# R&S®RT-Zxx High Voltage and Current Probes Specifications



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#### **Definitions**

#### General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- · Specified environmental conditions met
- Recommended calibration interval adhered to

#### Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <,  $\leq$ , >,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.

#### **Specifications without limits**

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

#### Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

#### Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Typical data as well as measured values are not warranted by Rohde & Schwarz.

## Probe/oscilloscope chart

Base unit: R&S®	Probe interface	RTC1000	RTB2000	RTM3000	RTA4000	RTE	RTO	RTH	RT-ZA9	Page
Probe: R&S®										
Passive probes										
RT-ZH03	BNC, 1 MΩ	•	•	•	•	•	•			6
RT-ZH10		0	0	•	•	•	•			9
RT-ZH11		0	0	•	•	•	•			9
RT-ZI10	BNC, 1 MΩ, readout							•		12
RT-ZI10C								•		12
RT-ZI11								•		12
Differential probes										
RT-ZD002		•	•	0	0	0	0			16
RT-ZD003	BNC, 1 MΩ	•	•	0	0	0	0			16
RT-ZD01		•	•	•	•	•	•			19
RT-ZD02	BNC, 50 Ω <sup>1</sup>			•	•	•	•		•	22
RT-ZD08	DIVO, 30 12			•	•	•	0		•	22
RT-ZHD07				•	•	•	•			24
RT-ZHD15	Rohde & Schwarz,			•	•	•	•			29
RT-ZHD16	1 ΜΩ			•	•	•	•			29
RT-ZHD60				•	•	•	•			33

4 Rohde & Schwarz R&S®RT-Zxx High Voltage and Current Probes

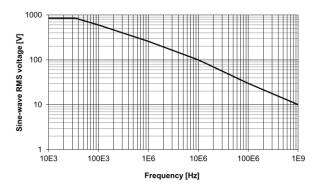
<sup>1</sup> Probe requires 50 Ω input coupling. It can be attached to oscilloscopes with 1 MΩ input coupling using a BNC feedthrough termination adapter.

Base unit: R&S®	Probe	RTC1000	RTB2000	RTM3000	RTA4000				RT-ZA9	Page
	Prol	RTC	RTB	RTI	RTA	RTE	RTO	RTH	RT-	
Probe: R&S®										
Current probes		<u>'</u>		,						
RT-ZC02		•	•	0	0	0	0	•		24
RT-ZC03		•	•	0	0	0	0	•		24
RT-ZC10	BNC, 1 MΩ	•	•	0	0	0	0			39
RT-ZC20		•	•	0	0	0	0			39
RT-ZC30		•	•	•	•	•	•			39
RT-ZC05B				•	•	•	•			39
RT-ZC10B	Rohde & Schwarz,			•	•	•	•			39
RT-ZC15B	1 ΜΩ			•	•	•	•			39
RT-ZC20B				•	•	•	•			39

- recommended extra
- $\circ \qquad \qquad \text{possible accessory, with limited functionality of probe or base unit} \\$

# R&S®RT-ZH03 high voltage passive probe

		R&S®RT-ZH03
Step response		
Rise time	system, 10 % to 90 %	1.4 ns (meas.)
Frequency response		
Bandwidth	system, -3 dB, starting at DC	> 250 MHz (meas.)
Input impedance		
DC input resistance	system	100 MΩ (meas.)
Input capacitance	system	6.5 pF (meas.)
DC characteristics		
Attenuation	system, automatically corrected on base unit display	100:1
Attenuation error	probe only, with ideal 1 MΩ load impedance	±2 %
Attenuation voltage coefficient		±0.0025 %/V (meas.)
Maximum rated input voltage		
Continuous voltage	derated, see figure on page 7	850 V (RMS)
Transient overvoltage		±1200 V
Base unit		
Input capacitance	must be compensated by probe's LF compensation	10 pF to 50 pF
Input coupling		1 MΩ AC/DC

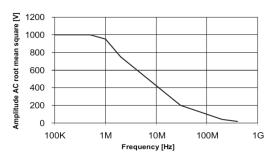


R&S®RT-ZH03 maximum rated sine-wave root mean square voltage versus frequency.

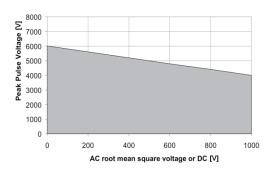
Temperature				
Temperature loading	operating temperature range	0 °C to +40 °C		
Climatic loading		80 % relative humidity without		
		condensation		
Altitude	operation	up to 2000 m		
Safety		in line with		
		Low Voltage Directive 2006/95/EC,		
		IEC/EN 61010-31 (pollution degree 2)		
RoHS		in line with EN50581		
Mechanical data				
Dimensions	diameter of probe tip	approx. 5 mm (0.2 in)		
	cable length	approx. 1.3 m (51 in)		
Weight	probe only	approx. 55 g (0.12 lb)		
Probe interface				
Connector		BNC		

# R&S®RT-ZH10/-ZH11 high voltage passive probes

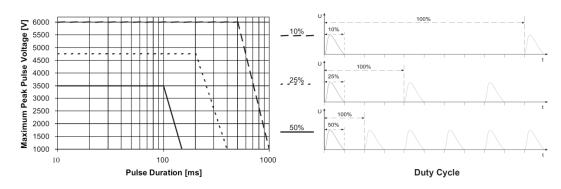
		R&S®RT-ZH10	R&S®RT-ZH11	
Step response				
Rise time	system, 10 % to 90 %	900 ps (meas.)		
Frequency response				
Bandwidth	system, -3 dB, starting at DC	> 400 MHz		
Input impedance				
DC input resistance	system	50 MΩ ± 1 %		
Input capacitance	system	7.5 pF (meas.)		
DC characteristics				
Attenuation	system, automatically corrected on base unit display	100:1	1000:1	
Attenuation error	probe only, with ideal 1 MΩ load impedance	±2 %		
Attenuation voltage coefficient		±0.0005 %/V (mea	s.)	
Maximum rated input voltage				
Continuous voltage	derated, see figures on page 10	1000 V (RMS), CA	T II	
Transient overvoltage		±4000 V		
Base unit				
Input capacitance	must be compensated by probe's LF compensation	5 pF to 20 pF	·	
Input coupling		1 MΩ AC/DC		



R&S®RT-ZH10/-ZH11 maximum rated sine-wave root mean square voltage versus frequency, CAT I.



