

# R&S® RT-ZC02 R&S® RT-ZC03 AC/DC Current Probe User Manual



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## 1 Introduction

The current probe has been designed for use with multi-meters and oscilloscopes respectively for accurate, non-intrusive measurement of AC, DC and complex waveform currents using advanced Hall Effect technology.

Key features:

	<b>RT-ZC03</b>	<b>RT-ZC02</b>
Measurement range	5 mA to 30 A	500 mA to 1000 A
Resolution	1 mA	100 mA/500 mA
Frequency range	DC to 100 kHz	DC to 20 kHz






### Connector

RT-ZCxx	BNC	BNC
HZCxx	dual 4 mm	dual 4 mm

These features make it a powerful tool for use in inverters, switch mode power supplies, industrial controllers and other applications requiring current measurement and/or waveform analysis.

## 2 Safety

The following symbols appear on the products:

<b>Symbol</b>	<b>Description</b>
	Do not dispose of this product as unsorted municipal waste. Contact Rohde & Schwarz GmbH & Co. KG or a qualified recycler for disposal.
	Important Information. See manual.
	Double insulation.
	Do not apply around or remove from the HAZARDOUS LIVE conductors.
	Complies with the relevant European standards.



#### Warning

The current probe may only be used and handled by qualified personnel. To avoid personal injury, follow these precautions:

- To avoid electric shock, use caution during installation and use of this product; high voltages and currents may be present in circuit under test.
- Do not use the product if damaged. Always connect probe to display device before it is installed around the conductor.
- Always ensure the probe is removed from any live electric circuit, and leads are disconnected before removing the battery cover.
- Use the Current Probe only as specified in the operating instructions; otherwise the current probe's safety features may not protect you.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent the shock and arc blast injury where hazardous live conductors are exposed.
- Do not hold the Current Probe anywhere beyond the tactile indicator.
- Before each use, inspect the Current Probe. Look for cracks or missing portions of the Current Probe housing or output cable insulation. Also look for loose or weakened components. Pay particular attention to the insulation surrounding the jaws.
- Use caution when working with voltages above 60 V<sub>DC</sub>, 30 V<sub>AC</sub> rms or 42 V<sub>AC</sub> peak. Such voltages pose a shock hazard.
- Use of this equipment in a manner not specified herein may impair the protection provided by the equipment.
- CAT III equipment is designed to protect against the transients in the equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and the lighting systems in large buildings.



Always inspect the probe and lead for damage before use.

To avoid electric shock, keep the probe clean and free of surface contamination.

Safety in its use is the responsibility of the operator who must be a suitably qualified and authorised person. Ensure that your fingers are behind the protective barrier when using the probe.

**Safety Standards**

EN 61010-1

EN 61010-2-032

300V<sub>RMS</sub> Cat III, Pollution Degree 2

**EMC Standards**

EN 61326-2-2

ROHS and WEEE compliant

This product is designed to be safe under the following conditions:

- indoor use
- altitude up to 2000m
- temperature 0°C to +50°C
- maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 40% relative humidity at 50°C.

Use of the probe on uninsulated conductors is limited to 300V<sub>RMS</sub> AC or DC and frequencies below 1 kHz.

### 3 Specifications RT-ZC03

#### Electrical Characteristics

(all accuracies stated at 23°C ±1°C)

Nominal input current	20 A <sub>RMS</sub> , AC or DC
Measuring range	±30 A
Overload capacity	±500 A
Overall DC accuracy	±1% of reading ±2m A, typ.
Resolution	1m A
Output noise level	200 μV <sub>RMS</sub> , typ.
Gain variation	±0.01% of reading/°C, typ.
Output sensitivity	100m V/A
Frequency range	DC to 100 kHz (0.5 dB), typ.
Max. slew rate	±20 A/μs, typ.
Response time	better than 1 μs
Working voltage	300 V <sub>RMS</sub> AC or DC

#### General data

Operating temperature	0°C to +50°C
Storage temperature with battery removed	-20°C to +85°C
Power supply	9 V Alkaline battery PP3, MN 1604 or IEC6LR61
Battery life	25 hours, typ.
Load impedance (minimum)	> 100kΩ and ≤100pF
Conductor size	25 mm diameter
Weight	320 g
Output cable and connectors	2 m long coax terminated with a safety BNC connector
<b>RT-ZC03</b>	50 Ohms

