ISSUE 2006/2007

Humidity ROTRONICNEWS

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Healthy housing

rotronic ag

Editorial

Susanne Schroff
Managing Director,
ROTRONIC Switzerland

Dear Business Acquaintances,
Partners and Readers,

In this issue of Humidity News, we present new product applications that we are sure you will find useful. We hope that our knowledge and experience will mean added value to you here and there.

Read, for instance, about how the networking of measuring instruments via RS485 and Ethernet and connection to bus systems are becoming more and more important. Just as exciting are the new docking stations for the HygroLog NT Logger, which have meanwhile become indispensable for many companies.

Be amazed by our unique DampGuard, which protects living accommodation from mould, and by how Roche monitors its cold storage! Did you know that science profits from the hornet, that master of light-weight construction? The humidity in hornets' nests is measured for research purposes using ROTRONIC technology.

Since the 1st of January 2006, ROTRONIC products have been RoHS compatible. Handling robots help to meet the rising demand, and at the same time contribute to further quality improvement.

Humidity News lives from your examples, your insights. Write to us. We will be glad to report on your experience in the next issue.

But we don't want to keep you in suspense any longer, and hope you enjoy reading this issue!

Yours,

Susanne Schroff
Managing Director

Contents

» Monitoring and control with the new Docking Station DS-R1

The new docking stations for the HygroLog NT logger series allow control of applications, in addition to their monitoring capabilities. The devices feature two relays by which, for example, humidifiers or dehumidifiers may be controlled. Another application might be the alerting of personnel in case of an alarm condition by means of a siren or a halogen flash light, etc. It is also possible to control a high power relay for switching high loads. The docking stations can be programmed with ROTRONIC HW4 software and may also be monitored in real time.

The relative humidity or temperature, or a parameter calculated from up to three probes, may be used for alarm triggering. Additionally, an alarm can be triggered when the flash card is defective, the logger battery is flat, or the mains adaptor does not supply power. The conditions for alarm acknowledging/resetting can also be determined. A time-out can be programmed in order to avoid alarms in the case of transient alarm limits being exceeded.

The timer function makes the device even more versatile. With this function, it can be determined on which days of the week and at what times the device should be active. The docking stations can be integrated in logger networks by the RS485 interface. The docking station DS-R1 may be operated in either Master or Slave mode. A USB interface is included for connection to a PC.

» Winner of the competition

The winner of our last competition is Mr. Markus Dolder of the engineering company of the same name for energy and building technology in Luzern, Switzerland. The photograph shows Mr. Dolder with his prize in obviously high spirits.

Enter our new competition on page 12!

» New ROTRONIC catalogue!

Again, two years have passed since we introduced the last edition of our catalogue. Order your personal copy by filling in the form on the back cover and faxing it to us. The catalogue can also be downloaded from our website:
http://www.rotronic.ch/link/cate

Exhibitions in 2006/2007

You will find ROTRONIC at the following exhibitions:

14.11.-17.11.2006
Electronica
Munich, Germany

29.01.-31.01.2007
AHR Expo
Dallas (Texas), USA

14./15.02.2007
MTEC
Birmingham, UK

27.03.-29.03.2007
TechnoPharm
Nuremberg, Germany

23.04.-25.04.2007
Interphex
New York City (NY), USA

08.05.-10.05.2007
Meteohydex
Geneva, Switzerland

22.05.-24.05.2007
Sensor
Nuremberg, Germany

18.06.-21.06.2007
Congrès International de Métrologie
Lille, France

28.07.-31.07.2007
IFT Food Expo
Chicago (IL), USA

» Healthy housing thanks to the DampGuard

Formaldehyde, plasticiser and PCP – we know all about the health risks they bring. But what about the biological pollution of the air? Are we equally aware of its dangers? Moulds, for example, can cause illness. They form minute spores that are released into the air of rooms in enormous quantities, and are then breathed in. One third of all allergies can be attributed to them. Children's respiratory systems are especially at risk, because their immune systems are not yet fully developed.