R&S®RT-ZH10/-ZH11 maximum root mean square voltage versus peak pulse voltage, CAT I.



R&S®RT-ZH10/-ZH11 maximum pulse derating, CAT I.

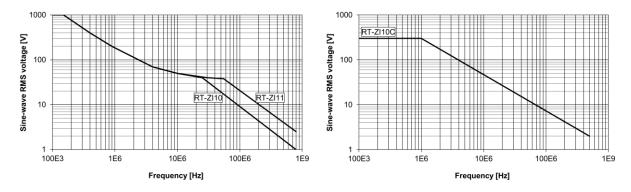
Temperature				
Temperature loading	operating temperature range	0 °C to +50 °C		
	storage temperature range	−40 °C to +70 °C		
Climatic loading		80 % relative humidity for temperatures		
		up to +31 °C,		
		decreasing linearly to 40 % at +50 °C		
Altitude	operation	up to 2000 m		
	transport	up to 15000 m		
Safety		in line with		
		Low Voltage Directive 2006/95/EC,		
		IEC/EN 61010-31 (pollution degree 2)		
RoHS		in line with EN50581		
Mechanical data				
Dimensions	diameter of probe tip	approx. 5 mm (0.2 in)		
	cable length	approx. 2 m (79 in)		
Weight	probe only	approx. 67 g (0.15 lb)		
Probe interface				
Connector		BNC with readout		

# R&S®RT-ZI10(C)/-ZI11 isolated probes

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1 M $\Omega$ . The R&S RT-ZI10/-ZI11 must be used only with insulated oscilloscopes provided with touch-protected inputs. See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZI10	R&S®RT-ZI11	
Step response	·	<u>'</u>		
Rise time	system, 10 % to 90 %	900 ps (meas.)		
Frequency response				
Bandwidth	system, -3 dB, starting at DC	> 500 MHz (meas.	.)	
Input impedance				
DC input resistance	system	10 MΩ ± 1 %	100 MΩ ± 1 %	
		(meas.)	(meas.)	
Input capacitance	system	12 pF (meas.)	4.6 pF (meas.)	
DC characteristics				
Attenuation	system	10:1	100:1	
Maximum rated input voltage	between probe tip and probe reference terminal	1000 V (RMS)	3540 V (RMS)	
	derated, see figure on page 14	1000 V (RMS), CAT III		
		600 V (RMS), CAT IV		
	between probe terminals and earth ground	1000 V (RMS)		
	derated, refer to base unit manual			
Base unit				
Use with		R&S®RTH		
Input capacitance	must be compensated by probe's	10 pF to 22 pF	10 pF to 25 pF	
	LF compensation			
Input coupling		1 MΩ AC/DC		

		R&S®RT-ZI10C
Step response		
Rise time	system, 10 % to 90 %	700 ps (meas.)
Frequency response		
Bandwidth	system, -3 dB, starting at DC	> 500 MHz (meas.)
Input impedance		
DC input resistance	system	10 MΩ ± 1 % (meas.)
Input capacitance	system	11 pF (meas.)
DC characteristics		
Attenuation	system	10:1
	between probe tip and probe reference terminal	300 V (RMS), CAT III
	derated, see figure on page 14	
	between probe terminals and earth ground	300 V (RMS)
	derated, refer to base unit manual	
Base unit		
Use with		R&S®RTH
Input capacitance	must be compensated by probe's	10 pF to 22 pF
	LF compensation	
Input coupling		1 MΩ AC/DC

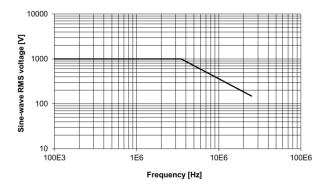


R&S®RT-ZI10(C)/-ZI11 maximum rated sine-wave root mean square voltage between probe tip and probe reference terminal versus frequency (CAT III).

Temperature		
Temperature loading	operating temperature range	+5 °C to +40 °C
Climatic loading		80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +50 °C
Altitude	operation	up to 2000 m
Safety		in line with Low Voltage Directive 2006/95/EC, IEC/EN 61010-31 (pollution degree 2)
RoHS		in line with EN50581
Mechanical data		
Dimensions	diameter of probe tip	approx. 5 mm (2 in)
	diameter of reference terminal (R&S®RT-ZI10 and R&S®RT-ZI11 only)	approx. 2 mm (0.8 in)
	cable length	approx. 1.2 m (47 in)
Weight	probe only	approx. 75 g (0.17 lb)
Probe interface		
Connector		BNC, isolated

## R&S®RT-ZD002/-ZD003 high voltage differential probes

		R&S®RT-ZD002	R&S®RT-ZD003	
Step response				
Rise time	10 % to 90 %	14 ns (meas.)		
Frequency response				
Bandwidth	–3 dB, starting at DC,	25 MHz		
	calculated from 0.35/rise time			
Common mode rejection	DC to 100 Hz	86 dB (meas.)	80 dB (meas.)	
	100 Hz to 20 kHz	66 dB (meas.)	60 dB (meas.)	
Input impedance				
DC input resistance	differential (between signal sockets)	8 MΩ (meas.)		
	single-ended (each signal socket to ground)	4 MΩ (meas.)		
Input capacitance	differential (between signal sockets)	2.75 pF (meas.)		
	single-ended (each signal socket to ground)	5.5 pF (meas.)		
DC characteristics				
Attenuation	low/high attenuation	10:1, 100:1	20:1, 200:1	
Attenuation error		±2 % (meas.)	±2 % (meas.)	
Max. differential input	between signal sockets, low/high attenuation	±70 V, ±700 V	±140 V, ±1400 V	
Operating voltage window	each signal socket to ground	±700 V	±1400 V	
Zero error	referenced to probe output	±5 mV (meas.)		
Noise voltage	referenced to probe output	0.7 mV (RMS)		
Maximum rated input voltage				
Continuous voltage	derated, see figure,	1000 V (RMS), CAT III		
	each signal socket to ground			
Base unit	· · · · · · · · · · · · · · · · · · ·			
Input coupling		1 ΜΩ		



Maximum rated sine-wave root mean square voltage versus frequency.

