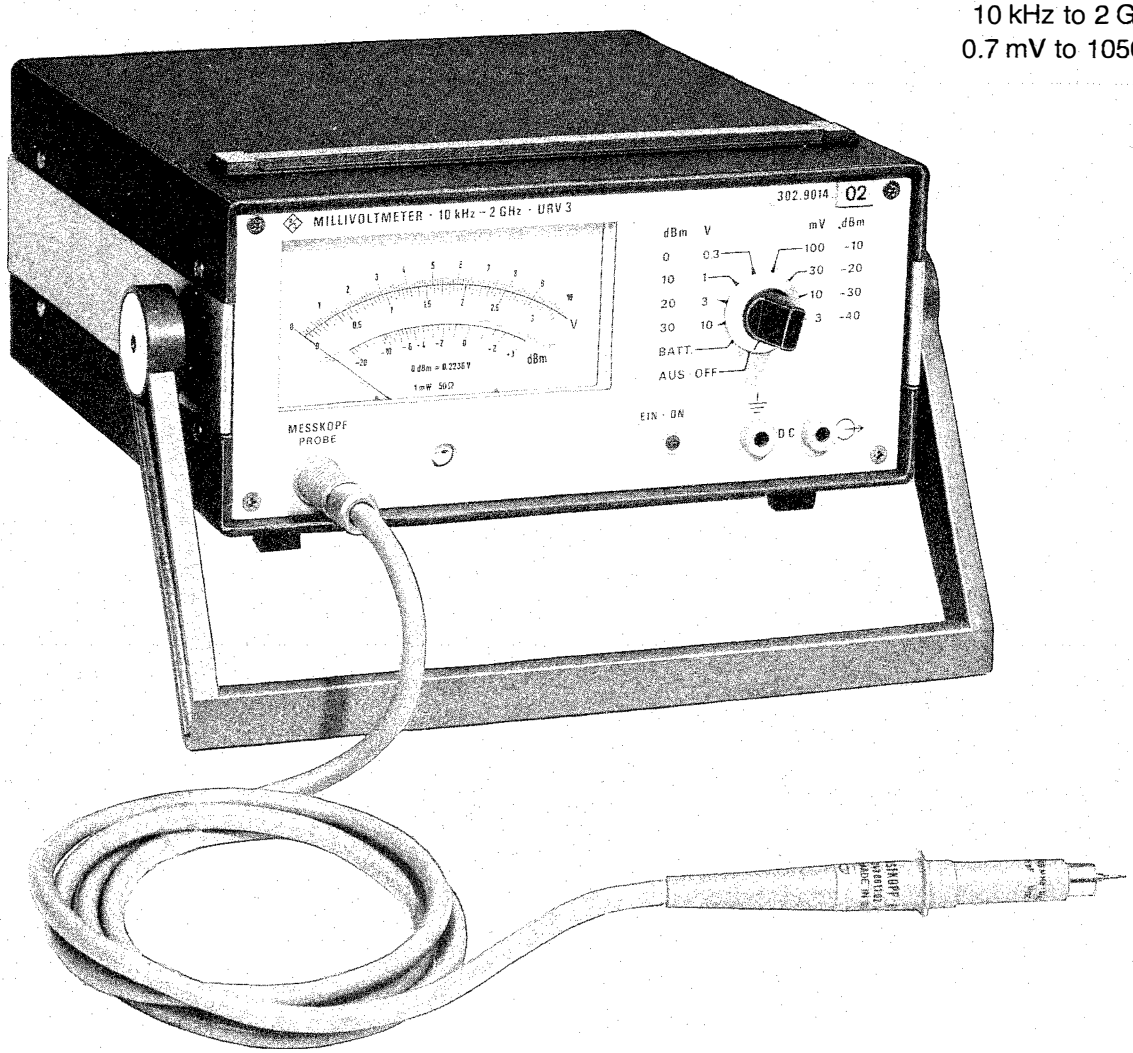
ROHDE&SCHWARZ

URV 3

RF MILLIVOLTMETER

10 kHz to 2 GHz
0.7 mV to 1050 V



- Handy RF millivoltmeter for mobile and stationary use
- RF probe (C_{in} = 2.5 pF) can also be combined with 20-dB or 40-dB divider
- RF insertion units with defined characteristic impedances 50 and 75 Ω, RF voltage coverage up to 100 V
- RF measuring heads can be quickly exchanged thanks to secure plug-and-socket connection
- Small measuring error of 3% – the RF measuring heads can be used with all voltmeters of the URV family
- Floating during battery and accumulator operation
- Universal powering system – battery, accumulator, power supply unit or external source

Characteristics

The URV 3 is a highly sensitive and accurate millivoltmeter for measuring RF voltages in the range from 10 kHz to 2 GHz (up to 3 GHz if used only as an indicator). A broad range of accessories (see photo below) and battery operation capability permit versatile stationary and mobile use of the voltmeter.