Did you know that …

- Mould mostly forms because of incorrect ventilation?
- 1/3 of all allergic respiratory diseases are caused by mould?
- Mould can really be detected early on and prevented only through measurement of the wall surface?

Advantages of the DampGuard

- Effective, timely prevention of mould through direct measurement of wall moisture
- Clear instructions, simple operation
- Avoidance of health problems
- Intelligent ventilation saves heating costs

How does mould form in dwellings?

Mould can be caused by insufficient ventilation, insulation of rooms with sealed window frames, reduced or incorrect ventilation combined with above-average production of humidity, or building flaws such as thermal bridges, open cracks and inadequately sealed joints and insulation measures. The moistening of building materials indoors through the formation of condensation depends solely on the surface temperature, not on the type of material!

A representative survey has shown that almost 1/3 of all dwellings in Germany are affected by damage through humidity, of which 6–9% have visible mould.

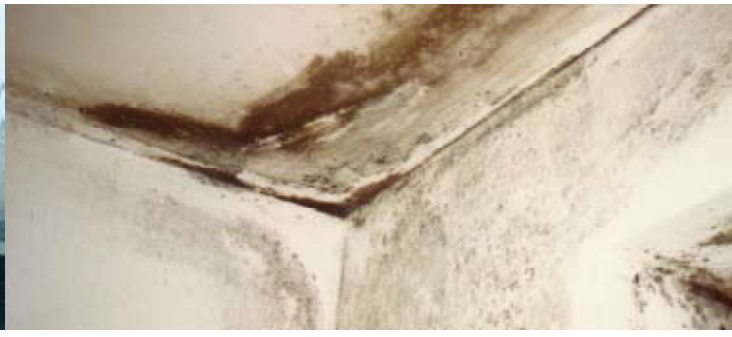
How can you combat mould in advance?

Mould can form only on sufficiently moist surfaces. So the monitoring of the surface humidity is the key to its prevention. The actual intrinsic humidity of the (hygroscopic) wall coverings can be measured only with the patented DampGuard from ROTRONIC. Normal hygrometers are not suitable, because they measure the humidity of the air in the room, not the critical surface humidity of the building material.

Case study

In Hanover, the Cologne company Vivacon AG modernised a housing estate with almost 1000 dwellings. The facades, dating from the 1920s, are declared as a historical monument, so exterior heat insulation was not possible. Only a short time after completion of the work, mould formed in well over 100 of the dwellings. In the vast majority of the cases, the cause of the problem was found to be a change for the worse in the balance of humidity caused by the renovation measures (windows, heating), in addition to deficits in the way the occupants aired the rooms. The passive exchange of air, which had formerly taken place through the porous shell of the building, was now prevented. But because of the existing layout, it had not been

Mould can form only on surfaces that are moist enough.



Mould caused by thermal bridge in an older house.

Reliable, unique: the sensor measures the moisture directly on the wall surface – rear view.

possible to apply interior heat insulation of adequate thickness. To prevent the formation of mould, wall moisture indicators were needed, to allow the airing of the rooms to be adapted to the new climatic situation.

Development of the DampGuard

A humidity indicator that shows exactly how and at what intervals the occupants must air the rooms in order to avoid the formation of mould is not feasible with conventional hygrometers. With this urgent need in mind, the Vivacon company turned to the mould expert Dr. Thomas Missel. After many fruitless experiments with sensors and hygrometers of various types, Dr. Missel found a competent partner in ROTRONIC. In close cooperation, a special wall moisture measuring instrument was developed: the appropriately named DampGuard®: What is new about it is that the sensors of the instruments measure the humidity directly on the surface of the wall. Its unique design prevents the formation of a microclimate under the senswor. The DampGuard® indicates the momentary surface humidity with light-emitting diodes, and helps the user of the room to specifically counteract critical surface humidity. The relative humidity values registered by the probe are displayed on a "four-point scale" by means of LEDs of different colours.

Vivacon AG are currently equipping the affected dwellings with DampGuard to prevent recurrence.

