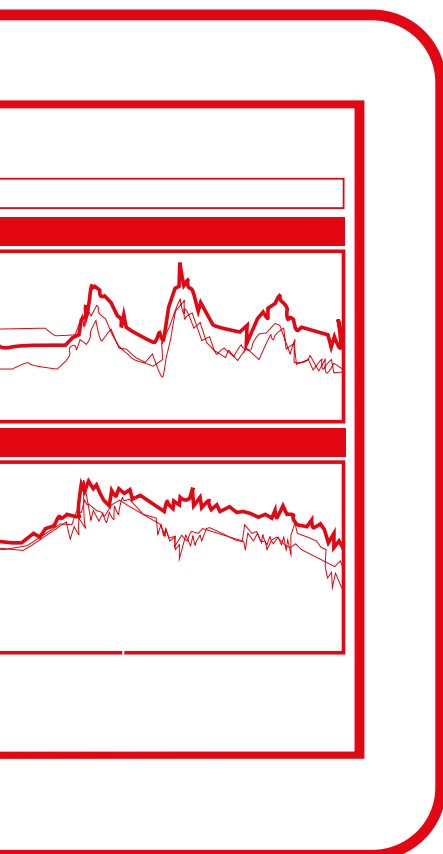


The Rotronic Universal Monitoring System RMS



ROTRONIC MONITORING SYSTEM (RMS)

High quality standards in production and storage necessitate a comprehensive monitoring system that delivers measured data reliably. The adaptive RMS Rotronic Monitoring System is the perfect solution for a wide range of applications.



RMS – FOR EVERY APPLICATION

The Rotronic Monitoring System is a modular system of hardware elements and web-based software. It provides maximum flexibility in installation and ensures readily available data. The data loggers record measurements from Rotronic and third-party sensors and transmit them to the secure database. It stores information and makes it available to users, regardless of whether they access the database via a PC, Mac, tablet or smartphone.

RMS – FOR BIG AND SMALL

The RMS is perfect for both large monitoring systems and for simple, small applications. Rotronic makes the database available as a secure cloud account.

RMS – THE ONE-STOP SOLUTION

Rotronic manufactures a full range of individual components and software for the monitoring system. We also offer professional advice, installation, commissioning and maintenance for the installed RMS.

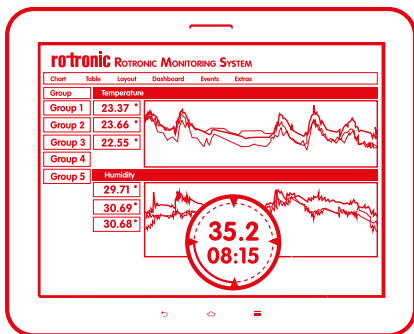
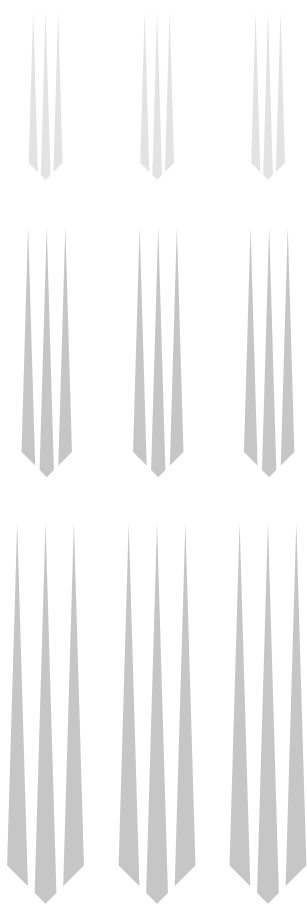
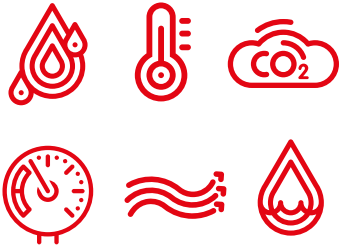
MAIN FEATURES

- GMP/GLP/GDP compatibility
- FDA 21 CFR Part 11
- EN 12830
- PDF report with chart and statistics
- Alarm notification by voice call, SMS or email
- Platform independent
- Suitable for smartphones and tablets

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DATA FLOW



INPUT TRANSDUCERS

Rotronic probes or other input transducers such as cameras or third-party sensors can be interfaced by the data loggers. In this way the RMS monitors a variety of parameters such as humidity, temperature, dew point, door contacts, particles and many more.



DATA LOGGER

The data logger stores the measured data and sends it to the database. Should the connection be lost, the logger stores the data to protect data integrity and fills any data gaps when the connection has been restored.



SOFTWARE / DATABASE

The database covers the complete monitoring system. It contains all the measured values for the system and saves actions. The server software alerts the relevant users and manages the user-specific access rights.