The URV 3 affords extremely constant indication and zero setting as well as easy reading of the measured values. Low capacitive and resistive loading by the RF probe minimize measuring errors introduced by detuning of resonant circuits, damping and unwanted phase shifts in feedback networks, etc. Mismatching is negligible thanks to the low reflection coefficient of the RF insertion units.

Measuring heads

The measuring heads are freely interchangeable within the URV family without degrading the error limits. The accuracy is exclusively determined by the matching of the characteristics of the diodes used in the measuring head. The RF probe is supplied with the URV 3, the other accessories are recommended extras.

RF probe alone:
700 µV to 10.5 V
100 kHz to 1 GHz
(up to 2 GHz if only used as an indicator)

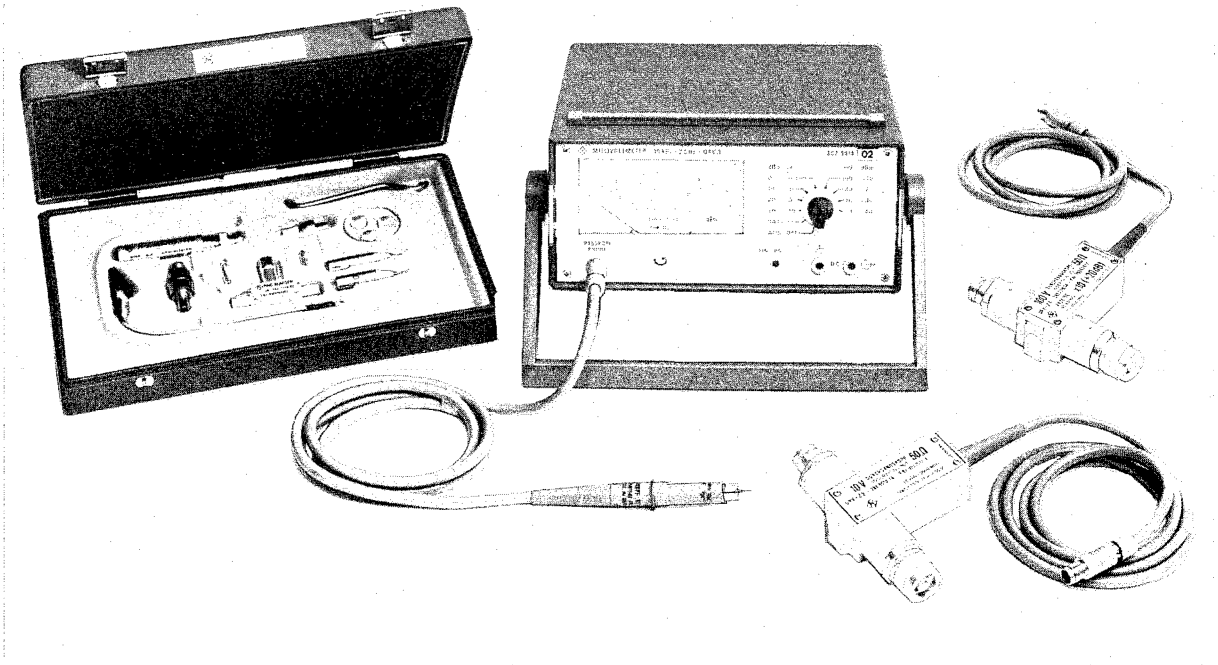
RF probe + 20-dB divider:
7 mV to 105 V
2 to 500 MHz

RF probe + 40-dB divider:
70 mV to 1050 V
1 to 500 MHz
The capacitive dividers at the same time reduce the input capacitance and increase the input resistance.

