

# General Specifications

Model CA51/CA71  
HANDY CAL calibrator

GS 77W02A01-01-E

## GENERAL

The CA51/CA71 HANDY CAL calibrators are comprehensive generating/measuring instruments for all your calibration and equipment checking needs at maintenance sites. The CA51/CA71 can simultaneously generate and measure voltage, current, TC, RTD and pulse signals, thus you don't need to prepare many instruments. In addition, the incorporated rotary switches of good repute enable operations so smooth that an incorrect measurement caused from erroneous operations can be prevented.

## FEATURES

### Simultaneous signal generation and measurement capability

The CA71 lets you handle regular tests on TCs, RTDs and various other types of sensors and instruments, as well as operation checks when a problem has occurred. By itself it can generate signals for input to equipment, and check output signal from equipment.

(TC and RTD measurement functions: CA71 only)

### AC voltage (including supply voltage) measurement capability

In cases where numerous signal converters and other devices are mounted on a rack or panel, the CA51/CA71 can be used to check the input and output signals of each device, while simultaneously checking the power supply. There is no need for a separate multimeter to measure supply voltage.

### A wide array of useful functions

Divided output (n/m) function, Auto-step function, Sweep function, Memory function and Communication function are available.

(Communication function: CA71 only)

### Easy Operation

The CA51/CA71 incorporates rotary switches for simple handling. Just open the cover of carrying case and connect the cables, and you are ready to take measurement.

## FUNCTIONS

### Generation and Measurement

#### Generation and Measurement of Voltage/Current

The CA51/CA71 can generate voltage/current up to 30 V DC/24 mA DC and measure up to 100 V DC/100 mA DC.

#### 4-20 mA Step Function

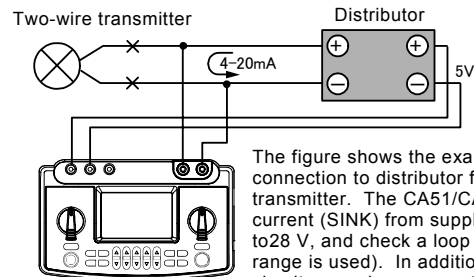
You can set the signal in 4 mA increments or decrements in order 4 ⇄ 8 ⇄ 12 ⇄ 16 ⇄ 20 mA by one touch operation.

#### 20 mA SINK Function

The 20 mA SINK function can draw current from an external voltage source to the H terminal of SOURCE unit. Thus, the CA51/CA71 can be used in a loop test, for example, as a simulator for transmitters.



### Example of Connection



The figure shows the example of connection to distributor for two-wire transmitter. The CA51/CA71 can draw current (SINK) from supply voltage up to 28 V, and check a loop (20 mA SINK range is used). In addition, it can simultaneously measure the output of distributor.

### Equivalent Output of TC/RTD

In addition to 10 types of TC (K, E, J, T, N, L, U, R, S and B), RTD (Pt100, JPt100) outputs are available.

The CA51/CA71 can be used for maintenance of industrial instruments for process or various thermometers.

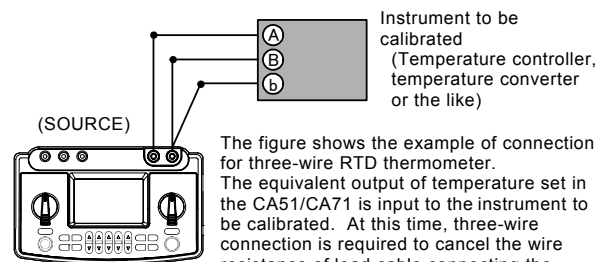
### Multi Temperature

The CA51/CA71 can be used as multi thermometer because the measurements for all ranges are available. For RTD, 3-wire measurement is available.

### Built-in Reference Junction Compensation Sensor

As a means of easily providing reference junction compensation when TC is generated, you can use the temperature sensor within the CA51/CA71. For more accurate reference junction compensation, use RJ sensor (model: B9108WA) sold separately.

### Example of Connection



The figure shows the example of connection for three-wire RTD thermometer. The equivalent output of temperature set in the CA51/CA71 is input to the instrument to be calibrated. At this time, three-wire connection is required to cancel the wire resistance of lead cable connecting the CA71 and the instrument to be calibrated.