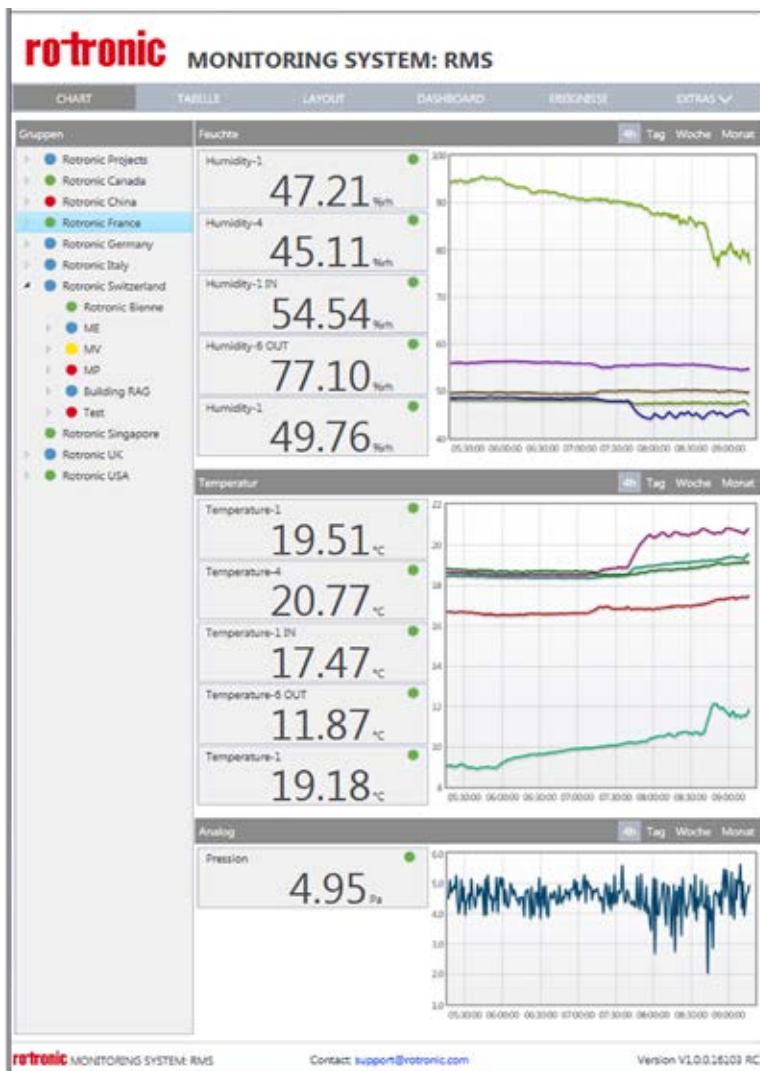
USER INTERFACE

The database can be accessed with smartphones, tablets and all PCs with a web browser. Visualization and alarming are therefore possible worldwide and on all common platforms. Additional automated outputs are possible, inclusive email reports and 3rd party integration.



MONITORING SOFTWARE

The RMS Web Software fulfills requirements for server-based monitoring. The software is linked to a database that stores all the measured data and system actions. The data can be accessed from anywhere in the world via all common platforms as long as an internet connection is available.



MENU

Chart

Shows all parameters graphically and numerically.

Table

Enables sorting and filtering of all input variables available in the system.

Layout

Visualizes which variable is measured where and its state.

Dashboard

Offers the individual user the possibility to display the most important parameters for them in one view.

Events

Alarms, warnings and system messages are shown here clearly and can be acknowledged directly.

Tools

The user can generate PDF reports, calibrate/adjust measuring points and manage the complete system.

DATA HISTORY ALWAYS AVAILABLE

The database allows access to historical data at any time, thereby ensuring traceability according to FDA and GMP. This data can be combined in a complete PDF report quickly and easily.

COMPATIBLE WITH ALL PLATFORMS

Regardless of the manufacturer or hardware, the software can run on all systems with a web browser. The user can therefore access it with all devices.

ALARMING

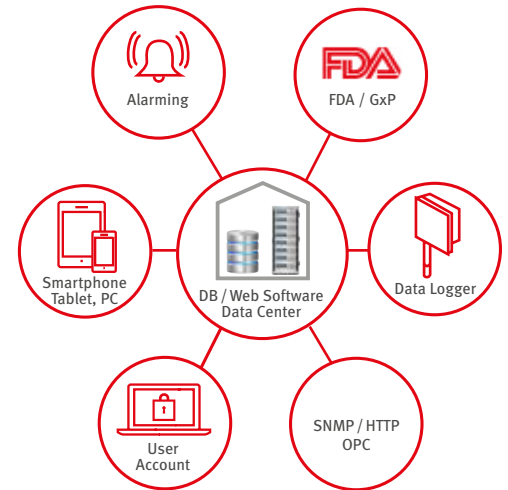
Whether by voice call, email, SMS or switching of an alarm relay, the RMS offers clear alarm functions and records all events such as error messages, warnings or system messages in the database.

VALIDATION AT THE TOUCH OF A BUTTON

The RMS Web Software enables validation at the touch of a button. The system checks the data integrity automatically by self-test, it switches all input modules into their various states and checks the alarms that are meant to be triggered. The software then generates a validation report on the complete system.

EASY USER MANAGEMENT

The intelligent user management function makes it possible to assign different rights to every user on the basis of data groups. For example, the same user can have only read rights in data group A, whilst also having write rights in data group B.

