

### RCM Type B/B+ residual current monitor

These installation and operating instructions describe the installation and commissioning of the RCM Type B/B+ residual current monitor. The devices are intended for use by electrically skilled persons. Electrical laypersons must not install and connect devices of this type due to the considerable potential dangers. The instructions must be kept so that they can be referred to at a later stage.

#### Warning notes

1. Devices with visible damage must not be installed or used
2. Residual current monitors of this type are not suitable as additional protection through switch-off in combination with a circuit-breaker, for example, as per VDE 0100 Part 410 (residual current protection).
3. There is no difference between operation-related leakage currents and residual currents.

#### Intended use

The residual current monitors from the RCM Type B range as per IEC 62020 are used to detect and report residual currents in electrical installations, especially those in TN-S, TN-CS and TT networks.

These RCM devices are AC-DC sensitive and detect type B residual currents from DC to 100 kHz. They also meet the requirement for increased preventative fire safety in the detection of type B+ residual currents. The RCM features an analog 4-20mA output which represents the real-time True RMS (TRMS) value of the measured residual current for interfacing to e.g. a PLC or a universal measuring device.

According to VDE 0100 part 420, residual current monitors may be used in connection with a circuit-breaker for installation switch-off in order to prevent electrical fires caused by insulation faults, insofar as residual current circuit breakers cannot be used for technical reasons.

The RCMs Type B/B+ are designed for installation in power distributions in dry indoor conditions. The devices are mounted on stable surfaces or a mounting plate using the holes in the mounting foot or by fixing it to a rigid cable using cable strips in the mounting hooks around the aperture.

The following information must be observed to ensure correct operation.

#### Technical data

The residual current monitor requires a 24 V DC power supply. The active conductors to be monitored are fed closely coupled together through the inner aperture of the sensor. The protective conductor (PE) must not be passed through the aperture.

In addition to the 4-20 mA DC output, the device has a built-in relay which trips, like conventional RCDs, when the response threshold of between 50 and 100 % of the rated residual current has been reached. The relay contacts can switch external acoustic or optical warning devices. If the installation regulations allow, the relay output can also be connected to the switch-off of a circuit-breaker. The status of the relay output is indicated by the status LED. Relay and 4-20 mA interface can be used simultaneously or individually. The trigger threshold of the relay output or the scaling of the 4-20 mA interface can be selected using the various push-buttons on the housing surface in the operating terminal.

#### Auto setup

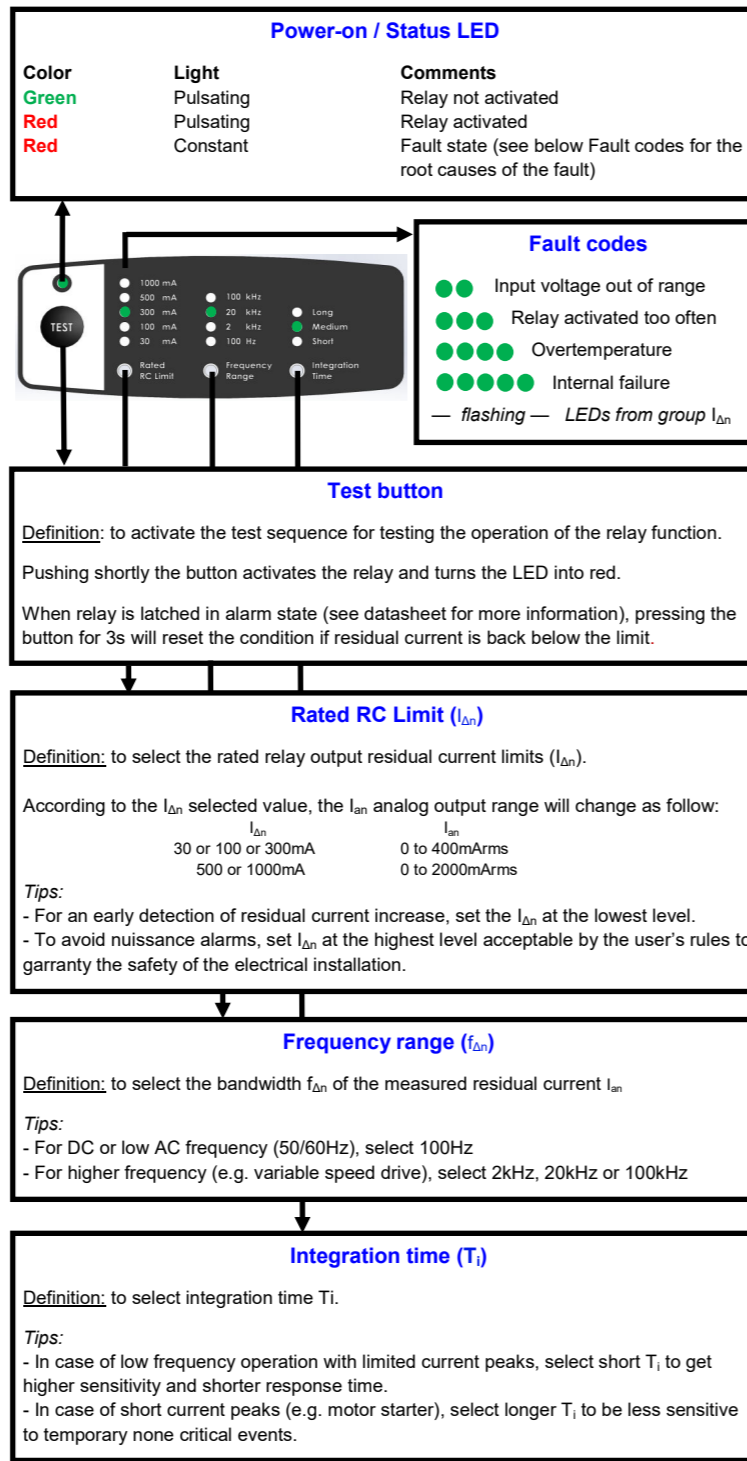
- Activate the auto setup by pressing "Rated RC limit" and "Integration time" buttons simultaneously for more than 3s
- RCM will perform sequence of measurements with different settings
- Proposed settings for "Rated RC limit", "Frequency range" and "Integration time" are marked with flashing LEDs
- Accept the proposed change of settings by pressing the "Test" button
- If the change is not accepted within 10s, the RCM will revert back to the old settings