RF probe + BNC adapter
(with or without divider):
RF voltage measurement in coaxial systems up to 350 V (probe + 40-dB divider + BNC adapter); limit dictated by the voltage rating of the BNC connecting cables.

RF probe + 75-Ω adapter:
700 µV to 10.5 V
100 kHz to 500 MHz
RF voltage measurement in coaxial 75-Ω systems (adaptable connectors, see page 6).

RF insertion units:
RF voltage measurement in coaxial systems with low reflection coefficient; various connector systems (see page 6).
10-V insertion units (50 or 75 Ω):
700 µV to 10.5 V
10 kHz to 2 GHz
(up to 3 GHz if only used as an indicator) at 50 Ω
10 kHz to 1.6 GHz at 75 Ω
100-V insertion unit (50 Ω):
7 mV to 105 V, 1 MHz to 2 GHz
Appropriately terminated, the 100-V insertion unit is suitable for measurements on power stages up to 200 W.



RF Millivoltmeter URV 3 with measuring heads: 100-V insertion unit and 10-V insertion unit; case containing RF probe and accessories, all supplied with the URV 3. The case also accommodates the recommended extras: 20-dB divider, 40-dB divider, BNC adapter and 75-Ω adapter.

Uses

RF voltage measurements. High-impedance measurements with RF probe in broadband amplifiers, on resonant circuits of oscillators, narrowband amplifiers and filters; measurements with impedance-matched RF insertion unit at the outputs of transmitters and other coaxial systems. True rms value measurement possible up to 3 V and peak-value measurement from 1 V RF voltage.

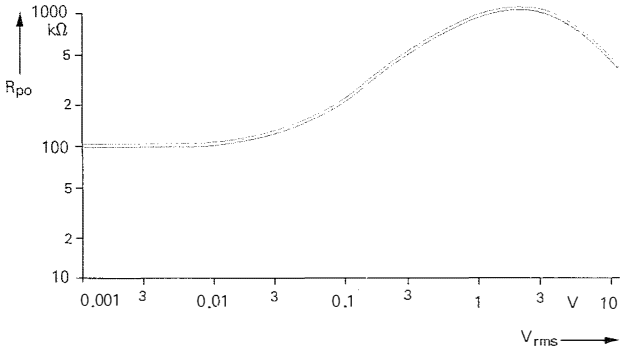
Adjustment to maximum, minimum or nominal value. Determination of the 3-dB points as a function of frequency.

Gain or attenuation measurement. Measurement of gain attenuation on passive or active four-terminal networks as a function of frequency (frequency response).

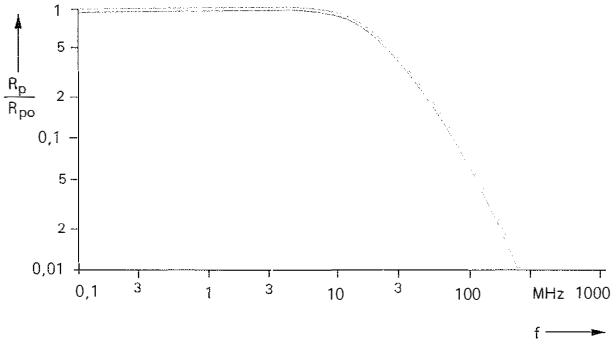
Level measurement. Measurement of level in dBm referred to 0 dBm = 1 mW into 50 Ω (0.2236 V), correction of level indication (according to relation 10 log $\frac{50}{Z}$): − 1.76 dB at Z = 75 Ω.

