

Handy Calibrators

CA11E / CA12E

CA11E Voltage/Current Calibrator

CA12E Temperature Calibrator

- Both signal source and measurement functions
- Simple operation, easy to use
- Lightweight, compact body
- Display resolution for current 0.001mA (**CA11E**)
- Addition of loop check function (**CA11E**)
- Source/measurement of 10 kinds of thermocouples (**CA12E**)
- Addition of rubber boot as accessory



Compact, Low Cost, Versatile

Voltage/Current Calibrator CA11E



Features

Source and Measuring of Voltage and Current

Generates and measures voltages up to 30 V DC and currents up to 24 mA DC.

Improved display resolution for current NEW

The source/measurement resolution has improved to 0.001 mA.

24 V (20 mA)/Loop check function* NEW

Enables measurement of source current signals while supplying loop power to two-wire transmitter.
* Load current: Max. DC22 mA

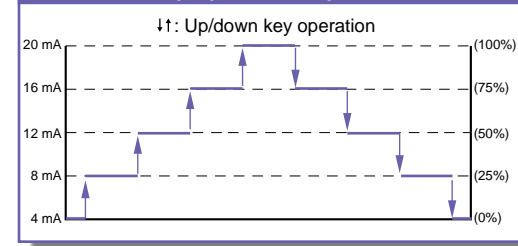
20 mA SINK Function

Absorbs the voltage supplied from an external power supply to its H terminal and simulates a two-wire transmitter making it ideal for loop checks.

4-20 mA and 1-5 V DC Step-up/down Function

The output level can be changed between 4⇔8⇔12⇔16⇔20 mA signals by one touch for the 4-20 mA DC output, and between 1⇔2⇔3⇔4⇔5 V signals for the 1-5 V DC output, for efficient calibration work.

4-20 mA Step-up/down Output



Sweep Function

Increases and decreases the output level to the preset level at a constant rate for the selected sweep time (16 or 32 seconds). The sweep function and sweep time are set by the internal dip switches.

Panel Design Common to All Models

Power Switch

Up/Down Keys

Used to set the output signal level. A pair of up/down keys is conveniently located immediately below each digit in the LCD panel.

Output On/Off Switch

(Output signal can set ON/OFF)

Range Selection Rotary Switch

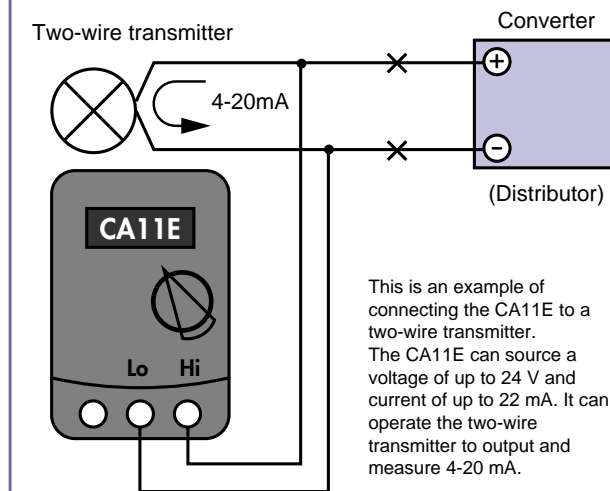
The rotary switch simplifies range selection: just leave the switch set to the most frequently used range.