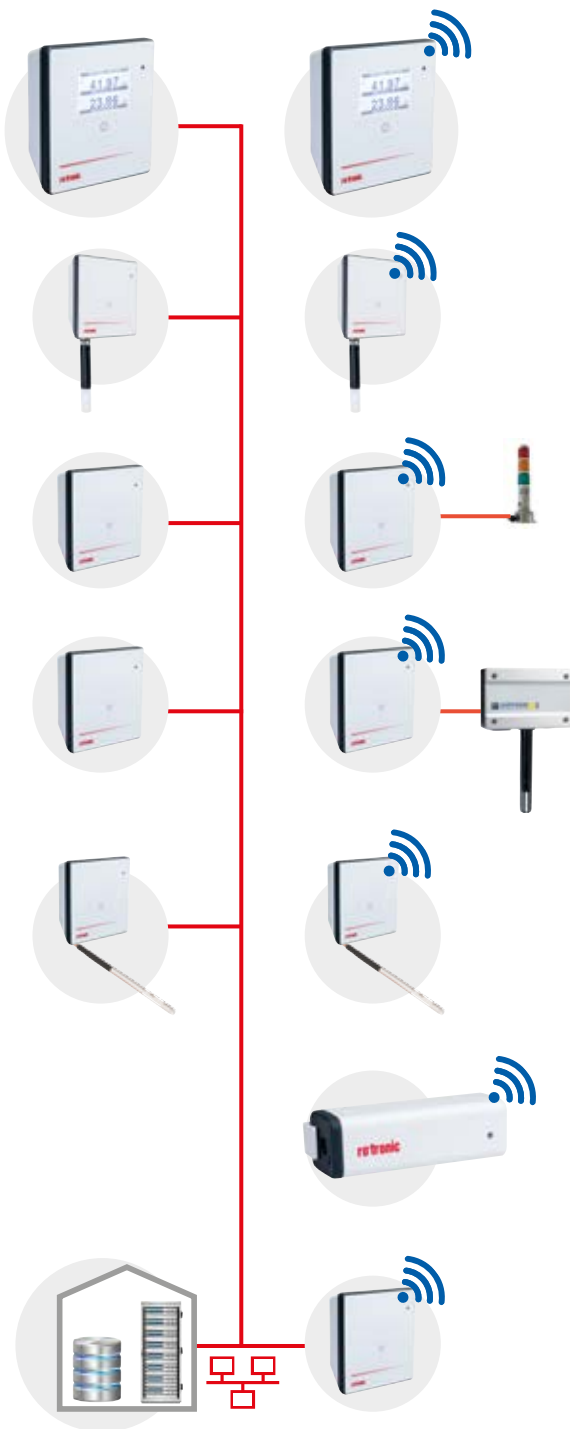


RMS SOFTWARE PRODUCTS

Type	RMS Web Software			RMS Cloud Software (SaaS - Software as a Service)			
	Small	Professional	Enterprise	Free	Small	Professional	Enterprise
Device settings	✓	✓	✓	✓	✓	✓	✓
Chart & table view	✓	✓	✓	✓	✓	✓	✓
Layout view		✓	✓			✓	✓
Dashboard view		✓	✓			✓	✓
Alarm table	✓	✓	✓		✓	✓	✓
Data view	✓	✓	✓		✓	✓	✓
Data archiving			✓				
Event logging		✓	✓			✓	✓
Calibration/Adjustment	✓	✓	✓		✓	✓	✓
Validation			✓				✓
Measuring point alarm	✓	✓	✓		✓	✓	✓
Alarm triggers		∞	∞			40	200
Alarm scripts			∞				200
Calculations		∞	∞			40	200
Virtual keys		∞	∞			40	200
System counters			∞				200
Users (freely extendable)	2	5	10	1	2	5	10
User roles	∞	∞	∞	1	2	5	10
Groups	∞	∞	∞	2	5	10	50
Measuring points (freely extendable)	5	10	50	2	5	10	50
Memory	∞	∞	∞				

LAN AND WIRELESS SYSTEM

All RMS components come with a LAN or wireless interface. They are linked to each other in an Ethernet network or send their data to the data center via a gateway. In this way every module transmits its data to the RMS database. It must therefore be ensured by network connections that the RMS modules can reach the server with the Web Software.



Data Center

Display Module

The display module can show any values from the RMS network. Humidity, temperature and switch states can be configured by the software.

Standard Logger

Records the measured data of the digital HygroClip HCD or other RMS probes. Stored in the ring memory, the data are then sent to the Web Software.

Output Module

Provides two analog voltage or current outputs or is also available as a variant with two solid-state relays in order, for example, to switch visual alarms.

Input Module

Records voltage or current signals from analog devices such as particle counters, flow transmitters or CO₂ probes.

For example:

- AF1 transmitter (airflow)
- CO₂ transmitter (CO₂)
- PF4 transmitter (differential pressure)

Temperature Loggers

The loggers can be equipped with various temperature sensors (NTC, Pt100, Pt1000 or K-element). This offers highest flexibility in use.

Mini Logger

A temperature logger with integrated or remote NTC sensor. Instead of a temperature sensor, it is also available with a switch input in order, for example, to monitor door contacts.

Gateway

The gateway is the connecting element between Ethernet and wireless networks and forwards the data flow from the loggers to the data center.

