ROHDE & SCHWARZ

Fast & Accurate

µP-controlled error correction

Millivoltmeter URV 5

DC, 9 kHz to 18 GHz

200 µV to 1000 V
1 nW to 2 kW (50 Ω)
−60 to +63 dBm (50 Ω)
0 to 400 V DC

IEC 625 Bus

IEEE 488

Millivolt-meter URV 5

DC, 9 kHz to 18 GHz/200 µV to 1000 V

- Two test inputs
- Unexcelled accuracy through µP-controlled error correction: ±1 %
- Voltage, level and power measurement; tendency indication
- Probes, insertion units and power sensors may be exchanged as required
- Readout in all conventional units with freely selectable reference impedance; relative measurements
- Frequency-dependent calibration factors are taken into account
- DC output (option)

Scale 1:2.5

IEC 625 Bus

The **Millivoltmeter URV 5** is a broadband, sensitive voltage, level and power meter featuring high accuracy and suitable both for manual operation and for use in systems. A great variety of measuring heads and accessories allows the URV 5 to be used for all kinds of measurement:

- With RF probe and DC probe for no-load AC and DC voltage measurements in electronic circuits.
- Voltage (and power) measurements in coaxial 50-Ω and 75-Ω systems using the low-reflection and low-loss insertion units (up to 2 GHz).
- Power measurement up to 18 GHz using the power sensors of Power Meter NRV.

Readout One or two measuring heads can be connected to the URV 5. The values measured in the two channels can be displayed separately, set off against one another or referred to any reference (A, B, A/B, B/A, A/REF_A, B/REF_B). For absolute measurement, four different units can be selected:

volt V watt W dBm dBV

In the case of **relative measurements,** the difference, the difference in percent, the logarithmic difference or the ratio is indicated (ΔV, ΔW, Δ%, ΔdB, X/REF).

Tendency indication The Millivoltmeter has a fast tendency indication which follows the variations of the measured values, thus facilitating adjustments and maxima-minima settings.

Measurement rate With a test rate of up to 30 measurements/s, the URV 5 is ideally suited for use in systems. For applications requiring a noise-free indication rather than a high measurement rate, the results can be filtered, the measurement rate being then reduced accordingly. The measurement rate can be set in six steps via the filter functions (F0 to F5).

Waveform weighting The rectifiers used in the AC voltage measuring heads handle an extremely wide dynamic range of the input voltage of more than 90 dB. The partly non-linear transfer characteristic is individually linearized, so that for sinewave voltages the rms value is always read out. Non-sinewave voltages up to about 30 mV are also measured with rms weighting, whereas for voltages above 1 V the result is read out as $V_{pp}/2\sqrt{2}$ (peak weighting). If dividers are connected ahead of the measuring heads, the specified limits are shifted upwards (300 mV and 10 V for 100-V insertion units).

PEP measurement The PEAK (PEP) key is used for reading the peak envelope power of a modulated signal. Signals with a minimum pulse width of 200 µs and pulse repetition frequencies down to 0.05 Hz can be measured in this mode.

Frequency-response correction Each measuring head is individually calibrated. The test frequency need only be entered via the keyboard or IEC/IEEE bus and the URV 5 will take account of the calibration factor in the measurement result.

Attenuation correction The URV 5 automatically takes account of the division factors of the measuring heads. If a plug-on divider or attenuator pad is connected ahead of the measuring head, the corresponding attenuation can be entered and will be taken into account in the result.

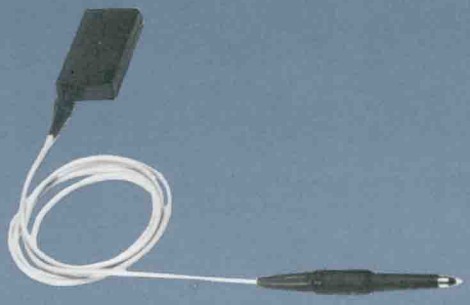
Data input Upon pressing the SHIFT key, a decimal keypad is available to the user for data entry or for calling up **special functions,** such as:

- display test,
- entry and checking of IEC/IEEE-bus address,
- nonvolatile storage of reference values,
- selection of filters F0 to F5,
- indication of calibration date/recalling of calibration routines,
- transfer of reference value channel A to B and vice versa.

DC output (option) This option delivers a DC voltage proportional to the numerical readout. Thanks to the versatile conversion capability of the URV 5, the scale can be linear or logarithmic.

The **measuring heads** are individually calibrated and therefore interchangeable without affecting the error limits.

