NEW

YOKOGAWA

# Handy Calibrator

## CA150

### Multi-functional Hand-held Calibrator

- 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 function (24 VDC at a load of max 22 mA)
  It is possible to measure current in the mA range while supplying power.
- Sink function
- Sweep functions that allow 3 types of continuous outputs:
  Step sweep function
  Linear sweep function
  Program sweep function

CE


Yokogawa Meters & Instruments Corporation

Bulletin CA150-E

# CA150

Handy Cal

## Multi-functional and high-precision calibrator that can be used to calibrate and test industrial process devices and various electronics equipment

## Functions/Features

### ■Vertical hand-held 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.

Using the main body case (model No. 93027) (sold separately), you can hang CA150 to your body or a handrail to keep it handy.

### ■Simultaneous source and measurement for process devices

In conventional calibration applications, multiple devices such as a standard generator, dial resistor and multi-meter 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 mADC).

### ■Highly accurate and multi-functional source and measurement

High accuracy: 0.02% for the source unit and 0.02% for the measurement unit

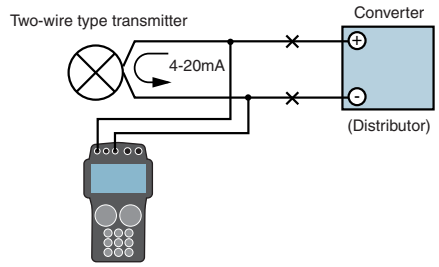
Source and Measurement functions: DCV voltage, DC mA, ohm, frequency and temperature (thermocouple, RTD) and 24 VDC power supply function for transmitters

## Two-wire Type Transmitter Applications

### ■Two-wire type transmitter (measurement function) application

○Loop check function

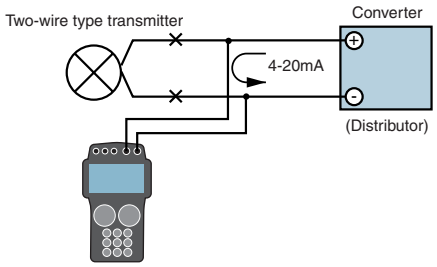
Measures mADC signals output while supplying transmitter power at 24 VDC.




### ■Two-wire type transmitter (source function) application

○Sink function

Receives current (Sink) from the power supply at voltages of up to 28 VDC and transmits mADC signals to the loop.




## 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.

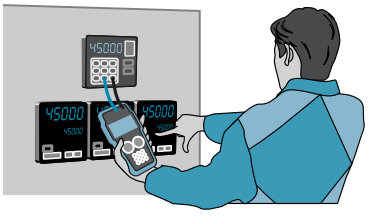
○Data memory

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.

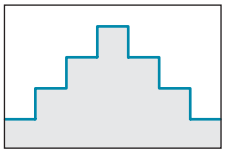


## Convenient Functions Useful in Field Tests

## Sweep Functions (Automatic Output Functions)

### ■Step sweep function

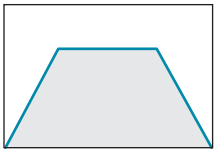
This function changes the output in a staircase (step) pattern at fixed intervals.



Step sweep

### ■Linear sweep function

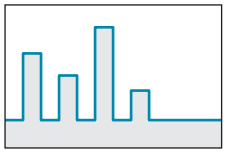
This function increases (or decreases) the output linearly with respect to the generated value.