#### Smart RCM (SRCM)

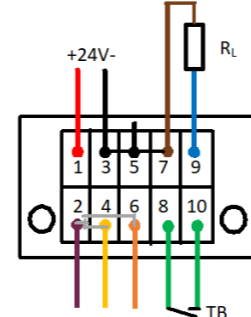
The Smart RCM (SRCM) introduces USB connectivity. Download the PC application software for residual current analysis from her:

[www.danisense.com/products/residual-current-monitoring](http://www.danisense.com/products/residual-current-monitoring)

For more information on the RCM products download the corresponding datasheets from the same web location.



#### Connector:



#### Pinout:

- 1: 24Vdc
- 2: Relay common
- 3: 0Vdc
- 4: Relay NC contact, alarm: closed
- 5: 0Vdc
- 6: Relay NO contact, alarm :open
- 7: 0Vdc
- 8: External Test button, contact 1
- 9: Analog 4-20mA output
- 10: External Test button, contact 2

#### Primary monitored circuit

Parameter	Symbol	Value
Rated voltage of monitored circuit	U <sub>n</sub>	690Vrms
Rated frequency of monitored circuit	f <sub>n</sub>	50Hz / 60Hz
Applicable operating frequency range of monitored circuit	f <sub>aop</sub>	0-400Hz
Rated primary current	I <sub>n</sub>	100A (I <sub>Δn</sub> =30mA) 300A (I <sub>Δn</sub> =100-1000mA)
Max. non-tripping overcurrent	I <sub>max</sub>	600A (I <sub>Δn</sub> =30mA) 1800A (I <sub>Δn</sub> =100-1000mA)
Thermal rated short-time (10ms) withstand	I <sub>Δth</sub>	200A
Thermal rated continuous withstand residual current	I <sub>Δcth</sub>	100A
Rated impulse residual current	I <sub>Δdyn</sub>	10kA
Rated insulation voltage	U <sub>i</sub>	700V
Impulse withstand voltage	U <sub>imp</sub>	8kV
Overvoltage category	OVC	IV
Pollution degree acc. EN/IEC 60664	PD	3

