

A new calibrator concept that generates, in addition to the **standard electrical parameters**, other parameters for **temperature** and **power** applications



### SUITABLE FOR THE CALIBRATION OF INSTRUMENTS...

(multimeters, analogue instruments, panel instruments, clip-on ammeters, portable calibrators, wattmeters, electrometers, oscilloscopes, thermometers, recorders, and more)

- Manufacturers of measuring instruments,
- Laboratories,
- Customer service departments,
- For design work,
- For the quality certification of instruments...

### MULTIPLICITY OF SIGNALS

- Generation of AC/DC voltage, current, and power
- Generation of non-harmonic periodic signals with peak factor
- Generation of square signals with programmable amplitude & frequency
- Simulation of resistors and capacitors
- Simulation of RTD thermometers and thermocouples

### POWERFUL FUNCTIONS

- Built-in multimeter to test and calibrate transmitters, regulators, and other controllers without additional equipment
- Calibrator-tester programmable up to 10 test steps. At the end of the sequence, the test result (PASS/FAIL) is displayed

### ERGONOMICS FOR EASE OF USE

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

# C.X 1651

## the high-precision, high-stability multi-purpose calibrator

### DC Voltage

Range	% of value + % of range
0 $\mu$ V - 20 mV	0.05 + 0.0 + 10 $\mu$ V
20 mV - 200 mV	0.01 + 0.0 + 10 $\mu$ V
200 mV - 2 V	0.003 + 0.0008
2 V - 20 V	0.003 + 0.0005
20 V - 240 V	0.003 + 0.0005
240 V - 1,000 V	0.005 + 0.005

### AC Voltage

Range	% of value + % of range	% of value + % of range	% of value + % of range
	20 Hz - 10 kHz	10 kHz - 50 kHz	50 kHz - 100 kHz
1 mV - 20 mV	0.2 + 0.05 + 20 $\mu$ V	0.20 + 0.10 + 20 $\mu$ V	1.0 + 0.10 + 20 $\mu$ V
20 mV - 200 mV	0.1 + 0.03 + 20 $\mu$ V	0.15 + 0.05 + 20 $\mu$ V	0.3 + 0.05 + 20 $\mu$ V
200 mV - 2 V	0.025 + 0.005	0.05 + 0.01	0.2 + 0.05
2 V - 20 V	0.025 + 0.005	0.05 + 0.03	0.2 + 0.05
20 V - 240 V	0.025 + 0.010	--	--
240 V - 1,000 V	0.03 + 0.02 (f < 1000 Hz)	--	--

### DC Current

Range	% of value + % of range
1 $\mu$ A - 200 $\mu$ A	0.05 + 0.0 + 20 nA
200 $\mu$ A - 2 mA	0.02 + 0.005
2 mA - 20 mA	0.01 + 0.003
20 mA - 200 mA	0.01 + 0.003
200 mA - 2 A	0.015 + 0.005
2 A - 20 A	0.02 + 0.010

### Resistance (4 wires)

Range	% of value
0 $\Omega$ - 100 $\Omega$	0.03 + 10 m $\Omega$
100 $\Omega$ - 400 $\Omega$	0.015
400 $\Omega$ - 2 k $\Omega$	0.015
2 k $\Omega$ - 10 k $\Omega$	0.015
10 k $\Omega$ - 40 k $\Omega$	0.015
40 k $\Omega$ - 200 k $\Omega$	0.015
200 k $\Omega$ - 1 M $\Omega$	0.05
1 M $\Omega$ - 4 M $\Omega$	0.1
4 M $\Omega$ - 20 M $\Omega$	0.2
20 M $\Omega$ - 50 M $\Omega$	0.5

### Capacitance (4 wires)

Range	% of value
900 pF - 2.5 nF	0.5 + 15 pF
2.5 nF - 10 nF	0.5 + 5 pF
10 nF - 50 nF	0.5
50 nF - 250 nF	0.5
250 nF - 1 $\mu$ F	0.5
1 $\mu$ F - 3.5 $\mu$ F	1.0
3.5 $\mu$ F - 5 $\mu$ F	1.0
5 $\mu$ F - 10 $\mu$ F	1.5
10 $\mu$ F - 50 $\mu$ F	2.0

Maximum allowed voltage on the load is 8 Vpk.

### AC Current

Range	% of value + % of range	
	20 Hz - 1 kHz	1 kHz - 5 kHz
1 $\mu$ A - 200 $\mu$ A	0.15 + 0.0 + 20 nA	0.30 + 0.10 + 20 nA
200 $\mu$ A - 2 mA	0.07 + 0.01	0.20 + 0.05
2 mA - 20 mA	0.05 + 0.005	0.20 + 0.05
20 mA - 200 mA	0.05 + 0.005	0.20 + 0.05
200 mA - 2 A	0.05 + 0.005	--
2 A - 20 A	0.10 + 0.03	--

### Frequency

Type	PWM (pos, neg, sym)	HF (rise time < 5ns)
range	0.1 Hz - 100 kHz	0.1 Hz - 20 MHz
frequency unc. (%)	0.005	0.005
amplitude	1 mV - 10 V	2 V
amplitude unc. (%)	0.1	10
ratio	0.00 - 1.00	--
ratio unc. (%)	0.05	--

### DC power, energy

Quantity	Range	% of value + % of range
Voltage	200 mV - 240 V	see voltage table
Current	2 mA - 10 A	0.05 + 0.01

### AC power, energy

Quantity	Range	Uncertainty
Voltage	200 mV - 240 V	see voltage table
Current	2 mA - 10 A	0.05 % + 0.01 %
Frequency	40 Hz - 400 Hz	0.005
Power factor	-1 - +1	0.005 - 0.0005
Phase	0 - 360 °	0.15 ° - 0.25 °

Setting time in energy mode 10 s - 1999 s. Uncertainty of AC power depends on set value of voltage, current, phase. The best uncertainty is 0.08 %.  
Uncertainty in energy mode depends on set value of voltage, current, phase and time. The best uncertainty is 0.09 %.

## REFERENCE FOR ORDERING

### • CX1651

### Temperature sensor

	Resistive temperature sensor	Thermocouple
types	Pt 1.385, Pt 1.392, Ni	R, S, B, J, T, E, K, N
range of R0	20 $\Omega$ - 2 k $\Omega$	--
range of temperature	-200 °C - 850 °C	-250 °C - 1,820 °C
temperature uncertainty	0.04 °C - 0.5 °C	0.4 °C - 4.0 °C
temperature scale	ITS 90, PTS 68	ITS 90, PTS 68

### Build-in meter

Quantity	Range	Uncertainty
VDC (DC voltage)	0 - $\pm$ 12 V	0.01 % + 100 $\mu$ V
mVDC (DC voltage)	0 - $\pm$ 2,000 mV	0.01 % + 10 $\mu$ V
mADC (DC current)	0 - $\pm$ 25 mA	0.02 % + 1 $\mu$ A
FREQ (Frequency)	1 Hz - 15 kHz	0.005 %
R4W (Resistance)	0 - 2 k $\Omega$	0.02 % + 100 m $\Omega$
TRTD (RTD sensors)	-150 - +600 °C	0.1 °C
TTC (TC sensors)	-250 - +1,820 °C	0.4 - 4 °C
SGS (strain gauge sensor) *	depends on sensor	0.01 % + 10 $\mu$ V + sensor unc.

\* Supplying voltage 2 to 10 V DC, max. current 40 mA, input resistance > 100 M $\Omega$ , sensitivity 0.5 - 100 mV/V, displayed unit settable



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