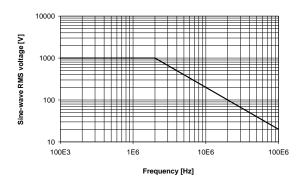
		R&S®RT-ZD002	R&S®RT-ZD003		
Temperature			<u>'</u>		
Temperature loading	operating temperature range	−10 °C to +40 °C			
	storage temperature range,	−30 °C to +70 °C			
	with battery removed				
Climatic loading		85 % relative humid	ty without condensation		
Altitude	operation	up to 2000 m			
Safety		in line with EN 6101	0-1		
RoHS		in line with EN 50581			
EMC		in line with EN 61326-1			
Calibration interval		2 years			
Mechanical data					
Dimensions	probe head (L x W x H)	approx. 170 mm × 63 mm × 21 mm			
		$(6.7 \text{ in} \times 2.5 \text{ in} \times 0.8)$	in)		
	length of probe cable	approx. 95 cm (37 in)			
	length of input leads	approx. 45 cm (18 ir	1)		
Weight	probe only	approx. 400 g (0.88	lb)		
Probe interface					
Connector		BNC			
Supply voltage		4.5 V to 12 V, 360 mW			
Supply type		battery or USB adapter			
Battery type		4 times AA cells			

# R&S®RT-ZD01 high voltage differential probe

		R&S®RT-ZD01	
Attenuation setting		100:1	1000:1
Step response		·	
Rise time	10 % to 90 %	< 3.5 ns (meas.)	
Frequency response			
Bandwidth	starting at DC, calculated from 0.35/rise time	100 MHz	
Common mode rejection	DC to 100 Hz	80 dB (meas.)	
	100 Hz to 1 MHz	50 dB (meas.)	
Input impedance			
DC input resistance	differential (between signal sockets)	8 MΩ	
	single-ended (each signal socket to ground)	4 ΜΩ	
Input capacitance	differential (between signal sockets)	3.5 pF (meas.)	
	single-ended (each signal socket to ground)	7 pF (meas.)	
DC characteristics			
Attenuation error		±2 %	
Zero error	referenced to probe input	±0.5 V (meas.)	±5 V (meas.)
Max. differential input	between signal sockets	±140 V	±1400 V
Operating voltage window	each signal socket to ground	±1400 V	
Noise voltage	referenced to probe input	90 mV (RMS)	0.9 V (RMS)
		(meas.)	(meas.)

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Maximum rated input volta	ge	
Continuous voltage	derated, see figure, each signal socket to ground	1000 V (RMS), CAT III
Base unit		
Input coupling		1 MΩ AC/DC



Maximum rated sine-wave root mean square voltage versus frequency.

Temperature		
Temperature loading	operating temperature range	0 °C to +40 °C
-	storage temperature range	−30 °C to +70 °C
Climatic loading		85 % relative humidity
Altitude	operation	up to 2000 m
	transport	up to 4600 m
EMC		in line with EMC Directive 2004/108/EC,
		IEC/EN 61326-1, IEC/EN 61326-2-2
Calibration interval		2 years
Safety		in line with
•		Low Voltage Directive 2006/95/EC,
		IEC/EN 61010-31 (pollution degree 2)
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe head (L × W × H)	approx. 207 mm x 83 mm x 38 mm
		$(8.1 \text{ in} \times 3.2 \text{ in} \times 1.5 \text{ in})$
	length of input leads	approx. 30 cm (12 in)
	length of probe cable	approx. 90 cm (35 in)
Weight	probe only	approx. 500 g (1.1 lb)
Probe interface		
Connector		BNC
Supply type		battery or USB adapter
Supply voltage		4.5 V to 12 V
Battery type		4 times AA cells

# R&S®RT-ZD02/-ZD08 high voltage differential probes

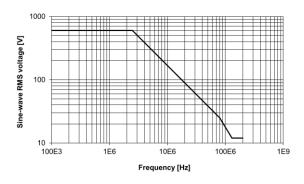
		R&S®RT-ZD02	R&S®RT-ZD08
Step response			
Rise time	10 % to 90 %	1.75 ns (meas.)	437 ps (meas.)
Frequency response			
Bandwidth	-3 dB, starting at DC,	200 MHz	800 MHz
	calculated from 0.35/rise time		
Common mode rejection	DC to 100 Hz	80 dB (meas.)	60 dB (meas.)
	100 Hz to 10 MHz	50 dB (meas.)	_
	100 Hz to 500 MHz	_	15 dB (meas.)
Input impedance			
DC input resistance	differential (between signal sockets)	1 MΩ (meas.)	200 kΩ (meas.)
	single-ended (each signal socket to ground)	500 kΩ (meas.)	100 kΩ (meas.)
Input capacitance	differential (between signal sockets)	3.5 pF (meas.)	1 pF (meas.)
	single-ended (each signal socket to ground)	7 pF (meas.)	2 pF (meas.)
DC characteristics			
Max. differential input	between signal sockets	±20 V	±15 V
Operating voltage window	each signal socket to ground	±60 V	±30 V
Attenuation		10:1	10:1
Attenuation error	probe only, with ideal 50 $\Omega$ load impedance	±1 % (meas.)	±2 % (meas.)
Zero error	at probe output	±2 mV (meas.)	±5 mV (meas.)
Maximum rated input voltage			
DC peak voltage	single-ended (each signal socket to ground)	±60 V	±40 V
AC peak voltage	single-ended (each signal socket to ground)	±60 V	±40 V
Base unit			
Input coupling		50 Ω	

		R&S®RT-ZD02	R&S®RT-ZD08
Temperature			
Temperature loading	operating temperature range	+5 °C to +40 °C	
	storage temperature range, with battery removed	-20 °C to +70 °C	
Climatic loading		85 % relative humidity v	without condensation
Altitude	operation	up to 3000 m	
	transport	up to 15,300 m	
Safety		in line with EN 61010-1	
RoHS		in line with EN50581	
EMC		in line with EN 61326-1	
Calibration interval		2 years	
Mechanical data			
Dimensions	probe head (L x W x H)	approx. 111 mm x 22 m	nm × 14 mm
		$(4.3 \text{ in} \times 0.9 \text{ in} \times 0.6 \text{ in})$	
	length of probe cable	approx. 1.2 m (47 in)	
	length of input leads	approx. 15 cm (6 in)	_
Weight	probe only	approx. 170 g (0.37 lb)	
Probe interface			
Connector		BNC	
Supply voltage		4.5 V to 12 V	
Supply type		battery or USB adapter	<u> </u>
Battery type		9 V Alkaline battery	
Battery lifetime		7.5 h (meas.)	4.5 h (meas.)