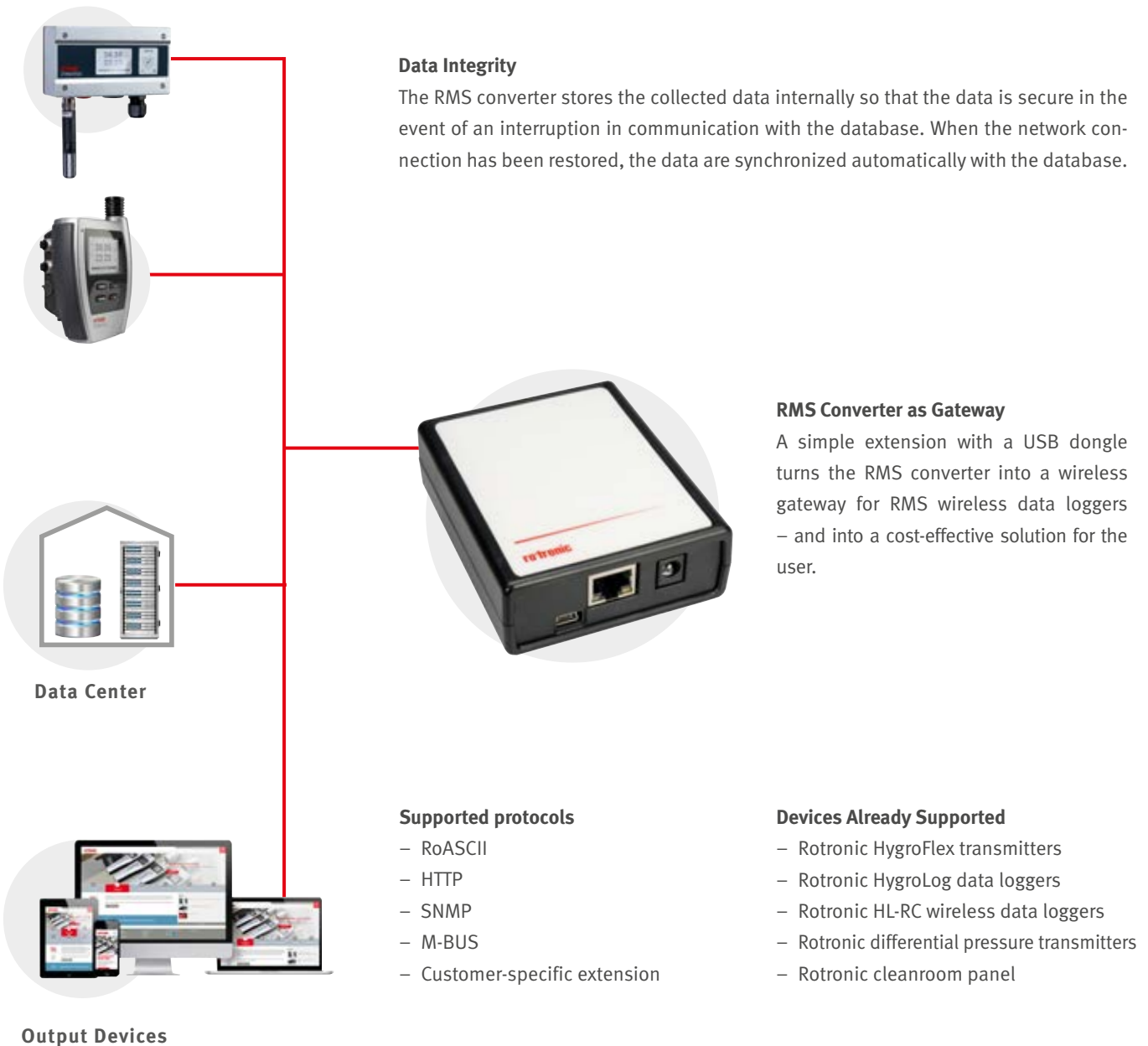
PRODUCT OVERVIEW

									
	Wall Mounted Housing IP65	DIN Rail Housing IP20	Ext. Power Supply 24 VDC	Power over Ethernet (PoE)	Battery	Data Memory (points)	Wireless Interface	LAN Interface	Parameters Output Parameters
Data logger RMS-LOG 	✓	✓	✓	✓	✓	45,000	✓	✓	%RH & °C °Cdp
Temperature data logger RMS-LOG-T 	✓	✓	✓	✓	✓	45,000	✓	✓	°C
Temperature mini data logger RMS-MLOG 	✓				✓	10,000	✓		°C
Analog input module RMS-ADC 	✓	✓	✓	✓	✓	45,000	✓	✓	mA / V
Digital input module RMS-DI 	✓	✓	✓	✓	✓	✓	✓	✓	On-Off (input)
Digital input mini module RMS-MDI 	✓				✓	10,000	✓		On-Off (input)
Analog output module RMS-DAC 	✓	✓	✓	✓			✓	✓	mA / V
Relay module RMS-DO 	✓	✓	✓	✓			✓	✓	On-Off (output)
Display module RMS-D 	✓		✓	✓			✓	✓	Display

RMS CONVERTER

INTEGRATE THIRD-PARTY DEVICES WITH THE RMS CONVERTER

The RMS converter allows integration of digital third-party devices. The hardware collects the data of all third-party components and, if required, controls them. In this way Rotronic devices from existing networks as well as web cams or third-party devices with a public protocol can be integrated. Our customers are therefore able to implement hardware extensions easily on a project-specific basis. The only requirement is that the devices have an Ethernet interface.



RMS PROBES

CHOICE OF DIGITAL RMS PROBES

The digital RMS probes have been developed in line with the latest engineering developments. With minimal current consumption, they measure environmental conditions within a few milliseconds and boast high accuracy. The new probe generation therefore fulfills the requirements for long battery life and quick response times during measurement – and this without any loss in Rotronic's renowned measurement accuracy.

