°C as well as 10 to 98% relative humidity. Customers take advantage of the company's flexibility to come up with their own individual test installations through modifications to the basic program. The highly individual characteristics of the equipment must be matched by an electronic, computer based control system developed in-house. It permits an almost unlimited range of test programs to be specified and all-embracing communication with the system – locally and remotely via the Internet.

The climate cabinet control system developed in-house provides for the input of any desired test profiles and the processing and presentation of the results.

CTS and Rotronic

Humidity and temperature sensors for industrial applications are required to fulfil stringent criteria with regard to accuracy, long-term stability and reliability. Manufacturers require enormous know-how, especially when it comes to fast-responding capacitative humidity sensors with hygroscopic polymer dielectric material. The Swabian climate chamber manufacturer CTS therefore puts its faith in the industrial climate sensors and products from the Swiss company Rotronic AG. The wide operating temperature range, exceptional resistance against aggressive atmospheres, minimal maintenance requirement, a calibration certificate from the Swiss Calibration Service (SCS) and low failure rate of all system components won over CTS.

The Tuffeau Project

ROTRONIC received an assignment from CETE de l'Ouest to meet the functional specifications for the instruments of the experimental cells on the DLRCDLRC*1 d'Angers platform.

The tufa walls of the two experimental cells, seen from the outside.

The Tuffeau Project pursues the aim of creating energy-efficient, technically sustainable and architecturally appealing renovation solutions for buildings constructed of calcareous tufa.
The hygroscopic properties of the stone cause problems during the renovation of older buildings. Solutions for a lasting restoration call for measurements under real conditions, although these are insufficient on their own.
It is known that the ambiguities arising from use and climatic conditions fail to adequately explain the difference between theoretical and measured values.

Measurements made under controlled conditions therefore represent a necessary complement. Moreover, they enable the properties of different wall insulation systems to be assessed. This was the task of the experimental cells, from which we were expecting to obtain the following results:

- Measurement and characterization of the mass and heat transfer in bare and insulated tufa walls for modelling purposes;
- Identification of suitable insulation techniques for tufa
- Comparison of energy performance and durability in situ under controlled conditions

With these aims in mind, two test cells consisting of two tufa walls were equipped with instruments:

- Temperature and humidity sensors with which to measure the properties of the ambient air
- Temperature and humidity sensors at various depths in the walls with which to measure the hygrometric properties of the wall moisture

ROTRONIC's expertise:

- Exceptionally robust measurement sensors, also in respect of water saturation for infiltration tests
- Rotronic sensors function both at various wall depths and on the wall surface
- Unrivalled measurement uncertainty
- Interchangeability of the sensors and wide adjustment range
- The flexibility of the device (HygroLog NT enables simple and independent mounting)

For these reasons, a decision was taken in favor of the HygroLog NT. The customer was also enthused about the Ethernet connection. Since the rooms concerned were already fitted with RJ45 connectors, the data gathered by the measurement stations is available instantly on the local IT network.

This initial project was a total success and Rotronic will do everything in its power to fulfill CETE's future needs.

*1 Département Laboratoire Régional Centre

CETE in brief

The Centres d'Etudes Techniques de l'Equipement (CETE) are public institutions involved in research, development, innovation and engineering. As outsourced services of the Ministry for the Environment, Sustainability, Transport and Housing, they are contact points for the implementation of public sector projects in the service of spatial development and planning.

The CETE de l'Ouest

Since its founding in 1972, the CETE de l'Ouest has amassed a body of know-how in the areas falling within its responsibility (Brittany and Loire region) and employs 355 personnel, among whom are many national and international specialists and experts in their particular subjects.

Rotronic meteorological probe in world-class weather station

A steady stream of new and innovative measurement solutions is being developed for the ever-growing meteorology sector.

Gill Instruments Ltd, based in Lymington UK, is a world leader in the field of ultrasonic wind measurement and weather monitoring. The company is also renowned for its expertise in ignition and emissions control for industrial gas engines.

Gill recently launched an updated version of its sophisticated MetPak weather station. The system now incorporates the Rotronic HygroClip2 combined meteorological sensor which measures temperature and humidity and calculates the dew point.

A specialist in ultrasound wind measurement, the company develops and sells some of the best anemometers available. Likewise, the MetPak weather station stands out for its high degree of flexibility.

