

# R&S<sup>®</sup> RT-ZM Modular Probe System User Manual



1419312802

This manual describes the following R&S®RT-ZM models:

- R&S®RT-ZM15 (1800.4700K02)
- R&S®RT-ZM30 (1419.3005K02)
- R&S®RT-ZM60 (1419.3105K02)
- R&S®RT-ZM90 (1419.3205K02)
- R&S®RT-ZM130 (1800.4500K02)
- R&S®RT-ZM160 (1800.4600K02)

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol and without product type numbers, e.g. R&S®RT-ZM15/30/60/90/130/160 is indicated as R&S RT-ZM.

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# 1 Product Description

## 1.1 Key Features and Key Characteristics

The R&S RT-ZM is a modular probe consisting of a probe amplifier and various probe tip modules for different applications.

The R&S RT-ZM probe family features the MultiMode function which allows you to switch between single-ended, differential and common mode measurements without reconnecting or re-soldering the probe.

With different tip modules and tip cables, the R&S RT-ZM probe can be connected to a wide variety of devices under test (DUT) and is suitable for various measurement tasks.

Provided with special features such as the R&S ProbeMeter and the micro button, the R&S RT-ZM is designed to meet tomorrow's challenges in probing.

The probe is equipped with the Rohde & Schwarz probe interface. It can be connected to any Rohde & Schwarz instrument that is compatible with this interface. When connected to the front panel, the probe is controlled by the oscilloscope's software. Supported oscilloscopes are listed in the data sheet.

### 1.1.1 Key Characteristics

The key characteristics of the probe are the following:

MultiMode feature for differential, common mode and single-ended measurements	
Two different probe gain settings with 10:1 and 2:1 attenuation to achieve low system noise	
Bandwidth	DC to 1.5 GHz (R&S RT-ZM15) DC to 3 GHz (R&S RT-ZM30) DC to 6 GHz (R&S RT-ZM60) DC to 9 GHz (R&S RT-ZM90) DC to 13 GHz (R&S RT-ZM130) DC to 16 GHz (R&S RT-ZM160)
Dynamic range	±2.5 V (10:1 attenuation) ±0.5 V (2:1 attenuation)

## Key Features and Key Characteristics

Operating voltage window (each pin to GND)	$\pm 7.0$ V with $\pm 16$ V offset capability, DC to 100 kHz $\pm 5.0$ V with $\pm 16$ V offset capability, > 100 kHz
Maximum non-destructive input voltage	$\pm 30$ V
Input resistance	Differential: 400 k $\Omega$ Single-ended: 200 k $\Omega$
R&S ProbeMeter, measurement error	<0.2 %
R&S ProbeMeter, dynamic range	$\pm 7$ V
Offset capability	$\pm 16$ V for compensating single-ended, differential and common mode DC offsets
Low zero and gain errors throughout the entire temperature range for all measurement modes	
Micro button	
Rohde & Schwarz probe interface	

## 1.1.2 Key Features

### Micro button

The micro button at the probe head can remotely control different functions on the base unit. The assigned function is configured via the base unit.

For details, see [Chapter 2.5, "Micro Button"](#), on page 18.

### R&S ProbeMeter

The R&S ProbeMeter measures the DC voltage of the input signal directly at the probe tip. It provides a continuous high-precision DC voltage measurement that is independent of the settings of the oscilloscope and runs in parallel to the time domain measurement. If activated on the base unit, the measured value is displayed on the screen of the Rohde & Schwarz oscilloscope.

The R&S ProbeMeter simultaneously measures both differential and common mode DC voltages.

For details, see [Chapter 2.7, "R&S ProbeMeter"](#), on page 23.

### Probe DC correction

The probe amplifier includes an integrated data memory with individually determined DC correction parameters (e.g. gain, offset). These correction parameters are read out and processed by the Rohde & Schwarz oscilloscope. As a result,

the probe offers a very high degree of DC accuracy so that additional calibration procedures are not required.

### Probe frequency correction

The R&S RT-ZM probe amplifier includes an integrated data memory with individually measured S-parameters. These correction parameters are read out and processed by the Rohde & Schwarz oscilloscope. This leads to a more accurate probe frequency response and an enhanced measurement accuracy.

## 1.2 Unpacking

The carrying case contains the following items:



- R&S RT-ZM modular probe
- Carrying case
- Accessory boxes
- User manual
- R&S RT-ZM data sheet
- Calibration certificate
- Documentation of calibration values (if ordered)
- Foam inlay for tip cables

If R&S RT-ZMA tip modules were ordered, they come in a separate packaging and can be inserted into the foam inlay.

### 1.2.1 Inspecting the Contents

- Inspect the package for damage.  
Keep the package and the cushioning material until the contents have been checked for completeness and the device has been tested.  
If the packaging material shows any signs of stress, notify the carrier and your Rohde & Schwarz service center. Keep the package and cushioning material for inspection.
- Inspect the probe.

## Description of the Probe

If there is any damage or defect, or if the R&S RT-ZM modular probe does not operate properly, notify your Rohde & Schwarz service center.

- Inspect the accessories.  
If the contents are incomplete or damaged, notify your Rohde & Schwarz service center.

## 1.3 Description of the Probe

The probe consists of the active probe amplifier, the probe box for connection to the oscilloscope, the probe cable and various probe tip modules.



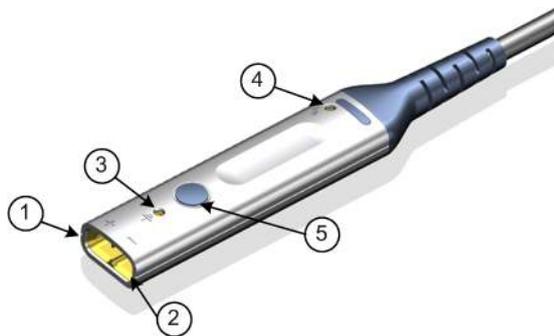
*Figure 1-1: R&S RT-ZM probe consisting of probe amplifier and probe box*

### 1.3.1 Probe Amplifier

The probe amplifier is designed for easy handling and high performance measurements. The R&S RT-ZM probe amplifier is designed for use with the R&S RT-ZMA probe tip modules.

See also: [Chapter 3, "Connecting the Probe to the DUT"](#), on page 24.

## Description of the Probe

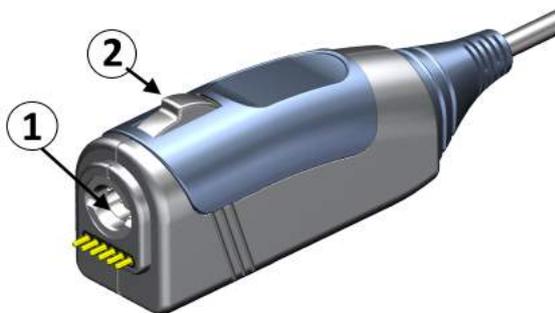


- (1) Positive coaxial input
- (2) Negative coaxial input
- (3) Ground socket
- (4) Termination voltage socket
- (5) Micro button

Signal and Termination voltage sockets are compatible with 0.64 mm (25 mil) square pins and 0.6 mm to 0.8 mm (24 mil to 35mil) round pins.

### 1.3.2 Probe Box

The probe box connects the probe and the oscilloscope via the Rohde & Schwarz probe interface. The Rohde & Schwarz probe interface contains a male precision 7 mm (276 mil) BNC connector and six pogo pin connectors. This interface provides the required supply voltage and is also used to transmit analog signals and digital data simultaneously. All the analog voltages required by the probe are generated in the probe box. This approach ensures that it will be possible to operate future probes on any base unit that features a Rohde & Schwarz probe interface.



- (1) Rohde & Schwarz probe interface with 7 mm (276 mil) coaxial connector and 6 pogo pins
- (2) Release knob

### 1.3.3 Probe Tip Modules

To use the probe for measurements, select the appropriate probe tip module and connect it to the probe amplifier.

Figure 1-2 shows all probe tip modules are available for the R&S RT-ZM probe. The usage of probe tip modules is described in [Chapter 3, "Connecting the Probe to the DUT"](#), on page 24.

If you need more probe tip modules, you can order them at Rohde & Schwarz. The order numbers are provided in the data sheet.