# R&S®RT-ZHD07 high voltage differential probe

Attenuation setting		25:1	250:1
Step response			
Rise time	10 % to 90 %, both attenuations	< 2 ns	
Frequency response			
Bandwidth	starting at DC, calculated from 0.4/rise time	200 MHz	
Common mode rejection	DC to 60 Hz	> 80 dB	
	60 Hz to 1 kHz	70 dB (meas.)	65 dB (meas.)
	1 kHz to 1 MHz	55 dB (meas.)	55 dB (meas.)
	1 MHz to 50 MHz	35 dB (meas.)	20 dB (meas.)
Input impedance			
DC input resistance	differential (between signal sockets)	5 ΜΩ	
	single-ended (each signal socket to ground)	2.5 ΜΩ	
Input capacitance	differential (between signal sockets)	2.5 pF (meas.)	
	single-ended (each signal socket to ground)	5 pF (meas.)	
DC characteristics			
Attenuation error	after applying digital correction factors	±0.5 %	
Temperature drift, attenuation		±60 ppm/°C	
Zero error	after applying digital correction factors,		
	referenced to probe input		
	+15 °C to +35°C	±12.5 mV	±35 mV
	+0 °C to +50°C	±25 mV	±55 mV
Temperature drift, zero error	referenced to probe input	±0.75 mV/°C	±1.12 mV/°C
	referenced to probe output	±30 μV/°C	±4.5 μV/°C
Dynamic range			
Differential input	between signal sockets	±75 V	±750 V

Offset compensation range		±1000 V		
Offset compensation error	offset compensation setting = 0 V	no additional error		
	offset compensation setting ≠ 0 V	±0.2 % of setting ±25 mV (meas.)		
Operating voltage window	each signal socket to ground	±750 V	±750 V	
Noise voltage	referenced to probe input	12 mV (RMS) (meas.)	40 mV (RMS) (meas.)	
Maximum rated input voltage				
Continuous voltage	derated, see figure, each signal socket to ground	300 V (RMS), CAT III		
		600 V (RMS), CAT II		
		600 V (RMS)		
Transient voltage	each signal socket to ground	±4500 V (peak)		
Base unit				
Input coupling		1 MΩ AC/DC		



Maximum rated sine-wave root mean square voltage versus frequency. Each signal socket to ground.

## R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®ProbeMeter can be used to measure differential and common mode voltages.

Measurement error,	+15 °C to +35 °C	±0.1 % of reading ±0.02 V
differential mode and common mode	0 °C to +50 °C	±0.2 % of reading ±0.04 V
Temperature drift		±60 ppm/°C of reading ±1 mV/°C
Common mode rejection	for differential measurement,	> 80 dB
	0 °C to +50 °C	
50/60 Hz rejection		> 87 dB
Integration time		147 ms

Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
-	storage temperature range	-40 °C to +70 °C
Climatic loading		+25 °C/+40 °C cyclic at 95 % relative
		humidity without condensation,
		in line with IEC 60068-2-30
Altitude	operation	up to 3000 m
	transport	up to 4600 m
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz,
		0.5 g from 55 Hz to 150 Hz,
		in line with EN 60068-2-6
	random	10 Hz to 500 Hz,
		acceleration 1.9 g (RMS),
		in line with EN 60068-2-64
Shock		40 g shock spectrum,
		in line with MIL-STD-810E
EMC		in line with EMC Directive 2014/30/EC,
		IEC/EN 61326-1 (table 2),
		IEC/EN 61326-2-1,
		CISPR 11/EN 55011(class B)
Calibration interval		2 years
Safety		in line with IEC/EN 61010-031
RoHS		in line with EN50581
Mechanical data		
Dimensions	probe amplifier box, without protector	approx. 55 mm × 26 mm × 165 mm
	$(W \times H \times L)$	$(2.17 \text{ in} \times 1.02 \text{ in} \times 6.5 \text{ in})$
	cable length	approx. 1.3 m (52 in)
	overall length	approx. 1.6 m (63 in)

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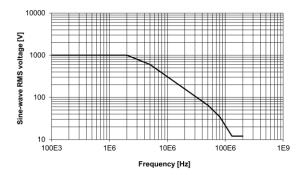
Weight	probe amplifier only approx. 360 g (0.8 lb)		
Probe interface			
Connector Rohde & Schwarz probe interface			

# R&S®RT-ZHD15/-ZHD16 high voltage differential probe

Attenuation setting		50:1	500:1	
Step response				
Rise time	10 % to 90 %, both attenuations			
	R&S <sup>®</sup> RT-ZHD15	< 4 ns		
	R&S®RT-ZHD16	< 2 ns		
Frequency response				
Bandwidth	starting at DC, calculated from 0.4/rise time			
	R&S®RT-ZHD15	100 MHz		
	R&S®RT-ZHD16	200 MHz		
Common mode rejection	DC to 60 Hz	> 80 dB		
	60 Hz to 1 kHz	70 dB (meas.)	65 dB (meas.)	
	1 kHz to 1 MHz	55 dB (meas.)	55 dB (meas.)	
	1 MHz to 50 MHz	35 dB (meas.)	20 dB (meas.)	
Input impedance				
DC input resistance	differential (between signal sockets)	10 ΜΩ		
	single-ended (each signal socket to ground)	5 ΜΩ		
Input capacitance	differential (between signal sockets)	2 pF (meas.)		
	single-ended (each signal socket to ground)	4 pF (meas.)		
DC characteristics				
Attenuation error	after applying digital correction factors	±0.5 %		
Temperature drift, attenuation		±60 ppm/°C		
Zero error	after applying digital correction factors,			
	referenced to probe input			
	+15 °C to +35°C	±25 mV	±65 mV	
	+0 °C to +50°C	±50 mV	±95 mV	

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Temperature drift, zero error	referenced to probe input	±1.5 mV/°C	±1.75 mV/°C	
	referenced to probe output	±30 μV/°C	±3.5 μV/°C	
Dynamic range				
Differential input	between signal sockets	±150 V	±1500 V	
Offset compensation range		±2000 V		
Offset compensation error	offset compensation setting = 0 V	no additional erro	or	
	offset compensation setting ≠ 0 V	±0.2 % of setting ± 50 mV (meas.)		
Operating voltage window	each signal socket to ground	±1500 V		
Noise voltage	referenced to probe input, (RMS)			
	R&S®RT-ZHD15	20 mV (meas.)	70 mV (meas.)	
	R&S®RT-ZHD16	25 mV (meas.)	80 mV (meas.)	
Maximum rated input voltage				
Continuous voltage	derated, see figure, each signal socket to ground	1000 V (RMS), C	AT III	
		1000 V (RMS)		
Transient voltage	each signal socket to ground	±6800 V (peak)		
Base unit				
Input coupling		1 MΩ AC/DC		



Maximum rated sine-wave root mean square voltage versus frequency. Each signal socket to ground.

