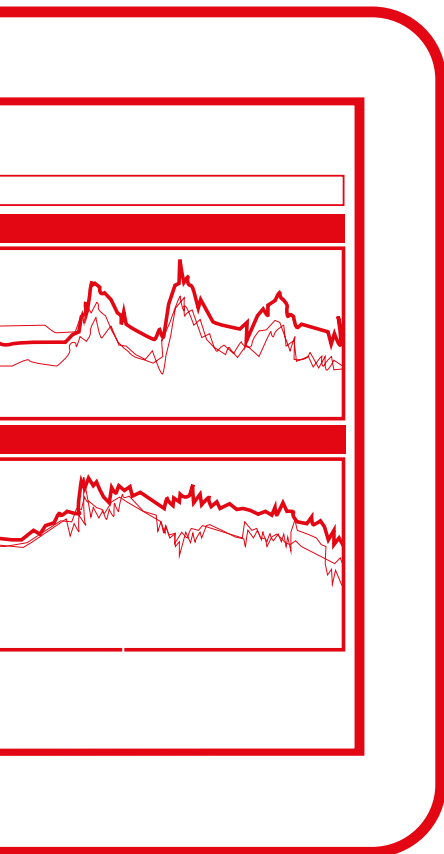


# Rotronic's Universal Monitoring System: RMS



# RMS – ROTRONIC MONITORING SYSTEM

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



## RMS – FOR EVERY APPLICATION

The Rotronic Monitoring System is a modular system of hardware elements and a server software. It guarantees maximum flexibility at installation time, and ensures excellent availability of the data during operation. The data loggers record all measurements by Rotronic and third-party sensors and transmit them to the database. It stores all information and makes it available to all users, regardless of whether they access the database by PC, Mac, tablet or smart phone.

## RMS – FOR BIG AND SMALL

The RMS is ideal for both large monitoring systems in international corporations and for simple small applications, for which Rotronic makes the database available as cloud account.

## RMS – THE ONE-STOP SOLUTION

Rotronic does not only supply the individual components such as the instruments and software for the monitoring system. We also offer professional advice, installation, commissioning and maintenance of the RMS during operation.

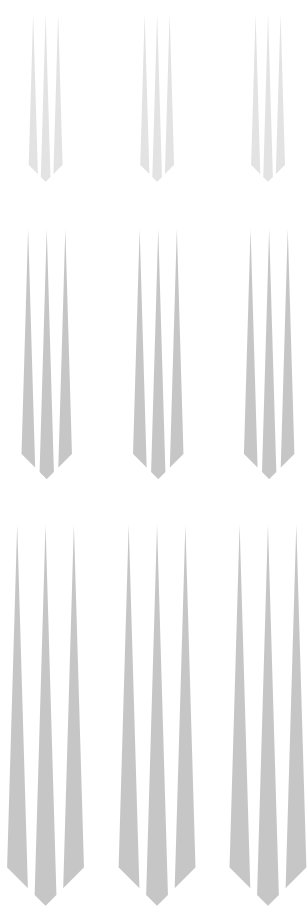
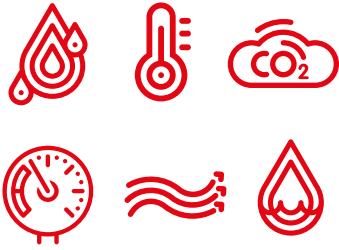
## MAIN FEATURES

- GMP/GLP/GDP compatibility
- FDA 21 CFR Part 11
- PDF report with chart and statistics
- Alarming by voice call, SMS or email
- Platform-independent
- Suitable for smart phones 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 read out 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.