Description of the Probe

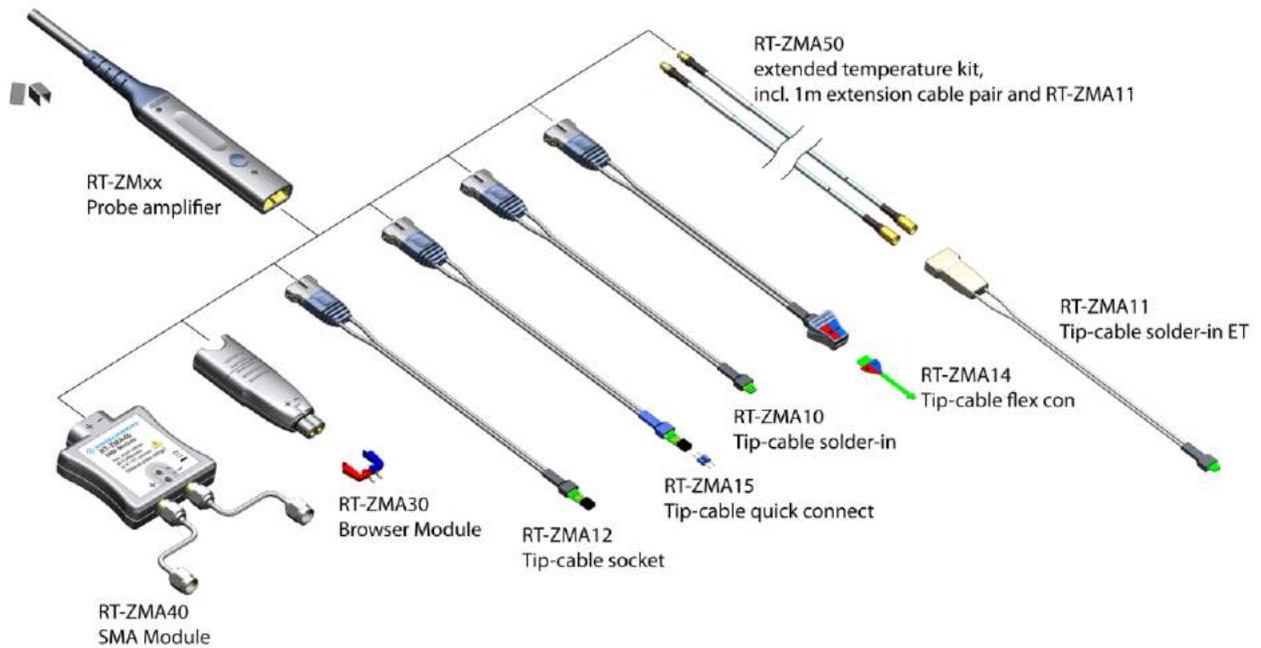


Figure 1-2: R&S RT-ZM probing system compatibility chart

### 1.3.4 Accessories and Items

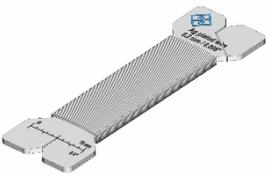
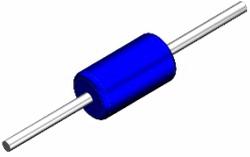
#### 1.3.4.1 Accessories Supplied

Table 1-1 shows the accessories that are supplied with the R&S RT-ZM modular probe.

Table 1-1: Accessories supplied

Item	Quantity	Description
	1	Lead, 15 cm / 5.9 in
	1	Solder wire 0.1mm, Ag plated, 10 m

## Description of the Probe

Item	Quantity	Description
	1	Solder wire 0.2mm, Ag plated, 10 m
	1	Solder wire, lead free, 5 m
	7	Adhesive pads
	20	Solder in resistor (270 Ω) for R&S RT-ZMA15
	20	Solder lead for R&S RT-ZMA12/15

For a list of spare parts, see [Chapter 4.5, "Spare Parts"](#), on page 37.

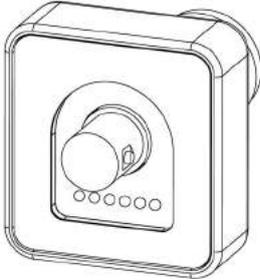
### 1.3.4.2 Optional Accessories

If the delivered accessories do not meet individual customer requirements, Rohde & Schwarz offers different accessory sets for sale. The order numbers are provided in the data sheet.

**Table 1-2: Optional accessories**

Accessory set	Items	Quantity
R&S RT-ZA4 mini clips	Mini clip	10
R&S RT-ZA5 micro clips	Micro clip	4

## Description of the Probe

Accessory set	Items	Quantity
R&S RT-ZA6 lead set	Lead, 6 cm / 2.4 in Lead, 15 cm / 5.9 in	5 5
R&S RT-ZA9 probe box to N/USB adapter 	The adapter connects the R&S RT-ZM modular probe to any other oscilloscope or any other measurement instrument (e.g. a network or spectrum analyzer). Using the USB interface of the adapter, the probe can be powered and controlled from any conventional PC. However, full software functionality is only provided by the supported oscilloscopes (see data sheet).	1

### 1.3.4.3 Service Accessories

To order accessories for servicing the probe, contact your Rohde & Schwarz service center. The following accessories are available:

**Table 1-3: Service accessories**

Item	Description
R&S RT-ZK3	The service kit is used to calibrate the probe, to do performance tests, and for servicing. The service kit includes all adapters and accessories to connect the probe to the required measuring instruments.
R&S RT-ZM Service Manual	The service manual contains a detailed description of the performance test to verify the specifications, and other important service procedures.

## 2 Putting into Operation

The probe is designed for usage with oscilloscopes that have a Rohde & Schwarz probe interface. Supported Rohde & Schwarz oscilloscopes are listed in the probe's data sheet.

Read and observe the printed "Basic Safety Instructions" that are delivered with the probe. Also, read and observe the safety instructions of the oscilloscope the probe is connected to.

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### **NOTICE**

#### **Maximum non-destructive input voltage**

The maximum non-destructive input voltage is  $\pm 30$  V. A higher input voltage can destroy the probe.

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### **NOTICE**

#### **Risk of device damage**

The R&S RT-ZM can withstand a moderate amount of physical and electrical stress. To avoid damage, treat the probe with care:

- Do not exceed the specified voltage limits.
  - Connect the R&S RT-ZM only to an instrument with Rohde & Schwarz probe interface. Never connect it to a usual BNC jack. Although the 7 mm coaxial connector looks like a standard BNC connector, it is constructed differently and does not fit to the standard BNC jack. The interface of the R&S RT-ZM can withstand a higher frequency limit.
  - Handle the probe by the probe tip module or probe box.
  - Handle the probe by the probe head or probe box. Avoid excessive strain on the probe cable, and kinking.
  - Prevent the probe from receiving mechanical shock.
  - Do not spill liquids on the probe.
  - Store the probe in a shock-resistant case, e.g. in the foam-lined shipping case.
-

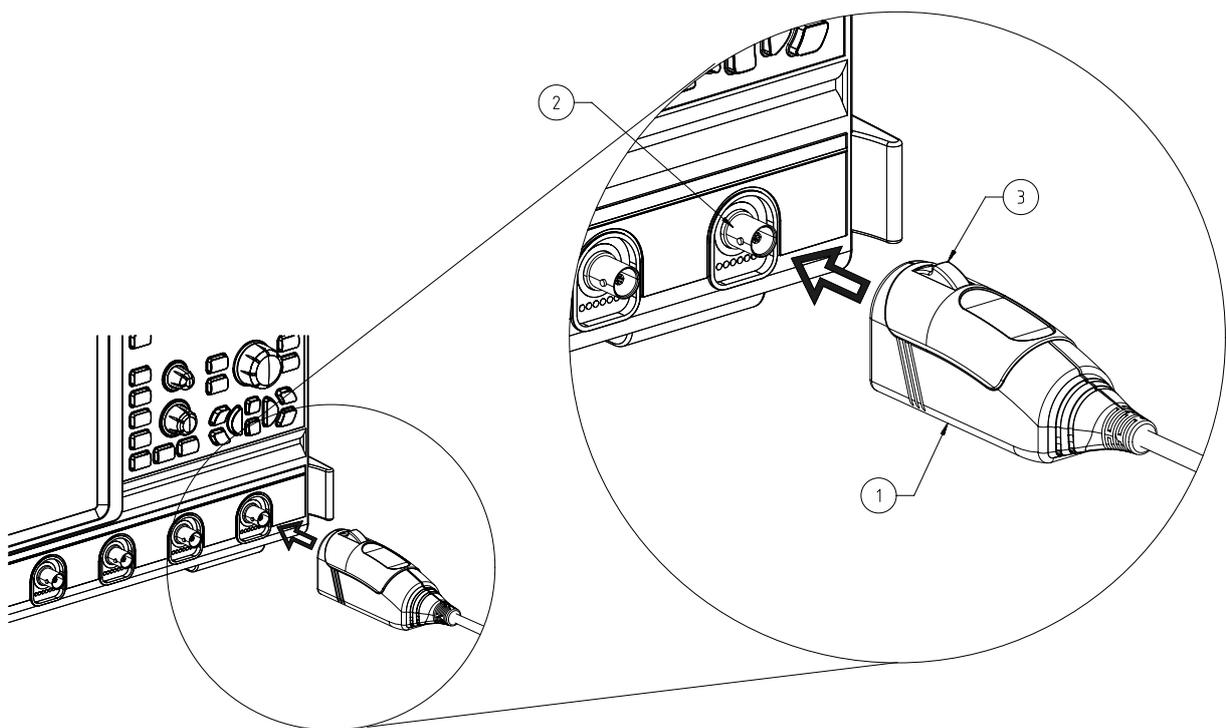
## Connecting the Probe to the Oscilloscope

During usage, the probe slightly heats up. Warming is normal behavior and not a sign of malfunction.

