

# **RIGOL**

## **User Guide**

### **RP1000D Series High Voltage Differential Probe**

**Apr. 2021**

**RIGOL TECHNOLOGIES. CO., LTD.**



# Guaranty and Declaration

## Copyright

© 2021 **RIGOL** TECHNOLOGIES CO., LTD. All Rights Reserved.

## Trademark Information

**RIGOL**® is the trademark of **RIGOL** TECHNOLOGIES CO., LTD.

## Publication Number

UGE18108-1110

## Notices

- **RIGOL** products are covered by P.R.C. and foreign patents, issued and pending.
- **RIGOL** reserves the right to modify or change parts of or all the specifications and pricing policies at the company's sole decision.
- Information in this publication replaces all previously released materials.
- Information in this publication is subject to change without notice.
- **RIGOL** shall not be liable for either incidental or consequential losses in connection with the furnishing, use, or performance of this manual, as well as any information contained.
- Any part of this document is forbidden to be copied, photocopied, or rearranged without prior written approval of **RIGOL**.

## Product Certification

**RIGOL** guarantees that this product conforms to the national and industrial standards in China as well as the ISO9001:2015 standard and the ISO14001:2015 standard. Other international standard conformance certifications are in progress.

## Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: [service@rigol.com](mailto:service@rigol.com)

Website: [www.rigol.com](http://www.rigol.com)

## General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

### **Ground the Instrument.**

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, connect the earth terminal of the power cord to the Protective Earth terminal before connecting any input or output terminals.

### **Observe All Terminal Ratings.**

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting the instrument.

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

Do not operate the instrument with covers or panels removed.

### **Avoid Circuit or Wire Exposure.**

Do not touch exposed junctions and components when the unit is powered on.

### **Do Not Operate with Suspected Failures.**

If you suspect that any damage may occur to the instrument, have it inspected by **RIGOL** authorized personnel before further operations. Any maintenance, adjustment or replacement especially

to circuits or accessories must be performed by **RIGOL** authorized personnel.

**Provide Adequate Ventilation.**

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

**Do Not Operate in Wet Conditions.**

To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

**Do Not Operate in an Explosive Atmosphere.**

To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

**Keep Product Surfaces Clean and Dry.**

To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

**Prevent Electrostatic Impact.**

Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

# Safety Terms and Symbols

## Safety Notices in this Manual:



---

### **WARNING**

Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

---



---

### **CAUTION**

Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

---

## Safety Terms on the Product:

**DANGER** It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

**WARNING** It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

**CAUTION** It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

## Safety Symbols on the Product:



**Double Insulation**



**Hazardous Voltage**



**Safety Warning**



**Protective Earth Terminal**



**Chassis Ground**



**Test Ground**

---

# Contents

<b>Guaranty and Declaration</b> .....	<b>I</b>
<b>General Safety Summary</b> .....	<b>II</b>
<b>Safety Terms and Symbols</b> .....	<b>IV</b>
<b>RP1000D Overview</b> .....	<b>1</b>
<b>Basic Operations</b> .....	<b>5</b>
<b>Cleaning and General Care</b> .....	<b>7</b>
<b>Warranty</b> .....	<b>7</b>
<b>Specifications</b> .....	<b>8</b>
Technical Specifications .....	8
Operation Environment.....	11
General Specifications.....	11
<b>Accessories</b> .....	<b>12</b>





## RP1000D Overview

RP1000D series high voltage differential probe can convert high differential input voltage to low voltage and display the waveforms on the oscilloscope. Its working frequency is up to 25MHz (RP1025D), 50MHz (RP1050D) and 100MHz (RP1100D) and it is rather suitable for large electricity test and R&D.

RP1000D series high voltage differential probe is applicable to general purpose oscilloscope and the labeled attenuation ratios are those when the input impedance of the oscilloscope is  $1M\Omega$ . The attenuation ratios will double when the input impedance of the oscilloscope is  $50\Omega$ .



