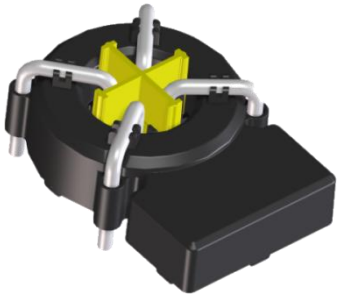
BRCS03C / IEC

Residual Current Sensor for Charging Equipment of Electric Vehicles

- DC 6mA (IEC 62955)
- Type A 30mA and DC 6mA (IEC 62752; IEC 62955)

The BRCS03C is an AC/DC residual current sensor with two separate fault signal outputs – one Pin with DC fault signal output and the other Pin with AC & DC fault signal output. It can be used for built-in RDC-MD (Residual Direct Current Monitoring Device, DC 6mA, IEC 62955) or RDC-PD (Type A 30mA and DC 6mA, Residual Direct Current Protection Device, IEC61008-1 + IEC 62955) at Mode-3 AC chargers. Additionally, it can be used in IC-CPD (In-Cable Control- and Protection Device)



- Accurate measurement and optimization against nuisance tripping
- Cost-effective solution of residual current detection for Mode-2/3 EVSE
- Fast response time facilitating a broad selection of switching devices
- Two fault signal pins for solely DC 6mA and Type-A 30mA +DC 6mA alarming

Technical Specification

#	Technical Specification	BRCS03C-05
101	Rated operating voltage in monitoring circuit	230/400VAC
102	Rated current in monitoring circuit	≤ 32A
103	Poles in monitoring circuit	1P+N / 3P+N
104	Frequency in monitoring circuit	50Hz
105	Rated impulse withstand voltage in monitoring circuit	6kV
106	Over-voltage category in monitoring circuit	III
201	Rated operating voltage in control circuit, Vcc	5VDC±3%
202	Power consumption	<500mW
203	Pin 1 – N.C.	Not connected
204	Pin 2 – Test signal	Digital input
205	Pin 3 – DC fault signal	Digital output
206	Pin 4 – AC & DC fault signal	Digital output
207	Pin 5 – GND	GND
208	Pin 6 – Vcc for 5V	+5VDC
301	Rated DC residual operating current I△dc	6mA
302	Rated DC residual non-operating current I△ndc	3mA
303	Rated AC residual operating current I△n	30mA
304	Rated AC residual non-operating current I△nc	15mA
305	Electrical endurance	20,000
306	Rated operating temperature	-40~85 ℃
307	Pollution degree	2

Residual Current Detection Characteristics

Operating Current

#	Operating Current	PIN 3 (DC)	PIN 4 (AC & DC)
401	Smooth DC	4.0~6.0 mA	4.0~6.0 mA
402	DC rectified from 2 phases	4.0~7.0 mA	4.0~7.0 mA
403	DC rectified from 3 phases	4.0~6.2 mA	4.0~6.2 mA
404	Sinewave AC	-	22.0~28.0 mA
405	A0 pulsating DC	-	10.5~42.0 mA
406	A90 pulsating DC	-	7.5~42.0 mA
407	A135 pulsating DC	-	3.3~42.0 mA

