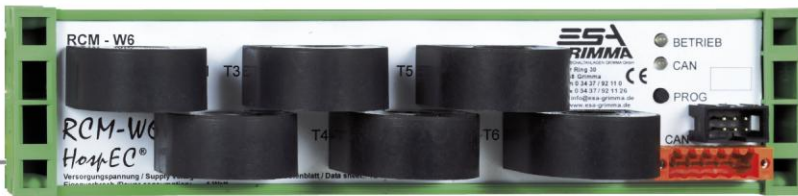


RCM-W6

Residual Current Monitoring Device



Product Information



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1 Application

The residual current monitoring device RCM-W6 with integrated current transformers is used for the monitoring of residual currents in TN and TT systems (earthed AC systems). In combination with other devices of the RCM series, display devices or devices for data coupling to third-party systems, it forms a complete residual and operating monitoring system. This monitoring system increases the safety and reliability of a system, e.g. through early detection of faults or of (usually gradual) increases residual currents. This supports preventative maintenance.

The main features of the RCM-W6 are as follows:

- Six integrated current transformers for residual current measurement
- True RMS measurement (RMS = root mean square)
- Parallel measurement and data processing (no multiplexing)
- Configurable triggering thresholds for trigger messages, channel-specific
- Configurable warning thresholds (e.g. preliminary warnings) for warning messages, channel-specific
- Configurable delay times for warning and trigger messages
- Configurable reset delay time for trigger and warning messages
- Communication via CAN bus (CAN = Controller Area Network)
- Use of up to 16 devices, such as RCM-W6 (96 channels) per bus segment
- Evaluation possible using a web browser (e.g. via the web interface MPG-ETH-3) or a display and configuration device (e.g. ANZ 05)

2 Functions

2.1 Warning and triggering thresholds

Warning and triggering thresholds are configurable limit values that can be adjusted according to the currents to be measured.

If any of these thresholds is reached, the RCM-W6 sends a message via the CAN bus. Warning and triggering thresholds can be set separately for each channel.

Delay times for warning and trigger messages can be set to prevent a message from being displayed if the value exceeds or falls below the threshold for a short time only (see chapter 2.3 on page 7).

For residual current monitoring, only the upper warning and triggering thresholds need to be evaluated for each channel. The lower thresholds should be set to 0 mA.

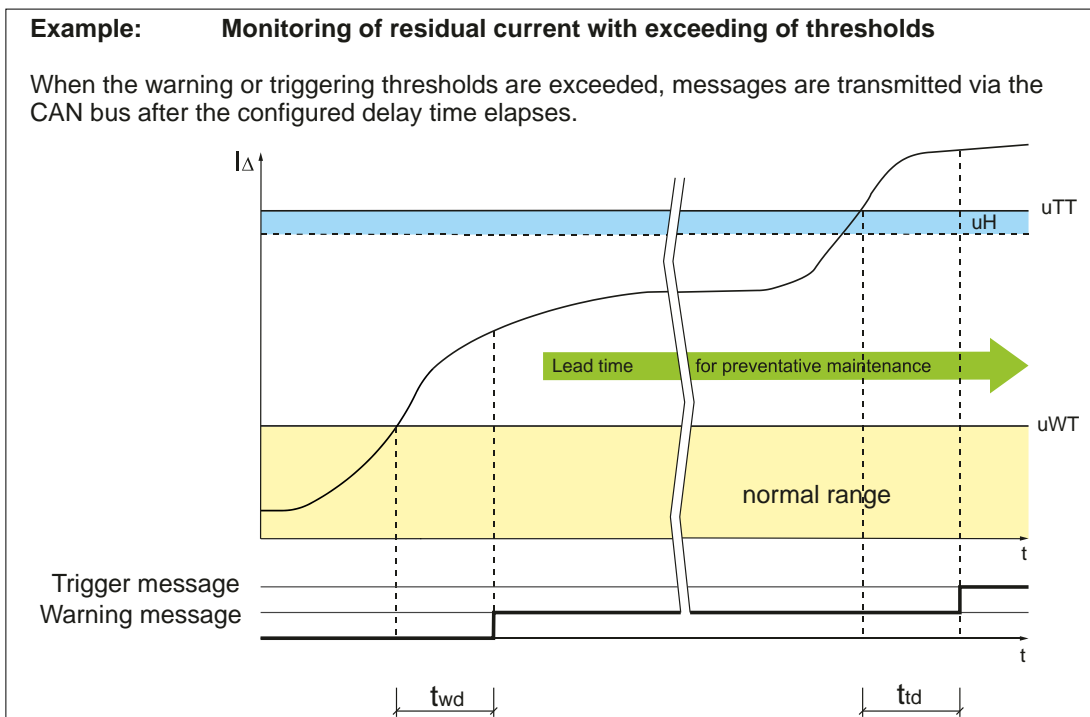


Figure 1: Example residual current curve

I_{Δ}	Residual current
t	Time
t_{wd}	Delay time for warning messages (configurable)
t_{td}	Delay time for trigger messages (configurable)
u_{TT}	Upper triggering threshold (configurable)
u_H	Upper hysteresis range (configurable, see chapter 2.2 on page 5)
u_{WT}	Upper warning threshold (configurable)

2.2 Hysteresis range

The upper triggering thresholds have a configurable hysteresis range. The hysteresis ranges can be defined individually for each channel.

