



ROHDE & SCHWARZ

Digital Multimeter

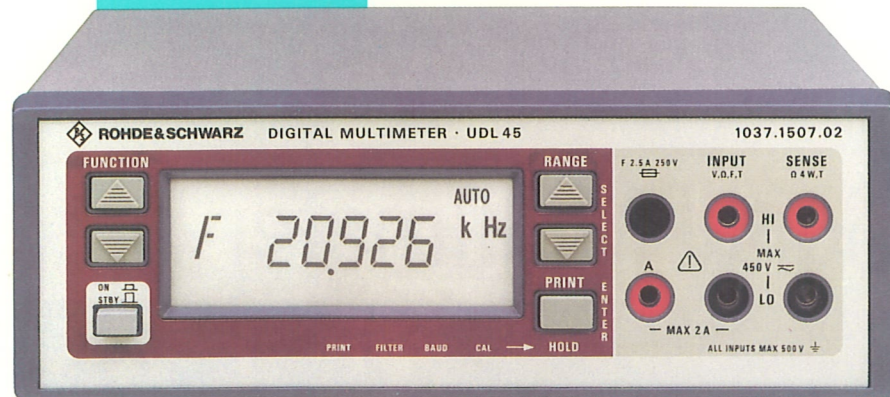
UDL 45



... to satisfy exacting requirements

- High-precision measurement of voltage, current and resistance
- Frequency counter up to 25 MHz
- Temperature measurement
- 5 $\frac{1}{2}$ -digit readout
- RS-232 interface
- AC supply and battery operation

Digital Multimeter UDL 45



- True RMS measurement
- Four-terminal resistance measurement
- Measurement of frequency and temperature
- AC supply and battery operation
- RS-232 interface
- Mobile and stationary use in lab, production and service

In spite of its compact size and mobile configuration, **Digital Multimeter UDL 45** from Rohde & Schwarz is able to satisfy even the highest requirements in the lab. UDL 45 measures DC and AC voltages, DC and AC currents as well as frequencies up to 25 MHz and temperatures with an accuracy previously known of expensive system instruments only.

AC voltages with **true RMS weighting** can be measured up to a frequency of 50 kHz. The **high crest factor** of 5:1 enables accurate detection of pulses and voltage spikes. Current measurements are possible up to 2 A with the aid of the built-in, overcurrent-protected 0.1-Ω shunt, the measurement range being expandable by external shunts. Digital filters allow averaging of highly noisy signals.

For resistance and temperature measurements, the SENSE input of the UDL 45 is additionally used for **elimination of errors caused by the leads** (four-terminal test method).

A minimum number of keys makes for **great ease of operation**. A large-size LCD

display reads out the results in 5½ digits and indicates the active function.

The built-in **RS-232 interface** allows a printer to be connected or the UDL 45 to be integrated into automatic test systems. This interface can also be used for convenient calibration of the meter, the calibration interval being one year.

The UDL 45 can be operated from the **built-in battery** or from the **AC supply**. Rugged design, low weight and handy size make the Multimeter ideal for use in the **lab, production and service** even under harsh environmental conditions.

Specifications

Functions	measurement of DC and AC voltage, DC and AC current, resistance (two-terminal or four-terminal), frequency, temperature; automatic and manual range selection, additional functions PRINT, FILTER, BAUD and CAL
Display	13-mm high LCD, display of measurement functions and units: AC, DC, V, I, R, 4T, F, T; M, k, m, V, A, Ω, Hz, °C, °F; in addition: symbol for low battery voltage, indication of UNCAL (instrument not calibrated), REM (remote control on), AUTO (auto-ranging selected), and marker for additional functions
Measurement rate	3 readings/s
Interface	RS-232 interface for connection of a printer or controller; 9-contact Sub-D connector; 500-V isolation from input signals
Warmup period	15 min to attain full accuracy
Test connectors	HI, LO, HI SENSE, LO SENSE, inputs for current measurement
Maximum input voltage	450 V DC or AC RMS between HI and LO in any range, 500 V DC or AC RMS between any input connector and ground
Maximum measurement current	2 A DC or RMS

Unless stated otherwise, error limits are specified in ±(% of reading + digit) for temperatures from 18 to 28 °C (one digit corresponding to 0.0005% of full-scale deflection).