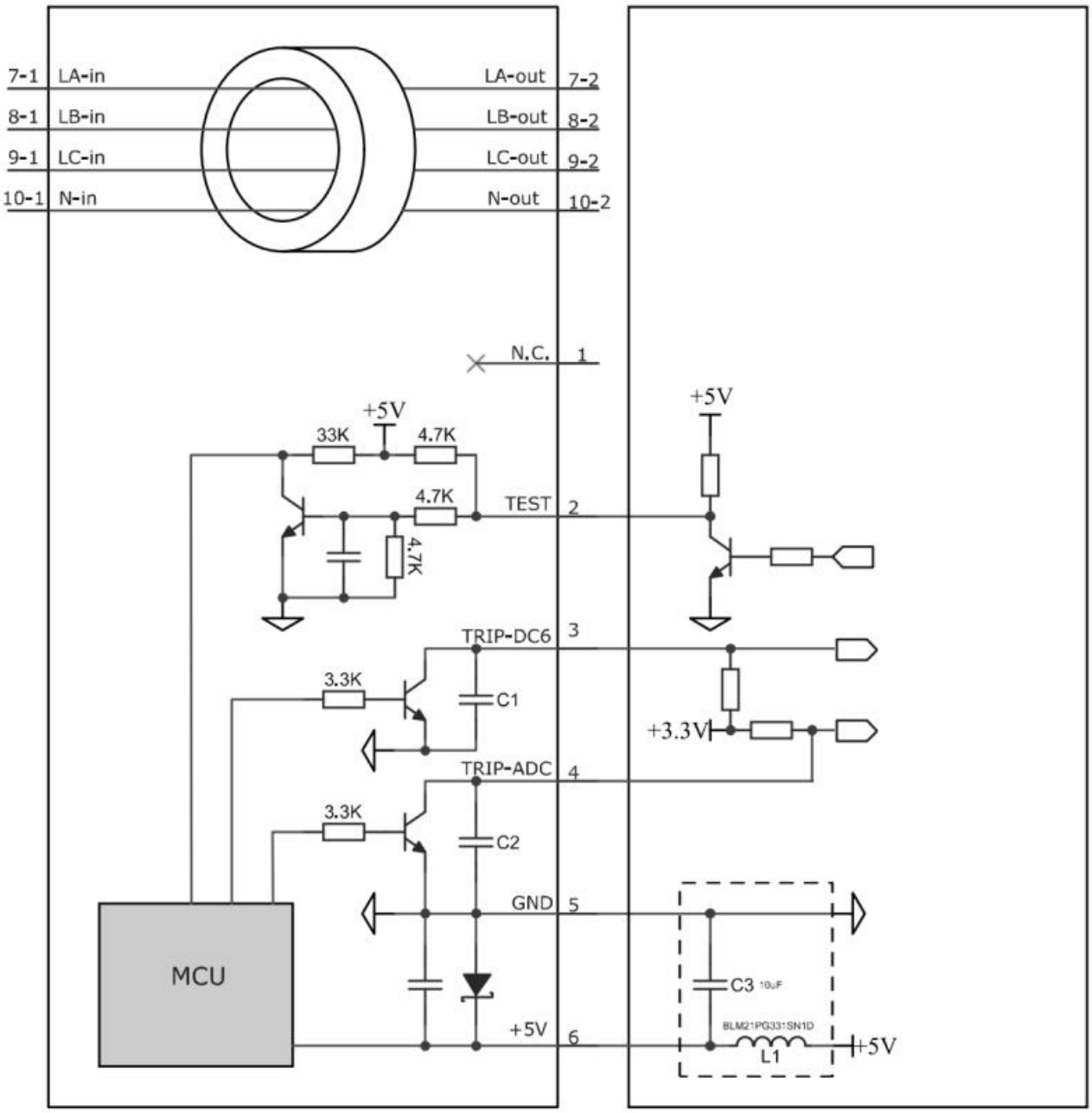
Operating Time

#	Response time	PIN 3 (DC)	PIN 4 (AC & DC)
501	Smooth DC 6mA	≤ 500 ms	≤ 500 ms
502	Smooth DC 60mA	≤ 200 ms	≤ 200 ms
503	Smooth DC 200mA	≤ 70 ms	≤ 70 ms
504	Smooth DC 300mA	-	≤ 20 ms
505	DC rectified from 2 phases 60mA	≤ 200 ms	≤ 200 ms
506	DC rectified from 2 phases 200mA	≤ 70 ms	≤ 70 ms
507	DC rectified from 2 phases 300mA	-	≤ 20 ms
508	DC rectified from 3 phases 60mA	≤ 200 ms	≤ 200 ms
509	DC rectified from 3 phases 200mA	≤ 70 ms	≤ 70 ms
510	DC rectified from 3 phases 300mA	-	≤ 20 ms
511	AC 30mA	> 10000 ms	≤ 80 ms
512	AC 60mA	> 300 ms	≤ 60 ms
513	AC 150mA	> 80 ms	≤ 20 ms
514	AC 5A	> 80 ms	≤ 20 ms

