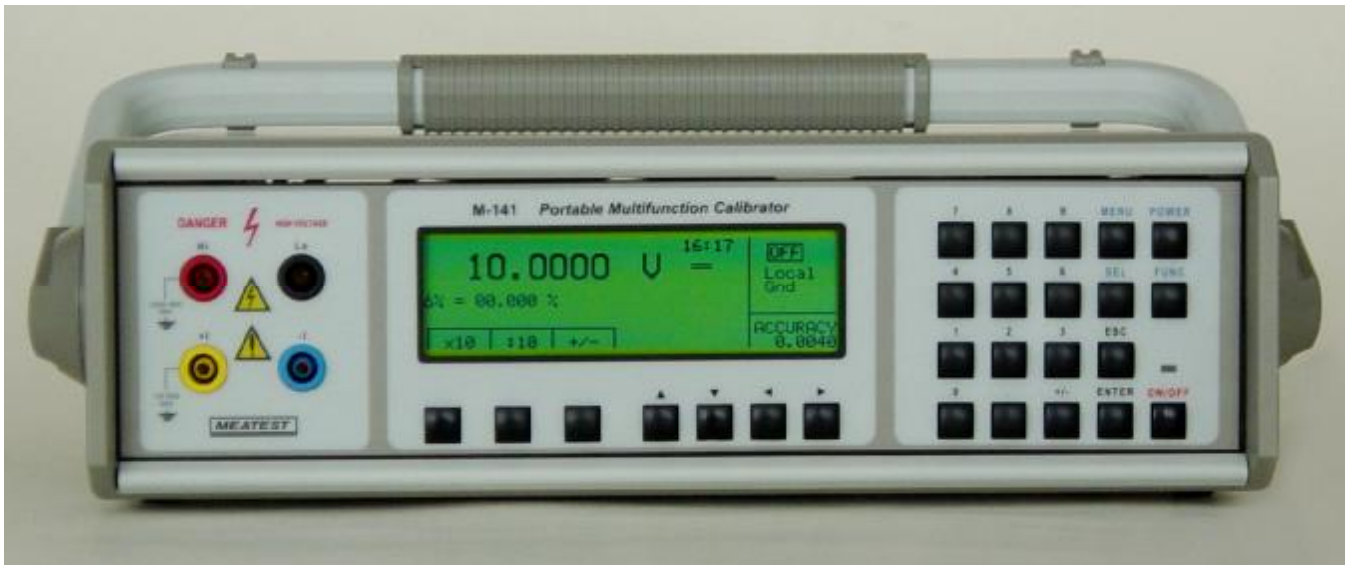


M-141 *Portable Multifunction Calibrator*



Portable Multifunction Calibrator to 750 V and 2 A

- Voltage range from 0 to 700 V DC/AC with uncertainty 0.01 %
- Current range from 0 to 2 A DC/AC with uncertainty 0.02 %
- Sinusoidal output signal
- Fix standard resistors from 10 Ω to 10 M Ω in decade values with uncertainty 0.01 %
- TC temperature sensor simulation R, S, B, J, T, E, K, N in range from 250°C to 1850°C
- Cold junction point automatic compensation with internal Pt1000 sensor
- Power supply voltage 115/230V 50/60 Hz
- Interface RS 232, IEEE488
- Comfortable control, large display

Multifunction calibrator is designed for use in calibration laboratories, quality departments and production lines as a standard for electric quantity meters testing. With model M-141 calibration of voltmeters to 700 V, ammeters to 2 A, resistance ranges of multimeters and industrial evaluation units can be performed easily.

Interface RS-232 enables to add the calibrator to the automated calibration and testing systems. Model M-141 can work under Meatest application SW like WinQbase and Caliber.

Technical data

Voltage

Summary voltage range : 0 μ V – 750 V DC, 1 mV – 750 V AC
 Internal ranges : 100 mV, 1 V, 10 V, 100 V, 750 V
 Frequency range in AC mode : 1 mV - 10 V from 20 Hz to 1 kHz, 10 V – 750 V from 40 Hz to 1 kHz
 Accuracy of frequency: 0.01%

DC voltage

range	% of value + % of range
0 μ V – 10 mV	0.05 + 0.005 + 10 μ V
10 mV – 100 mV	0.01 + 0.001 + 10 μ V
100 mV – 1 V	0.008 + 0.002
1 V – 10 V	0.008 + 0.002
10 V – 100 V	0.015 + 0.004
100 V – 750 V	0.018 + 0.004

AC voltage

range	% of value + % of range	
	20 Hz - 200 Hz	200 Hz - 1000 Hz
1 mV – 10 mV	0.20 + 0.05 + 20 μ V	0.20 + 0.10 + 20 μ V
10 mV – 100 mV	0.10 + 0.03 + 20 μ V	0.15 + 0.05 + 20 μ V
100 mV – 1 V	0.05 + 0.005	0.07 + 0.01
1 V – 10 V	0.05 + 0.005	0.07 + 0.03
10 V – 100 V ¹⁾	0.05 + 0.010	0.07 + 0.03
100 V – 750 V ¹⁾	0.07 + 0.02	0.1 + 0.03

