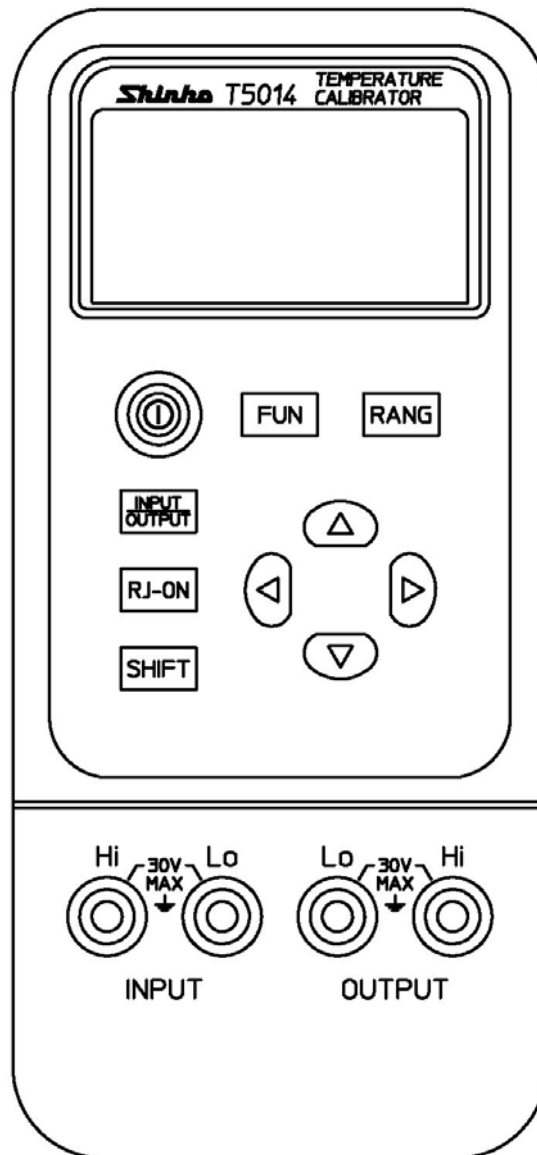


CALIBRATOR

T5014

INSTRUCTION MANUAL



Shinho

Preface

Thank you for purchasing our Calibrator T5014.


This manual contains instructions for the mounting, functions, operations and notes when operating the Calibrator T5014. To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- Specifications, external appearance of the Calibrator T5014 and the contents of this instruction manual are subject to change without notice.
- Care has been taken to assure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos CO., LTD. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

SAFETY PRECAUTIONS (Be sure to read these precautions before using our products.)

The safety precautions are classified into categories: "Warning" and "Caution".

Depending on circumstances, procedures indicated by  Caution may be linked to serious results, so be sure to follow the directions for usage.

Warning

Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution

Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

Warning

- To prevent an electric shock or fire, only Shinko or qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to instrument, parts replacement may only be undertaken by Shinko or qualified service personnel.

Safety precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.) We strongly recommend periodic maintenance of this equipment by our qualified personnel (standard charges apply).
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.

In the case of resale, ensure that this instrument is not illegally exported.

1. Usage precautions



Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1):
Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of $23 \pm 5^{\circ}\text{C}$ that does not change rapidly
- An ambient non-condensing humidity of 80%RH or less
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit

Note • Do not install this instrument near flammable material even though the case of this instrument is made of flame-resistant resin.

Avoid setting this instrument directly on flammable material.

2. Handling precautions



Caution

- After power-on, warm up this calibrator for approximately 10 minutes.
- Do not short the input terminals and output terminals.
- Maximum voltage between terminals and between terminal and grounding is 30V.
Therefore, do not apply voltage over 30V. This could cause a malfunction.
- Do not apply voltage to the output terminals, as it could cause a malfunction.
- Do not apply voltage exceeding the measuring range to the input terminals of the calibrator.
Turn the power supply to the unit to be measured OFF before connecting the calibrator.
- Do not apply current (ampere) signal to the input terminals of the calibrator.

3. Maintenance precautions



Caution

- Use a soft, dry cloth when cleaning the instrument.
(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object or press hard on it.

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1. Unpacking

1.1 Unpacking

Upon delivery, unpack and take out a unit and accessories.

1.2 Checking the accessories

Check whether the following accessories are included.




Accessories	Q'ty
Instruction manual	1 copy
Carrying case	1 piece
Lead wire CF-36 (with a clip)	1 set
Alkaline battery	1 piece

1.3 Checking the model T5014




Check the model T5014 on the model label at the back of the unit.

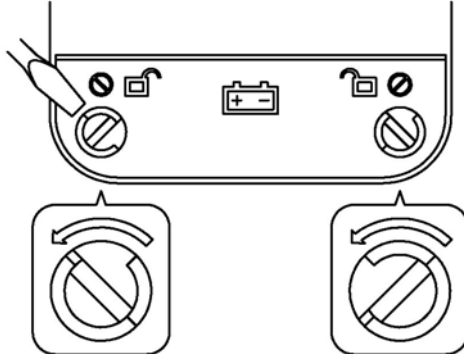
2. Battery loading/replacement

⚠ Caution

- As the material of this calibrator is made of resin, do not use excessive force when turning the lock ( , ) of the battery cover (), or the lock could be damaged.

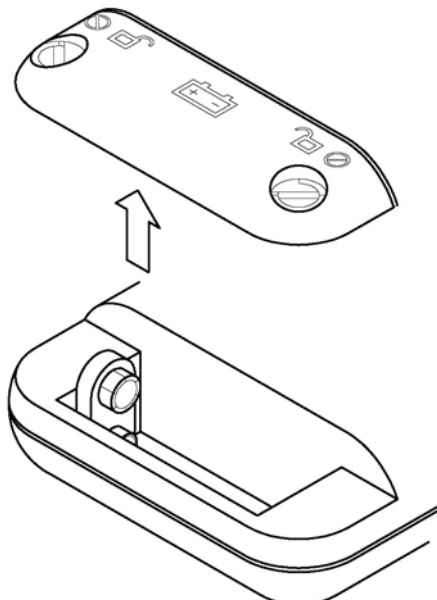
2.1 Battery loading

- Remove the holster.
- Release the lock by turning the lock ( , ) of the battery cover () at the back of the unit) counterclockwise until it stops, using a flat blade screwdriver.



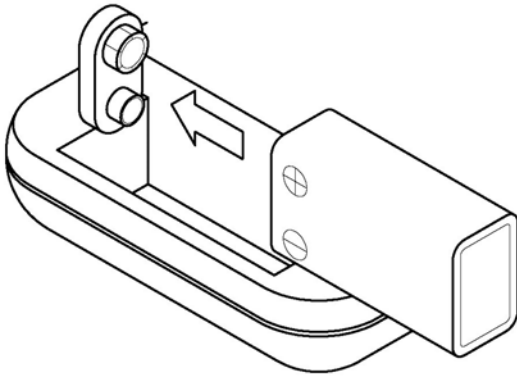
(Fig. 2.1-1)

- Remove the battery cover.



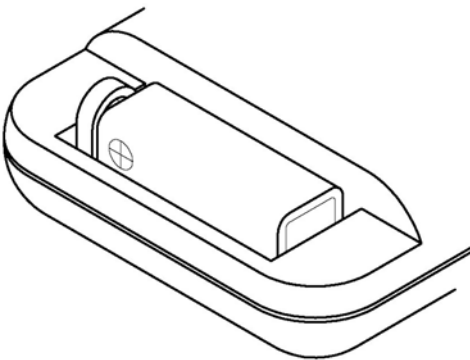
(Fig. 2.1-2)

(4) Load the included alkaline battery.



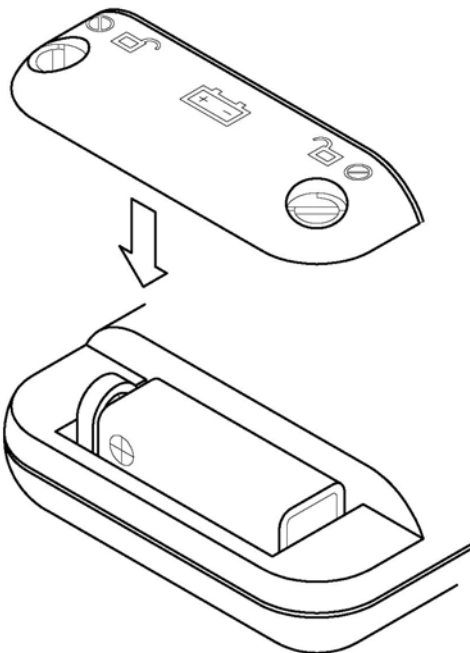
(Fig. 2.1-3)

(5) Set the battery in the battery case.






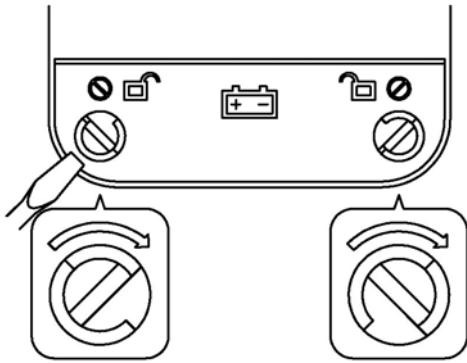
(Fig. 2.1-4)

(6) Mount the battery cover.