URV 5-Z1 **DC Probe**
0 to 400 V, R_{in} = 9 MΩ ‖ 6 pF



DC probe

URV 5-Z7 **RF Probe** with ground cable and clip, ground sleeve, ground strip, hook tip and solder tip

without plug-on divider
200 µV to 10 V, 20 kHz to 1 GHz

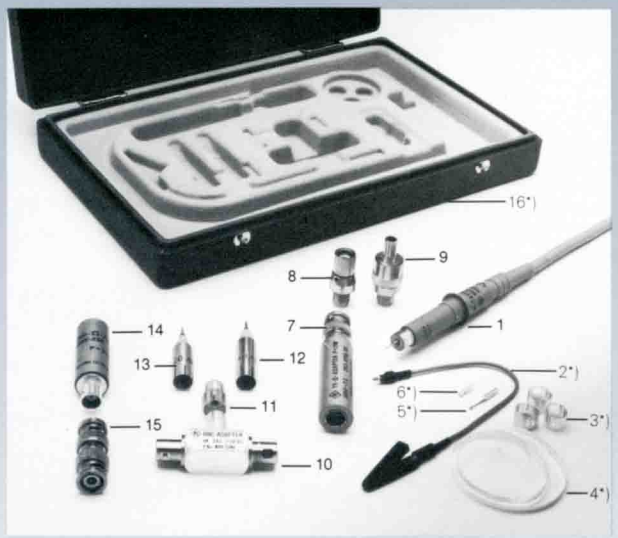
with **20-dB plug-on divider** (URV-Z6)
2 mV to 100 V, 1 to 500 MHz

with **40-dB plug-on divider** (URV-Z6)
20 mV to 1000 V, 500 kHz to 500 MHz

with **BNC adapter** (URV-Z6) with or without plug-on divider, for voltage measurement on 50-Ω coaxial lines

with **50-Ω adapter** (URV-Z50)
200 µV to 10 V, 20 kHz to 1 GHz
RF voltage measurement with integrated termination in 50-Ω coaxial systems

with **75-Ω adapter** (URV-Z3)
200 µV to 10 V, 20 kHz to 500 MHz
RF voltage measurement with integrated termination in 75-Ω coaxial systems (adaptable connectors)



RF probe (1) with accessories: ground cable and clip (2); ground sleeve (3); ground strip (4); hook tip (5); solder tip (6); 75-Ω adapter (7) with BNC adapter, adapter to 1.6/5.6 connectors (8) and to 2.5/6 connectors (9); BNC adapter (10) with reducer sleeve (11) for plug-on dividers (12, 13): 50-Ω adapter (14) with BNC adapter (15) to BNC connectors; case (16);
*) supplied with RF Probe URV 5-Z7

URV 5-Z9 **Dual Directional Coupler, 50 Ω**
100 kHz to 80 MHz, 10 µW to 2 kW
Coupling of forward and reflected power; in conjunction with two RF Probes URV 5-Z7 for measurement of directional power and reflection

Dual directional coupler

URV 5-Z2 **10-V Insertion Unit, 50 Ω**
200 µV to 10 V
9 kHz to 2 GHz (model 55)
9 kHz to 1 GHz (model 04)
RF voltage measurement with **low reflection coefficient** in 50-Ω coaxial systems

10-V insertion unit

URV 5-Z4 **100-V Insertion Units, 50 and 75 Ω**
2 mV to 100 V
100 kHz to 2 GHz, 50 Ω (model 55)
100 kHz to 1 GHz, 50 Ω (model 04)
100 kHz to 2 GHz, 75 Ω (model 75)
RF voltage measurement in 50-Ω and 75-Ω coaxial systems for higher voltages and with extremely low reflection coefficient; power measurements up to 200 W (130 W) possible with suitable termination

