YOKOGAWA

Handy Calibrators

CA10 Series

CA11 Voltage/Current Calibrator
CA12 Temperature Calibrator
CA13 Frequency Calibrator

- Both signal source and measurement functions
- Simple operation, easy to use
- Lightweight, compact body

Yokogawa M&C Corporation

MCC CA10-E

Compact, Low Cost, Versatile

Voltage/Current Calibrator

CA11

Features

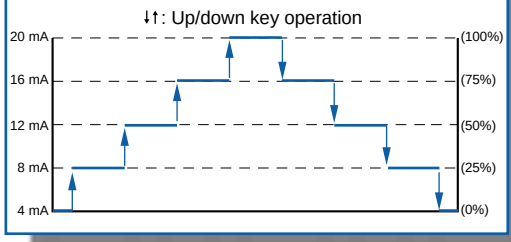
Source and Measuring of Voltage and Current

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

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⇔5V signals for the 1-5 V DC output, for efficient calibration work.

4-20 mA Step-up/down Output



20 mA SINK Function

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

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

(In case of CA12, set temperature clear switch)

Range Selection Rotary Switch

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

Source/MeasureSelection Switch

Temperature Calibrator

CA12

Features

Simulator of Common Thermocouples and RTD Sensors

Outputs a signal equivalent to signals of six types of thermocouple K, E, J, T, N, and R as well as Pt100 resistance temperature detector. (The former Pt100 standard, JPt100, is also selectable by an internal dip switch.) 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

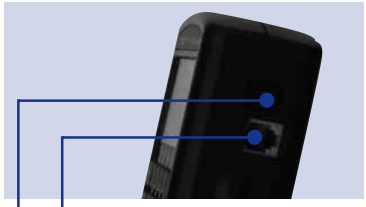
Reference junction compensation when generating a thermocouple signal can be performed by the built-in temperature sensor. For more precise compensation, use the external RJC sensor (model B9108WA, sold separately).

°C/°F Selection Key

Selects" °C " or " °F " 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 CA12 by short-circuiting the Lo-Lo terminals using the short-circuit bar that also comes with the CA12.



Plug for Exter nal RJC Sensor

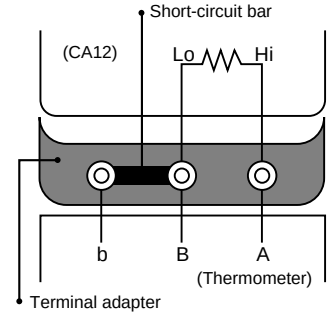
The RJC sensor is sold separately.

Plug for AC Adapter

Common for all CA11, CA12, and CA13

Example of Use of Terminal Adapter

(When outputting a three-wire RTD signal)



Frequency Calibrator

CA13

Features

Pulse Generator and Meter

Wide setting range of 0.1 Hz to 11 kHz. A simple key action switches over the function between a pulse generator and pulse meter, suitable for checking flowmeters and receiver instruments.

Both Voltage Pulses and Contact Pulse Are Available

The CA13 can generate and measure both voltage pulses (amplitude of +0.1 to +15 V, zero-based waveform) and contact Pulses.

Duty Ratio Setting Key

The duty ratio of the generated pulses can be set in increments of 10% (within the range of 10 to 90% except for the two-phase output).

Display Switching Key

Switches over the display between the frequency setting, amplitude setting, and number-of-pulse setting (when using a **PULSE CYCLES** range).

Plug for Input and Two-phase Output

The leftmost input plug can be used as an additional output terminal only by setting an internal dip switch for two-phase output.

CPM Function

The CA13 can count the number of pulses per minute when using the measurement function, suitable for totalizing the flow rate based on discontinuous pulses from a flowmeter. When using the generation function, the pulse train signal to be output can be set by a number of pulses per minute (60 CPM = 1 Hz).

Generation of DC Voltage and Current

A DC voltage (0.1 to 15 V) and current (step setting of 4⇔8⇔12⇔16⇔20 mA) can be generated. (Note that the accuracy is ±0.5% of full scale. Use this function only for simplified checks. For precise measurement, use the CA11.)

