RC 001

S-DIAS RealTimeClock Module

Instruction Manual

Date of creation: 26.04.2016 | Version date: 26.07.2023 | Article number: 20-012-001-E

Publisher: SIGMATEK GmbH & Co KG
A-5112 Lamprechtshausen
Tel.: +43/6274/4321
Fax: +43/6274/4321-18
Email: office@sigmatek.at
WWW.SIGMATEK-AUTOMATION.COM

Translation of the Original Instructions

S-DIAS RealTimeClock Module RC 001

with 1 RealTimeClock battery buffered

The S-DIAS RC 001 RealTimeClock module provides battery buffered date and time information for processor modules on the bus, which have no integrated real-time clock. Buffering of the RealTimeClock without supply is realized with a Lithium battery.

Contents

1 Introduction

1.1 Target Group/Purpose of this Operating Manual

This operating manual contains all information required for the operation of the product.

This operating manual is intended for:

- Project planners
- Technicians
- Commissioning engineers
- Machine operators
- Maintenance/test technicians

General knowledge of automation technology is required.

Further help and training information, as well as the appropriate accessories can be found on our website www.sigmatek-automation.com.

Our support team is happily available to answer your questions.
Please see our website for our hotline number and business hours.

1.2 Important Reference Documentation

This and additional documents can be downloaded from our website or obtained through support.

1.3 Contents of Delivery

1x RC 001

2 Basic Safety Directives

2.1 Symbols Used

The following symbols are used in the operator documentation for warning and danger messages, as well as informational notes:

DANGER

Danger indicates that death or serious injury **will occur**, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Danger indique une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

WARNING

Warning indicates that death or serious injury **can** occur, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Avertissement d'une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

CAUTION

Caution indicates that moderate to slight injury **can** occur, if the specified measures are not taken.

⇨ To avoid moderate to slight injuries, observe all guidelines.

Attention indique une situation dangereuse qui, faute de prendre les mesures adéquates, **peut** entraîner des blessures assez graves ou légères.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

INFORMATION

Information

⇨ Provides important information on the product, handling or relevant sections of the documentation, which require attention.

2.2 Disclaimer

INFORMATION

The contents of this operating manual were prepared with the greatest care. However, deviations cannot be ruled out. This operating manual is regularly checked and required corrections are included in the subsequent versions. The machine manufacturer is responsible for the proper assembly, as well as device configuration. The machine operator is responsible for safe handling, as well as proper operation.

The current operating manual can be found on our website. If necessary, contact our support.

Subject to technical changes, which improve the performance of the devices. The following operating manual is purely a product description. It does not guarantee properties under the warranty.

Please thoroughly read the corresponding documents and this operating manual before handling a product.

SIGMATEK GmbH & Co KG is not liable for damages caused through, non-compliance with these instructions or applicable regulations.

2.3 General Safety Directives

The Safety Directives in the other sections of this operating manual must be observed. These instructions are visually emphasized by symbols.

INFORMATION

According to EU Directives, the operating manual is a component of a product.

This operating manual must therefore be accessible in the vicinity of the machine since it contains important instructions.

This operating manual should be included in the sale, rental or transfer of the product, or its online availability indicated.

Regarding the requirements for Safety and health connected to the use of machines, the manufacturer must perform a risk assessment in accordance with machine directives 2006/42/EG before introducing a machine to the market.

Operate the unit with devices and accessories approved by SIGMATEK only.

CAUTION

Handle the device with care and do not drop or let fall.

Prevent foreign bodies and fluids from entering the device.

The device must not be opened!

Manipulez l'appareil avec précaution et ne le laissez pas tomber.

Empêchez les corps étrangers et les liquides de pénétrer dans l'appareil.

L'appareil ne doit pas être ouvert!

If the device does not function as intended or has damage that could pose a danger, it must be replaced!

En cas de fonctionnement non conforme ou de dommages pouvant entraîner des risques, l'appareil doit être remplacé!

The module complies with EN 61131-2.

In combination with a facility, the system integrator must comply with EN 60204-1 standards.

