

CX 1652 Multifunction Laboratory Calibrator



For checking your instruments in the laboratory

- AC / DC voltage up to 1,000 V
- AC / DC current up to 30 A
- Resistance up to 1,000 M Ω
- Capacitance up to 100 μ F
- Simulation of TC / RTD temperature sensors
- Frequency up to 20 MHz
- 240 V / 20 A electric power / energy
- Built-in process multimeter
- GPIB & RS232 interfaces

As well as the standard electrical parameters, the CX 1652 generates others for temperature and energy applications.

Ideal for calibrating and adjusting instruments:

(multimeters, analogue instruments, switchboard equipment, current clamps, portable calibrators, wattmeters, electrometers, oscilloscopes, thermometers, loggers, etc.)

- Measuring instrument manufacturers,
- Laboratories,
- After-sales departments,
- Metrology departments, R&D teams, etc.
- For instrument certification, quality, etc.

Multiple functions

- Generation of AC/DC voltage, current and power
- Generation of periodic non-harmonic signals with crest factor
- Generation of square signals with programmable amplitude and frequency
- Simulation of resistors and capacitors
- Simulation of RTD resistive sensors and thermocouples (R, S, B, J, K, T, E, N)
- Built-in multimeter for testing and calibrating transmitters, controllers and testers without additional equipment

Ergonomics for easy use

- Large LCD screen
- Display of menus, parameters and other useful information: uncertainties, etc.
- Keys for direct access to the main functions



Check your current clamps particularly simply



Calibrate your temperature sensors

AC / DC voltage up to 1,000 V

Range	% value + μ V	% value + μ V	% value + μ V	% value + μ V
	DC	20 Hz - 10 kHz	10 kHz - 50 kHz	50 kHz - 100 kHz
0 mV - 20 mV	0.005 + 6	0.2 + 30	0.20 + 40	1.0 + 40
20 mV - 200 mV	0.0015 + 8	0.1 + 80	0.15 + 120	0.3 + 120
200 mV - 2 V	0.0012 + 10	0.018 + 100	0.05 + 200	0.2 + 1,000
2 V - 20 V	0.0010 + 50	0.018 + 1,000	0.05 + 6,000	0.2 + 10,000
20 V - 240 V	0.0015 + 500	0.018 + 10,000	--	--
240 V - 1,000 V	0.005 + 20,000	0.03 + 200,000 *	--	--

*Max. frequency 1000 Hz

- ☒ Frequency uncertainty: 0.005 %
- ☒ Voltage frequency: 20 Hz to 100 kHz
- ☒ Resolution: 6½ digits

AC / DC current from 1 μ A to 30 A

Range	% value + μ A	% value + μ A	% value + μ A	% value + μ A
	DC	20 Hz - 1 kHz	1 kHz - 5 kHz	5 kHz - 10 kHz
1 μ A - 200 μ A	0.05 + 0.02	0.15 + 0.02	0.30 + 0.22	--
200 μ A - 2 mA	0.02 + 0.1	0.07 + 0.2	0.20 + 1	0.50 + 1.4
2 mA - 20 mA	0.01 + 0.6	0.05 + 1	0.20 + 10	0.50 + 14
20 mA - 200 mA	0.01 + 6	0.05 + 10	0.20 + 100	0.50 + 140
200 mA - 2 A	0.015 + 100	0.05 + 100	--	--
2 A - 20 A	0.02 + 2,000	0.10 + 6,000	--	--
20 A - 30 A *	$[0.02 + 0.003 \cdot (I-20)] + 2,000$	$[0.1 + 0.003 \cdot (I-20)] + 6,000$	--	--

*I is the current value selected in A

0.3 % additional uncertainty when the 140-50 coil option is applied. The output current is multiplied by a factor of 25 or 50.