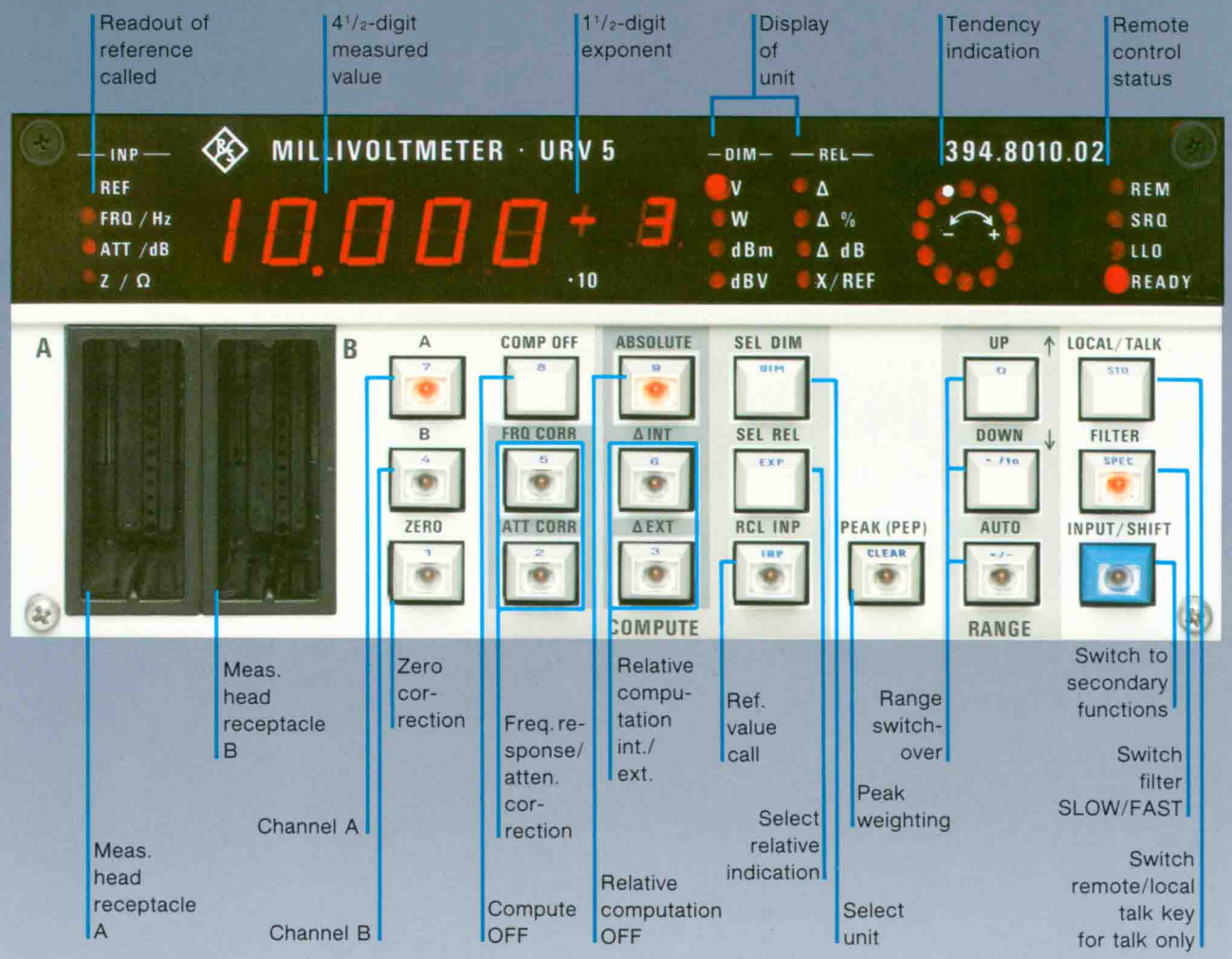
NRV-Z1 **1-nW Power Sensor, 50 Ω**
1 nW to 20 mW, 10 MHz to 18 GHz

NRV-Z2 **Precision Power Sensor, 50 Ω**
100 nW to 500 mW, 10 MHz to 18 GHz
VSWR < 1.05 up to 4 GHz, < 1.2 up to 18 GHz

NRV-Z3 **400-pW Power Sensor, 75 Ω**
400 pW to 13 mW, 1 MHz to 2.5 GHz

Power sensor

OPERATION



Selection of filter functions
SLOW (F2) ⇄ FAST (F4)
F0 to F5

F2 ⇄ [FILTER] ⇄ F4

[SHIFT] [SPEC] [3] → Indication of instantaneous filter function, e.g. F4

[1] → F1

Call of a special function
e.g. LED test

[SHIFT] [SPEC] [0]

IEC-bus address
indication of address set

[SHIFT] [SPEC] [1] → [SHIFT]

Blue: secondary functions

Reference correction values

Indication: reference or correction values for selected channel

[RCL INP] → Indication reference value [RCL INP] → Indication frequency →

[RCL INP] → Indication attenuation [RCL INP] → Indication Z →

[RCL INP] → Indication meas. value

Storage of reference value, e.g. 150 mV for channel set

[RCL INP] → Indication of old ref. value [SHIFT] [1] [5] [0]

[EXP] [+/-] [3] [DIM] ..... [DIM] [STO]

only if unit other than V

Transfer of instantaneous meas. value as reference

[SHIFT] [STO]

Nonvolatile storage of all reference, correction and impedance values (both channels)

[SHIFT] [SPEC] [2]

Input pointer

Command code	Function
IA IB	Input for channel A valid Input for channel B valid Note: With commands marked by * it is possible to define the input channel — independent of the selected measurement channel — for all subsequent commands by sending IA or IB once in the command string (resetting by delimiter or PA, PB).