Source/Measure Selection Switch

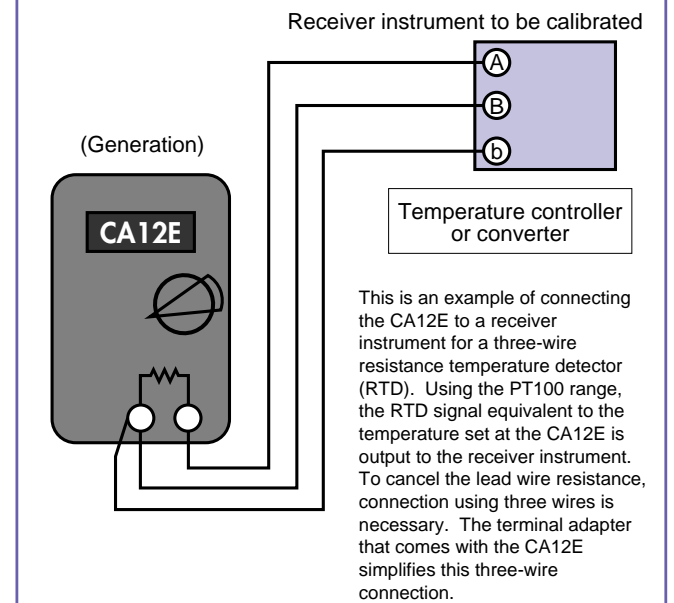
Examples of Applications

Application Example of CA11E (Transmitter Simulation 1)

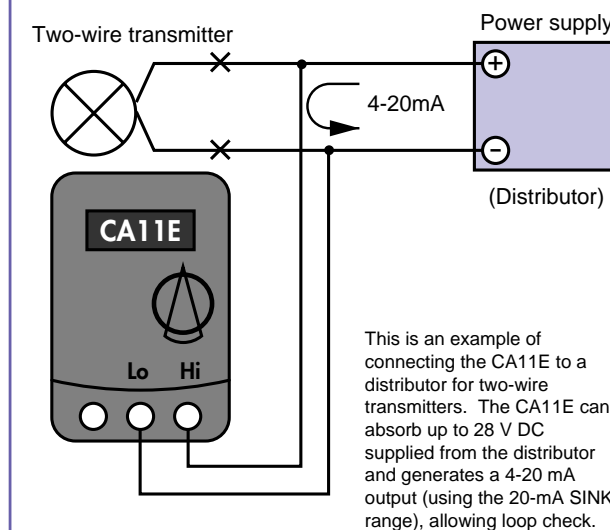
New function



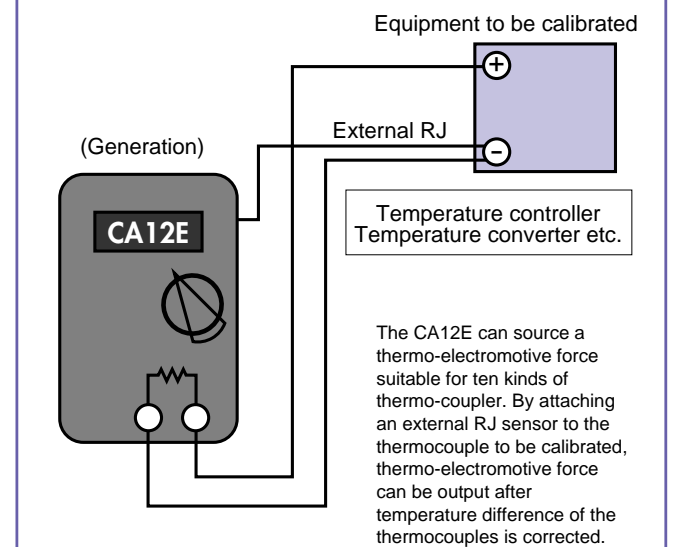
An Application of CA12E (RTD Simulation)



An Application of CA11E (Transmitter Simulation 2)



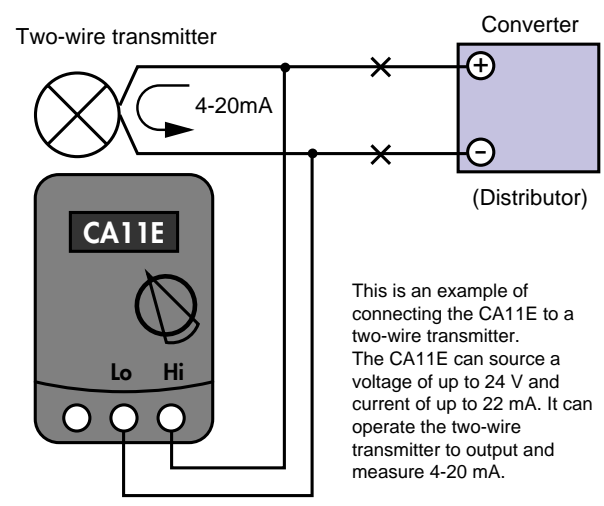
Application Example of CA12E (Generation of thermo-electromotive force)