At the heart of the MetPak is Gill's WindSonic system which measures wind speed and direction. An integral part of the new MetPak is the Rotronic HC2-S3 meteorological probe. With its compact size, secure connection, low power supply requirement of just 3.3 VDC together with the dew point calculation feature and the accuracy of its temperature and humidity measurements, it satisfied Gill's requirements to the letter.

Thanks to the HC2-S3 probe, the MetPak weather station is now able to provide digital data on temperature, relative humidity and dew point from a single interchangeable probe. This is a key factor since it allows the use of a single system for relative humidity or dew point, or both parameters, irrespective of the preference expressed by the end user.

The MetPak:
Successful new development by Rotronic UK and Gill Instruments.

The new MetPak weather station:
low electricity consumption thanks to the HygroClip2 probe's modest voltage requirement.

The low voltage requirement of the Rotronic HygroClip2 probe results in a weather station with a very low power consumption - a decisive argument in situations where operating power is derived from local renewable energy or batteries.

Following the success of the MetPak, Gill has expanded its range with the launch of the MetPak Pro featuring additional analog, digital and Pt100 inputs for connecting further probes such as a water level sensor, pyranometer or tipping bucket rain gauge.

Rotronic UK and Gill intend to continue their collaboration and combine their know-how for the benefit of both parties.

CO_2 sensors from Rotronic set a precedent

Rotronic CO_2 sensors installed in Högalidskolan school in Stockholm in August 2012

The Högalidsskolan primary school in Stockholm.

Högalidsskolan school, opened in 1921, is located on the beautiful hills of Southern Stockholm and is home to one of the so-called ”palace” schools. The building consists of the three blocks, A, B and C. Whereas some years ago the school had to cater for the needs of 1100 (later 900) pupils between 6 and 16, this primary school now hosts 660 pupils, since their numbers were reduced due to a planned renovation costing 167 MSEK.

In a meeting with headmaster Mattias Boström we discussed the importance of the indoor climate in the school. Old buildings generally have a natural draft as ventilation, but energy savings and the need for a more comfortable indoor temperature during wintertime resulted in less natural draft and, as a consequence, higher CO_2 emissions.

Schools have long ago introduced ventilation routines, but these are difficult to stick to especially during the winter season because ventilation means cooling. In order to quickly reach acceptable CO_2 levels, the consultant firm MAKAB recommended the installation of CO_2 sensors to measure proper CO_2 values in all areas where pupils are working.

After the installation of stand-alone CO_2 sensors (no regulation system needed) in all 36 classrooms, it can be seen that in some rooms the CO_2 level quickly crosses the threshold of 1000 ppm. Now, teachers and pupils are regularly checking whether the red LEDs on the sensors are lit to indicate that the 1000 ppm limit is exceeded.

Sometimes it is impossible to vacate the room immediately for CO_2 remediation, but the sensor also displays the actual CO_2 value and rate of change and thus is very valuable. The response from teachers and pupils so far has been very positive and shows that the CO_2 sensor is a practical tool for keeping the indoor climate at an acceptable quality.

After the renovation - according to plans - begins with the C block in mid-2013, the building will be equipped entirely with a new ventilation system with advanced filtering to reduce particles in the air.

But there will still remain a need to regularly check on the CO_2, temperature and humidity levels.

The new CO_2 sensors from Rotronic guarantee a perfect indoor climate.

Incubator for the electronics of the future

No extraneous sounds, vibrations or electromagnetic fields find their way into the noise-free lab at the Binnig and Rohrer Nanotechnology Center in Rüschlikon. Moreover, a temperature sensor ensures that experiments on new switching elements for computer chips are not affected by temperature fluctuations.

The temperature sensor maintains the room at a constant temperature – with fluctuation of less than 0.5 °C (absolute) and a drift of maximum 0.1 °C per hour.

Today, a single computer chip contains over a billion transistors, a far cry from the ten transistors in the first integrated circuit in 1958. In the intervening years, the structures have become so small that individual layers are just a few atoms thick. This has created a new problem of electrons flowing between layers. In order to prevent this from happening, researchers are endeavoring to reinvent the transistor and to explore new types of components.

