RMS/Peak Voltmeter URE 3

At the peak of speed and precision

- DC, 0.02 Hz to 30 MHz
- 50 μV to 300 V AC
- 0 to 300 V DC

The RMS/Peak Voltmeter URE 3 from Rohde & Schwarz is an extremely fast rms- and peak-responding voltmeter suitable for a countless number of applications. A patented rectifier circuit with microprocessor-controlled autocalibration makes for unparalleled measurement characteristics.

System compatibility together with ergonomical operation result in a mature concept, whose benefits are manifested in everyday use in labs and in automated measurements alike.
Measurement functions: the multitalent

The RMS/Peak Voltmeter URE3 measures the true rms value of AC and mixed (AC+DC) voltages up to 30 MHz as well as DC voltages. A zero function allows noise voltages and the inherent noise to be compensated for calculating the rms value, the measuring accuracy being thus increased in particular at low levels.

The built-in peak-value rectifiers permit measuring the positive, negative and peak-to-peak value of any signal.

In addition to the voltage, the frequency of the applied signal can be measured and displayed alone or together with the voltage value.

Since the URE3 has an input impedance of 1 MΩ, commercial probes can be used and their division ratio be taken into account in the displayed result.

Accuracy: unrivalled

The measured frequency value is used for an internal frequency response error correction, the required correction factors being determined at the works for each instrument and each measurement range and stored in a nonvolatile memory. This method, which increases the accuracy mainly at the higher frequencies, and the high-performance patented rectifier circuit make for a measuring accuracy that is setting new standards.

Operation: as easy as pie

The URE3 is convincing by its clear ergonomical configuration which enables the user to work with the instrument within a few minutes.

Remote control is effected via the built-in IEC (IEEE 488) bus using plain-text commands. Remote control fully complies with the IEC 625-2 standard and applies to all equipment functions.
Applications: all under control

In audio and telephone measurements, frequency response and linearity measurements on components, modules and instruments are everyday routine tasks. High measurement speed, true rms weighting for noise voltage measurements and high absolute accuracy are good reasons for choosing the URE 3.

For video measurements, and to an increasing extent in high-definition television (HDTV), broadband voltmeters with peak weighting like the URE 3 are indispensable, since video signals (e.g. the sync level) are defined as peak values.

For all analog recording techniques, the quality of audio and video tapes must be guaranteed and therefore continuously controlled.

For digital magnetic storage as well as optical data storage, data transfer rates are used which require high-frequency measurements on sampling probes and amplifiers. The characteristics of the storage media must be determined in the MHz range and a suitable broadband measuring instrument is required for this purpose. With hard-disk memories being mass-produced to an increasing extent, their production is aimed to be more cost-effective by reducing the testing time and increasing the measurement speed, both of which can be achieved with the features of the URE 3.

Due to its excellent immunity to interference, the URE 3 is ideally suited for use in industrial environments. Further applications can be found in training, R&D and in the field of service. Ease of operation, versatility and accuracy are the main points in favour of the URE 3.

Three typical uses of URE 3: magnetic storage, video measurements (also HDTV) and computer-controlled measurements and testing.
Specification

Overview
Measurement functions
rms value, peak value, DC voltage, frequency
Frequency range
RMS: 0.02 Hz to 30 MHz
PEAK: 10 Hz to 10 MHz
Voltage measurement range
DC: 0 to ±300 V
AC: 0 to ±30 V to 300 V
Range selection
AUTO, HOLD, FIX
Input
BNC connector, either floating or grounded, switch-selectable
Input impedance
1 MΩ shunted by 40 pF
Maximum input voltage
300 VRms [max. 1 x 10⁴ V/Hz], 500 Vp
Display
illuminated LCD, 4 1/2 digit level display, digital and analog readout in V, W, dBV, dBm, dBd, dBu or Hz, deviation in % of dB and ratio to a reference value
Input level and frequency
output impedance 1 kΩ
voltage range 0 to 3 V (EMP)
resolution 1 mV
error ±3 mV
frequency input
(10, 0.1 Hz to 30 MHz)
trigger input (10, active low)
readout input (10, active high)
IEC/IEEE bus
acted as standard to IEC 625-2;
functions: SH1, AH1, L1, T6, S11, P11, R11, DC1, DT1

DC voltage measurement
Voltage measurement range
0 to ±300 V
10 mV to 1000 V, 10 dB steps, maximum reading 12000 digits, maximum resolution 1 mV
Measurement speed
Speed 1: 3 s
Speed 2: 32 ms
Speed 0 to 3: 10 s
Error limits
±0.1% of reading + 10 digits
±0.01% of reading + 1 digit/°C

RMS measurement
Voltage measurement range
0.02 mV to 30 V
1 mV to 300 V, 10 dB steps, maximum reading 2000 or 12000 digits, maximum resolution 1 mV
Frequency range
AC coupling
DC to 30 MHz
Selecting lowpass filters
20 kHz, 100 kHz Butterworth, 1 MHz Bessel (3 dB cutoff frequency, 40 dB/decade)
Selecting highpass filters
10 Hz, 100 Hz, 1 kHz (lower measurement limit)
Measurement speed and lower frequency limit (1) (AC component in AC+DC)
Time of readout min. meas. triggered rate frequency measurement
Speed 0: selectable time 10 ms to 60 s
Speed 1: selectable time 10 ms to 60 s
Speed 2: fixed time 10 s
Speed 3: fixed time 1 s
Speed 4: fixed time 1 s with speed 1, 2 and 3 automatic synchronization to whole number of signal periods; due to synchronization, measurement takes 2 or 3 times the time selected
Speed 5: 1.3 s
Speed 6: 70 ms
Error limits
±30 ms