## SPECIFICATIONS

### SOURCE unit: Range and Accuracy

Accuracy:  $\pm$ (setting percentage plus  $\mu\text{V}$ ,  $\text{mV}$ ,  $\text{mA}$ ,  $\Omega$  or  $^{\circ}\text{C}$ )

Parameter	Reference	Range	Accuracy (23 $\pm$ 5 $^{\circ}\text{C}$ per year)	Resolution	Remarks
DC voltage	100mV	-10.00 to 110.00 mV	$\pm$ (0.02%+15 $\mu\text{V}$ )	10 $\mu\text{V}$	
	1 V	0 to 1.1000 V	$\pm$ (0.02%+0.1 mV)	0.1 mV	Maximum output: 5 mA
	10 V	0 to 11.000 V	$\pm$ (0.02%+1 mV)	1 mV	Maximum output: 10 mA
	30 V	0 to 30.00 V	$\pm$ (0.02%+10 mV)	10 mV	Maximum output 10 mA *1
DC current	20 mA	0 to 24.000 mA	$\pm$ (0.025%+3 $\mu\text{A}$ )	1 $\mu\text{A}$	Maximum load: 12 V
	4-20 mA	0.1 to 24.000 mA		4 mA	
mA SINK	20 mA	0.1 to 24.000 mA	$\pm$ (0.05%+3 $\mu\text{A}$ )	1 $\mu\text{A}$	External power supply: 5 to 28 V
Resistance	400 $\Omega$	0 to 400.00 $\Omega$	$\pm$ (0.025%+0.1 $\Omega$ )	0.01 $\Omega$	Excitation current: 0.5 to 5 mA *3
RTD	Pt100 *2	-200.0 to 850.0 $^{\circ}\text{C}$	$\pm$ (0.025%+0.3 $^{\circ}\text{C}$ )	0.1 $^{\circ}\text{C}$	If 0.1 mA, add 0.25 $\Omega$ or 0.6 $^{\circ}\text{C}$ . Subject device input capacitance: 0.1 $\mu\text{F}$ or less
	JPt100	-200.0 to 500.0 $^{\circ}\text{C}$			
TC *4	K	-200.0 to 1372.0 $^{\circ}\text{C}$	$\pm$ (0.02%+0.5 $^{\circ}\text{C}$ ) (-100 $^{\circ}\text{C}$ or greater)	0.1 $^{\circ}\text{C}$	TC generation accuracy does not include RJ sensor accuracy. < RJ sensor specs > Measurement range: -10 to 50 $^{\circ}\text{C}$ Accuracy (when combined with main unit) 18 to 28 $^{\circ}\text{C}$ : $\pm$ 0.5 $^{\circ}\text{C}$ Other than the above: $\pm$ 1 $^{\circ}\text{C}$
	E	-200.0 to 1000.0 $^{\circ}\text{C}$			
	J	-200.0 to 1200.0 $^{\circ}\text{C}$			
	T	-200.0 to 400.0 $^{\circ}\text{C}$	$\pm$ (0.02%+0.5 $^{\circ}\text{C}$ ) (0 $^{\circ}\text{C}$ or greater)	1 $^{\circ}\text{C}$	
	N	-200.0 to 1300.0 $^{\circ}\text{C}$			
	L	-200.0 to 900.0 $^{\circ}\text{C}$	$\pm$ (0.02%+1.5 $^{\circ}\text{C}$ ) (0 $^{\circ}\text{C}$ or less)		
	U	-200.0 to 400.0 $^{\circ}\text{C}$			
	R	0 to 1768 $^{\circ}\text{C}$	$\pm$ (0.02%+2.5 $^{\circ}\text{C}$ ) (100 $^{\circ}\text{C}$ or less)		
	S		$\pm$ (0.02%+1.5 $^{\circ}\text{C}$ ) (100 $^{\circ}\text{C}$ or greater)		
B	600 to 1800 $^{\circ}\text{C}$	$\pm$ (0.02%+2 $^{\circ}\text{C}$ ) (1000 $^{\circ}\text{C}$ or less) $\pm$ (0.02%+1.5 $^{\circ}\text{C}$ ) (1000 $^{\circ}\text{C}$ or greater)			
Frequency, pulse	500 Hz	1.0 to 500.0 Hz	$\pm$ 0.2 Hz	0.1 Hz	Output voltage: +0.1 to 15 V (zero base waveform)
	1000 Hz	90 to 1100 Hz	$\pm$ 1 Hz	1 Hz	Amplitude accuracy: $\pm$ (5% + 0.1 V)
	10 kHz	0.9 kHz to 11.0 kHz	$\pm$ 0.1 kHz	0.1 kHz	Maximum load current: 10 mA
	Pulse cycle *5	1 to 99999 cycles	—	1 cycles	Contact output (With 0.0 V amplitude setting, FET switch ON/OFF) Maximum open/close voltage/current: +28 V/50 mA