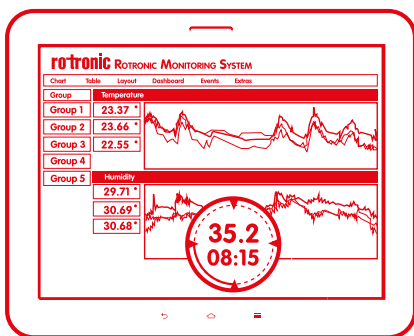
## DATA LOGGER

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



## SOFTWARE / DATABASE

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



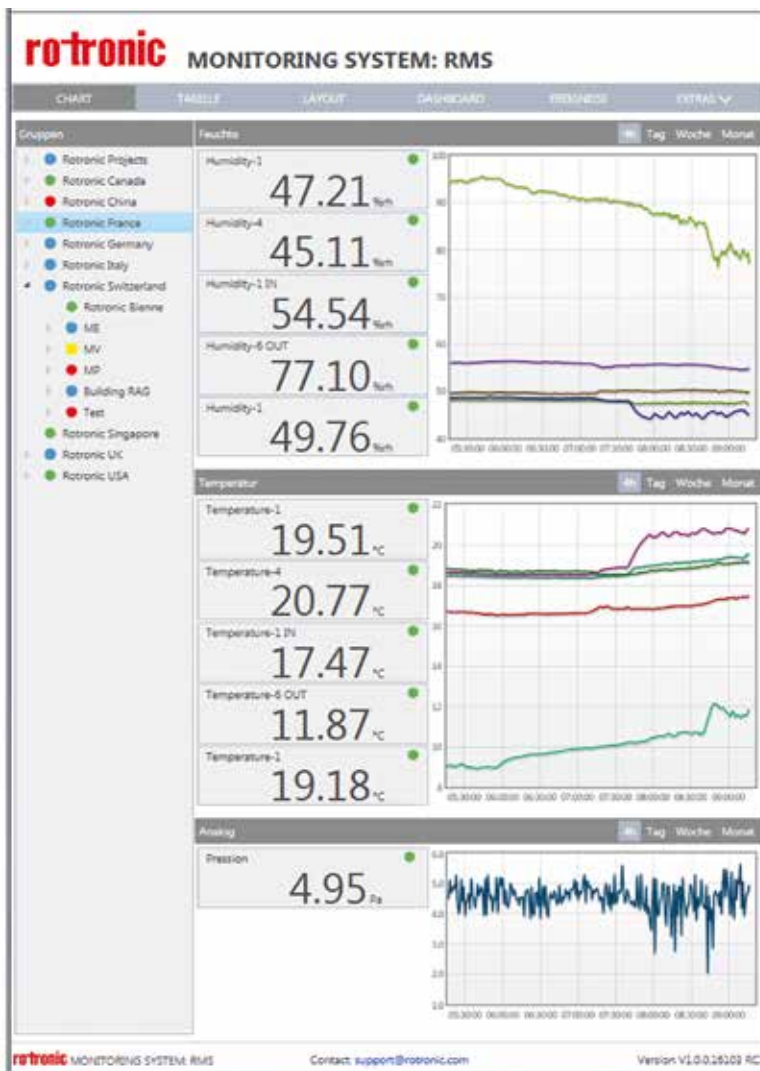
## OUTPUT SIZE

The database can be accessed with smart phones, tables and all PCs with a web browser. Visualization and alarming are therefore possible worldwide and on all common platforms.



# MONITORING SOFTWARE

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



## DATA HISTORY ALWAYS AVAILABLE

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

## 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 show the most important parameters for him in one view.

### Events

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

### Tools

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

## COMPATIBLE WITH ALL PLATFORMS

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

## ALARMS

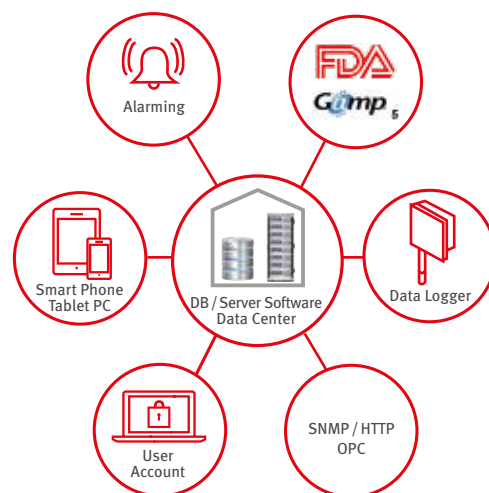
Whether by voice call, email, SMS or switching of an alarm relay: the RMS offers clear alarm functions and records all events such as error messages, warnings or system messages in the database.