Maximum crest factor
7 of nominal range

Peak measurement
Voltage measurement range
Ranges and resolution
0.1 mV to 500 V
3 mV to 1000 V, 10 dB steps, maximum reading 12000 digits, maximum resolution 1 mV
Frequency range
AC coupling
DC coupling
Selecting lowpass filters
Selecting highpass filters
Time of readout min. meas. triggered rate frequency measurement
Speed 1 to 3
Speed 4
Speed 5
Speed 6
Error limits

Frequency measurement
0.02 Hz to 30 MHz
0.1 Hz to 30 MHz (rear input)
Measurement speed and lower frequency limit (1)
Time of readout min. meas. triggered rate frequency measurement
Speed 0: selectable time 10 ms to 60 s
Speed 1: selectable time 10 ms to 60 s
Speed 2: fixed time 10 s
Speed 3: fixed time 1 s
Speed 4: fixed time 1 s with speed 1, 2 and 3 automatic synchronization to whole number of signal periods; due to synchronization, measurement takes 2 or 3 times the time selected
Speed 5: 1.3 s
Speed 6: 70 ms
Error limits

Temperature effect
% of rdg/°C
0.6
0.3
0.1
0.01

Notes:
1) When the measurement speed is increased, the required highpass filter is automatically switched in circuit. At lower measurement speeds, the higher-frequency highpass filters can be selected as desired.
2) The measurement speed increases when higher-frequency highpass filters are switched in circuit.
3) The specified settling times are maximum values. They may be reduced by selection of a suitable detector and highpass filter.
Display: at a glance

The measured value is read out in up to five digits with unit and additional information on a large liquid crystal display. Readout in volts, watts, dBV, dBµV, dBµ or dBm can be selected; readout in volts and in dBm can be referred to any impedance value.

Relative display is possible in dB or %, as a ratio of measured value to reference value, or as a difference. Reference values can be entered or measured values be used as reference values. Minimum and maximum values as well as tolerance limits can be determined automatically.

For quick informative measurements and precise adjustments, a high-resolution bargraph indicator is additionally provided on the display. Due to the selectable scale (automatically following the digital display or manually adjusted), this bargraph display is extremely versatile and outperforms any pointer instrument.

Measurement speed: unparalleled

The measurement speed for AC voltage measurements is an important criterion for a voltmeter’s usability in automatic systems. With more than 30 measurements/s in the fast mode, the URE3 fully satisfies even the most exacting requirements. Unlike many other instruments, the measurement rate of the URE3 refers to settled values and not to rapidly changing readouts which provide no real information in system operation.

The lower cutoff frequency and, hence, the attainable measurement speed, is determined by the selection of the highpass filters. Irrespective of this, maximum display stability can be achieved by selecting a lower than the maximum speed.

Due to automatic synchronization, lowest-frequency AC voltages from 0.02 Hz can be measured within two signal cycles. If the signal frequency is known, a further mode without synchronization even allows measurement within one cycle, the physically shortest possible period length.

For upper band limiting, e.g. for suppressing high-frequency noise, low-pass filters with 20-kHz, 100-kHz and 1-MHz cutoff frequencies are fitted in the URE3. Due to their slight overshoot, the 1-MHz Bessel lowpass filter and the special highpass filters ensure high accuracy of peak-value measurement.

Selectable filters of URE3 and relationship between measurement speed and lower cutoff frequency.
General data

Temperature range
0 to +50 °C
-40 to +70 °C

Operating

Storage

Permissible humidity
max. 80%, without condensation

Sinusoidal vibration
5 to 55 Hz, max. 2 g, 55 to 150 Hz, 0.5 g continuous; DIN IEC 68-2-6, IEC 1010-1 and MIL-T-28800 D, Class S

Random vibration
10 to 500 Hz, 1.9 g rms.

Shock
40 g shock spectrum, to MIL-STD-210D, DIN IEC 68-2-27, complied with

EMC
complying with EN 50081-1 and 50082-1, EMC directive of EU (89/336/EEC) and EMC law of the Federal Republic of Germany, VDE 0843, part 1 to 4, IEC 801, part 1 to 5, degree of severity 4 and NAMUR recommendations, part 1

Safes

Power supply
100/200/220/240 V ±10%, 47 to 440 Hz (2.5 VA)

Dimensions (W x H x D)
219 mm x 103 mm x 350 mm

Ordering information

Order designation
RMS/Peak Voltmeter
UER 3
0350.5315.00

Lv/Out Option
UER 3482
0351.1513.02

Recommended extras
ZT 296
0396.9813.00

Accessory Bag
ZT 291
0827.6356.00

Carrying Case
ZT 224
1029.3379.02

19" Rack Adapter
ZT 247
0827.4527.00

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Certified Quality System
ISO 9001