Temperature coefficient: Accuracy shown above  $\times$  (1/5)/  $^{\circ}\text{C}$

\*1: Output up to 24 V/22 mA is possible when using the AC adapter.

\*2: As per JIS C 1604-1997 (ITS-90). IPTS-68 may be selected through internal settings (DIP switch).

\*3: Excitation current: If less than 0.1 mA to 0.5 mA, then add [0.025/Is (mA)] $\Omega$  or [0.06/Is (mA)]  $^{\circ}\text{C}$

\*4: As per JIS C 1602-1995 (ITS-90) (L and U are DIN specs).

K, E, J, T, N, R, S, and B may be switched to IPTS-68 through internal settings (DIP switch) (L and U are not switched).

\*5: Frequency (interval between one pulse and another) and amplitude during pulse cycle generation may have the same range as during frequency generation.

### MEASURE unit: Range and Accuracy

Accuracy:  $\pm$ (reading percentage plus  $\mu\text{V}$ ,  $\text{mV}$ ,  $\mu\text{A}$ ,  $\Omega$  or dgt (digit))

Parameter	Reference	Range	Accuracy (23 $\pm$ 5 $^{\circ}\text{C}$ per year)	Resolution	Remarks
DC voltage	100 mV	0 to $\pm$ 110.00 mV	$\pm$ (0.025% + 20 $\mu\text{V}$ )	10 $\mu\text{V}$	Input resistance: 10 M $\Omega$ or greater
	1 V	0 to $\pm$ 1.1000 V	$\pm$ (0.025% + 0.2 mV)	0.1 mV	
	10 V	0 to $\pm$ 11.000 V	$\pm$ (0.025% + 2 mV)	1 mV	Input resistance: Approximately 1 M $\Omega$
	100 V	0 to $\pm$ 110.00 V	$\pm$ (0.05% + 20 mV)	0.01 V	
DC current	20 mA	0 to $\pm$ 24.000 mA	$\pm$ (0.025% + 4 $\mu\text{A}$ )	1 $\mu\text{A}$	Input resistance: Approximately 14 $\Omega$
	100 mA	0 to $\pm$ 100.00 mA		10 $\mu\text{A}$	
Resistance	400 $\Omega$	0 to 400.00 $\Omega$	$\pm$ (0.05% + 0.1 $\Omega$ )	0.01 $\Omega$	Accuracy during 3-wire measurement
AC voltage	1 V	0 to 1.100 V	$\pm$ (0.5% + 5 dgt)	1 mV	Input resistance: Approximately 10 M $\Omega$ /10 pF Input frequency: 45 to 65 Hz Input voltage range: 10 to 100% Measurement method: Average value rectification
	10 V	0 to 11.00 V		0.01 V	
	100 V	0 to 110.0 V		0.1 V	
	300 V	0 to 300 V	1 V		
Frequency, pulse	100 Hz	1.00 to 100.00 Hz	$\pm$ 2 dgt	0.01 Hz	Maximum input: 30 V peak Input resistance: 200 k $\Omega$ or greater Sensitivity: 0.5 V peak or greater Contact input: Maximum 100Hz Notes CPM: Counts per minute CPH: Counts per hour
	1000 Hz	1.0 to 1000.0 Hz		0.1 Hz	
	10 kHz	0.001 to 11.000 kHz		0.001 kHz	
	CPM	1 to 99999 CPM		1 CPM	
	CPH	1 to 99999 CPH		1 CPH	

Temperature coefficient: Accuracy shown above  $\times$  (1/5)/  $^{\circ}\text{C}$