## VALIDATION AT THE TOUCH OF A BUTTON

The RMS Server Software enables validation at the touch of a button. The system checks the data integrity automatically by self test in that 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, while he also has write rights in data group B.

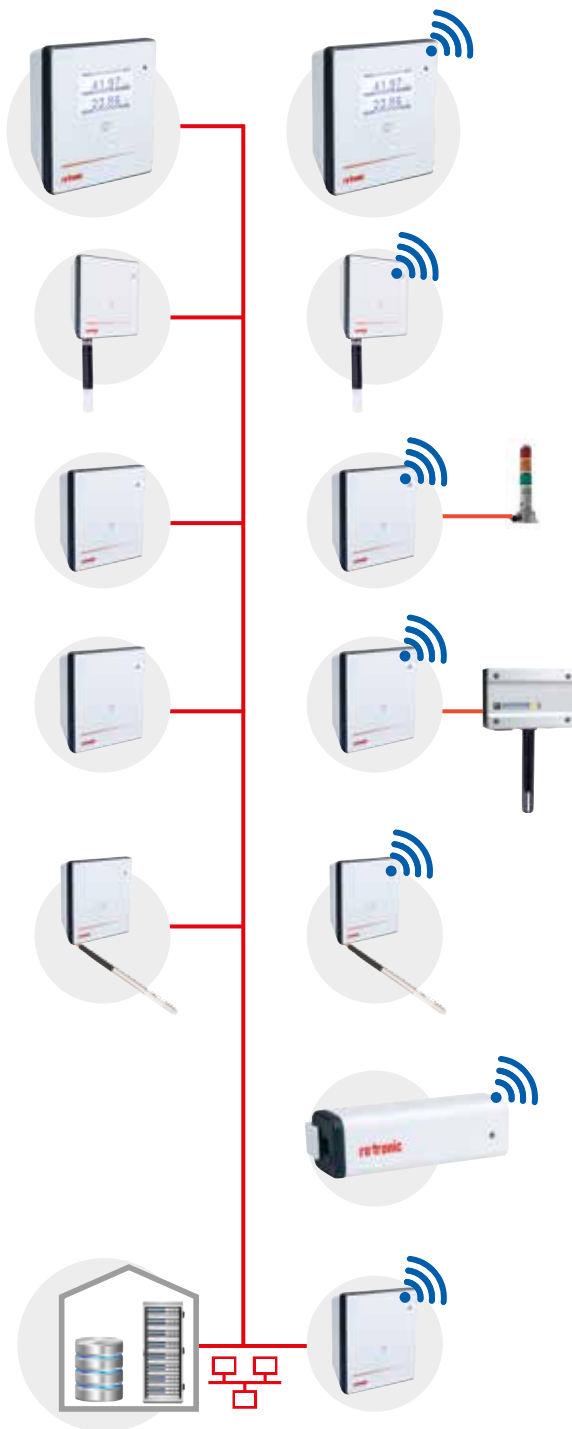


## RMS SOFTWARE PRODUCTS

Type	RMS Server Software				RMS Cloud (SaaS - Software as a Service)			
	Basic	Professional	Enterprise	Free	Small	Professional	Enterprise	Exclusive
Chart & table view	✓	✓	✓	✓	✓	✓	✓	✓
Layout view		✓	✓			✓	✓	✓
Dashboard view		✓	✓			✓	✓	✓
Alarm table	✓	✓	✓		✓	✓	✓	✓
Data archiving			✓				✓	✓
Audit trail		✓	✓			✓	✓	✓
Calibration/Adjustment	✓	✓	✓		✓	✓	✓	✓
Validation			✓					✓
Measuring point alarm	✓	✓	✓		✓	✓	✓	✓
Alarm scheme		∞	∞			40	200	200
Users (freely extendable)	2	5	10	1	2	5	10	10
Devices or measuring points (freely extendable)	10	40	100	2	10	40	100	100
Storage (freely extendable)	∞	∞	∞		6 months	6 months	6 months	∞

# 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 way of network connections that the RMS modules can reach the server with the Server Software.



