RMS Mini Wireless Data Logger

rotronic

MEASUREMENT SOLUTIONS

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Scope:

This manual is valid for the RMS mini wireless data logger from firmware version V1.x. The low-order digit of the firmware version stands for minor changes, e.g. correction of errors, that do not influence the main functionality of the device.

1   Overview

1.1   *RMS System Overview*

The Rotronic Monitoring System (RMS) is a network comprising various devices and the RMS Server software. The software is the heart of the system. It collects all measured data of the devices and saves it in the database. The individual devices work as input modules (data loggers) and as output modules (displays, analog outputs, switched outputs). The user can view the system data at any time on a PC, laptop or smart phone.
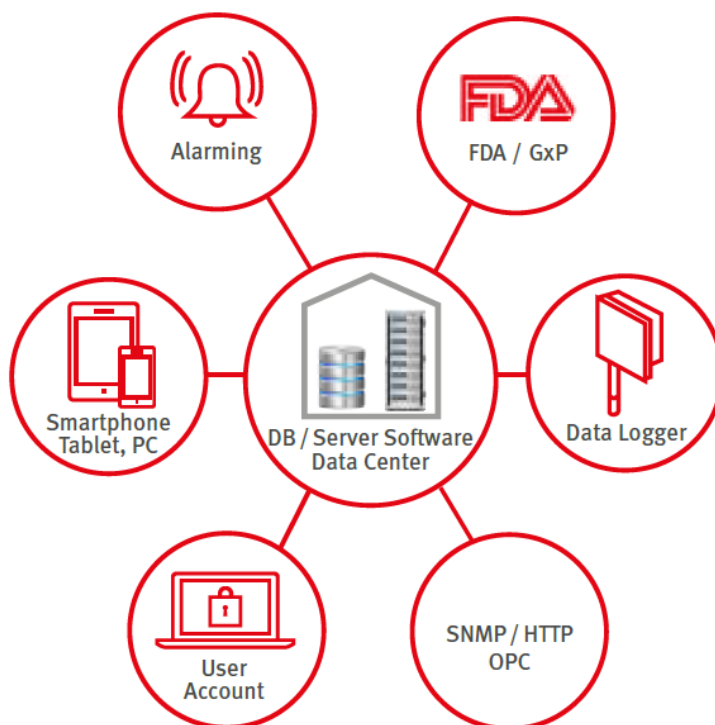

Figure 1: Schematic diagram of the RMS with the server software and database at the heart

1.2 *Device Overview*

All devices can be configured as wanted as modules of the system. The following table shows all basic types of the RMS devices. Almost all modules[1] have the following options:

- Interface: Ethernet / Wireless
- Housing: Wall housing / DIN top hat rail housing / Mini housing

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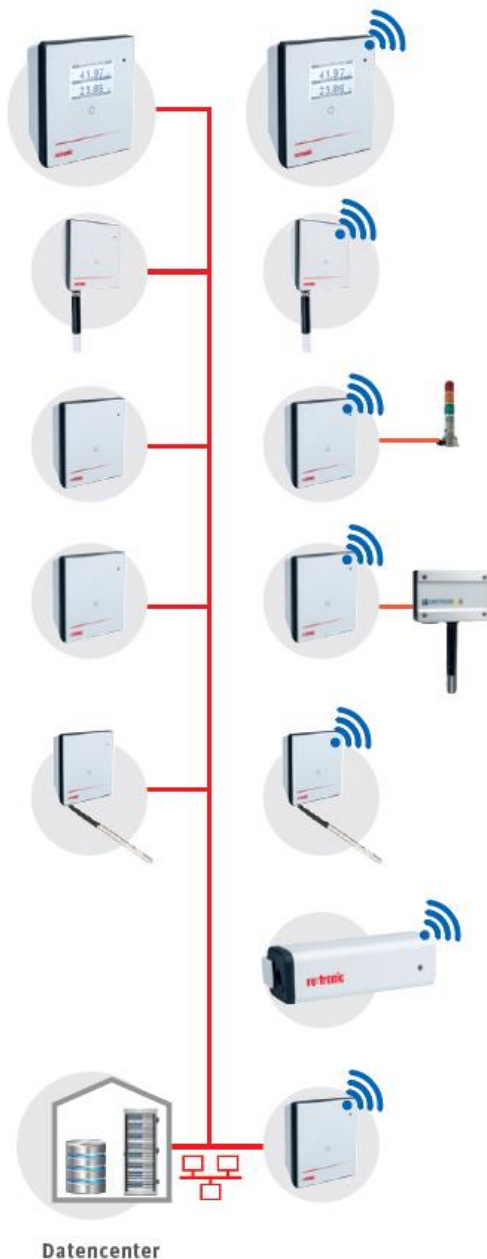
Display Module
The display module can show any values from the RMS network. Humidity, temperature and switch states can be configured per software.

