RMS Digital Output Module

rotronic

MEASUREMENT SOLUTIONS

Table of Contents

Scope:

This manual is valid for the RMS digital output module from firmware version V1.x. (The low-order digit of the firmware version stands for minor changes, such as bug fixes, which do not affect 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.
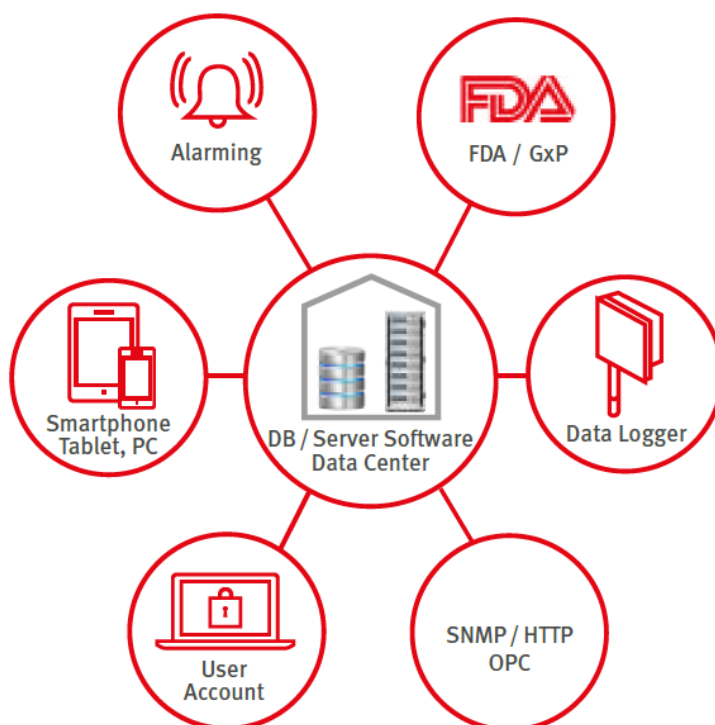

Figure 1: Schematic diagram of the RMS with the server software and database at the heart

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

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_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 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 centre.

---

[1] Except for the Mini Logger

1.3 *RMS Digital Output Module*

The digital output module provides two digital outputs as well as an Ethernet connection for integration into the Rotronic Monitoring System (RMS).

The device provides the following basic functions:
- o Two digital output channels
- o Relays can be read or set via interface
- o Firmware update

1.4 *Power Supply*

The module has the following two power supply variants:
- 24 VDC ±10 % / <100 mA[2] via terminals (V+ / V-)
- Power over Ethernet (PoE), per standard IEEE 802.3af, Class 1

1.5 *Inputs / Outputs*

The RMS devices have different inputs or outputs. Devices with replaceable probes (E2 connector) automatically detect the probe's measuring parameters.
The following table lists the main types of RMS devices:

Data Loggers for Interchangeable Probes	
RMS-LOG-L	Data logger, external probe, LAN
RMS-LOG-868	Data logger, external probe, 868 MHz
Temperature Data Loggers	
RMS-MLOG-T10-xxx	Data logger, external probe, 1 x NTC, 868 / 915 Mhz
RMS-LOG-T-xxx	Data logger, internal probe, 1 x NTC, 868 / 915 Mhz
Analog Input Modules	
RMS-MADC-xxx-A	Data logger, 1 x analog input, 868 / 915 Mhz , 0(4)…20 mA
RMS-MADC-xxx-V	Data logger, 1 x analog input, 868 / 915 Mhz , 0…10 V
RMS-8ADC-L-R-A	8 x analog input, LAN, mounting on DIN top hat rail, 0(4)…20 mA
Digital Input Modules	
RMS-DI-L-R	Data logger, 2 x digital input, LAN, mounting on DIN top hat rail
Digital Output Modules	
RMS-DO-L-R	2 x digital output, LAN, mounting on DIN top hat rail

---

[2] Power supply requirements: 24 VDC ±10 % / >4 W nominal / <15W limited power source

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 Output*

The outputs are active as soon as the software configuration has been completed.

Following values are saved:

- time stamp
- actual status of the digital outputs

1.8 *Operating and display elements*

The device has a button and a multi-color LED for operation and display of the operating state. The button is used during commissioning or for switching the device off in battery operation. The device flashes only if the operating state changes, or if the push button is pressed briefly. The displayed device state is updated for each event. In order to prolong the operating time in the battery operation, the LED flashing can be deactivated.

