

# INSTRUCTION MANUAL

## RT-ZD002 / RT-ZD003

### 25 MHz Active Differential Probes



RT-ZD002 (1337.9700.02)

RT-ZD003 (1337.9800.02)

These probes are in compliance with IEC-61010-031 CAT III, Pollution Degree 2

## 1. Safety Terms and Symbols

Terms appear in this manual:



---

**WARNING.** Warning statements identify conditions or practice that could result in injury or loss of life.

---



---

**CAUTION.** Caution statements identify conditions or practice that could result in damage to this product or other property.

---

### Safety Symbols



**Connect to safety earth ground using the wire recommended in the user's manual.**



**High voltage danger**



**The symbol on an instrument indicates that the user should refer to the operating instructions located in the manual.**

## 2. General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this probe or any products connected to it.

### Observe Maximum Working Voltage

To avoid any injury, do not use the probe under the condition that the voltage between both input leads and earth is above 1000 Vrms CAT III. This voltage rating applies to both probes and both settings 1/10 & 1/100 (RT-ZD002) and 1/20 & 1/200 (RT-ZD003).

### **Must be Grounded**

This probe is grounded with the shell of BNC connector and an auxiliary grounding terminal, through the grounding conductor of the power cord of the measurement instrument. Before making connections to the input leads of this probe, ensure that the output BNC connector is attached to the BNC connector of the measurement instrument and the measurement instrument is properly grounded.

### **Do Not Operate Without Covers**

To avoid electric shock or fire hazard, do not operate this probe with covers removed.

### **Do Not Operate in Wet/Damp Conditions**

To avoid electric shock, do not operate this probe in wet or damp conditions.

### **Do Not Operate in Explosive Atmosphere**

To avoid injury or fire hazard, do not operate this probe in an explosive atmosphere.

### **Avoid Exposed Circuit**

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

### **Use Proper Power Source**

To ensure the function of the probe, use four AA cells or the supplied USB power cord. Do not operate this probe from a power source that applies more than the voltage specified.

### **Do Not Operated With Suspected Failures**

If you suspect there is damage to this probe, have it inspected by qualified service personnel.

## **3. Description**

By enabling conventional oscilloscopes to display and measure in-circuit waveforms that are referenced to high common mode voltages, the differential probe extends the measurement capability of oscilloscopes in electronic power converters, inverters, motor speed controls, switch mode power supplies, and many applications.

## 4. Installation

- Simply plug-in the BNC output connector to the vertical input of a general purposed oscilloscope or other measurement instrument. The measurement instrument must be ground referenced.
- Connect an appropriate power source to the probe or enter the batteries, then turn it on.
- Select the proper attenuation ratio. When measuring signals below 70 V or 140 V, switch the attenuation ratio to 1/10 (RT-ZD002) or 1/20 (RT-ZD003) in order to get higher resolution and less noise. Otherwise, set the attenuation ratio to 1/100 (RT-ZD002) or 1/200 (RT-ZD003) when measuring signals up to 700 V or 1400 V.



---

WARNING. To protect against electric shock, use only the accessories supplied with this probe.

---

- Using the appropriate probe accessories, connect the inputs to the circuit under test.



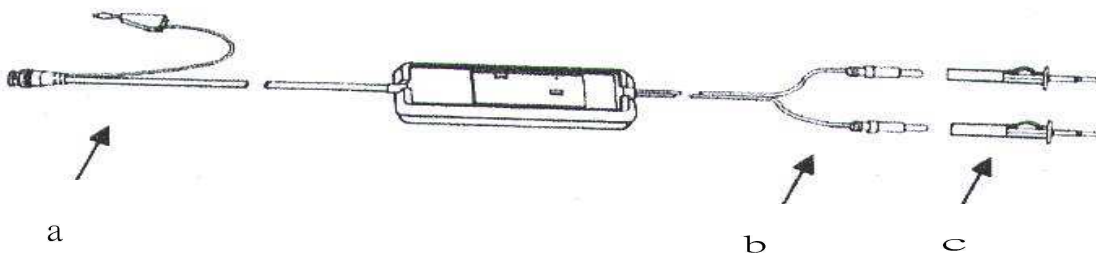
---

CAUTION. This probe is built to carry out differential measurements between two points on the circuit under test. This probe is not meant for electrically insulating the circuit under test and the measuring instrument.