(Fig. 2.1-5)

(7) To lock the cover, turn the lock ( , ) of the battery cover ( at the back of the unit) clockwise until it stops, using a flat blade screwdriver.



(Fig. 2.1-6)

2.2 Battery removal



Caution

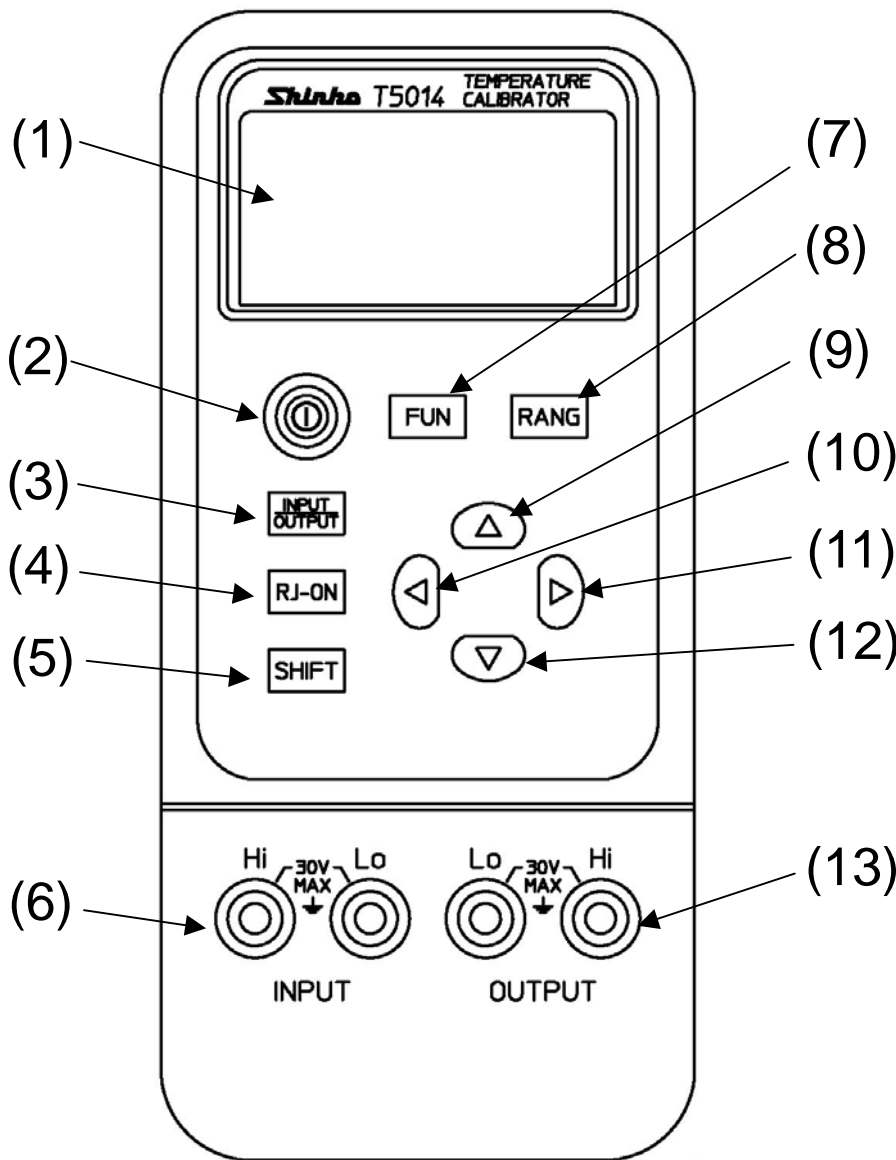
- Remove the lead wire, and turn the power supply to the calibrator OFF before replacing the battery.
- Use a new battery: Alkaline battery 9V (ANSI/NEDA 1604A or IEC/JIS 6LR61)

If  is indicated on the LCD display, replace the battery.

- (1) Remove the lead wire, and turn the power supply to the calibrator OFF.
- (2) Replace the battery with the new one, referring to Section 2.1.

3. Name and functions of the sections

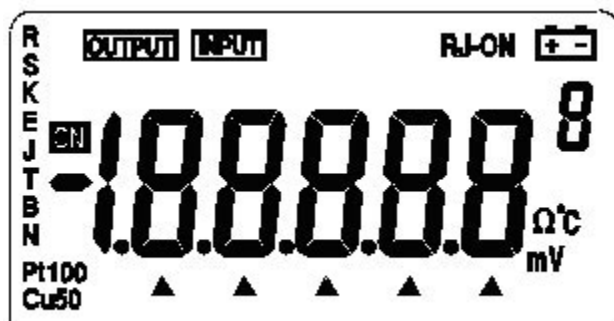
3.1 Name and functions of the sections





(Fig. 3.1-1)

- (1) **LCD display** : Indicates action status of the calibrator.
(See Section “3.2 Name and functions of the LCD display” on p.9.)
- (2) **Power key** : Turns the power supply to this instrument ON or OFF.
- (3) **Input/Output key**: Switches Measurement or Output mode of the calibrator.
- (4) **RJ-ON key** : Switches Effective/Not effective of the Automatic cold junction temperature compensating function.
- (5) **Shift key** : Use this key with the Output value setting key when resetting output value of the calibrator.
- (6) **Input terminals** : Used in the Measurement mode.
- (7) **Function key** : Selects the unit (V, mV, Ω, °C) in the Measurement mode and Output mode.
- (8) **Range key** : Selects thermocouple and RTD type in the Measurement mode and Output mode.
- (9), (12) **Output value setting key**:
Sets output value in the Output mode.
Output value continuously changes by holding down this key for approx. 1 second.
- (10), (11) **Output value digit selection key**:
Selects Output value digit in the Output mode.
- (13) **Output terminals**: Used in the Output mode.

3.2 Name and functions of the LCD display

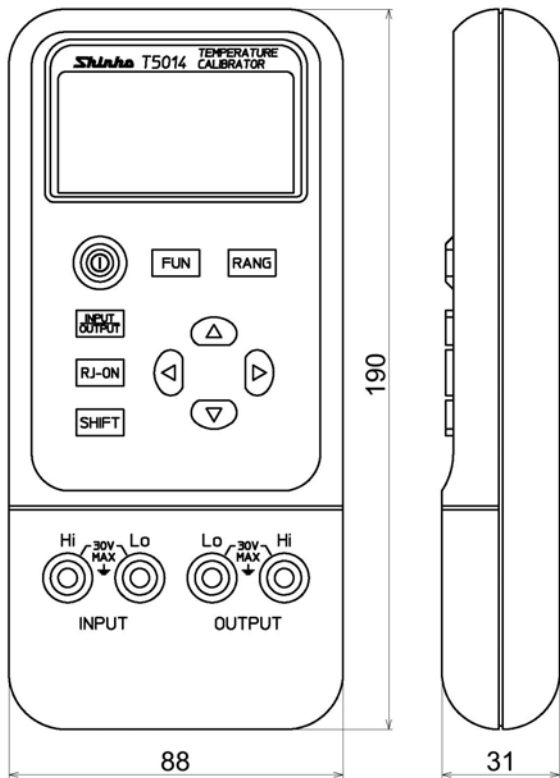


(Fig. 3.2-1)

- OUTPUT** : Indicated during the Output mode.
- INPUT** : Indicated during the Measurement mode.
- RJ-ON** : Indicated when Automatic cold junction temperature compensating function is set to "Effective".
-  : Indicated when batteries are low.
-  : Indicates output value digit in the Output mode.
- V, mV, Ω, °C** : Indicates the unit (V, mV, Ω, °C) in the Measurement mode or Output mode.
- ON** : Indicated when output signal is ON in the Measurement mode or Output mode.
- R, S, K, E, J, T, B, N** : Indicates thermocouple type in the Measurement mode or Output mode.
- Pt100, Cu50** : Indicates RTD type in the Measurement mode or Output mode.