Figure 1 RP1025D High Voltage Differential Probe



Figure 2 RP1050D High Voltage Differential Probe



Figure 3 RP1100D High Voltage Differential Probe

---

## Basic Operations

1. Connect the red safety IC clip with one end of the red dual-banana plug silicon cable and the black safety IC clip with one end of the black dual-banana plug silicon cable provided in the accessories. Then, connect the red dual-banana plug silicon cable with the red (+) input terminal of the high voltage probe and the black dual-banana plug silicon cable with the black (-) input terminal of the high voltage probe.

Note:

- a) The safety IC clip can be replaced by the high voltage dedicated IC clip, safety alligator clip or safety contact probe prod;
  - b) The dual-banana plug silicon cable can be replaced by high voltage dedicated dual-banana plug silicon cable.
2. Connect one end of the dual-BNC coaxial cable to the BNC interface of the high voltage differential probe and the other end to the input terminal of the oscilloscope.
  3. Turn on the channel switch on the oscilloscope and adjust the attenuation of the high voltage probe to make it match that of the oscilloscope. If the attenuation ratio of the oscilloscope does not match that of the high voltage probe, the actual vertical scale equals the attenuation ratio of the high voltage probe divided by the attenuation ratio of the oscilloscope and then times the vertical scale of the oscilloscope.

For example, when the attenuation ratio of the oscilloscope is

set to 1X, the attenuation ratio of the high voltage probe is set to X200 and the vertical scale of the oscilloscope is 0.5V/div, the actual vertical scale is  $200 \times 0.5\text{V/div} = 100\text{V/div}$ . When the input impedance of the oscilloscope is  $50\Omega$ , the actual vertical scale is  $2 \times 200 \times 0.5\text{V/div} = 200\text{V/div}$ .

Note: When the attenuation ratio of the oscilloscope matches the attenuation ratio of the high voltage probe, the vertical scale displayed on the oscilloscope is the actual scale.

## **Cleaning and General Care**

### **Cleaning:**

This product has no particular requirement for cleaning. To clean the probe, please wipe the probe surface using soft and clean cloth dampened with detergent.

### **General Care:**

Please store this product in anti-humidity case if the product will not be used for more than 60 days.

## **Warranty**

**RIGOL** TECHNOLOGIES CO., LTD. (hereinafter referred to as **RIGOL**) warrants that the product will be free from defects in materials and workmanship within the warranty period. If a product proves defective within the warranty period, **RIGOL** guarantees free replacement or repair for the defective product.

To get repair service, please contact with your nearest **RIGOL** sales or service office.

There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall **RIGOL** be liable for any consequential, indirect, ensuing, or special damages for any breach of warranty in any case.

# Specifications

## Technical Specifications

### RP1025D:

<b>Bandwidth</b>	DC - 25MHz (-3dB)
<b>Attenuation Ratio</b>	X20, X50, X200
<b>Accuracy</b>	±2%
<b>Input Voltage Range (DC + AC peak-peak value)</b>	X20 attenuation ratio: ≤ 140Vpp, about 50Vrms or DC X50 attenuation ratio: ≤ 350Vpp, about 125Vrms or DC X200 attenuation ratio: ≤ 1400Vpp, about 500Vrms or DC
<b>Maximum Input Voltage</b>	Maximum differential voltage: 1400V (DC+AC peak-peak value) or 500Vrms Voltage to ground at the input terminal: 600Vrms
<b>Input Impedance</b>	Differential: 4MΩ/1.2pF Single-ended and to ground: 2MΩ/2.3pF
<b>Output Voltage</b>	≤ ±6.5V
<b>Output Impedance</b>	50Ω
<b>Rise Time</b>	14ns
<b>Common-mode Rejection</b>	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
<b>Power Supply</b>	Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )
<b>Power Consumption</b>	<300 mA



