

Compact, Accurate, Multi-Function Calibrator

Model CA100
£1330

The CA100, a new type of general-purpose measuring instrument, features all the latest OMEGA® technologies for generating and measuring voltages and currents



Shown slightly smaller than actual size



✓ Compact and Lightweight

The CA100 is both small and light. This highly portable instrument is ideal for on-site use in process industries, for diagnosing factory equipment, and also for research and development.

✓ Multiple SOURCE and MEASURE Functions

A single CA100 unit can be used to generate a DC voltage, DC current, resistance, temperature (thermocouple and resistance temperature detector), and frequency, provide a 24 Vdc power supply for calibrating transmitters, and measure a DC voltage, DC current, and resistance. This multi-function capability makes it ideal for maintaining various equipment used in process industries, such as standard generators, decade resistance boxes and digital multimeters, diagnosing factory equipment, and for research and development work.

✓ High Accuracy of 0.02%

The CA100 can calibrate transmitters and converters to 0.1% accuracy, which is becoming the de-facto standard.

✓ 24 Vdc Power Supply to Transmitter

A 24 Vdc power supply provides a handy power source for transmitters to facilitate on-site calibration and maintenance of transmitters and converters.

✓ General and RTD Resistance Generation

The CA100 can generate a general resistance or a resistance appropriate for the resistance temperature detector temperature being measured. And it can also generate general DC voltages and currents, or DC voltages to suit the thermocouple temperature being measured. The instrument offers the greatest advantages during calibration and maintenance in process industries and, unlike previous models, no decade resistance box, etc. is needed.

✓ RS-232C Interface

The CA100 comes with an RS-232C interface as standard, so you can upload data to your personal computer, as well as configure functions or ranges from the computer or output data to a dedicated printer.

✓ Runs on AA Batteries, Ni-Cd Battery Pack, or AC Adapter

An optional dedicated built-in Ni-Cd battery pack for the CA100 allows the instrument to be used in all sorts of workplaces. Alternatively, the CA100 can run on AA batteries (supplied as standard accessories) if charging is not possible, or from the AC power source (with an optional dedicated AC adapter for any commercial AC power supply voltage).

✓ Easy to Use

One of the main advantages of the CA100 is that the generation functions and the measurement functions are separate from each other, because of the carefully designed key layout. On the left side of the UP/DOWN keys at the centre of the instrument are the SOURCE function keys, and on the right side are the MEASURE function keys, and two separate pairs of function selection and range setting keys are provided for generation and measurement individually. This independence of the generation and measurement functions is the result of a careful design for ease of use, and allows you to change the range for the MEASURE function while generating a signal.

✓ Simultaneous Display of Generation Value and Measurement Value

Because the generation and measurement functions are independent of each other, the generation value and measurement value can be displayed simultaneously on the large LCD.

✓ Large LCD and Backlight

The large, segment-type LCD of the CA100 makes it easy to read the numerical values, and the backlight produces a clear screen even in the dark.

✓ Simple and Safe Terminal Shape

The simple shape of the terminals makes it quick and easy to use the instrument at the work site, and the safe construction prevents the metal parts from being accidentally touched. With the separate terminals for both generation and measurement, you can perform measurement while generating a signal.



General Specifications

Power Supply: AA-size batteries, dedicated Ni-Cd battery pack, or dedicated AC adapter

AA-size batteries: Eight cells. Approximate service life assuming continuous use (and alkaline cells): 5 Vdc (10 mA load current) generation with active measurement function: 10 hours. 20 mA DC generation with active measurement function, active 24 Vdc power supply to transmitter, and lit backlight: 2 hours

Ni-Cd battery pack: 1200 mA h, 9.6 V battery pack for repeated use with service life of approximately two years (depending on usage conditions). Approximate service life assuming continuous use: 5 Vdc (10 mA load current) generation with active measurement function: 7.5 hours. 20 mA DC generation with active measurement function, active 24 Vdc power supply to transmitter, and lit backlight: 2.5 hours. Charging: Timer-operated charging using the main unit (10 hours of charging, requiring AC adapter)

AC Adapter:

Input: 100-120 or 220-240 Vac, 50/60 Hz, 40-55 VA.
Maximum range of input voltage: 90-264 Vac

Maximum range of input frequency: 48-62 Hz

Automatic power-off: 30 minutes (Condition: If there is no key input or data exchange via communication while the instrument is running on batteries)

Communication: RS-232C (9-pin D-Sub connector).