Setting commands

Command code	IA, IB	Function		
CØ	–	Reading in of test data into basic unit (≙ DCL, SDC after addressing)		
C1	–	Basic setting: PA (PB), EØ, F2, KAØ, KFØ, RGØ, UØ..., HØ, NØ, QØ, W3, Y1 Note: Resetting of input pointers IA, IB		
EØ E1	* *	Off On	PEAK (PEP) measurement	
FØ F1 F2 F3 F4 F5	* * * * * *	SLOW FAST SUPERFAST	4½-digit display 3½-digit display	measurement speed
KFØ KF1 KAØ KA1	* * * *	FRQ CORR off FRQ CORR on ATT CORR off ATT CORR on (It is also possible to send KFØ1 instead of e.g. KF1)		corrective evaluation
NØ N1	– –	Output with Output without		alpha header
O1	*	Triggering		ZERO meas.
PA PB	– –	Probe A Probe B Note: Resetting of input pointers IA, IB		Setting of measurement channel
RG, RGØ RG1 RG2 RG3 RG4	* * * * *	Autorange 10 mV 100 mV 1 V 10 V AC probe, 10-V insertion unit (It is also possible to send RGØ3 instead of e.g. RG3)	100 mV 1 V 10 V 100 V 100-V insertion units	1 V 10 V 100 V 1000 V DC probe
UØ U1 U2 U7	* * * *	V dBm dBV W		Output unit (ABSOLUTE)
U3 [[W] [X]] U4 [[W] [X]] U5 [[W] [X]] U6 [[W] [X]]	* * * *	Δlin Δ% ΔdB X/Ref Note: The letters X and/or W can be added to the commands U3 to U6. X = ΔEXT (reference = second channel) W = relative readout in W, e.g. U3X or U6WX	in V referred to internal reference value	Output unit (relative)
YØ Y1 YX	– – –	off on Triggering	Cyclical temperature measurement	
Y?	–	Read-out of set status, i.e. if cyclical temperature measurement is switched on or off (output via SRQ).		

Data input commands

DU ‹DATUM›	*	Reference value in V	
DV ‹DATUM›	*	Reference value in V	
DB ‹DATUM›	*	Reference value in dBV	Data input
DM ‹DATUM›	*	Reference value in dBm	
DW ‹DATUM›	*	Reference value in W	
DR ‹DATUM›	*	Reference impedance in Ω	

Data input commands (continued)

Command code	IA, IB	Function
DZ ‹DATUM›	*	Reference impedance in Ω
DA ‹DATUM› DF ‹DATUM›	* *	Correction attenuation in dB Correction frequency in Hz
D = D = AA D = BB	* – –	Data copying to channel IA, IB Data copying values B same as in channel A Data copying values A same as in channel B

Interface commands

WØ W1 W2 W3 W4 W5 W6 W7 W8	– – – – – – – – –	NL CR ETX CR + NL EOI NL + EOI CR + EOI ETX + EOI CR + NL + EOI		Delimiters for string output
QØ Q1 Q2 Q3	– – – –	off on on on	(all SRQ) (except for SRQ (80) ≙ meas. value ready, all SRQ (only error SRQ, ≥ 96)	Call of SRQ
HØ H1	– –	off on	Auxiliary mode (PET time-out correction)	

Trigger commands

XØ	–	Reset command for commands X3/X4
X1	–	Trigger command (≙ GET)
X2	*	Trigger command + storage of measured value as reference value
X3	–	Setting command for triggering measurement upon a service request
X4	–	Setting command for continuous triggering
X8	–	Trigger command for both measurement channels (measured values are separated by delimiters [corresponding to WØ to W8])
ZØ	*	Output of reference value
Z1	*	Output of reference impedance
Z2	*	Output of correction frequency
Z3	*	Output of correction attenuation

Special commands

SØ	–	LED test of display
S4	–	Indication of date under which the calibration values have been stored
S5	–	Output of error code according to hardware function errors occurred
S6	–	Checksum output of program memory
ST	*	Status output of all device settings for the selected channel

Keywords

CALIBRATION	Switchover between measurement and calibration mode: only commands for calibration are valid (CA..)

Separators and delimiters

Symbol	Designation	ASCII decimal equivalent	Recommended use
	Comma	44	Separator between commands
CR	Carriage Return	13	Delimiters
NL	New Line	10	Delimiters
ETX		3	Delimiters
EOI	If the EOI line is set during the transfer of the last character, this is also accepted as delimiter.		