#### R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®ProbeMeter can be used to measure differential and common mode voltages.

Measurement error,	+15 °C to +35 °C	
differential mode and common mode	≤ 1000 V	±0.1 % of reading ±0.03 V
	> 1000 V	±0.1 % of reading ±0.03 V (meas.)
	0 °C to +50 °C	
	≤ 1000 V	±0.2 % of reading ±0.06 V
	> 1000 V	±0.2 % of reading ±0.06 V (meas.)
Temperature drift		±60 ppm/°C of reading ±1.5 mV/°C
Common mode rejection	for differential measurement,	> 80 dB
•	0 °C to +50 °C	

## Version 18.00, December 2017

50/60 Hz rejection	> 87 dB
Integration time	147 ms

#### General data

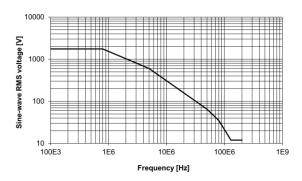
See page 27.

# R&S®RT-ZHD60 high voltage differential probe

Attenuation setting		100:1	1000:1
Step response		·	
Rise time	10 % to 90 %, both attenuations	< 4 ns	
Frequency response			
Bandwidth	starting at DC, calculated from 0.4/rise time	100 MHz	
Common mode rejection	DC to 60 Hz	> 80 dB	
	60 Hz to 1 kHz	70 dB (meas.)	65 dB (meas.)
	1 kHz to 1 MHz	55 dB (meas.)	55 dB (meas.)
	1 MHz to 50 MHz	35 dB (meas.)	20 dB (meas.)
Input impedance			
DC input resistance	differential (between signal sockets)	40 ΜΩ	
	single-ended (each signal socket to ground)	20 ΜΩ	
Input capacitance	differential (between signal sockets)	2 pF (meas.)	
	single-ended (each signal socket to ground)	4 pF (meas.)	
DC characteristics			
Attenuation error	after applying digital correction factors	±0.5 %	
Temperature drift, attenuation		±80 ppm/°C	
Zero error	after applying digital correction factors,		
	referenced to probe input		
	+15 °C to +35°C	±70 mV	±150 mV
	+0 °C to +50°C	±150 mV	±230 mV
Temperature drift, zero error	referenced to probe input	±5 mV/°C	±5.5 mV/°C
	referenced to probe output	±50 μV/°C	±5.5 μV/°C
Dynamic range			
Differential input	between signal sockets	±600 V	±6000 V

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Offset compensation range		±2000 V	
Offset compensation error	offset compensation setting = 0 V	no additional error	
	offset compensation setting ≠ 0 V	±0.2 % of setting ±60 mV (meas.)	
Operating voltage window	each signal socket to ground	±6000 V	
Noise voltage	referenced to probe input	70 mV (RMS)	280 mV (RMS)
		(meas.)	(meas.)
Maximum rated input voltage			
Continuous voltage	derated, see figure, each signal socket to ground	1000 V (RMS), CAT III	
		1750 V (RMS)	
Transient voltage	each signal socket to ground	±6800 V (peak)	
Base unit			
Input coupling		1 MΩ AC/DC	



Maximum rated sine-wave root mean square voltage versus frequency. Each signal socket to ground.

## R&S®ProbeMeter

Specifications for measurement error apply only when offset compensation setting is 0 V. The R&S®ProbeMeter can be used to measure differential and common mode voltages.

Measurement error,	+15 °C to +35 °C	
differential mode and common mode	≤ 1000 V	±0.12 % of reading ±0.1 V
	> 1000 V	±0.12 % of reading ±0.1 V (meas.)
	0 °C to +50 °C	
	≤ 1000 V	±0.25 % of reading ±0.2 V
	> 1000 V	±0.25 % of reading ±0.2 V (meas.)
Temperature drift		±80 ppm/°C of reading ±4.5 mV/°C
Common mode rejection	for differential measurement,	> 80 dB
	0 °C to +50 °C	
50/60 Hz rejection		> 87 dB
Integration time		147 ms

#### **General data**

See page 27.

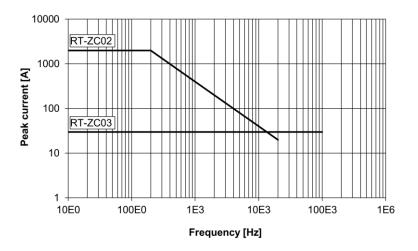
## R&S®RT-ZC02/-ZC03 current probes

		R&S®RT-ZC02	
Sensitivity setting		0.01 V/A	0.001 V/A
Step response			·
Rise time	10 % to 90 %	20 µs (meas.)	
Frequency response			
Bandwidth	-3 dB, starting at DC	20 kHz (meas.)	
DC characteristics			
Dynamic range	derated, see figures on page 39	±200 A	±2000 A
Sensitivity error	+23 °C ±1 °C, ±1500 A	±1 % (meas.)	·
	+23 °C ±1 °C, ±2000 A	±5 % (meas.)	
Temperature drift, sensitivity		±0.15 %/°C (meas.)	
Zero error	referenced to probe input after	±100 mA (meas.)	±500 mA (meas.)
	demagnetizing and zero adjustment		
AC characteristics			
Maximum slew rate		±20 A/μs (meas.)	
Maximum rated input			
Maximum continuous current		1000 A (RMS)	
Maximum working voltage	for uninsulated conductors	300 V (RMS) CAT III	
Other			
Noise	with 20 MHz lowpass filter	30 mA (RMS) (meas.)	80 mA (RMS) (meas.)
Base unit			
Input coupling		1 ΜΩ	