## Specifications RT-ZC02

### Electrical Characteristics

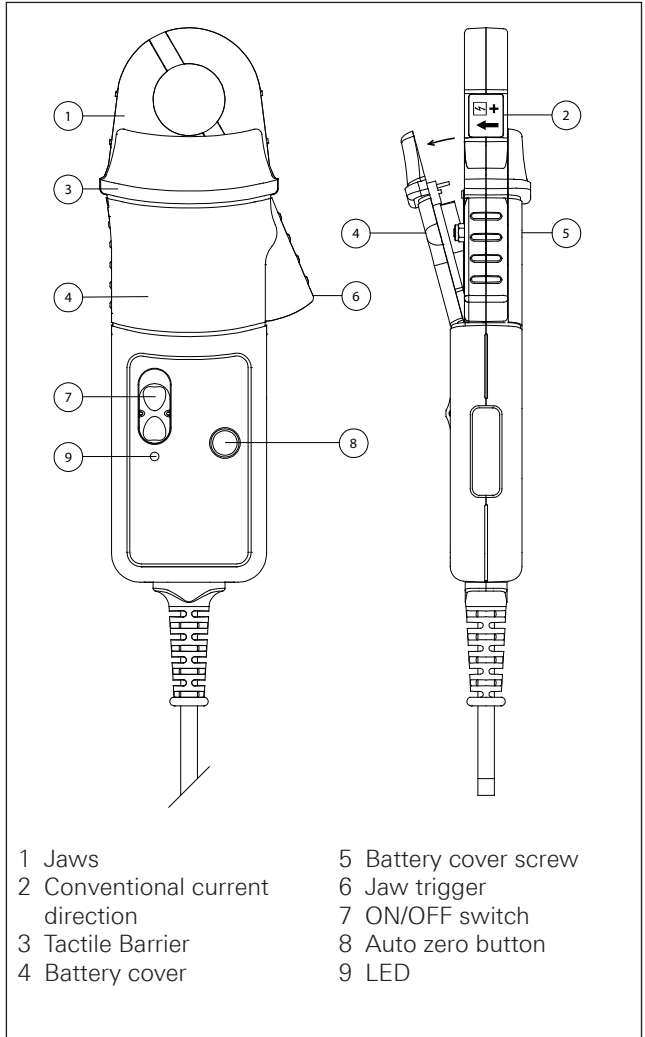
(all accuracies stated at 23°C ±1°C)

Nominal current In	1000 A <sub>RMS</sub> AC or DC
Measuring range	±200/±2000 A
Overload capacity	±2000 A
Overall DC accuracy (0 A ... 200 A / 1500 A)	±1% of reading ±0.1/0.5 A, typ.
Overall DC accuracy (1500 A ... 2000 A)	±5% of reading
Resolution	100/500 mA
Output noise level	600 μV <sub>RMS</sub> /10 μV <sub>RMS</sub> , typ.
Gain variation	±0.15% of reading/°C, typ.
Output sensitivity	10 / 1 mV/A
Frequency range	DC to 20 kHz (-3 dB), typ.
Max. slew rate	±20 A/μs, typ.
Response time	better than 5 μs
Working voltage	300 V <sub>RMS</sub> AC or DC