Signal lamp and push button

Trigger	Action	LED
Pairing		
1s	Confirms pairing	N x orange, the indicator flashes while the paring request is running
Device status check		
1s	Shows current status	1 x green, measurement & data transmission succesful
Automatic	At status change at the relay	1x orange, measurement succesful, data transfer failed

1.9 *Interface*

The device is operated completely via the LAN interface.

1.10 *MODBUS communication protocol*

For direct connection to other systems, the device provides a MODBUS TCP server. Following data is available via MODBUS communication:

Description	Details
Protocol	MODBUS TCP
TCP Port	502

1.10.1 MODBUS register

Device data (FC4: Read Input Registers)

Address	Number	Parameter	Data type	Comment
30000	2	Serial number	Unsigned 32 Bit	SN in Hex: e.g. 01ACCBE1 = 28101601

Output (FC1: Read Coils)

Adresse	Number	Parameter	Data type	Comment
0000	16	Status of digital outputs	Unsigned 16 Bit	Bit 0 = status of output 1 Bit 1 = status of output 2

(FC5: Write Single Coil)

Adresse	Number	Function	Data type	Comment
0000 0001	1	Relays: set Relays: reset	Unsigned 16 Bit	FF00: set relay 0000: reset relay

☞ If no communication is performed for more than 30 seconds, the device automatically closes the TCP connection.
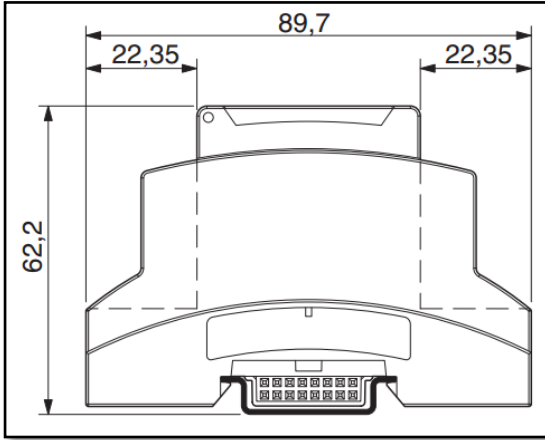
2   Dimensions

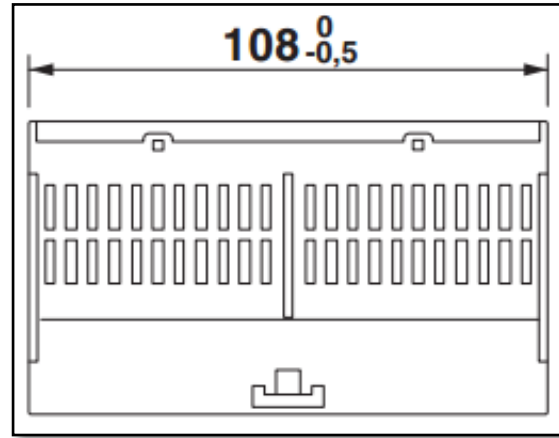Figure 2: Side view from left of DIN rail housing

Figure 3: Front view of DIN rail housing

3   Installation

The wall mounting is carried out using a standard DIN rail (EN 50022 / 35mm x 7.5mm). The rail is attached to the wall or in the control cabinet. Then just plug in the device on the DIN rail.
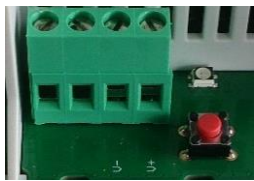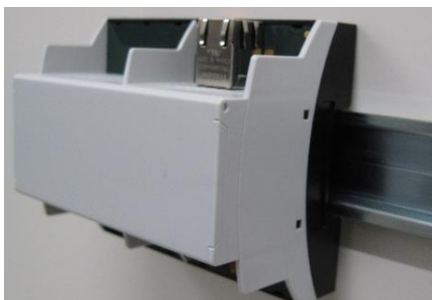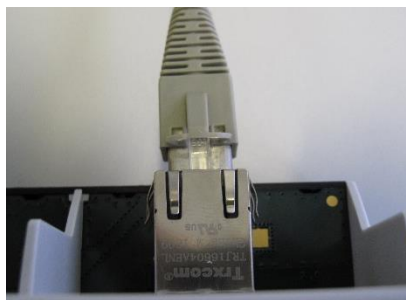

Figure 4: Wall mounting

Figure 5: Network cable connection

When plugging the network cable into the device, make sure it clicks in audibly.