**MEASURE unit (temperature): Range and Accuracy (CA71 only)**

 Accuracy:  $\pm$ (reading percentage plus °C)

Parameter	Reference	Range	Accuracy (23±5 °C per year)	Resolution	Remarks
TC *7	K	-200.0 to 1372.0 °C	$\pm$ (0.05% + 1.5 °C) (-100 °C or greater)	0.1 °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	$\pm$ (0.05% + 2 °C) (-100 °C or less)	1 °C	
	L	-200.0 to 900.0 °C			
	U	-200.0 to 400.0 °C	$\pm$ (0.05% + 2 °C) (100 °C or greater) $\pm$ (0.05% + 3 °C) (100 °C or less)	1 °C	
	R	0 to 1768 °C			
S	0 to 1768 °C				
RTD	B	600 to 1800 °C	$\pm$ (0.05% + 6 °C)	0.1 °C	Accuracy during 3-wire measurement
	Pt100 *6	-200.0 to 850.0 °C			
	JPt100	-200.0 to 500.0 °C			

 Temperature coefficient: Accuracy shown above  $\times$  (1/5)/°C

\*6: As per JIS C 1604-1997 (ITS-90). IPTS-68 may be selected through internal settings (DIP switch).

\*7: As per JIS C 1602-1995 (ITS-90) (L and U are DIN specs).

K, E, J, T, N, R, S, and B may be switched to IPTS-68 through internal settings (DIP switch) (L and U are not switched).

**General Specifications**

Parameter	Specification		
SOURCE unit response time	Approximately 1 second (time between start of voltage change and when voltage enters accuracy range)		
SOURCE unit voltage limiter	Approximately 32 V		
SOURCE unit current limiter	Approximately 25 mA		
Divided output (n/m) function	Output = setting $\times$ (n/m) n = 0 to m; m = 1 to 19; n $\leq$ m		
Auto-step output function	n value sent automatically when n/m function is selected (two options: approximately 2.5 seconds/step or approximately 5 seconds/step)		
Sweep function	Sweep time (two options: approximately 16 seconds or approximately 32 seconds)		
Memory function	50 sets of data (generated and measured values are stored as value sets with the same address (up to 50 sets of data can be stored))		
MEASURE unit maximum input	Voltage terminal: 300V DC/AC Current terminal: 120 mA DC		
Current terminal input protection	Fuses: 125 mA/250 V		
MEASURE unit ground voltage	Maximum 300 V AC		
Measurement display updating rate	Approximately once per second		
Serial interface	Enables when communication cable (RS-232) is connected; sold separately as optional accessory (CA71 only)		
Display	Segment LCD (approximately 76 mm $\times$ 48 mm)		
Backlight	LED backlight; auto-off after one minute (from when LIGHT key is turned on)		
Power supply	Four AA-size (LR6) alkaline batteries, or special AC adapter (sold separately)		
Battery life	Measurement off, output 5 V DC/10 k $\Omega$ or greater: Approximately 40 hours Simultaneous signal generation/measurement, output 5 V DC/10 k $\Omega$ or greater: Approximately 20 hours Simultaneous signal generation/measurement, output 20 mA/5 V: Approximately 12 hours (using alkaline batteries, with backlight off)		
Consumed power	Approximately 7 VA (using 100 V AC adapter)		
Auto-power-off function	Approximately 10 minutes (auto-power-off can be disabled through a DIP switch setting)		
Applicable standards	Standard safety	IEC61010-1, EN61010-2-031	
	EMC	Emission	EN61236-1 Class B, EN61000-3-2, EN61000-3-3 EN55011: Group1, Class
		Immunity	EN61326 Annex B
Insulation resistance	Across input terminal and output terminal, 500V DC, 50 M $\Omega$ or greater		
Withstand voltage	Across input terminal and output terminal, 3.7 kV AC, for one minute		
Operating temperature and humidity ranges	0 to 50 °C, 20 to 80% RH (no condensation)		
Storage temperature and humidity ranges	-20 to 50 °C, 90% RH or less (no condensation)		
External dimensions (WHD)	Approximately 190 $\times$ 120 $\times$ 55 mm		
Wight	Approximately 730 g (including batteries)		