SPECIFICATIONS

Basic Unit

(Unless otherwise stated, all specifications refer to voltage readout in V)

Test channels ..... 2 (A and B), independent of each other, separately adjustable
Measuring heads ..... all intelligent measuring heads for URV 5 and NRV can be used
Measurement range ..... >94 dB (4 ranges in 20-dB steps)
Measurement mode
absolute ..... A, B
relative ..... A/REF_A, B/REF_B, A/B, B/A
Readout mode
absolute ..... V, W, dBm, dBV
relative ..... ΔV, ΔW, Δ %, ΔdB, X/REF
Display range ..... $\pm 19{,}999 \times 10^{\pm 19}$
Resolution ..... 0.01 % (0.1 %) [1] of nominal measurement range with readout in V; 0.01 dB with readout in dBm, dBV or ΔdB; 0.01 % with readout in Δ %

Error limits
18 to 28 °C ..... ±0.15 % of rdg per channel
Additional error due to temperature
10 to 40 °C ..... ±0.25 % of rdg per channel
0 to 50 °C ..... ±0.5 % of rdg per channel
Filter ..... for reduction of display noise, adjustable[2] in 6 steps (F0 to F5)
Zero adjustment ..... via keyboard or remote-controlled, duration approx. 4 s[2]
Measurement rate (manual) ..... approx. 1 measurement/s with filter F0 up to 30 measurements/s with filter F5[2]
Measurement time (IEC/IEEE bus) approx. 0.05 s with filter F5 up to 20 s with filter F0[2]; with dual-channel measurement sum of the individual times as maximum, no switchover delay; all measurements triggered via IEC/IEEE bus are in steady state, even in case of range switchover

PEP measurement
Pulse width approx. 200 µs to CW
Minimum pulse repetition frequency

Filter	F0	F1	F2	F3	F4	F5
f_{min}/Hz	0.05	0.25	1	5	25	100

Frequency-response correction .... can be selected for all AC voltage and power measuring heads; frequency response of measuring head is accounted for after entry of test frequency; one frequency per channel can be entered
Attenuation correction ..... can be switched on for all measuring heads; one attenuation value per channel can be entered (−199.99 to +199.99 dB)
Reference values ..... one reference value per channel for relative measurements (REF_A, REF_B); entry via keyboard, IEC/IEEE bus or transfer of measured value
Reference impedance ..... for computation and indication of power and power level; one value per channel can be entered (10^{-4} to 10^4 Ω); automatic initialization with impedance value (50/75 Ω) of power sensors for NRV and insertion units URV 5-Z2/-Z4

Remote control

Interface ..... IEC 625-1 (IEEE 488) for control of all device functions
Interface functions SH1, AH1, T5, L4, SR1, RL1, DC1, DT1, PP1

General data

Operating temperature range ..... 0 to +50 °C, class I to IEC 359 (no dewing)
Storage temperature range ..... −40 to +70 °C
Power supply ..... 100/120/220/240 V ±10 % 47 to 63 Hz, 400 Hz (30 VA)
Dimensions, weight ..... 241 mm × 110 mm × 340 mm, 4.4 kg

Option DC Output URV 5-B2

Output impedance ..... 1 kΩ
Output voltage range (EMF) ..... −1.999 to +1.999 V
Resolution ..... 1 mV (10 digits)
Error ..... ±2 mV

Measuring heads and measurement functions

(All specifications without errors of basic unit)

DC voltage measurement — using DC Probe URV 5-Z1

Voltage measurement range ..... 0 to 400 V
Input impedance ..... 9 MΩ || 6 pF
Maximum load ..... 400 V

General data
Dimensions, weight ..... 15 mm dia. × 125 mm, 80 g
Length of connecting cable ..... 1.2 m
Temperature range ..... see basic unit URV 5

Nominal range	Resolution[3]	Max. reading	Error limits 18 to 28 °C
1 V	100 µV	1.2200 V	±(0.15 % of rdg + 5 digits)
10 V	1 mV	12.200 V	±(0.15 % of rdg + 1 digit)
100 V	10 mV	122.00 V	±(0.15 % of rdg + 1 digit)
400 V	100 mV	420.00 V	±(0.35 % of rdg + 1 digit)

Additional error due to temperature
10 to 40 °C ..... ±0.25 % of rdg
0 to 50 °C ..... ±0.5 % of rdg

Filter-dependent data

Filter	F0	F1	F2	F3	F4	F5
Series-mode rejection 50 (60) Hz ±0.05 % in dB	64 (15)	64 (15)	64 (15)	64 (15)	64 (15)	–
Measurement rate (manual)[4]	1/s	2/s	5/s	9/s	15/s	31/s
Measurement time (IEC/IEEE bus), trigger to output of 1st byte[4]	13 s	3.2 s	0.8 s	0.22 s	0.07 s	0.034 s

AC voltage measurement — using Insertion Unit URV 5-Z2

Voltage measurement range ..... 200 µV to 10 V
Level/power measurement range ... −60 to +33 dBm/1 nW to 2 W
Frequency range ..... 9 kHz to 2 GHz (model 55)
9 kHz to 1 GHz (model 04)
Characteristic impedance ..... 50 Ω
Max. input voltage rms (sinewave) .. 15 V
peak ..... 22 V
DC ..... 50 V