The solution lies in silence

Switzerland is home to a world-renowned laboratory in which scientists are working on the transistors of the future: the IBM research laboratory in Rüschlikon. The location's easy accessibility is not exclusively advantageous, when a truck passes by it causes the samples to shake under the electron microscope. In 2011, the Binnig and Rohrer Nanotechnology Center opened six integrated laboratories with exceptionally high protection against external factors: the noise-free labs. They are built directly on rock, the actual measurement set-ups mounted in turn on concrete blocks that float on a cushion of air. Forty-ton trucks can now race by without vibrating the sample. Another problem is noise. To keep it out, the labs are equipped with thick doors. Even the scientists present were too loud and were obliged to control the experiments from a separate room.

Precise room temperature

A temperature difference of just a few degrees would be capable of moving a sample by several 100 nanometres per hour with disastrous consequences for structures in the range of 1 - 50 nanometres. A sensor is therefore used to measure the temperature and air humidity. IBM is using a Rotronic transmitter capable of measuring temperature to 0.1 °C with absolute accuracy for this purpose. This corresponds to the maximum temperature drift permitted in the laboratory over a 1-hour period. At the same time, the sensor measures the relative humidity of the air which is required to remain within 35 and 55 %RH and not fluctuate by more than 5 %RH. The sensor is even capable of measuring the air humidity to exactly 0.8 %RH thanks to an integrated chip.

Top-ranking labs

Researcher Heike Riel makes good use of the quantum effects to develop small transistors that are also highly energy efficient. Instead of an operating voltage of somewhat over 1 V commonly employed today, they would work with voltages of less than 0.5 V. Rolf Allenspach aims to utilize electron spin; spin-up corresponds to a logical 1, spin-down to a logical 0. The chief attraction of this is that much less energy is required to change the spin than to displace the electron as is the case in transistors today.

Storing cheese at the right temperature

In order to develop the right taste, cheese needs to be stored at the optimum temperature and humidity for a number of months. Not every sensor is up to the task of controlling the air conditioning system due to the high air humidity. In addition, the sensors need to be calibrated in the correct working position.

Temperature and humidity sensors ensure the correct atmosphere in the cheese store.

Emmi AG

Emmi is the biggest Swiss milk processor and one of the most innovative premium dairies in Europe. In Switzerland, Emmi concentrates on the development, production and marketing of a full range of dairy and chilled products as well as cheese manufacture, maturing and wholesale with a particular emphasis on Swiss cheeses. Outside Switzerland, Emmi concentrates on brand concepts and specialities in the European and North American markets. The stock exchange listed company achieved net sales of CHF 2,721 million in 2011 and has a worldwide workforce of 3,890.

At Kirchberg (Canton of Berne) 18,000 wheels of Emmentaler are maturing in storage. The temperature and air humidity in the hall are critical if the cheese is not to begin to sweat or exude fat. A number of Rotronic temperature and humidity sensors are installed to assist the Emmi cellarers in their work. They keep the temperature at a constant 11.5 °C and the relative humidity at 74 %RH.

New sensors

Owing to the unavailability of spare parts for the existing sensors, Emmi decided in favor of new HygroFlex5 transmitters from Rotronic. A feature of the new transmitters much appreciated by Daniel Wüthrich, responsible for the air conditioning system in the storage rooms, is the ability to replace the sensors easily without the need to remove the entire housing. When the regular calibration time comes around again, all he has to do is to remove the sensor and replace it with a newly calibrated one. That saves precious time.