Application Notes

Typical application diagram

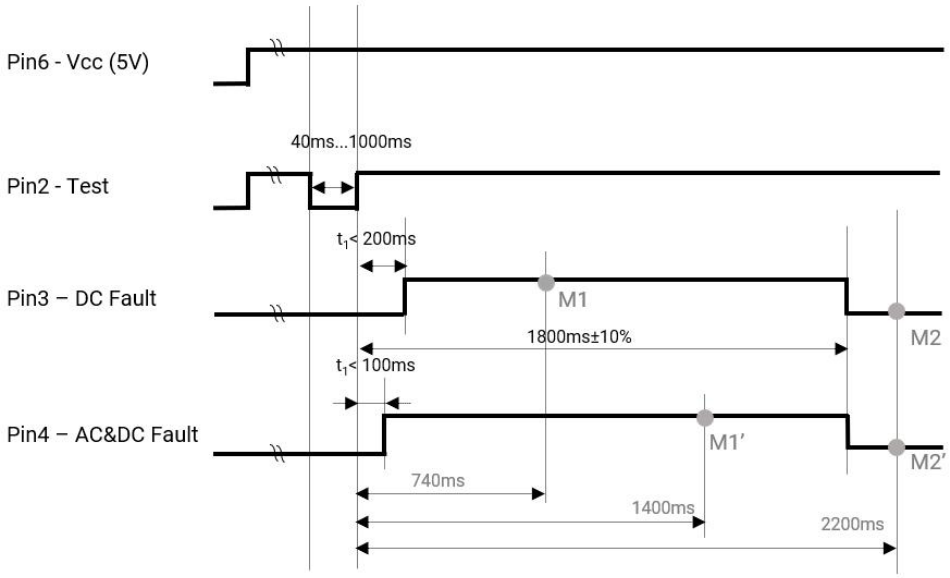
BRCS03C-05-* **EV charging controller**



Additional information

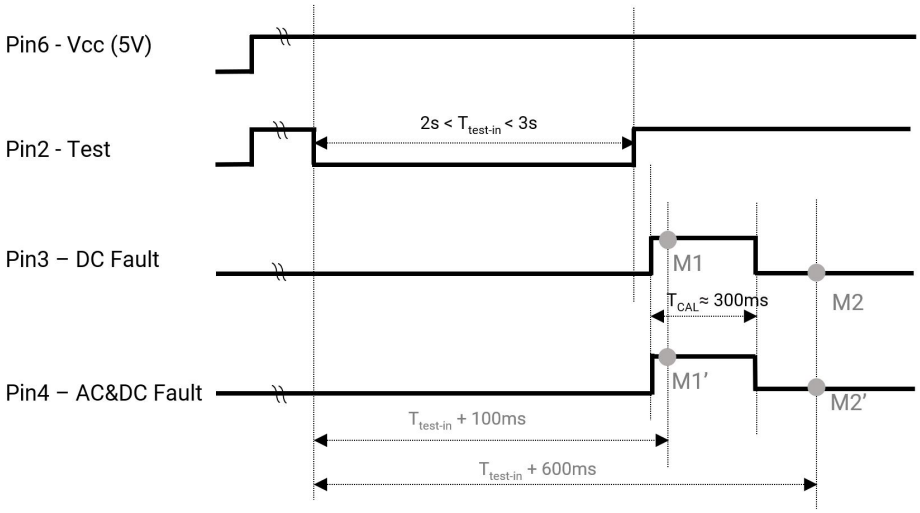
- Ferrite beads - such as BLM21PG331SN1D- are suggested to replace the L1 at some existing charging controller models. C3 might be added in case of limit 5V DC power supply. Please ensure the DC power supply to the 5V version sensor is within the range of 5VDC ± 3%, so as to ensure the proper function of the sensor.
- NPN transistors are used internally at the Pin 3 (DC fault signal) and Pin 4 (AC & DC fault signal) of the 5V version sensor, and the direct connection of Pin 3/4 to switching devices such as relays or contactors- is NOT allowed. Vce and Ic of the NPN transistor inside the 5V version sensor are maximally 40V and 50mA.

Self-test time chart



A self-test excluding offset calibration is activated if Pin 2 - Test is connected to GND for a period of 40ms to 130ms; A self-test including offset calibration is activated if Pin 2 - Test is connected to GND for a period of 150ms to 1000ms. t_1 is the response time for internally generated test current.

Offset calibration time chart



An offset calibration is activated if Pin 2 - Test is connected to GND for a period of 2s to 3s. An offset calibration can be activated at regular intervals (such as start-up) or after the occur of certain critical events (such as short circuit).
Attention: During the offset calibration, NO leakage current or any other current may flow through the device and the relays/contactors must be open. Also, the power supply voltage at Pin 6 Vcc must be stay at 5VDC ± 3%.