- ☒ Frequency uncertainty: 0.005 %
- ☒ Current frequency: 20 Hz to 10 kHz
- ☒ Resolution: 6½ digits

Waveform function (non-harmonic signal)

- ☒ Voltage range: 1 mV to 200 V
- ☒ Current range: 100 μ A to 2 A
- ☒ Output signal waveform:
positive square, negative square,
symmetrical square, triangle A,
triangle B, limited-sine triangle with
distortion $k = 13.45$ %
- ☒ Peak value accuracy: 0.3% + 50 μ V
- ☒ Displayed value: Peak, calculated
rms value
- ☒ Frequency calibre: 1,000 Hz for AC
voltage, 120 Hz for AC current

The smallest frequency for slot signals
is 0.1 Hz. For other signals, it is 20 Hz.

Resistance and Capacitance

Resistance range	% value + m Ω
0 Ω - 10 Ω	0.03 + 5
10 Ω - 33 Ω	0.015 + 5
33 Ω - 100 Ω	0.010 + 5
100 Ω - 330 Ω	0.010 + 5
330 Ω - 1 k Ω	0.010
1 k Ω - 3.3 k Ω	0.010
3.3 k Ω - 10 k Ω	0.010
10 k Ω - 33 k Ω	0.010
33 k Ω - 100 k Ω	0.010
100 k Ω - 330 k Ω	0.010
330 k Ω - 1 M Ω	0.010
1 M Ω - 3.3 M Ω	0.020
3.3 M Ω - 10 M Ω	0.050
10 M Ω - 33 M Ω	0.1
33 M Ω - 100 M Ω	0.2
100 M Ω - 1000 M Ω	0.5

Capacitance range *	% value + pF
700 pF - 1 nF	0.5 + 15
1 nF - 3.3 nF	0.5 + 5
3.3 nF - 10 nF	0.5
10 nF - 33 nF	0.5
33 nF - 100 nF	0.5
100 nF - 330 nF	1
330 nF - 1 μ F	1
1 μ F - 3.3 μ F	1.5
3.3 μ F - 10 μ F	1.5
10 μ F - 100 μ F	2.0

- ☒ Resistance range: 0 to 1,000 M Ω
- ☒ Resolution: 4 digits
- ☒ Capacitance range: 900 pF to 100 μ F

* The max. test voltage applicable on the output terminals is 2 to 5.5 Vrms.

DC/AC electric power and energy

- ☒ Voltage range: 0.2 V to 240 V
- ☒ Current range: 2 mA to 20 A
- ☒ Electric power range: 0.0004 to 2.4 kVA
- ☒ Time selection: 1.1 s to 1999 s
- ☒ Frequency range: DC, 40 Hz to 400 Hz
- ☒ Frequency accuracy: 0.005 %
- ☒ AC power accuracy: $dP = \sqrt{(dU^2 + dI^2 + dPF^2 + 0.03^2)}$ [%]
- ☒ DC power accuracy: $P = \sqrt{(dU^2 + dI^2 + 0.01^2)}$ [%]
- ☒ Power Factor accuracy: $dPF = (1 - \cos(\varphi + d\varphi) / \cos \varphi) \cdot 100$ [%]

CX 1652 - the high-accuracy, high-stability multifunction calibrator

Frequency function

PWM mode

Voltage range	% value + mV
1 mV - 20 mV	0.2 + 0.1
20 mV - 200 mV	0.1 + 0.1
200 - 2 V	0.1 + 0.1
2 V - 10 V	0.1 + 0.1

HF mode

- ☒ Frequency range: 0.1 Hz to 20 MHz
- ☒ Output impedance: 50 Ω
- ☒ Output signal waveform: square, symmetrical
- ☒ Output signal amplitude: 4 V pk-pk

- ☒ Output amplitude: 0, -10, -20 dB, -30 dB $\pm$ 1 dB
- ☒ Amplitude accuracy: 10 %
- ☒ Rise and fall time: < 3 ns

- ☒ Frequency range: 0.1 Hz to 20 MHz
- ☒ Resolution: 6 digits
- ☒ Frequency accuracy: 0.005 %

