

# Multi-Functional Handheld Calibrator



CA150



**Highly Accurate Within 0.02% of the DC Voltage Range for Source and Measure**

**Source and Measurement can be Performed Simultaneously**

**Vertical Body with Large Screen Display**

**Loop Power Supply Sink Function**

**3 Sweep Function Outputs (Step Sweep, Linear Sweep, Program Sweep)**

## Vertical Handheld Calibrator

Easy-to-hold vertical body is designed to make it intuitively easy to operate, as individual functions are accessed directly by pressing assigned keys. The main body case (sold separately) is designed to make it easy to hold the CA150 in one hand.

## Simultaneous Source and Measurement for Process Devices

In conventional calibration applications, multiple devices such as a standard generator, dial resistor and multimeter were required. Now with a single CA150 unit, it is possible to perform operation check at regular inspection and maintenance of thermocouples, RTDs and instruments, as well as maintenance and equipment diagnosis of process devices such as transmitters, thermostats and signal converters.

## Loop Power Supply Function

It is possible to measure generated current signals while supplying loop power 24 Vdc from a two-wire type transmitter (up to 22 mA DC).

## Highly Accurate and Multi-Functional Source and Measurement

**High Accuracy:** 0.02% for the source unit and 0.02% for the measurement unit

**Source and Measurement Functions:** DCV voltage, DC mA, ohm, Frequency and temperature (thermocouple, RTD) and 24 Vdc power supply function for transmitters

## Memory Functions: Setting Memory

This function saves/loads setting conditions. Up to 21 data items can be stored. Settings for (source/measurement) functions, ranges, generated values/measured values as well as setting mode conditions can be stored.

## Data Memory

This function saves source and measure values displayed. Up to 100 data items can be stored. Storage date/time, (source/measurement) functions, ranges and generated values/measured values can be stored. Stored data can be checked on the display of the main unit as well as via communication.

## Specifications (Common to Source and Measurement)

### Communication Functions:

Serial interface RS232 D-Sub 9-pin connector

**Memory Functions:** Data can be stored and loaded in setting memory (setting data) and data memory (source/measurement).

## Specifications (Common to Source Specifications)

**Power Supply:** 6 "AA" size alkaline batteries (included), AC adaptor (sold separately) or dedicated NiMH battery (sold separately)

**AC Adaptor:** 100 to 240 Vac, 50/60 Hz, 1.4 A



CA150 shown smaller than actual size.

**Output:** 12 Vdc, 3 A

### Battery Life Conditions:

Simultaneous source/measurement output of 5 Vdc/10 kΩ or more Vdc

### Approx 8 Hours:

When 6 batteries are used

**Approx 10 Hours:** When NiMH batteries are used

**Auto Power-Off:** Approx 10 minutes; it can be canceled by setting

**Insulation Resistance (Between Input Terminal and Output Terminal):** 500 Vdc, 50 MΩ or more

**Withstand Voltage (Between Measurement Terminal and Generation Terminal):** 350 Vac, 1 minute



### Operating Temperature/Humidity

**Range:** 0 to 40°C (32 to 104°F),  
20 to 80%RH (no condensation)

### Storage Temperature Range:

-20 to 60°C (-4 to 140°F), 90%RH or  
less (no condensation)

### External Dimensions:

Approx 251 H x 124 L x 70 W mm  
(10 x 5 x 3")

**Weight:** Approx 1000 g (oz)

**Accessories:** One set of lead  
cables for generation, 1 set of lead  
cables for measurement, carrying  
case, terminal adaptor, and  
1 (spare) fuse for measurement.

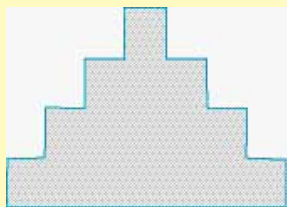
### Conforming Standards:

**Safety:** EN61010-1

**EMC:** EN 61326 Class B;  
EN 55011 Class B Group1

EN 61000-3-2; EN 61000-3-3,  
EN 61326

### Sweep Functions (Automatic Output Functions)



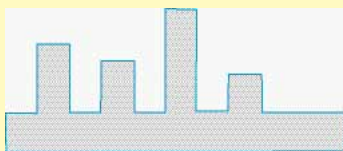
#### Step Sweep Function

This function changes the output  
in a staircase (step) pattern at  
fixed intervals.