Examples of Applications

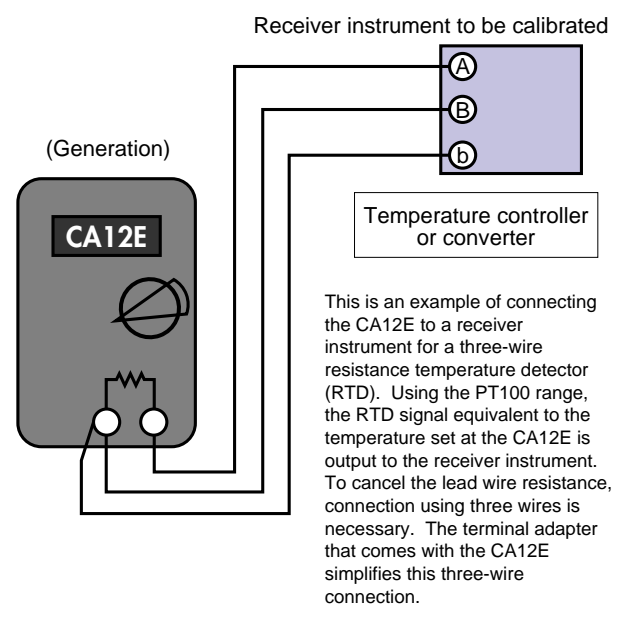
Application Example of CA11E (Transmitter Simulation 1)

New function



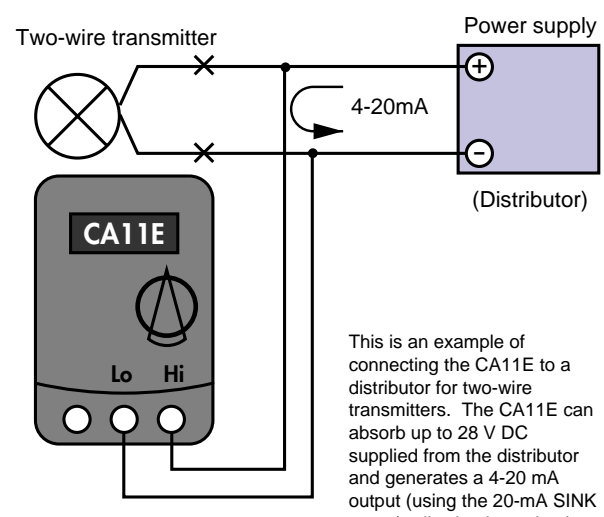
This is an example of connecting the CA11E to a two-wire transmitter. The CA11E can source a voltage of up to 24 V and current of up to 22 mA. It can operate the two-wire transmitter to output and measure 4-20 mA.

An Application of CA12E (RTD Simulation)



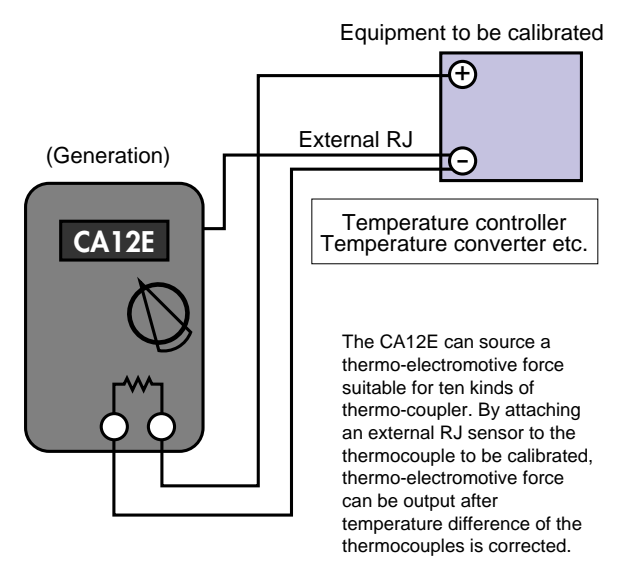
This is an example of connecting the CA12E to a receiver instrument for a three-wire resistance temperature detector (RTD). Using the PT100 range, the RTD signal equivalent to the temperature set at the CA12E is output to the receiver instrument. To cancel the lead wire resistance, connection using three wires is necessary. The terminal adapter that comes with the CA12E simplifies this three-wire connection.