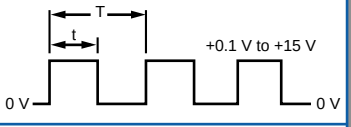
Pulse Cycle Output

A set number of pulses (of a desired frequency and amplitude) can be output, ideal for checking totalizer counters.

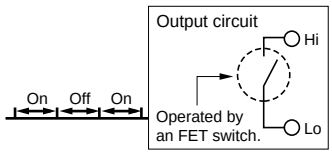
Pulse Waveform Generated

(When selecting voltage pulses)

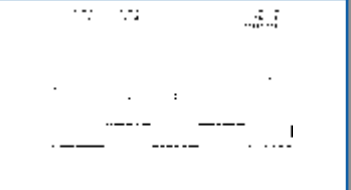
Duty ratio = t/T × 100% (The same equation applied to voltage-free contact pulses.)



(When selecting voltage-free pulses)

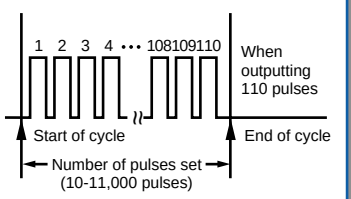


Pulse Waveform of Two-phase Output



Settings:
Frequency = 5 kHz (duty ratio = fixed to 50%);
Amplitude = 5 V (voltage-free contact pulses are also selectable.)

Pulse Cycle Output



(Voltage-free contact pulses are also selectable.)

Additional Features

Automatic Power-off

The power is turned off automatically if the calibrator is not touched for 10 minutes, prolonging battery life.

Simple and Easy Calibration

For the CA11 and CA12, there is no need to open the case when performing calibrations during periodic maintenance as they can be simply calibrated by the up/down keys. (A separate reference instrument is needed. This feature does not apply to the CA13.)

Complete Protection (CA11)

The complete protector protects the circuit against short-circuiting of the voltage output terminals and application of a voltage (of up to 30 V) to the output terminals, etc. due to misconnection.

Runs on 1.5 V AA-size Batteries or AC Adapter

The handy calibrators can run on the built-in 1.5-V ANSI batteries or an AC power supply using the AC adapter (sold separately).

Longer Lead Cables

The slightly longer than usual lead cables of 1.7 m (approximately 0.1 Ω for both cables) allow easy cable connection even if the handy calibrator is put on the floor.

Compact and Lightweight

Almost the same size and weight as a hand-held digital multimeter, this calibrator is designed for use in the field.

Handy Carrying Case — A Standard Accessory

The roomy case easily holds the calibrator without having to disconnect the lead cables.

● **Dip Switches (inside battery compartment)**

	CA11	CA12	CA13
Switch Number	ON		
1	When generating a signal: the sweep function takes 16 seconds.	When generating a signal, the built-in RJC is on.	When generating a signal, a two-phase signal is output.
2	When generating a signal: the sweep function takes 32 seconds.	Unused	When measuring a signal, a voltage-free contact pulse signal is selected for the input.
3	Unused	Unused	Unused
4	Automatic power-off is disabled.	Automatic power-off is disabled.	Automatic power-off is disabled.

Related Product

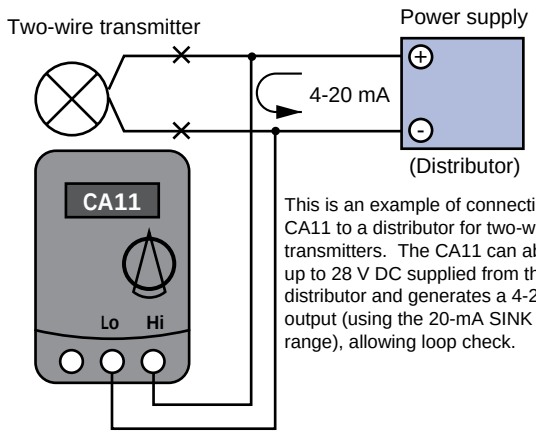
Portable Calibrator

Model 2422

- **Simultaneous displays for output generation and input measurement**
- **Output dividing function**
- **Auto stepping output function**
- **Set-value memory function**
- **Runs on Ni-Cd betteries or AC power supply**