		R&S®RT-ZC03
Step response		
Rise time	10 % to 90 %	1 µs (meas.)
Frequency response		
Bandwidth	-0.5 dB, starting at DC	100 kHz (meas.)
DC characteristics		
Dynamic range	derated, see figures on page 39	±30 A
Sensitivity		0.1 V/A
Sensitivity error	+23 °C ±1 °C	±1 % (meas.)
Temperature drift, sensitivity		±0.01 %/°C (meas.)
Zero error	referenced to probe input after	±2 mA (meas.)
	demagnetizing and zero adjustment	
AC characteristics		
Maximum slew rate		±20 A/μs (meas.)
Maximum rated input		
Maximum continuous current		20 A (RMS)
Maximum working voltage	for uninsulated conductors	300 V (RMS) CAT III
Other		
Noise	with 20 MHz lowpass filter	2 mA (RMS) (meas.)
Base unit		
Input coupling		1 ΜΩ

# **General data**

		R&S®RT-ZC02	R&S®RT-ZC03	
Temperature		·		
Temperature loading	operating temperature range	0 °C to +50 °C		
	storage temperature range,	−20 °C to +85 °C		
	with battery removed			
Climatic loading		80 % relative humidity fo	r temperatures up to +31 °C,	
		decreasing linearly to 40	% at +50 °C	
Altitude	operation	up to 2000 m		
Safety		in line with EN 61010-1		
		in line with EN 61010-2-032 (pollution degree 2)		
RoHS		in line with EN50581		
EMC		in line with EN 61326-2-2		
Calibration interval		2 years		
Mechanical data				
Dimensions	diameter of probe tip	approx. 32 mm (1.3 in)	approx. 25 mm (1.0 in)	
	cable length	approx. 2.0 m (79 in)		
Weight	probe only	approx. 320 g (0.7 lb)		
Probe interface				
Connector		BNC		
Battery type		9 V Alkaline battery, PP3	,	
		MN 1604 or IEC6LR61		
Battery lifetime		50 h (meas.)	25 h (meas.)	



Maximum rated peak input current versus frequency.

# R&S®RT-ZC05B/-ZC10(B)/-ZC15B/-ZC20(B)/-ZC30 current probes

All parameters are valid when the probe is connected to an appropriate Rohde & Schwarz oscilloscope with an input impedance of 1  $M\Omega$ . See table on page 4 and Rohde & Schwarz oscilloscope operating manual for more details.

		R&S®RT-ZC05B	R&S®RT-ZC10(B)
Step response			
Rise time	10 % to 90 %	175 ns (meas.)	35 ns (meas.)
Frequency response			
Bandwidth	-3 dB, starting at DC	2 MHz (meas.)	10 MHz (meas.)
Input impedance		see figure on page 45	
DC characteristics			
Sensitivity		0.01 V/A	
Sensitivity error	+23 °C ±3 °C	±1 %	
Zero error	referenced to probe input after	±500 mA (meas.)	±100 mA (meas.)
	demagnetizing and zero adjustment		
AC characteristics			
AC sensitivity error	+23 °C ±3 °C	±1 % ± 500 mA (RMS)	±1 % ± 100 mA (RMS)
(sinusoidal, 45 Hz to 66 Hz)		(meas.)	(meas.)
	0 °C to +40 °C	±3 % ± 500 mA (RMS) (meas.)	±3 % ± 100 mA (RMS) (meas.)
Measurement due to external magnetic fields	400 A/m magnetic field, DC or 60 Hz, referenced to probe input	< 800 mA (RMS) (meas.)	< 150 mA (RMS) (meas.)
Maximum rated input			
Maximum continuous current	derated, see figures on page 45	500 A (RMS)	150 A (RMS)
Maximum transient current	peak	±700 A	±300 A
Other			
Noise	20 MHz measurement bandwidth,	25 mA (RMS) (meas.)	
	referenced to probe input		

		R&S®RT-ZC15B	R&S®RT-ZC20(B)
Step response			
Rise time	10 % to 90 %	7 ns (meas.)	3.5 ns (meas.)
Frequency response			
Bandwidth	-3 dB, starting at DC	50 MHz (meas.)	100 MHz (meas.)
Input impedance		see figure on page 45	
DC characteristics			
Sensitivity		0.1 V/A	
Sensitivity error	+23 °C ±3 °C	±1 %	
Zero error	referenced to probe input after	±10 mA (meas.)	
	demagnetizing and zero adjustment		
AC characteristics			
AC sensitivity error	+23 °C ±3 °C	±1 % ± 10 mA (RMS) (meas.)	
(sinusoidal, 45 Hz to 66 Hz)	0 °C to +40 °C	±3 % ± 10 mA (RMS) (meas.	)
Measurement due to external	400 A/m magnetic field, DC or 60 Hz,	< 20 mA (RMS) (meas.)	< 5 mA (RMS) (meas.)
magnetic fields	referenced to probe input		
Maximum rated input			
Maximum continuous current	derated, see figures on page 45	30 A (RMS)	
Maximum transient current	peak	±50 A	
Other		<u> </u>	
Noise	20 MHz measurement bandwidth,	2.5 mA (RMS) (meas.)	
	referenced to probe input		

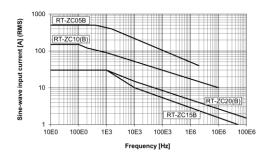
# Version 18.00, December 2017

		R&S®RT-ZC30
Step response		
Rise time	10 % to 90 %	2.9 ns (meas.)
Frequency response		
Bandwidth	-3 dB, starting at DC	120 MHz (meas.)
Input impedance		see figure on page 45
DC characteristics		
Sensitivity		1 V/A
Sensitivity error	+23 °C ±3 °C	±3 %
Zero error	referenced to probe input	±1 mA (meas.)
	after demagnetizing and zero adjustment	
AC characteristics		
AC sensitivity error	+23 °C ±3 °C	±3 % ±1 mA (RMS) (meas.)
(sinusoidal, 45 Hz to 66 Hz)	0 °C to +40 °C	±5 % ±1 mA (RMS) (meas.)
Measurement due to external	400 A/m magnetic field, DC or 60 Hz,	< 5 mA (RMS) (meas.)
magnetic fields	referenced to probe input	
Maximum rated input		
Maximum continuous current	derated, see figures on page 45	5 A (RMS)
Maximum transient current	peak	±7.5 A
Other		
Noise	30 MHz measurement bandwidth,	60 μA (RMS) (meas.)
	referenced to probe input	