Calibration at high air humidity

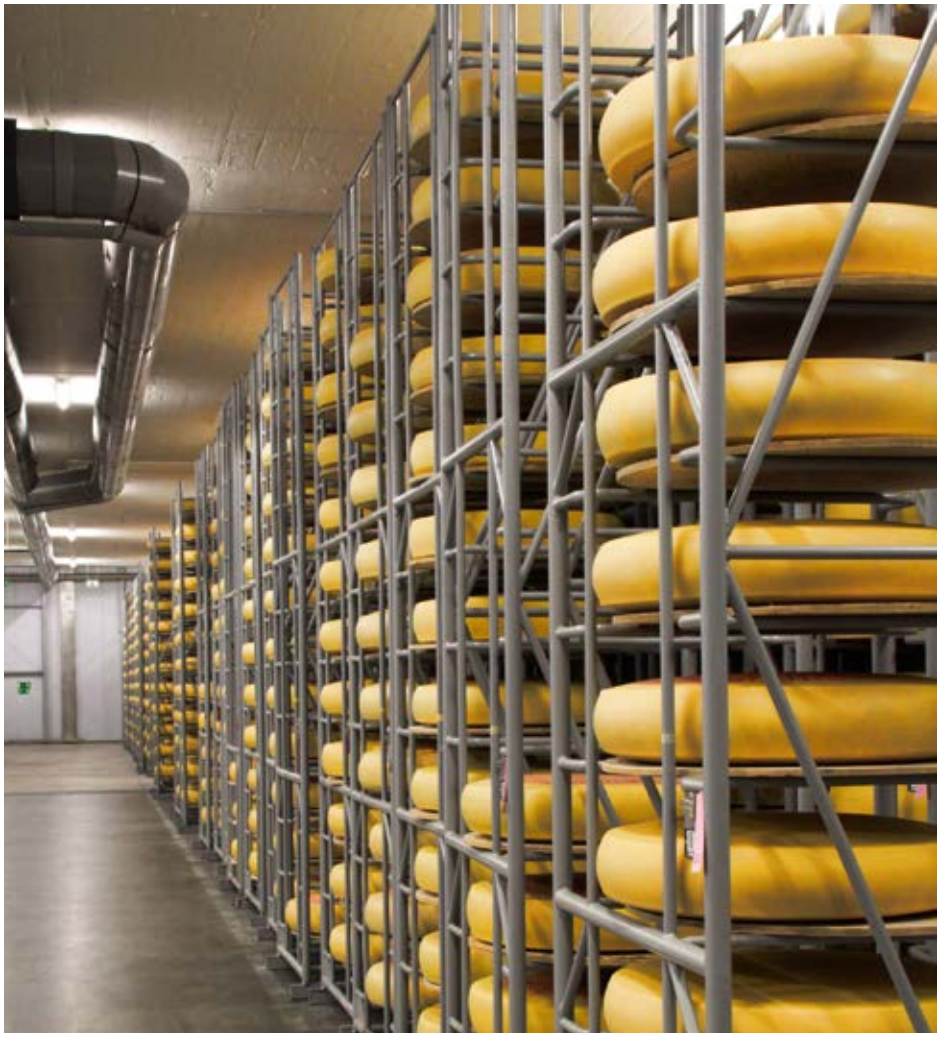
Sensor calibration is especially important for a cheese warehouse. Temperature sensors are normally calibrated at 23 °C with relative humidity of 10, 35 and 80 RH%. This means that the sensor is at its most accurate around this operating point at which it reports the temperature with an accuracy of ±0.1 K and the relative humidity with an accuracy of ±0.8 %RH.

The greater the deviation from 23 °C, the greater the potential aberration. Air humidity in particular is critical. Here, incorrectly calibrated systems can rapidly give rise to faults. With a relative humidity of 74 %RH at a temperature of 11.5 °C in the cheese store and over 90 %RH in the second large store for Gruyère, Daniel Wüthrich regularly calls in the Rotronic calibration vehicle to recalibrate the sensors in the working locations concerned.

Gruyère gives off ammonia

The sensor order posed another big challenge for the Rotronic developers. During its maturing process, Gruyère gives off ammonia. The engineers were concerned that it might attack or affect the sensors. After an extended monitoring phase however, they were able to give the all-clear. The sensors operate reliably despite the high ammonia concentration. Another plus point of the Rotronic measurement instruments is the uninterrupted monitoring of temperature and air humidity, even when the technician is not present. Should the values exceed the permitted tolerance for more than an hour, he receives an alarm on his mobile phone.

Should the temperature exceed a given threshold, the system triggers an alarm.



Emmi Emmentaler cheeses maturing in Kirchberg.

HygroFlex5. The intelligent transmitters from ROTRONIC

The HygroFlex5 series is the latest development of HVAC transmitters for the measurement of relative humidity, temperature and dew point. With freely selectable and scalable analog outputs, the HygroFlex5 is suitable for a wide range of applications and its digital outputs guarantee full network functionality. The series stands out for its high level of reproducibility and ensures a system accuracy of ‹ 0.8 %RH and 0.1 K. At its heart is the HygroClip2, a probe equipped with the AirChip3000 technology. It can compensate temperature and humidity at over 30,000 reference points, store 2,000 data sets and calculate the current dew point. The chip's auto-diagnostic function performs regular checks, records the sensor status and triggers an alarm if necessary.

Our new products at a glance.

CO_2 transmitter.

CF3

Application:
Ideal for residential properties as well as for spaces in which many people gather at a time, such as offices, classrooms and cinemas.