## 2.1 Connecting the Probe to the Oscilloscope

1. If your DUT is floating and not grounded, connect the DUT ground to the oscilloscope ground before connecting any probe tip module to your DUT.
2. Connect the probe box (1) to the Rohde & Schwarz probe interface of the oscilloscope (2).

The probe snaps in when connected properly to the port.



**Figure 2-1: Connecting the probe to the Rohde & Schwarz oscilloscope**

- ▶ To disconnect the probe:
  - a) Press and hold the release button (3).
  - b) Pull the probe box away from the oscilloscope.

## 2.2 Identification of the Probe

When the probe is connected to the oscilloscope, the oscilloscope recognizes the probe and reads out the probe-specific parameters.

The complete probe information is shown in the probe settings dialog. For more information, refer to the user manual of your oscilloscope.

## 2.3 MultiMode

The R&S RT-ZM probe family features the MultiMode function which allows you to switch between single-ended, differential and common mode measurements without reconnecting or resoldering the probe.

Four different input voltages can be measured with the MultiMode feature:

- **P-Mode:** (pos.) Single-ended input voltage ( $V_p$ )  
Voltage between the positive input terminal and ground
- **N-Mode:** (neg.) Single-ended input voltage ( $V_n$ )  
Voltage between the negative input terminal and ground
- **DM-Mode:** Differential mode input voltage ( $V_{dm}$ )  
Voltage between the positive and negative input terminal
- **CM-Mode:** Common mode input voltage ( $V_{cm}$ )  
Mean voltage between the positive and negative input terminal vs. ground

$$V_{cm} = \frac{V_p + V_n}{2}$$



In the N-Mode, the signal at negative input terminal is not inverted.

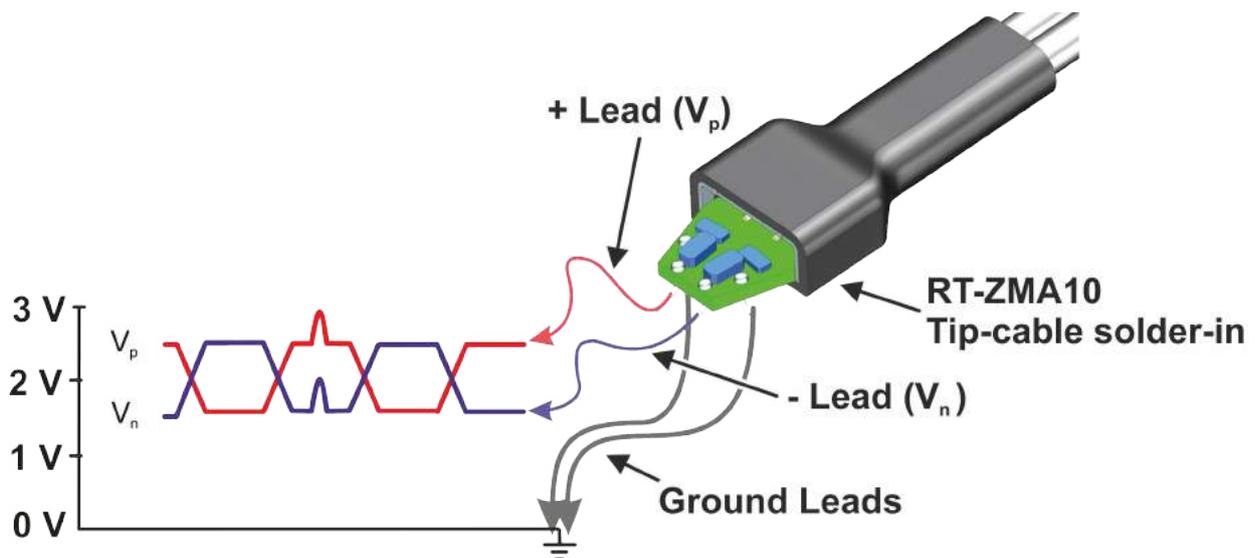


Figure 2-2: Input voltage at probe tip

The R&S RT-ZM probes have three input terminals: the positive signal input (+), the negative signal input (-), and ground.

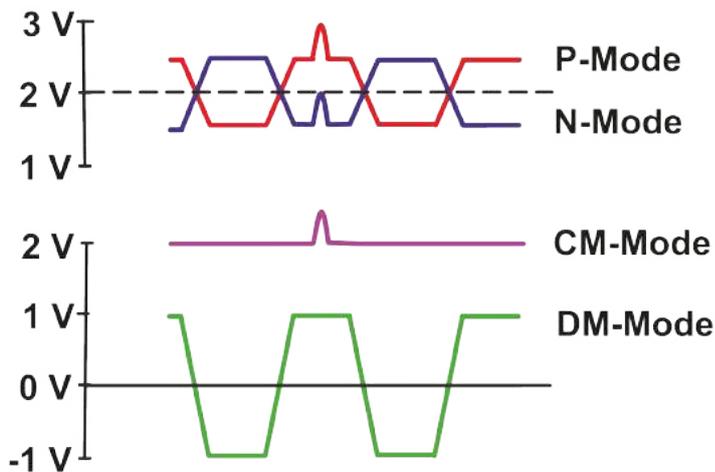


Figure 2-3: Displayed voltage on oscilloscope screen

The setting of the probe mode is part of the probe settings of the channel to which the probe is connected. You can also configure the micro button at the probe amplifier to select the "Probe Mode". For more details, see the oscilloscope's user manual.



The MultiMode feature is not supported by R&S RT-ZMA30 browser module because there is no ground connection.

## 2.4 Dynamic Range and Operating Voltage Window

Two separate specifications are necessary to characterize the permissible input voltage range of a R&S RT-ZM MultiMode probe.

### Measurement mode Single-Ended P, Single-Ended N, or Common Mode

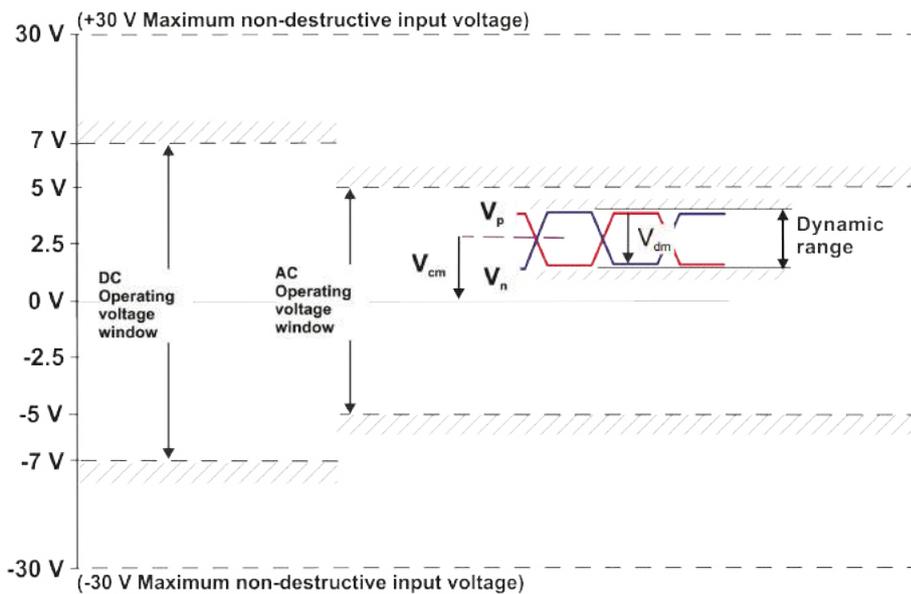
Dynamic Range	$\pm 2.50$ V at 10:1 attenuation
	$\pm 0.50$ V at 2:1 attenuation

The dynamic range for single-ended (P-Mode, N-Mode) or common mode (CM-Mode) measurements designates the maximum voltage ( $V_p$ ,  $V_n$ ) that can occur between each of the two input terminals ( $V_p$ ,  $V_n$ ) and ground at the probe tip.