Nominal range	Resolution[3]	Max. reading	Error limits 18 to 28 °C
10 mV	1 µV	12.200 mV	±(0.3 % of rdg + 3 digits + frequency response error + zero error)
100 mV	10 µV	122.00 mV	
1 V	100 µV	1.2200 V	
10 V	1 mV	10.500 V	

Maximum reflection coefficient and VSWR (model 04 up to 1 GHz)

	DC	200 MHz	500 MHz	1 GHz	1.6 GHz	2 GHz
r/%	1	2	7	10	15	
VSWR	1.02	1.04	1.15	1.22	1.35	

General data
Connectors ..... N male, N female
Dimensions, weight ..... 85 mm × 115 mm × 30 mm, 0.35 kg
Length of connecting cable ..... 1.2 m
Temperature range ..... see basic unit

Frequency response error in % of rdg

	9 kHz	20 kHz	50 kHz	30 MHz	100 MHz	200 MHz	500 MHz	1 GHz	2 GHz	
Model 55	6[5]	2	0.5	1.5	2	3	5	7[6]		[7]
				1.5	2	5	11	18		[8]
Model 04	6[5]	2	0.5	1.5	2	3	5			[7]
				1.5	2	6	13			[8]

Zero error, display noise, measurement rate and additional error due to temperature see additional data for AC voltage measurement on back cover

Footnotes see page 7.

Measuring heads and measurement functions (continued)

AC voltage measurement — using Insertion Unit URV 5-Z4

Voltage measurement range	2 mV to 100 V
Level measurement range	−40 to +53 dBm (models 55 and 04) −42 to +51 dBm (model 75)
Power measurement range	100 nW to 200 W (models 55 and 04) 50 nW to 130 W (model 75)
Frequency range	100 kHz to 2 GHz (models 55 and 75) 100 kHz to 1 GHz (model 04)
Characteristic impedance	50 Ω (models 55 and 04) 75 Ω (model 75)
Max. input voltage rms (sinewave)	150 V
peak	220 V
DC	1000 V

Maximum reflection coefficient and VSWR

		DC	200	500 (MHz)	1 (GHz)	1.6	2
Model 55	r/%	1		2		3	
	VSWR	1.02		1.04		1.06	
Model 04	r/%	1		2			
	VSWR	1.02		1.04			
Model 75	r/%	1.5	2	3		5	
	VSWR	1.03	1.04	1.06		1.11	

Nominal range	Resolution[3]	Max. reading	Error limits 18 to 28 °C
100 mV	10 µV	122.00 mV	±(0.3% of rdg + 3 digits
1 V	100 µV	1.2200 V	+ frequency response error
10 V	1 mV	12.200 V	+ zero error)
100 V	10 mV	105.00 V	

Frequency response error in % of rdg

	100 (kHz)	200	500	1 (MHz)	30	200	500	1 (GHz)	1.6	2 GHz	
Model 55	15[5]	6[5]	2	1	1.5	2	4	6	8[9]		[7]
					2	5	7	10	18		[8]
Model 04	15[5]	6[5]	2	1	1.5	2	4	[7]			
					2	6	9	[8]			
Model 75	20[5]	8[5]	2	1	2	2.5	5	7	10[9]		[7]
					2	5	7	12	20		[8]

Zero error, display noise, measurement rate and additional error due to temperature see additional data for AC voltage measurement on back cover

General data

Connectors	N male, N female
Dimensions, weight	85 mm × 115 mm × 30 mm, 0.35 kg
Length of connecting cable	1.2 m
Temperature range	see basic unit

AC voltage measurement — using RF Probe URV 5-Z7

RF probe	without plug-on divider	with 20-dB plug-on divider	with 40-dB plug-on divider	with 50-Ω adapter	with 75-Ω adapter
Voltage measurement range	200 µV to 10 V	2 mV to 100 V	20 mV to 1000 V	200 µV to 10 V	200 µV to 10 V
Level measurement range 50 (75) Ω	−60 to +33 dBm	−40 to +53 dBm	−20 to +73 dBm	−60 to +33 dBm	(−62 to +31 dBm)
Power measurement range 50 (75) Ω	1 nW to 2 W	100 nW to 200 W	10 µW to 20 kW	1 nW to 2 W	(500 pW to 1.3 W)
Frequency range	20 kHz to 1 GHz	1 to 500 MHz	0.5 to 500 MHz	20 kHz to 1 GHz	20 kHz to 500 MHz
Input impedance $C_{in} \| R_p$ (f = 10 MHz)	2.5 pF‖ > 80 kΩ	1 pF‖ > 1 MΩ	0.5 pF‖ > 10 MΩ	50 Ω	75 Ω
Max. input voltage rms (sinewave)	15 V	150 V	1050 V	10 V	12 V
peak	22 V	220 V	1500 V	22 V	22 V
DC	400 V	1000 V	1000 V	10 V	12 V