For your own safety and that of others, compliance with the environmental conditions is essential.

Le module est conforme à la norme EN 61131-2.

En combinaison avec une équipement, l'intégrateur de système doit respecter la norme EN 60204-1.

Pour votre propre sécurité et celle des autres, le respect des conditions environnementales est essential.

2.4 Software/Training

The application is created with the software LASAL CLASS 2 and LASAL SCREEN Editor.

Training for the LASAL development environment, with which the product can be configured, is provided. Information on our training schedule can be found on our website.

3 Standards and Directives

3.1 Directives

The product was constructed in compliance with the following European Union directives and tested for conformity.

3.1.1 EU Conformity Declaration

EU Declaration of Conformity

The product RC 001 conforms to the following European directives:

- **2014/35/EU** Low-voltage Directive
- **2014/30/EU** Electromagnetic Compatibility (EMC Directive)
- **2011/65/EU** “Restricted use of certain hazardous substances in electrical and electronic equipment” (RoHS Directive)

The EU Conformity Declarations are provided on the SIGMATEK website. See Products/Downloads or use the search function and the keyword “EU Declaration of Conformity”.

4 Type Plate

Exemplary nameplate (symbol image)

HW: Hardware version
SW: Software version

5 Technical Data

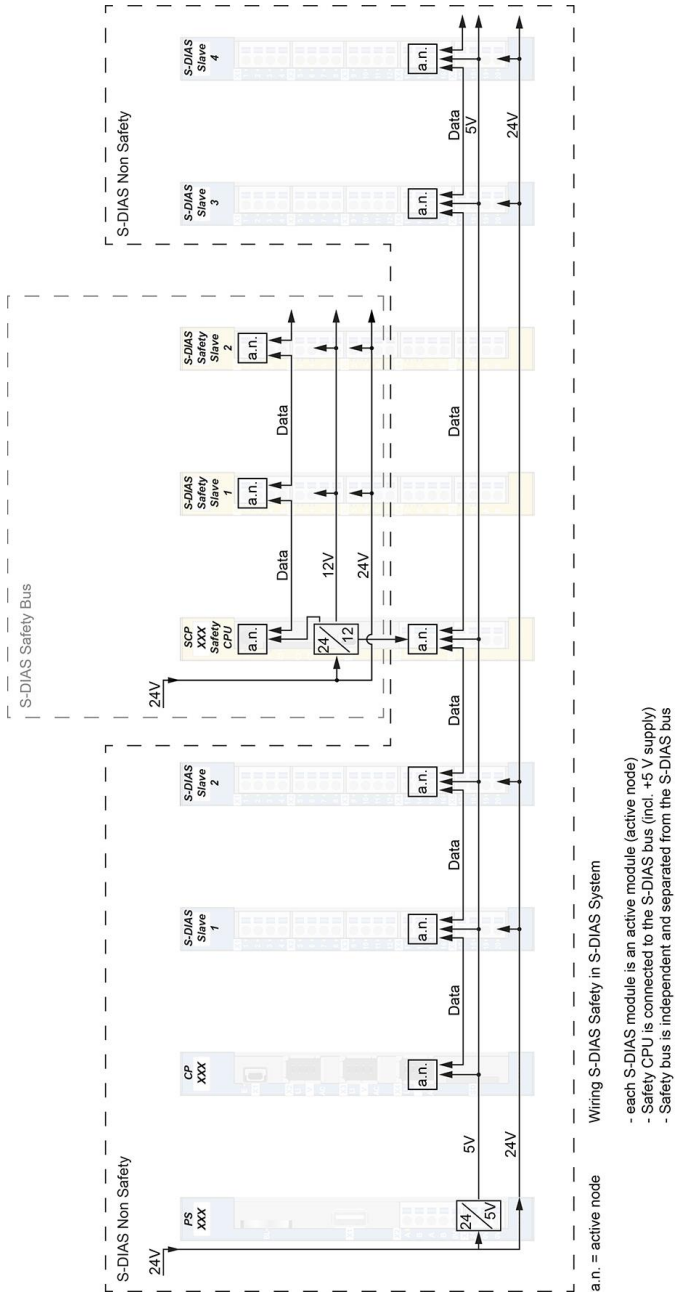
5.1 Performance Data

Real-time clock	yes (battery buffered)
Precision[1]	-50 ppm to +25 ppm (typ. -5 ppm) @ 0 °C ambient temperature -50 ppm to +25 ppm (typ. -20 ppm) @ 25 °C ambient temperature -95 ppm to +15 ppm (typ. -70 ppm) @ 45 °C ambient temperature -150 ppm to -20 ppm (typ. -120 ppm) @ 60 °C ambient temperature