Data Center

## Display Module

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

## Output Module

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

## Input Module

Records voltage or current signals from analog devices such as particle counters, flow transmitters or CO<sub>2</sub> probes. For example:

- AF1 transmitter (airflow)
- CO<sub>2</sub> transmitter (CO<sub>2</sub>)
- 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 network and forwards the data flow from the loggers to the data center.

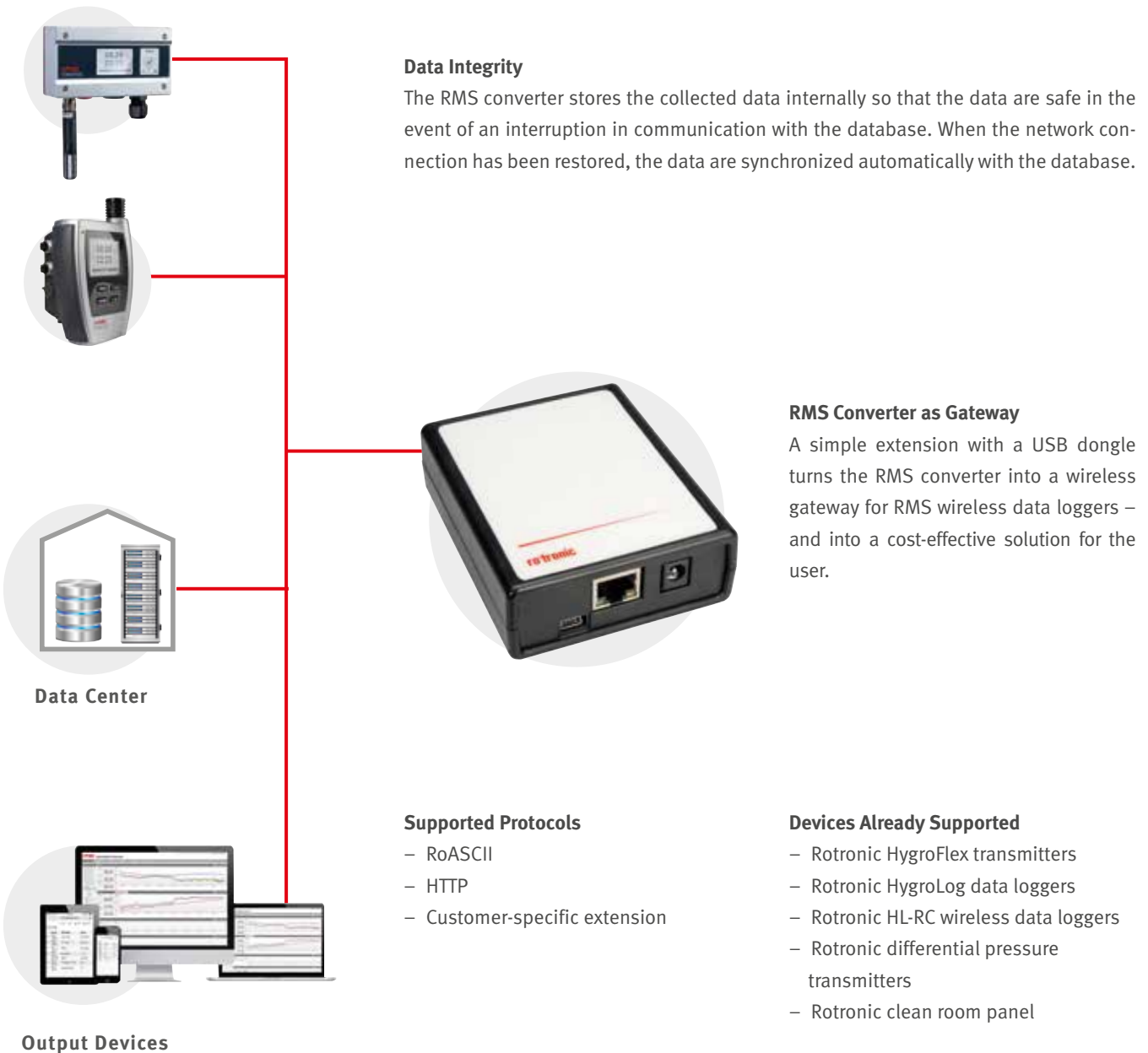
## PRODUCT OVERVIEW

									
	Wall-Mounted Housing IP65	DIN Rail Housing IP20	Ext. Power Supply 24 V	Power over Ethernet (PoE)	Battery	Data Memory (Points)	Wireless Interface	LAN Interface	Parameters Output Parameters
Data logger RMS-LOG 	✓	✓	✓	✓	✓	40'000	✓	✓	%RH & °C °Cdp
Temperature mini data logger RMS-MLOG-868 	✓				✓	10'000	✓		°C
Analog input module RMS-ADC 	✓	✓	✓	✓	✓	40'000	✓	✓	mA/V
Digital input module RMS-DI 	✓	✓	✓	✓	✓	✓	✓	✓	On-Off
Digital mini logger RMS-MDI-868 	✓				✓	10'000	✓		On-Off
Analog mini logger RMS-MADC-868 	✓				✓	✓	✓		mA/V
Light mini logger RMS-MLOG-LGT-868 	✓				✓	✓	✓		Lux
Relay module RMS-DO 	✓	✓	✓	✓			✓	✓	On-Off
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 via an Ethernet interface. The hardware collects the data of all third-party components and, if necessary, controls them. In this way Rotronic devices from existing networks as well as web cams or third-party devices with public protocol can be integrated. Our customers are therefore able to implement software 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 art of engineering. 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	Filter	Response Time	Material	Parameters
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
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