Maximum reflection coefficient and VSWR (adapter with probe)

		DC	50	100	200 (MHz)	500	700	1 (GHz)
50-Ω adapter	r/%	1.5	3		5	10	18	
	VSWR	1.03	1.06		1.11	1.22	1.44	
75-Ω adapter (with BNC connector)	r/%	1.5		3	10			
	VSWR	1.03		1.06	1.22			

Nominal range	Resolution[3]	Max. reading	Error limits 18 to 28 °C
10 mV	1 µV	12.200 mV	±(0.3% of reading + 3 digits
100 mV	10 µV	122.00 mV	+ frequency response error
1 V	100 µV	1.2200 V	+ zero error)
10 V	1 mV	10.500 V	

Frequency response error in % of rdg

	20	50	100	200	500 (kHz)	1	2	30	100	200	500 (MHz)	1 (GHz)	
RF probe with 50-Ω adapter	10[5]	2	1.5		1			2	3	7	11[10]		[11]
								2	4	10	20		[8]
75-Ω adapter (with BNC connector)	10[5]	2	1.5		1			2	4	12			
RF probe with BNC adapter	10[5]	2	1		0.5			1.5	3	12			
and with 20-dB plug-on divider						20[5]		12	15	20			
40-dB plug-on divider					20[5]		7		10	15			

Zero error, display noise, measurement rate and additional error due to temperature see additional data for AC voltage measurement on back cover

General data

Dimensions, weights	
Probe	18 mm dia. × 100 mm, 140 g
Plug-on divider	10 mm dia. × 45 mm, 7 g
BNC adapter	30 mm × 50 mm, 45 g
50-Ω adapter	16 mm dia. × 50 mm, 30 g
75-Ω adapter	16 mm dia. × 75 mm, 50 g
Length of connecting cable	1.25 m
Temperature range	see basic unit

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1) Filter F5.
2) Further details see measuring heads and measuring functions.
3) With filters F0 to F4.
4) Without range switchover, 1 channel.
5) The additional error due to temperature stated in the additional data may be exceeded at temperatures above 28 °C.
6) +3% for 1 to 10 V.
7) With frequency response correction (linear interpolation between calibration frequencies).
Calibration frequencies: 32/40/50/64/80/100/120/160/200/250/320/400/500/600/700/800/900/1000/1100/1200/1300/1400/1500/1600/1700/1800/1900/2000 MHz
1100 to 2000 MHz models 55 and 75 only.
8) Without frequency response correction.
9) +5% for 10 to 100 V.
10) +7% for 1 to 10 V.
11) With frequency response correction (linear interpolation between calibration frequencies).
Calibration frequencies: 32/40/50/64/80/100/120/160/200/250/300/350/400/450/500/550/600/650/700/750/800/850/900/950/1000 MHz.

SPECIFICATIONS, ORDERING INFORMATION

Measuring heads and measurement functions (continued)

AC voltage measurement — additional data

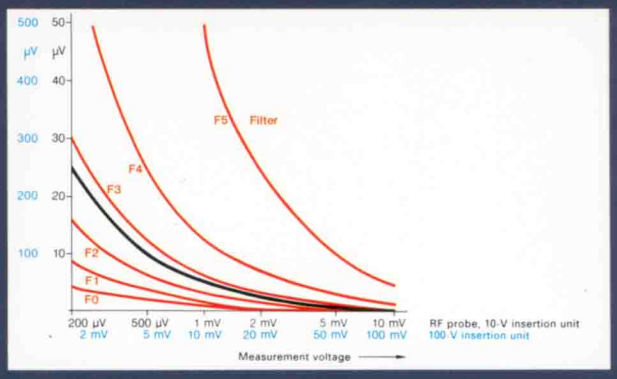
Measurement rate

Filter	F0	F1	F2	F3	F4	F5
Measurement rate (manual operation)	1/s	1.5/s	3/s	5/s	10/s	16/s
Measuring time (IEC/IEEE bus), trigger to output of 1st byte	22 s	5.5 s	1.4 s	0.36 s	0.10 s	0.065 s

Red curves: display noise[12] (double standard deviation, observation time 1 min, temperature of measuring head 18 to 28 °C, approx. double values at 0 °C) ▶

Black curve: zero error[12] (1 h after zero adjustment, ±1 °C; after warmup of 2 hours with measuring head connected) ▶

Additional error due to temperature
10 to 40 °C ..... ±2% of rdg
0 to 50 °C ..... ±5% of rdg



Directional power and reflection measurement — using Dual Directional Coupler URV 5-Z9 and 2 RF Probes URV 5-Z7