Product information:
- Measurement range: 0…2,000 ppm
- Measurement technique: infrared (NDIR) with automatic calibration
- Lifetime: ›15 years

CO_2 and temperature transmitter.

CF5

Application:
Industrial enclosure with duct probe. For use in building automation systems to control fans, air dampers, valves, etc.

Product information:
- Measurement range CO_2: 0…3,000 ppm/Measurement range temperature: 0…50 °C
- Measurement technique: infrared (NDIR) with automatic calibration
- Lifetime: ›15 years

Transmitters for special applications.

CF8

Application:
Ideally suited for adverse ambient conditions thanks to the robust, industrial grade enclosure.
The different models are intended for various applications such as underground garages, tunnels, greenhouses and incubators.

Product information:
- Measurement range CO_2: 0…40,000 ppm
- Measurement technique: infrared (NDIR)
- Optionally available with relay

Handheld multimeter for CO_2, humidity and temperature.

CP11

Application:
Testing and monitoring of indoor air quality. Equipped with the tried and tested ROTRONIC HYGROMER® IN-1 humidity sensor, the CarbonPalm11 offers unbeatable value for money.

Product information:
- Measures and logs CO_2, relative humidity and temperature
- Calculates the dew point
- HYGROMER® IN-1 humidity sensor
- 18,000 data point memory for CO_2, humidity and temperature values

Monitors even in locations difficult to access.

Wireless Logger

Application:
Wireless data logger for a wide range of humidity and temperature monitoring tasks without additional wiring costs.

Product information:
- Wireless transmission allows the logger to be placed in any desired position
- Transmission distance up to 100 metres
- Thanks to the data logging function, the data is not lost in the event of an interruption in wireless transmission and can be retrieved at any time

A real multitalent.

Universal Logger LOG-HC2-P1

Application:
Measures and records temperature, humidity, air pressure, illuminance and 3-axis acceleration / position simultaneously.

Product information:
- 2 inputs for interchangeable HC2 probes
- 4-line programmable LC matrix display
- Rechargeable battery
- For mounting in switch cabinets and industrial environments, the logger can easily be attached to a DIN top-hat rail

Innovative and inexpensive.

HygroFlex1-transmitters

Application:
The HygroFlex1 series is the latest development of an inexpensive and compact HVAC transmitter for relative humidity and temperature.

Product information:
- Tried and tested Hygromer® IN-1 humidity sensor
- Two freely scalable analog voltage or current outputs
- USB service interface
- Easy mechanical installation

10th International Sales Meeting 2012 – Treasure Hunt

Successful treasure hunt at Rotronic

Our international sales meeting took place on the shores of Lake Maggiore at Stresa (Italy) from 4 - 7 September 2012. This biennial event has grown into a most enjoyable tradition. Participants were able to look forward to an interesting mix of workshops with product presentations, new product previews, strategy papers and award ceremonies in the delightful ambiance of the "Regina Palace" hotel. Although all the participants have known one another for many years and a family-like atmosphere prevailed, there was no lack of technical discussion and constructive exchange of ideas.

Team fun

On this occasion the fun aspect was provided by way of a "treasure hunt" – aptly portrayed by our mascot. One afternoon a team competition was held with the emphasis on sporting activities. The programme featured a climbing garden, trampoline jumping, climbing wall and orienteering.

The participants, 77 in total from 30 countries, certainly enjoyed themselves and are already looking forward to the next sales meeting in 2014!

2011 competition winners

Congratulations to the 3 winners of the "Humidity News 2011" competition. We hope you will enjoy using the **«Victorinox Swiss» Tool Spirit!**

Winner France
Alain Pajonk, MT Aerospace Guyane SAS
in Kourou Cedex

Winner Switzerland
Jérome Simonet, EM Microelectronic
in Marin-Epagnier

Winner UK
Mark Boettcher, WEISS Gallenkamp Limited
in Loughborough, Leicestershire

Take part and win.

Answer the 3 following questions and win one of three "Swatch watches"

1 Which company is utilising Rotronic transmitters for cheese storage?
a) Nestlé
b) Emmi
c) Kraft Foods

2 Which page contains the Tuffeau Project report?
a) 6
b) 8
c) 9

3 What is the new subline beneath the Rotronic logo?
a) Measurement Innovation
b) Measurement Solutions
c) Leading in Measurement

Send the answers (e.g. 1a / 2b / 3c) either by e-mail to **kow@rotronic.ch** or enter them in the boxes below, add your contact details and fax to **+41 44 838 13 07**.