4 Electrical Connections

4.1 *Connection of external power supply*

Marking	Function
V+	Power Supply +
V-	Power Supply -

4.2 *Connection of digital inputs*

Marking	Function
VEX1+	Power supply for relays (+24VDC)
VEX1-	Power supply GND
REL1+	Relay 1 + connection
REL1-	Relay 1 - connection
REL2+	Relay 2 + connection
REL2-	Relay 2 - connection

4.3 *Behavior of the outputs*

The outputs can be controlled via the web service. As soon as a change is made, it is transmitted to the device at the set interval. The corresponding relays are switched and the LED flashes green. In case of simultaneous events (both outputs change the status), the LED flashes green twice.

4.4 *Behavior in power failure*

If the external power supply fails, the relays go into their original state (normally open). After the voltage recovery, they again take over the states before the voltage interruption.

4.5   *VEX power supply*

For the supply of, for example, an external relay, the connections VEX + and VEX- are available. These are taken directly from the supply voltage (V + / V-) and are not protected against short circuit or polarity reversal. The maximum current that can be obtained depends on the power supply V+. It should be noted that this shall supply enough current to the output module as well as the connected relays.

When operating the output module via PoE, no external devices can be supplied via the VEX connections.
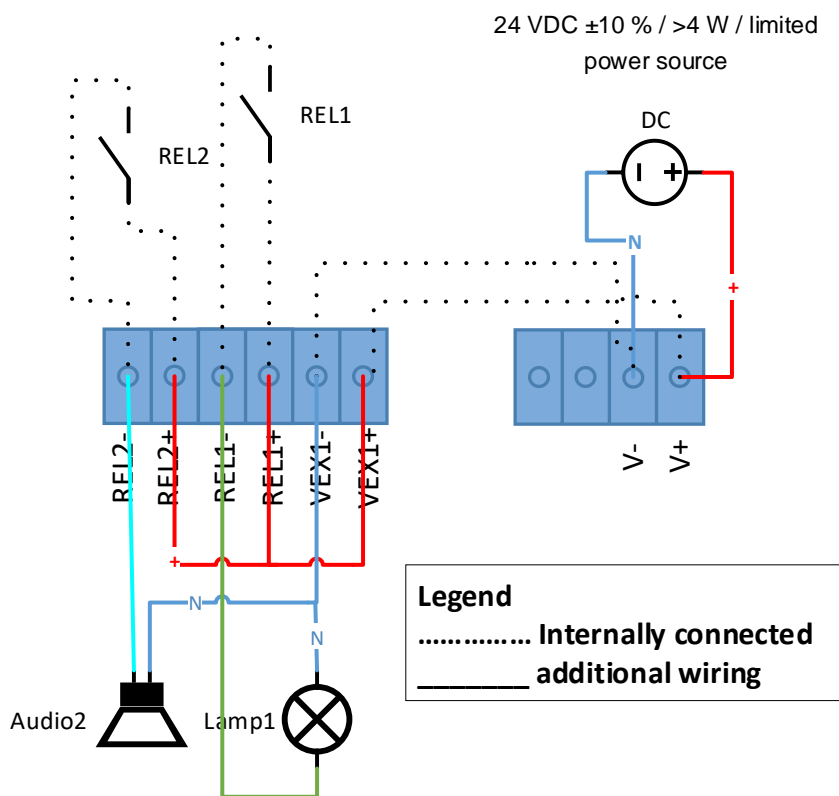
24 VDC ±10 % / >4 W / limited power source

Legend

…………… Internally connected

_____ additional wiring

5   Operation

This section describes all manipulations necessary for operation.

5.1 *Default Configuration*

The devices are configured ex works. All devices with a LAN connection have a standard address for the server with the RMS server software. The standard server corresponds to the Rotronic Cloud. Devices that need to send the data to a different server need to be reconfigured.