(1) The RTC is subject to a component and temperature-dependent deviation. The deviation in seconds during a certain time frame can be calculated with the formula $t_{DEVIATION}$ in seconds = Precision in ppm / 10^6 * time frame in seconds. For applications that require high time accuracy, occasional time synchronization (e.g. via NTP to Internet time servers) may be required.

5.2 Electrical Requirements

Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	typically 40 mA	maximum 50 mA


S-DIAS Non Safety
S-DIAS Safety Bus
S-DIAS Non Safety
24V
PS XXX
CP XXX
S-DIAS Slave 1
S-DIAS Slave 2
SCP XXX Safety CPU
S-DIAS Safety Slave 1
S-DIAS Safety Slave 2
S-DIAS Slave 3
S-DIAS Slave 4
a.n.
Data
5V
12V
24V
24/5V
24/12
a.n. = active node
Wiring S-DIAS Safety in S-DIAS System
- each S-DIAS module is an active module (active node)
- Safety CPU is connected to the S-DIAS bus (incl. +5 V supply)
- Safety bus is independent and separated from the S-DIAS bus

5.3 Miscellaneous

Article number	20-012-001
Standard	UL 508 (in preparation)

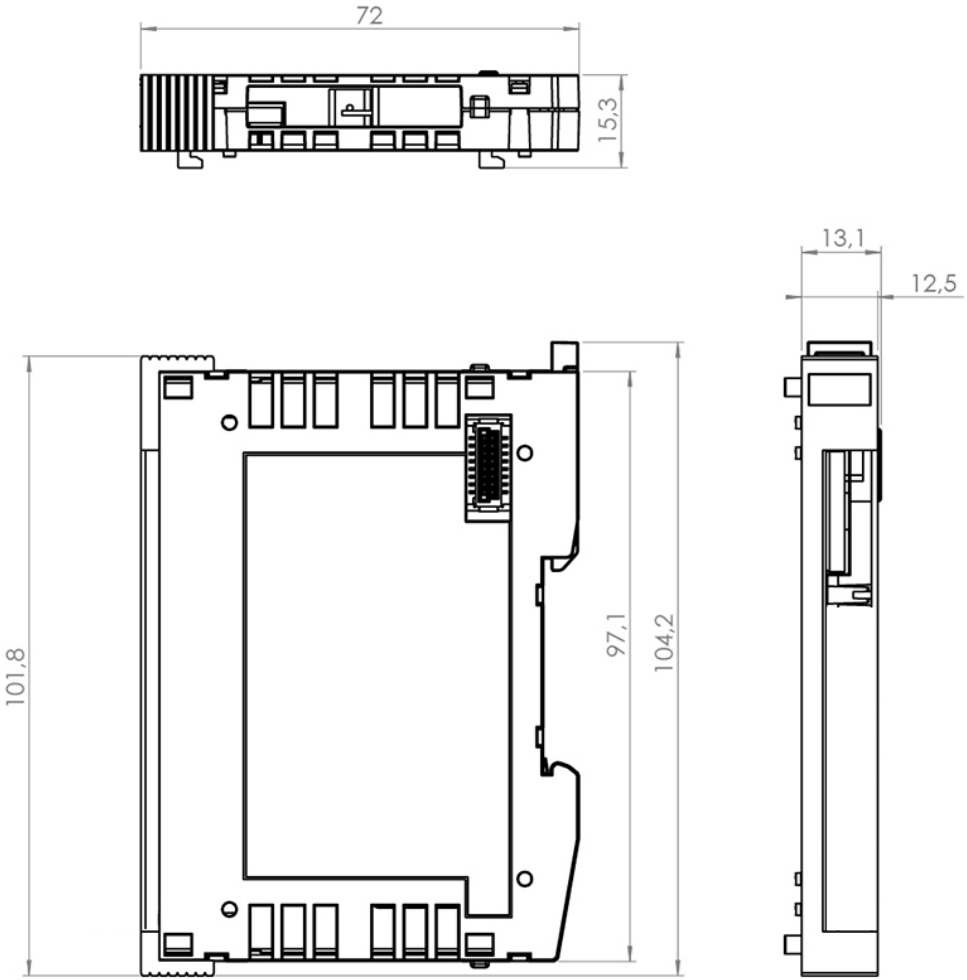
INFORMATION

The RC 001 module should only be used with processor modules without real-time clock, otherwise the clock time of the CPU is overwritten by the module.

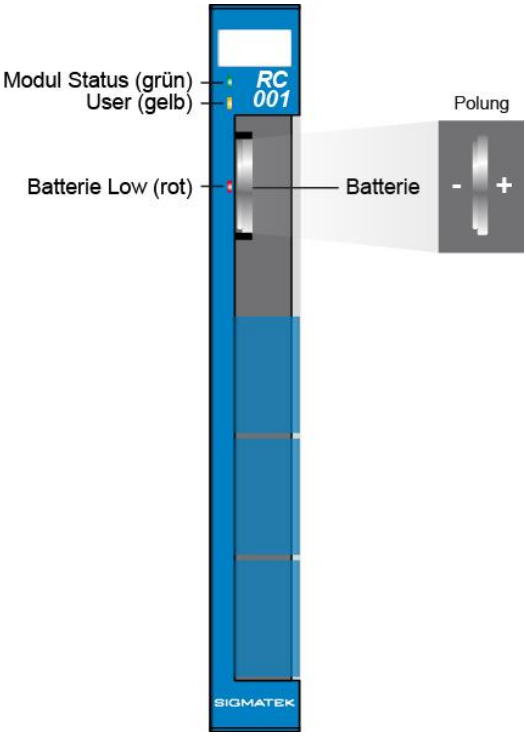
5.4 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +60 °C	
Humidity	0-95 %, non-condensing	
Installation altitude above sea level	0-2000 m without derating > 2000 m up to a maximum of 5000 m with derating of the maximum environmental temperature by 0.5 °C per 100 m	