### Differential measurement mode

Dynamic Range	$\pm 2.50$ V at 10:1 attenuation
	$\pm 0.50$ V at 2:1 attenuation
Operating voltage window (each pin to ground)	$\pm 7.0$ VDC to 100 kHz
	$\pm 5.0$ V > 100 kHz at 10:1 attenuation
	$\pm 1.0$ V > 100 kHz at 2:1 attenuation

- The dynamic range for differential measurement (DM-Mode) designates the maximum differential voltage  $V_{dm}$  that can occur between the positive and negative signal terminal at the probe tip.
- At the same time, the two voltage values at each of the two signal terminals  $V_p$  and  $V_n$  referenced to the common ground must not exceed a specific limit value. This limitation is referred to as the operating voltage window (some manufacturers also use the less precise term "common mode range" for the same parameter).
- If one of these ranges is exceeded, an unwanted signal clipping can occur. When measuring differential signals, frequently change to common mode measurement to check for unallowed common mode signals.
- The attenuation is automatically selected by the oscilloscope's "V/div" setting



**Figure 2-4: Operating voltage window for differential measurement mode DM at 10:1 attenuation for all offset settings at 0 V**

## 2.5 Micro Button

The micro button provides easy and quick access to important functions of the Rohde & Schwarz oscilloscope. After a function has been assigned, pressing the micro button remotely controls this specific function on the base unit. For example, "Run continuous" or "Run single" are often assigned to the micro button.

The configuration of the micro button is part of the probe settings of the channel to which the probe is connected. For more details, see the oscilloscope's user manual.

## 2.6 Offset Compensation

The R&S RT-ZM probe features the most comprehensive offset compensation function. The compensation of DC components directly at the probe tip even in front of the active probe amplifier is possible with an extremely wide compensation range of  $\pm 16$  V.

The offset compensation feature is available for every MultiMode setting:

MultiMode setting	Offset compensation	Offset compensation range	Application
DM-Mode	Differential DC voltage	$\pm 16$ V	Probing single-ended signals with the R&S RT-ZMA30 browser module, e.g. power rails with high DC component and small AC signal.
CM-Mode	Common mode DC voltage	$\pm 16$ V	Measurements of signals with high common mode levels, e.g. current measurements with a shunt resistor.
P-Mode	DC voltage at positive input terminal	$\pm 24$ V	Measurement of single-ended AC signals with high superimposed DC component at the positive input terminal. <b>Note:</b> The maximum voltage difference between the positive and negative input terminals is 16 V.
N-Mode	DC voltage at negative input terminal	$\pm 24$ V	Measurement of single ended AC signals with high superimposed DC component at the negative input terminal. <b>Note:</b> The maximum voltage difference between the positive and negative input terminals is 16 V.

You can set the offset compensation at the oscilloscope in various ways:

- Use the vertical [Position] knob. Before adjusting the offset, make sure that the function of the knob is set to "Offset".
- Use the probe settings menu of the channel to which the probe is connected.
- Use the micro button to compensate the DC component of the measurement signal, which is very helpful during measurements of input signals with different DC offsets. Therefore, assign "Set offset to mean" to the micro button function.

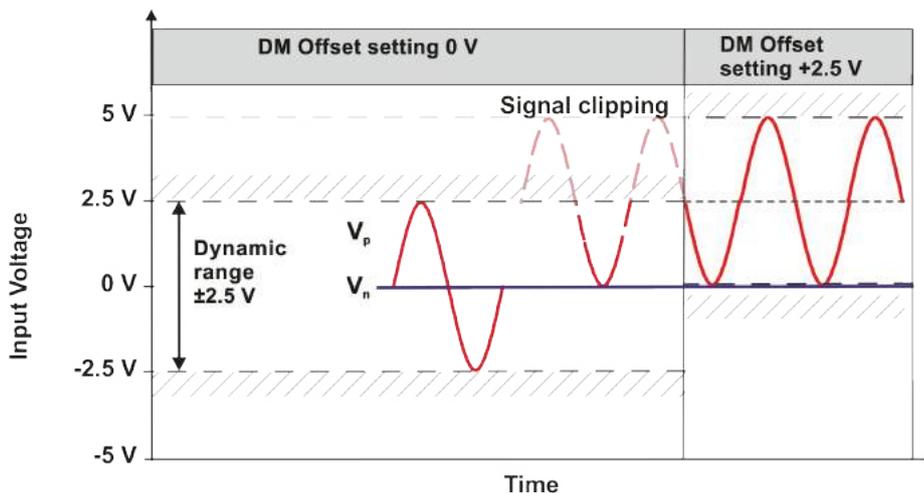
Setting an offset compensation voltage and then switching the probe measurement mode does not affect the offset settings.

For example, you can measure a differential signal superimposed with a high DC common mode component. First switch to CM-mode and compensate the common mode offset using the vertical [Position] knob until the measurement trace is in the center of the oscilloscope screen. Then switch back to DM-mode to measure the differential signal.

For more details on setting the offset compensation voltage, refer to the user manual of your Rohde & Schwarz oscilloscope.

## 2.6.1 Differential Offset

The differential offset function can compensate a DC voltage applied between the positive ( $V_p$ ) and the negative ( $V_n$ ) input terminal at the probe tip. Setting a differential offset compensation in DM measurement mode is directly visible on the oscilloscope screen as a voltage offset of the measured waveform.



**Figure 2-5: Differential offset compensation for a single-ended measurement (negative input connected to ground) using an R&S RT-ZM15/30/60/90/130/160**

## 2.6.2 Common Mode Offset

The common mode offset function can compensate a DC voltage applied to both input terminals at the probe tip (referenced to ground). Setting a common mode offset compensation in CM measurement mode is directly visible on the oscilloscope screen as a voltage offset of the measured waveform.