#### Linear Sweep Function

This function increases (or  
decreases) the output linearly with  
respect to the generated value.



#### Program Sweep Function

This function outputs source setting  
values stored by the data memory  
function sequentially in the order  
they are stored in the memory.



Carrying case lead cables  
for source/ measurement,  
terminal adaptor, 6 spare  
"AA" batteries, fuse, AC  
adaptor and instruction  
manual.

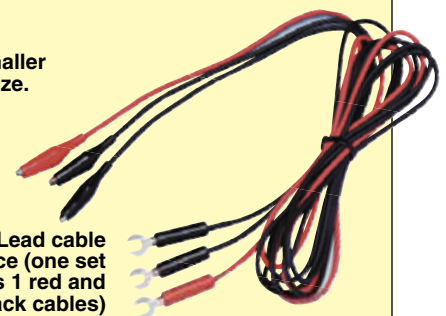
Included!



Terminal adaptor used for  
temperature measurement.



Lead cable for measurement  
(one set includes 1 red and  
1 black cable)  
Length: Approx. 1.0 m



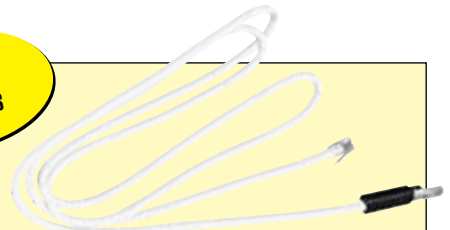
Lead cable  
for source (one set  
includes 1 red and  
2 black cables)  
Length: Approx 1.7 m

All shown smaller  
than actual size.



CA150-AC-ADAP,  
AC adaptor -D for  
UL/CSA shown  
smaller than  
actual size.

Optional  
Accessories



CA150-RJ-SENS, RJ sensor for  
reference junction compensation  
shown smaller than actual size.

CA150-ACC-CASE,  
accessory storage  
case with lead  
cables, RJ sensor,  
and more can  
be stored,  
shown smaller  
than actual size.



CA150-STRAP-CASE,  
main body case with  
strap and accessory  
storage case  
shown smaller  
than actual size.



CA150-NIMH-BAT,  
NiMH battery  
shown smaller than  
actual size.