For example, if the measured residual current exceeds the upper triggering threshold and then falls below again, the trigger message will be reset only after the residual current falls below the hysteresis range and the configured reset delay time elapses.

The following figure shows an example of the current curve with the corresponding warning and trigger messages.

The configuration in the example (Figure 2) is as follows:

- Delay time for trigger messages $t_{td} = 0$ s
- Delay time for warning messages $t_{wd} = 0$ s
- Reset delay time for trigger and warning messages $t_{rd} = 0$ s

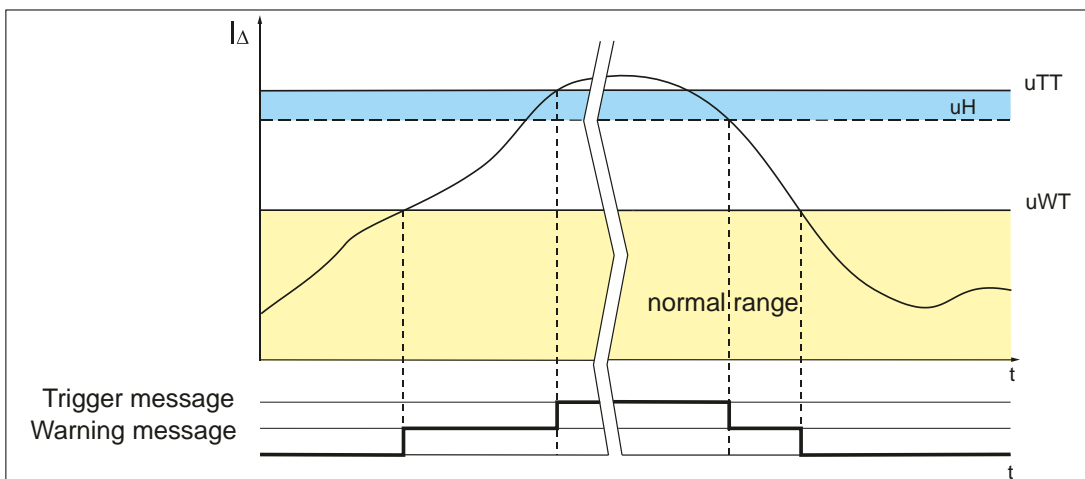


Figure 2: Example current curve

2.3 Delay times

The following delay times can be set for residual current monitoring:

- Delay time for trigger messages (t_{td})
- Delay time for warning messages (t_{wd})
- Reset delay time for trigger and warning messages (t_{rd}).

Delay times for warning and trigger messages

By entering a delay time, messages triggered by short-term current fluctuations can be prevented from being displayed (see Figure 3).