LAN Devices

TCPIP configuration: The DHCP server must be on, the configuration is obtained automatically.

RMS-WEB Server URL: http://rms.rotronic.com/wService/wService3.DeviceService.svc

5.2 *Configuration of the LAN Devices with RMS-CONFIG*

If you do not want to connect the device to the Rotronic Cloud, the server must be configured in the device.

- Connect the device to the local network as described in section 3 . Start the RMS configuration software.
- Search for the device under *Device > Search > Network Device*. The software finds all RMS devices in the local network.
- Enter the host (server address) and the URL of the software services under Settings.
- Finish configuration with *"Write"*.
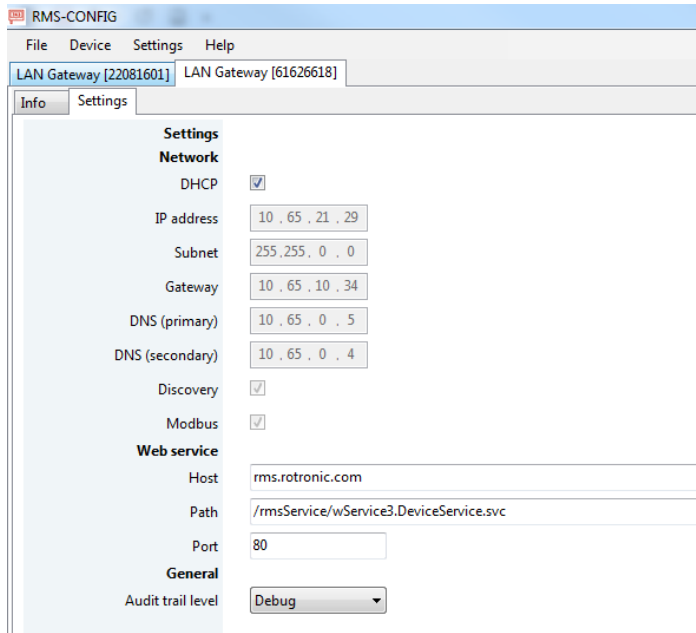
Once they have been configured with the correct server address, the devices can then be integrated into the server software. Details are described in the manual **E-SM-RMS-WEB**.
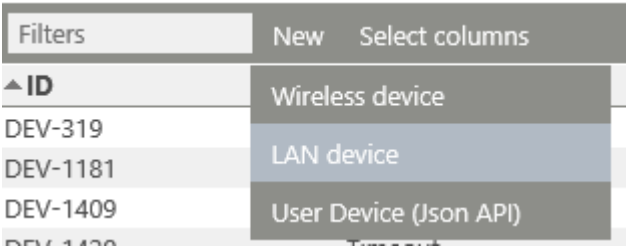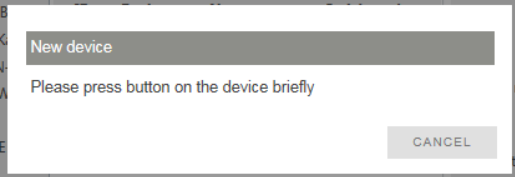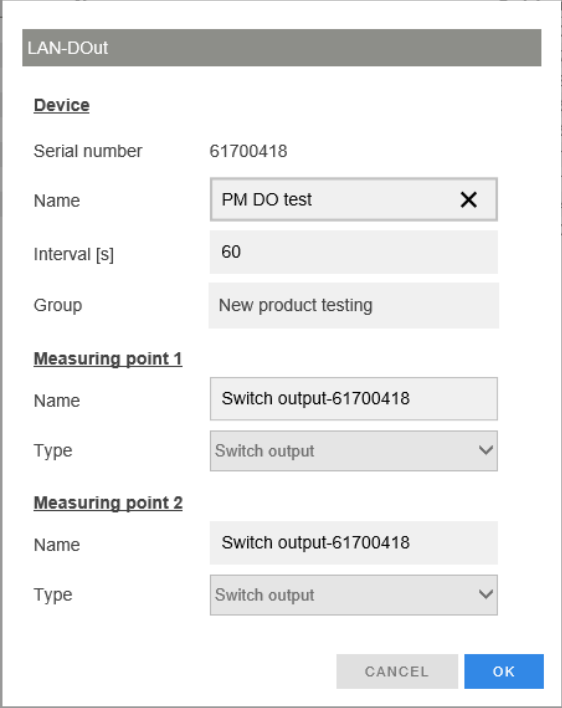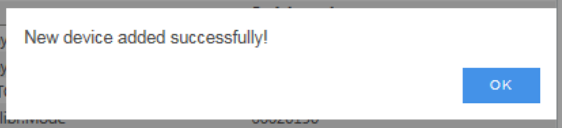
5.3 *Integration in the RMS-WEB Software*