### General data

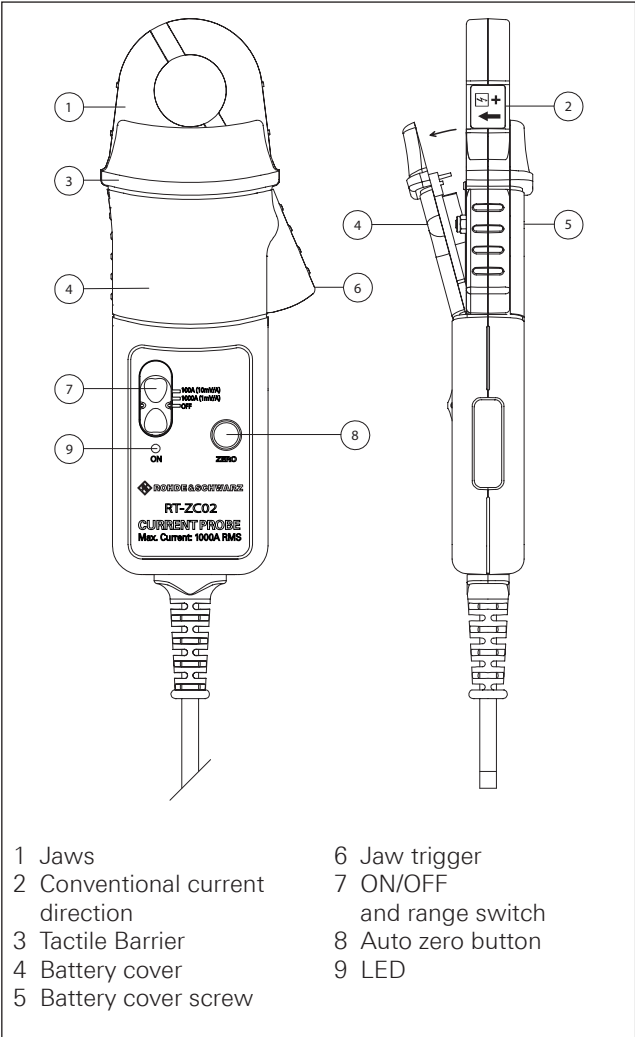
Operating temperature	0°C to +50°C
Storage temperature with battery removed	-20°C to +85°C
Power supply	9 V Alkaline battery PP3, MN 1604 or IEC6LR61
Battery life	50 hours, typ.
Load impedance (minimum)	> 100 kΩ and ≤100pF
Conductor size	32 mm diameter
Weight	320 g
Output cable and connectors	2 m long coax terminated with a safety BNC connector
<b>RT-ZC02</b>	50 Ohms

## 4 Operating Instructions RT-ZC03

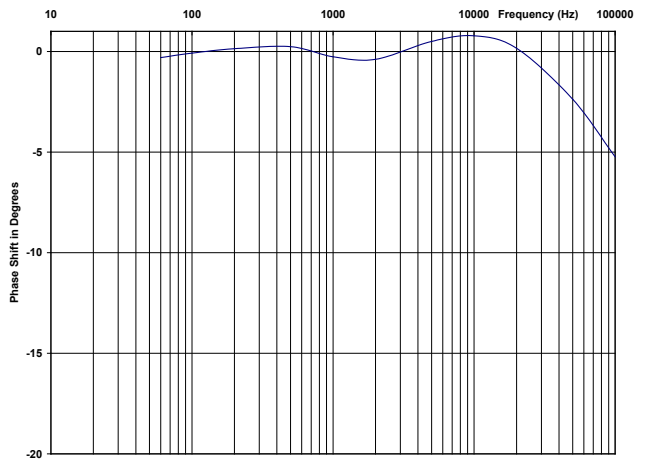
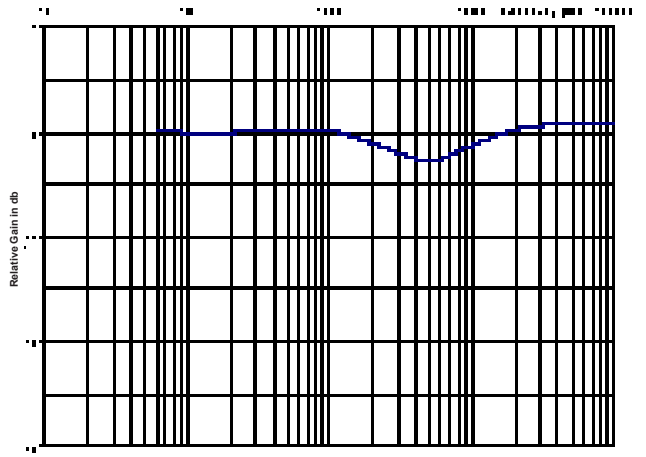