T10-0001 	N/A	-200...25 °C	NTC	N/A	N/A	Stainless steel	°C
T10-0002 	N/A	-80...200 °C	NTC	N/A	N/A	Stainless steel	°C
T10-0003 	N/A	-50...200 °C	NTC	N/A	N/A	Stainless steel	°C
DC-0001 	N/A	-20...70 °C	Switch	N/A	N/A	PC	On-Off

# DATA SECURITY/ DATA INTEGRITY/FDA CONFORMITY

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

## Data Security

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



## Data Security in RMS

If wanted by the customer, the monitoring system offers encryption of the data during transfer. This means the data can neither be tapped nor manipulated by so-called retry attacks. The security of the stored database is ensured in RMS 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 support in IT expertise.

## FDA/GMP Requirements

Regulators in the pharmaceutical and food industries demand that all relevant events are recorded such that they are clear and traceable. This is achieved through 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 date and inspection stamp must be traceable such that the correctness of 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, etc. This in turn ensures that all events can be tracked at a later point in time.

### Data Availability

Data availability usually stands in contradiction to data security because secure data are difficult to access. The user must authenticate himself 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

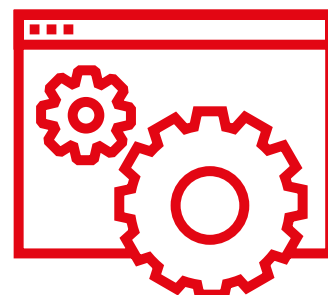
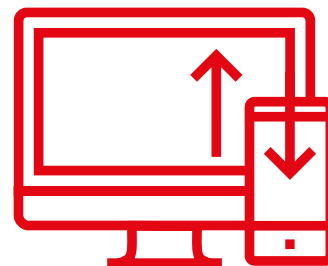
Thanks to the server database and Server Software, very high availability of the data is already implemented in the basic concept of the RMS. The data can be viewed without problem from anywhere in the world with all conventional devices. Security is guaranteed by user rights and authentication.