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 analogue 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 analogue devices such as particle counters, flow transmitters or CO_2 probes. For example:
- HF5 transmitter (humidity & temperature)
- AF1 transmitter (air flow)
- CO2 transmitter (CO2)
- PF4 transmitter (differential pressure)

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

Mini Logger
Various parameters measured. A temperature logger with integrated or remote NTC sensor. A switch input in order, for example, to monitor door contacts. Also LUX measurement or analogue to digital converter.

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

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[1] Except for the Mini Logger

1.3   *RMS Mini Data Logger*

The mini data logger carries out measurements in a fixed interval, saves all measured data and sends it to the database by radio link. 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. Depending on the variant, the mini data logger records various parameters: temperature, current, voltage, humidity, temperature & light or switch contact. The device uses a battery as the power supply.

The mini data logger provides the following basic functions:
- Measurement (temperature, temperature & humidity, current, voltage, light or switch contact)
- Recording of up to 10,000 data points
- Transfer of the recorded data to the RMS software
- Calibration and adjustment of the sensors (via the electronics)
- Firmware update

1.4   *Power Supply*

The mini data logger has one 3.6 V lithium thionyl chloride AA battery. The power supply of this battery suffices to carry out measurement and data storage and to operate the wireless interface.

Note on the batteries:

The AA batteries are lithium thionyl chloride batteries available in the industrial trade. All RMS input modules are designed for this type of battery. Only batteries of the same type or with identical characteristic values may be used as replacement batteries.

1.4.1 Type of Battery

Battery Specifications	
Article	RMS-BAT(ER14505M, multiple manufacturer, please see for Details www.rotronic.com)
Type	Li-SOCl2
Capacitance	~2200 mAh
Voltage	3.6 V
Dimensions	AA (H: 50.3 mm, D: 14.55 mm)

1.5   Measured Parameters

Depending on the version, the mini data logger has different inputs. The following table lists the main types:

RMS Mini Data Logger	
RMS-MLOG-T-868	Mini data logger, integrated temperature probe, °C, 868 MHz
RMS-MLOG-T10-868	Mini data logger, external NTC probe, °C, 868 MHz, NTC must be ordered separately
RMS-MADC-868-A	Mini data logger, 1 x analogue input, 0…20 mA, 868 MHz
RMS-MADC-868-V	Mini data logger, 1 x analogue input, 0…10 V, 868 MHz
RMS-MLOG-LGT-868	Mini data logger, integrated light sensor, 868 MHz
RMS-MDI-868	Mini data logger, 1 x digital input, 868 MHz
RMS-MLOG-B-868	Mini data logger, integrated temperature (°C) and humidity (%rh) probe, 868 MHz
RMS-MLOG-T-915	Mini data logger, integrated temperature probe, °C, 915 MHz
RMS-MLOG-T10-915	Mini data logger, external NTC probe, °C, 915 MHz, NTC must be ordered separately
RMS-MADC-915-A	Mini data logger, 1 x analogue input, 0…20 mA, 915 MHz
RMS-MLOG-B-915	Mini data logger, integrated temperature (°C) and humidity (%rh) probe, 915 MHz

1.6   RTCC (Real Time Clock Calendar)

The device has a real time clock calendar. The time is synchronized continuously when connected to the server.