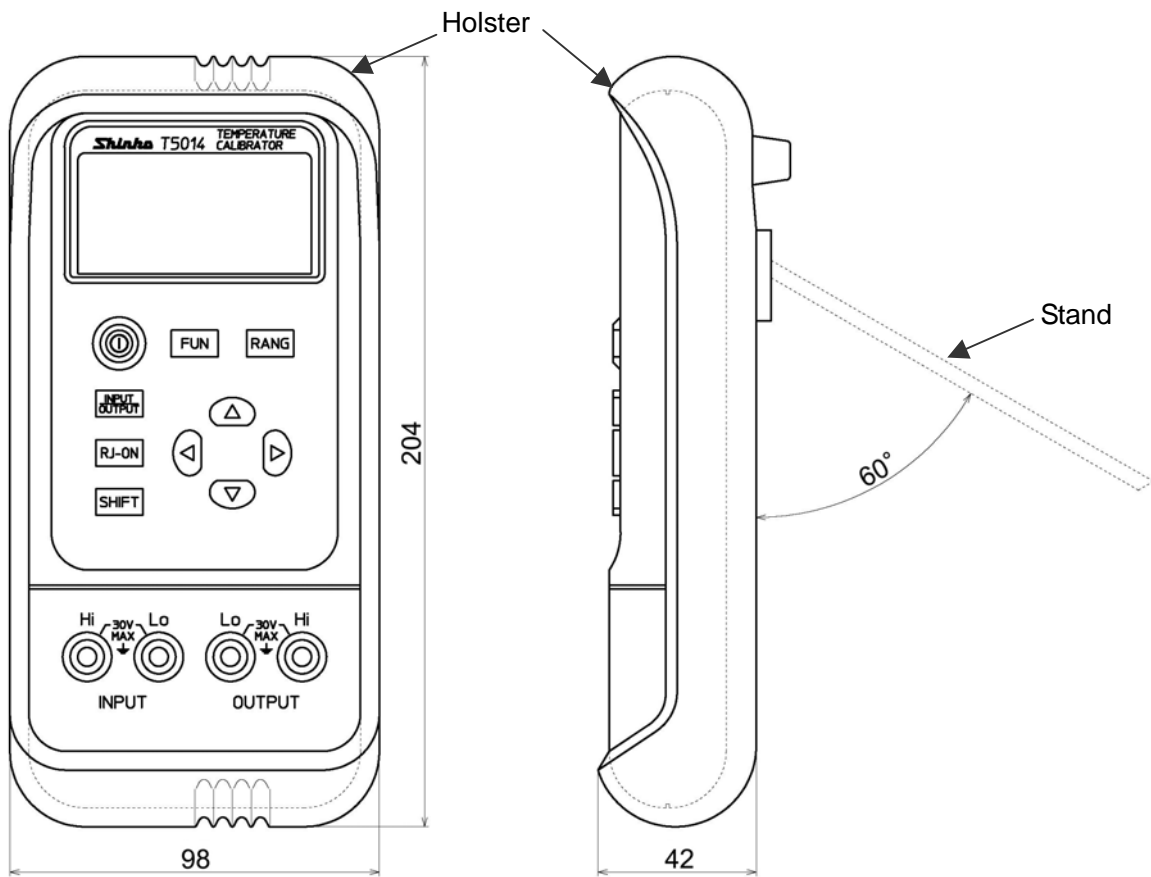
4. External dimensions

4.1 External dimensions (Unit: mm)



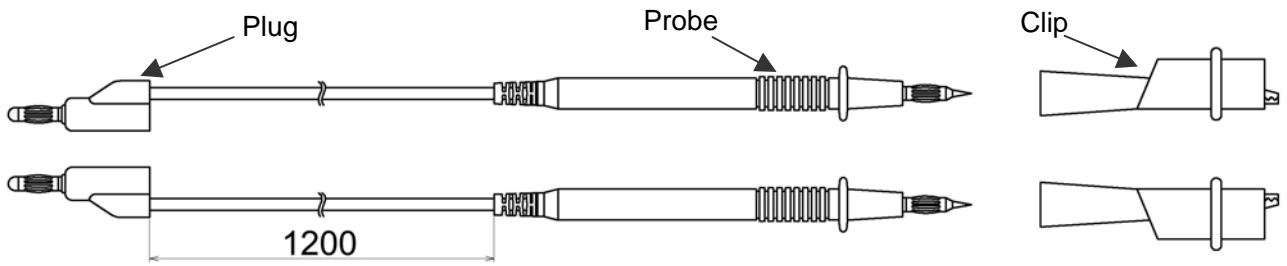
(Fig. 4.1-1)

External dimensions when attaching the holster (Unit: mm)



(Fig. 4.1-2)

4.2 External dimensions of Lead wire CF-36 (with a clip) and name (Unit: mm)

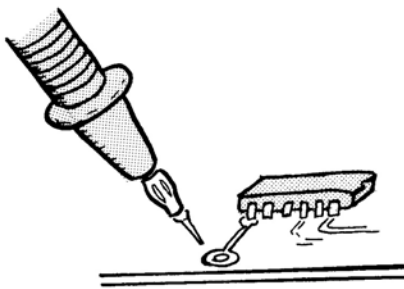


(Fig. 4.2-1)

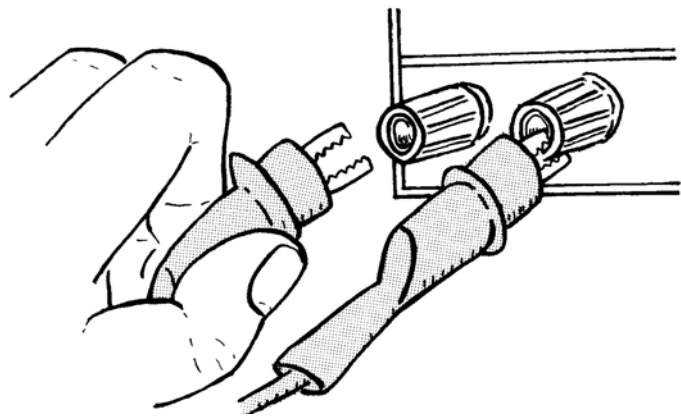
Use the probe for a through hole of the PCB or for a pin of the electronic components (Fig. 4.2-2).

Attach the clip to the probe of the lead wire (Fig. 4.2-3).

For the usage of the probe and clip, refer to the drawings below.

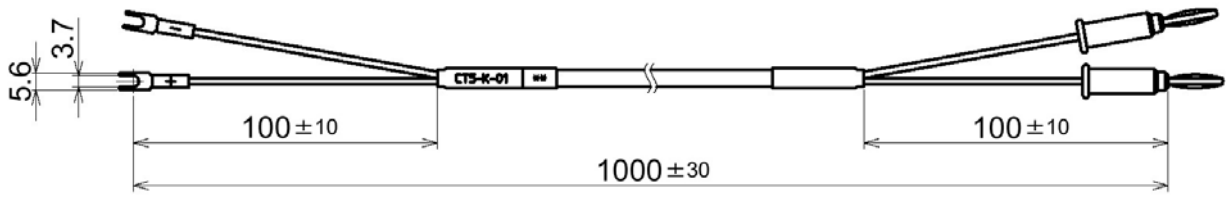


(Fig. 4.2-2)



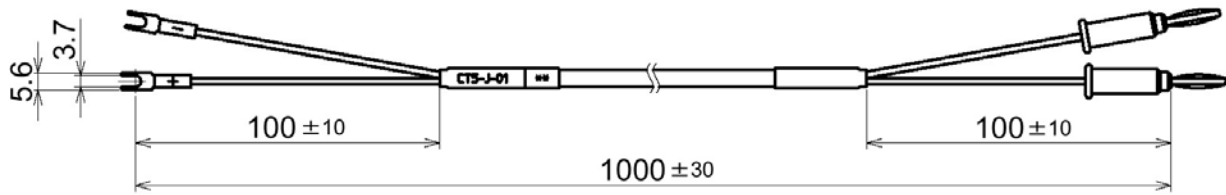
(Fig. 4.2-3)

4.3 Compensating lead wire K (CT5-K-01, sold separately) external dimensions (unit: mm)



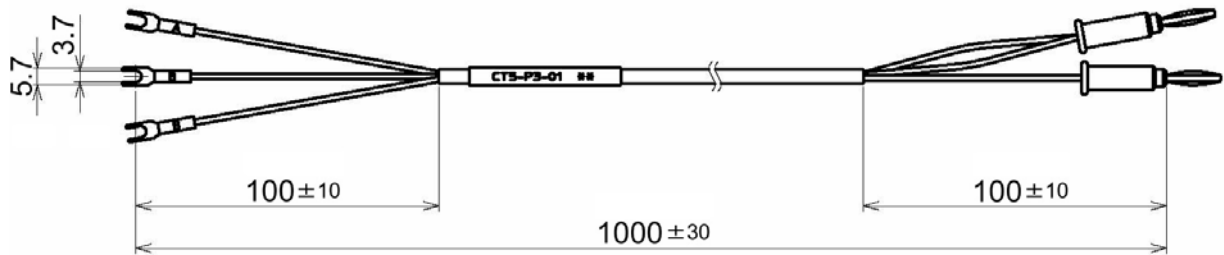
(Fig. 4.3-1)

4.4 Compensating lead wire J (CT5-J-01, sold separately) external dimensions (unit: mm)



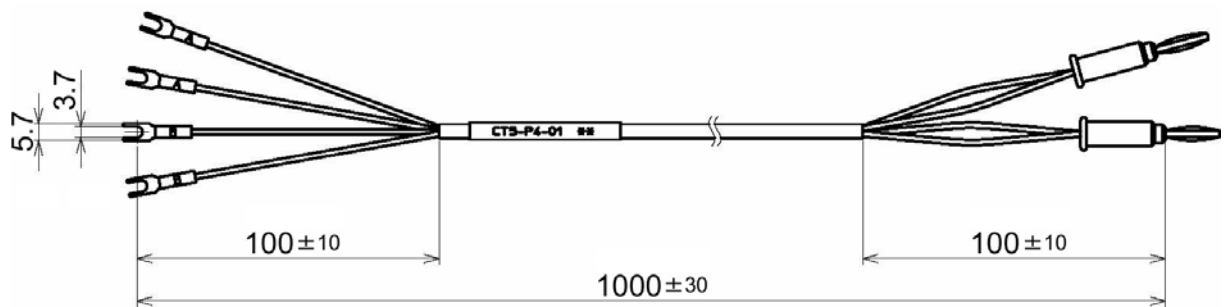
(Fig. 4.4-1)

4.5 RTD 3-wire lead (CT5-P3-01, sold separately) external dimensions (unit: mm)



(Fig. 4.5-1)


4.6 RTD 4-wire lead (CT5-P4-01, sold separately) external dimensions (unit: mm)



(Fig. 4.6-1)

5. Power ON/OFF

5.1 Power ON/OFF

Press the  key to turn the power of the calibrator ON.