### Data Integrity

Ensuring data integrity means guaranteeing secure transmission and storage. A measured value may not change suddenly 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

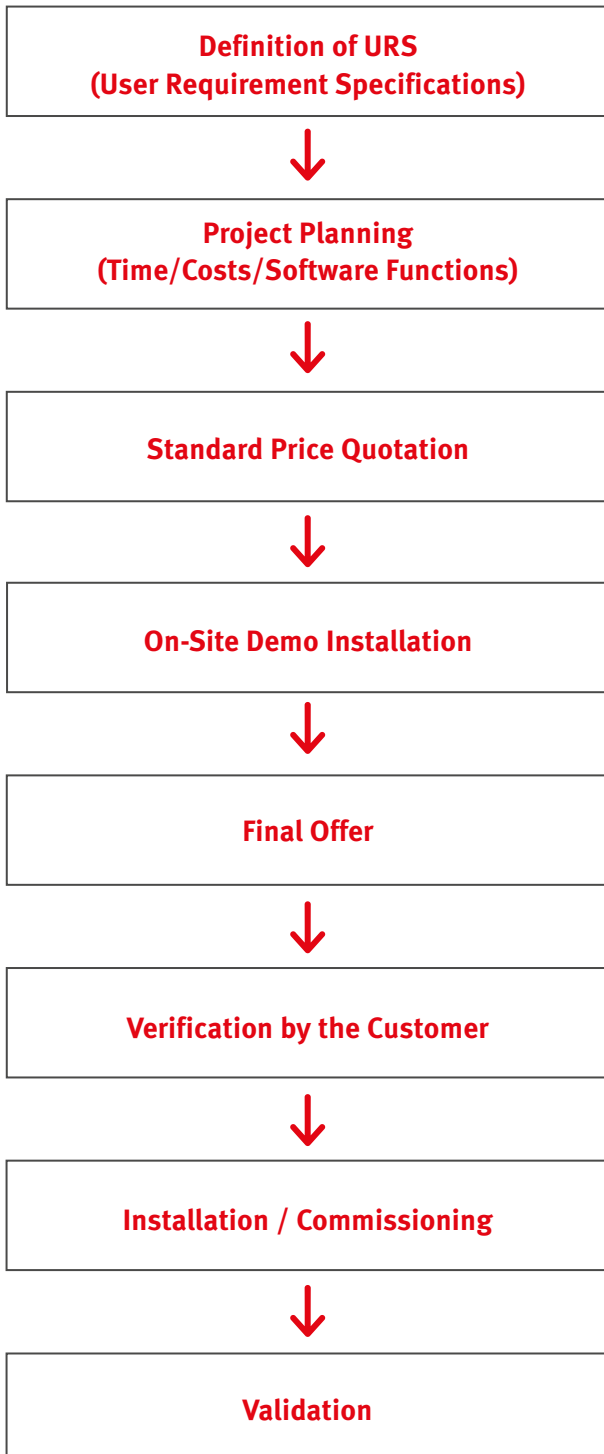
All data in RMS are sent with CRC checksums and confirmed by the recipient after receipt. Faulty data transmission is thus ruled out. Should the data not arrive at the recipient, they are stored intermediately by the logger and can then be transmitted at a later point in time when the connection has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



# RMS APPLICATIONS

## YOU NEED A UNIVERSAL AND TURNKEY MONITORING SOLUTION?

With its RMS, Rotronic offers a complete solution for monitoring systems. Our team supports the project from beginning to end from stipulation of the user requirement specifications (URS) and installation of the system to servicing of all measuring points and their regular calibration.



### The most important phases in RMS projects:

- Definition of the URS and clarification of technical implementation. The main task in this phase is to define additional requirements and to prioritize them.
- A subsequent demo installation offers the possibility of verifying implementation directly and making detailed adaptations. The engineering team stipulates the customer requirements in detail so that the customer can check the correctness of implementation.
- Following acceptance of the demo installation, the final system 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?