Transmission: Asynchronous.

Transmission rate: 150, 300, 600, 1200, 2400, 4800 or 9600 bits/sec

Modes:

Allows selection between talk-only and normal modes and selection of handshaking mode and data format

Printer using ESC/P command: Yes

Display: Segmented LCD with built-in backlight; 5 digits for generated value and 4.5 digits for measured value.

Warm-up Time: 5 minutes

Power Consumption: 55 VA maximum

Insulation Resistance: 20 M Ω or greater at 500 Vdc for 1 minute applied between respective terminals and between each terminal and the power line of the AC adapter

Withstanding Voltage: 350 Vac, 1 minute (between respective terminals); 1,500 Vac, 1 minute (between each terminal and the power line of the AC adapter)

Operating Temperature and Humidity Range: 5 to 40°C, 20 to 80% RH (no condensation), during generation and/or measurement (in normal operation) or while charging when neither generation nor measurement is taking place

Storage Temperature and Humidity Range:

-20 to 45°C, 90% RH maximum (no condensation)

Maximum Allowable Voltage: 42 V_{peak} maximum between respective terminals and between each terminal and the ground

Dimensions: Approx. 237 (W) x 137 (H) x 63 (D) mm (excluding protrusions) (9.3 x 5.4 x 2.5")

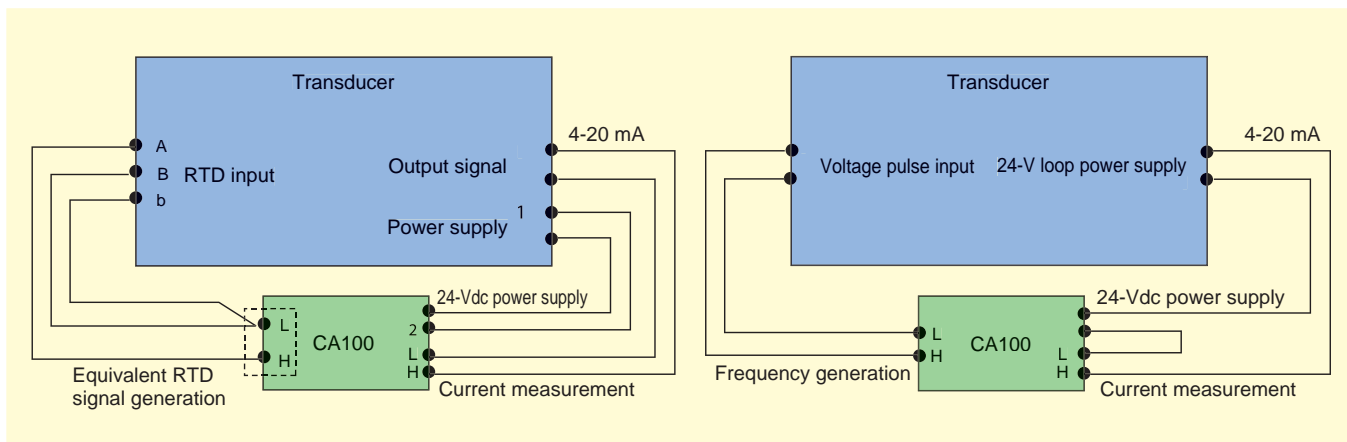
Weight: Approx. 1.2 kg (2.64 lb)