After power-on, the calibrator will initiate self-test, and indicates [*50 14*] on the LCD display.

After that, the instrument proceeds to the Output mode (OUTPUT).



Caution

Do not operate the calibrator while [*50 14*] is being displayed.

To turn the power supply to the calibrator OFF, Press the  key for approx. 1 second.



Caution

When turning the power supply to the calibrator OFF and ON again, turn on the power approx. 5 seconds later after power-off, in order to ensure the action of the calibrator.





5.2 Auto-power-OFF

If the instrument has not been operated for 10 minutes after power-on, its power will be automatically turned off.

Either Auto-power-OFF “Effective” or “Not effective” can be selected.

(Default: Auto-power-OFF “Effective”)

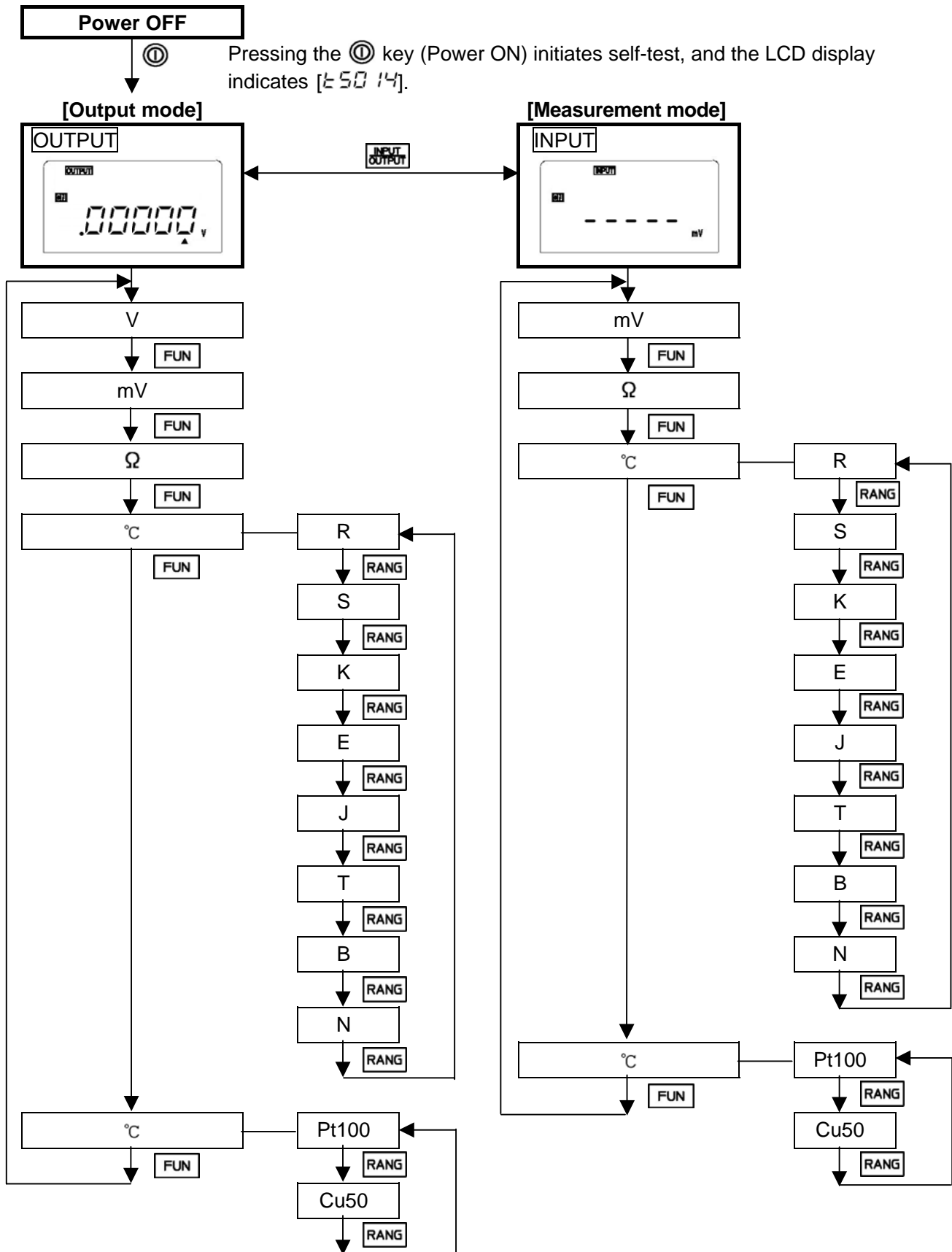
How to switch Auto-power-OFF Effective/Not effective

- (1) If the power to the instrument is turned on, turn the power OFF by pressing the  key for approx. 1 second.
- (2) Press the  and RANG keys at the same time.
[*RP-on*] or [*RP-oF*] will be indicated on the LCD display, and the unit enters the Auto-power-OFF selection mode.
- (3) Using the  key, select “Effective” or “Not effective” of the Auto-power-OFF.
RP-on: Auto-power-OFF “Effective”
RP-oF: Auto-power-OFF “Not effective”
- (4) Press the  key for approximately 1 second.
Auto-power-OFF selection mode will close, and the power supply to the calibrator will be turned OFF.

6. Operation flowchart

Explanation of key operation

↓ [FUN] means that if the [FUN] key is pressed, the unit proceeds to the next setting item.



7. Output and measurement mode

7.1 Output mode



Caution

- Do not short output terminals of the calibrator.
- Maximum voltage between terminals and between terminal and grounding is 30V. Therefore, do not apply voltage over 30V. This could cause a malfunction.
- Do not apply voltage to the output terminals, as it could cause a malfunction.

In the Output mode, the preset DC voltage or resistance will be output from the output terminals of the calibrator.

7.1.1 Wiring

(1) DC voltage (V, mV), thermocouple wiring

Connect the lead wire plug to the output terminals of the calibrator, and connect the probe to the input terminals of the unit to be measured.

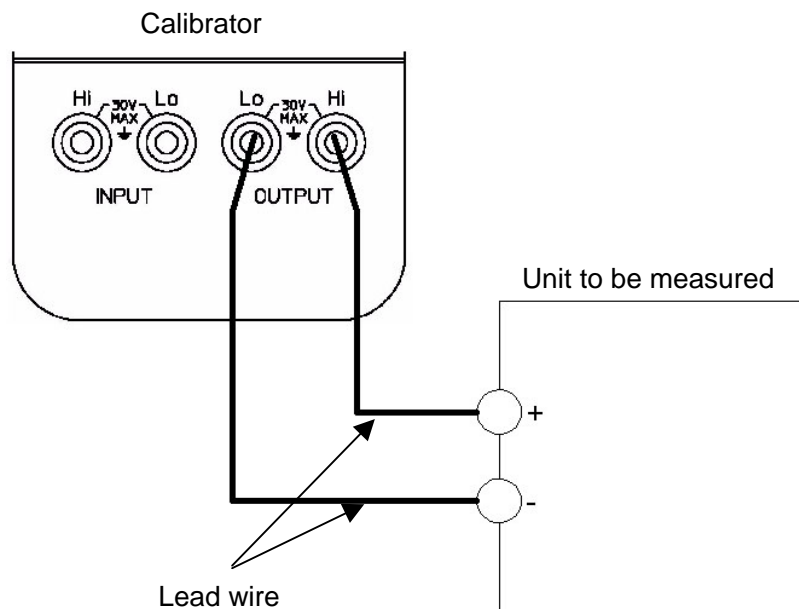
When using a clip, attach it to the tip of the probe. Refer to (Fig. 4.2-1) to (Fig. 4.2-3).

For thermocouple K, J, the compensating lead wire (plug into the calibrator, and the Y terminal to the unit to be measured) is sold separately.