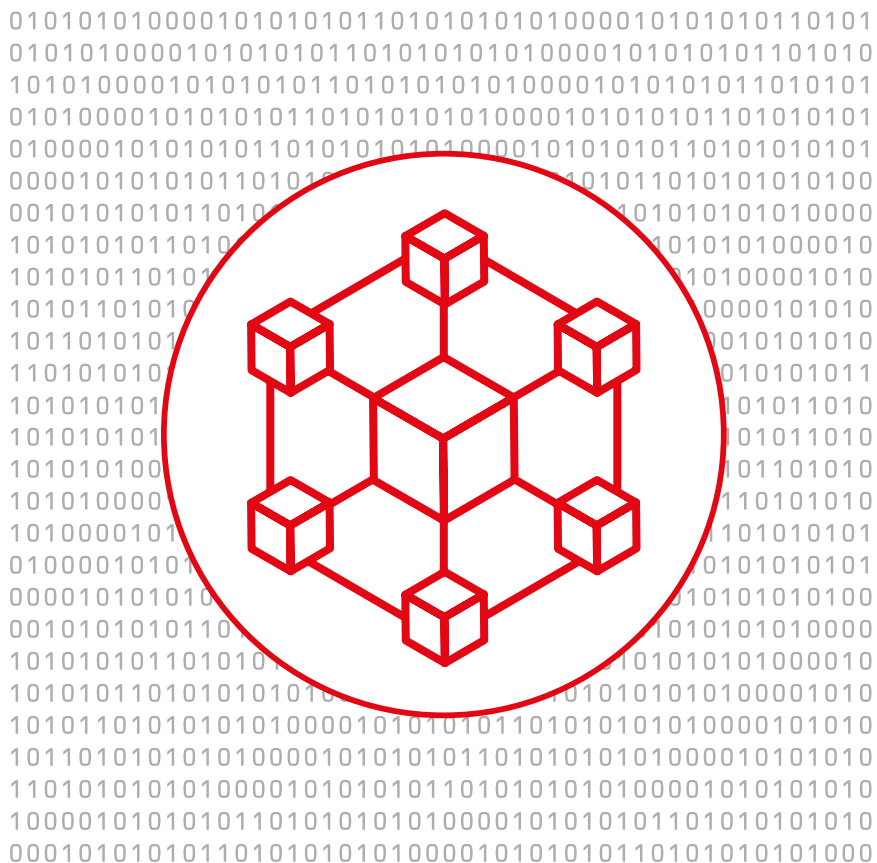
With RMS, Rotronic offers an easy possibility to update current HW4 monitoring systems to the latest state of the art and to adapt them for future extensions. It is not only inexpensive but also very easy to update HW4 to RMS for a complete system.

### 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 per Ethernet interface. The software upgrade to RMS turns the monitoring system into a server-client system, making it more flexible and compliant with the latest state of the art. 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 without problem. To this end, Rotronic has equipped all products by default with the standard MODBUS protocol. The digital HygroClips can be read out directly per MODBUS-RTU. This is interesting 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 the customer needs to do is install the devices locally and configure the account according to his requirements. This simplifies the complete commissioning process significantly.



# RMS SERVICES

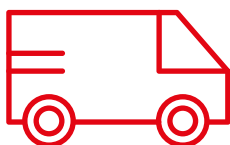
## CALIBRATION AND ADJUSTMENT

In spite of the almost legendary long-term stability of Rotronic sensors, we advise our customers to calibrate their probes regularly. Calibration once a year normally suffices. However, more frequent calibration can be necessary if the probes are used in polluted/contaminated atmospheres.

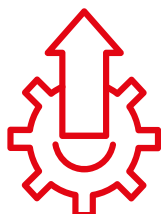
Humidity and temperature measuring instruments are precision instruments that must be serviced regularly to maintain reliability. Measurement errors can cause substantial damage to products during production and storage. If the last calibration carried out by you is long in the past, we recommend you 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)
- 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 FDA. Another well-known code is GAMP<sup>2</sup>, which, although it is not legally binding, is an acknowledged standard for validation.