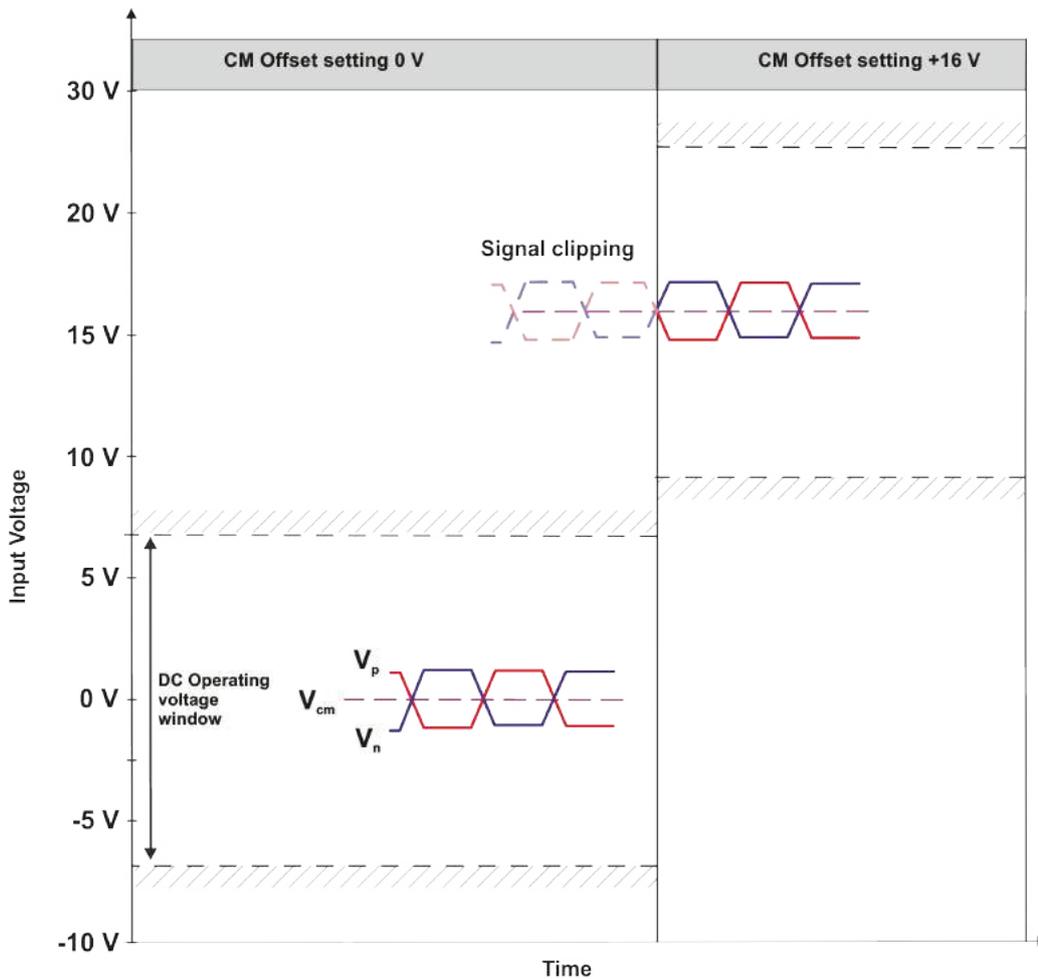


Figure 2-6: Common mode (CM) offset compensation for a differential measurement

### 2.6.3 Positive Input Single-Ended Offset

The P offset function can compensate a DC voltage applied to the positive input terminal ( $V_p$ ) at the probe tip (referenced to ground). Setting a P offset compensation in single-ended P measurement mode is directly visible on the oscilloscope screen as a voltage offset of the measured waveform.

This function is useful when measuring single-ended AC signals with high superimposed DC component at the positive input terminal referenced to ground.

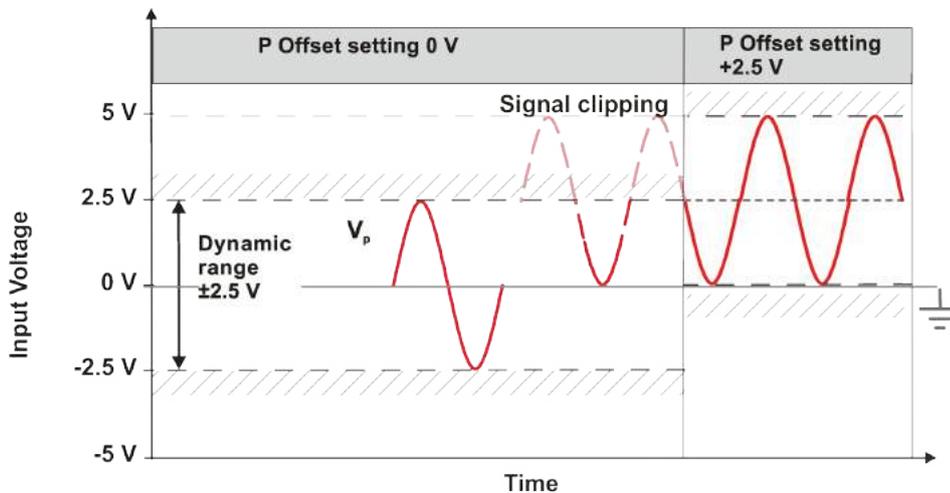


Figure 2-7: P offset compensation for a single-ended measurement at the positive input terminal

## 2.6.4 Negative Input Single-Ended Offset

The N offset function can compensate a DC voltage applied to the negative input terminal ( $V_n$ ) at the probe tip (referenced to ground). Setting an N offset compensation in single-ended N measurement mode is directly visible on the oscilloscope screen as a voltage offset of the measured waveform.

This function is useful when measuring single-ended AC signals with high superimposed DC component at the negative input terminal referenced to ground.

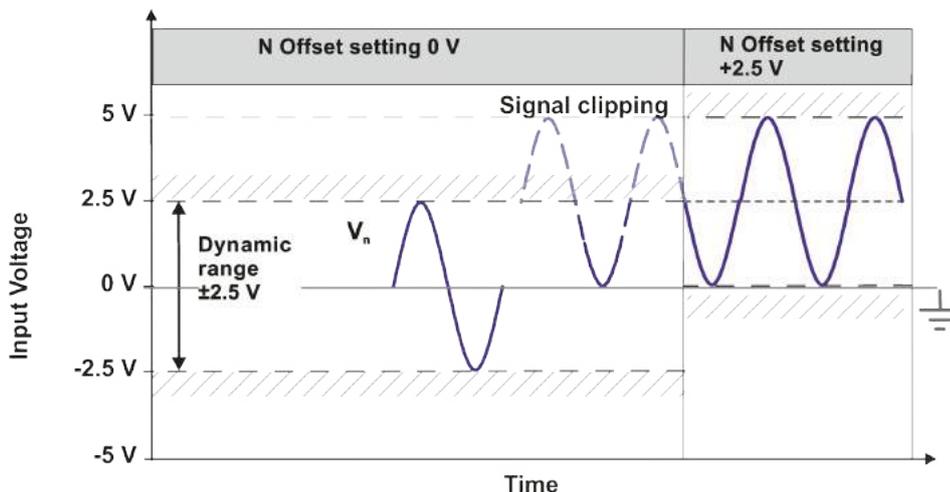


Figure 2-8: N offset compensation for a single-ended measurement at the negative input terminal

## 2.7 R&S ProbeMeter

The R&S ProbeMeter is an integrated voltmeter that measures DC voltages with higher precision compared to the oscilloscope's DC accuracy. The DC measurement is performed continuously and in parallel to the time domain measurement of the oscilloscope.

High-precision measurements are achieved through immediate digitization of the measured DC voltage at the probe tip.

The R&S ProbeMeter measures the differential and common mode DC voltages simultaneously, and independently of the MultiMode setting.

When the R&S ProbeMeter is active, the measured values are displayed on the oscilloscope. The R&S ProbeMeter state is part of the probe settings of the channel to which the probe is connected. For details, refer to the user manual of the Rohde & Schwarz oscilloscope.

Advantages of the R&S ProbeMeter:

- Measures DC voltages of different levels, no need to adjust the measurement range of the oscilloscope.
- True DC measurement (integration time > 100 ms), not mathematical average of displayed waveform.
- High measurement accuracy and low temperature sensitivity.
- Simple means of setting the oscilloscope's trigger level and vertical scaling if a waveform is not visible.
- Independent of oscilloscope settings for offset, position, vertical scale, horizontal scale, and trigger.
- Independent of probe settings for measurement mode and gain.
- Unique way to detect unexpected or inadmissible common mode voltages, e.g. bias points - measurement of common mode DC voltages without reconnecting the probe.
- Differential measurement range  $\pm 2.5$  V + offset compensation setting.  
Common mode measurement range  $\pm 7$  V + common mode offset compensation setting.

## 3 Connecting the Probe to the DUT

This chapter describes how to connect the probe to the DUT using different R&S RT-ZMA tip modules offered for the R&S RT-ZM probe family. The various tip modules are described and their use is explained. Note that you always need a tip module, measurements without any tip module are not possible.

The recommended configurations are designed to give the best probe performance for different probing situations, to measure with confidence in the performance and signal fidelity. Using the recommended connection configurations is your key to making accurate oscilloscope measurements with known performance levels.

### Probe frequency correction

For R&S RT-ZMAxx probe tip modules, typical S-parameters are determined and stored in the oscilloscope. When the connected R&S RT-ZMA tip module is selected in the oscilloscope probe menu, the appropriate correction parameters are automatically processed by the Rohde & Schwarz oscilloscope. Correction leads to a more accurate probe frequency response and an enhanced measurement accuracy.

Supported oscilloscopes are listed in the data sheet.

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#### **NOTICE**

##### **Damage caused by electrostatic discharge**

Electrostatic discharge (ESD) can damage the electronic components of the probe and the instrument, and also the device under test (DUT). Electrostatic discharge is most likely to occur when you connect or disconnect a DUT or test fixture to the probe and to the instrument's test ports. To prevent electrostatic discharge, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination. Discharge cables and probe tips before you connect them.

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**NOTICE****Risk of damaging the device**

To avoid damage to the device, take the following precautions:

- Only connect the probe tip module to the probe amplifier if the probe amplifier is connected to the oscilloscope channel. This ensures that the amplifier is grounded.
- Always disconnect the probe tip module from the probe amplifier before unsoldering or disconnecting it, moving it to a new position and resoldering or reconnecting it.
- Be careful when handling the probe amplifier connection pins:
  - When connecting a tip module to the probe amplifier, push it straight in.
  - When disconnecting a tip module from the probe amplifier, pull the tip module connectors straight out of the sockets.
  - Never bend the probe tip module to pop it loose from the amplifier.
  - Do not wiggle the probe tip module up and down or twist it to remove the connector from the probe amplifier.