---

## 5. Appearance

The differential probe looks as follows.



- |                           |   |
|---------------------------|---|
| a. Output cable           | The BNC output connector and an auxiliary grounding terminal are connected to the oscilloscope. |
| b. Input leads            | The input leads of the differential probe connect to appropriate accessories with 4 mm sockets. |
| c. Connection accessories | The accessories are connected safely to test points in the circuit under test.                  |

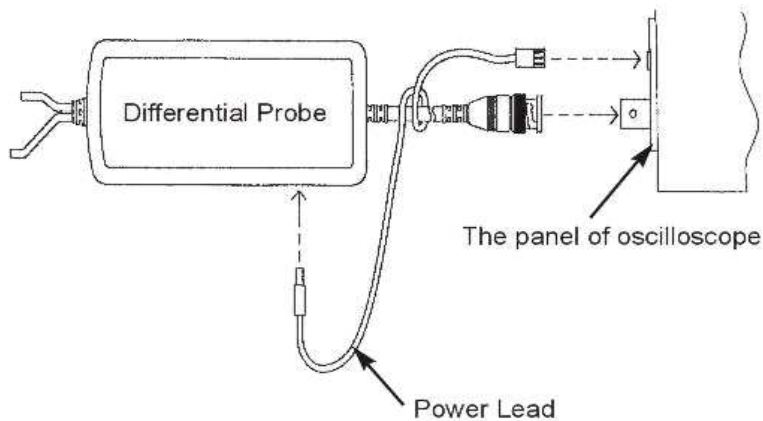
## 6. Available Power Sources

- 4 x AA batteries
- USB Power Cord, for oscilloscopes which offer USB connector.

The supplied voltage must be less than 12 V and greater than 4.5 V, otherwise the probe could be damaged or can't be operated properly.

Polarity is “+” inside and “-” outside. For wrong polarity a built-in circuit protects the probe, no danger or damage will occur.

When the voltage of the cells become too low, the power indicator on the front panel will flicker.



## 7. Accessories supplied

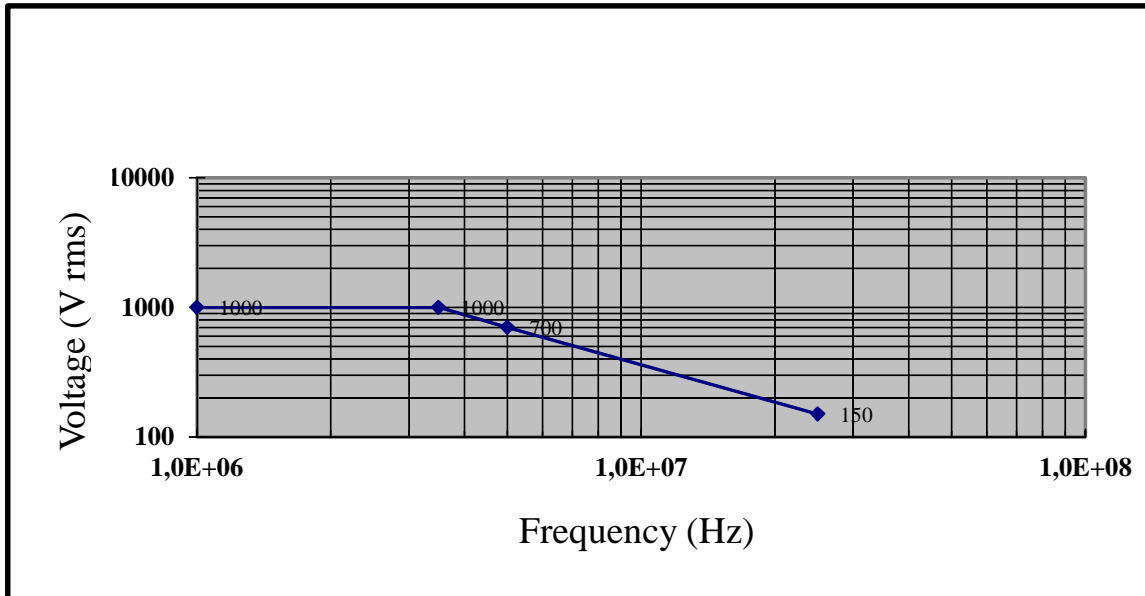
- Grabber red and black
- Alligator clip red and black
- USB power cord
- Trimming tool
- Instruction manual
- Certificate of calibration