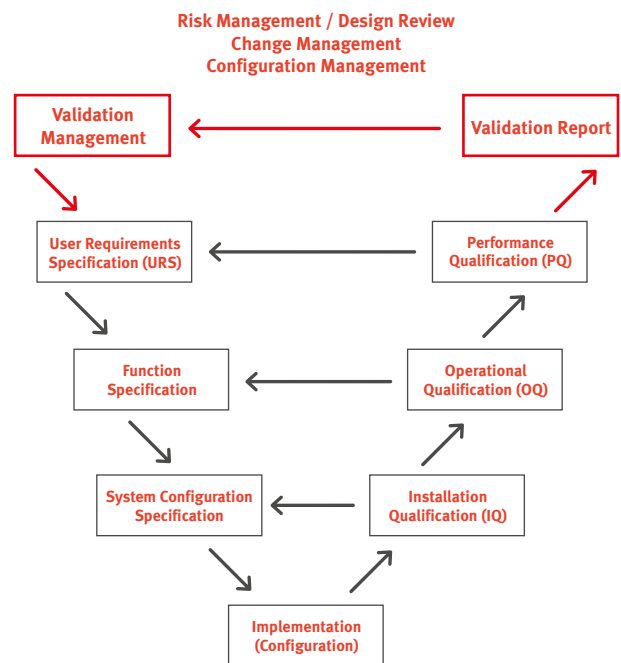
Validation includes the provision of documented evidence that a system was planned and produced according to extremely strict quality guidelines, is tested against specifications and has been operated in a qualified manner since it was introduced. Missing information and poorly specified or inadequately 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.

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

<sup>1</sup>FDA: Food and Drug Administration

<sup>2</sup>GAMP: Good Automated Manufacturing Practice

<sup>3</sup>CSV: 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 outdoor 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

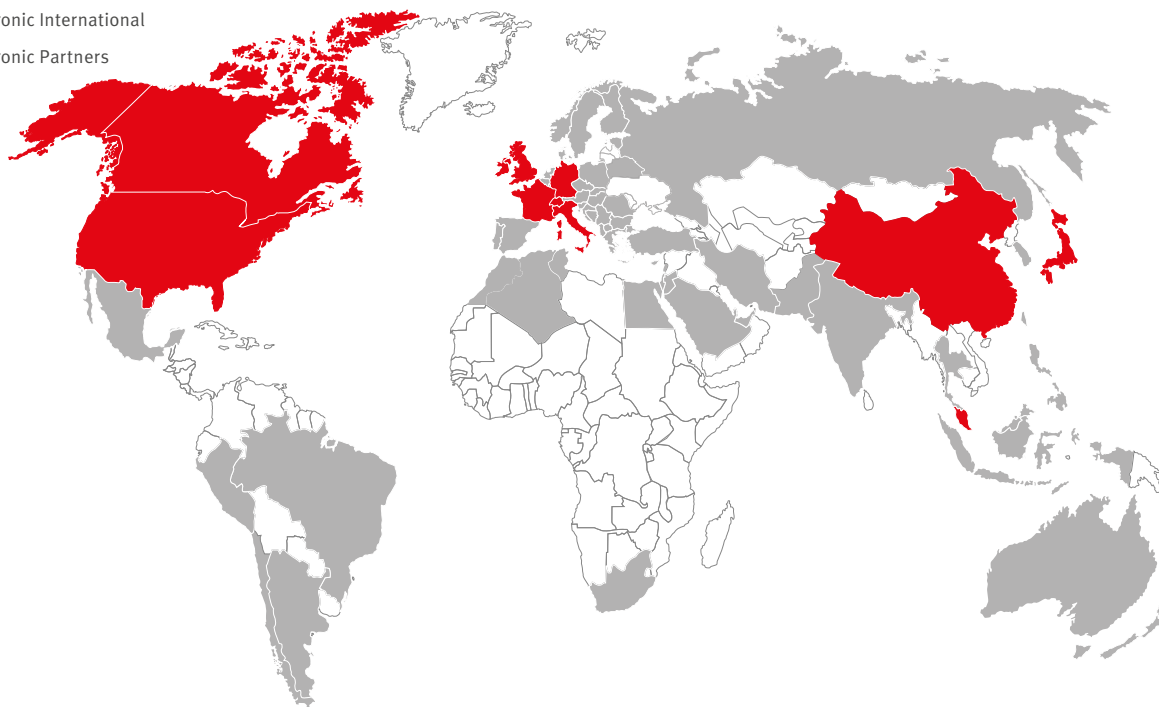


# ROTRONIC WORLDWIDE

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

[www.rotronic.com](http://www.rotronic.com)

- Rotronic International
- Rotronic Partners



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