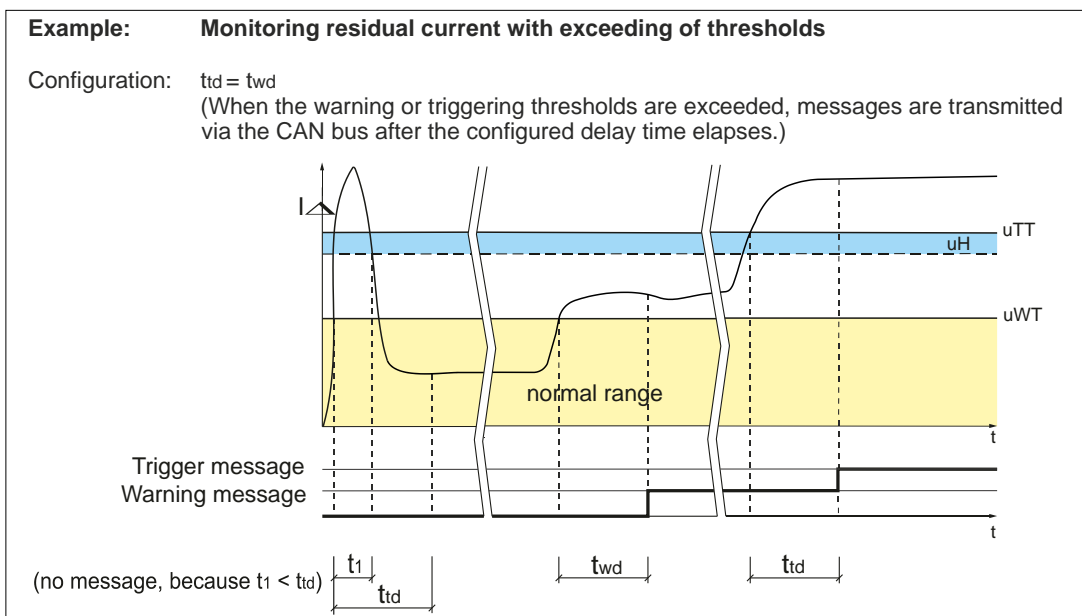


Figure 3: Delay times for warning and trigger messages

Reset delay for trigger and warning messages

Warning and trigger messages are reset when no more messages are pending. The reset delay time (t_{rd}) of the trigger and warning messages can be configured. It is used to ignore short-term fluctuations of a value that already has exceeded or falls below a warning and triggering threshold. The reset delay time is applied equally to the warning and trigger messages of all channels of a RCM-W6.

The figure (Figure 4) shows an example residual current curve with the corresponding signal curve. The trigger message is displayed after the delay time for the trigger message (t_{td}) has expired. It is sent to the CAN bus only if the current is still above the upper triggering threshold after the delay time has expired. When the current falls below the hysteresis range or exceeds the upper warning threshold, the reset delay time (t_{rd}) is activated. During the reset delay time, the trigger message remains active. The trigger message is only reset if the current is still below the hysteresis range after the reset delay time has expired. The warning message is reset after the current falls below the upper warning threshold and the reset delay time has expired.

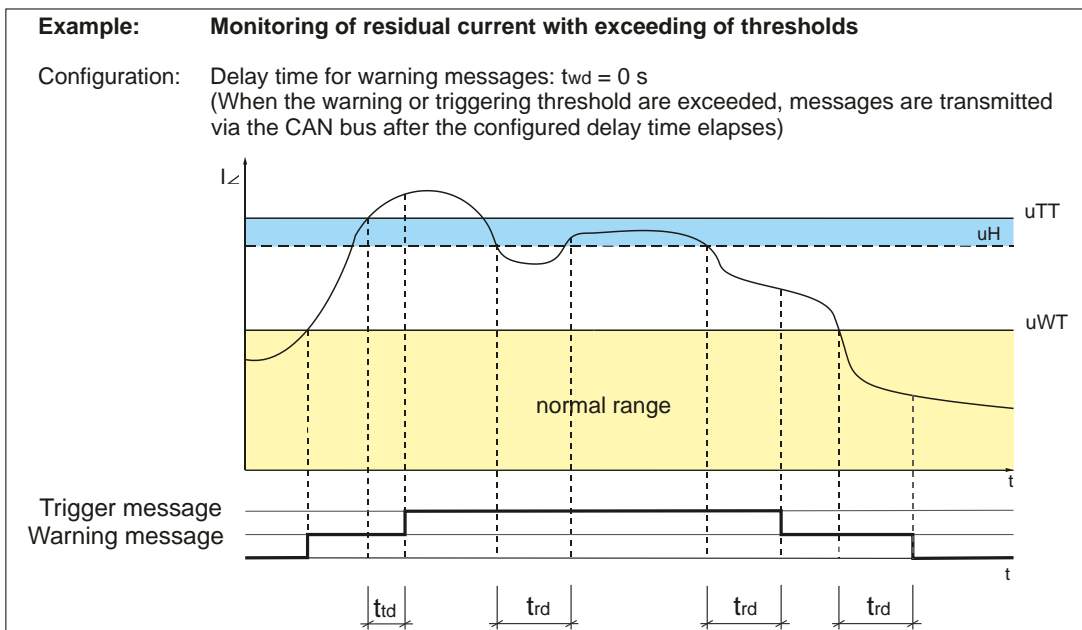


Figure 4: Example current curve illustrating the functional principle of the reset delay time

2.4 Residual current monitoring

Integrated current transformers measure the residual currents for each channel of the RCM-W6. Fault currents flowing to earth or other paths are detected with the current transformers according to IEC 60755, type A, e.g.:

- In the incoming feeders
- In the outgoing feeders (consumers and systems)
- Stray currents in TN-S systems (PEN and N lines)
- At central earthing points