Protect the probe amplifier against excess heat. When using the probe amplifier with tip modules that can withstand extreme temperatures, do not subject the probe amplifier to temperatures outside of its operating range of 0 °C to 40 °C.

Some solder-in accessories are very fine and sensitive. Stabilize the probe using appropriate means (e.g. adhesive pads, probe positioner) in order to protect the solder joint from excessive mechanical stress.

### 3.1 R&S RT-ZMA10 Tip Cable Solder-In

The R&S RT-ZMA10 tip cable solder-in is a semi-permanent solder-in connection that supports the full bandwidth of the probe amplifier.

## R&amp;S RT-ZMA10 Tip Cable Solder-In



The R&S RT-ZMA10 tip cable solder-in is well suited for creating solid contact with test points that are hard to reach (e.g. IC pins).

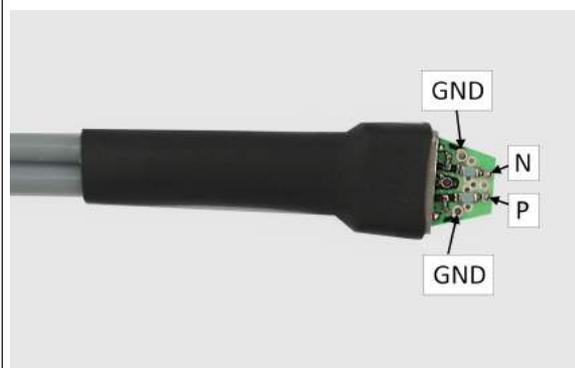
Bandwidth: up to 16 GHz

MultiMode compatible

Length: 15 cm

Variable span range of the leads: 0 mm to 5 mm (0 mil to 200 mil).

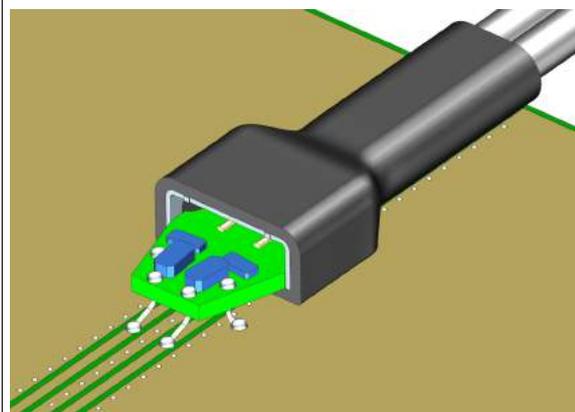
Temperature range: -30 °C to +80 °C



For measurements with MultiMode functionality, solder both signal leads (P,N) in front and both ground wires (GND) at the outside of the tip board to the DUT. In this configuration, you can measure single-ended, differential and common mode signals without resoldering the tip cable.

If you want to use the DM Mode only for differential measurements, you do not have to solder the ground wires (GND). Leave ground vias open and only solder both signal leads (P,N) to your DUT.

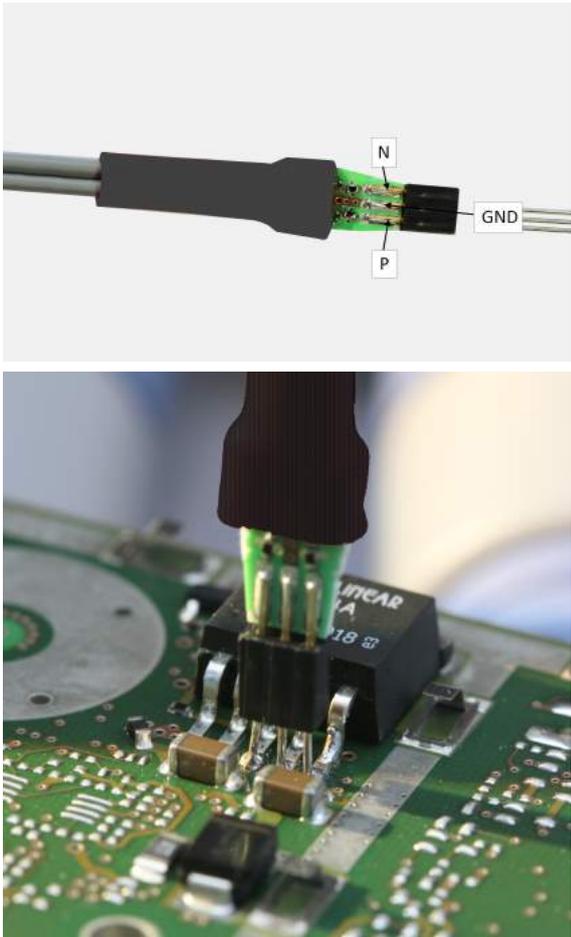
Always keep soldered leads as short as possible for best performance and signal integrity

**NOTICE****Risk of damaging the probe due to excess heat**

Do not leave the soldering iron in contact with the probe tip for more than a few seconds at a time. Excess heat may damage the probe.

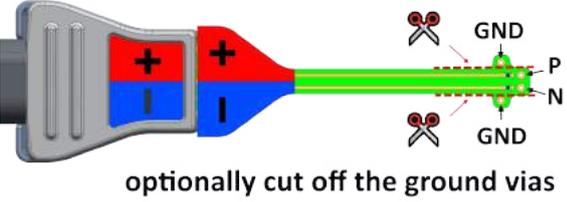
### 3.2 R&S RT-ZMA12 Tip Cable Square Pin

The R&S RT-ZMA12 tip cable square pin is used to plug onto pins and make a connection to the DUT that is easy to plug and remove.

	<p>The R&amp;S RT-ZMA12 tip cable square pin is well suited for creating contact with soldered in test leads. It can also be used to plug onto pin strips with a pitch of 1.27 mm (50 mil).</p> <p>Bandwidth: up to 6 GHz  MultiMode compatible  Length: 15 cm  Distance range: 1.27 mm (50 mil)  Temperature range: -30°C to +80°C</p>
	<p>Permanently solder 2 signal (P,N) and ground wires (GND) to your DUT and effortlessly connect or reconnect your socket head to your measurement point. In this configuration, you can measure single-ended, differential and common mode signals.</p> <p>However, if you are making only differential measurements you do not have to connect the GND lead (GND).</p> <p>Always keep soldered or connected pins as short as possible for best performance and signal integrity.</p>

### 3.3 R&S RT-ZMA14 Tip Cable Flex Connect

The R&S RT-ZMA14 tip cable flex connect makes an easy to clamp and remove connection onto solder-in flex tips soldered directly to the DUT, and supports the full bandwidth of the probe amplifier.

	<p>The R&amp;S RT-ZMA14 tip cable flex connector is suited for contacting with soldered-in flex tips. Solder as many flex tips onto your DUT as needed and easily connect and reconnect different test points using the clamp connector of the tip cable.</p> <p>Bandwidth: up to 16 GHz  MultiMode compatible  Length: 15 cm  Variable span range of the leads: 0 mm to 5 mm (0 mil to 200 mil)  Temperature range: -30°C to +80°C</p>
 <p>optionally cut off the ground vias</p>	<p>Permanently solder the flex tips and ground wire (GND) to your DUT and effortlessly connect or reconnect your RT-ZMA14 tip cable using its clamp connector.</p> <p>In this configuration, you can measure single-ended, differential and common mode signals. However, if you are making only differential measurements you do not have to solder the ground wires (GND) to the two ground vias at both sides of the flex tips. For differential measurements only, optionally cut off the ground vias to reach smaller probing areas.</p> <p>Always keep soldered pins and resistors as short as possible for best performance and signal integrity.</p>

#### NOTICE

##### Risk of damaging the probe due to excess heat

Do not leave the soldering iron in contact with the probe tip for more than a few seconds at a time. Excess heat may damage the probe.

**NOTICE****Risk of damaging the accessories**

Always mechanically strain-relieve the flex tip using adhesive pads or low-temperature hot glue to protect your probe accessories and DUT from damage.

