

RLC 200 RLC Meter

digimess® expert

Order No.: H.UC 30-00



The RLC 200, an automatic RLC meter, is designed for the manual or fully automatic measurement of components.

Full remote control is possible via an RS-232 interface.

All the usual component parameters such as resistance, conductance, inductance, capacitance, Q factor and loss factor can be determined with a basic accuracy of 0.2%. Deviations from the reference components can be represented either absolutely or relatively.

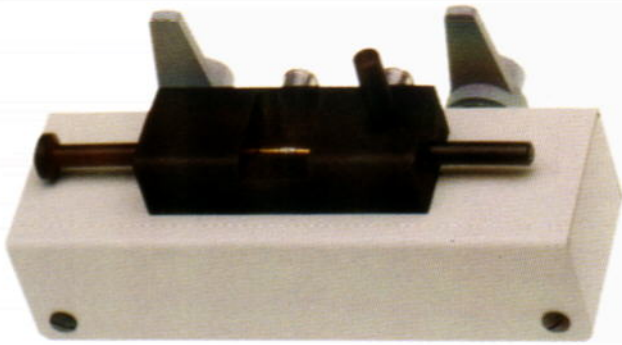
The information is displayed on a large, backlit alphanumeric LCD.

In addition to parameter measurements, DC voltages up to 400 V can be measured with a resolution of 100 μ V.

The package includes extensive accessories including an adapter for radial and axial components, an adapter for SMD components and a 4-line measuring cable with Kelvin clips (see overleaf).

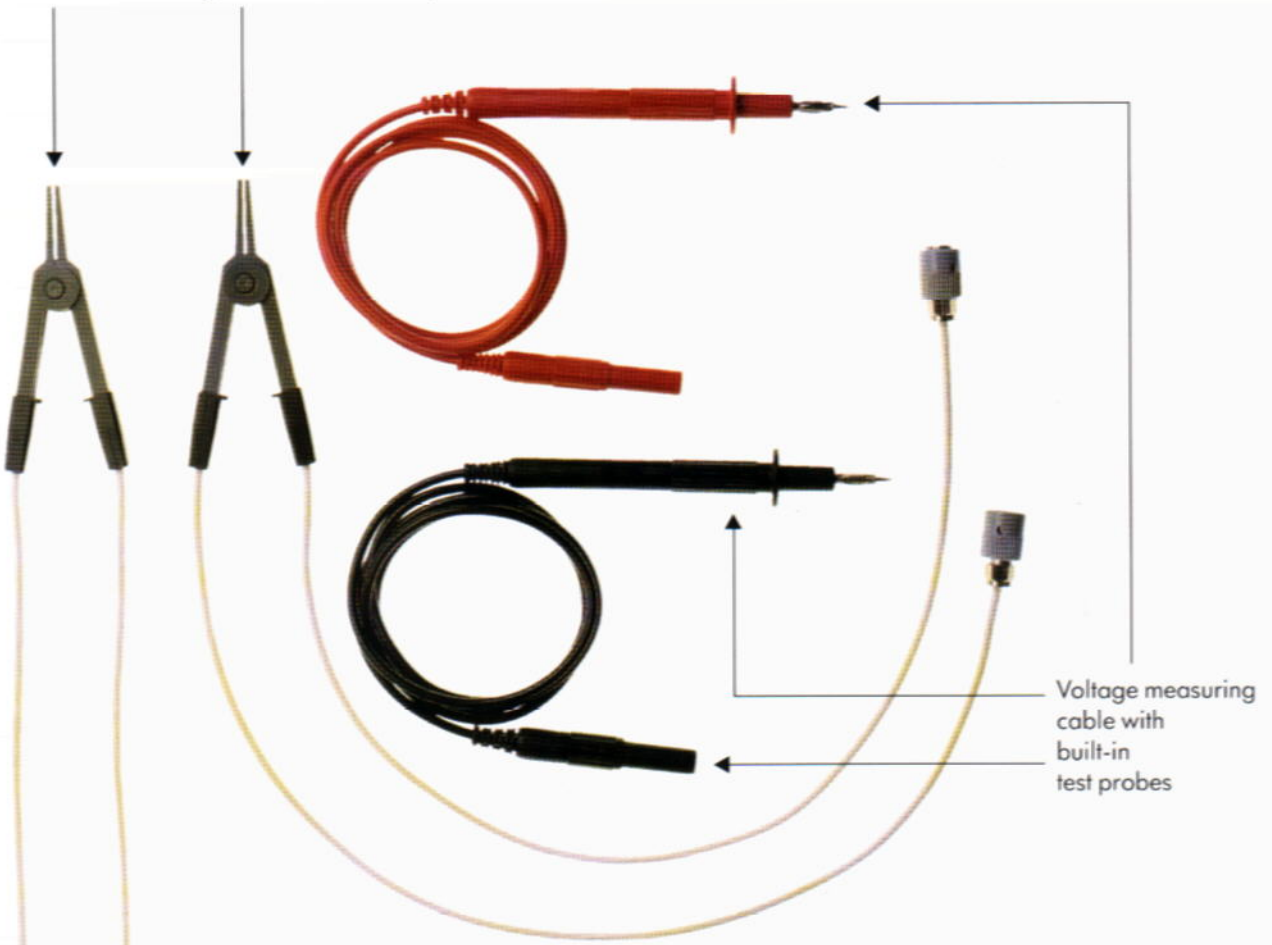
As you can see, the RLC 200 offers an unbeatable price/performance ratio.