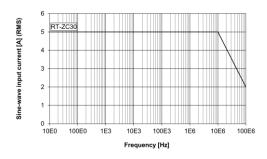
# **General data**

		R&S®RT-ZC05B/ R&S®RT-ZC10(B)	R&S <sup>®</sup> RT-ZC15B/ R&S <sup>®</sup> RT-ZC20(B)/ R&S <sup>®</sup> RT-ZC30	
Temperature				
Temperature loading	operating temperature range	0 °C to +40 °C		
	storage temperature range	−10 °C to +50 °C		
Climatic loading		80 % relative humidity		
Altitude	operation	up to 2000 m		
Safety		in line with EN 61010-2-032		
		(type D sensor, insulated cor	nductor only)	
RoHS		in line with EN50581		
EMC		in line with		
		EN 61326-1, CISPR 11/EN 5	55011 (class B, table 2)	
Calibration interval		2 years		
Mechanical data				
Dimensions	max. conductor diameter	approx. 20 mm (0.79 in)	approx. 5 mm (0.2 in)	
	cable length, probe	approx. 2 m (78.7 in)	approx. 1.5 m (59 in)	
	cable length, power supply of R&S®RT-ZCxx	approx. 1 m (39.4 in)	approx. 1 m (39.4 in)	
	probe head (W × H × L, approx.)	27 mm × 69 mm × 176 mm	18 mm × 40 mm × 175 mm	
		$(1.06 \text{ in} \times 2.72 \text{ in} \times 6.93 \text{ in})$	$(0.71 \text{ in} \times 1.57 \text{ in} \times 6.89 \text{ in})$	
Weight	probe only	approx. 500 g (1.1 lb)	approx. 240 g (0.53 lb)	
Probe interface				
Connector	R&S®RT-ZCxx	BNC		
	R&S®RT-ZCxxB	Rohde & Schwarz probe inte	erface	
Supply voltage	R&S®RT-ZCxx	external power supply neces ±12 V ± 0.5 V (5.5 W)	sary (e.g. R&S <sup>®</sup> RT-ZA13)	
	R&S®RT-ZCxxB	power supply by Rohde & So	chwarz probe interface	
			•	

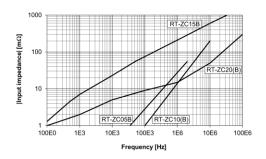
### Version 18.00, December 2017



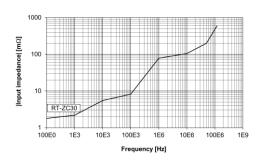
Maximum rated sine-wave root mean square input current versus frequency.



Maximum rated sine-wave root mean square input current versus frequency.



Input impedance (meas.).



Input impedance (meas.).

# R&S®RT-ZA13 probe power supply

Electrical data			
Number of channels		4	
Output voltage		±12 V ±0.5 V	
Maximum output current	sum total of all channels	2.5 A	
Power requirements		100 V to 240 V, 50/60 Hz	
Maximum rated input power		170 W	

## General data

Safety		in line with EN 61010-1
RoHS		in line with EN50581
EMC		in line with EN 61326-1 (class B equipment),
		EN 61000-3-2, EN 61000-3-3
Mechanical data		
Dimensions	$W \times H \times L$	approx. 80 mm × 119 mm × 200 mm
		$(3.1 \text{ in} \times 4.7 \text{ in} \times 7.9 \text{ in})$
Weight		approx. 1.1 kg (2.4 lb)
Connector		LEMO FFA.OS.304.CLAC44Z

# **Ordering information**

Designation	Туре	Order No.
High voltage passive probes		
250 MHz High Voltage Probe, passive, 100:1, 100 M $\Omega$ , 6.5 pF, 850 V (RMS)	R&S®RT-ZH03	1333.0873.02
Incl. adjustment tool; coding clips (set) 2 x 4 colors; signal pin (2); sprung hook 5 mm;		
ground lead 14 cm; insulating cap; protective cap; operating manual		
400 MHz High Voltage Probe, passive, 100:1, 50 MΩ, 7.5 pF, 1 kV (RMS)	R&S®RT-ZH10	1409.7720.02
Incl. adjustment tool; BNC adapter 5.0-L; coding rings (set) 3 x 4 colors;		
flexible adapter 5.0-L; ground lead 22 cm (2); ground lead 22 cm to 4 mm banana plug;		
insulating cap 5.0-L; operating manual; protection cap 5.0-L; safety alligator clip (2);		
solid tip 0.8 mm (5); spring tip 0.8 mm (5); sprung hook 5.0-L (2)		
400 MHz High Voltage Probe, passive, 1000:1, 50 MΩ, 7.5 pF, 1 kV (RMS)	R&S®RT-ZH11	1409.7737.02
See R&S®RT-ZH10 for equipment included		
500 MHz Isolated Probe, passive, 10:1, 10 M $\Omega$ , 12 pF, 1 kV (RMS) CAT III	R&S®RT-ZI10	1326.1761.02
Incl. coding rings (set) 5 x 2 colors; ground lead 32 cm with safety alligator clip;		
sprung hook; ground pin; operating manual		
500 MHz Isolated Probe, passive, 10:1, 10 M $\Omega$ , 11 pF, 300 V (RMS) CAT III	R&S®RT-ZI10C	1326.3106.02
Incl. coding rings (set) 5 x 2 colors; ground lead with safety alligator clip;		
sprung hook; ground pin; BNC adapter, operating manual		
500 MHz Isolated Probe, passive, 100:1, 100 M $\Omega$ , 4.6 pF, 1 kV (RMS) CAT III	R&S®RT-ZI11	1326.1810.02
Incl. coding rings (set) 5 x 2 colors; ground lead 32 cm with safety alligator clip;		
sprung hook; ground pin; operating manual		