#### Residual current characteristics

Parameter	Symbol	Value
Rated relay output residual current at 50/60Hz – user selectable Rated RC limit	I <sub>Δn</sub>	30mA-100mA-300mA 500mA-1000mA
Residual current frequency range – user selectable	f <sub>Δn</sub>	DC-100Hz* DC-2kHz DC-20kHz DC-100kHz
Relay output residual operating current at 50/60Hz	I <sub>Δn</sub>	100% I <sub>Δn</sub> +0%-20%
Relay output residual non-operating current at 50/60Hz	I <sub>Δno</sub>	50% I <sub>Δn</sub> +20%-0%
Frequency dependence of residual operating current	I <sub>Δn, freq</sub>	150Hz: 2.4 · I <sub>Δn</sub> (or 2Arms max) 400Hz: 6 · I <sub>Δn</sub> (or 2Arms max) 1000Hz: 14 · I <sub>Δn</sub> (or 2Arms max)
Frequency dependence of residual non-operating current	I <sub>Δn, freq</sub>	150Hz: 0.5 · I <sub>Δn</sub> 400Hz: 0.5 · I <sub>Δn</sub> 1000Hz: 1 · I <sub>Δn</sub>
Rated analog output residual current (20mA)	I <sub>an</sub>	0.4Arms ±2% (I <sub>Δn</sub> =30-300mA) 2Arms ±2% (I <sub>Δn</sub> =0.5-1A)
Hysteresis on relay output (for non-latched operation)	I <sub>Δn, hyst</sub>	<30% I <sub>Δn</sub>
Integration time	T <sub>i</sub>	Short (100ms) Medium (400ms) Long (1000ms)

All values are True RMS (TRMS) values  
\* 100Hz frequency range makes RCM insensitive to higher frequencies and is not Type B compliant acc. to IEC 62020-1

#### Supply voltage

Parameter	Symbol	Value
Rated supply voltage*	U <sub>e</sub>	24Vdc +10%/-15%
Overvoltage category	OVC <sub>e</sub>	III
Rated impulse withstand voltage	U <sub>impe</sub>	1.5kV
Rated insulation voltage	U <sub>ie</sub>	30V
Internal consumption	P <sub>e</sub>	<4W

\* External adapter

#### Analog current interface 4-20mA

Parameter	Symbol	Value
Current output 0-0.4Arms / 0-2Arms	I <sub>out</sub>	4-20mAdc
Current output at 0% I <sub>Δn</sub>	0%	4-4.2mAdc
Current output at 0.4Arms / 2Arms	100%	19-21mAdc
Peak-to-Peak noise	pk-pk	≤0.25%
Resolution	Res <sub>out</sub>	0.01mA
Short-circuit current	I <sub>sc, out</sub>	<25mAdc, SC-proof
Maximum total load resistance / apparent	R <sub>t, max</sub>	≤ 900Ω
Typical load resistance	R <sub>typ</sub>	250Ω
Voltage at open terminals	U <sub>oc, out</sub>	24Vdc
Response time 1x I <sub>Δn</sub> , step response 10-90%	t <sub>10-90%</sub>	≤T <sub>i</sub>
Response time 1x I <sub>Δn</sub> , step response 0-50%	t <sub>0-50%</sub>	≤T <sub>i</sub> /2
Response time 5x I <sub>Δn</sub> , step response 10-90%	5x t <sub>10-90%</sub>	≤T <sub>i</sub> /30
Response time 5x I <sub>Δn</sub> , step response 0-50%	5x t <sub>0-50%</sub>	≤T <sub>i</sub> /50

#### Relay output

Parameter	Symbol	Value
Contact output		NO+NC
Rated voltage	U <sub>r</sub>	30Vac/dc
Rated current	I <sub>r</sub>	1Aac/dc
Maximum actuating time 1x I <sub>Δn</sub>	t <sub>r, 1x I<sub>Δn</sub></sub>	≤T <sub>i</sub> +1/(2·frc)*
Maximum actuating time 5x I <sub>Δn</sub>	t <sub>r, 5x I<sub>Δn</sub></sub>	≤T <sub>i</sub> /16+1/(2·frc)*
Response threshold I <sub>Δn</sub>		100% +0-20%
Latching function with Reset (int/ext)		Yes
Minimum non-actuating time	t <sub>nr, 1x I<sub>Δn</sub></sub>	≤T <sub>i</sub> /2
Switching operations		>20.000

\* f<sub>rc</sub> is the frequency of the dominant residual current component

#### External Test and Reset button

Parameter	Symbol	Value
Cable length for external Test & Reset key	L <sub>tk</sub>	≤10m
Short-circuit current	I <sub>sc, tk</sub>	<4mAdc, SC-proof
Voltage at open terminals	U <sub>oc, tk</sub>	24Vdc

#### Environmental and mechanical characteristics

Parameter	Unit	Min	Typ	Max	Comment
Operating temperature range	°C	-20		55	
Storage temperature range	°C	-40		85	
Relative humidity	%	20		80	Non-condensing
Mass	kg		0.9		
Connector	Phoenix Contact DFMC 1.5-3.5 2x5way PN: 1790519, or compatible				
Standards	EN / IEC 62020-1:2020				