1.7   Data Logging and Measurement Interval

The values of every measurement are saved in the memory with the time-stamp. At a measurement interval of one minute, it is possible to save data of one month, which corresponds to 10,000 pairs of measured values. When the ring memory is full, the oldest values are overwritten.

1.8   *Indicator and Button*

The device has a button and multicolour LED for use and indication of the operating state. The button is used to start the device or switch it off in battery mode. The LED indicates the device status and whether it was possible in the current measurement interval to carry out a valid measurement and send the data to the monitoring system.

LED Status Indicator

Pairing		
Trigger	Action	LED
1s press	Confirms pairing	1 x orange, the LED blinks orange for each channel searched.
	Gateway found	n x orange, the LED flashes orange when the pairing demand is open.
	Confirmed pairing	3 x green.
	Issue pairing (time out, no data recieved)	3 x red.
Remove pairing		
Trigger	Action	LED
8s press	Removes pairing, stops logging, and turns off device.	3 x red, the pairing information stored in the logger is deleted.
Device status update		
Trigger	Action	LED
1s press	Shows the current status	Green, see the ISM connection (below). 1 x orange, the measurement is good, no ISM connection. 2 x red, measurement failed.
Wireless range		
Trigger		
	Action	LED
1s press	Shows the current wireless status	4 x green, RSSI >-30dBm. 3 x green, RSSI >-60dBm. 2 x green, RSSI >-80dBm. 1 x green, RSSI <= -80dBm.

1.9   *Interface*

The logger is operated completely via the wireless interface.

1.10   *Software Compatibility*

The logger is designed for use with the RMS server software (local installation or Rotronic Cloud). The data logger can alternatively also be operated with the RMS configuration software (standalone software).
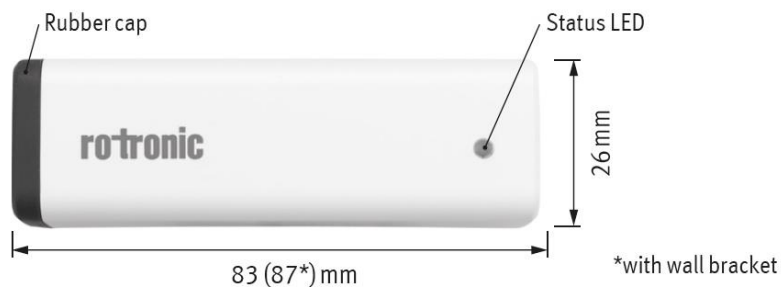
915 Mhz devices are compatible ≥V1.2.1 or higher versions.

2   Dimensions

All dimensions are shown in Figure 2.

Figure 2: Dimensions of the housing

3   Installation

The following instructions describe installation of the data logger step by step.

1	Insert the battery. Make sure it is inserted correctly. The poles are marked on the battery and on the electronics.	
2	Put on the housing cover.	
3	The wall bracket is fastened to the wall with screws. The screws may only protrude so far that the device can click into place properly when put on to the fastened cover.	
4	The housing is put in the wall bracket and clicked into place.	
5	The device can then be integrated into the server software. Please see for details in chapter 5.2.	