Linear sweep

### ■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.



Program sweep

# Specifications

## Source Unit

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

| | Range | Resolution | Source range | Accuracy | Remark |
|---|---|---|---|---|---|
| DC voltage | 100mV | 1uV | 0 to ±110.000mV | ±(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%+10mV) | Maximum output: 10 mA |
| DC current mA SINK | 20mA | 1uA | 0 to +22.000mA | ±(0.025%+3uA) | Maximum load: 24 V |
| | 20mASINK | 1uA | 0 to -22.000mA | ±(0.025%+6uA) | External power supply: 5 to 28 V |
| OHM | 500Ω | 0.01Ω | 0 to 550.00Ω | ±(0.02%+0.1Ω) | Excitation current: 1 to 5 mA or maximum output: 2 V *2 |
| | 5kΩ | 0.1Ω | 0 to 5.5000kΩ | ±(0.05%+1.5Ω) | Excitation current: 0.1 to 0.5 mA or maximum output: 2 V |
| | 50kΩ | 1Ω | 0 to 55.000kΩ | ±(0.1%+50Ω) | Excitation current: 0.01 to 0.1 mA or maximum output: 2 V |
| RTD *1 | PT100 | 0.1°C | -200.0 to 850.0°C | ±(0.025%+0.3°C) | Excitation current: 1 to 5 mA *2 |
| | JPT100 | | -200.0 to 500.0°C | | |
| Thermocouple *3 | K | 0.1°C | -200.0 to -100.0°C | ±(0.02%+0.8°C) | *2 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)<br>*3 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.<br>Output compensation: Every 10 seconds<br>RJ sensor specifications<br>Measured temperature range: -10 to 50°C<br>Accuracy:<br>18 to 28°C:<br>±0.5°C (combination with the main unit)<br>Other than above:<br>±1.0°C (combination with the main unit) |
| | | | -100.0 to 1372.0°C | ±(0.02%+0.5°C) | |
| | E | | -200.0 to -100.0°C | ±(0.02%+0.6°C) | |
| | | | -100.0 to 1000.0°C | ±(0.02%+0.4°C) | |
| | J | | -200.0 to -100.0°C | ±(0.02%+0.7°C) | |
| | | | -100.0 to 1200.0°C | ±(0.02%+0.4°C) | |
| | T | | -200.0 to -100.0°C | ±(0.02%+0.8°C) | |
| | | | -100.0 to 400.0°C | ±(0.02%+0.5°C) | |
| | N | | -200.0 to 0°C | ±(0.02%+1.0°C) | |
| | | | 0.0 to 1300.0°C | ±(0.02%+0.5°C) | |
| | L | | -200.0 to 900.0°C | ±(0.02%+0.5°C) | |
| | U | | -200.0 to 0°C | ±(0.02%+0.7°C) | |
| | | | 0 to 400.0°C | ±(0.02%+0.5°C) | |
| | R | 1°C | 0 to 100°C | ±(0.02%+2°C) | |
| | | | 100 to 1768°C | ±(0.02%+1.2°C) | |
| | S | | 0 to 100°C | ±(0.02%+2°C) | |
| | | | 100 to 1768°C | ±(0.02%+1.2°C) | |
| | B | | 600 to 1000°C | ±(0.02%+1.5°C) | |
| | | | 1000 to 1820°C | ±(0.02%+1°C) | |
| Frequency /pulse | 100Hz | 0.01Hz | 1.00 to 110.00Hz | ±0.05Hz | Output voltage: +0.1 V to +11 V (Zero-base waveform)<br>Amplitude accuracy: ±10%<br>Maximum load current: 10 mA<br>Pulse cycle: 1 to 60000 cycles *4 |
| | 1000Hz | 0.1Hz | 90.0 to 1100.0Hz | ±0.5Hz | |
| | 10kHz | 0.1kHz | 0.9kHz to 11.0kHz | ±0.1kHz | |
| | 50kHz | 1kHz | 9kHz to 50kHz | ±1kHz | |
| | CPM | 0.1CPM | 1.0 to 1100.0CPM | ±0.5CPM | |

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

- Source unit response time: Approx. 300 ms only ranges 1V,10V,500Ω (excitation current 1mA) and RTD (excitation current 1mA) response time appox.5ms (the time from the point where the output starts to change to the point when it gets within the accuracy range)
- Source unit voltage limiter: Approx. 32 V
- Source unit 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
  The output setting can be selected from the following options: 5 seconds, 10 seconds and step.