Operating conditions	pollution degree 2	
EMC resistance	in accordance with EN 61000-6-2 (industrial area)	
EMC noise generation	In accordance with EN 61000-6-4 (industrial area)	
Vibration resistance	EN 60068-2-6	3.5 mm from 5-8.4 Hz 1 g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	15 g
Protection type	EN 60529	IP20

6 Mechanical Dimensions



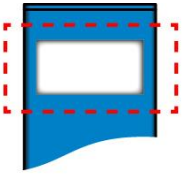
7 Connector Layout



7.1 Status LEDs

Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Battery Low	red	ON	battery voltage too low (battery empty)
		OFF	battery voltage OK

7.2 Label Field



Manufacturer	Weidmüller
Type	MF 10/5 CABUR MC NE WS
Weidmüller article number	1854510000
Compatible printer	Weidmüller
Type	Printjet Advanced 230V
Weidmüller article number	1324380000

8 Buffer Battery

The exchangeable buffer battery ensures that the clock time (RTC) of the module is preserved in the absence of a supply voltage. A lithium battery is installed at the manufacturer.

The battery has enough capacity to preserve data in the absence of a supply voltage for up to 3 years.

We recommend however, that the battery be replaced **annually** to ensure optimal performance.

INFORMATION

If the module is not powered for a period of 2 years, the battery is empty.

Battery order number: 01-690-028

The battery can only be exchanged when power is supplied **to the module; otherwise data loss will occur!**

	COMPANY	DATA
Lithium battery	RENATA	3,0 V/200 mAh

WARNING

Fire and explosion hazard!

