

Residual Current Monitors

RCMP20-03 Series

Mode 2 Charging Stations

IEC RoHS 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.

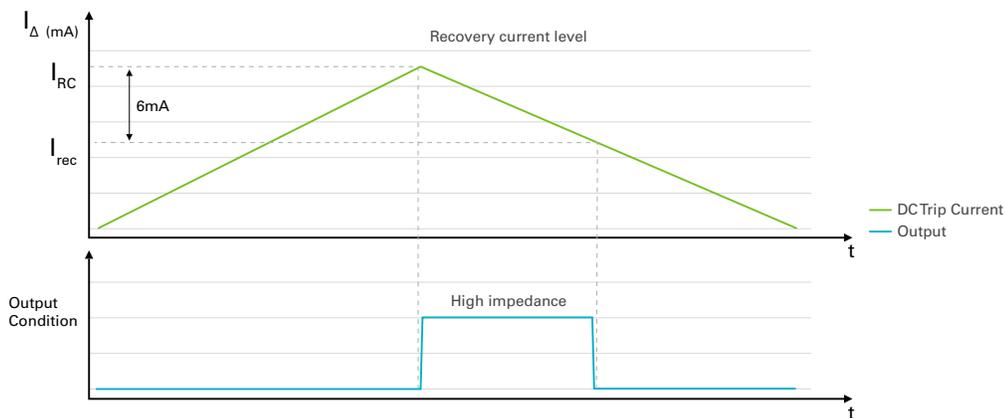
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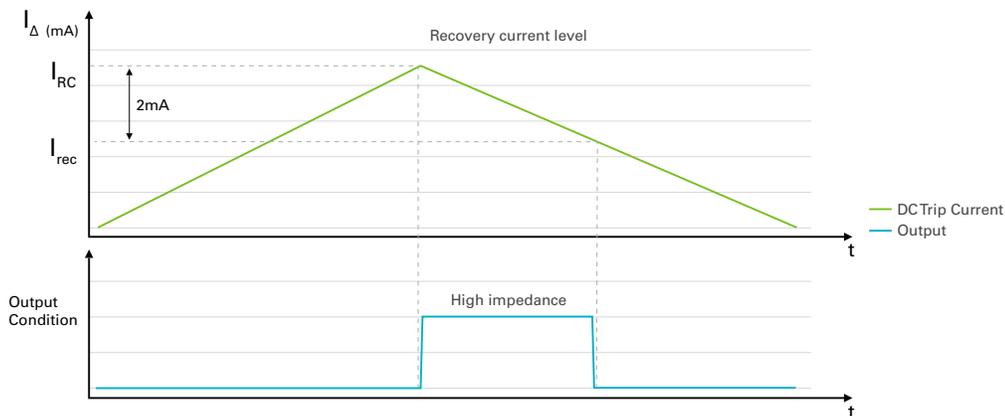
Response data

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



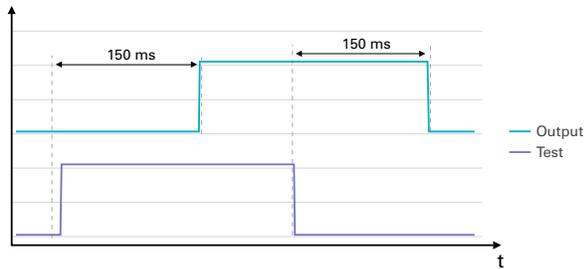
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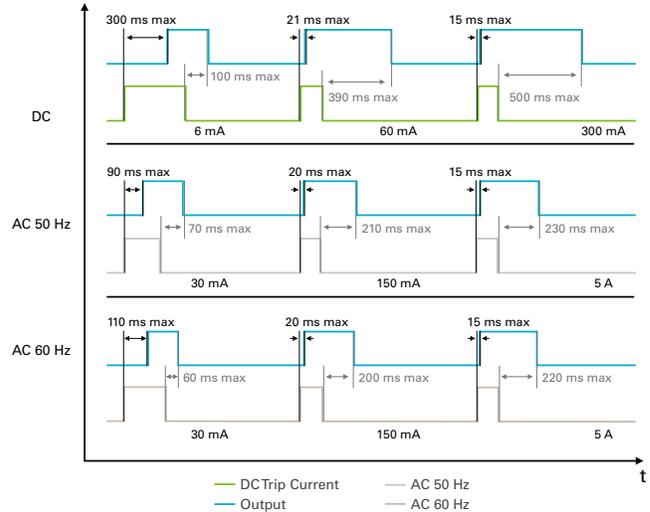
Response time

	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	0.30s	0.015s	0.09/0.11s	0.02/0.02s	0.015/0.015s

AC/DC TEST FUNCTION (MODE 2)



TRIP TIMES



General Data

PARAMETER	SYMBOL	UNIT	MIN	TYPICAL	MAX
Aperture	A	mm	-	-	20
Operating temperature	T_o	$^{\circ}\text{C}$	-40	-	105
Storage temperature	T_s	$^{\circ}\text{C}$	-40	-	105
Altitude	H	m	-	-	4000
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	-