Probe Types	Accuracy at 23 °C ± 5 °C	Measurement range	Sensor	Filters	Response time	Material	Parameter
Standard probe HCD-S 	±0.8 %RH ±0.1 °C	-40...85 °C 0...100 %RH	HT-1 Pt1000	PC, 40 µm	15 s	PC	%RH & °C
Probes for H ₂ O ₂ applications HCD-S-HH 	±0.8 %RH ±0.1 °C	-40...85 °C 0...100 %RH	HH-1 Pt1000	No filter	15 s	PC	%RH & °C
Probe with interchangeable sensor HCD-S-I 	±0.8 %RH ±0.1 °C	-40...85 °C 0...100 %RH	HT-1 Pt1000	PC, 40 µm	15 s	PC	%RH & °C
Probe with increased accuracy HCD-SH 	±0.5 %RH ±0.1 °C	-40...85 °C 0...100 %RH	HT-1 Pt1000	PC, 40 µm	15 s	PC	%RH & °C
Industrial probe with remote sensor HCD-IC (2 m, 5 m cable), PPS 	±0.8 %RH ±0.1 °C	-100...200 °C 0...100 %RH	HT-1 Pt1000	No filter	15 s	PPS	%RH & °C
Industrial probe with remote sensor HCD-IM (2 m, 5 m cable), metal 	±0.8 %RH ±0.1 °C	-100...200 °C 0...100 %RH	HT-1 Pt1000	No filter	15 s	Steel 1.4301	%RH & °C
Dew point probe HCD-LDPO 	±3 °Cdp	-60...20 °Cdp	HT-1 Pt1000	Sintered steel, 10 µm	15 s	PC Steel 1.4301	°Cdp

DATA SECURITY/ DATA INTEGRITY/FDA CONFORMITY

Data security, data integrity, data availability: these three terms play a central role in monitoring systems. The RMS reassuringly scores in all these fields.

Data Security

Data security means the data cannot be accessed by unauthorized persons. This is achieved through encryption during data transfer and storage.



Data Security in RMS

The monitoring system provides encryption of the data during transfer. This means the data can neither be tapped or manipulated by so-called retry attacks. The security of the stored database in RMS is ensured by the IT structure. The Rotronic Cloud is protected by certified IT data centers. If the database is located in the customer's server center, the customer defines the security infrastructure. Rotronic then offers IT support.

FDA/GMP Requirements

Regulators in the pharmaceutical and food industries demand that all relevant events are recorded so they are traceable. This is achieved through the electronic marking of all calibration measurements and verification processes. The so-called «electronic recording» requires unique identification of certificates. This means that every calibration certificate with a date and inspection stamp must be traceable such that the calibration chain can be verified.



Audit Trail

When a monitoring system is commissioned, it is calibrated and validated. In this way the operator assures his Quality department that the system works correctly. During subsequent operation, all relevant changes must be recorded in full. The audit trail guarantees recording of all changes in the system such as, for example, change in measurement probes, user activities, battery change. This in turn ensures that all events can be tracked at a later date.

Data Availability

For some manufacturer's systems, data availability can contradict data security because secure data are difficult to access. The user must authenticate themselves and use secure connections or verified platforms. Nevertheless, the trend is clearly moving towards worldwide data accessibility allowing platform-independent viewing and evaluation.



Availability of Data Centers

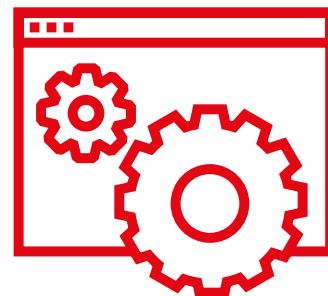
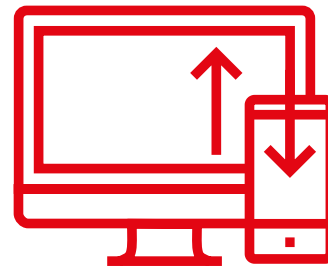
Thanks to the server database and Web Software, very high availability of the data is already implemented in the basic concept of the Rotronic RMS. The data can be viewed without problem from anywhere in the world with all conventional devices. Security is guaranteed by user rights and authentication.

Data Integrity

Ensuring data integrity means guaranteeing secure transmission and storage. A measured value must not change during transmission because of disruptions. Data transmission and storage must therefore be safe from manipulation. This is achieved with CRC checksums and intermediate storage during data transmission. In this way, faulty data communication is recognized and the data stored in the buffer memory are sent again until the transmission has been finished.