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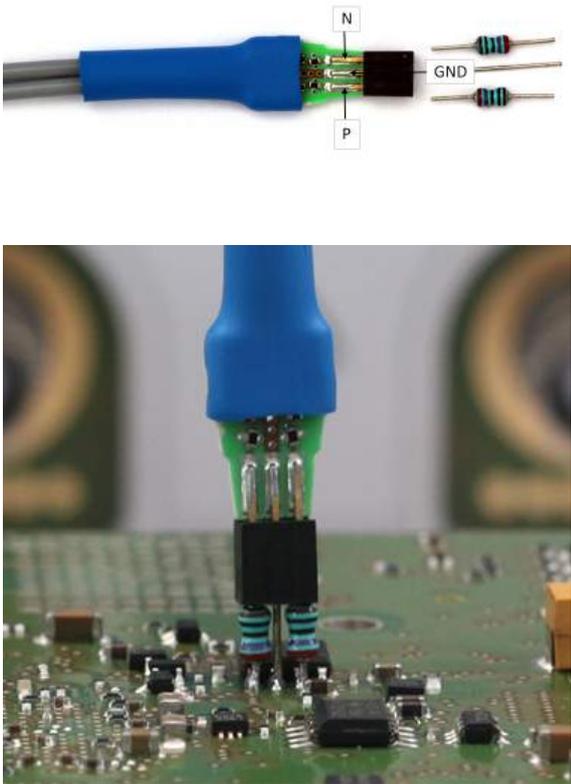
**NOTICE****Risk of damaging the clamp connector**

During soldering always disconnect the flex tip from the R&S RT-ZMA14 tip cable to prevent damaging the clamp connector.

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### 3.4 R&S RT-ZMA15 Tip Cable Quick Connect

The R&S RT-ZMA15 tip cable quick connect makes an easy to plug and remove connection onto resistors soldered directly to the DUT, and supports the full bandwidth of the probe amplifier.

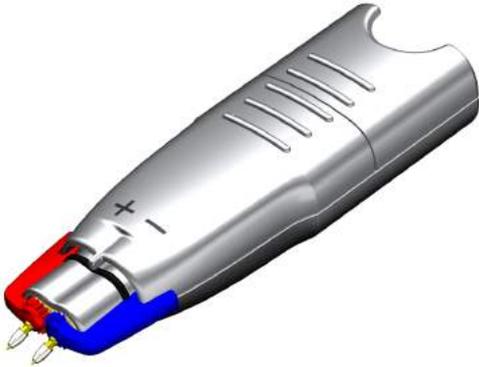
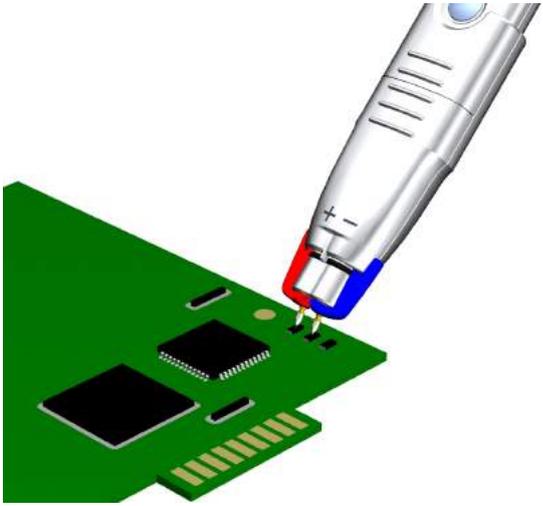
	<p>The R&amp;S RT-ZMA15 tip cable quick connect is suited for creating contact with soldered-in 270 <math>\Omega</math> resistors, and easily reconnecting different test points.</p> <p>Only use the 270 <math>\Omega</math> resistors from the R&amp;S RT-ZMA accessories set for optimal flatness and bandwidth</p> <p>Bandwidth: up to 12 GHz</p> <p>MultiMode compatible</p> <p>Length: 15 cm</p> <p>Distance range: 1.27 mm (50 mil)</p> <p>Temperature range: -30°C to +80°C</p>
	<p>Permanently solder the 270 <math>\Omega</math> resistors (P,N) and ground wire (GND) to your DUT and effortlessly connect or reconnect your socket head to your measurement point. In this configuration, you can measure single-ended, differential and common mode signals.</p> <p>However, if you are making only differential measurements you do not have to solder the ground wire (GND) between the two resistors.</p> <p>Always keep soldered pins and resistors as short as possible for best performance and signal integrity.</p>

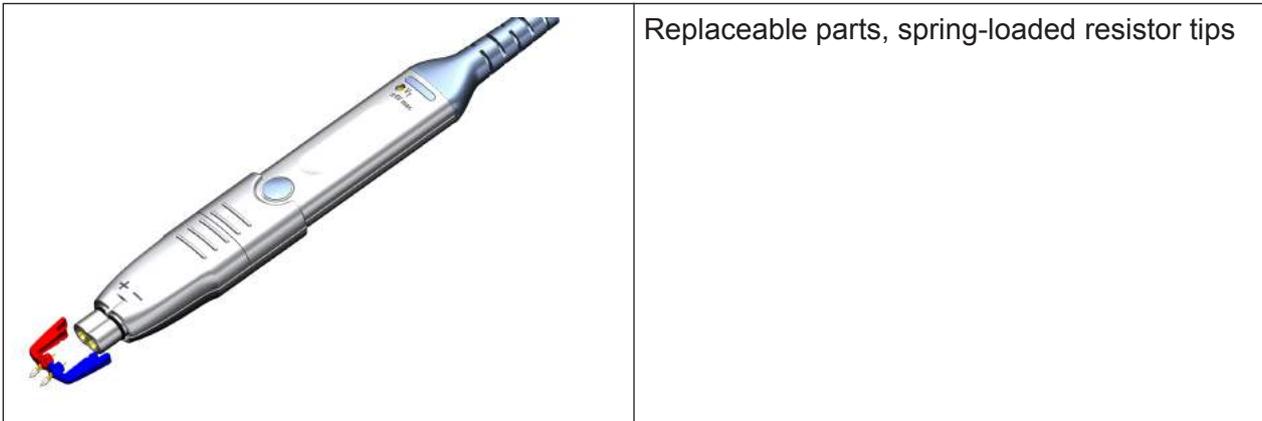
### 3.5 R&S RT-ZMA30 Browser Module

The R&S RT-ZMA30 browser module allows handheld probing with maximum convenience at the DUT and supports the full bandwidth of the probe amplifier.

**⚠ CAUTION****Risk of injuries**

The included browser pins are exceptionally sharp and must be handled with extreme care. To prevent injuries, always use tweezers when inserting or removing pins.

	<p>The R&amp;S RT-ZMA30 browser module has spring-loaded pins with damping resistors close to the test point.</p> <p>The pin distance can be set by turning the levers.</p> <p>Bandwidth: up to 16 GHz</p> <p>Distance range: 0.5 mm to 8 mm (20 mil to 315 mil)</p> <p>Axial travel: 0.5 mm (20 mil)</p> <p><i>Not</i> MultiMode compatible, the module has no ground connector.</p>
	<p>Using the R&amp;S RT-ZMA30 browser module sets the probe amplifier to DM mode.</p> <p>To measure differential signals, connect both pins to the differential pair at the DUT.</p> <p>To probe single-ended signals, connect the positive pin to the signal and the negative pin to the ground.</p>

**NOTICE****Risk of damage due to excess force**

To avoid damaging the browser's pins, do not apply a side load to the browser.

Do not apply too much force when browsing. The weight of the probe in your hand should be sufficient.

Always remove the browser from the DUT before disconnecting the probe amplifier from the oscilloscope.

### 3.6 R&S RT-ZMA40 SMA Module

The R&S RT-ZMA40 SMA module allows you to connect two 2.92 mm, 3.5 mm, or SMA cables to make a MultiMode measurement on a single oscilloscope channel. It supports the full bandwidth of the probe amplifier.

When connecting the SMA module to the output sockets of the DUT, use the S-shaped semi-rigid cables supplied with the SMA module. Change the angle of the S-shaped semi-rigid cables to adjust the distance of the input sockets. The S-shaped semi-rigid cables are phase-matched to prevent unwanted signal conversion and assure best signal integrity.

Always remove the SMA module from the DUT before disconnecting the probe amplifier from the oscilloscope.