Broad Range of Applications

For maintenance work in process industries

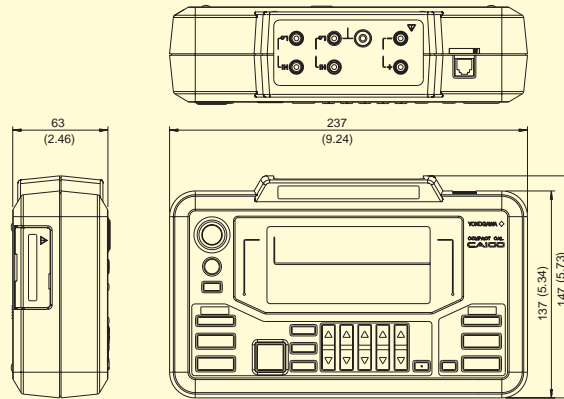
Calibrating transducers

A single CA100 unit can supply signals and power to the input and power supply terminals of a transducer for an RTD sensor or a pulse output sensor while measuring the output of the transducer at the same time. You can also calibrate and check transducers using the thermocouple, DC voltage and DC current generation functions of the CA100.



Dimensions

Unit: mm (inch)



If not specified, tolerance is 3%. However, where less than 10mm, tolerance is 0.3mm.

Specifications of Generation Functions

DC Voltage/Current and Resistance Generation

Function	Range	Range with Guaranteed Accuracy	Setting Resolution	Setting Range	Accuracy ±(% of setting + % of range)		Temp Coefficient ±(% of setting + % of range)/°C		Remarks
					% of setting	% of range	% of setting/°C	% of range/°C	
DC voltage generation	100 mV	0 to 100.000 mV	1 µV	-10 to 110.000 mV	0.02	0.01	0.003	0.002	Output resistance approx. 6.5 Ω
	1 V	0 to 1.00000 V	10 µV	-0.1 to 1.10000 V	0.02	0.005	0.002	0.001	Max. output: 10 mA
	10 V	0 to 10.0000 V	100 µV	-1 to 11.0000 V	0.02	0.005	0.002	0.001	approx. 30 MΩ Max output: 10 mA Output Resis. approx 30 mΩ
DC current generation	20 mA	0 to 20.000 mA	1 µA	0 to 22.000 mA	0.025	0.015	0.003	0.003	Max. output: 24 V Max. output: 28 V
	-20 mA*2	0 to -20.000 mA	1 µA	0 to -22.000 mA	0.025	0.03	0.003	0.003	
Resistance generation*3	500 Ω	0 to 500.00 Ω	10 mΩ	0 to 550.00 Ω	0.02 ⁴	0.02 ⁴	0.002	0.01	⁵
	5 kΩ	0 to 5.0000 kΩ	100 mΩ	0 to 5.5000 kΩ	0.05 ⁴	0.03 ⁴	0.002	0.01	⁶
	50 kΩ	0 to 50.000 kΩ	1 Ω	0 to 55.000 kΩ	0.1 ⁴	0.1 ⁴	0.002	0.03	⁷

*1) Temperature conditions of temperature coefficient: 5°C or greater but less than 18°C and greater than 28°C but no greater than 40°C

*2) DC-mA sink: A function which draws a current of the specified intensity in the direction from an external voltage generation source to the positive terminal.

*3) Resistance is generated by generating an equivalent resistance based on detection of the resistance-measuring current and generation of a voltage drop.

The specifications are valid over the ranges of measuring current and output voltage shown in the Remarks column

*4) Does not include the resistance effects of the leads provided.

*5) Effective for measuring-current range of 1 to 5 mA, and for output voltage of no greater than 2 V.

*6) Effective for measuring-current range of 0.1 to 1 mA, and for output voltage of no greater than 2 V.

*7) Effective for measuring-current range of 0.01 to 0.1 mA, and for output voltage of no greater than 2 V.