Data Integrity in RMS

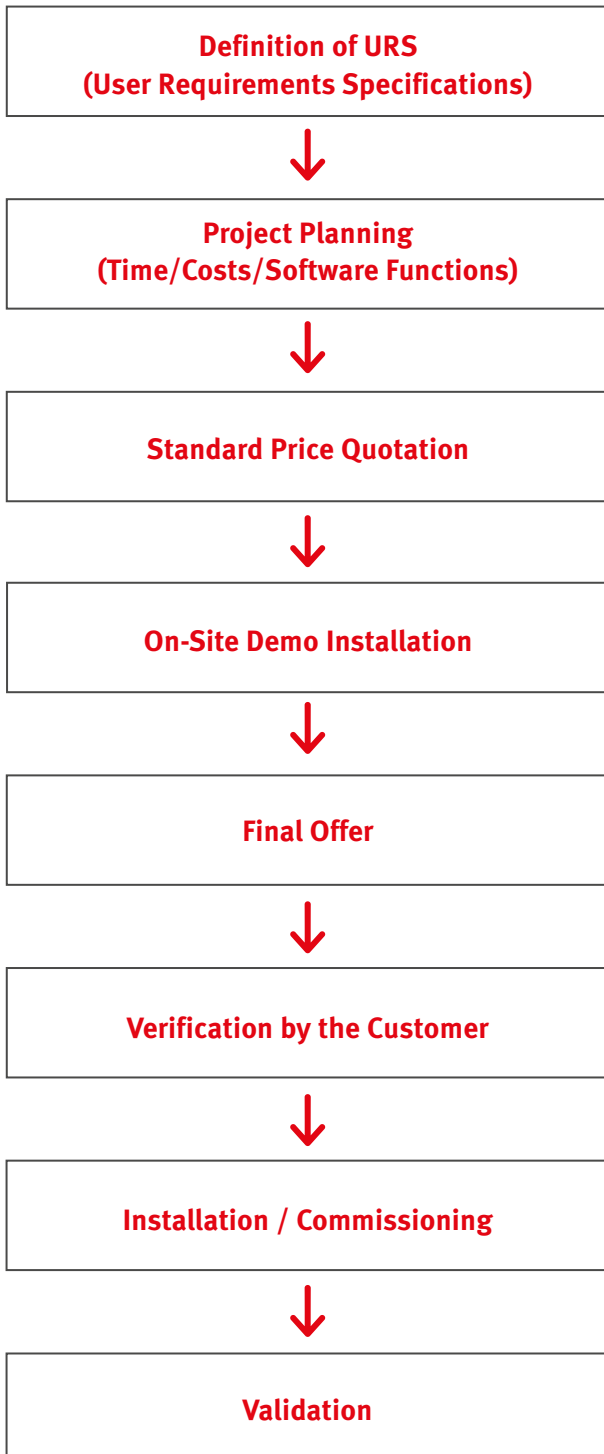
All data in RMS are sent with CRC checksums and confirmed by the recipient after receipt. Faulty data transmission is thus ruled out. Should the data not arrive with the recipient, they are stored intermediately by the logger and can then be transmitted at a later point in time when the connection has been restored.



RMS APPLICATIONS

YOU NEED A UNIVERSAL AND TURNKEY MONITORING SOLUTION?

With its RMS, Rotronic offers a complete solution for monitoring systems. Our engineering team supports the project from beginning to end from stipulation of the user requirement specifications (URS) and installation of the system through to periodic calibration and support.



The most important phases in RMS projects:

- Definition of the URS and clarification of technical requirements with prioritisation.
- A subsequent product demonstration provides an opportunity to verify the instrumentation suggested and make detailed adaptations. The engineering team stipulates the customer requirements in detail so they can fully check the products. Then a quotation can be prepared.
- Following acceptance of the proposed system, the RMS is installed, calibrated and commissioned. The software is also installed and configured. In the last step, all measuring points are calibrated.
- Depending on the project, the complete monitoring system is then validated. This is complex and requires checking and documentation of all possible system states.
- The system is then serviced by Rotronic in subsequent operation. This includes regular calibration of all measuring points by our after-sales team. It provides on-site support in the event of faults and ensures trouble-free operation.



YOU USE HW4 SUCCESSFULLY AND NEED AN UPDATE?

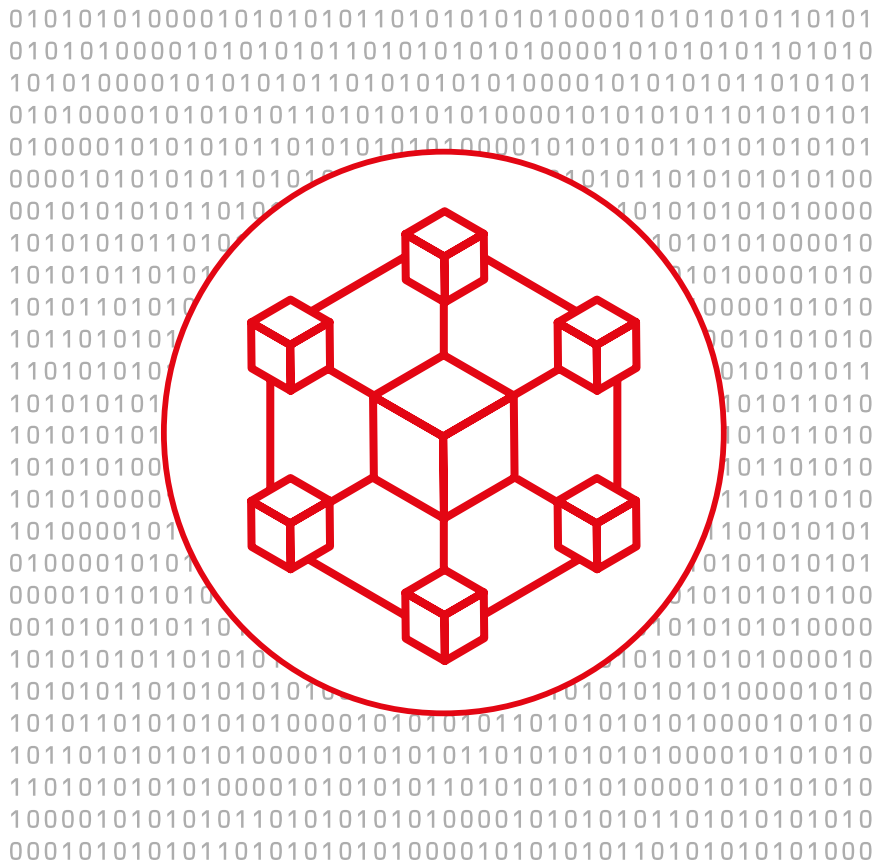
With RMS, Rotronic offers an easy possibility to update installed HW4 software monitoring systems to the latest version. It is not only inexpensive but also very easy to update HW4 to RMS for a complete system.