- ☒ Mode: PWM, square signal with calculated duty cycle ratio, frequency and HF amplitude

RTD: temperature sensor simulation

Type	Range -200 to +250 °C	Range 250 - 850 °C
Pt100	0.1 °C	0.3 °C
Pt200	0.1 °C	0.2 °C
Pt1000	0.2 °C	0.4 °C
Ni100	0.07 °C	- -

- ☒ Standard sensor: DIN, US/JS, Ni,
- ☒ selectable R0: 20 Ω to 2 k Ω

TC: temperature sensor simulation

R	Range [°C]	-50 - 0	0 - 400	400 - 1000	1000 - 1767
Accuracy [°C]		2.0	1.5	0.9	1.0
S	Range [°C]	-50 ... 0	0 ... 250	250 ... 1400	1400 ... 1767
Accuracy [°C]		1.8	1.5	1.0	1.0
B	Range [°C]	400 ... 800	800 ... 1000	1000 ... 1500	1500 ... 1820
Accuracy [°C]		1.9	1.1	1.0	0.9
J	Range [°C]	-210 ... -100	-100 ... 150	150 ... 700	700 ... 1200
Accuracy [°C]		0.6	0.4	0.3	0.4
T	Range [°C]	-200 ... -100	-100 ... 0	0 ... 100	100 ... 400
Accuracy [°C]		0.6	0.4	0.3	0.4
E	Range [°C]	-250 ... -100	-100 ... 280	280 ... 600	600 ... 1000
Accuracy [°C]		0.9	0.3	0.2	0.2
K	Range [°C]	-200 ... -100	-100 ... 480	480 ... 1000	1000 ... 1372
Accuracy [°C]		0.7	0.4	0.4	0.5
N	Range [°C]	-200 ... -100	-100 ... 0	0 ... 580	580 ... 1300
Accuracy [°C]		1.0	0.5	0.5	0.5

General data

Heating time	60 min
Working temperature	23 °C $\pm$ 10 °C
Storage temperature	0 to 40 °C with humidity below 80 %RH
Reference temperature	23 °C $\pm$ 2 °C
Dimensions	450 x 480 x 150 mm
Weight	22 kg
Mains power supply	230 V - 50 Hz
Consumption	Max. 250 VA

Built-in process multimeter

Function	Range	Accuracy (%)	Resolution / Range
DC voltage - VDC	0 to $\pm$ 20 V	0.01 % + 500 μ V	100 μ V / 20 V
DC current	0 to $\pm$ 25 mA	0.015 % + 300 nA	100 nA / 20 mA
DC voltage - mVDC	0 to $\pm$ 2 V	0.02 % + 7 μ V	100 nV / 20 mV 1 μ V / 200 mV 10 μ V / 2 V
Resistance *	0 to 2.5 k Ω	0.02 % + 10 m Ω	4 m Ω / 20 Ω 1 m Ω / 200 Ω 10 m Ω / 2 k Ω
Frequency	1 Hz to 15 kHz	0.005	10 μ Hz to 0.1 Hz
TC simulation	-250 to +1820 °C	0.4 to 2.5 °C	0.1 °C
RTD simulation	-200 to +850 °C*	0.1 °C	0.1 °C

*1mA test current

State at delivery

CX 1652 calibrator delivered with:

- ✓ Mains power cable, User's Manual (CD),
- ✓ 2 x 1000V - 20 A test cables, black / red 1m long,
- ✓ Adapter cable: SUB-D25 / 2 x banana 1 m long (DC voltage/current),
- ✓ Adapter cable: SUB-D25 / 4 x banana 1 m long (4-wire resistance),
- ✓ Adapter cable: SUB-D25 / 4 x banana 1m long (4-wire resistance simulation),
- ✓ Adapter cable: SUB-D25 / 2 x banana 1 m long (mVDC and TC), spare fuses,
- ✓ RS232 cable 1m long.
- ✓ Test Report

Reference for orders:

CX 1652 calibrator CX1652

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