

BRCS01/01X

Residual Current Sensor for Charging Equipment of Electric Vehicles
(IEC 62955 / IEC 62752)

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



PCB-mount



Flexible

- Simplified 4 pin interface of Vcc, GND, Test and Trip
- Residual current detection either solely DC 6mA or combined Type A 30mA and DC 6mA
- Fast residual current detection facilitates broad selection of switching relays and contactors
- Cost-effective solution of residual current detection for charging system of Electric Vehicles

Technical Specification

#	Technical Specification	BRCS01-ADC- BRCS01X-ADC-*	BRCS01-DC6- BRCS01X-DC6-*
101	Rated operating voltage in monitoring circuit	230/400VAC	230/400VAC
102	Rated current in monitoring circuit	≤ 32A	≤ 32A
103	Poles in monitoring circuit	1P+N / 3P+N	1P+N / 3P+N
104	Frequency in monitoring circuit	50Hz	50Hz
105	Rated impulse withstand voltage in monitoring circuit	4kV	4kV
106	Over-voltage category in monitoring circuit	III	III
201	Rated operating voltage in control circuit	5VDC±3%	5VDC±3%
202	Power consumption	<500mW	<500mW
203	Pin 1 - Vcc	+5VDC	+5VDC
204	Pin 2 - GND	GND	GND
205	Pin 3 - Test signal input	Test ¹⁾	Test ¹⁾
206	Pin 4 - Fault signal output	Trip	Trip
301	Rated DC residual operating current $I_{\Delta dc}$	6mA	6mA
302	Rated DC residual non-operating current $I_{\Delta ndc}$	3mA	3mA
303	Rated AC residual operating current $I_{\Delta n}$	30mA	-
304	Rated AC residual non-operating current $I_{\Delta nc}$	15mA	-
305	Electrical endurance	20,000	20,000
306	Rated operating temperature	-40~85 °C	-40~85 °C
307	Pollution degree	2	2

1) An offset calibration is activated if PIN 3 is connected to ground for a period of 4s to 5s. The time for offset calibration is less than 500ms. An offset calibration can be activated at regular intervals (e.g. startup) or after the occur of certain critical events (e.g. short circuit).

Residual Current Detection Characteristics

Operating Current

#	Description	AC&DC fault signal	DC fault signal
401	Operating current for smooth DC	4.0~6.0 mA	4.0~6.0 mA
402	Operating current for DC rectified from 2 phases	4.0~7.0 mA	4.0~7.0 mA
403	Operating current for DC rectified from 3 phases	4.0~6.2 mA	4.0~6.2 mA
404	Operating current for sinewave AC	22.0~28.0 mA	-
405	Operating current for A0 pulsating DC	10.5~42.0 mA	-
406	Operating current for A90 pulsating DC	7.5~42.0 mA	-
407	Operating current for A135 pulsating DC	3.3~42.0 mA	-