RMS Converter for Integration of Ethernet Devices

The RMS converter makes it possible to integrate all products with an Ethernet interface from HW4 systems into RMS directly. The RMS converter collects all data from the devices and stores their values. The data are then forwarded to the server by the RMS software.

Input Modules for Integration of Analog Devices

Devices that do not have an Ethernet interface must be integrated into the RMS system via the analog input modules. The analog input modules digitalize the analog signal and send the data to the RMS software via the Ethernet interface. The software upgrade to RMS turns the monitoring system into a server-client system, making it more flexible and compliant. Users can access the monitoring system from iOS devices, Linux platforms, Windows systems or Android devices, as a result of which they are kept up to date from anywhere about the state of the monitoring system.



YOU HAVE YOUR OWN SYSTEM AND WOULD LIKE TO CONNECT RMS DEVICES?

All RMS devices can be integrated into third-party systems such as building management systems. Rotronic has equipped all products with the standard MODBUS protocol. The digital Hygro-Clip2 probes can be read directly via MODBUS-RTU. This is perfect for systems in which power consumption must be kept to a minimum. In systems with Ethernet, data loggers and gateways can be addressed directly via MODBUS-TCP.

YOU WANT TO USE AN EXTERNAL IT INFRASTRUCTURE?

Not all systems are suitable for installation of the software and database on a local server. For small enterprises such as pharmacies it is often far easier to outsource the IT infrastructure. For this, Rotronic offers accounts in the Rotronic Cloud. Rotronic provides the database and all our customers need to do is install the devices locally and configure the account according to their requirements. This simplifies the entire commissioning process significantly.



RMS SERVICES

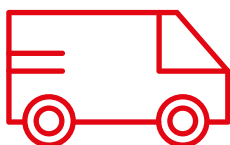
CALIBRATION AND ADJUSTMENT

Rotronic sensors have long-term stability, however we advise our customers to calibrate their probes regularly to confirm sensor performance. Calibration once a year normally suffices. However, more frequent calibration can be necessary if the probes are used in polluted/contaminated atmospheres.

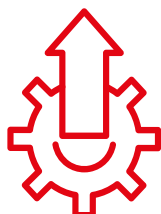
Humidity and temperature measuring instruments are precision instruments that must be serviced regularly to maintain reliability. Measurement errors can cause substantial product damage during production and storage. If the last calibration carried out by you is long in the past, we recommend you attend one of our calibration seminars. In one day, we refresh your knowledge and carry out practical calibrations with you.



Project Planning



Calibration Mobile



Validation

WHAT ARE THE CALIBRATION OPTIONS?

We can calibrate your instruments both on your premises or in our laboratory – or you calibrate the instruments yourself:

1. Calibration in Rotronic laboratory

- RAG factory adjustment certificate (ISO 9001 standard)
- SCS certificate (Swiss Calibration Standard, accredited laboratory ISO/IEC 17025)

2. We come to you

- HygroGen humidity and temperature generator
- Calibration mobile

3. You calibrate yourself

- Rotronic calibration device and SCS-certified humidity standards
- SCS-certified reference probes (reference measurement) or salts
- HygroGen

PROJECT PLANNING

We support you from planning to realization of your system. This ensures optimal design for your processing unit. The uniqueness of your application can necessitate a multitude of function-specific settings and measurement systems. Rotronic is one of the leading suppliers in the world for humidity and temperature measurement equipment – profit from our know-how!

VALIDATION/QUALIFICATION

Global companies are increasingly subject to obligatory international regulations. For example, manufacturers wishing to deliver pharmaceutical products or foods to the USA must fulfill the requirements of the FDA¹. Another well-known set of guidelines is GAMP², which, although it is not legally binding, is an acknowledged standard for validation.

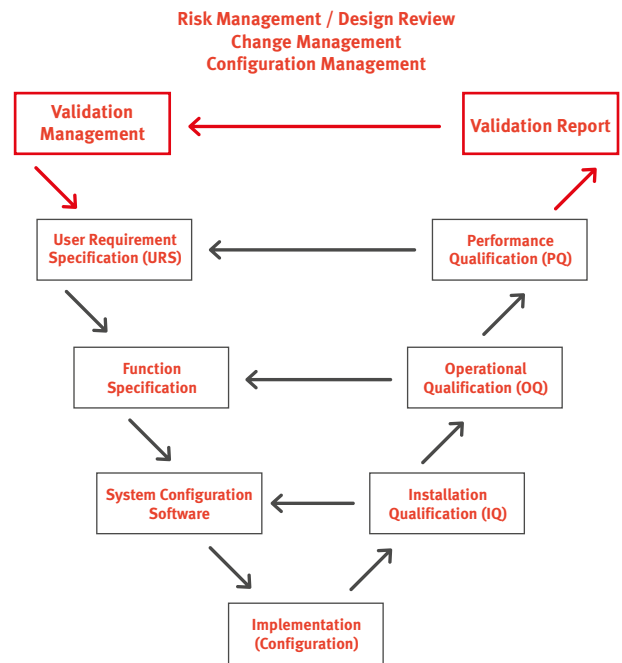
Validation includes the provision of documented evidence that a system was planned and produced according to extremely strict quality guidelines, is tested against specifications and has been operated in a qualified manner since it was introduced. Missing information and poorly specified or inadequately tested systems represent a risk and can lead to high maintenance costs and losses in productivity. Validation by a computer-aided system (CSV³) is therefore critical for legal and business reasons. The business reasons are also valid for fields not subject to special legal regulations.