Minor to severe injuries may occur due to incorrect use of the battery.

Do not recharge, disassemble or dispose of battery in fire!

When the battery voltage is in between the supervisor circuit thresholds, it may happen that the battery is detected "good" during operation, but "low" after a power cycle. If this happens, it is recommended to replace the battery.

9 Assembly/Installation

9.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter 1.3 Contents of Delivery.

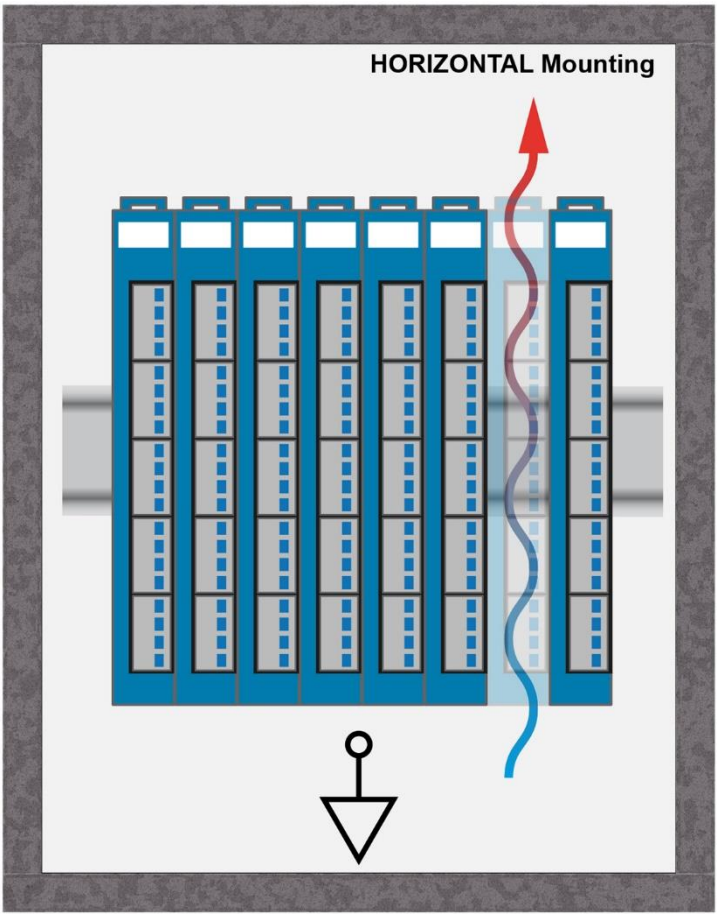
INFORMATION

On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

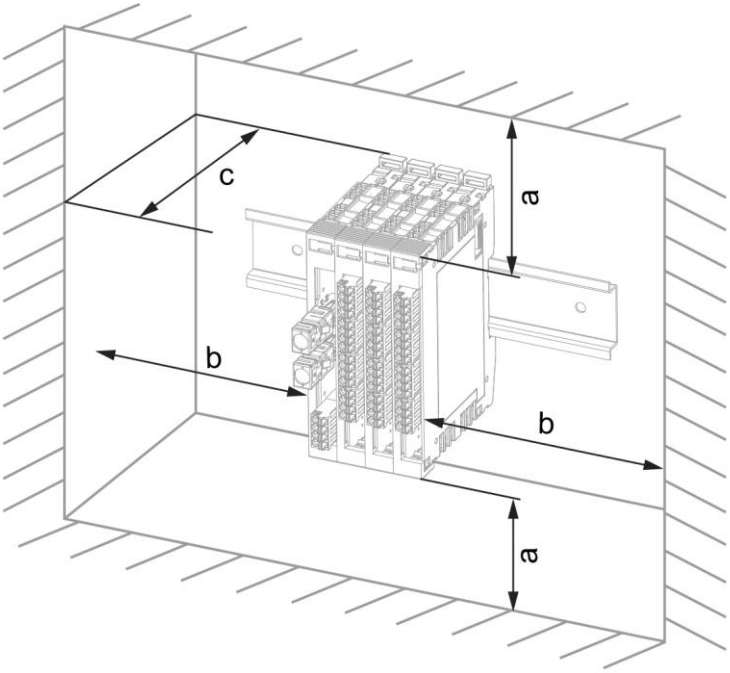
Damaged components can disrupt or damage the system.