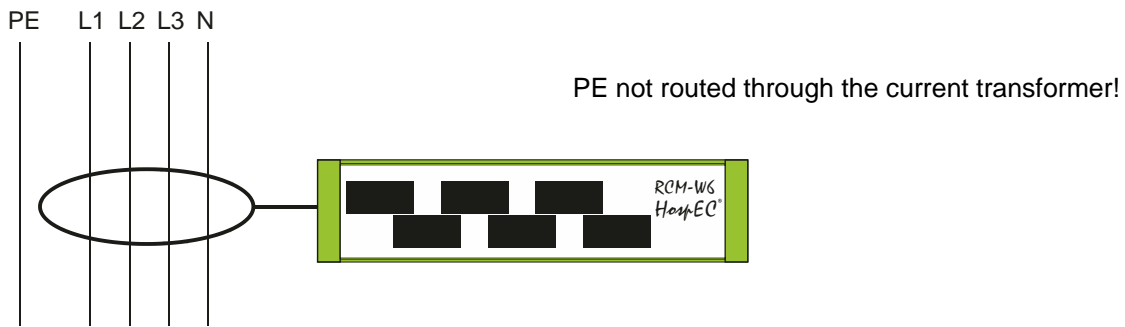


Figure 5: Simplified illustration of residual current measurement

The display and configuration device ANZ 05 shows all current warning messages and residual currents. Via the web interface of the MPG-ETH-3 (system gateway as a web server), the channel-specific readings for each field device and the configured warning and triggering thresholds are displayed on a PC / laptop with a web browser.

3 Connections

3.1 Connections of a RCM-W6

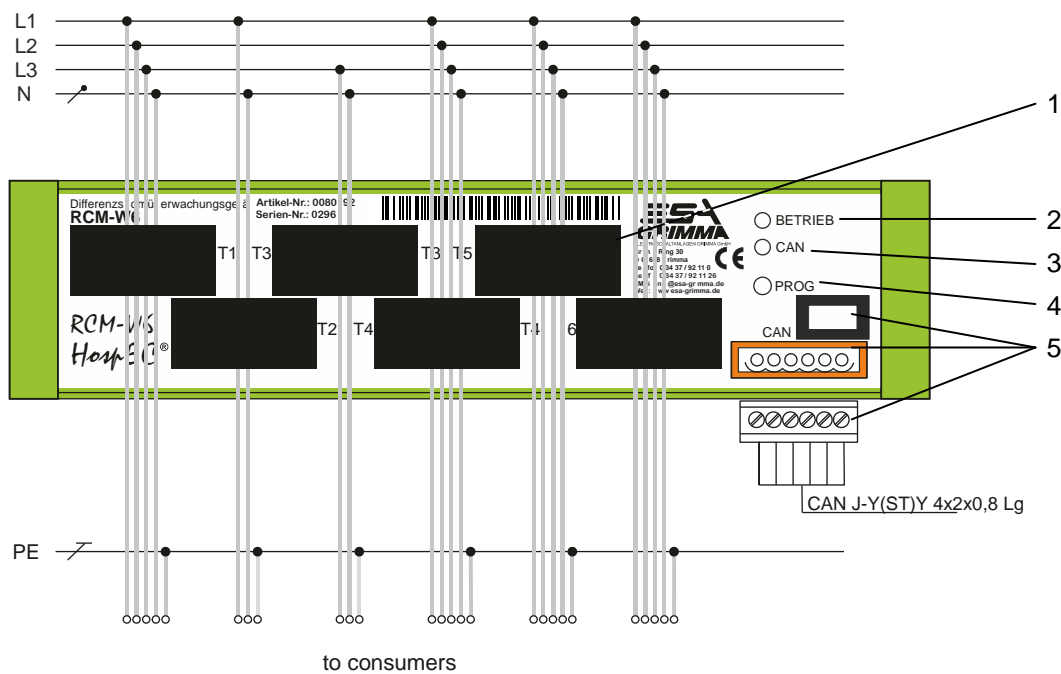


Figure 6: Connection diagram

- | | | | |
|---|--|---|---------------------------------|
| 1 | Current transformer (altogether six (6)) | 4 | Button "PROG" |
| 2 | Status LED "BETRIEB" (Ready) | 5 | Port / contact plug for CAN bus |
| 3 | Status LED "CAN" | | |

3.2 Application examples

Figure 7 shows a simplified representation of a residual current measurement using several RCM-W6 devices.

The display and configuration device ANZ 05 shows the measured values, messages and device faults for all RCM-W6 devices initialised on the CAN bus.