ROTRONIC products, including software, conform to specific FDA requirements, are manufactured according to GAMP and provide a path to validation.

FDA¹: Food and Drug Administration

GAMP²: Good Automated Manufacturing Practice

CSV³: Computer System Validation



HUMIDITY AND TEMPERATURE MAPPING

Incorrect temperature or humidity control can result in expensive damage to products. In the case of climate deviations, therefore, it is necessary to react immediately.

However, before an FDA-compliant system can be installed, it is first necessary to investigate where and how many measuring points should be set up to monitor the production or storage rooms and cabinets. This is done with the help of a temperature and humidity mapping procedure. It provides information on how many different climate zones (temperature gradients) there are in the rooms. Using the measured data, it is possible to define the optimum storage positions for products or even to initiate changes in the room climate. Mapping also takes influencing factors such as direct sunlight, air conditioners, insulation, heat sources and external temperature into consideration, resulting in recommendations on how to optimize conditions if applicable. Mapping is typically performed at very hot and very cold times of the year and takes about 1 to 2 weeks. A generous number of measuring points is used to ensure that every zone is covered!

We recommend renewed mapping if a production or storage area is modified or if there are other significant changes to the room.

Mapping by Rotronic Comprises:

- Analysis of the requirements and definition of the measuring points
- Placement/Installation of the data loggers with traceable certificates
- Continuous recording of the climatic conditions
- Evaluation and analysis of the recorded data
- Preparation of GMP-compliant documentation
- Recommendations for optimization from Rotronic

Your Benefits:

- Exact data on room climate
- FDA conformity
- Knowledge of possible weak points



Your Contact:

- rms-support@rotronic.ch

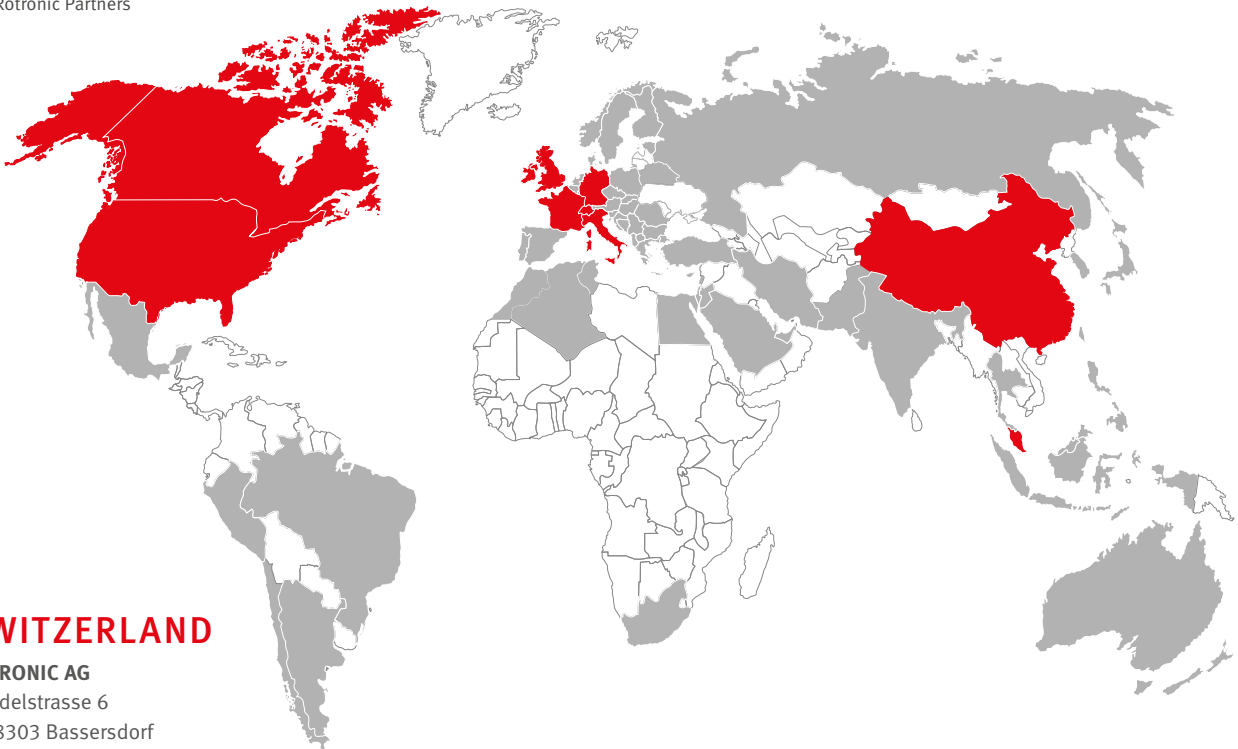
ROTRONIC WORLDWIDE

Rotronic is present in more than 40 countries worldwide. You can find a complete list of all our partners at

www.rotronic.com

■ Rotronic International

■ Rotronic Partners



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