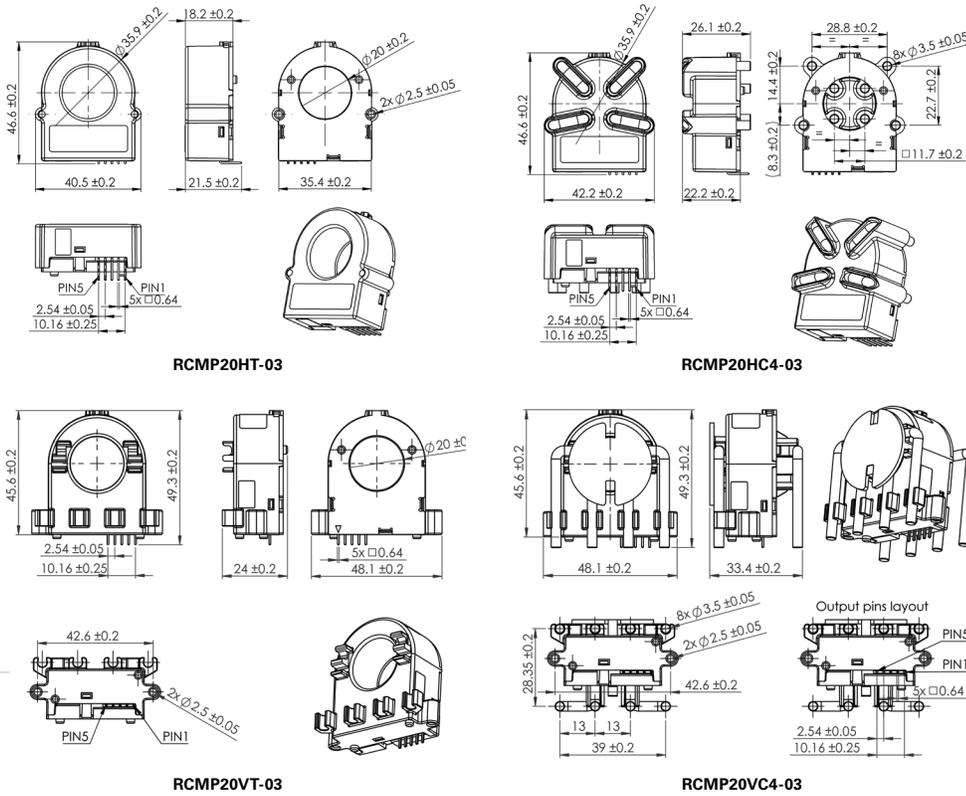
General Data (Continued)

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

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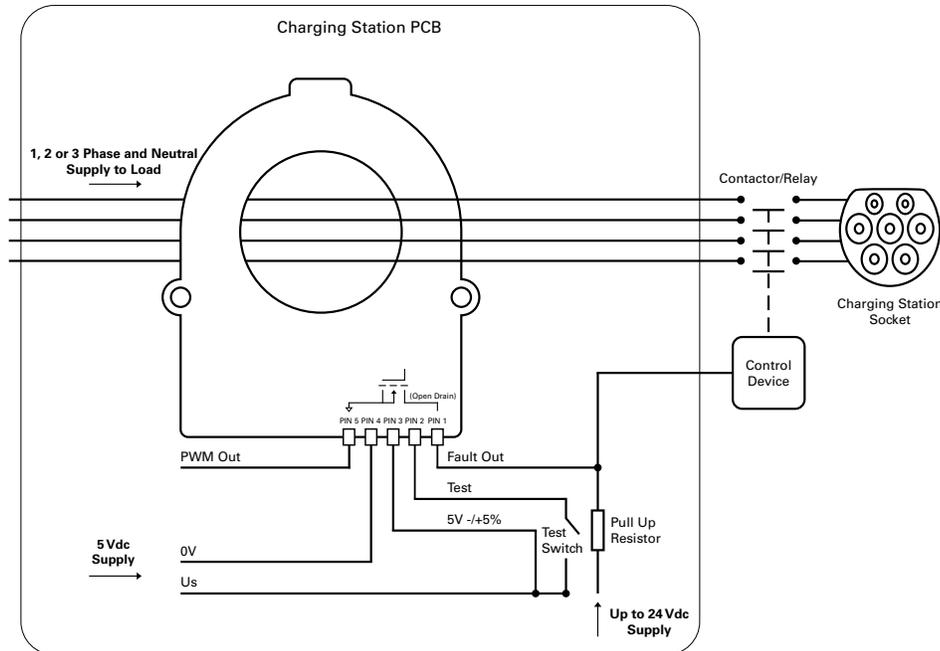
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Dimension Diagrams



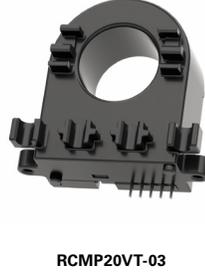
Note: Clearance and creepage distances between output pins and integrated conductors are 6.5mm minimum.

Wiring Diagrams



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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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