An Application of CA11E (Transmitter Simulation 2)



This is an example of connecting the CA11E to a distributor for two-wire transmitters. The CA11E can absorb up to 28 V DC supplied from the distributor and generates a 4-20 mA output (using the 20-mA SINK range), allowing loop check.

Application Example of CA12E (Generation of thermo-electromotive force)



The CA12E can source a thermo-electromotive force suitable for ten kinds of thermo-coupler. By attaching an external RJ sensor to the thermocouple to be calibrated, thermo-electromotive force can be output after temperature difference of the thermocouples is corrected.

Temperature Calibrator CA12E



Features

Simulator of Common Thermocouples and RTD Sensors
Outputs a signal equivalent to signals of ten types of thermocouple K, E, J, T, N, S, B, L, M and R as well as Pt100 resistance temperature detector. Suitable for a broad range of applications such as maintenance of industrial process instruments and various thermometers.

Multi-range Thermometer

Can be used as a multi-range thermometer. Three-wire RTD connection for an RTD is possible.

Built-in Sensor for Reference Junction Compensation

Reference junction compensation when generating a thermocouple signal can be performed by the built-in temperature sensor. For more precise compensation, use the external RJC sensor (model B9108WA, sold separately).

Shift Key

Selects "temperature" or "RTD" unit.

Terminal Adapter

Provides screw terminals for connecting a temperature sensor such as a thermocouple and RTD when measuring temperature. When generating an RTD signal, a three-wire RTD signal can be output using the lead cables that come with the CA12E by short-circuiting the Lo-Lo terminals using the short-circuit bar that also comes with the CA12E.



Plug for External RJC Sensor

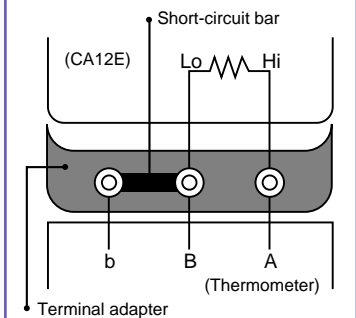
The RJC sensor is sold separately.

Plug for AC Adapter

Common for all CA11E, CA12E

Example of Use of Terminal Adapter

(When outputting a three-wire RTD signal)



General/Common Specifications for CA11E/CA12E

Power supply	: Four 1.5-V alkaline batteries (ANSI AA-size) or dedicated AC adapter (sold separately)	Measurement display update interval	: Approximately 1 update/sec.
Life of Batteries	: CA11E : Approximately 50 hours for 5 V DC output (with a load of 10kΩ or greater) Approximately 25 hours for 20 mA DC output (with a load of 5 V) CA12E : Approximately 55 hours * When generating a signal continuously on alkaline batteries	Display	: 7 segments LCD
Automatic Power-off	: Approximately 10 minutes (Can be canceled by DIP switch setting)	Operating temperature/humidity range	: 0 to 50°C and 20 to 85%RH (no condensation)
Generation Signal Level Setting	: By four-digit up/down keys	Storage temperature/humidity range	: -20 to 50°C and 90%RH or less (no condensation)
Response of generator	: CA11E : Approximately 1 second (from when the output begins to change until when the output level falls within the specified accuracy) CA12E (400Ω and RTD range) : Approximately 20 milliseconds (from when the specified current is applied until when the output level falls within the specified accuracy)	Dimensions	: Approximately 192 (W) × 92 (H) × 42 (D) mm (Excluding protrusions)
Maximum Allowable Applied Voltage	: CA11E: 30 VDC or less between each terminal and ground CA12E: 42 V peak or less between each terminal and ground	Weight	: Approximately 440 g (including batteries)
		Accessories	: Lead cable (1 pair) Terminal adapter (for CA12E only) (1) Instruction manual (1) 1.5-V alkaline battery (ANSI AA-size)(4) • For suffix code -1 Carrying case (1) • For suffix code -2 Rubber boot (1) Strap (1) Accessory case (1)