**RP1050D:**

<b>Bandwidth</b>	DC - 50MHz (-3dB)
<b>Attenuation Ratio</b>	X100, X200, X500, X1000
<b>Accuracy</b>	±2%
<b>Input Voltage Range (DC + AC peak-peak value)</b>	X100 attenuation ratio: ≤ 700Vpp, about 230Vrms or DC X200 attenuation ratio: ≤ 1400Vpp, about 460Vrms or DC X500 attenuation ratio: ≤ 3500Vpp, about 1140Vrms or DC X1000 attenuation ratio: ≤ 7000Vpp, 2300Vrms or DC
<b>Maximum Input Voltage</b>	Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms Voltage to ground at the input terminal: 6500Vrms
<b>Input Impedance</b>	Differential: 16MΩ/1pF Single-ended and to ground: 8MΩ/2pF
<b>Output Voltage</b>	≤ ±7.0V
<b>Output Impedance</b>	50Ω
<b>Rise Time</b>	7ns
<b>Common-mode Rejection</b>	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
<b>Power Supply</b>	Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )
<b>Power Consumption</b>	<300 mA

**RP1100D:**

<b>Bandwidth</b>	DC - 100MHz (-3dB)
<b>Attenuation Ratio</b>	X100, X200, X500, X1000
<b>Accuracy</b>	±2%
<b>Input Voltage Range (DC + AC peak-peak value)</b>	X100 attenuation ratio: ≤ 700Vpp, about 230Vrms or DC X200 attenuation ratio: ≤ 1400Vpp, about 460Vrms or DC X500 attenuation ratio: ≤ 3500Vpp, about 1140Vrms or DC X1000 attenuation ratio: ≤ 7000Vpp, about 2300Vrms or DC
<b>Maximum Input Voltage</b>	Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms Voltage to ground at the input terminal: 6500Vrms
<b>Input Impedance</b>	Differential: 16MΩ/1.2pF Single-ended and to ground: 8MΩ/2.3pF
<b>Output Voltage</b>	≤ ±8.0V
<b>Output Impedance</b>	50Ω
<b>Rise Time</b>	3.5ns
<b>Common-mode Rejection</b>	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
<b>Power Supply</b>	Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )
<b>Power Consumption</b>	<300 mA

## Operation Environment

	General	Operation	Storage
Temperature	+20°C to +30°C	0°C to +50°C	-30°C to +70°C
Humidity	≤ 70%RH	10% to 85%RH	10% to 90%RH

## General Specifications

<b>Probe Dimensions</b>	RP1025D: about 214mm x 60mm x 35mm
	RP1050D: about 240mm x 85mm x 36mm
	RP1100D: about 240mm x 85mm x 36mm
<b>Weight</b>	RP1025D: 280g
	RP1050D: 280g
	RP1100D: 280g
<b>Safety</b>	IEC 1010-1, CAT III, pollution degree 2
<b>Electromagnetic Compatibility</b>	Conform to EN50081-1 and 50082-1 standards
<b>Maximum Voltage to Ground</b>	RP1025D: 600Vrms
	RP1050D: 6500Vrms
	RP1100D: 6500Vrms
<b>Using Environment</b>	Indoor environment
<b>Insulation Category</b>	Double insulation

# Accessories

## RP1025D:

	Accessories	Explanation	Quantity
1.	User Guide	Chinese & English	1
2.	AC power adaptor conforming to the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50Ω impedance RG58C UL 100cm length	1
4.	Dual-banana plug silicon cable	UL 6KV 18AWG 60cm length	Red: 1; Black: 1
5.	Safety IC clip	UL 1000V CAT III	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1

**RP1050D:**

	<b>Accessories</b>	<b>Explanation</b>	<b>Quantity</b>
1.	User Guide	Chinese & English	1
2.	AC power adaptor conforming to the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50Ω impedance RG58C UL 100cm length	1
4.	High voltage dedicated dual-banana plug silicon cable	UL 20KV 16AWG 60cm length	Red: 1; Black: 1
5.	High voltage dedicated IC clip	maximum 6500V (DC+AC p-p)	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1

**RP1100D:**

	<b>Accessories</b>	<b>Explanation</b>	<b>Quantity</b>
1.	User Guide	Chinese & English	1
2.	AC power adaptor conforming to the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50Ω impedance RG58C UL 100cm length	1
4.	High voltage dedicated dual-banana plug silicon cable	UL 20KV 16AWG 60cm length	Red: 1; Black: 1
5.	High voltage dedicated IC clip	maximum 6500V (DC+AC p-p)	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1
7.	Safety contact probe prod	UL 1000V, CAT III	Red: 1; Black: 1