The measuring instruments are placed on the parts of the wall affected by mould. As soon as the rooms were ventilated in accordance with the DampGuard display and the mould manual, no excessive humidity values were ascertained, even on the less well insulated exterior walls and at consistently low outside temperatures. The tenants are delighted with the measuring instrument, because they can now keep the problem under control by themselves. There were no complaints of inconvenience caused by the light-emitting diodes.

A further advantage

As soon as the humidity of the masonry increases, this is indicated by the fact that the interval between the airing of the room and the red LEDs going on again is always the same. The caretaker can be alerted in time, and the formation of mould can be avoided. Up to now, no formation of mould through lack of airing has occurred in the renovated dwellings. The high degree of acceptance of the device on the part of those affected raises expectations of a permanent solution of the problem. Vivacon AG, as the ordering party, are very satisfied with the new measuring instrument, and will use the DampGuard in projects with the same problems in future.

LED's	Humidity	Mould Formation	Action
●	< 70% RH	Not possible	None
●	70%-80% RH	Critical range	Quick ventilation
●	80%-100% RH	Possible	Quick ventilation
● ●	90%-100% RH	Very probable	Quick ventilation

The LED indicator: Guarantees optimal ventilation!

Mould can form because of faults in building work.

One third of all dwellings in Germany have damage from humidity.

» ROTRONIC optimises production

[1] **WEEE** (Waste Electrical and Electronic Equipment)
[2] **RoHS** (Restriction of the use of certain hazardous substances in electrical and electronic equipment)
[3] **SMD** (Surface mounted device)

By Leonhard Löw,
Production Manager

Further quality improvements and an increase in production capacity at ROTRONIC.

WEEE[1] and **RoHS**[2] – these two acronyms are heard the world over. Our instruments for the measurement of relative humidity and temperature are not subject to the RoHS 2002/95/EC guidelines. As monitoring and control instruments, they belong to Category 9, which is explicitly exempted from these rules. However, as a responsible manufacturer, ROTRONIC has committed itself on a voluntary basis to fulfil the regulations whenever possible as of July 1st 2006.

For approximately six months now, we have been purchasing only components and PCBs that are RoHS compliant. As of January 2006, all soldering is lead-free.

In order to fulfil the requirements, ROTRONIC invested considerable funds and purchased a new placing machine and a new reflow oven for lead-free soldering. Of course, all hand soldering is performed lead free too. However, this change is not absolutely free of problems. Because the solder temperatures of lead-free solder are significantly higher than they used to be with leaded solder, the stress on PCBs and components is higher. Even today, there are some component manufacturers who are not yet capable of delivering their whole product line lead-free, or with less than 0.1% by weight. Lead-free soldering has a small, inherent drawback: the solder points are no longer glossy. Therefore, a purely visual control is no longer sufficient, and the products must undergo more complex electrical testing.

Production capacity
The ever increasing demand for our products on the one hand forced us to increase our personnel capacities. On the other hand, we have also expanded our outsourcing network. We have evaluated a company in Romania, which proved to be well-managed and in a position to fulfil our high quality demands. The company has been chosen as a supplier for complete sub-assemblies. The final assembly, programming and quality assurance are located in our headquarters in Bassersdorf.

Sensor production
The production of our worldwide leading humidity sensors runs parallel to the general increase in demand. This higher demand also called for certain measures to be taken in the sensor production, which were successful. The most important aspects are to maintain the high quality and – especially with these large quantities – the traceability of each single sensor. Every single ROTRONIC humidity sensor undergoes a test procedure before it leaves the production area. In order to guarantee this with increasing numbers of produced sensors, we developed a handling robot for all test procedures, which also include the marking of the sensors for traceability and data archiving. This automatic test device will ensure high quality at ROTRONIC for many years, and still allow further increases in production.