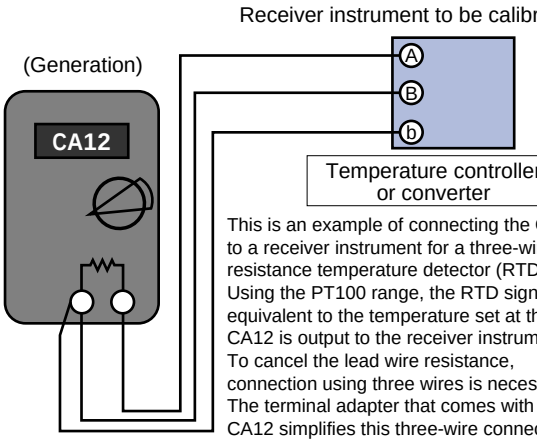
Examples of Applications

An Application of CA11



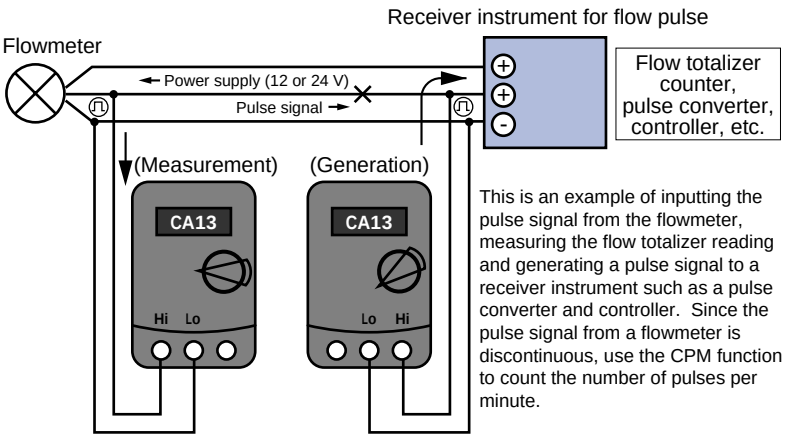
This is an example of connecting the CA11 to a distributor for two-wire transmitters. The CA11 can absorb up to 28 V DC supplied from the distributor and generates a 4-20 mA output (using the 20-mA SINK range), allowing loop check.

An Application of CA12



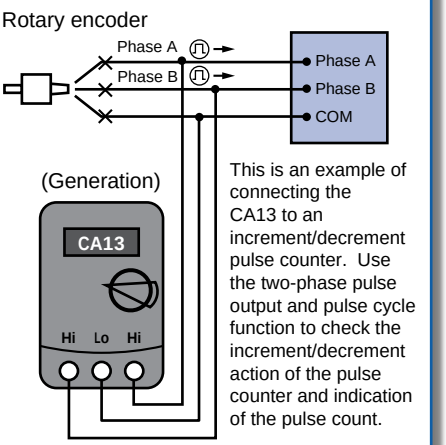
This is an example of connecting the CA12 to a receiver instrument for a three-wire resistance temperature detector (RTD). Using the PT100 range, the RTD signal equivalent to the temperature set at the CA12 is output to the receiver instrument. To cancel the lead wire resistance, connection using three wires is necessary. The terminal adapter that comes with the CA12 simplifies this three-wire connection.

An Application of CA13



This is an example of inputting the pulse signal from the flowmeter, measuring the flow totalizer reading and generating a pulse signal to a receiver instrument such as a pulse converter and controller. Since the pulse signal from a flowmeter is discontinuous, use the CPM function to count the number of pulses per minute.

An Application of CA13



This is an example of connecting the CA13 to an increment/decrement pulse counter. Use the two-phase pulse output and pulse cycle function to check the increment/decrement action of the pulse counter and indication of the pulse count.