DC VOLTAGE MEASUREMENT

Range	Resolution	Input impedance	Error limits for calibration intervals of
			24 hours (22 to 24 °C) 90 days (18 to 28 °C) 1 year (18 to 28 °C)
20 mV	0.1 μV	>10 GΩ	0.0040 + 20 0.0060 + 30 0.0080 + 30
200 mV	1 μV	>10 GΩ	0.0025 + 2 0.0040 + 3 0.0060 + 3
2 V	10 μV	>10 GΩ	0.0015 + 2 0.0025 + 2 0.0030 + 2
20 V	0.1 mV	10 MΩ	0.0015 + 2 0.0025 + 2 0.0035 + 2
200 V	1 mV	10 MΩ	0.0015 + 2 0.0025 + 2 0.0035 + 2
450 V	10 mV	10 MΩ	0.0020 + 2 0.0030 + 2 0.0045 + 2
Common-mode rejection	>140 dB for DC, 50 or 60 Hz AC, 1 kΩ x unbalance of input impedance		
Normal-mode rejection	>60 dB for 50 or 60 Hz, V _p <1/10 of full scale, (V _p +V) _{rms} <full scale		
Temperature effect	±(0.0005 % + 0.3 digit + 0.2 μV)/°C in range 0 to 18 °C and 28 to 50 °C		

AC VOLTAGE MEASUREMENT (true RMS weighting)

Frequency range	Error limits ¹⁾	2-V, 20-V, 200-V range	450-V range
20 to 50 Hz	1.1 + 150	1.1 + 200	1.1 + 100
50 to 100 Hz	0.4 + 150	0.35 + 100	0.35 + 50
0.1 to 10 kHz	0.3 + 300	0.25 + 100	0.25 + 50
10 to 20 kHz	1.0 + 700	0.35 + 500	0.35 + 200
20 to 50 kHz	-	1.0 + 700	1.0 + 500
Resolution	1 μV	10 μV, 0.1 mV, 1 mV	10 mV
Input impedance	1 MΩ shunted by <60 pF		
Crest factor	<5		
Common-mode rejection	>140 dB for DC, >80 dB for 50 or 60 Hz with 1 kΩ unbalance in input impedance		

RESISTANCE MEASUREMENT

Error limits are specified for four-terminal measurements. Lead resistances up to 1% of full scale per lead can be compensated. An offset up to 100 mΩ may occur in conventional two-terminal measurements.

Range	Resolution	Test current	Error limits for calibration intervals of	Temperature coefficient/°C
			24 hours (22 to 24 °C) 90 days (18 to 28 °C) 1 year (18 to 28 °C)	
200 Ω	1 mΩ	1 mA	0.003 + 3 0.006 + 3 0.008 + 4	0.0010 + 0.3
2 kΩ	10 mΩ	1 mA	0.003 + 2 0.005 + 3 0.007 + 3	0.0008 + 0.3
20 kΩ	0.1 Ω	10 μA	0.002 + 2 0.005 + 2 0.007 + 3	0.0008 + 0.3
200 kΩ	1 Ω	10 μA	0.002 + 2 0.005 + 2 0.008 + 3	0.0008 + 0.3
2 MΩ	10 Ω	1 μA	0.012 + 3 0.025 + 3 0.027 + 3	0.0020 + 0.3
20 MΩ ²⁾	100 Ω	0.1 μA	0.035 + 3 0.055 + 4 0.065 + 4	0.0150 + 0.3

DC CURRENT MEASUREMENT

Range	Resolution	Error limits
200 mA	1 μA	0.05 + 50
2 A	10 μA	0.05 + 5 (I < 1 A) 0.1 + 5 (I > 1 A)

AC CURRENT MEASUREMENT (true RMS weighting)