Lead wire K: CT5-K-01

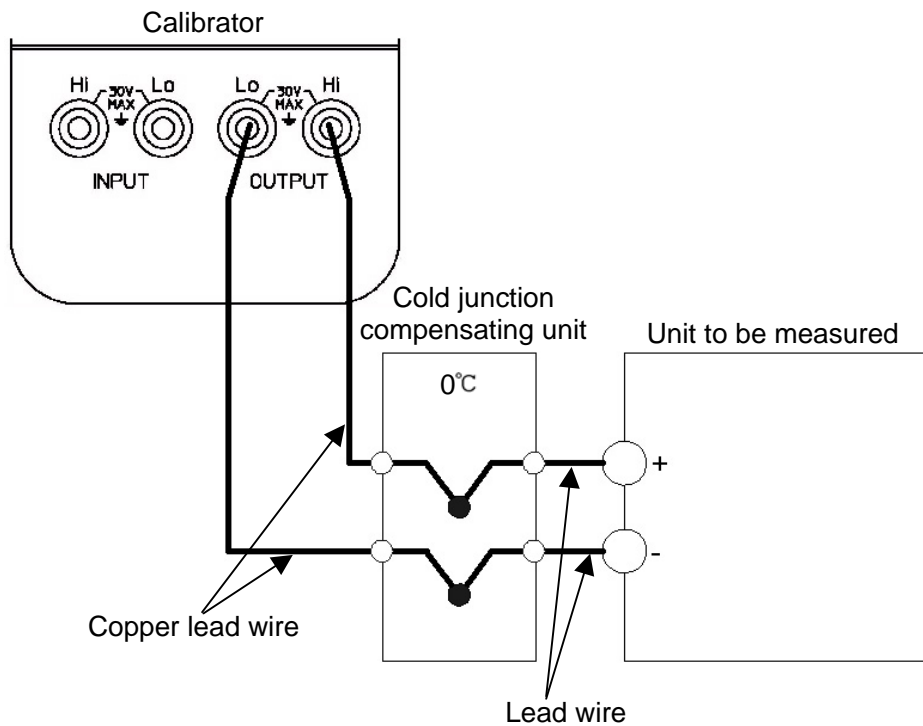
Lead wire J: CT5-J-01

[DC voltage (V, mV)], [When thermocouple is selected and Automatic cold junction temperature compensating function of the calibrator is used]



(Fig. 7.1.1-1)

[When thermocouple is selected and Automatic cold junction temperature compensating function of the calibrator is not used]



(Fig. 7.1.1-2)

(2) Resistance, RTD wiring

Connect the lead wire plug to the output terminals of the calibrator, and connect the probe to the input terminals of the unit to be measured.

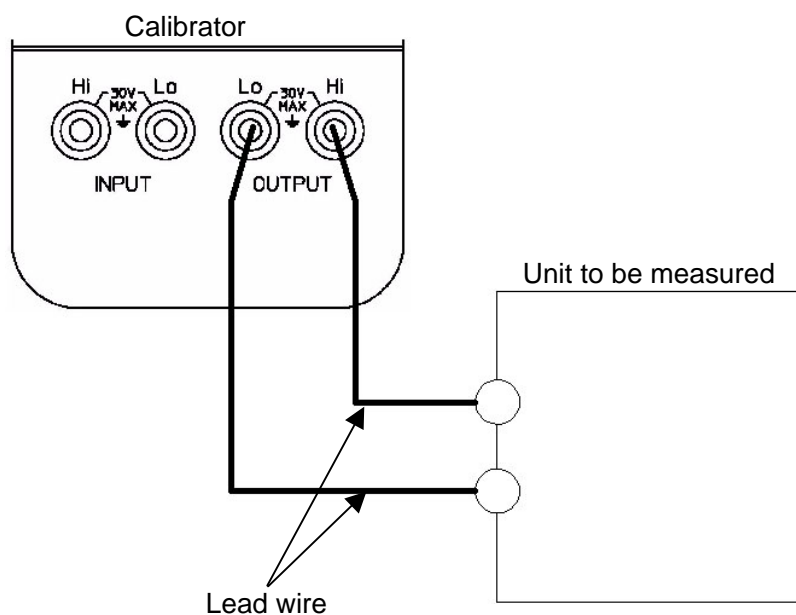
When using a clip, attach it to the tip of the probe. Refer to (Fig. 4.2-1) to (Fig. 4.2-3).

For the Resistance output, use 3 or 4-wire connection.

When using 2-wire connection, take lead wire error (approx. 0.1Ω) into consideration.

If capacitance between calibrator output terminal and the unit to be measured is $0.1\mu\text{F}$ or more, a calibration error will be generated.

[2-wire connection]

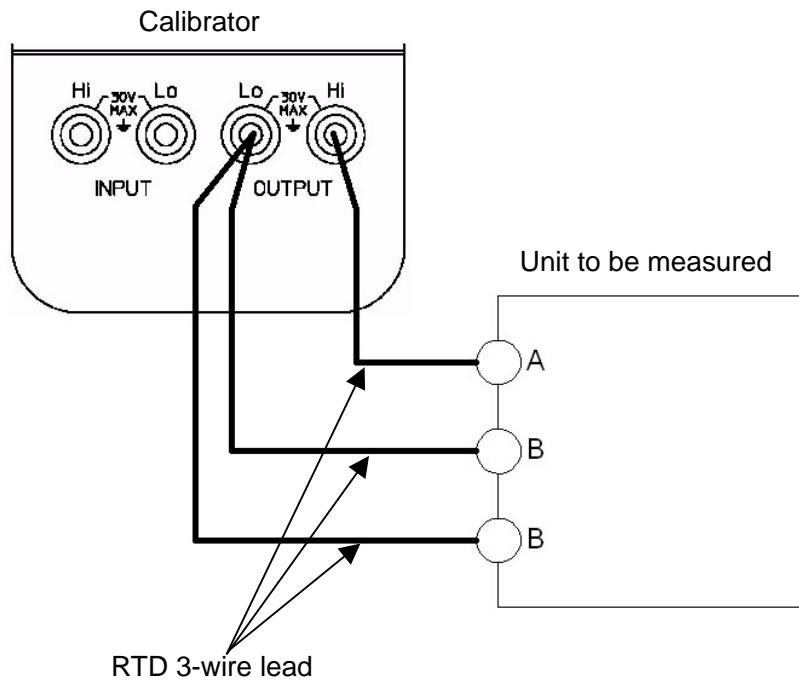


(Fig. 7.1.1-3)

[3-wire connection]

For 3-wire RTD, an exclusive cable (plug into the calibrator, and the Y terminal to the unit to be measured) is sold separately.

RTD 3-wire lead: CT5-P3-01

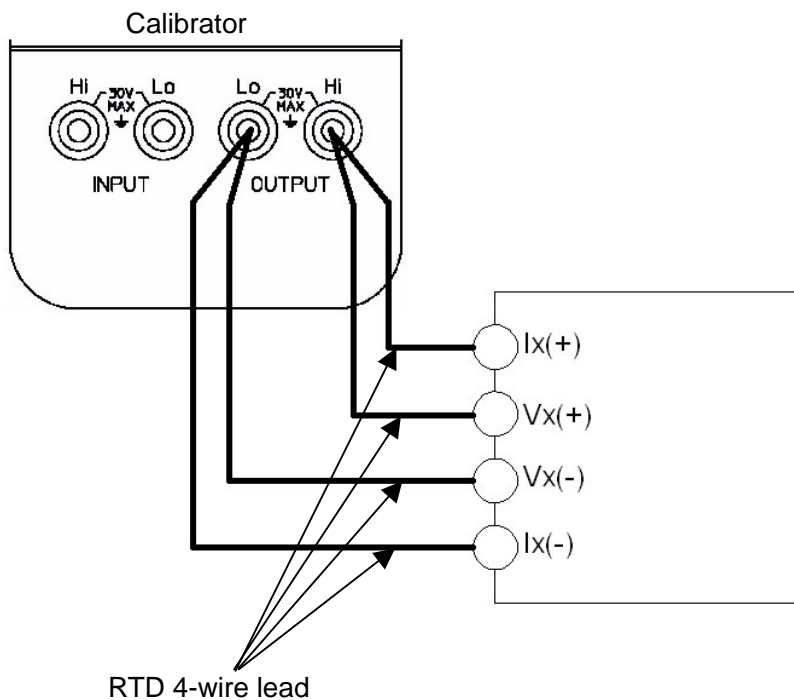


(Fig. 7.1.1-4)

[4-wire connection]

For 4-wire RTD, an exclusive cable (plug into the calibrator, and the Y terminal to the unit to be measured) is sold separately.





RTD 4-wire lead: CT5-P4-01



(Fig. 7.1.1-5)

7.1.2 Operation

When generating thermo-electromotive force of 400°C of the thermocouple K

LCD display, key	Operation
<p>(1)</p> 	<p>Output mode (OUTPUT) confirmation</p> <p>Ensure that the calibrator is in the Output mode (OUTPUT). If the calibrator is in the Measurement mode (INPUT), press the INPUT/OUTPUT key to enter the Output mode (OUTPUT).</p>
<p>(2)</p> 	<p>Output range selection</p> <p>Select the output unit (°C) with the FUN key. For thermocouple and RTD, use the RANG key for selection (K). (e.g.) Thermocouple K and °C have been selected.</p>
<p>(3)</p> 	<p>Output value digit selection</p> <p>Select the Output value digit by pressing the ◀ or ▶ key.</p>
<p>(4)</p> 	<p>Output value setting</p> <p>Set the output value by pressing the ▲ or ▼ key. Holding down this key for 1 second, the output value changes continuously. (e.g.) The output value has been set to 400°C.</p>

7.1.3 Output reset

Output value can be reset by pressing the **SHIFT** and **Δ** key simultaneously.