ROTRONIC production in Bassersdorf

» Swiss Calibration Service, SCS065

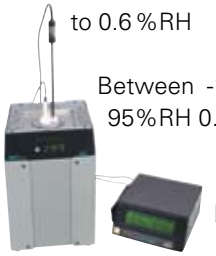
Our SCS (Swiss Calibration Service) crew did their homework properly. Due to adjustments in the characteristics of the precision-controlled flow rates and minimising of temperature gradients in our SCS calibration instruments, it was possible to considerably improve the measurement uncertainty. This has been verified by METAS, the Swiss Federal Office for Metrology and Accreditation, on the occasion of the accreditation renewal of April 23, 2005. In addition, the accreditation has been extended to temperature calibration.

The best possible measurement uncertainties are as follows:

For temperature calibration:
In Fluorine inert bath and a range of -25 °C to 125 °C: 0.03 K

For humidity calibration:
At 23 °C and a range of 0.5 %RH to 99 %RH: 0.2 %RH to 0.6 %RH

Between -10 °C to 70 °C and a range of 10%RH to 95%RH 0.2%RH to 2.1%RH.



This precision is astonishing and is achieved by only a few calibration laboratories.

» Savings in time and costs with digital probes

Author: Barry Wilson
Parameter Generation and Control,
Black Mountain, NC, USA

Parameter Generation and Control, Inc. produces environmental chambers for a variety of industries ranging from semiconductor production to paper testing. One of the most promising applications for PGC chambers is for stability storage chambers. The pharmaceutical industry uses stability chambers for shelf-life studies for both products and packaging. This industry has adopted stringent guidelines regarding test conditions and documentation put forth by the International Committee for Harmonization of Standards, also know as ICH. Sensor calibration traceability is an important component in adhering to these standards. PGC applies the ROTRONIC HygroClip, with it's digital output, to offer their customers an edge in this traceability requirement.

Any environmental chamber can obtain a traceable calibration. This means the temperature and/or relative humidity measurement has been compared to a traceable reference sensor. In order for a reference sensor to be traceable it must be of sufficient reliability, and it must be calibrated periodically against an acceptable standard, and it must have the appropriate documentation to support the calibration.

Most environmental chambers use a RH/Temperature transmitter with an analog output. This output is sent to the chamber controller, so the measured RH and temperature can be displayed as well as used for the control of the chamber. This approach leads to several areas of measurement uncertainty. The first area to examine is the control system which uses the analog output from the transmitter connected to the analog input of the controller. The errors come from the conversions. The controller input typically consists of an analog input buffer and an analog to digital converter to change the measurements to digital values for the controller's use. An analog RH/Temperature transmitter can use a variety of means to calibrate the analog outputs, including potentiometers, switches, and software adjustments. The controller will also have a means to adjust the analog input in order to correct for errors in the input buffer and the A/D converter. In addition, depending on the distance from the transmitter to the controller, as well as the type of analogue signal applied, the interconnecting cable from the transmitter to the controller can add an error to the measurement. These cumulative errors can only be properly adjusted in the field as a complete system.

PGC environment chamber

Complete system calibration requires that a properly trained technician inspects the chamber and compares the chamber controller readings to a reference standard. Depending on the number of calibration points required, this on-site calibration could require anywhere from hours to days to perform. To compound the problem, most companies and/or regulatory agencies require that the calibration must be performed by an outside party not associated with either the chamber manufacturer or the chamber owner. This can lead to an expensive calibration that must be performed annually or bi-annually.

The logical solution to this problem is to reduce the number of components requiring calibration, thereby simplifying the calibration procedure and improving the reliability. Enter the HygroClip. While the HygroClip has analog outputs for both temperature and relative humidity, it is also equipped with a digital output. The digital output, and the fact that the calibration constants are stored in the HygroClip, makes it an ideal choice for this application.

PGC's controller is equipped with a single-line serial data input port developed specifically to communicate with the HygroClip. This allows direct digital input from the HygroClip. Since the data is already in digital format the controller does not corrupt the data in any way. This means the HygroClip can be calibrated off-site against a traceable reference standard, then re-installed in the chamber while retaining traceability.