¹⁾ voltage ranges 100 and 700V form 40 Hz

Auxiliary parameters

range	10mV	100mV	1V	10V	100V	750V
THD ²⁾	0,05% + 200 μ V	0,05% + 300 μ V	0,05%	0,05%	0,05%	0,2%
Maximal output current	5 mA	5 mA	10 mA	30 mA	10 mA	2 mA
Output impedance	< 10 m Ω	< 10 m Ω	< 10 m Ω	< 10 m Ω	< 100 m Ω	< 100 m Ω
Maximal capacitance load	500 pF	500 pF	500 pF	500 pF	300 pF	150 pF

²⁾ parameter includes non-linear distortion and non-harmonic noise

Current

Summary current range : 0 μ A – 2 A DC, 1 μ A – 2 A AC
 Internal ranges : 200 μ A, 2 mA, 20 mA, 200 mA, 2A
 Frequency range in AC mode : 20 Hz to 1 kHz, accuracy of frequency 0.01%

DC current

range	% of value + % of range
0 μ A – 200 μ A	0.05 + 0.0 + 20 nA
200 μ A - 2 mA	0.025 + 0.005
2 mA - 22 mA	0.015 + 0.003
22 mA – 200 mA	0.015 + 0.003
200 mA – 2 A	0.015 + 0.005

AC current

range	% of value + % of range	
	20 Hz – 200 Hz	200 Hz – 1000 Hz
1 μ A – 200 μ A	0.25 + 0.0 + 20 nA	0.30 + 0.10 + 20 nA
200 μ A – 2 mA	0.10 + 0.01	0.20 + 0.05
2 mA - 20 mA	0.07 + 0.005	0.20 + 0.05
20 mA – 200 mA	0.07 + 0.005	0.20 + 0.05
200 mA - 2 A	0.1 + 0.005	0.25 + 0.05

Auxiliary parameters

range	200 mA	2 mA	20 mA	200 mA	2 A
Maximal inductive load	400 μ H	400 μ H	400 μ H	400 μ H	200 μ H
Maximal compliance voltage (pk)	2 V	2 V	2 VAC, 7 VDC	2 V	2 V
THD ³⁾	0,2%	0,2%	0,2%	0,2%	0,2%

³⁾ parameter includes non-linear distortion and non-harmonic noise

Resistance

Summary range : 10 Ω to 10 M Ω
 Maximal voltage : 50 V_{eff} / 0.1W

range	uncertainty of value [%]
10 Ω	0.03 + 10 m Ω
100 Ω	0.05
1 k Ω	0.02
10 k Ω	0.02
100 k Ω	0.02
1 M Ω	0.05
10 M Ω	0.05
100 M Ω	0.5

TC sensor simulation

Types : R, S, B, J, T, E, K, N
 Temperature scale : IPTS68, ITS90

type	range [$^{\circ}$ C]	uncertainty [$^{\circ}$ C]
R	-50 to +1767	1.2 to 2.5
S	-50 to +1767	1.5 to 2.2
B	400 to +1820	1.3 to 2.7
J	-210 to +1200	0.3 to 0.9
T	-200 to +400	0.3 to 0.9
E	-250 to +1000	0.2 to 1.7
K	-200 to +1372	0.4 to 0.8
N	-200 to +1300	0.5 to 1.3

RTD sensor simulation (M141 R version only)

Type: Pt, Ni

type	range [$^{\circ}$ C]	uncertainty [$^{\circ}$ C]
Pt10 - Pt200	-200 ... 0	0.2
Pt10 - Pt200	0 ... 850	0.1
Pt200 - Pt1000	-200 ... 0	0.1
Pt200 - Pt1000	0 ... 850	0.1
Ni10 - Ni200	-60 ... 0	0.2
Ni10 - Ni200	0 ... 300	0.1
Ni200 - Ni1000	-60 ... 0	0.1
Ni200 - Ni1000	0 ... 300	0.1

Frequency output: TTL 5V_{pk-pk} 0.1Hz to 2 MHz

Power supply: 115/230V - 50/60 Hz

Dimensions: 325 x 111 x 316 mm

Weight: 6 kg

Interface: RS232, (IEEE488 as option)

Reference temperature range:

23 $^{\circ}$ C \pm 2 $^{\circ}$ C (for above shown uncertainties)

For temperature range 23 $^{\circ}$ C \pm 5 $^{\circ}$ C uncertainty parameters are times 2

Range of working temperatures: +5 $^{\circ}$ C ... +40 $^{\circ}$ C