## Source Unit

Accuracy = ± (% of setting + μV, mV, μA, Ω and °C) at 23°C ±5°C

	Range	Resolution	Source Range	Accuracy	Remark
DC Voltage	100 mV	1uV	0 to ±110.000 mV	±(0.02%+10uV)	Output resistance: approx. 6.5Ω
	1V	10uV	0 to ±1.10000V	±(0.02%+0.05mV)	Maximum output: 10 mA, output resistance: approx. 30 mΩ
	10V	0.1mV	0 to ±11.0000V	±(0.02%+0.5mV)	Maximum output: 10 mA, output resistance: approx. 30 mΩ
	30V	10mV	0 to 30.00V	±(0.02%+10 mV)	Maximum output: 10 mA
DC Current	20 mA	1 uA	0 to +22.000 mA	±(0.025%+3uA)	Maximum load: 24V
mA SINK	20 mA SINK	1 uA	0 to -22.000 mA	±(0.025%+6uA)	External power supply: 5 to 28V
OHM	500Ω	0.01Ω	0 to 550.00Ω	±(0.02%+0.1Ω)	Excitation current: 1 to 5 mA or maximum output: 2V
	5kΩ	0.1Ω	0 to 5.5000kΩ	±(0.05%+1.5Ω)	Excitation current: 0.1 to 0.5 mA or maximum output: 2V
	50kΩ	1Ω	0 to 55.000kΩ	±(0.1%+50Ω)	Excitation current: 0.01 to 0.1 mA or maximum output: 2V
RTD*	PT100	0.1°C	-200.0 to 850.0°C	±(0.025%+0.3°C)	Excitation current: 1 to 5 mA
	JPT100		-200.0 to 500.0°C		
Thermocouple	K	0.1°C	-200.0 to -100.0°C	±(0.02%+0.8°C)	Excitation current is: In the case of 0.1 mA to 1 mA or less, {0.05/Is (mA)} (Ω) or add {0.12/Is (mA)} (°C) RJC accuracy is not included in the thermocouple generation accuracy. Reference temperature compensation is carried out by the separately sold RJ sensor. To compensate for the reference contact temperature in the output, add the RJ sensor accuracy. Output compensation: Every 10 seconds RJ sensor specifications Measured temperature range: -10 to 50°C Accuracy: 18 to 28°C: 0.5°C (combination with the main unit) Other than above: 1.0°C (combination with the main unit)
	E		-100.0 to 1372.0°C	±(0.02%+0.5°C)	
	J		-200.0 to -100.0°C	±(0.02%+0.6°C)	
	T		-100.0 to 1000.0°C	±(0.02%+0.4°C)	
	N		-200.0 to -100.0°C	±(0.02%+0.7°C)	
	L		-100.0 to 1200.0°C	±(0.02%+0.4°C)	
	U		-200.0 to -100.0°C	±(0.02%+0.8°C)	
	R		-100.0 to 400.0°C	±(0.02%+0.5°C)	
	S	1°C	-200.0 to 0°C	±(0.02%+1.0°C)	
	B		0.0 to 1300.0°C	±(0.02%+0.5°C)	
Frequency/ Pulse	100 Hz	0.0 1Hz	0 to 100°C	±(0.02%+2°C)	Output voltage: +0.1 V to +11 V (Zero-base waveform) Amplitude accuracy: 10% Maximum load current: 10 mA Pulse cycle: 1 to 60,000 cycles
	1000 Hz	0.1 Hz	100 to 1768°C	±(0.02%+1.2°C)	
	10 kHz	0.1 kHz	0 to 100°C	±(0.02%+2°C)	
	50 kHz	1 kHz	100 to 1768°C	±(0.02%+1.2°C)	
	CPM	0.1 CPM	600 to 1000°C	±(0.02%+1.5°C)	
			1000 to 1820°C	±(0.02%+1°C)	

\* Depending on the internal settings, either ITS-90 or IPTS-68 can be selected.

Temperature Coefficient: Accuracy above x (1/10)/°C. The temperature coefficient is added in the ranges from 0 to 18°C and from 28 to 40°C.

## Specifications (Common to Source Unit)

**Response Time:** Approx 300 m only ranges 1V, 10V, 500Ω (excitation current 1mA) and RTD (excitation current 1mA) response time approx 5 ms (the time from the point where the output starts to change to the point when it gets within the accuracy range)

**Voltage Limiter:** Approx 32 V

**Current Limiter:** Approx 25 mA

### Output Polarity Switching:

Enable division output (n/m) function  
output = setting value x (n/m). Steps can be set in the ranges of n = 0 to 19 and m = 1 to 19 condition: n/m

**Step Sweep Function:** Automatic sweep of n values when the division (n/m) function is selected (it can be selected from the following options: 5 seconds, 10 seconds and step)

### Linear Sweep Function/Linear Output

**Function:** The sweep time can be selected from the following options: 16 seconds and 32 seconds

**Program Sweep Function:** Outputs source values saved by the data memory function in the order the values are stored in memory (maximum step setting: 100 data) (output setting can be selected from the following options: 5 seconds, 10 seconds and step)

## Measurement Unit

Accuracy =  $\pm$  (% of setting +  $\mu\text{V}$ ,  $\text{mV}$ ,  $\mu\text{A}$ ,  $\Omega$  and  $^{\circ}\text{C}$ ) at  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$