Advantages of off-site calibration

- **No down times:** the chamber can remain in operation during calibration. Potential down times are eliminated, because the only interruption is during the exchange of the probe, which takes only seconds.
- **Minimisation of costs:** No visit by Service is necessary. Travel time, expenses and labour time are saved. The only costs are the shipping costs for the HygroClip probe. With calibration in the chamber, most of the highly paid work time is spent in waiting for stable values.
- **Resolution:** The HygroClip probes have a 12-bit digital/analogue converter, while the digital signal with a resolution of 16 bits is available. This permits a digital resolution of 0.004% or 0.004 °C, as opposed to the maximum possible resolution of 0.025% or 0.06 °C with analogue signals.
- **Precision:** The analogue signal is subject to various possible sources of error:
  - Digital-analogue converter in the HygroClip
  - Signal converter and amplifier
  - Errors in the area of the controls.

PGC and ROTRONIC have teamed up to provide a solution that is more reliable, more accurate, and less expensive to install and maintain. Furthermore, this solution provides an increase in both quality and performance.

» ROTRONIC data logger systems in use at F. Hoffmann-La Roche

The medication authority in the United States, FDA[1] and the European GMP[2] directives require regular data acquisition and documentation of the prevailing conditions in rooms used for the production and storage of pharmaceutical products .

Probably one of the most modern storage and packaging centres for pharmaceutical specialities in Europe at the present time is located at F. Hoffmann-La Roche AG in Kaiseraugst. The high-rise store contains various materials, such as packaging or ready-packed medicines (bulk material). The more than 13,000 palette positions are managed and controlled fully automatically by a storage management system.

After an evaluation phase with various data-logger systems, F. Hoffmann-La Roche AG decided on the HygroLog NT from ROTRONIC AG. This temperature and humidity data logger meets the high requirements of the FDA – CFR21 – Part 11 and GAMP4 directives in full, and has

a number of unique, attractive advantages. For instance, the HygroLog NT, with its digital concept, measures extremely precisely, and the HygroClip probe displays unusually high performance, with long-term stability.

The 160 measurement points are read out continually via a network by an OPC server, and made available by Roche's evaluation software. Server-client functions allow online visualisation of the current measurement values. In addition, the data are stored directly on a flash card in the HygroLog NT as a backup.

All events, such as changing batteries, operator intervention or exchange of the memory card, are stored by the HygroLog NT, and also passed to the Roche evaluation software. This fulfils a further criterion of the pharmaceutical, foodstuffs and chemical industries, generally known as the Audit Trail.

[1] **FDA** (Food and Drug Administration) is the regulatory authority in the USA

[2] **GAMP** (Good Automated Manufacturing Practice) Regulations, whose fourth version has been in force since the end of 2001, which have become the "standard regulations" for validation of computer-based systems in the pharmaceutical industry (manufacturers and suppliers)

«We were also pleased and satisfied by the flexibility that ROTRONIC demonstrated again and again in the case of adaptations and modifications.»

Horst Lindner, F. Hoffmann-La Roche AG

» Interview

Horst Lindner, Roche Project Manager

Mr. Lindner, why did F. Hoffmann-La Roche AG decide on the HygroLog NT System by ROTRONIC AG after detailed evaluation of a data logger system?

The deciding criteria that led to implementation with the ROTRONIC HygroLog NT were, on one hand, the many years of positive experience with the ROTRONIC humidity-measurement cell, and on the other hand the digital HygroClip concept.

A HygroClip® sensor module can be swapped out in seconds, without having to calibrate the display instrument or the data logger afterwards. Thanks to the digital technology, the precision between probe and display is absolute: a 1 is always a one, and a 0 is always a zero. There are no values in between.

A further important point was the connection to an OPC interface (standardised software interface). Here, ROTRONIC and F. Hoffmann-La Roche together performed a pioneering feat that led to a win-win situation for both companies.

What are the results of the introduction of the new units, and what definite added value do you get from them?

With the introduction of the HygroLog NT system, environmental data can be visualised and evaluated online on the desired Roche user interface.

If need be, the system can be enlarged without much effort, and therefore gives us a certain freedom for enhancements through additional measuring points.

How did you perceive the cooperation and implementation of the project with ROTRONIC?