9.2 Mounting

The S-DIAS modules are designed for installation into the control cabinet. To mount the modules a DIN-rail is required. The DIN rail must establish a conductive connection with the back wall of the control cabinet. The individual S-DIAS modules are mounted on the DIN rail as a block and secured with latches. The functional ground connection from the module to the DIN rail is made via the grounding clamp on the back of the S-DIAS modules. The modules must be mounted vertically with sufficient clearance between the ventilation slots of the S-DIAS module blocks and nearby components and/or the control cabinet wall. This is necessary for optimal cooling and air circulation, so that proper function up to the maximum operating temperature is ensured.



Recommended minimum distances of the S-DIAS modules to the surrounding components or control cabinet wall:



a	b	c
30 mm (1.18″)	**30 mm** (1.18″)	**100 mm** (3.94″)

a, b, c … distances in mm (inches)

10 Addressing

10.1 Address Mapping Overview

Address (hex)	Size (bytes)	Access Type	Description	Reset value
0000	2		reserved	0..0
0002	1	r/w	I^2C slave address offset Configurable from which address to write/read	00
0004	2	r16	I^2C slave byte number with control/status bit Bit 0-3 Number of bytes written/read Bit 4-5 Reserve Bit 6 Bus communication active (busy) Bit 7 Read/write (‚0' = read, ‚1' = write [1])	00
0006	2	r16	Data read from the I^2C slave	0..0
0008	2	r16	Data to write to the I^2C slave Start trigger for writing access: 0x0002 + „I^2C slave byte number with control/status bit" Bit 3..0 -1	0..0

[1] On writing this register the I^2C writing access is started (if Bit 7 = ‚0'). On I^2C writing access, it is started after writing the data (see address 0x0004) „Data to write to the I^2C slave").

11 Supported Cycle Times

11.1 Cycle Times below 1 ms (in µs)

50	100	125	200	250	500
x	x	x	x	x	x

x= supported

11.2 Cycle Times equal to or higher than 1 ms (in ms)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

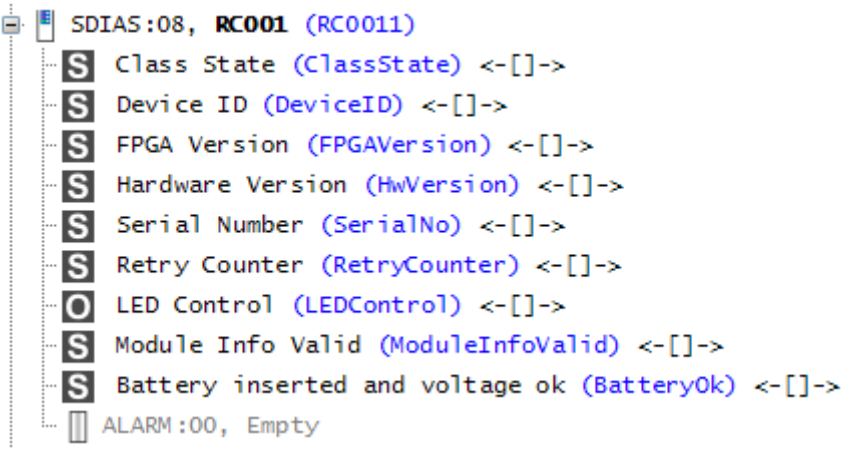
x= supported

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x= supported

12 Hardware Class RC001

Hardware Class RC 001 for the S-DIAS RealtimeClock Module RC 001



This hardware class is used to control the RC 001 hardware module. The S-DIAS RealTimeClock module provides battery buffered date and time information for processor modules on the bus, which have no integrated real-time clock. More information on the hardware can be found in the module documentation.