## 8. Specifications

	RT-ZD002	RT-ZD003
Bandwidth	DC to 25 MHz (-3 dB)	DC to 25 MHz (-3 dB)
Attenuation Ratio	1:10 / 1:100	1:20 / 1:200
Accuracy	±2 % (meas.)	±2 % (meas.)
Rise Time	14 ns (calculated from bandwidth)	14 ns (calculated from bandwidth)
Input Impedance	8 MΩ // 2.75 pF differential 4 MΩ // 5.5 pF each side to ground	8 MΩ // 2.75 pF differential 4 MΩ // 5.5 pF each side to ground
Input Voltage - Differential Range	1:10 ±70 V (DC+peak AC) 1:100 ±700 V (DC+peak AC)	1:20 ±140 V (DC+peak AC) 1:200 ±1400 V (DC+peak AC) or 1000 Vrms
Input Voltage - Common Mode Range	1:10 and 1:100 ±700 V (DC+peak AC)	1:20 and 1:200 ±1400 V (DC+peak AC) or 1000 Vrms
Maximum Input Voltage (each side to ground)	1000 V CAT III	1000 V CAT III
Output Voltage Swing	±7 V (into 50 kΩ load)	±7 V (into 50 kΩ load)
Output Voltage Offset	±5 mV (meas.)	±5 mV (meas.)
Output Voltage Noise	0.7 mVrms (meas.)	0.7 mVrms (meas.)
Oscilloscope Input Impedance	1 MΩ	1 MΩ
CMRR (meas.)	-86 dB @ 50 Hz, -66 dB @ 20 kHz	-80 dB @ 50 Hz, -60 dB @ 20 kHz
Operating Temperature	-10 °C to 40 °C	-10 °C to 40 °C
Storage Temperature	-30 °C to 70 °C	-30 °C to 70 °C
Humidity	25 % to 85 % RH	25 % to 85 % RH
Power Requirements - Standard	4 x AA Cells	4 x AA Cells
Power Requirements - Optional	4.5 V to 12 V, 360 mW	4.5 V to 12 V, 360 mW
Length of BNC Cable	95 cm	95 cm
Length of Input Leads	45 cm	45 cm
Weight	400 g (probe and PVC jacket)	400 g (probe and PVC jacket)
Dimensions (LxWxH)	170 mm x 63 mm x 21 mm	170 mm x 63 mm x 21 mm

## 9. Derating Curve

The derating curve of the absolute maximum input voltage in common mode is shown as follows and valid for both models RT-ZD002 and RT-ZD003.



## 10. Inspection Procedure

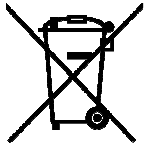
- Connect the BNC output connector to the vertical input of a general purpose oscilloscope.
- Install four AA cells or connect an appropriate power lead.
- Set the oscilloscope input coupling to 1 M $\Omega$ , DC and to 1V/div. Center the trace on the display.
- Connect the inputs of the probe to power lines, using an appropriate power socket to 4 mm adapter.
- Set the range of the probe to 1/100 (RT-ZD002) or 1/200 (RT-ZD003).
- Then, a 50 Hz/ 60 Hz sine-wave of proper amplitude will be displayed on the screen of the oscilloscope and this means the probe is working properly.

## 11. Cleaning

Use a soft cloth to clean the dirt. Prevent damage to probe.

- Avoid immersing the probe.
- Avoid using abrasive cleaners.
- Avoid using chemicals contains benzene or similar solvents.

## 12. WEEE / RoHS Directives



This electronic product is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronics equipment in standard waste receptacles.



## 13. Manufacturer

### ROHDE & SCHWARZ

For comprehensive information about Rohde and Schwarz, please visit our homepage on the R&S Internet (<http://www.rohde-schwarz.com>).

For queries regarding technical aspects of our products, please contact our customer support at <http://www.customersupport.rohde-schwarz.com>.

For international services, please contact our service partners at <http://www.service.rohde-schwarz.com>.

For additional questions, please contact our headquarters in Munich.

ROHDE & SCHWARZ GmbH & Co. KG

Mühldorfstraße 15

D-81671 München

Phone: +49 (89) 41 29 - 0

Fax: +49 (89) 41 29 - 12 164