Designation	Туре	Order No.
Differential probes		
25 MHz Differential Probe, ±700 V, 1 kV (RMS) CAT III, BNC	R&S®RT-ZD002	1337.9700.02
Incl. sprung hook 4 mm (red, black); safety alligator clip 4 mm (red, black); USB power cord;		
trimming tool; operating manual		
25 MHz Differential Probe, ±1.4 kV, 1 kV (RMS) CAT III, BNC	R&S®RT-ZD003	1337.9800.02
Incl. sprung hook 4 mm (red, black); safety alligator clip 4 mm (red, black); USB power cord;		
trimming tool; operating manual		
100 MHz Differential Probe, ±1.4 kV, 1 kV (RMS) CAT III, BNC	R&S®RT-ZD01	1422.0703.02
Incl. sprung hook 4 mm (2); USB power cord; carrying case; operating manual		
200 MHz Differential Probe, ±20 V, BNC	R&S®RT-ZD02	1333.0821.02
Incl. safety alligator clip 4 mm (2); sprung hook 4 mm (2); USB power cord; 9 V battery;		
carrying case; operating manual		
800 MHz Differential Probe, ±15 V, BNC	R&S®RT-ZD08	1333.0838.02
Incl. lead 11 cm (2); lead 7 cm (2); signal pin (6); dual pin (4); mini clip (2); micro clip (2);		
USB power cord; 9 V battery; carrying case; operating manual		
200 MHz Differential Probe, ±750 V, 600 V (RMS) CAT II, Rohde & Schwarz probe	R&S®RT-ZHD07	1800.2307.02
interface		
Incl. R&S®RT-ZA24 accessory kit; R&S®RT-ZA22 test leads; R&S®RT-ZHD protector;		
carrying case; operating manual		
100 MHz Differential Probe, ±1.5 kV, 1 kV (RMS) CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD15	1800.2107.02
Incl. R&S®RT-ZA24 accessory kit; R&S®RT-ZA22 test leads; R&S®RT-ZHD protector;		
carrying case; operating manual		
200 MHz Differential Probe, ±1.5 kV, 1 kV (RMS) CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD16	1800.2207.02
Incl. R&S®RT-ZA24 accessory kit; R&S®RT-ZA22 test leads; R&S®RT-ZHD protector;		
carrying case; operating manual		
100 MHz Differential Probe, ±6 kV, 1 kV (RMS) CAT III, Rohde & Schwarz probe interface	R&S®RT-ZHD60	1800.2007.02
Incl. R&S®RT-ZA24 accessory kit; R&S®RT-ZA22 test leads; R&S®RT-ZHD protector;		
carrying case; operating manual		

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Designation	Туре	Order No.
Current probes		
20 kHz Current Probe, AC/DC, 0.01/0.001 V/A, 1000 A, 300 V (RMS) CAT III, BNC	R&S®RT-ZC02	1333.0850.02
Incl. operating manual		
100 kHz Current Probe, AC/DC, 0.1 V/A, 30 A, 300 V (RMS) CAT III, BNC	R&S®RT-ZC03	1333.0844.02
Incl. operating manual		
10 MHz Current Probe, AC/DC, 0.01 V/A, 150 A (RMS), BNC	R&S®RT-ZC10	1409.7750K02
Incl. carrying case; operating manual		
100 MHz Current Probe, AC/DC, 0.1 V/A, 30 A (RMS), BNC	R&S®RT-ZC20	1409.7766K02
Incl. carrying case; operating manual		
120 MHz Current Probe, AC/DC, 1 V/A, 5 A (RMS), BNC	R&S®RT-ZC30	1409.7772K02
Incl. carrying case; operating manual		
2 MHz Current Probe, AC/DC, 0.01 V/A, 500 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC05B	1409.8204.02
Incl. carrying case; operating manual		
10 MHz Current Probe, AC/DC, 0.01 V/A, 150 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC10B	1409.8210.02
Incl. carrying case; operating manual		
50 MHz Current Probe, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC15B	1409.8227.02
Incl. carrying case; operating manual		
100 MHz Current Probe, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC20B	1409.8233.02
Incl. carrying case; operating manual		

Designation	Туре	Order No.
Accessories and sets		
Mini Clips, contains: mini clip (10)	R&S®RT-ZA4	1416.0428.02
Micro Clips, contains: micro clip (4)	R&S®RT-ZA5	1416.0434.02
Lead Set, contains: lead 6 cm (2.4 in) (5); lead 15 cm (5.9 in) (5)	R&S®RT-ZA6	1416.0440.02
Probe Box to N/USB Adapter	R&S®RT-ZA9	1417.0909.02
SMA(f) to BNC(m) Adapter	R&S®RT-ZA10	1416.0457.02
Adapter BNC to 4 mm Dual Banana	R&S®RT-ZA11	1333.0796.02
Probe Power Supply	R&S®RT-ZA13	1409.7789.02
Spare Accessory Set for R&S®RT-ZI10/11 Isolated Probes,	R&S®RT-ZA20	1326.1978.02
contains: insulating sleeve (2), reference contact (2), reference leads with crocodile clip,		
color clips, sprung hook		
Extended Accessory Set for R&S®RT-ZI10/11 Isolated Probes,	R&S®RT-ZA21	1326.1984.02
contains: jaw clip, safety jaw clip, reference lead with 4 mm connector, reference lead with		
hook clip, 4 mm test probe, BNC connector, dual 4 mm to safety BNC adapter		
Multimeter Test Leads, two leads (red/black), 1000 V CAT III	R&S®RT-ZA22	1326.0988.02
Accessory Kit for R&S®RT-ZHD	R&S®RT-ZA24	1800.2707.02
contains: safety alligator clip (red/black); pincer clip (red/black); test clip (red/black); spade		
terminal (red/black); lead 17 cm (red/black); lead 100 cm (red/black)		
3D Probe Positioner	R&S®RT-ZAP	1326.3641.02
Power Deskew Fixture	R&S®RT-ZF20	1800.0004.02

Service options		
Extended Warranty, one year	R&S®WE1	Not available for all products.
Extended Warranty, two years	R&S®WE2	Please contact your local
Extended Warranty, three years	R&S®WE3	Rohde & Schwarz sales office.
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

#### Extended warranty with a term of one to four years (WE1 to WE4)

Repairs carried out during the contract term are free of charge <sup>2</sup>. Necessary calibration and adjustments carried out during repairs are also covered.

### Extended warranty with calibration (CW1 to CW4)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs <sup>2</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

<sup>&</sup>lt;sup>2</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

## Service that adds value

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

#### Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management  $1S0\,9001$ 

Certified Environmental Management ISO 14001

#### Rohde & Schwarz GmbH & Co. KG

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