Model and Suffix Code

Calibrators Model and Suffix Code

Name	Model	Suffix code	Description
Handy CAL	CA11E		voltage/current calibrator
	CA12E		temperature calibrator
		-1	With carrying case(B9108NK)
		-2	With rubber boot(93038), strap(97040), accessory case(B9108XA)

Temperature effect: 1/10 of accuracy/°C; however, for 100-mV range, 0.005% + 10 μV/°C

Accessory

Name	Model	Description
AC adapter	94012	For 100 V
	94013	For 120 V
	B9108WB	For 220-240 V
Reference junction sensor	B9108WA	

Spare Parts

Name	Model	Description
Lead cables	B9108MS	1 pair(1 red and 1 black cables) for CA11E
Lead cables	B9108MT	1 pair(1 red and 2 black cables) for CA12E
Terminal adapter	B9108KF	for CA12E
Carrying case	B9108NK	This spare part is setting with suffix code 01
Rubber boot	93038	This spare part is setting with suffix code 02
Strap	97040	
Accessory case	B9108XA	

Specifications of Each Model

CA11E Voltage/Current Calibrator

Source Functions

Accuracy = ±(% of setting + value in mV, μV, or μA), at 23 ±5°C for one year

Range Selection	Range of Generated Signal	Accuracy	Setting Resolution	Remarks
30 V	0 to 30.00 V	0.05% + 20 mV	10 mV	Maximum current: 1mA
10 V	0 to 11.000 V	0.05% + 2 mV	1 mV	Maximum output current: 10 mA
1-5 V	1/2/3/4/5 V	0.05% + 2 mV *2	1 V step	*2 When the load is 1 kΩ or greater, and the error of the lead cables is excluded
1 V	0 to 1.1000 V	0.05% + 0.2 mV *2	0.1 mV	
100 mV	0.00 to 110.00 mV	0.05% + 50 μV	10 μV	
20 mA * 1</td <td>0 to 24.000 mA</td> <td rowspan="2">0.05% + 4 μA</td> <td>1 μA</td> <td rowspan="2">Maximum load: 12 V</td>	0 to 24.000 mA	0.05% + 4 μA	1 μA	Maximum load: 12 V
4-20 mA *1	4/8/12/16/20 mA		4 mA step	
24 V (20 mA) *1	24 V	±10%	—	Maximum current: 22 mA
20 mA SINK *1	0.1 to 24.000 mA	0.1% + 4 μA	1 μA	External power supply: 5 to 28 V

Temperature effect: 1/10 of accuracy/°C; however, for 100-mV range, 0.005% + 10 μV/°C

*1 The display resolution can select 24.000 or 24.00 displays with dip switch.

Measurement Functions

Accuracy = ±(% of reading + value in the least significant digit), at 23 ±5°C for one year

Range Selection	Indication	Accuracy	Resolution	Remarks
30 V	0 to ±30.00 V DC	0.05% + 2 digits	10 mV	Input impedance: Approx. 1 MΩ
10 V	0 to ±11.000 V DC	0.05% + 2 digits	1 mV	
1 V	0 to ±1100.0 mV	0.05% + 2 digits	0.1 mV	
100 mV	0 to ±110.00 mV DC	0.05% + 7 digits	0.01 mV	
20 mA * 1</td <td>0 to ±24.000 mA DC</td> <td>0.05% + 4 digit</td> <td>0.001 mA</td> <td>Input impedance: Approx. 45 Ω</td>	0 to ±24.000 mA DC	0.05% + 4 digit	0.001 mA	Input impedance: Approx. 45 Ω

*1 The display resolution can select 24.000 or 24.00 displays with dip switch.