Input impedance of RF probe

The input impedance of the RF probe is given by the input capacitance C_{in} and the parallel input resistance R_p, which is dependent on the test voltage, and, above 3 MHz, also on the frequency. See diagrams below.



Input resistance R_{po} for f < 3 MHz as a typical function of the test voltage (sinewave).



Typical frequency function of the input resistance R_p relative to the input resistance R_{po} at low frequencies.

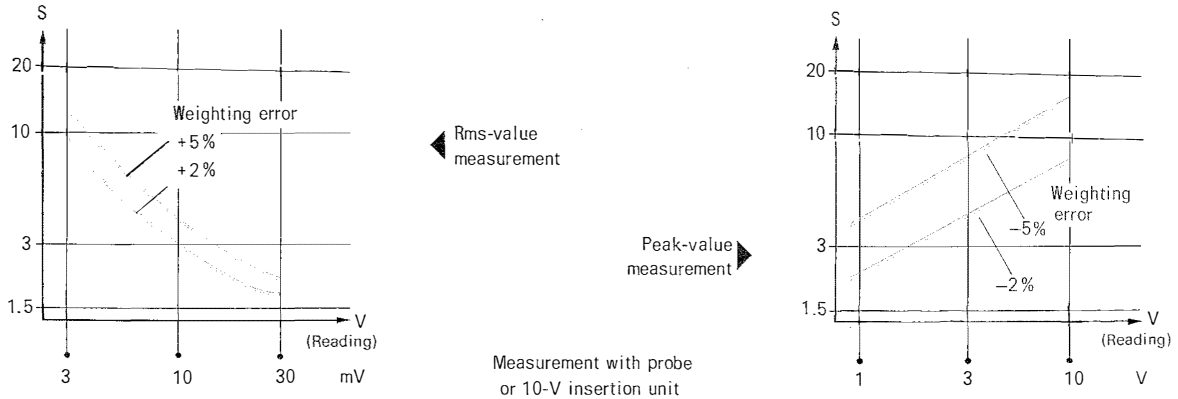
Waveform weighting

Rms-value measurement. The URV 3 measures and reads the rms value in the most sensitive measurement ranges. The curves below show the maximum permissible crest factor vs. test voltage for weighting errors of +2% and +5%.

Peak-value measurement. The URV 3 measures the peak-to-peak value at voltages above 1 V but reads out the value $\frac{V_{pp}}{2\sqrt{2}}$. This corresponds to readout of the rms value for sinusoidal voltages. The curves below show the maximum permissible crest factor vs. test voltage for weighting errors of −2% and −5%.

Maximum permissible crest factor S

for rms-value measurement (left) and peak-value measurement (right)



3	10	30	mV	Measurement with probe or 10-V insertion unit	1	3	10	V
30	100	300	mV	Measurement with probe and 20-dB divider or 100-V insertion unit	10	30	100	V
300	1000	3000	mV	Measurement with probe and 40-dB divider	100	300	1000	V

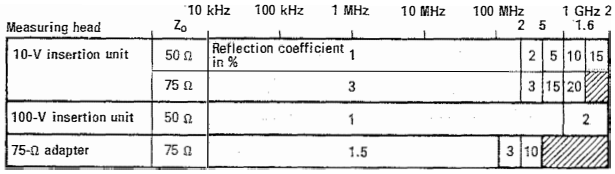
In the transition region between rms-value and peak value measurement the reading is defined only for sinusoidal voltages.