Specifications of Measurement Functions

Function	Range	Range with Guaranteed Accuracy	Reading Resolution	Reading Range	Accuracy ±(% of reading + % of range)		Temperature Coefficient ±(% of reading)/°C		Remarks
					% of reading	% of range	(% of reading)/°C	(% of range)/°C	
DC voltage measurements	500 mV	-500.00 to 500.00 mV	10 µV	-599.99 to 599.99 mV	0.02	0.01	0.002	0.001	Input resistance: more than 1GΩ
	5V	-5.0000 to 5.0000 V	100 µV	-5.9999 to 5.9999 V	0.02	0.01	0.002	0.001	Input resistance: approx. 1MΩ
	35V	-35.000 to 35.000 V	1 mV	-41.999 to 41.999 V	0.02	0.015	0.002	0.001	
DC current measurements	20 mA	-20.000 to 20.000 mA	1 µA	-23.999 to 23.999 mA	0.025	0.02	0.002	0.001	Input resistance: no more than 200Ω
	100 mA	-100.00 to 100.00 mA	10 µA	-119.99 to 119.99 mA	0.04	0.03	0.002	0.001	
Resistance Measurement	500 Ω	0 to 500.00 Ω	10 mΩ	0 to 599.99 Ω	0.055 ¹¹	0.015 ¹¹	0.005	0.02	Measurement current: approx. 1 mA
	5 kΩ	0 to 5.0000 kΩ	100 mΩ	0 to 5.9999 kΩ	0.055 ¹¹	0.015 ¹¹	0.005	0.02	Measurement current approx. 100 µA
	50 kΩ	0 to 50.000 kΩ	1 Ω	0 to 59.999 kΩ	0.55 ¹¹	0.02 ¹¹	0.005	0.02	Measurement current approx. 10 µA

Generation of Equivalent Resistance-Temperature-Detector Temperature

Range	Generation Range (°C) ^{*10}	Setting Resolution (°C)	Accuracy ^{*8} (°C)	Temperature Coefficient ^{*9} (°C/°C)
PT100	-200.0 to 0	0.1	0.3	0.04
	0 to 400.0	0.1	0.5	0.04
	400.0 to 850.0	0.1	0.8	0.04

*8) The accuracy is specified for measurement currents from 1 to 5 mA, excluding the resistance effects of the leads provided.

*9) Temperature conditions to temperature coefficient: 5°C or greater but less than 18°C, and greater than 28°C but no greater than 40°C. The specifications are compatible with both IEC 751-1983 and IEC 751-1995

*10) The equivalent RTD temperature is generated by generating an equivalent resistance based on detection of the resistance-measuring current and generation of a voltage drop.

**11) See *5)

• Response time of generation function:

DC V generation with 1-V or 10-V range: 10 ms (time taken from when the output begins changing to when it falls within the given accuracy)

Resistance generation with 500 Ω range (including RTD output): 10 ms (time taken from when the specified current is applied to when the output falls within the given accuracy)

Generation functions for ranges other than noted above: 300 ms

• DC V generation limiter: Active for load voltages equal to or greater than 28.5 V (recovered manually)

• DC A generation limiter: Active for load currents equal to or greater than 12 mA (DC voltage, frequency and pulse generation functions only. Recovered manually)

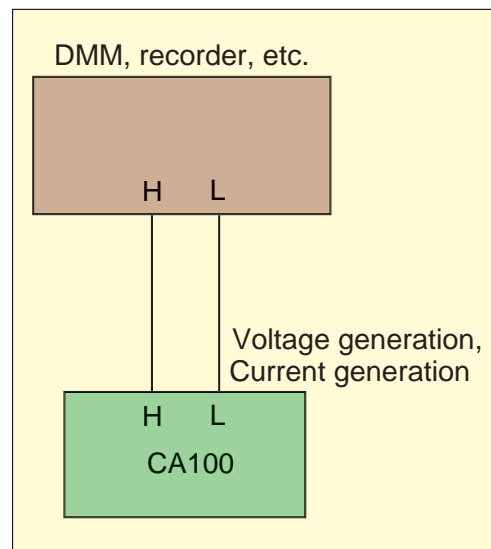
• Temperature Unit: °C, °F

- ✓ For Calibrating and Checking Various Measuring Instruments
- ✓ Checking and Calibrating Digital Multimeters, Recorders, Temperature Controllers, etc., By Using the DC Voltage and Current Generation Functions of the CA100