General Specifications of CA10 SeriesCalibrators

Power Supply: Four 1.5-V alkaline batteries (ANSI AA-size) or dedicated AC adapter (sold separately)
Life of Batteries (When generating a signal continuously)
CA11: Approximately 50 hours for 5 V DC output (with a load of 10 kΩ orgreater)
Approximately 25 hours for 20 mA DC output (with a load of 5 V)
CA12: Approximately 80 hours
CA13: Approximately 30 hours for 10 V_{P-P} output (with a load of 10 kΩ or greater)
Approximately 40 hours for voltage-free contact output
Automatic Power-off: After approximately 10 minutes
Generation Signal Level Setting: By four-digit up/down keys
Response of Generator
CA11: Approximately 1 second (from when the output begins to change until when the output level falls within the specified accuracy)
CA12: Approximately 20 milliseconds for 400-Ω and RTD ranges (from when the specified current is applied until when the output level falls within the specified accuracy)
Display: LCD
Maximum Allowable Applied Voltage
CA11: 30 V peak between each terminal to ground
CA12: 42 V peak between each terminal to ground
Compliance to Standards
Safety: EN61010-1: 1993 (except for the A1020UP/1A1022UP optional AC adapter)
EMC: EN55011: 1991, group 1, class B
EN50082-1: 1992
Operating Temperature/Humidity Range: 0 to 50°C and 20 to 80% RH (no condensation)
Storage Temperature/Humidity Range: -20 to 50°C and 90% RH or less (no condensation)
Dimensions: Approximately 192 (H) x 90 (W) x 42 (D) mm (excluding protrusions)
Weight: Approximately 440 g(f) (including batteries)
Accessories
Lead cables (1 pair)
Carrying case (1)
Terminal adapter (1 for only CA12)

Model Code

Name	Model Code
CA11 voltage/current calibrator	710 10
CA12 temperature calibrator	710 21
CA13 frequency calibrator	710 30

Optional Accessories

Name	Model Code
Dedicated AC adapter (100 V)	A1020UP
Dedicated AC adapter (120 V)	A1022UP
Dedicated AC adapter (220-240 V)	B9108WB
Reference junction sensor	B9108WA
Accessory case	B9108XA

Spare Parts

Name	Model Code
Lead cables (1 pair [1 red and 1 black cables] for CA11)	B9108MS
Lead cables (1 set [1 red and 2 black cables] for CA12)	B9108MT
Lead cables (1 set [2 red and 1 black cables] for CA13)	B9108MU
Carrying case	B9108NK
Terminal adapter (for CA12)	B9108KF

Specifications of Each Model

CA11 Voltage/Current Calibrator (Model Code 710 10)

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
30V	0 to 30.00 V DC	0.05% + 20 mV	10 mV	Maximum output current: 1 mA
10V	0 to 11.000 V DC	0.05% + 2 mV	1 mV	Maximum output current: 10 mA
1-5V	1/2/3/4/5 V DC		1-V step	
1V	0 to 1.1000 V DC	0.05% + 0.2 mV *1	0.1 mV	*1: When the load is 1 kΩ or greater, and the error of the lead cables is excluded
100mV	0 to 110.00 mV DC	0.05% + 50 µV *1	0.01 mV	
20mA	0 to 24.00 mA DC	0.05% + 4 µA	0.01 mA	Maximum load: 12 V
4-20mA	4/8/12/16/20 mA DC		4-mA step	
20mA SINK	0.1 to 24.00 mA DC	0.1% + 4 µA	0.01 mA	External power supply: 5 to 28 V

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

Measurement Functions

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

Range Selection	Indication	Accuracy	Resolution	Remarks
30V	0 to ±30.00 V DC	0.05% + 2 digits	10 mV	Input impedance: Approx. 1 MΩ
10V	0 to ±11.000 V DC	0.05% + 2 digits	1 mV	
1V	0 to ±1.1000 V DC	0.05% + 2 digits	0.1 mV	
100mV	0 to ±110.00 mV DC	0.05% + 7 digits	0.01 mV	
20mA	0 to ±24.00 mA DC	0.05% + 1 digit	0.01 mA	Input impedance: Approx. 45 Ω

CA12 Temperature Calibrator (Model Code 710 21)

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*1	K	−200.0 to 1370.0°C	−328 to 2498°F	0.05% + 1°C (at −100°C or greater) 0.05% + 2°C (at less than −100°C)	0.07% + 1.5°C (at −100°C or greater) 0.07% + 2°C (at less than −100°C)	0.1°C or 1°F	
	E	−200.0 to 1000.0°C	−328 to 1832°F				
	J	−200.0 to 1200.0°C	−328 to 2192°F				
	T	−200.0 to 400.0°C	−328 to 752°F				
	N	−200.0 to 1300.0°C	−328 to 2372°F				
	R	0 to 100°C	32 to 212°F	0.05% + 3°C	0.07% + 3°C	1°C or 1°F	
		100 to 1768°C	212 to 3214°F	0.05% + 2°C	0.07% + 2°C		
100mV		−10.00 to 110.00mV		0.05% + 30 µV	0.05% + 30 µV	10 µV	
RTD Pt100*2, 3		−200.0 to 850.0°C	−328 to 1562°F	0.05% + 0.6°C *6	0.05% + 0.6°C *7	0.1°C or 1°F	
400Ω		0.0 to 400.0 Ω		0.05% + 0.2 Ω *6	0.05% + 0.2 Ω *7	0.1 Ω	