Answers: 1 2 3

First name Surname

Company Job title

Street Post code/place

E-mail

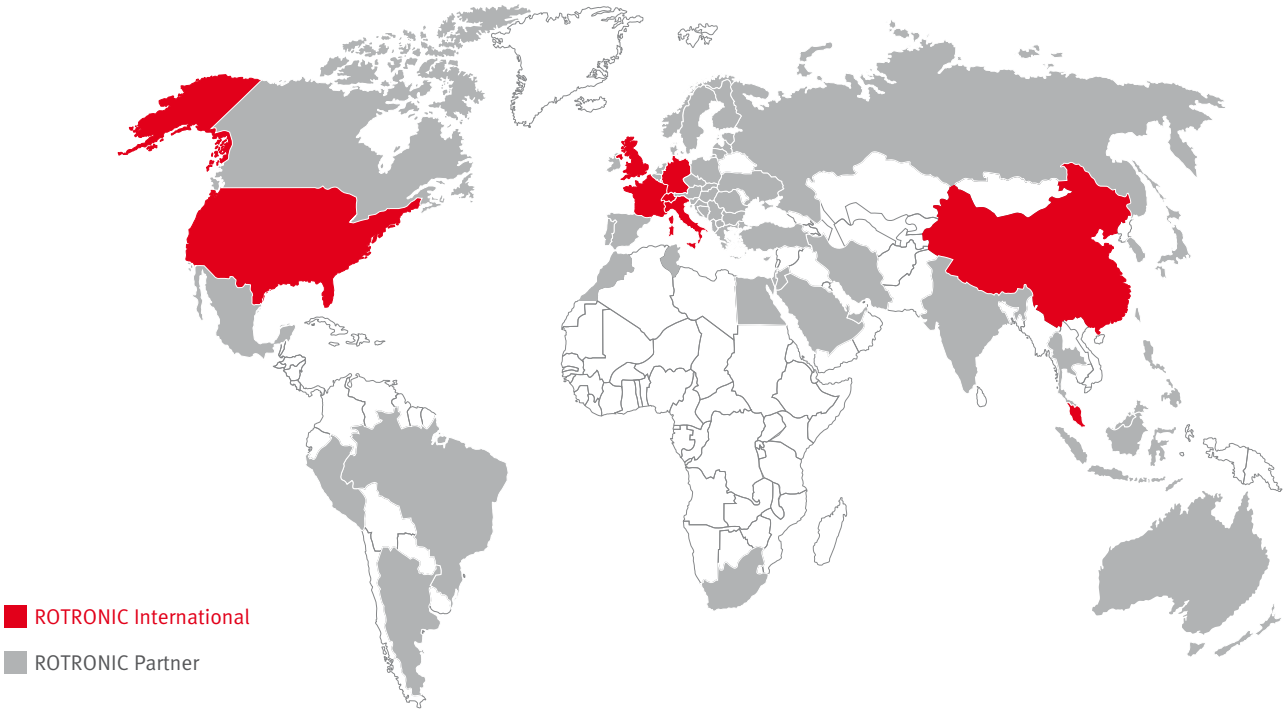
Entry conditions
The closing date for the competition is 30 April 2013. The winners will be notified by 15 Mai 2013. The winners will be notified in person and their names may be published. Entry is free of charge and without obligation. No cash alternative is available. No correspondence will be entered into regarding the competition and the decision is final. ROTRONIC employees and their families are not permitted to enter the competition. Personal data will be treated as confidential and not passed on to third parties.

We will be represented at the following trade fairs:

Trade fair	Location	Date
Lounges 2013 / Vision Pharma	Karlsruhe (D)	05.02. - 07.02.2013
SIAF SPS Industrial Automation Fair 2013	Guangzhou (CN)	04.03. - 06.03.2013
ProcessNet 2013	Magdeburg (D)	11.03. - 12.03.2013
Interphex 2013	New York City (USA)	23.04. - 25.04.2013
SENSOR + TEST 2013	Nürnberg (D)	14.05. - 16.05.2013
NCSL 2013	Nashville, TN (USA)	14.07. - 18.07.2013
ISPE Boston 2013	Foxborough, MA (USA)	02.10.2013

ROTRONIC worldwide.

ROTRONIC is present in more than 40 countries worldwide. You will find a complete list of all our partners, which is always kept up to date, at **www.rotronic.com/distributor**



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