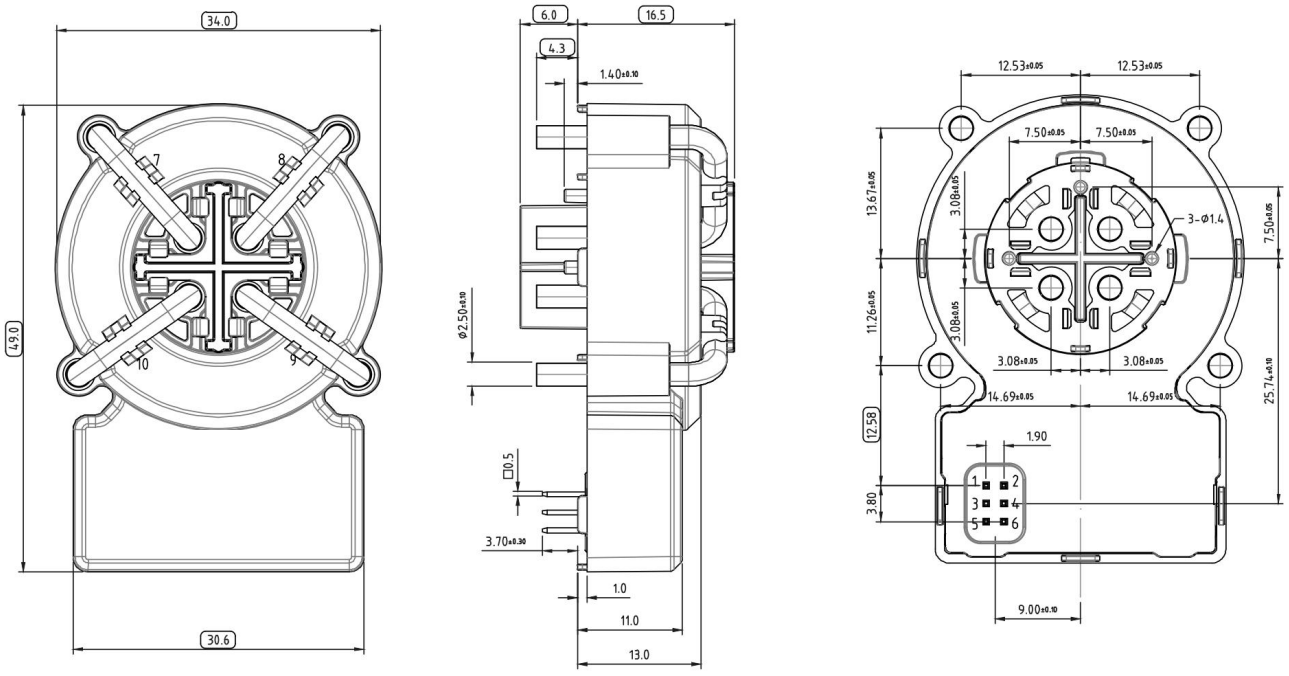
Possible Output States

Status	PIN 3 Output (DC Trip)	PIN 4 Output (AC & DC Trip)
Normal condition	GND	GND
$I_{\triangle}$ ≥ 6 mA DC	High impedance	High impedance
$I_{\triangle}$≥ 30 mA AC	GND[1)]	High impedance
$I_{\triangle}$≥ 30 mA AC & $I_{\triangle}$ ≥ 6 mA DC	High impedance	High impedance

A change from GND to High impedance is allowed, as long as such a change is compliant with IEC 62955.

Mechanical outline

BRCS03C-05-L1 :



	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
BRCS03C-05-L1	-	Test	DC fault	AC & DC fault	GND	5V DC

Ordering information

#	Order Number	Description
1	BRCS03C-05-L1	BRCS03C Residual Current Sensor 5V DC Interface, PCB-mounting (Copper jumper) Type A 30 mA+DC6mA / DC6mA, 32A, 1P+N / 3P+N 6 Pin, Pitch=1.9mm

Additional Notes

- Do NOT allow strong static electricity near the sensor, because static electricity can cause damage to the ICs inside the sensor. Take static electricity precautions when handling.
- Do NOT exceed 260°C for 10 seconds when soldering the sensors of PCB-mounting versions. This is the maximum heat resistance grade of these sensors.
- Do NOT solder the sensors with the central isolation cross installed. The central isolation cross can be installed after soldering the sensors.
- Do NOT drop the sensor or apply any other mechanical stress to the sensor, as such stresses may change performance characteristics.
- Please place the sensor with an appropriate distance from components that can generate high magnetic fields, such as relays or contactors, to ensure accurate residual current detection.

The sensor is susceptible to be damaged from an ESD event and the personnel should be grounded when handling it.

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