	Range	Resolution	Measurement Range	Accuracy	Remark
DC Voltage	500 mV	10uV	0 to ±500.00 mV	±(0.02%+50uV)	Input resistance: 1000 MΩ or more
	5V	0.1 mV	0 to ±5.0000V	±(0.02%+0.5mV)	Input resistance: approx. 1 MΩ
	35V	1 mV	0 to ±35.000V	±(0.025%+5mV)	
DC Current	20 mA	1 uA	0 to ±20.000 mA	±(0.025%+4uA)	Input resistance: approx. 20Ω or less
	100 mA	10 uA	0 to ±100.00 mA	±(0.04%+30uA)	
OHM	500Ω	0.01Ω	0 to 500.00	±(0.055%+0.075)	Measurement current: approx. 1 mA
	5kΩ	0.1Ω	0 to 5.0000k	±(0.055%+0.75)	Measurement current: approx. 100 μA
	50kΩ	1Ω	0 to 50.000k	±(0.055%+10)	Measurement current: approx. 10 μA
RTD	PT100	0.1°C	-200.0 to 850.0°C	±(0.05%+0.6°C)	At three-wire type measurement
	JPT100	0.1°C	-200.0 to 500.0°C		
Thermocouple	K	0.1°C	-200.0 to 1372.0°C	±(0.05%+1.5°C)/ -100°C or more ±(0.05%+2°C)/ -100°C or less	A temperature coefficient is added to the display if the temperature monitor is outside the range of 18 to 28°C.
	E		-200.0 to 1000.0°C		
	J		-200.0 to 1200.0°C		
	T		-200.0 to 400.0°C		
	N		-200.0 to 1300.0°C		
	L		-200.0 to 900.0°C		
	U		-200.0 to 400.0°C		
	R	1°C	0 to 1768°C	±(0.05%+2°C)/ -100°C or more ±(0.05%+3°C)/ -100°C or less	
	S		0 to 1768°C		
	B		600 to 1800°C		
Pulse	100 Hz	0.01 Hz	1.00 to 110.00 Hz	±2 dgt	Maximum input: 30V, Sensitivity: 0.5 Vp-p, Input resistance: 100k
	1000 Hz	0.1 Hz	1.0 to 1100.0 Hz		
	10 kHz	0.001 kHz	0.001 to 11.000 kHz		
	CPM	1 CPM	0 to 100,000 CPM	—	Contact input: Up to 100 Hz
	CPH	1 CPH	0 to 100,000 CPH	—	—
Loop Power Supply	24V			24V±2V	Maximum load current: 22 mA

Temperature Coefficient: Accuracy above  $\times (1/10)^{\circ}\text{C}$ . The temperature coefficient is added in the ranges from 0 to 18 $^{\circ}\text{C}$  and from 28 to 40 $^{\circ}\text{C}$ .

## Specifications (Common to Measurement Unit)

Maximum Measurement Unit Input

Voltage Terminal: 42 Vdc

Current Terminal: 120 mA

Current Terminal Input Protection

Fuse: 125 mA/250 V

Measurement Display Refresh Rate:

Approx once per second

## Specifications (Loop Power Supply)

Single 24 Vdc power supply  
(measurement terminal used)

Maximum Load: 22 mA DC or less

**mA DC Signals:** Measured while power is being supplied with the loop check function

To Order	
Model No.	Description
CA150	Handheld calibrator
CA150-NIST	Calibrator with 3-point calibration
Accessories	
CA150-AC-ADAP	Power cord ul/csa for CA150
CA150-ACC-CASE	Accessory case for CA150
CA150-CARRY-CASE	Carrying case for CA150
CA150-FER-CORE	Ferrite core for CA150
CA150-FUSE-SET	Fuse set CA150 set of 10 fuses
CA150-MEAS-LEAD	Measurement lead cables for CA150
CA150-NIMH-BAT	NiMH battery for CA150
CA150-RJ-SENS	Reference junction sensor for CA150
CA150-SOURCE-LEAD	Lead cable for generation
CA150-STRAP-CASE	Main body case for CA150
CA150-TERM-ADAP	Terminal adaptor for CA150

Comes with complete instruction manual, 6 "AA" batteries, carrying case, leads and terminal adaptor.

**Ordering Examples:** CA150-NIST, calibrator with 3-point calibration.

CA150, handheld calibrator and CA150-RJ-SENS, reference junction sensor.