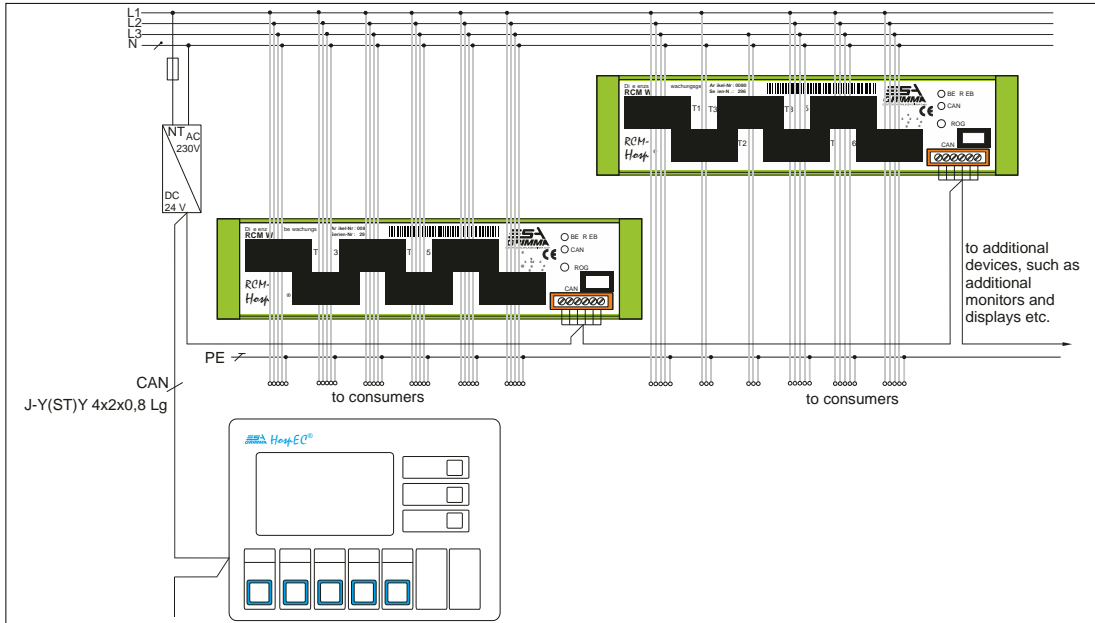


Figure 7: Overview of residual current measurement using multiple RCM-W6 devices

Figure 8 shows a simplified representation of a measurement channel-specific evaluation using digital input/output devices of the MPM series. The digital I/O-devices of the MPM series can be used to provide a CAN bus system with binary signals specific to any monitoring channel, e.g. to indicate threshold exceeding. These signals can be used for further controlling purposes.

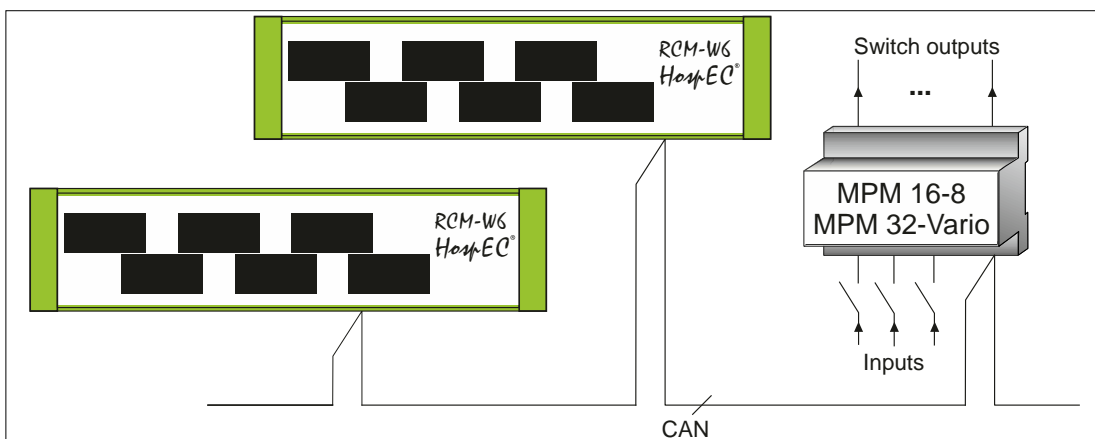


Figure 8: Simplified representation of a measurement channel-specific evaluation using digital I/O-devices of the MPM series

4 Assembly, connection, start-up, maintenance and testing



Assembly, connection and start-up of the RCM-W6 may only be carried out by qualified electricians. All relevant safety regulations and standards have to be observed.

The RCM-W6 is installed in distribution boards (DIN 43871) on top-hat rails (DIN EN 60715).

The device automatically monitors all internal functions and the state of the communication interface. Regular maintenance is therefore not required.

5 Buttons and display

5.1 Indication of the operation and communication status of the RCM-W6

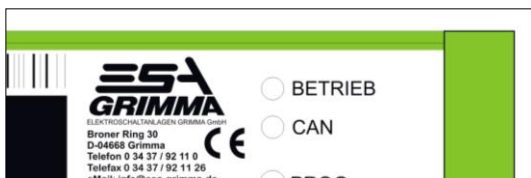


Figure 9: Status LED indicators

Status LED “BETRIEB” (Ready)

Off	No power supply
Green	Normal operation
Yellow	Configuration in progress
Red	Device fault

Status LED “CAN”

Off	No power supply
Flashes green	CAN bus is all right (communication is all right).
Green	Configuration in progress
Red	CAN bus fault (communication fault)

5.2 Button “PROG”



Figure 10: Button “PROG”

NOTE: Only authorised service technicians from ESA Elektroschaltanlagen Grimma GmbH are permitted to use this button for any other purposes.