axial components, 4-line SMD adapter, 4-line measuring cable with Kelvin clips, 4-line measuring cable with built-in test probes.



4-line SMD adapter

4-line measuring cable with Kelvin clips



Voltage measuring cable with built-in test probes

Impedance $ Z $	Measuring frequency	
	100 Hz	1 kHz
100 m Ω $\leq Z < 2 \Omega$	not specified	$\pm 0.8\% \pm 3$ dig
2 Ω $\leq Z < 20 \Omega$	$\pm 0.5\% \pm 3$ dig	$\pm 0.5\% \pm 2$ dig
20 Ω $\leq Z < 200 \Omega$	$\pm 0.3\% \pm 3$ dig	$\pm 0.3\% \pm 2$ dig
200 Ω $\leq Z < 2$ k Ω	$\pm 0.3\% \pm 3$ dig	$\pm 0.3\% \pm 2$ dig
2 k Ω $\leq Z < 20$ k Ω	$\pm 0.3\% \pm 3$ dig	$\pm 0.3\% \pm 2$ dig
20 k Ω $\leq Z < 500$ k Ω	$\pm 0.3\% \pm 3$ dig	$\pm 0.3\% \pm 2$ dig
500 k Ω $\leq Z < 5$ M Ω	$\pm 0.5\% \pm 5$ dig	$\pm 0.5\% \pm 3$ dig
5 M Ω $\leq Z < 20$ M Ω	not specified	$\pm 3.0\% \pm 3$ dig

Where impedance $|Z| \geq 20$ M Ω ($0 < G \leq 50$ nS), $U_{\text{meas}} = 50$ mV. The measurement tolerance is specified using the conductance deviation $G = \pm 3$ nS for the measuring frequency 1 kHz.

Where impedance $|Z| < 100$ m Ω ($0 < R < 100$ m Ω), $U_{\text{meas}} = 50$ mV. The measurement tolerance is specified using the resistance deviation $R = \pm 3$ m Ω for the measuring frequency 1 kHz.

All percentages refer to the displayed measured values.