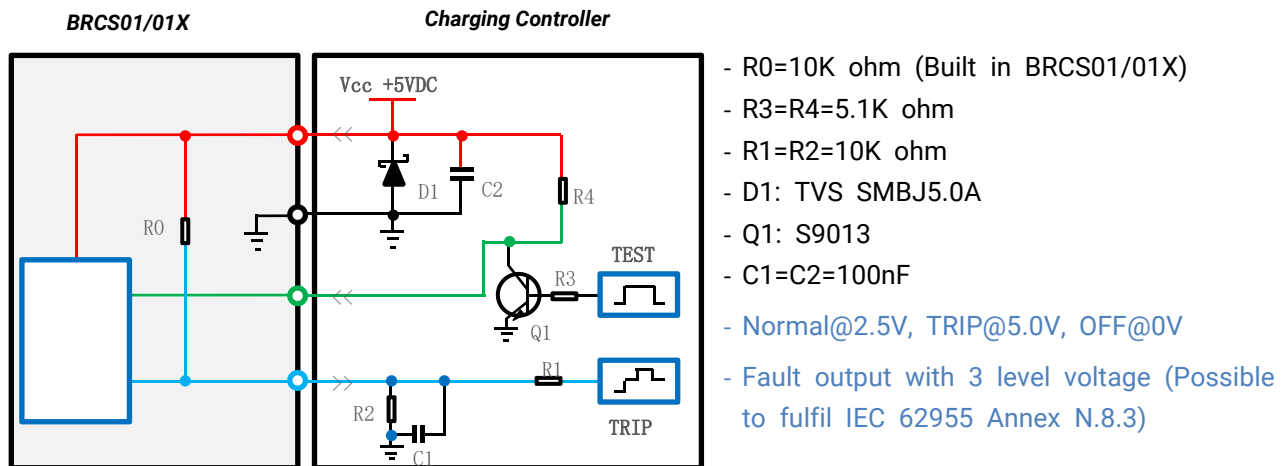
Operating Time

#	Description	AC&DC fault signal	DC fault signal
501	Response time for 6mA smooth DC residual current	≤ 500 ms	≤ 500 ms
502	Response time for 60mA smooth DC residual current	≤ 200 ms	≤ 200 ms
503	Response time for 200mA smooth DC residual current	≤ 70 ms	≤ 70 ms
504	Response time for 300mA smooth DC residual current	≤ 20 ms	-
505	Response time for 60mA DC rectified from 2 phases	≤ 200 ms	≤ 200 ms
506	Response time for 200mA DC rectified from 2 phases	≤ 70 ms	≤ 70 ms
507	Response time for 300mA DC rectified from 2 phases	≤ 20 ms	-
508	Response time for 60mA DC rectified from 3 phases	≤ 200 ms	≤ 200 ms
509	Response time for 200mA DC rectified from 3 phases	≤ 70 ms	≤ 70 ms
510	Response time for 300mA DC rectified from 3 phases	≤ 20 ms	-
511	Response time for 30mA AC residual current	≤ 80 ms	> 10000 ms
512	Response time for 60mA AC residual current	≤ 60 ms	> 300 ms
513	Response time for 150mA AC residual current	≤ 20 ms	> 80 ms
514	Response time for 5A AC residual current	≤ 20 ms	> 80 ms

Application Notes for "Flexible" Variant

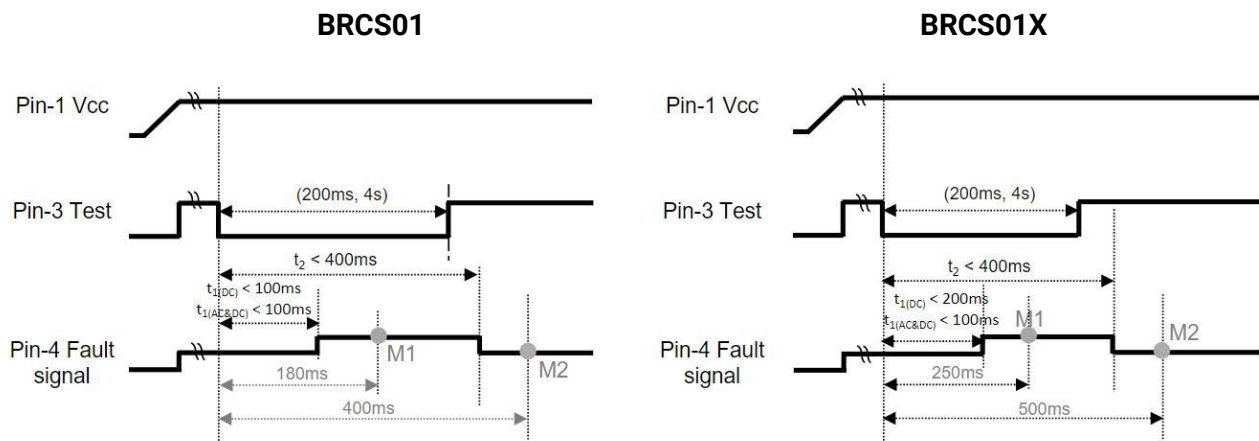
IEC 62955 Annex N.8.3 specifies that the M-module with facilitate for connection of an external detection module shall cause opening of the switching or protective device within 10s, if the external detection module is disconnected. A three-level voltage output at Fault signal pin of the BRCS01/01X sensors facilitate built-in RDC-DD at EV charger to meet this requirement.

Typical application diagram



Attention: More electronic components at charging controllers than those showed in the above simplified diagram might be added depending on the overall charging controller design.

Self-test time chart



t_1 is the response time for internally generated test current. A self-test excluding offset calibration is activated if Pin 3 - Test is connected to ground for a period of 200ms to 4s (Normally 300ms is recommended)