6 Messages / communication interface

Messages are given by the two LED indicators on the RCM-W6.

The CAN interface can be used to transmit measured values as well as the current operational and fault status to external peripheral equipment and to connect the device to the building services control system. For example, messages such as device fault or triggering threshold exceeding can be indicated visually or acoustically using the display and configuration device ANZ 05.

7 Configuration of the RCM-W6

7.1 Configurable values

NOTE: When the warning or triggering threshold are exceeded, messages are transmitted via the CAN bus after the configured delay time elapses.

The following settings on the RCM-W6 can be configured:

- Address on the CAN bus
- Activation of the corresponding channels
- Lower and upper triggering threshold for each channel (lower triggering threshold = 0 mA)
- Lower and upper warning threshold for each channel (lower warning threshold = 0 mA)
- Lower and upper hysteresis range for each channel (lower hysteresis range = 0 mA)
- Reset delay time (t_{rd}) for trigger and warning messages
- Delay time for trigger messages (t_{td})
- Delay time for warning messages (t_{wd})

7.2 Configuration using the software HospEC® Configurator

The software “HospEC® Configurator” can be used to configure the RCM-W6 and other devices in the system HospEC®. The final configuration is transmitted to the devices (CAN devices) from a PC / laptop connected to the CAN bus. The PC is connected to the CAN bus via an USB-CAN adapter. The previously stored data from the field devices can be read out and displayed with the HospEC® Configurator.

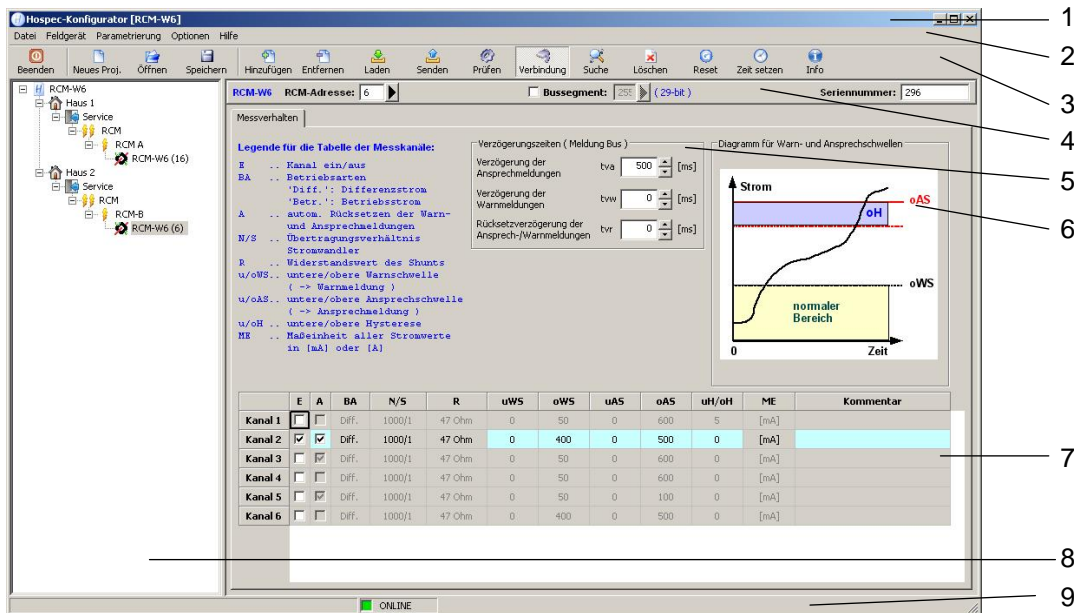


Figure 11: Configuration of the RCM-W6 measurement channels

- | | |
|---|---|
| 1 Title bar | 6 Warning and triggering threshold diagram |
| 2 Menu bar | 7 Configuration table for the six channels (current transformers) of the RCM-W6 |
| 3 Tool bar | 8 Project tree with connected field devices |
| 4 Display of the RCM address on the CAN bus and the serial number of the RCM-W6 | 9 CAN status bar |
| 5 Delay time settings | |

The following settings can be made:

- Lower and upper hysteresis range for each channel
- Lower and upper triggering threshold for each channel
- Lower and upper warning threshold for each channel
- Activation of the corresponding channels
- Delay time for trigger messages
- Delay time for warning messages
- Reset delay time for trigger or warning messages
- Changing the CAN address

7.3 Configuration using the display and configuration device ANZ 05

The measured values of each channel of a RCM-W6 connected via CAN bus can be shown on the display and configuration device ANZ 05. The ANZ 05 can also display incoming status messages from connected devices using freely configurable messages.