Frequency	Error limits	2-A range
20 to 50 Hz	0.7 + 250	0.7 + 200
50 Hz to 1 kHz	0.65 + 150	0.6 + 150
1 to 5 kHz	0.5 + 100	0.5 + 150
5 to 20 kHz	typ. 0.8 + 300	typ. 0.7 + 300
Resolution	1 μA	10 μA
Crest factor	≤5	
Test impedance	0.1 Ω in all ranges	

FREQUENCY MEASUREMENT

Range	Resolution	Measuring time	Error limits
200 kHz	1 Hz	1 s	0.005 + 2
2 MHz	10 Hz	100 ms	0.005 + 2
20 MHz	100 Hz	100 ms	0.005 + 2
25 MHz	1 kHz	100 ms	0.005 + 2
Input impedance	1 MΩ shunted by 30 pF		
Minimum test voltage	200 mV		

TEMPERATURE MEASUREMENT

Range	Resolution	Error limits ³⁾
-200 to +200 °C	0.1 °C	±0.3 °C
-328 to +482 °F	0.1 °F	±0.5 °F
Test current	1 mA	

General data

Operating temperature range	0 to 50 °C
Storage temperature range	-25 to +70 °C
Relative humidity	max. 93% at 0 to 40 °C
Power supply	
AC supply	88 to 132 V or 176 to 264 V (selectable by internal link), 47 to 63 Hz, 5 VA
Battery	built-in nickel-cadmium battery, service life >10 h, recharge time approx. 14 h
Electromagnetic compatibility	complying with IEC 801, CISPR 11, VDE 0871 Class B
Electrical safety	complying with standards to IEC 66 E category II, degree I (draft), ANSI/ISA-S82.01, VDE 0411/100, CSA Bulletin 556 B
Dimensions (W x H x D)	254 mm x 76 mm x 216 mm
Weight	1.6 kg

Ordering information

Order designation ▶ Digital Multimeter UDL 45 1037.1507.02

Accessories supplied test leads, power cable, manual

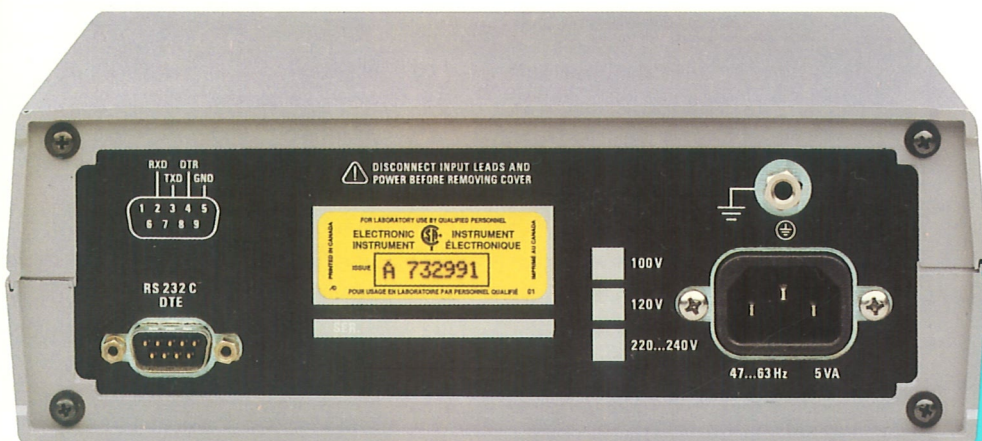
Recommended extras

150-A Clamp-on Current Probe	UDL 4-Z3	346.8113.02
1000-A Clamp-on Current Probe	UDL 4-Z4	346.8165.02
High-voltage Probe	UZ-2	277.8314.02
Temperature Measuring Module	UZ-10	277.8014.02
Immersion Temperature Probe	UZ-11	277.8095.02
Surface-type Temperature Probe	UZ-12	277.8120.02
Wire-type Temperature Probe	UZ-13	277.8150.02
Accessory Bag	ZZT-91	827.6365.00

¹⁾ Sinewave voltage >10 % of measurement range.

²⁾ Two-terminal measurement only.

³⁾ Probe error not taken into account (temperature is measured with a four-terminal PT-100 temperature probe, conversion for indication to DIN 43760).



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