

Residual Current Monitors

RCMP20-03 Series

Mode 2 Charging Stations



REACH



RCMP20HT-03



RCMP20HC4-03



RCMP20VT-03



RCMP20VC4-03

Description

The RCMP20-03 Series is an AC/DC sensitive residual current monitoring module that monitors ground fault currents, residual currents or leakage currents in single phase or multiple phase installations. The RCMP20-03 Series is suitable for integration into In-Cable Control and Protection Device, according to IEC 62752.

Fault Currents in AC and DC may occur in EV charging stations. Mode 2 chargers are devices connected to the electrical grid through an electric socket, which in many older installations may lack an RCD protection. It is required to install RCMP20-03 Series as an AC/DC fault sensor in Mode 2 devices to ensure suitable protection to the end user.

Mode 2

Portable in-cable control and protection device (IC-CPD) is used for Mode 2 electric vehicle charging. The RCMP20-03 Series simultaneously performs the functions of AC/DC residual current detection and opening the protected circuit when the residual current exceeds the specified value, according to IEC 62752.

The Mode 2 charging station standard (IEC 62752) requires both AC and DC fault current detection to guard against inadequate protection at the supply IC-ICP connection (i.e., Type A RCD).

Function

The RCMP20-03 Series is monitoring continuously AC and DC residual currents. When failure current exceeds the threshold values the device sends a tripping signal. The module, when coupled with an appropriate switching device, will meet the requirements of an IEC62752 IC-CPD.

Applications

- Ground fault detection
- Leakage current measurement in an IC-CPD in-cable (Mode 2)

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Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| Proprietary ASIC | Ensures supply chain continuity |
| High EMI resilience | Proven design prevents nuisance (false) circuit trip |
| Integrated PCB | Lessens components on reference board and reduce installation time, compact design and less complexity |
| Optional integrated load conductors | |
| Higher cross-sectional area of integrated conductors | Excellent thermal characteristics minimizes PCB temperature rise, allowing more compact design |
| Largest current transformer aperture in industry | Supports higher charging currents |
| Flexible design for OEM - Vertical or horizontal mount - Open or 2-4 integrated conductors | RCMP Series allows space optimization by adapting itself to the design |
| Wide variants range and customization options available for high volume customers | RCMP Series can be completely adapted to a specific design to fit in aperture, dimensions, weight and performance |
| Test Function | Self-diagnostic of any possible disfunction |

Certification & Compliance

| | |
|--------------|-----------|
| IEC | IEC 62752 |
| RoHS | Compliant |
| REACH | Compliant |

TECHNICAL DATA / SPECIFICATIONS

Electrical data

| PARAMETER | | SYMBOL | UNIT | MIN | TYPICAL | MAX |
|---|---|----------|----------------|------|---------|------|
| Supply Voltage | | U_s | VDC | 4.75 | 5 | 5.25 |
| Supply Current with no fault current (Note 1) | | I_s | mA | - | - | 2.5 |
| Supply current, peak >200mA DC fault current (Note 1) | | I_p | mA | - | - | 6 |
| Power Consumption | | - | - | - | 14 | 33 |
| Rated Load Current up to 3 Phase | RCM with Open Aperture (Note 2) | I_{L1} | A | - | - | 125 |
| | RCM with Integrated Conductors (Note 3) | I_{L2} | A | - | - | 40 |
| Rated residual operating current | | I_{RC} | mA DC mA AC | - | 6 22 | - |
| Frequency | | f | Hz | 50 | - | 60 |
| Effective DC Test current @5V | | I_T | mA DC | - | 7.8 | - |

Note 1: Fault Out not connected. External pull up current not included.

Note 2: Maximum rated load current is dependent on cable cross section - temperature of RCMP must not exceed 105 °C at rated load.

Note 3: Maximum rated load current is dependent on PCB mounting & layout – temperature of integrated conductors & RCMP must not exceed 105 °C.

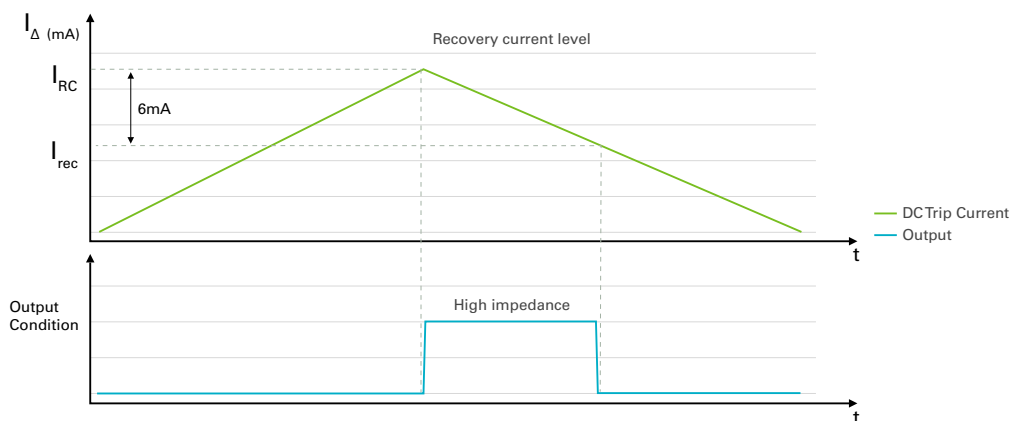
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RCMP20-03 Series