4   Electrical Connections

4.1   *Battery*

Lithium batteries of the type AA with 3.6 V are used, per section 1.4.1. Make sure they are inserted correctly. The poles are marked on the battery and on the electronics.
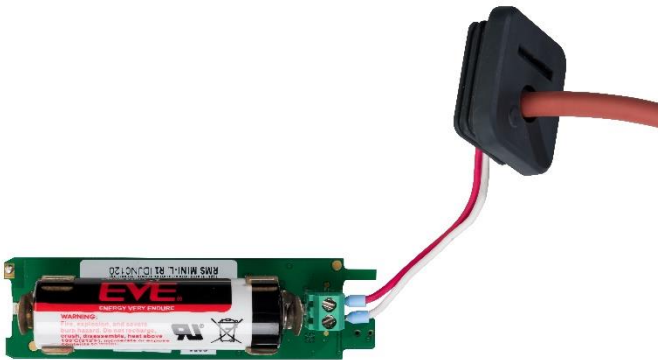
Picture 3: Inserted Battery, plus pole on the green sensor terminal side.

> **Note!**
> Not on all mini logger is the green terminal mounted on the PCB. Please insert the Battery + Pol in the direction to the rubber cover.

4.2   *Terminal Connections*

The terminal connections has two connections. Please see the attachment picture for the right connection.

Abbildung 4:Minus pol direction to the button

5   Operation

This section describes all manipulations necessary for operation.
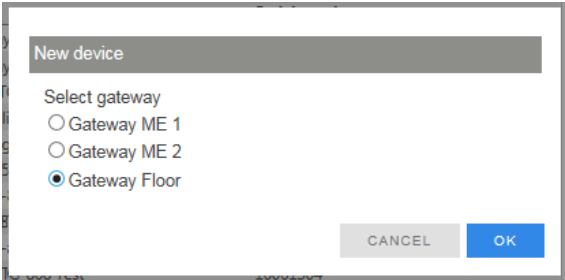
5.1   *Default Configuration*

The device does not have a wireless configuration on leaving the factory. It is assigned automatically when pairing the device in a system.

5.2   *Integration in the RMS-WEB Software*

To integrate the device in an RMS-WEB system, pairing mode must be enabled via the software on a gateway within wireless range. The search for the device is started by pressing a button. If it is possible for the device to connect with the gateway, this is shown by orange flashing. Pairing is then completed as described in the RMS-WEB software.

Integration of the Wireless Data Logger (Pairing) in 5 Steps.

1	Log into the RMS software / Cloud. Select *Extras > Setup > Devices > New Wireless Device*
2	Select the gateway you want your wireless data logger to be connected to. The selected gateway then changes to pairing mode and flashes orange.

3	Press the button on the device to confirm. The wireless data logger stops flashing. New device Search mode enabled! Please press button on the device briefly CANCEL Channel 5 12021601 **Button in the corner**
4	Configure the device. **RF-Logger** **Device** Serial number 564512333 Name Office ONE Address 2 Interval [s] 60s Group Office ME **Measuring point 1** Name Office ONE, Temp ✕ Type Temperature CANCEL OK *Picture 5: RMS-MLOG-868 Temperature* **RF-AnalogIn** **Device** Serial number 71705420 Name RF Device ✕ Address 13 Interval [s] 60s Group Test PIJ **Measuring point 1** Name Type Analog Unit CANCEL OK *Picture 6: RMS-MDI-868 D-In*
5	Finish configuration. New device added successfully! OK
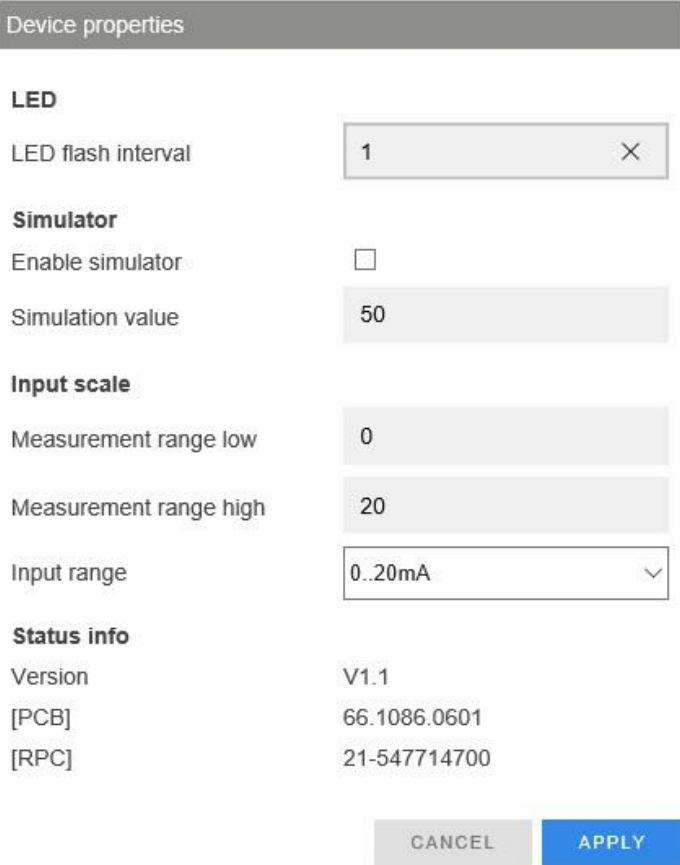
You can find details in the instruction manual for the RMS server software: **E-SM-RMS-WEB**