Offset calibration

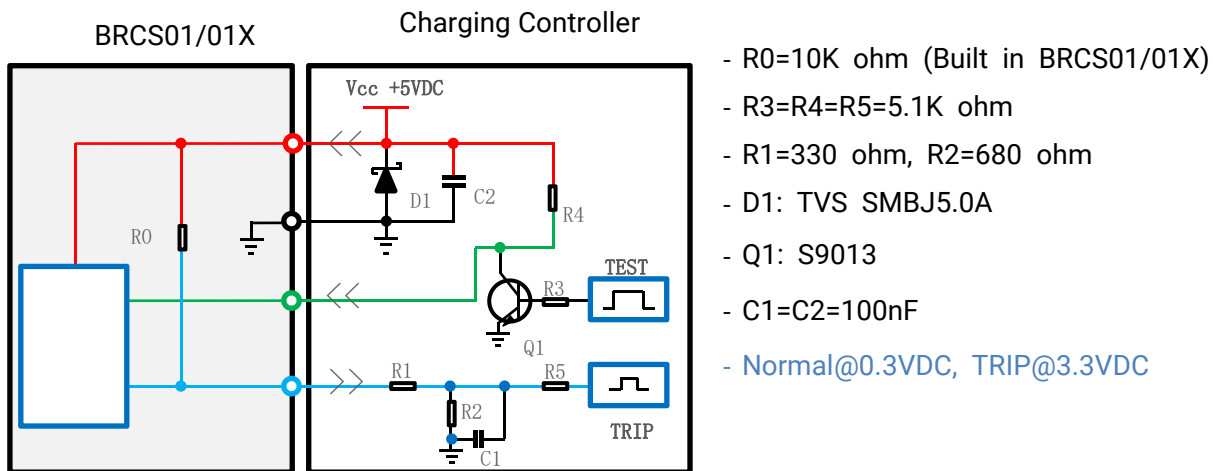
An offset calibration is activated if PIN 3 is connected to ground for a period of 4s to 5s. The time for offset calibration is less than 500ms. An offset calibration can be activated at regular intervals (e.g. startup) or after the occur of certain critical events (e.g. short circuit.).

Attention: During the offset calibration, NO leakage current or any other current may flow through the sensor. Please ensure voltage supply of 5VDC $\pm$ 3% to the sensor and remain the main-circuit contactors/relays open.

Application Notes for "PCB-mount" Variants

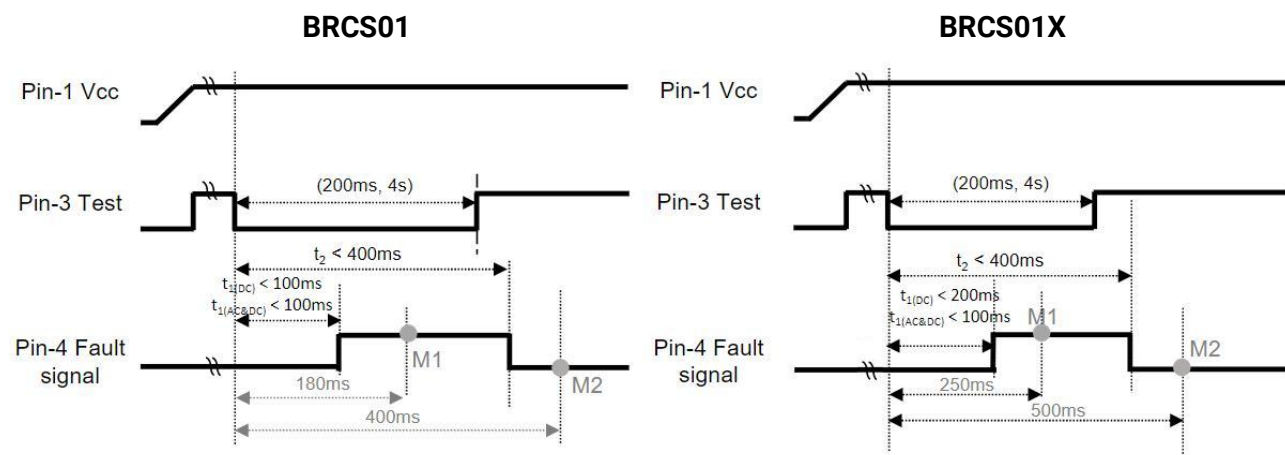
By adjusting the resistors between Fault signal pin of the BRSC01/01X sensors and charging controller MCU, GPIO ports of a 3.3V MCU at an EV charging controller can be used to read Normal/Trip status.

Typical application diagram



Attention: More electronic components at charging controllers than those showed in the above simplified diagram might be added depending on the overall charging controller design.

Self-test time chart



t_1 is the response time for internally generated test current. A self-test excluding offset calibration is activated if Pin 3 - Test is connected to ground for a period of 200ms to 4s (Normally 300ms is recommended)

Offset calibration

An offset calibration is activated if PIN 3 is connected to ground for a period of 4s to 5s. The time for offset calibration is less than 500ms. An offset calibration can be activated at regular intervals (e.g. startup) or after the occur of certain critical events (e.g. short circuit.).

Attention: During the offset calibration, NO leakage current or any other current may flow through the sensor. Please ensure voltage supply of 5VDC $\pm$ 3% to the sensor and remain the main-circuit contactors/relays open.