It is a matter of great importance to us to express our thanks to the whole ROTRONIC development team under the leadership of Fredy Hagenbucher. Throughout the project, we enjoyed very friendly, constructive cooperation.

We were also pleased and satisfied by the flexibility that ROTRONIC demonstrated again and again in the case of adaptations and modifications.

» Humidity and temperature measurement in hornets' nests

Two hornet colonies are currently housed in test stands on an EMPA building rooftop in Dübendorf, Switzerland, under the watchful eye of staff from the Wood Laboratory. Seeking inspiration for new technical solutions, the researchers are investigating both the fascinating lightweight structures built by the social hymenopterans and their thermoregulation strategies.

The highly efficient thermoregulation system used by hornets enables them to maintain a steady brood temperature of around 29 °C in the nest well into late autumn. In filigree lightweight structures built from chewed wood fibre and saliva, the social insects exploit a combination of physical principles to keep the nest interior at a constant high temperature – an intriguing phenomenon for materials scientists. Research staff at EMPA are trying to determine the precise bionic potential of this accomplishment, i.e. whether such feats observed in the natural world might serve as prototypes for technical innovation, for instance, in the field of facade engineering. Temperature and moisture sensors inside the nest and light beams at its entrance allow them to record all movements and fluctuations for subsequent analysis.

Like all insects, hornets suffer high heat losses on account of their unfavourable body surface-to-volume ratio. However, a nest envelope incorporating air voids that slow heat transfer provides insulation and retains warmth for the brood. On hot days, by contrast, considerable quantities of surplus heat have to be extracted from the nest to prevent overheating. Here, the low thermal capacity of the lightweight nest construction – adopted so as to minimize the energy expended for building – offers little assistance. Moreover, the nest is continuously enlarged until the size of the colony peaks in late summer. The insects meet the different requirements through a combination of behavioural patterns, design principles and, not least, the appropriate choice of construction material.

Best-practice construction, cooperative behaviour and a suitable material

The nest structure, comprising horizontal combs enclosed by a cellular envelope, allows the hornets to control the internal temperature with relative precision and reduce the heat lost by individual insects, especially on cool nights. Conversely, when overheating threatens, the hornets exploit the vapour pressure gradient between nest interior and outdoor environment. The air in the nest is warmer and more humid and therefore contains more energy per unit weight than the outside air. The hornets sit at the nest entrance, using their wings as fans to increase the air change rate and thereby extract energy from the interior.

Also, the wood-based material used by the hornets is hygroscopic, i.e. moisture-absorbent. The nest fabric takes up moisture from the air at night, thereby releasing warmth, through the heat of condensation, to the nest interior. The reverse happens during the daytime, with heat being extracted by the evaporation process (cooling effect). The hornets are able to enhance this effect deliberately by increasing the moisture gain and ventilation rate.

Model for improving internal environments through breathing envelopes and climatic buffers

The results of the EMPA project, backed by the Swiss National Science Foundation, will also feature in the dissertation being prepared by Raoul Klingner in collaboration with the Institute of Building Technology at the Swiss Federal Institute of Technology in Zurich. Both project and dissertation set out to gain a better understanding of the thermodynamic behaviour of natural structures made from wood. The findings on these efficient mechanisms may conceivably inspire new applications in timber engineering. The options include both refinements to breathing multi-layered building envelopes and the better exploitation of the hygroscopic properties of wood through its use as a climatic buffer to moderate undesirable fluctuations in the internal environment.

» Digital Interfaces and Bus-Systems

The expansion of data transmission in automation processes throughout industry has led to a huge increase in the number of communications systems on the market.

Within ROTRONIC, the availability of bus systems has often been discussed. However, the huge selection of systems and the comparatively low demand for specific systems always led to the decision not to offer bus systems in the short term. Today, well over one hundred different systems are available, and their numbers are increasing. Their variety demands a flexible solution for the realisation of a bus interface.

Meanwhile, a few systems have become established as quasi standards. ROTRONIC has developed a modular transmitter system for humidity and temperature, which is compliant to these standards: the DI-BUS. The modularity of the interfaces used, made the question of the right interface an academic one. Starting in the third quarter of 2006, we can offer bus-system based transmitters.