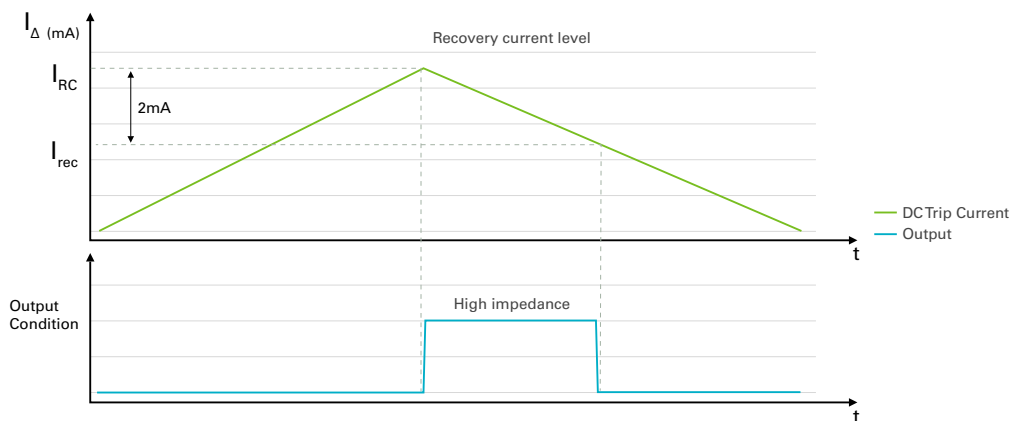
Response data

| PARAMETER | SYMBOL | UNIT | MIN | TYPICAL | MAX |
|---|---------------------|-------|------|---------|------|
| DC trip threshold | $I_{\Delta RC, DC}$ | mA DC | 3 | 4.5 | 6 |
| AC trip threshold, 50Hz & 60Hz | $I_{\Delta RC, AC}$ | mA AC | 15 | 22 | 30 |
| Scaling factor of the DC component | $S_{pwm-out}$ | %/mA | - | 6.66 | - |
| Recovery current level | I_{REC} | mA DC | 2 | - | - |
| Max. measuring range, peak | $I_{RC peak}$ | mA DC | - | - | 10 |
| Frequency range | f_{Δ} | Hz | 50Hz | - | 60Hz |
| Fault Out drain current | I_{FO} | mA | - | - | 150 |
| Fault Out pull up voltage | U_{FO} | V | - | - | 24 |
| Maximum supply voltage (without function) | $U_{s_{max}}$ | V | - | - | 8 |
| Vtest-in low Test-in input voltage, low level | $U_{test-in, low}$ | V | - | - | 0.2 |
| Vtest-in high Test-in input voltage, high level | $U_{test-in, high}$ | V | - | - | 4.75 |

AC 50/60Hz RECOVERY CURRENT LEVEL



DC RECOVERY CURRENT LEVEL



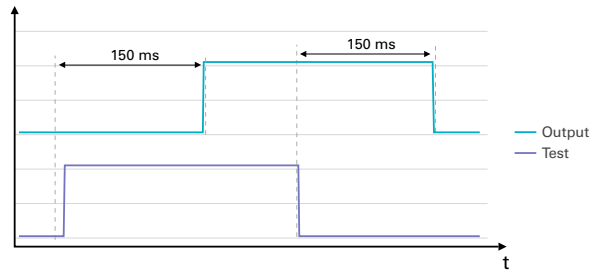
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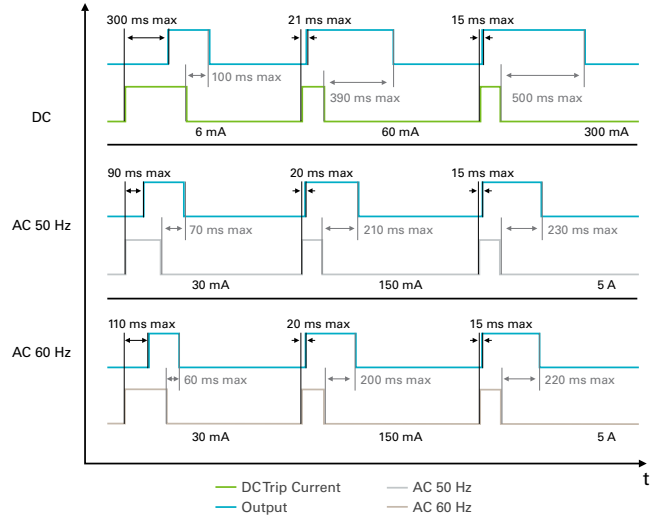
Response time

| | 6mA | 300mA | 30mA AC 50/60Hz | 150mA AC 50/60Hz | 5A AC 50/60Hz |
|---------------------------------------|-------|--------|--------------------|---------------------|------------------|
| Standard Values acc. To IEC62752:2016 | 10s | 0.04s | 0.3s | 0.04s | - |
| Typical values of sensor | 0.25s | 0.015s | 0.11/0.14s | 0.02/0.02 | 0.02/0.02 |