5.3   *Function Overview*

Overview of the main software functions of the device

► Measurement	The measured data are sent to the RMS server software at the set interval directly after the measurement.
► Adjustment	Adjustment is possible in device properties on all temperature MLOG devices: NTC
	Picture 7: RMS-MLOG-868 Adjustment

► Scaling	Rotronic MADC's are scaleable: Input scale in device properties Picture 8: RMS-MADC-868-A Scaling
► Save measured data	The measured values of every measurement are saved in the internal ring memory (10,000 pairs of measured values). If the data cannot be sent to the server software directly, they are kept in the device and then sent later as soon as the connection to the server software has been restored.
►Firmware update	The firmware of the device can be updated directly via the RMS server software.

6 Maintenance

Even the best technology needs regular maintenance. This chapter describes the most important points.

6.1 *Battery Replacement*

The batteries (see chapter 1.4.1 for the type of battery) of RMS devices typically last 3 years. The device shows automatically when the battery needs to be replaced.

- LED flashes red
- System message in the RMS server software

The following steps are necessary to replace the battery:

- Take the device out of the wall bracket.
- Remove the old battery and insert a new one.

The time setting of the data logger is synchronized automatically after the battery replacement.

Important:

- The battery life depends on the ambient temperature. Low or high temperatures can lead to a shorter battery life.

6.2 *Firmware Update*

The firmware can be updated with the RMS server software. Firmware updates are available for downloading on the ROTRONIC website.

6.3 *Adjustment*

This function is in the Manual **E-OM-RMS-WEB** described.

Technical Specifications

General	
Device type	RMS Mini Data Logger
Measured parameters	• Temperature RMS-MLOG-868 / 915 • Temp ext. NTC[2] RMS-MLOG-T10-868 / 915 & T10-xxxx • Temp + Humidity RMS-LOG-B-868 / 915 • Light RMS-MLOG-LGT-868 • Voltage RMS-MADC-868-V • Current RMS-MADC-868-A / RMS-MADC-915-A • Switch contact RMS-MDI-868
Accuracy (with integrated temperature sensor)	±0.4 °C @ 25 °C / ±1.5 °C @ 0...70 °C ±3.5°C other temperature range
Accuracy[2] (with external temperature sensor)	Measurement error electronic: ±0.1 °C @ 25 °C Measurement error Sensor: Depending on sensor, see datasheet RMS-Miniloggers
Accuracy (humidity & temperature)	Temperature: ±0.5°C @ 25 °C / ±1°C @ 0…70°C / ±3.5°C @ other temperature range Relative humidity: ± 3%rh @ 25°C
Accuracy (voltage / current)	Voltage: ±0,1V @ 25 °C Current: ±0,2mA @ 25 °C
Accuracy (light)	Lux: -3.5…10lux @ 10lux
IP protection class	IP65 IP30 RMS-MLOG-B-XXX
Range of application	All mini Data loggers-30…85 °C, expect RMS-MLOG-B-XXX • Temperature -30…85 °C • Temp ext. NTC -30…85 °C depends on the probe • Temp + Humidity -40..85 °C • Light 0.05…3000 lux • Voltage 0…10 VDC • Current 0…20 mA or 4…20 mA (Shunt 110 Ohm) • Switch contact < 15 kOhm for 0, > 500 kOhm for logical 1
Storage and transport conditions	-40..30 °C / 0..95 %RH
Data memory	10,000 measured values 13,000 measured values