Measurement tolerance of loss factor D

The measuring tolerance T_{meas} of loss factor of capacitances D can be calculated using the equation:

$$T_{\text{meas}} = 0.1 D_m \pm D$$

D_m = measured value D (display ed D-value)

D = additional error

Additional error D where $f_{\text{meas}} = 1$ kHz

Capacitance C	Measuring voltage	
	50 V	1 V
10 pF $\leq C < 100$ pF	not specified	± 0.005
100 pF $\leq C < 10$ nF	± 0.005	± 0.005
10 nF $\leq C < 100$ μ F	± 0.004	± 0.003
100 μ F $\leq C < 1$ mF	± 0.010	± 0.005

Additional error D where $f_{\text{meas}} = 100$ Hz

Capacitance C	Measuring voltage	
	50 V	1 V
10 pF $\leq C < 1$ nF	not specified	± 0.005
1 nF $\leq C < 10$ nF	± 0.005	± 0.005
10 nF $\leq C < 100$ μ F	± 0.003	± 0.003
100 μ F $\leq C < 1$ mF	± 0.005	± 0.003
1 mF $\leq C < 10$ mF	not specified	± 0.010

Measurement tolerances

The following measurement tolerances apply for a reference temperature of $+23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. In the case of deviations from

the reference temperature, the tolerance increases by 50% for every $10\text{ }^{\circ}\text{C}$.

Measurement tolerances for R and G ($Q < 1, D > 1$) and for L and C ($Q > 1, D < 1$)

The measurement tolerance T_{meas} is calculated using the following equation:

$$T_{\text{meas}} = \left[\pm (A\sqrt{1 + P_m^2}) \pm K \right] K_t$$

A = basic accuracy in %

P_m = parameter Q (for R-G-measurement) or parameter D (for L-C-measurement)

K = additional error in the last digit (dig)

K_t = temperature coefficient error

The following equations can be used to calculate impedance Z from R, G, C and L:

$$|Z| = R = 1/G$$

$$|Z| = 2\pi fL \quad \text{and} \quad |Z| = \frac{1}{2\pi fC}$$

Basic accuracy A + additional error K where $U_{\text{meas}} = 1\text{ V}$

Impedance Z	Measuring frequency	
	100 Hz	1 kHz
$100\text{ m}\Omega \leq Z < 2\ \Omega$	$\pm 0.5\% \pm 2\text{ dig}$	$\pm 0.5\% \pm 2\text{ dig}$
$2\ \Omega \leq Z < 20\ \Omega$	$\pm 0.3\% \pm 2\text{ dig}$	$\pm 0.3\% \pm 1\text{ dig}$
$20\ \Omega \leq Z < 200\ \Omega$	$\pm 0.2\% \pm 2\text{ dig}$	$\pm 0.2\% \pm 1\text{ dig}$
$200\ \Omega \leq Z < 2\text{ k}\Omega$	$\pm 0.2\% \pm 2\text{ dig}$	$\pm 0.2\% \pm 1\text{ dig}$
$2\text{ k}\Omega \leq Z < 20\text{ k}\Omega$	$\pm 0.2\% \pm 2\text{ dig}$	$\pm 0.2\% \pm 1\text{ dig}$
$20\text{ k}\Omega \leq Z < 500\text{ k}\Omega$	$\pm 0.2\% \pm 2\text{ dig}$	$\pm 0.2\% \pm 1\text{ dig}$
$500\text{ k}\Omega \leq Z < 5\text{ M}\Omega$	$\pm 0.3\% \pm 3\text{ dig}$	$\pm 0.3\% \pm 2\text{ dig}$
$5\text{ M}\Omega \leq Z < 20\text{ M}\Omega$	$\pm 1\% \pm 5\text{ dig}$	$\pm 1.0\% \pm 2\text{ dig}$

Where impedance $|Z| \geq 20\text{ M}\Omega$ ($0 < G \leq 50\text{ nS}$), $U_{\text{meas}} = 1\text{ V}$. The measurement tolerance is specified using the conductance deviation $G = \pm 2\text{ nS}$ for both measuring frequencies.

Where impedance $|Z| < 100\text{ m}\Omega$ ($0 < R < 100\text{ m}\Omega$), $U_{\text{meas}} = 50\text{ mV}$. The measurement tolerance is specified using the resistance deviation $R = \pm 2\text{ m}\Omega$ for both measuring frequencies.

All percentages refer to the displayed measured values.