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. The resistance values based on the former standard (JPt100) can also be selected.
*3 Based on the international temperature standard 1990 (ITS-90). The scale based on the former standard, IPTS-68, can also be selected by setting an internal dip switch.
*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 CA12): ±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 EMFtable 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.

CA13 Frequency Calibrator (Model Code 710 30)

Pulse Generation

Accuracy: At 23 ±5°C for one year

Range Selection		Range of Generated Signal	Accuracy	Setting Resolution	Remarks	
10kHz		0.9 to 11.0 kHz	±0.1 kHz	0.1 kHz	Output voltage level: +0.1 to 15 V (zero-based waveform) Accuracy of output level: ±(5% + 0.1 V) Maximum load current: 10 mA (on voltage-free contact output) Maximum contact operating voltage: +28 V Maximum contact current: 50 mA Contact capacitance: Approx. 500 pF	Duty ratio: 10 to 90% variable (in increments of 10%)
1kHz		90 to 1,100 Hz	±1 Hz	1 Hz		
100Hz		1.0 to 110.0 Hz	±0.1 Hz	0.1 Hz		
10000CPM*1		10 to 11,000 CPM	±10 CPM	10 CPM		
PULSE CYCLES*2	10kHz	10 to 11,000 cycles	——	——		
	1kHz					
	100Hz					

- Voltage-free contact output: Available by setting the voltage level to 0.0 V. The contact is operated by an FET switch.
- Two-phase output: A two-phase pulse signal having the phase difference of 90° can be output by setting an internal dip switch. (The duty ratio is fixed to 50%.) The typical variation of the phase difference is approximately ±3 µS (approximately ±10° at 10 kHz, ±5° at 5 kHz).

*1 60 CPM = 60 count per minute = 1 Hz
*2 Use the **PULSE CYCLES** ranges to generate a set number of pulses. Select the range suitable for the desired number of pulses per minute, from **10kHz, 1kHz,** and **100Hz.**

DC Voltage/Current Generation

Accuracy: At 23 ±5°C for one year

Range Selection	Range of Generated Signal	Accuracy	Setting Resolution	Remarks
10V	0.0 to +15.0 V DC	±0.5% of full scale	0.1 V	Maximum output current: 10 mA (input impedance: approx. 2 Ω)
4-20mA	4/8/12/16/20 mA DC	±0.5% of full scale	4 mA	Maximum load: 12 V

Measurement Functions

Accuracy: At 23 ±5°C for one year

Range Selection	Measurement Range	Accuracy	Resolution	Remarks
10kHz	0.001 to 11.000 kHz	±2 digits	0.001 kHz	Input sensitivity: 0.1 Vrms for sine wave; 0.14 Vpeak, duty ratio of 50% for pulse Maximum allowable input: 30 Vpeak Input impedance: 100 kΩ or greater
1kHz	1.0 to 1100.0 Hz	±2 digits	0.1 Hz	
100Hz	1.00 to 110.00 Hz	±2 digits	0.01 Hz	
10000CPM *1	0 to 11,000 CPM	——	1 CPM	

- Voltage-free contact output: Solid-state switching signal can be measured by setting an internal dip switch (however, no chattering is allowed in the input). Voltage applied for measuring the switching signal: +5 V at 0.1 mA or less.

*1 Indicates the number of pulses input per minute.

YOKOGAWA
Yokogawa M&C Corporation

World Wide Web site at
http://www.yokogawa.co.jp/MCC/Welcome_e.htm

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

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MCK-EL7

Subject to change without notice.
[Ed: 01/b]
Printed in Japan: Jul. 2000(C)/3,000(YG)