Specifications

Test input

Parameters measured	voltage (V, mV)/level (dBm)		
Frequency range	10 kHz to 2 GHz (choice of measuring heads)		
Voltage range	700 µV to 1050 V (with dividers)		
Level range	−50 to +73 dBm		
Level reference	0 dBm corresponding to 1 mW into 50 Ω (0.2236 V)		
Range of indication	300 to 700 µV or −57 to −50 dBm		
Connection of measuring head	three-pole socket (for URV measuring heads)		
RF measuring heads	RF probe with 20-dB and 40-dB dividers as well as BNC adapter and 75-Ω adapter 10-V insertion unit (50, 75 Ω) 100-V insertion unit (50 Ω)		
Input impedance of RF probe	$R_p > 80$ kΩ (up to 10 MHz), $C_{in} = 2.5$ pF		
with 20-dB divider	$R_p >$ 1 MΩ (up to 20 MHz), $C_{in} = 1$ pF		
with 40-dB divider	$R_p > 10$ MΩ (up to 20 MHz), $C_{in} = 0.5$ pF		
Voltage rating	V DC	V_{rms} (sinewave)	V_p
RF probe	400 V	15 V	22 V
with 20-dB divider	1000 V	150 V	220 V
with 40-dB divider			
up to 100 MHz	1000 V	1050 V	1500 V
up to 500 MHz	1000 V	210 V	1500 V
10-V insertion unit	50 V	15 V	22 V
100-V insertion unit	1000 V	150 V	220 V
75-Ω adapter ($P_{max} = 2$ W)	12 V	12 V	17 V

Reflection coefficients



Frequency ranges

RF probe	100 kHz to 1 GHz (up to 2 GHz if only used as indicator)
with 20-dB divider	2 to 500 MHz
with 40-dB divider	1 to 500 MHz
10-V insertion unit, 50 Ω	10 kHz to 2 GHz (up to 3 GHz if only used as indicator)
10-V insertion unit, 75 Ω	10 kHz to 1.6 GHz
100-V insertion unit, 50 Ω	1 MHz to 2 GHz
75-Ω adapter	100 kHz to 500 MHz

Voltage ranges (level ranges Z = 50 Ω)

RF probe, 10-V insertion unit	700 µV to 10.5/−50 to +33 dBm
RF probe with 20-dB divider, 100-V insertion unit	7 mV to 105 V/−30 to +53 dBm
RF probe with 40-dB divider	70 mV to 1050 V/−10 to +73 dBm

Subranges	Voltage measurement	3/10/30/100 mV/0.3/1/3/10 V
	Level measurement	−40/−30/−20/−10/0/+10/+20/+30 dBm
Range setting	rotary switch	

RF MILLIVOLTMETER URV 3

Service life	
Battery (alkali-manganese cells)	approx. 200 h
Lead accumulator	approx. 70 h
Overall dimensions (W x H x D) and weight	240 mm x 109 mm x 217 mm, 2.5 kg (with batteries)
Order designation	▶ RF Millivoltmeter URV 3 302.9014.02
without RF Probe URV-Z7	302.9014.12

Accessories supplied

RF Probe URV-Z7	292.5312.02 comprising earth cable 241.0620.00 with clip earth sleeve 241.0688.00 earth strip 243.9053.00 hook tip 265.4631.00 solder tip 265.4648.00 in case 219.5900.02
4 batteries, R-20, IEC	017.0015.00
Manual	

Recommended extras

Accessories URV-Z6	292.5364.02 comprising 20-dB divider 241.1510.00 40-dB divider 241.1710.00 BNC adapter URV-Z 241.1110.02 for RF probe (including reducing sleeve for dividers)
75-Ω Adapter URV-Z3	243.9118.70 comprising adapters from UNI-9 socket to 2.5/6 connector 243.9260.00 to 1.6/5.6 connector 243.9276.00 to BNC connector 243.9282.00

RF insertion units	50 Ω N connectors	50 Ω Dezifix B	75 Ω Dezifix B
10-V Insertion Unit URV-Z2	288.8010.55	288.8010.54	288.8010.74
100-V Insertion Unit URV-Z4	283.7716.55	.....	—

Power Supply (6 V) EGT-Z (220/115 V, 50/60 Hz) with connecting cable for buffer operation and charging	201.5414.00
Lead Storage Battery (6 V) EGT-Z	201.5437.00

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179/681 (Bi)