When warning or fault messages occur, the ANZ 05 automatically hides the measured values and displays the relevant messages. The ANZ 05 is also equipped with an acoustic alarm.

The ANZ 05 can be used to configure residual and operating current monitoring devices of the series RCM-Wx. In this case the devices have to be connected to the CAN bus and ready to operate.

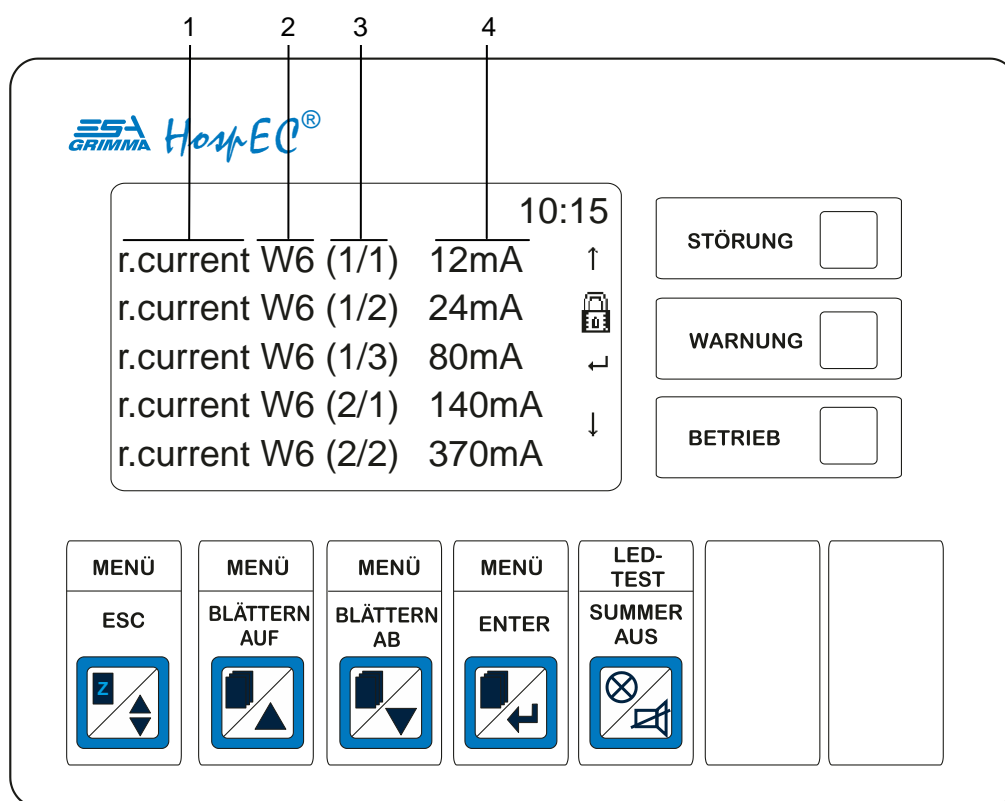


Figure 12: Example: Display of two RCM-W6 devices using the ANZ 05

- | | |
|------------------------|-------------------------------------|
| 1 Residual current | 3 CAN address / measurement channel |
| 2 Device type (RCM-W6) | 4 Current measured value |

The following settings can be made:

- Lower and upper hysteresis range for each channel
- Lower and upper warning threshold for each channel
- Lower and upper triggering threshold for each channel
- Activation of the corresponding channels
- Delay time for trigger messages
- Delay time for warning messages
- Reset delay time for trigger and warning messages
- Address on the CAN bus