AC/DC TEST FUNCTION (MODE 2)



TRIP TIMES



General Data

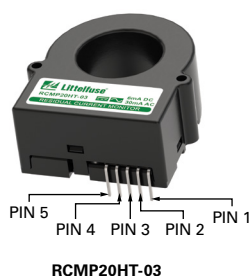
| PARAMETER | SYMBOL | UNIT | MIN | TYPICAL | MAX |
|------------------------------|--|------|-----|------------|------|
| Aperture | A | mm | - | - | 20 |
| Operating temperature | T_o | °C | -40 | - | 105 |
| Storage temperature | T_s | °C | -40 | - | 105 |
| Altitude | H | m | - | - | 2000 |
| Dielectric strength | Acc. IEC62752 Intended for use in EVSE up to CAT III | | | | |
| Overvoltage Category | Intended for use in EVSE up to CAT III | | | | |
| Impulse voltage | U_i | kV | - | - | 7.4 |
| AC Withstand Voltage at 50Hz | U_w | kV | - | 3.5kV@50Hz | - |

General Data (Continued)

| PARAMETER | DEVICE | SYMBOL | UNIT | TYPICAL |
|-----------|-----------|--------|------|---------|
| Mass | RCMP20HT | m | g | 28.2 |
| | RCMP20HC2 | m | g | 42.8 |
| | RCMP20HC3 | m | g | 47.5 |
| | RCMP20HC4 | m | g | 52.4 |
| | RCMP20VT | m | g | 29.7 |
| | RCMP20C2 | m | g | 48.5 |
| | RCMP20C3 | m | g | 58.5 |
| | RCMP20C4 | m | g | 68.5 |

Residual Current Monitors

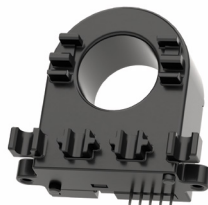
RCMP20-03 Series



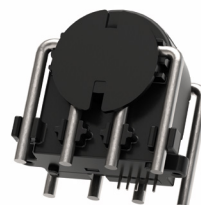
RCMP20HT-03



RCMP20HC4-03



RCMP20VT-03



RCMP20VC4-03

Pin Description

| PIN NO. | FUNCTION | DESCRIPTION |
|---------|----------------|---|
| PIN 1 | Trip Out | Open drain output. This pin should be connected to a suitable external pull-up resistor to the required signalling level, normally 5V, max 24V. |
| PIN 2 | Test Function | Test function is provided to verify the correct operation of the residual current sensing. This pin should be disconnected when the test function is not activated. To activate the test function 5V should be applied to this pin. Pin 1 will go HIGH if test is successful. The switch shown on wiring diagram is for illustrative purpose only. 5V can also be remotely applied to this pin through other means e.g., microcontroller. Current draw of the pin is 0.3mA. |
| PIN 3 | Supply Voltage | Positive supply voltage 5V±5% DC. Must be capable of supplying at least 10mA. |
| PIN 4 | 0 V/GND | Ground connection. |
| PIN 5 | PWM | Output of this pin is a PWM signal of f=13kHz and duty cycle proportional to the fault current flowing through RCM. V pulse on is 3.3V and 13% duty cycle with no fault present. Duty cycle increases proportional to the fault current present. This is for monitoring purposes only and is not a safety function! Positive supply voltage 5V±5% DC. Must be capable of supplying at least 10mA. Ground connection. Output of this pin is a PWM signal of f=13kHz and duty cycle proportional to the fault current flowing through RCM. |

Ordering Information

| SERIES | PCB MOUNTING | CONDUCTORS | PART NUMBER | ORDER CODE |
|-----------|--------------|---------------|--------------|------------|
| RCMP20-03 | Vertical | Open Aperture | RCMP20VT-03 | 90173 |
| | | 2 | RCMP20VC2-03 | 90174 |
| | | 3 | RCMP20VC3-03 | 90175 |
| | | 4 | RCMP20VC4-03 | 90176 |
| | Horizontal | Open Aperture | RCMP20HT-03 | 90181 |
| | | 2 | RCMP20HC2-03 | 90182 |
| | | 3 | RCMP20HC3-03 | 90183 |
| | | 4 | RCMP20HC4-03 | 90184 |

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