12.1 Usage

On delivery the module has date and time in Central European Time. If the module and the according hardware class are used, it is checked on starting the application if the module has valid date and time values. If this is the case, date and time of the module are taken in the system. If the information is invalid but the system has a valid time resp. date information, the information of the system is written to the module. During runtime the system time is overwritten with the time in the module every 10 seconds (if this time is valid) to have no noticeable jumps when aligning the two times. If the system time is changed by the user, the hardware class writes the changed system time to the module.

12.2 Interfaces

12.2.1 Clients

SdiasIn	The client must be connected to an S-DIAS port, an "SdiasOut"_[x]" server.
Place	The physical location of the hardware module is entered in this client. Up to 64 modules, 0 to 63, can be assigned.
Required	This client is active by default, which means that the S-DIAS hardware module at this position is mandatory for the system and can under no circumstances be disconnected or return an error. Otherwise, the entire hardware deactivated. If the hardware module is missing or removed, an S-DIAS error is triggered. If his client is initialized with 0, the hardware module located in this position is not mandatory. This means that it can be inserted or removed at any time. However, which components identified as "not required" should be selected with regard to the safety of the system.

12.2.2 Server

ClassState	This server shows the actual status of the hardware class.
DeviceID	The device ID of the hardware module is shown in this server.
FPGAVersion	FPGA version of the module in 16#XY (e.g. 16#10 = version 1.0).
SerialNo	The serial number of the hardware module is shown in this server.
RetryCounter	This server increments when a transfer fails.
LEDControl	With this server, the application LED of the S-DIAS module can be activated to find the module in the network more quickly. The following statuses are possible: 0 LED off 1 LED on 2 blinks slowly 3 blinks rapidly
ModuleInfoValid	This server shows, whether the date and time information stored in the module is valid. 0 time or date invalid 1 time or date valid This information can be invalid, if the RTC chip in the module was not supplied for a longer time. In order to save valid date and time information to the module, the system time has to be set to a valid value once.
BatteryOk	This server shows the battery status of the module. 0 low battery voltage or no battery available 1 battery available and battery voltage OK

12.2.3 Communication Interfaces

ALARM	Downlink	With this downlink the corresponding alarm class can be placed via the hardware editor.

13 Transport/Storage

INFORMATION

This device contains sensitive electronics. During transport and storage, high mechanical stress must therefore be avoided.

For storage and transport, the same values for humidity and vibration as for operation must be maintained!

Temperature and humidity fluctuations may occur during transport. Ensure that no moisture condenses in or on the device, by allowing the device to acclimate to the room temperature while turned off.

When sent, the device should be transported in the original packaging if possible. Otherwise, packaging should be selected that sufficiently protects the product from external mechanical influences. Such as cardboard filled with air cushioning.

14 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 13.

During storage, ensure that all protective covers (if available) are placed correctly, so that no contamination, foreign bodies or fluids enter the device.

15 Maintenance

INFORMATION

During maintenance as well as servicing, observe the safety instructions from chapter 2 Basic Safety Directives.

15.1 Service

This product was constructed for low-maintenance operation.

15.2 Repair

INFORMATION

In the event of a defect/repair, send the device with a detailed error description to the address listed at the beginning of this document.

For transport conditions, see chapter 13 Transport/Storage.

16 Disposal

INFORMATION

Should you need to dispose of the device, the national regulations for disposal must be followed.

The device appliance must not be disposed of as household waste.

Documentation Changes

Change date	Affected page(s)	Chapter	Note
28.04.2016	10	5 Mounting	Graphics distances
30.11.2016	8	4 Buffer Battery	Battery monitoring added
17.08.2017	5	1.4 Environmental Conditions	Pollution Degree added
18.10.2017	8 11	3.2 Label Field 5 Mounting	Added chapter Graphic replaced
25.05.2018	3	1.1 Performance Data	Precision added
14.11.2019	13	7 Supported Cycle Times	Chapter added
28.02.2020	13	7 Supported Cycle Times	Text adapted
08.09.2020	15	8 Hardware Class RC001	Chapter added
04.11.2020	11	5 Mounting	Expansion functional ground connection
26.07.2023		Document	General chapters added, design