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[2] The parameters from the external NTC can be adjusted over the RMS-Config

Interfaces[3]	ISM 868 MHz	ISM 915 MHz
Wireless range	20..50 m, 30m indoors	15…25 m, indoors
Transmitting power	14dBm (25mW)	2dBm (1,6mW)
Software compatibility	≥V1.1	≥V1.2.1

Power supply	
Supply voltage	Battery
Polarity protection	Yes
Battery life	Up to 3 years (at 23°C and interval of 1 minute) RMS-LOG-B-XXX up to 2,7 Years (at 23°C and interval of 1 minute)

Start Time and Measurement Interval	
Start time	Wireless logger: 1 s (typical)
Measurement interval	10 s to 15 min.

Housing Specifications	
Housing material	ABC
Dimensions	83 x 29 x 29 mm
Weight	100 g

Conformity	
EMC directives	EMV directive 2014/30/EU RED 2014/53/EU EN 61326-1 EN 61000-6-2 EN 300 220-1 EN 300 220-2 EN 301 489-1 EN 301 489-3 EN 62479
FCC (915 MHz devices)	FCC 47 CFR part 15 subpart B: Clause 15.107 + Clause 15.109 FCC 47 CFR part 15 subpart C: Clause 15.249

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[3] ISM (Industrial,Scientific and Medical Band)

	ICES-003 Issue 6: Clause 6.1 + Clause 6.2 RSS Issue 5: RSS-102 + RSS-210
Soldering material	Lead free (RoHS Directive 2011/65/EU)
FDA / GAMP directives	FDA CFR21 Part 11 / GAMP5

7   Accessories

7.1   *RMS Accessories*

Order Code	Description
RMS-GW-868	Gateway, LAN to 868 MHz
RMS-GW-915	Gateway, LAN to 915 MHz
AC1321	Mounting kit with Allen key and mounting cone
RMS-NPK	Network planning kit: wireless dongle, RMS mini logger
T10-xxxx	Different types of NTC sensors: - T10-0001: -196…-90°C - T10-0002: -80…150°C - T10-0003: -80…120°C - T10-0004: -50…120°C

8   Additional Documents

Document Name	Contents
E-IM-RMS-WEB	Instruction Manual: System Installation
E-SM-RMS-WEB	Instruction Manual: System Startup
E-OM-RMS-WEB	Instruction Manual: System Operation
E-M-RMS-GW-868-915	Instruction Manual: Gateway
E-M-RMS-LOG	Instruction Manual: Data Logger

9   Document Version

Version	Date	Notes
V1_0	October 2016	First version
V1_1	November 2016	Technical specifications updated
V1.1.1	May 2017	1.4.1: Type of battery: update. 1.8: Indicator and button: update. 8: Technical specifications: update.
V1.1.2	July 2017	1.4.1: Battey Picture to xxx*M* 1.3: Product Type: RMS-MLOG for (Humidity) in text & table 3: Pictures, button in the corner 5.2: Button description 5.3: Added adjustment example 8: Technical specification update
V1.1.3	February	1.4.1: Battery Update 7: technical specifiacitons
V1.1.4	April 2018	1.5: measurement parameters added with 915 MHz 4.2: Terminal connection schematic added 7: technical specifications added 915 MHz 8.1: Accessories added