*1 Depending on the internal settings, either ITS-90 or IPTS-68 can be selected.
*4 The same ranges of frequencies and

## Measurement Unit

Accuracy=±(% of reading+μV, mV, μA, Ω or dgt(digit)) at 23°C±5°C

| | Range | Resolution | Measurement range | Accuracy | Remark |
|---|---|---|---|---|---|
| DC voltage | 500mV | 10uV | 0 to ±500.00 mV | ±(0.02%+50uV) | Input resistance: 1000 MΩ or more |
| | 5V | 0.1mV | 0 to ±5.0000V | ±(0.02%+0.5mV) | Input resistance: Approx. 1 MΩ |
| | 35V | 1mV | 0 to ±35.000V | ±(0.025%+5mV) | |
| DC current | 20mA | 1uA | 0 to ±20.000mA | ±(0.025%+4uA) | Input resistance: Approx. 20Ω or less |
| | 100mA | 10uA | 0 to ±100.00mA | ±(0.04%+30uA) | |
| OHM | 500Ω | 0.01Ω | 0 to 500.00Ω | ±(0.055%+0.075Ω) | Measurement current: Approx. 1 mA |
| | 5kΩ | 0.1Ω | 0 to 5.0000kΩ | ±(0.055%+0.75Ω) | Measurement current: Approx. 100 μA |
| | 50kΩ | 1Ω | 0 to 50.000kΩ | ±(0.055%+10Ω) | Measurement current: Approx. 10 μA |
| RTD *5 | PT100 | 0.1°C | -200.0 to 850.0°C | ±(0.05%+0.6°C) | *5 At three-wire type measurement |
| | JPT100 | | -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<br>±(0.05%+2°C)/-100°C or less | A temperature coefficient is added if the display of 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<br>±(0.05%+3°C)/100°C or less | |
| | S | | 0 to 1768°C | | |
| | B | | 600 to 1800°C | | |
| Pulse | 100Hz | 0.01Hz | 1.00 to 110.00Hz | ±2 dgt | Maximum input: 30 V<br>Sensitivity: 0.5 Vp-p<br>Input resistance: 100kΩ<br>Contact input: Up to 100 Hz |
| | 1000Hz | 0.1Hz | 1.0 to 1100.0Hz | | |
| | 10kHz | 0.001kHz | 0.001 to 11.000kHz | | |
| | CPM | 1CPM | 0 to 100000CPM | ---- | |
| | CPH | 1CPH | 0 to 100000CPH | ---- | |
| Loop power supply | 24V LOOP | | | 24V±2V | Maximum load current: 22 mA |

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 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
- The mADC signals are measured while power is being supplied with the loop check function.

# General Specifications

## ○Specifica tions 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).

| | Items stored/loaded | Number of data items that can be stored |
|---|---|---|
| Setting memory | (source/measurement) functions, ranges, generated values/measured values and setting mode conditions | 21set |
| Data memory | Storage date/time, (source/measurement) functions, ranges and generated values/measured values | 100set |

## ○Common source specifications

•Power supply
6 AA size alkaline batteries
AC adapter (sold separately) or dedicated NiMH battery (sold separately)
AC adapter specification:
100 to 240 VAC, 50/60 Hz, 1.4 A
OUTPUT: 12 VDC, 3 A

•Battery life Conditions: Simultaneous Source/measurement
Output of 5 V DC/10 kΩ or more
Size AA alkaline batteries
When 6 batteries are used:
Approx. 8 hours
When NiMH battery is used:
Approx. 10 hours

•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, 20 to 80%RH
(no condensation)

•Storage temperature range:
-20 to 60°C 90%RH or less
(no condensation)

•External dimensions:Approx. 251 x 124 x 70 mm

•Weight:
Approx. 1000 g

•Accessories

| | |
|---|---|
| Lead cable for generation: | 1 set |
| Lead cable for measurement: | 1 set |
| Carrying case: | 1 |
| Terminal adapter: | 1 |
| Size AA battery: | 6 |
| Instruction Manual: | 1 |
| Fuse for measurement: | 1 (spare) |

•Conforming Standrads
Safty EN61010-1
EMC EN 61326 Class B;EN 55011 Class B Group1
EN 61000-3-2; EN 61000-3-3, EN61326