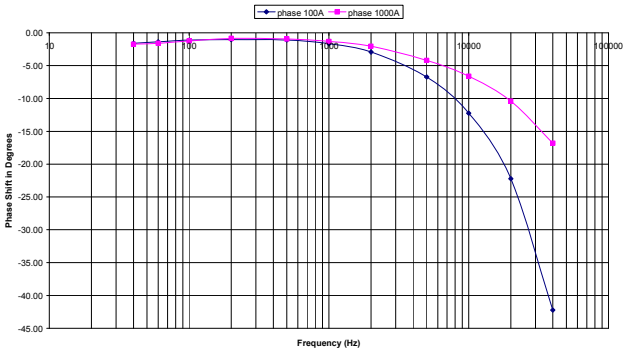
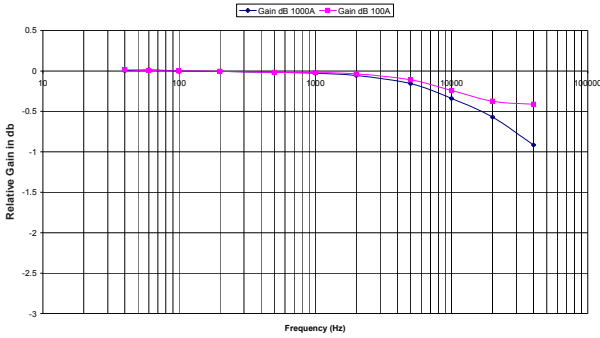
# Operating Instructions RT-ZC02



# Typical performance Plots RT-ZC03



# Typical performance Plots RT-ZC02



## Warning

To avoid injury, when using the probe ensure that your fingers are behind the protective barrier. Do not use the probe if any part of the probe, including the lead and connector(s), appear to be damaged or if a malfunction of the instrument is suspected.

## 4.1 Switch On

When the probe is switched on, the green LED will illuminate. The LED starts flashing when the battery voltage is too low for normal operation and warns the user that it requires changing. This procedure is described in Section 4.5.

## 4.2 Zero Adjustment

The output zero offset voltage of the probe may change due to thermal shifts and other environmental conditions. To null the output voltage depress the Auto Zero button. Ensure that the probe is away from the current carrying conductor whilst the probe is being nulled.

## 4.3 Current Measurement

- Switch on the probe and check that the LED is lit.
- Connect the output lead to an oscilloscope, multimeter or other measuring equipment.
- Zero the probe using the Auto Zero button.
- Clamp the jaws of the probe round the conductor ensuring a good contact between the closing faces of the jaws.
- Observe and take measurements as required. Positive output indicates that the current flow is in the direction shown by the arrow on the probe.

## 4.4 Auto Power OFF

In order to save battery life, the probe will automatically switch itself off after approximately 10 minutes. To disable the Auto power off function, Switch Off the probe and Switch On whilst pressing the auto zero button. The red LED will illuminate and the probe will stay On until switched off again.

## 4.5 Battery Replacement



### Warning

To avoid personal injury, always ensure the probe is removed from any live electric circuit, and leads are disconnected before removing the battery cover. Never operate the probe without the battery cover fitted.

The green or red LED will flash when the minimum operating voltage is approached. Use the following procedure.

- Unclamp the probe from the conductor, turn it off using the On - Off switch and disconnect the output leads, from external equipment.

- Loosen the captive screw which secures the battery cover. Lift the cover through 30° and pull it clear of the probe body. Replace the battery and re-fit the battery cover and fasten the screw .



Note:

Replacement with other than the specified type of battery will invalidate the warranty.

Fit only the type 9 V PP3 Alkaline (MN 1604).

## 4.6 Maintenance

Clean the case periodically by wiping it with a damp cloth and detergent. Use isopropyl alcohol to clean the electronics unit and the probe. Do not use abrasive cleaners or solvents. Do not immerse the probe in liquids.

## 5 Warranty and Repair

Our instruments are subject to strict quality controls. Prior to leaving the manufacturing site, each instrument undergoes a 10-hour burn-in test. This is followed by extensive functional quality testing to examine all operating modes and to guarantee compliance with the specified technical data. The testing is performed with testing equipment that is calibrated to national standards. The statutory warranty provisions shall be governed by the laws of the country in which the product was purchased. In case of any complaints, please contact your supplier.



The product may only be opened by authorized and qualified personnel. Prior to working on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

Any adjustments, replacements of parts, maintenance and repair may be carried out only by authorized technical personnel. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

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Mühlendorfstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Fax: +49 89 41 29 12 164

E-mail: [info@rohde-schwarz.com](mailto:info@rohde-schwarz.com)

Internet: [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

Customer Support: [www.customersupport.rohde-schwarz.com](http://www.customersupport.rohde-schwarz.com)

Service: [www.service.rohde-schwarz.com](http://www.service.rohde-schwarz.com)

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