7.4 Configuration using the MPG-ETH-3

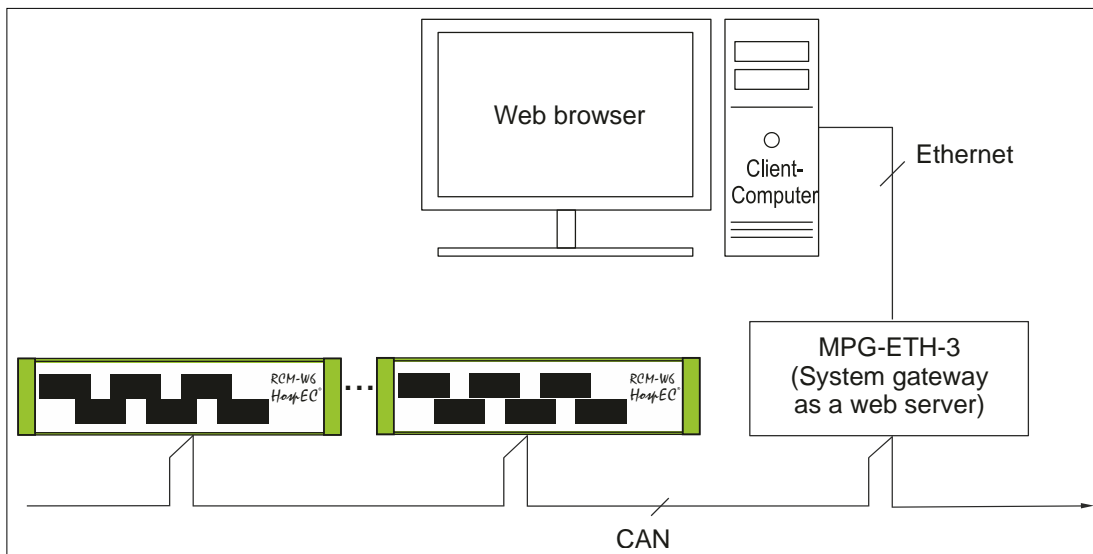


Figure 13: Schematic overview of an application using the MPG-ETH-3

The MPG-ETH-3 (system gateway as a web server) and its web interface can be used to configure the RCM-W6 and other devices. The configuration is done via web pages provided by the MPG-ETH-3 with the web interface. Stored field device data can be read out. Furthermore, the measured values of the respective channels of the connected RCM-W6 and the incoming fault, warning and trigger messages can be displayed.

The following settings can be made:

- Lower and upper hysteresis range for each channel
- Lower and upper triggering threshold for each channel (lower triggering threshold = 0 mA)
- Lower and upper warning threshold for each channel (lower warning threshold = 0 mA)
- Activation of the corresponding channels
- Delay time for trigger messages
- Delay time for warning messages
- Reset delay time for trigger and warning messages
- Changing the CAN address
- Notification via e-mail

8 Technical specifications

Operation	
Rated voltage (insulation coordination acc. to IEC 60664-1)	250 V AC
Rated impulse withstand voltage	4 kV
Pollution degree	3
Supply voltage	via CAN 24 V DC (PELV)
Internal consumption	approx. 2.5 W
Monitored system	
Transformer types / transformation ratio:	
Residual current transformer	1000/1
Current transformer rated voltage	20 ... 720 V AC
Current transformer rated frequency	50 ... 60 Hz
Current transformer rated current	50 A
Measuring channels	
Number of measuring channels	6
Number of measuring channels on the bus	max. 1536 (96 per bus segment)
Measurement value logging	parallel, true RMS (root mean square)
Evaluation	Residual currents (channels freely usable)
Residual current evaluation	IEC 60755, type A
Evaluation range of residual current	10 ... 1000 mA
Configuration	
Configurable values	
per channel	Warning and triggering thresholds / hysteresis range for triggering thresholds
Delay times	Delay times for warning and trigger messages t_{wd} , t_{td} (0 ... 10 s)
.....	Reset delay time for trigger and warning messages t_{rd} (0 ... 10 s)
Configuration	PC software "HospEC [®] Configurator" (via USB-CAN adapter),
.....	Display and configuration device ANZ 05 (via CAN field bus),
.....	MPG-ETH-3 (system gateway as a web server; via Ethernet and CAN field bus)
Display and messages	
Displays	LED
Messages	CAN-Bus
Inputs	
Interface	CAN
Communication interface / protocol	
Interface / protocol	CAN / CAN (2.0) acc. to ISO 11898
Electromagnetic compatibility (EMC)	
Acc. to DIN EN 62020:2005 (IEC 62020:2003-11)	
Emitted interference acc. to DIN EN 61543:2007-06 (IEC 61543:2005-11)	
Emissions acc. to EN 55014-1/CISPR14-1	

Environmental conditions

Ambient temperature (operation) acc. to EN 61557-8: 1997 -10 ... +55°C
 Ambient temperature (storage) acc. to EN 61557-8: 1997 -25 ... +70°C
 Climatic conditions acc. to IEC 721 3K5, no condensation or icing

Installation specifications

Installation position any
 Wire size / single-wire / fine-wire 0.2 ... 4 mm² / 0.2 ... 2.5 mm² (AWG 24-12)
 Protection class acc. to EN 60259 for installations / terminals IP30 / IP20
 Flammability class UL94V-0
 Weight approx. 313 g
 Device dimensions in mm (H x W x D) 46 x 190 x 60 (11 TE)
 Assembly Top-hat rail acc. to DIN EN 60715

Order information

RCM-W6 Item no.: 0080092

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RCM-W6
Residual current monitoring device
Product information (PI)

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