## R&amp;S RT-ZMA50 Extreme Temperature Kit

	<p>Bandwidth: up to 16 GHz  MultiMode compatible  Termination voltage range: <math>\pm 4\text{V}</math> with a maximum current of <math>\pm 40\text{ mA}</math>  Distance range: up to 65 mm (2560 mil)</p>
	<p>The R&amp;S RT-ZMA40 SMA module applies a termination voltage (<math>\pm 4\text{ V}</math>) to the DUT to enable measurements against a common mode DC voltage instead of ground, which is required for many digital signal standards.</p> <p>The termination voltage can be controlled by the oscilloscope. Therefore, connect the supplied red DC lead to the <math>V_T</math> terminal of the R&amp;S RT-ZM probe amplifier to the <math>V_T</math> terminal of the R&amp;S RT-ZMA40 SMA module. Necessary termination voltage is detected automatically, but can also be set manually.</p>

### 3.7 R&S RT-ZMA50 Extreme Temperature Kit

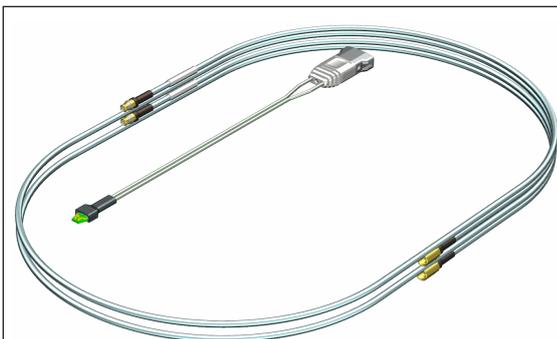
The R&S RT-ZMA50 extreme temperature kit contains a R&S RT-ZMA11 solder-in tip cable and a pair of matched extension cables for measurements in extreme temperature environments.

#### NOTICE

##### Risk of damaging the probe due to excess heat

Do not leave the soldering iron in contact with the probe tip for more than a few seconds at a time. Excess heat may damage the probe.

## R&amp;S RT-ZMA50 Extreme Temperature Kit



The R&S RT-ZMA50 extreme temperature kit is well suited for creating solid contact with test points in extreme temperature areas, e.g. temperature chambers.

**Note:** The R&S RT-ZM probe amplifier always remains outside the temperature chamber and has a specified operating temperature range from 0°C to 40°C.

Bandwidth: up to 12 GHz

MultiMode compatible

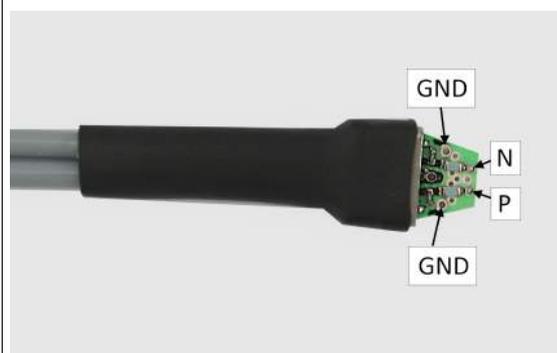
Length: 115 cm

Variable span range of the leads: 0 mm to 5 mm (0 mil to 200 mil)

Temperature range: -55° C to +125° C



The R&S RT-ZMA11 tip cable solder-in ET cannot be plugged directly into the probe amplifier. Always connect the R&S RT-ZMA11 tip cable solder-in ET to the 1-m extension cable pair and connect the other end of the extension cable pair to the R&S RT-ZM probe amplifier.

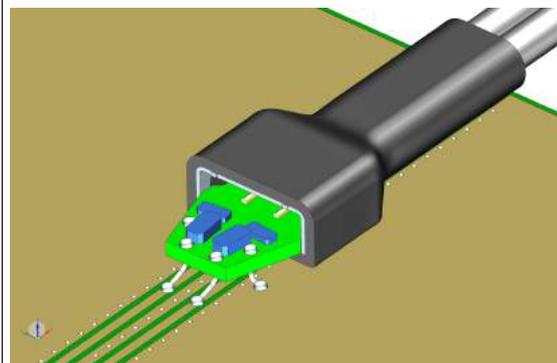


For measurements with MultiMode functionality, solder both signal wires (P,N) and both ground wires (GND) at the outside of the tip board to the DUT.

In this configuration, you can measure single-ended, differential and common mode signals.

If you want to use the DM mode only for differential measurements, you do not have to solder the ground wires (GND).

Always keep soldered leads as short as possible for best performance and signal integrity.



## 4 Maintenance and Service

Like all Rohde & Schwarz products, Rohde & Schwarz probes and adapters are of high quality and require only minimum service and repair. However, if service or calibration is needed, contact your Rohde & Schwarz service center. Return a defective product to the Rohde & Schwarz service center for diagnosis and exchange.

### 4.1 Cleaning

To clean the exterior of the product, use a soft cloth moistened with either distilled water or isopropyl alcohol. Before using the product again, make sure to dry it completely. Never use cleaning agents such as solvents (thinners, acetone, etc.), acids, bases or other substances.

### 4.2 Contacting Customer Support

#### **Technical support – where and when you need it**

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

#### **Up-to-date information and upgrades**

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

#### **Europe, Africa, Middle East**

Phone +49 89 4129 12345

[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)

**North America**

Phone 1-888-TEST-RSA (1-888-837-8772)

[customer.support@rsa.rohde-schwarz.com](mailto:customer.support@rsa.rohde-schwarz.com)

**Latin America**

Phone +1-410-910-7988

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**Asia/Pacific**

Phone +65 65 13 04 88

[customersupport.asia@rohde-schwarz.com](mailto:customersupport.asia@rohde-schwarz.com)

**China**

Phone +86-800-810-8228 / +86-400-650-5896

[customersupport.china@rohde-schwarz.com](mailto:customersupport.china@rohde-schwarz.com)

## 4.3 Returning for Servicing

Use the original packaging to return your R&S RT-ZM to your Rohde & Schwarz service center. A list of all service centers is available on:

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

If you cannot use the original packaging, consider the following:

1. Use a sufficiently sized box.
2. Protect the product from damage and moisture (e.g. with bubble wrap).
3. Use some kind of protective material (e.g. crumpled newspaper) to stabilize the product inside the box.
4. Seal the box with tape.
5. Address the package to your nearest Rohde & Schwarz service center.

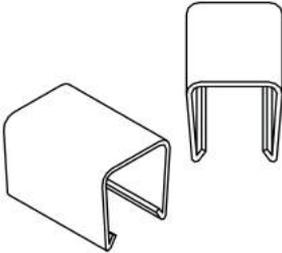
## 4.4 Calibration Interval

The recommended calibration interval for R&S RT-ZM modular probe is two years. For servicing, send the probe to your nearest Rohde & Schwarz service center (see [Chapter 4.3, "Returning for Servicing"](#), on page 36).

## 4.5 Spare Parts

The following accessories can be ordered at the Rohde & Schwarz service center. Use the order numbers provided in the following table.

**Table 4-1: Accessories for R&S RT-ZM**

Pos	Item	Description	Material number
1		Adhesive pads	1800.4268.00
2		Cable marker	1800.4245.00
3		Lead wire black (ground)	1800.4222.00
4		Solder wire 0.2mm Ag plated	1800.4074.00
5		Solder wire 0.1mm Ag plated	1800.4051.00

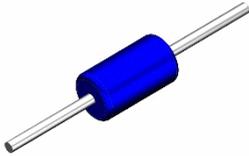
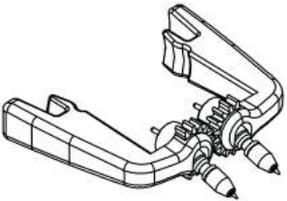
Pos	Item	Description	Material number
6		Spool solder wire	1800.4097.00
7		Solder in resistor 270 Ω	3623.2791.00
8		Solder lead	3623.2791.00
9		SMP bullet	1419.3386.00
10		SMP bullet removal tool	1800.4451.00
11	Pogo pin	Pogo pin connector, 6 pins	3584.6396.00
12	R&S RT-ZK3	R&S RT-ZK3 service kit	1419.3934.02

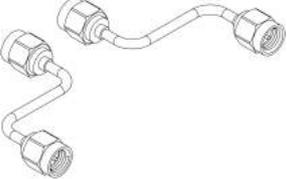
Table 4-2: Accessories for R&amp;S RT-ZMA14

Pos	Item	Description	Material number
1		10 Flex Tips 332 Ohm solder-in	1337.9781.02

**Table 4-3: Accessories for R&S RT-ZMA30**

Pos	Item	Description	Material number
1		Browser pins	1800.4416.00 1800.4422.00

**Table 4-4: Accessories for R&S RT-ZMA40**

Pos	Item	Description	Material number
1		Semi rigid cable	1419.4276.00
2		Lead wire red (termination voltage)	1800.4239.00

**Table 4-5: Parts for ESD prevention**

Pos.	Item	Material number
1	ESD wrist strap	0008.9959.00
2	ESD grounding cable	1043.4962.00