The system consists of a digital transmitter for the interchangeable digital HygroClip Industrial probes. The transmitter features an interface for the integration of various bus-modules. Depending on the application, different probes can be chosen and an interface according to the desired bus type may be selected.

Industrial probes
Various Industrial probes with temperature measurement ranges between -50 and 200 °C may be connected to the transmitter, including intrinsically safe probes for hazardous areas.

Bus functionality:

- **Reading of measurement parameters:**
  Humidity, temperature, calculated values
- **Probe adjustment:**
  Humidity: Single- and multi-point adjustment. Temperature: Single- and multi-point adjustments
- **Parameter status:** Valid/invalid
- **Engineering units:** Selectable

Available Bus modules:
Profibus, DeviceNet, CanOpen, ModbusRTU. Further modules on request.

Profibus DeviceNet

- Active module with serial and parallel device interface
- Complete Profibus-DP and DPV1 Slave
- Max. 400 Byte cyclic input and output data
- Additional acyclic DPV1-parameter data
- Supports master class 1 and master class 2 read and write functions
- Potential-free Profibus interface with automatic baud rate detection 9.6 kBit/s to12 Mbit/s

DeviceNet

- Active module with serial and parallel device interface
- Complete DeviceNet 2.0 Adaptor according to ODVA profile Group 2 Server
- Max. 512 Byte input and output data (implicit messaging)
- Additional acyclic DPV1-parameter data (explicit messaging)
- Supports Change-of-State, Cyclic I/O, Polled I/O and bit-strobed I/O
- Potential-free DeviceNet interface with automatic baud rate detection 125 to 500 kBit/s

CANopen

- Active module with serial and parallel device interface
- Complete CANopen Slave according to DS301-4 standard.
- Max. 32 TPDO and max. 32 RPDO Process data objects: totally max. 256 Byte Process data.
- Additional 16383 SDO Objects for parameter data
- Potential-free CANopen interface with automatic baud rate detection 10/1000 kBit/s
- Connection via 5-pin screw terminal with external 24 V supply

Modbus-RTU

- Active module with serial and parallel device interface
- Complete Modbus-RTU/ASCII Server (Slave) interface
- Max. 400 Bytes I/O Data
- Acyclic parameter data transmission
- Modbus-RTU/ASCII Class 0, Class 1 and partly Class 2 Functions
- Baud rates: 1.2 kBit/s to 115 kBit/s.
- RS232 or RS485 connection

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ROTRONIC is represented in over 40 countries worldwide. You will find the partner who is responsible for your country at: www.rotronic-humidity.com

Enter the ROTRONIC competition*, and win a Canon Digital IXUS i7 zoom worth € 300!

At which company has the large FDA 21 CFR Part 11, EU Appendix 11/GMP compliant logger network been installed?
- ☐ a) Roche
- ☐ b) Walmart
- ☐ c) Pfizer

How many relays does the new docking station for the HygroLog NT data logger feature?
- ☐ a) 1
- ☐ b) 2
- ☐ c) 4

With which probe are the temperature and humidity in hornets' nests measured?
- ☐ a) HygroClip S
- ☐ b) HygroClip SC05
- ☐ c) HygroClip HK 25

Which bus systems are supported with the new DI-BUS transmitter?
- ☐ a) BITBUS, DIN Messbus, ARCNET
- ☐ b) Profibus, DeviceNet, CanOpen, ModbusRTU
- ☐ c) LON Bus, Interbus, M-Bus, Omnibus

What makes the new DampGuard unique?
- ☐ a) Clever electronics
- ☐ b) Direct measurement of surface humidity
- ☐ c) It's breaking capacity

Reply by fax to: +41-44-8370073 or at our website: www.rotronic-humidity.com

* Closing date is the 30th of April 2007

Contact Information

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Fax: .....

E-Mail: .....

Website: .....

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- ☐ Please send me the latest catalogue.
- ☐ I would like your local representative to get in touch with me.