Technical data

Measuring parameters and measurement ranges

Measuring parameter	Measurement range	Resolution/dig
	from to	
R	1 m Ω – 100 M Ω	1 m Ω
G	1 nS – 10 S	1 nS
C	0.1 pF – 20 mF	0.1 pF
L	0.1 μ H – 20 kH	0.1 μ H
D	0.001 – 2	0.001
Q	0.1 – 500	0.1
U=	0.1 mV – 400 V	0.1 mV
$\Delta\%$	-999% – +999%	0.1%

Measurement specifications

Measuring parameters	R, G, C, L, D, Q, U=, $\Delta/\Delta\%$
Type of connection	Series or parallel connection with 4-pin arrangement of measuring terminals
Measuring frequencies	100 Hz, 1 kHz
Measuring voltage	50 mV, 1 V
Polarization of test object	
Internal voltage source	+5 V
External voltage source	$\leq +30$ V
Selection of measurement range	Automatic or as fixed range
Input resistance of DC voltmeter	> 9 M Ω
Triggering	internal, manual, external via RS 232 C
Measuring time	200 ms
Display	3 ½ -digit (measured value and unit)
Interface	RS 232 C
Remote control functions:	R, G, C, L, D, Q, U=, automatic measuring parameter selection, measurement types, measuring frequencies, measuring voltages, automatic measurement range selection or fixed range, absolute and percentage deviation ($\Delta/\Delta\%$) with input of reference value, triggering and acoustic short-circuit indicator
Data output	Measuring parameter, measurement type, measured value

Measurement tolerance of Q factor

The tolerance is ± 0.2 in the impedance range $100 \text{ m}\Omega \leq |Z| < 20 \text{ M}\Omega$ for R or G as test object.

The measurement tolerance of the Q factor of inductances is calculated using the following equation: $T_{\text{meas}} = 0.1 Q_m \pm Q$

Q_m = measured value Q Q = additional error (displayed Q-value)

Additional error Q where $f_{\text{meas}} = 1 \text{ kHz}$

Inductance L			Measuring voltage	
			50 mV	1 V
100 μH	$\leq L <$	1 mH	± 0.5	± 0.4
1 mH	$\leq L <$	100 H	± 0.3	± 0.3
100 H	$\leq L <$	1 kH	± 1.5	± 0.5
1 kH	$\leq L <$	2 kH	not specified	± 0.5

Additional error Q where $f_{\text{meas}} = 100 \text{ Hz}$

Inductance L			Measuring voltage	
			50 mV	1 V
1 mH	$\leq L <$	10 mH	not specified	± 0.3
10 mH	$\leq L <$	2 H	± 0.7	± 0.3

Measurement tolerance with DC voltage

In all measurement ranges, the measurement tolerance with DC voltage is: $T_{\text{meas}} = 0.2\% \pm 1 \text{ dig.}$

The percentages refer to the displayed value.

With a short-circuited input, the display may fluctuate by a maximum of $\pm 0.2 \text{ mV}$.

The specified values apply for a reference temperature of $23^\circ\text{C} \pm 1^\circ\text{C}$. In the case of deviations from the reference temperature, the tolerance increases by 50% for every 10°C .

Environmental conditions

Nominal temperature	$+23^\circ\text{C} \pm 1^\circ\text{C}$
Operating temperature	$+0^\circ\text{C} \dots +50^\circ\text{C}$
Relative atmospheric humidity	40 ... 80%
Atmospheric pressure	86 ... 106 kPa
Interference suppression	VfG 243/1991

Power supply

Operating voltage	Sinusoidal AC voltage 110/220 V ($\pm 10\%$) (internally switchable) 50 ... 60 Hz ($\pm 5\%$)
Power consumption	16 VA
Fuses	T 80 mA/250 V (220 V~), T 160 mA/250 V (110 V~)
Protection class	I, in accordance with IEC 348, corresponds DIN VDE 0411 Part 1 E81
Dimensions (W x H x D)	291 mm x 108 mm x 259 mm
Dimensions of packing	338 mm x 138 mm x 408 mm
Weight	approx. 2.8 kg
Weight incl. packing and accessories	4.5 kg

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