Output reset value differs depending on the selected unit and type as follows. (Table 7.1.3-1)

(Table 7.1.3-1)

Selected unit and type	Output reset value
V	0.00000V
mV	000.000mV
Ω	000.00Ω
Thermocouple: R, S	0000°C
Thermocouple: B	400°C
Thermocouple: K, E, J, T, N	0000.0°C
RTD: Pt100, Cu50	000.0°C

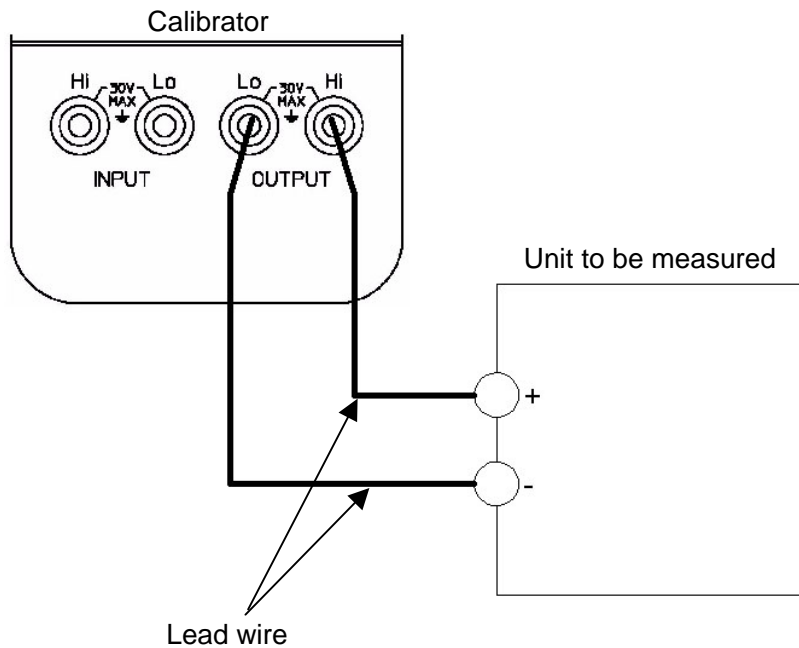
7.1.4 Automatic cold junction temperature compensating function

This detects the temperature at the connecting terminal between the thermocouple and the calibrator, and always maintains the same status as when the reference junction is located at 0°C (32°F).

In the case of thermocouple, select “Effective” or “Not effective” of the Automatic cold junction temperature compensating function of the calibrator.

“Effective” or “Not effective” selection differs depending on the connection method.

- When Automatic cold junction temperature compensating function of the calibrator is used



(Fig. 7.1.4-1)

Output electromotive force (E):

$$E = E_{st} - E_{at}$$


where E : Output electromotive force

E_{st} : Electromotive force corresponding to the setting temperature

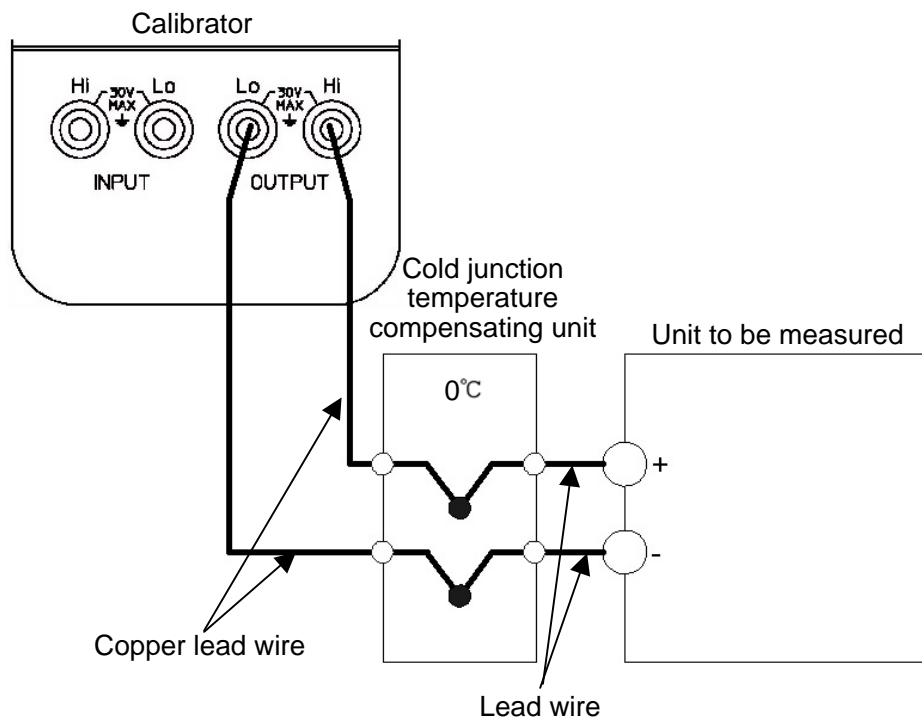
E_{at} : Electromotive force corresponding to ambient temperature

It takes approx. 2 seconds to initiate the Automatic cold junction temperature compensating function. After that, the function is conducted every 10 seconds.


If ambient temperature is changed, it will take approx. 10 minutes until the internal cold junction temperature compensation sensor is stabilized.

LCD display, key	Operation
	<p>Automatic cold junction temperature compensating function “Effective”</p> <p>Press the [RJ-ON] key.</p> <p>[RJ-ON] is indicated on the LCD display, and Automatic cold junction temperature compensating function becomes effective.</p>

- When Automatic cold junction temperature compensating function of the calibrator is not used



(Fig. 7.1.4-2)

LCD display, key	Operation
	<p>Automatic cold junction temperature compensating function “Not effective”</p> <p>Press the [RJ-ON] key.</p> <p>[RJ-ON] is not indicated on the LCD display, and Automatic cold junction temperature compensating function becomes ineffective.</p>

7.2 Measurement mode



Caution

- Do not short input terminals of the calibrator.
- Maximum voltage between terminals and between terminal and grounding is 30V. Therefore, do not apply voltage over 30V. This could cause malfunction.
- Do not apply voltage exceeding the measuring range to the calibrator input terminals. Turn the power supply to the unit to be measured OFF before connecting the calibrator.
- Do not apply current signal to the calibrator input terminals.

7.2.1 Wiring

(1) DC voltage (mV), thermocouple wiring

Connect the lead wire plug to the input terminal of the calibrator, and connect the probe to the output terminal of the unit to be measured.

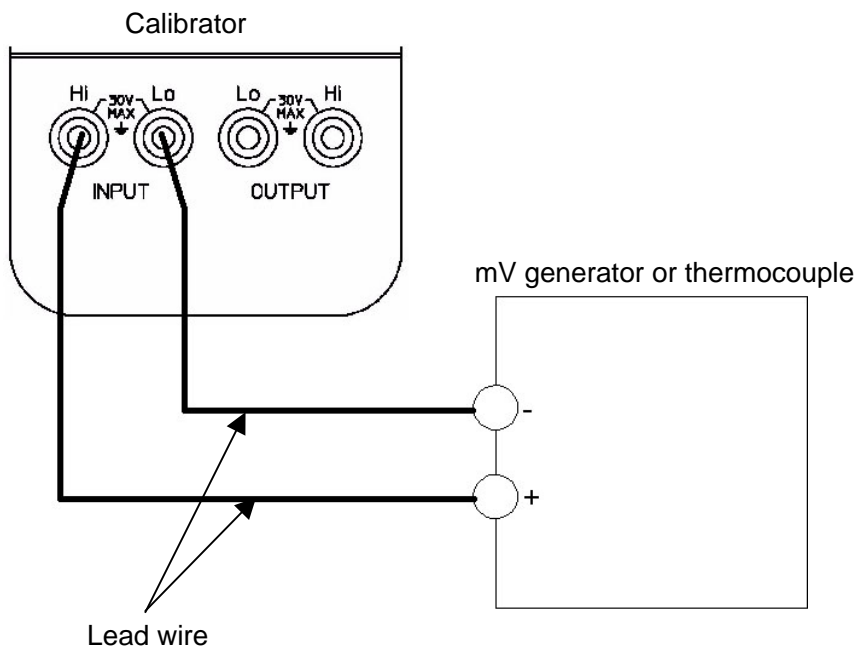
When using a clip, attach it to the tip of the probe. Refer to (Fig. 4.2-1) to (Fig. 4.2-3).

For thermocouple K, J, the compensating lead wire (plug into the calibrator, and the Y terminal to the unit to be measured) is sold separately.