## Model Name

| Product name | Model name |
|---|---|
| Handy Calibrator | CA150 |

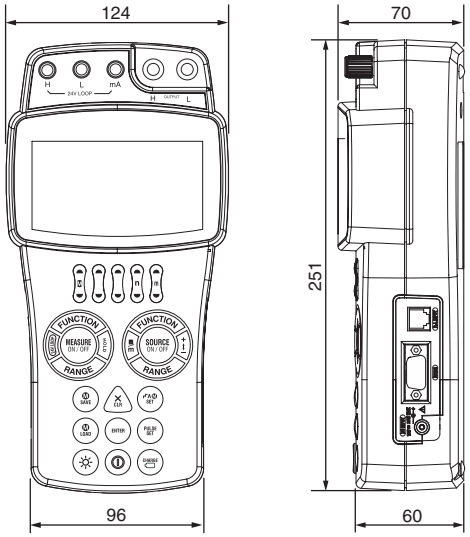
**With the main body case (model name: 93027) (sold separately) installed**

Includes strap and accessory storage case

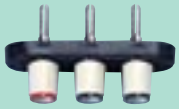
The main body case is designed to make it easy to hold with one hand.

## External Dimensions

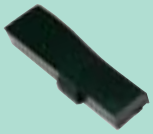
Unit: mm




## Supplied Accessories

| Product name | Lead cable for source | Lead cable for measurement | Carrying case | Terminal adapter |
|---|---|---|---|---|
| |  |  |  |  |
| Model name | 98020 | RD031 | 93026 | 99022 |
| Remark | One set of 1 red and 2 black cables Length: Approx. 1.7 m | One set of 1 red and 1 black cables Length: Approx. 1.0 m | Lead cables for source/measurement, terminal adapter, 6 spare batteries, fuse, AC adapter and Instruction Manual can be stored. | Used for temperature measurement. |

## Optional Accessories (sold separately)

| Product name | AC adapter | RJ sensor | Accessory storage case | NiMH battery | Main body case |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| Model name | 94010 | B9108WA | B9108XA | 94015 | 93027 |
| Remark | -D For UL/CSA Standard<br>-F For VDE Standard<br>-H For GB Standard<br>-R For SAA Standard<br>-S For BS Standard | For reference junction compensation | Lead cables, RJ sensor, etc. can be stored. | NiMH battery Dedicated | With strap and accessory storage case |

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Yokogawa Meters & Instruments Corporation

World Wide Web site at
**http://www.yokogawa.com/MCC**

⚠NOTICE
- Before using the product, read the instruction manual carefully to ensure proper and safe operation.


YOKOGAWA METERS & INSTRUMENTS CORPORATION
International Sales Dept.
Tachihi Bld. No.2, 6-1-3 Sakaecho, Tachikawa-shi, Tokyo, 190-8586 Japan
Phone: +81-42-534-1413 Facsimile: +81-42-534-1426

| | | |
|---|---|---|
| YOKOGAWA CORPORATION OF AMERICA (U.S.A.) | Phone: +1-770-253-7000 | Facsimile: +1-770-251-2088 |
| YOKOGAWA EUROPE B. V. (THE NETHERLANDS) | Phone: +31-334-64-1611 | Facsimile: +31-334-64-1610 |
| YOKOGAWA ENGINEERING ASIA PTE. LTD. (SINGAPORE) | Phone: +65-6241-9933 | Facsimile: +65-6241-2606 |
| YOKOGAWA AMERICA DO SUL LTDA (BRAZIL) | Phone: +55-11-5681-2400 | Facsimile: +55-11-5681-1274/4434 |
| YOKOGAWA MEASURING INSTRUMENTS KOREA CORPORATION (KOREA) | Phone: +82-2-551-0660 | Facsimile: +82-2-551-0665 |
| YOKOGAWA AUSTRALIA PTY. LTD. (AUSTRALIA) | Phone: +61-2-8870-1100 | Facsimile: +61-2-8870-1111 |
| YOKOGAWA INDIA LTD. (INDIA) | Phone: +91-80-4158-6000 | Facsimile: +91-80-2852-1441 |
| YOKOGAWA SHANGHAI TRADING CO., LTD. (CHINA) | Phone: +86-21-6880-8107 | Facsimile: +86-21-6880-4987 |
| YOKOGAWA MIDDLE EAST E.C. (BAHRAIN) | Phone: +973-358100 | Facsimile: +973-336100 |
| YOKOGAWA ELECTRIC CIS LTD. (RUSSIAN FEDERATION) | Phone: +7-095-737-7868 | Facsimile: +7-095-737-7869 |


Represented by:

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