To integrate the device, port 80 must be enabled in your network and a DHCP server must assign the IP address to the device. The device must be able to reach the server with the RMS server software or the Cloud.

The devices can also be given a static IP address if there is no DHCP server available in the network.

Integration of the device (Pairing) in 6 Steps

1	If you do not want to connect the device to the Rotronic Cloud, the server must be configured in the device. • Connect the device to the local network and start the RMS configuration software. • Search for the device under *Device > Search > Network Device*. The software finds all RMS devices in the local network. • Enter the host (server address) and the URL of the software services under Settings. • Finish configuration with "*Write*".
2	Log into the RMS software / Cloud. Select *Extras > Setup > Devices > New LAN Device*
3	Enter the serial number of the device. The device flashes orange.
4	Press the button on the device briefly. The device stops flashing.

5	Configure the device.
6	Finish configuration.

You can find details in the instruction manual for the RMS server software: **E-SM-RMS-WEB**

5.4 *Function Overview*

Overview of the main software functions of the device

► Digital outputs	The device updates the states at the output in the set interval. The relays can be read or set via Modbus TCP.
► Discovery	With Discovery it is possible to find devices in the subnet with the RMS configuration software irrespective of their IP configuration and to change their settings.
► IP configuration	The devices can have static or dynamic IP configurations. It is recommended that you use a dynamic IP configuration whenever possible. If fixed IPs are used, the network topology must be considered exactly.
► RMS Web Server settings	Every device has the server address and software path of the RMS server software stored in it in order to build up communication with the RMS server software. The two parameters can be set with the RMS configuration software: • **Host**: Address of the server with the RMS software • **Server path**: Server path where the server software is installed.
► Audit Trail	The device stores events when changes are made to the configuration.
►Firmware update	The firmware of the device can be updated directly via the RMS server software.

6 Firmware Update

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

7   Technical Specifications

Device specific data	
Device type	RMS digital output module
Number of outputs	2
Relay switching power	50VAC(Peak) 1A / 50VDC/1A, polarity independent
Voltage output (VEX)	24VDC (maximum current depends on the connected power supply)
Max. output cable length	<3m

General data LAN devices	
Range of application	-40…70 °C / 0…100 %RH, Not condensing
Storage and transport conditions	-40…30 °C / 0…90 %RH
Max. altitude of operation	2000 m.a.s.l.
Interfaces	Ethernet
Protocol	Modbus
Cable length ethernet	<30m min. Cat. 5

Power Supply	
Supply voltage	24 VDC ±10 % / <100 mA[3] PoE: 802.3af-2003, Class 1
AC Adapter requirements	24 VDC ±10 % / 4 W nominal /<15 W power-limited
Polarity protection	Yes
Current consumption	<100 mA

Start Time and Measurement Interval	
Start time	10 s (typical)
Update frequency	Interval (10 s to 15 min)

---

[3] Power supply requirements: 24 VDC ±10 % / >4 W / limited power source

Housing Specifications	
Housing material	PC (Polycarbonate)
IP protection class	IP20
Fire protection klass	UL94-V0
Dimensions	108 x 89,7 x 62,2 mm
Weight	155 g

Conformity		
EMV-directives 2014/30/EU LVD- directives: 2014/35/EU	EN 61326-1 EN 61000-6-2 EN 55011 EN 55032 EN 61010-1 Performance criterion: www.rotronic.com	IEC 61326-1 IEC 61000-6-2 IEC CISPR 11 IEC CISPR 32 IEC 61010-1
RoHS-directives: 2014/65/EU	EN 50581 Soldering material: Lead free	
FDA / GAMP directives	FDA CFR21 Part 11 / GAMP5	

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

9 Document Version

Version	Date	Notes
V1_0	August 2017	First version
V1_1	February 2018	Revision