Lead wire K: CT5-K-01

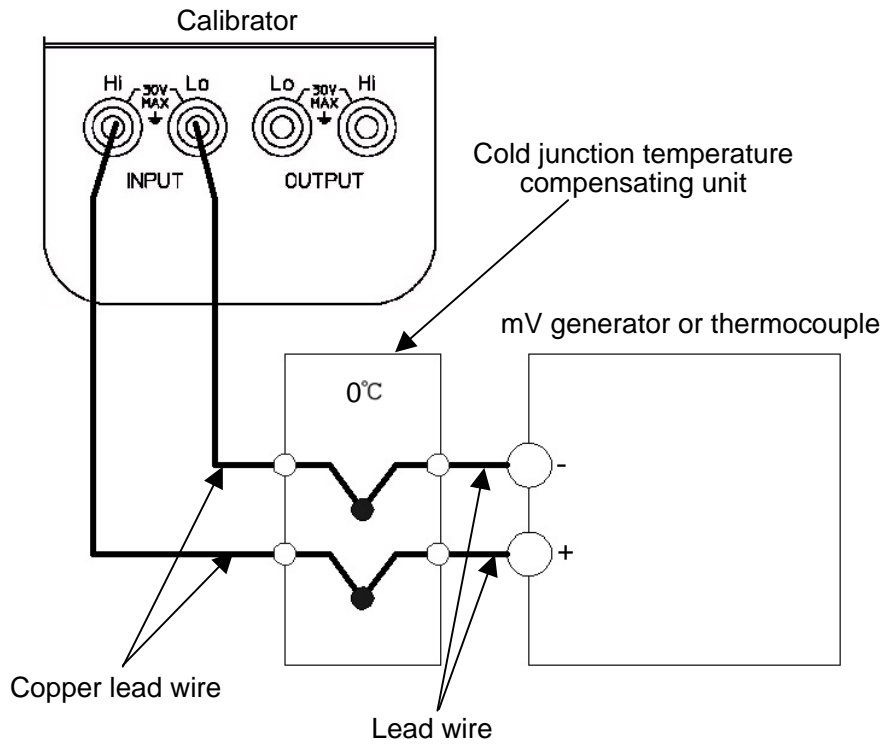
Lead wire J: CT5-J-01

[DC voltage (mV)], [In the case of thermocouple input, and when Automatic cold junction temperature compensating function of the calibrator is used (See p.23, 24)]



(Fig. 7.2.1-1)

[In the case of thermocouple input, and when Automatic cold junction temperature compensating function of the calibrator is not used (See p.23, 24)]



(Fig. 7.2.1-2)

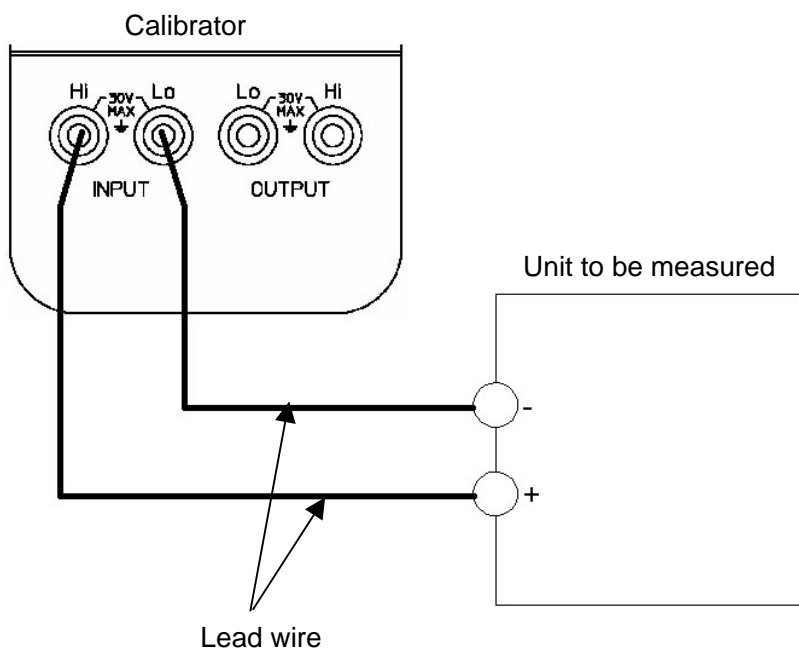
(2) Resistance, RTD wiring

Connect the lead wire pug to the input terminal of the calibrator, and connect the probe to the output terminal of the unit to be measured.

When using a clip, attach it to the tip of the probe. Refer to (Fig. 4.2-1) to (Fig. 4.2-3).

For the Resistance, RTD measurement mode, only 2-wire connection is available.

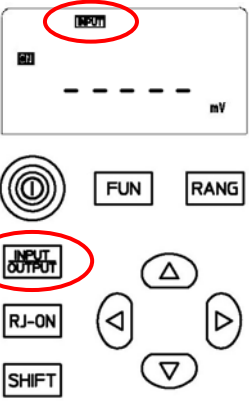


Take lead wire error (approx. 0.1Ω) into consideration when measuring.



(Fig. 7.2.1-3)

7.2.2 Operation

When measuring DC voltage

LCD display, key	Operation
<p>(1)</p> 	<p>Measurement mode (INPUT) confirmation</p> <p>Ensure that the calibrator is in the Measurement mode (INPUT). If the calibrator is in the Output mode (OUTPUT), press the INPUT/OUTPUT key to enter the Measurement mode (INPUT).</p>
<p>(2)</p> 	<p>Measurement range selection</p> <p>Select the input range with the FUN key. For thermocouple and RTD, use the RANG key for selection. (e.g.) DC voltage mV range has been selected.</p> <p>[-----] is indicated on the LCD display, then measured value is indicated.</p>
<p>(3)</p> 	<p>Measurement</p> <p>Measured value will be updated for every 0.5 second cycle (for thermocouple, approx. 1 second) (e.g.) Measured value: 400.00mV</p>

7.2.3 Overrange indication

If measured value exceeds the measuring range, [-oL-] is indicated on the LCD display.
For the thermocouple input, if input signal is open, [-bo-] is indicated.

7.2.4 Automatic cold junction temperature compensating function

This detects the temperature at the connecting terminal between the thermocouple and the calibrator, and always maintains the same status as when the reference junction is located at 0°C (32°F).

For the thermocouple input, Automatic cold junction temperature compensating function Effective/Not effective can be switched.

[In the case of thermocouple input, and when Automatic cold junction temperature compensating function of the calibrator is used]

Press the **[RJ-ON]** key.

[RJ-ON] is indicated on the LCD display, Automatic cold junction temperature compensating function becomes "Effective".

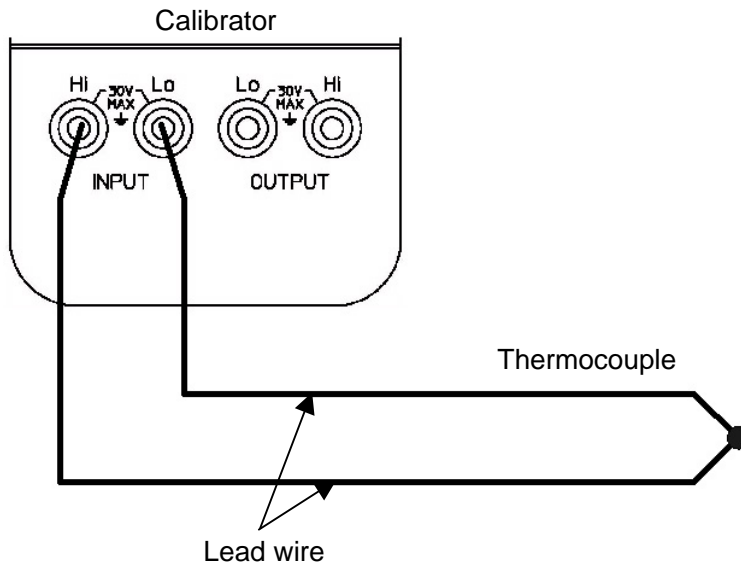
Indicated temperature will be as shown below.

$$T = T_{tt} + T_{at}$$

where T : Indicated temperature

T_{tt} : Thermocouple temperature corresponding to input electromotive force

T_{at} : Ambient temperature

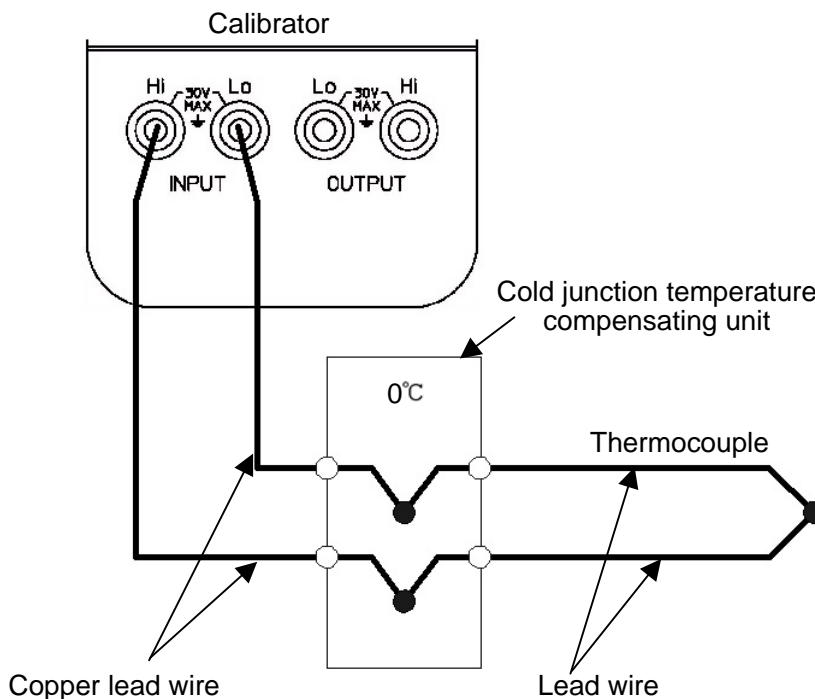


(Fig. 7.2.4-1)

[In the case of thermocouple input, and when Automatic cold junction temperature compensating function of the calibrator is not used]

Press the **[RJ-ON]** key.