CA12E Temperature Calibrator

Source and Measurement Functions

Accuracy = ±(% of setting or reading + value in °C), at 23 ±5°C for one year

Range Selection	Range of Generated Signal/Indication	Accuracy		Resolution	Remarks
		Source *4	Measurement *5		
TC **4	K	-200.0 to 1372.0°C	0.05% + 1°C (>-100°C)	0.07% + 1.5°C (>-100°C)	0.1°C
	E	-200.0 to 1000.0°C	0.05% + 2°C (≤-100°C)	0.07% + 2°C (≤-100°C)	
	J	-200.0 to 1200.0°C			
	T	-200.0 to 400.0°C			
	N	-200.0 to 1300.0°C			
	R	0 to 1768°C	0.05% + 3°C (<100°C)	0.07% + 3°C (<100°C)	1°C
	S		0.05% + 2°C (≥100°C)	0.07% + 2°C (≥100°C)	
	B	600 to 1800°C	0.05% + 4°C (<1000°C)	0.07% + 4°C (<1000°C)	0.1°C
	L	-200.0 to 900.0°C	0.05% + 0.5°C (<0°C)	0.07% + 1.5°C (<0°C)	
	U	-200 to 400°C	0.05% + 1°C (≥0°C)	0.07% + 2°C (≥0°C)	
100mV	0 to ±110.00mV	0.05% + 30 μV	0.05% + 30 μV	10 μV	
RTD PT100 *2 *3 (JPT100)	-200.0 to 850.0°C (-200.0 to 440.0°C)	0.05% + 0.6°C *6	0.05% + 0.6°C *7	0.1°C	
400 Ω	0 to 400.0 Ω	0.05% + 0.2 Ω *6	0.05% + 0.2 Ω *7	0.1Ω	

Temperature effect: 1/10 of accuracy/°C

*1 Based on the reference thermal EMF table of JIS C1602-1995

*2 Based on the reference resistance table of JIS C1604-1997.

*3 Based on the international temperature standard 1990 (ITS-90).

*4 The accuracy for generation of thermocouple signals does not include the error of the reference junction compensation. When compensating the output using an RJC sensor, add the accuracy of the RJC sensor. The output compensation is performed every 4 seconds. RJC sensor specifications - measurement range: -10 to 50°C; accuracy(in combination with the CA12E): ±0.5°C at 18 to 28°C and ±1°C at other temperatures.

*5 The accuracy for measurement of thermocouple signals indicates the error against the reference EMF table and includes the error of the internal reference junction compensation when the temperature at the terminals is stable.

*6 External excitation current: 0.5 to 2 mA; add 0.05% + 1°C (or 0.4 Ω) when it is 0.1 mA. Input capacitance of receiver instrument: 0.1 μF or less.

*7 When measuring a temperature using a three-wire RTD.

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

YOKOGAWA CORPORATION OF AMERICA (U.S.A.)	Phone: +1-770-253-7000	Facsimile: +1-770-254-0928
YOKOGAWA EUROPE B. V. (THE NETHERLANDS)	Phone: +31-88-4641000	Facsimile: +31-88-4641111
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: +55-11-5681-4434
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: +86-21-6239-6363	Facsimile: +86-21-6880-4987
YOKOGAWA MIDDLE EAST B. S. C. (C) (BAHRAIN)	Phone: +973-17-358100	Facsimile: +973-17-336100
YOKOGAWA ELECTRIC CIS LTD. (RUSSIAN FEDERATION)	Phone: +7-495-737-7868	Facsimile: +7-495-737-7869

Represented by:

MIK-ES16

Subject to change without notice.

All Rights Reserved. Copyright © 2007, Yokogawa Meters & Instruments Corporation.

[Ed: 03/b]

Printed in Japan: Aug. 2010(C)/3,000(KP)