Additional Product Illustration

Flexible version (16.2mm Aperture)

- BRCS01-DC6-H2 / BRCS01-ADC-H2
- BRCS01X-DC6-H2 / BRCS01X-ADC-H2



XHB 2.5mm connector:

- Red: 5VDC
- Black: GND
- Green/Yellow: TEST
- White: TRIP

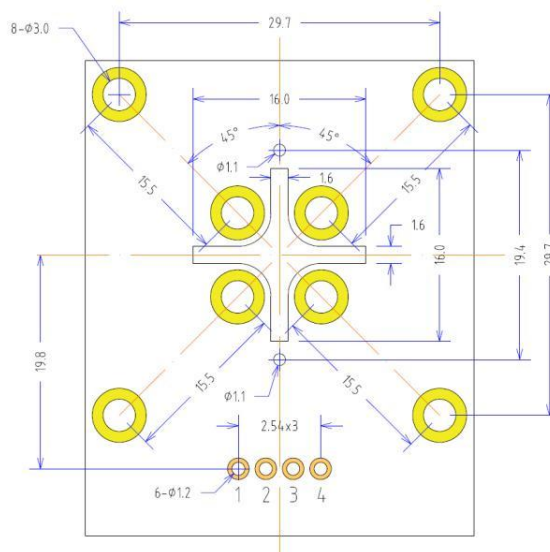
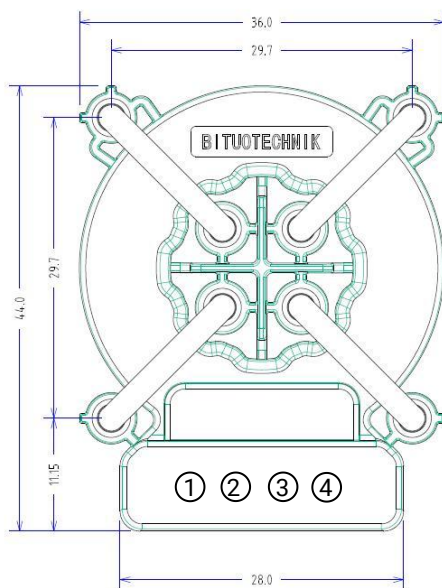
MOLEX 0353120460 can be used at the charging controller side.

PCB-mount version

- BRCS01-DC6-L / BRCS01-ADC-L
- BRCS01X-DC6-L / BRCS01X-ADC-L



- Pin 1: 5VDC
- Pin 2: GND
- Pin 3: TEST
- Pin 4: TRIP



Ordering Information

#	Order Number	Description
1	BRCS01-ADC-H2	BRCS01 Residual Current Sensor (Open-loop fluxgate), A30+DC6mA Flexible, XHB 4Pin, Pitch=2.5mm, 220mm cable
2	BRCS01-DC6-H2	BRCS01 Residual Current Sensor (Open-loop fluxgate), DC6mA Flexible, XHB 4Pin, Pitch=2.5mm, 220mm cable
3	BRCS01-ADC-L	BRCS01 Residual Current Sensor (Open-loop fluxgate), A30+DC6mA PCB-mount, 4Pin, Pitch=2.54mm
4	BRCS01-DC6-L	BRCS01 Residual Current Sensor (Open-loop fluxgate), DC6mA PCB-mount, 4Pin, Pitch=2.54mm
5	BRCS01X-ADC-H2	BRCS01X Residual Current Sensor (Closed-loop fluxgate), A30+DC6mA Flexible, XHB 4Pin, Pitch=2.5mm, 220mm cable
6	BRCS01X-DC6-H2	BRCS01X Residual Current Sensor (Closed-loop fluxgate), DC6mA Flexible, XHB 4Pin, Pitch=2.5mm, 220mm cable
7	BRCS01X-ADC-L	BRCS01X Residual Current Sensor (Closed-loop fluxgate), A30+DC6mA PCB-mount, 4Pin, Pitch=2.54mm
8	BRCS01X-DC6-L	BRCS01X Residual Current Sensor (Closed-loop fluxgate), DC6mA PCB-mount, 4Pin, Pitch=2.54mm

Note: The through-hole variants of BRCS01 have already been in phase-out stages since the launch of [BRCS01V](#) and [BRCS03X](#).

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 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.

Shanghai Bituo Electric Co.,Ltd.

Add.: 5F, Building 24, No. 518 Xinzhuang Road, Songjiang District, Shanghai 201600, China

Tel: +86 (21) 5780 8599

Email: info@bituo-technik.com

Website: www.bituo-technik.com