Generation of Thermocouple EMF

Range	Generation Range (°C)	Setting Resolution (°C)	Accuracy (°C)	Temp. Coefficient (°C/°C)
K	-200 to -100	0.1	0.6	0.05
	-100 to 400	0.1	0.5	0.05
	400 to 1200	0.1	0.7	0.05
	1200 to 1372	0.1	0.9	0.05
E	-250 to -200	0.1	1.2	0.1
	-200 to 100	0.1	0.6	0.05
	-100 to 600	0.1	0.5	0.05
	600 to 1000	0.1	0.6	0.05
J	-210 to -100	0.1	0.6	0.05
	-100 to 800	0.1	0.5	0.05
	800 to 1200	0.1	0.7	0.05
T	-250 to -200	0.1	1.5	0.2
	-200 to 400	0.1	0.5	0.05
N	-200 to -100	0.1	1.0	0.1
	-100 to 900	0.1	0.7	0.05
	900 to 1300	0.1	0.8	0.05
B	400 to 600	1	2.0	0.2
	600 to 800	1	1.5	0.2
	800 to 1820	1	1.1	0.2
R	-40 to 100	1	1.5	0.2
	100 to 1767	1	1.2	0.2

- Temperature conditions of temperature coefficient: 5°C or greater but less than 18°C and greater than 28°C but no greater than 40°C
- The specifications are compatible with both IEC-1-1989 and IEC 584-1-1995.
- The internal resistance for thermocouple output is approximately 6.5 Ω.
- The accuracy does not include the accuracy of reference junction compensation. Reference junction compensation is done by the optional RJC sensor. When performing output correction using the reference junction temperature, add the sensor accuracy. The output is corrected about every 10 seconds.
- Specifications of RJC sensor: Measurement range: -10 to 50°C; Accuracy: ±0.5°C for a range of 18 to 28°C (when combined with the main unit) ±1°C for ranges of -10 to 18°C and 28 to 50°C (when combined with the main unit)
- Cable Length: approx. 1.5 m (5')
- Temperature Unit: °C, °F



Specifications

General Conditions:

These specifications apply to the CA100 calibrator under the following conditions: ambient temperature 23 ±5°C, auto-zeroing executed, the backlight turned off, no battery charging is in progress, and less than one year since calibrator was calibrated.

Frequency and Resistance Generation

Function	Range (Range with Guaranteed Accuracy)	Setting Resolution	Range of Generation Reading	Accuracy	Maximum Output	Remarks
Frequency Generation	1 to 100 Hz	100.0 Hz	1 to 110 Hz	±1 digits	10 mA	Waveform: Rectangular with approx. 50% of duty ratio
	100 to 1000 Hz	1000 Hz	90 to 1100 Hz			
	1 to 10 kHz	10.0 Hz	0.9 to 11.0 kHz			
	10 to 50 kHz	50 kHz	9 to 50 kHz			
Pulse Generation*	1 to 100 kHz	60,000 cycles	1 to 60,000 cycles	±1 digits	10 mA	Output level: 0 to 10 V Accuracy of output level ±10%
	100 to 1000 kHz					
	1 to 10 kHz					
	10 to 50 kHz					

* The pulse generation generates as many rectangular waves as the specified number or cycles, where the single period of a rectangular wave is defined as a cycle.

To Order (Specify Model Number)

Model Number	Price	Description
CA100	£1330	Compact multi-function calibrator

The CA100 is supplied with: carrying case, 8 alkaline dry cell batteries, battery holder, 2 measurement leads, 2 ferrite cores, 1 fuse, and user's manual. **Ordering Example:** CA100, compact multi-function calibrator with CA100-CAL, calibration certificate, £1330 + 264= **£1594**.

Accessories

Model Number	Price	Description
CA100-CAL	£264.00	Calibration Certificate, Traceable to UK National Standards
CA100-NIST	1450.00	CA100 NIST calibration certificate
CA100-PS	82.00	AC power supply for CA100
CA100-TL	24.50	Leads for 2 wire TX cal (required for transmitter calibration)
CA100-BATT	82.00	Battery pk; requires CA100-PS
CA100-ML	18.75	2 measurement leads (spare)
CA100-FC	8.20	Ferrite core, each (spare)