[RJ-ON] is not indicated on the LCD display, Automatic cold junction temperature compensating function becomes "Not effective".



(Fig. 7.2.4-2)

8. Specifications

Performance

Output performance

The following specifications are applicable at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ of ambient temperature and within 1 year after calibration.

Output	Type	Output range	Resolution	Accuracy	Remarks
DC voltage	1V	-0.10000 to 1.10000V	0.01mV	0.02% of setting + 0.01% of range	Max. output current: $\pm 2\text{mA}$
	100mV	-10.000 to 110.000mV	0.001mV		
Resistance	400 Ω	0.00 to 400.00 Ω	0.01 Ω	0.02% of setting + 0.02% of range	Energized current: 1mA(*1,*2)
Thermocouple	R	-40 to 1760 $^{\circ}\text{C}$	1 $^{\circ}\text{C}$	-40 to 100 $^{\circ}\text{C}$: 1.5 $^{\circ}\text{C}$	ITS-90 (*3)
				100 to 1760 $^{\circ}\text{C}$: 1.2 $^{\circ}\text{C}$	
	S	-20 to 1760 $^{\circ}\text{C}$	1 $^{\circ}\text{C}$	-20 to 100 $^{\circ}\text{C}$: 1.5 $^{\circ}\text{C}$	
				100 to 1760 $^{\circ}\text{C}$: 1.2 $^{\circ}\text{C}$	
	K	-200 to 1370 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to -100 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$	
				-100 to 400 $^{\circ}\text{C}$: 0.5 $^{\circ}\text{C}$	
				400 to 1200 $^{\circ}\text{C}$: 0.7 $^{\circ}\text{C}$	
				1200 to 1370 $^{\circ}\text{C}$: 0.9 $^{\circ}\text{C}$	
	E	-200 to 1000 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to -100 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$	
				-100 to 600 $^{\circ}\text{C}$: 0.5 $^{\circ}\text{C}$	
				600 to 1000 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$	
	J	-200 to 1200 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to -100 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$	
				-100 to 800 $^{\circ}\text{C}$: 0.5 $^{\circ}\text{C}$	
				800 to 1200 $^{\circ}\text{C}$: 0.7 $^{\circ}\text{C}$	
T	-200 to 400 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to 400 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$		
B	400 to 1800 $^{\circ}\text{C}$	1 $^{\circ}\text{C}$	400 to 600 $^{\circ}\text{C}$: 2.0 $^{\circ}\text{C}$		
			600 to 800 $^{\circ}\text{C}$: 1.5 $^{\circ}\text{C}$		
			800 to 1800 $^{\circ}\text{C}$: 1.1 $^{\circ}\text{C}$		
N	-200 to 1300 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to -100 $^{\circ}\text{C}$: 1.0 $^{\circ}\text{C}$		
			-100 to 900 $^{\circ}\text{C}$: 0.7 $^{\circ}\text{C}$		
			900 to 1300 $^{\circ}\text{C}$: 0.8 $^{\circ}\text{C}$		
RTD	Pt100	-200 to 850 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-200 to 0 $^{\circ}\text{C}$: 0.3 $^{\circ}\text{C}$	Energized current: 1mA (*1,*2)
				0 to 400 $^{\circ}\text{C}$: 0.5 $^{\circ}\text{C}$	
				400 to 850 $^{\circ}\text{C}$: 0.8 $^{\circ}\text{C}$	
	Cu50	-50 to 150 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	-50 to 150 $^{\circ}\text{C}$: 0.6 $^{\circ}\text{C}$	

(*1): Excluding lead wire (accessories included) resistance

(*2): Energized current range 0.5 to 2mA, Max output voltage: 2V or less

(*3): Excluding an error of the automatic cold junction temperature compensating sensor.

Internal cold junction temperature compensating range: -10 to 50 $^{\circ}\text{C}$,

Compensating error: 0.5 $^{\circ}\text{C}$ or less

Temperature coefficient: 0.005%/ $^{\circ}\text{C}$, Temperature range: 0 to 18 $^{\circ}\text{C}$, 28 to 50 $^{\circ}\text{C}$

Measurement performance

The following specifications are applicable at 23°C ± 5°C of ambient temperature and within 1 year after calibration.

Input	Type	Input range	Resolution	Accuracy	Remarks
DC voltage	400mV	0.00 to ±450.00mV	10 μ V	0.02% of reading + 0.02% of range	Input resistance: 1G Ω
Resistance	400 Ω	0.00 to 450.00 Ω	0.01 Ω	0.02% of reading + 0.02% of range	Measuring current: 1mA (*1)
Thermocouple	R	-40 to 1760°C	1°C	-40 to 500°C : 1.8°C	Input resistance: 1G Ω ITS-90 (*2)
				500 to 1760°C : 1.5°C	
	S	-20 to 1760°C	1°C	-20 to 500°C : 1.8°C	
				500 to 1760°C : 1.5°C	
	K	-200 to 1370°C	0.1°C	-200 to 0°C : 1.2°C	
				0 to 1370°C : 0.8°C	
	E	-200 to 1000°C	0.1°C	-200 to 0°C : 0.9°C	
				0 to 1000°C : 1.5°C	
	J	-200 to 1200°C	0.1°C	-200 to 0°C : 1.0°C	
				0 to 1200°C : 0.7°C	
T	-200 to 400°C	0.1°C	-200 to 0°C : 1.0°C		
			0 to 400°C : 0.7°C		
B	400 to 1800°C	1°C	400 to 800°C : 2.2°C		
			800 to 1000°C : 1.8°C		
			1000 to 1800°C : 1.4°C		
N	-200 to 1300°C	0.1°C	-200 to 0°C : 1.5°C		
			0 to 1300°C : 0.9°C		
RTD	Pt100	-200 to 850°C	0.1°C	-200 to 0°C : 0.5°C	Measuring current: 1mA (*1)
				0 to 400°C : 0.7°C	
				400 to 850°C : 0.8°C	
	Cu50	-50 to 150°C	0.1°C	-50 to 0°C : 0.5°C	
				0 to 150°C : 0.7°C	

(*1): Excluding lead wire (accessories included) resistance

(*2): Excluding an error of the automatic cold junction temperature compensating sensor.
Internal cold junction temperature compensating range: -10 to 50°C,
Compensating error: 0.5°C or less

Temperature coefficient: 0.005%/°C, Temperature range: 0 to 18°C, 28 to 50°C

General specifications

Power supply	Alkaline battery 9V (ANSI/NEDA 1604A or IEC/JIS 6LR61)	
Battery life	Approx. 15 hours	
Max. allowable voltage	30V (Between terminals, Between terminal and grounding)	
Operating temperature range	0 to 50°C (Accuracy guaranteed at 23±5°C)	
Operating humidity range	80%RH or less	
Storage temperature range	-10 to 55°C	
Storage humidity range	90%RH or less	
Warm-up period	Approx. 10 minutes	
External dimensions	98 x 204 x 42mm (W x H x D) (with holster)	
Weight	550g (with holster)	
Accessories included	Instruction manual	1 copy
	Carrying case	1 piece
	Lead wire CF-36 (with a clip)	1 set
	Alkaline battery	1 piece
Accessories sold separately	Lead wire K	: CT5-K-01
	Lead wire J	: CT5-J-01
	RTD 3-wire lead	: CT5-P3-01
	RTD 4-wire lead	: CT5-P4-01

9. Troubleshooting

Problem	Presumed cause and solution
Output does not occur in the Output mode.	<ul style="list-style-type: none"> • Check whether the calibrator is in the Output mode (<u>OUTPUT</u>). • Check whether the lead wire is securely connected to the output terminals. • Check wiring. • Check the output range and output value.
Error is generated in the TC electromotive force output mode.	<ul style="list-style-type: none"> • Check whether the unit to be measured has the automatic cold junction temperature compensating function. If it has the automatic cold junction temperature compensating function, set the automatic cold junction temperature compensating function of the calibrator to "Effective".
[-OL-] is indicated on the LCD display.	<ul style="list-style-type: none"> • Measured value has exceeded the measuring range. Check the input signal. • Check whether the lead wire is connected to input terminals • Check wiring.
[-b0-] is indicated on the LCD display.	<ul style="list-style-type: none"> • For thermocouple input, input signal is open. Check the input signal. • Check whether the lead wire is connected to input terminals. • Check wiring.
Power is turned off.	<ul style="list-style-type: none"> • If the calibrator is not operated for 10 minutes after power-on, its power will be automatically turned off (Auto-power OFF function). If auto-power-off function is not required, set the Auto-power-OFF to "Not effective".

10 About calibration

To maintain accuracy, please calibrate this instrument every year.
We cannot guarantee accuracy if users calibrate this instrument.
For calibration, please contact our main office or dealers.

***** Inquiry *****

For any inquiries about this unit, please contact our agency or the shop where you purchased the unit after checking the following.

(e.g.)

- Model ----- T5014
- Serial number ----- No. xxxxxxxx

In addition to the above, please let us know the details of the malfunction, if any, and the operating conditions

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