Level/power measurement range ... −20 to +63 dBm/10 µW to 2 kW
Minimum forward power required for reflection measurements ..... 50 mW (17 dBm)
Frequency range ..... 100 kHz to 80 MHz
Characteristic impedance ..... 50 Ω
Coupling (nominal value) ..... 40 dB

Error limits in dB for forward power measured with reflection-free load (18 to 28 °C)

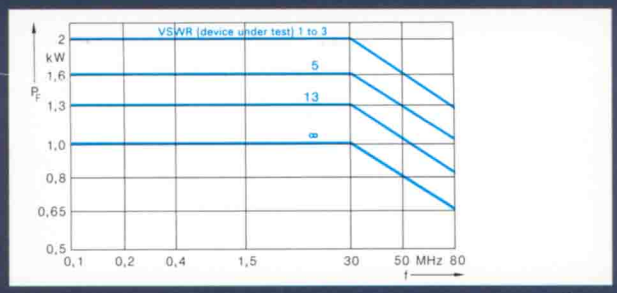
0.1	0.2	0.4	30	50	80 MHz	
±0.20	±0.15	±0.10	±0.15	±0.20		13)
−1/+0.2	−0.4/+0.2	±0.2	±0.35	±0.8		14)

Display noise and zero error see page 7 (RF probe), taking into account the coupling
Additional error due to temperature incl. RF Probe URV 5-Z7
10 to 40 °C ..... ±0.2 dB
0 to 50 °C ..... ±0.5 dB

Minimum directivity in dB (typ. values in parentheses)

0.1	0.2	0.4	30	50 MHz	80
23(30)	28(35)	35(40)	30(35)	20(30)	

Insertion loss ..... ≤0.015 dB
Reflection coefficient
0.1 to 30 MHz ..... ≤1% (VSWR ≤ 1.02)
30 to 80 MHz ..... ≤1.5% (VSWR ≤ 1.03)
Max. permissible forward power P_F . see diagram ▼



General data
Connectors ..... N male, N female
Dimensions, weight ..... 118 mm × 102 mm × 45 mm, 0.5 kg
Temperature range ..... see basic unit URV 5

Power measurement — using Power Sensors NRV-Z1/-Z2/-Z3

See page 3, detailed information in data sheet 828251 of Dual-channel Power Meter NRV

Ordering information

Order designation ..... ▶ Millivoltmeter URV 5 394.8010.02
Option DC Output ..... URV 5-B2 ..... 395.0112.02
19" Rack Adapter ..... ZZA-12 ..... 079.0631.00

Measuring heads
DC Probe with ground cable, clamp-on tip and BNC adapter ..... URV 5-Z1 ..... 395.0512.02
10-V Insertion Unit
50 Ω, 2 GHz (model 55) ..... URV 5-Z2 ..... 395.1019.55
50 Ω, 1 GHz (model 04) ..... URV 5-Z2 ..... 395.1019.04
100-V Insertion Unit
50 Ω, 2 GHz (model 55) ..... URV 5-Z4 ..... 395.1619.55
50 Ω, 1 GHz (model 04) ..... URV 5-Z4 ..... 395.1619.04
75 Ω, 2 GHz (model 75) ..... URV 5-Z4 ..... 395.1619.75

RF Probe with ground cable and clip, ground sleeve and strip, hook tip and solder tip, in case ..... URV 5-Z7 ..... 395.2615.02
Power Sensor
50 Ω, 18 GHz, 20 mW ..... NRV-Z1 ..... 828.3018.02
50 Ω, 18 GHz, 500 mW ..... NRV-Z2 ..... 828.3218.02
75 Ω, 2.5 GHz, 13 mW ..... NRV-Z3 ..... 828.3418.02

Recommended extras for RF probe
Accessory Set comprising plug-on dividers 20 dB/40 dB, BNC adapter, reducing sleeve for dividers ..... URV-Z6 ..... 292.5364.02
50-Ω Adapter (BNC female connector) with adapter to BNC connector ... URV-Z50 ..... 394.9816.50
75-Ω Adapter with adapters to BNC connector, 2.5/6 connectors and 1.6/5.6 connectors ..... URV-Z3 ..... 243.9118.70
Dual Directional Coupler 2 kW, 0.1 to 80 MHz ..... URV 5-Z9 ..... 265.5315.02

Servicing aids
Service Kit for calibration of basic units URV 5 and NRV ..... UZ-8 ..... 394.9968.02

[12] Higher values with plug-on dividers and attenuation correction.
[13] Taking into account calibration values for coupling, including probe error.
Calibration frequencies: 0.1/0.15/0.2/0.3/0.4/0.45/0.5/0.7/1/1.5/3/5/10/20/30/40/50/60/70/80 MHz
[14] When using nominal coupling of 40 dB, including probe error.

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