


Operation Instruction For RTD Calibrator


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1. Safety Information

To ensure the safety operation, the following signs are used only as specified in this operation instruction.

 **Warning** A warning shows that if the operation does not comply with the following correct methods, it is possible to bring hazards to the user or cause damage to the calibrator in use. The warning also points out how to avoid the accidents.

 **Caution** A caution shows that if the operation does not comply with the following correct methods, it is possible to cause damage to the calibrator in use .the caution also points out how to avoid maloperation.

 **Note** A note serves as a sign to remind the user that he must understand the correct operation of the calibrator and its characteristics.

To prevent the user and the calibrator from any electric shock and other hazards, it is necessary to observe the following regulation;

 **warning**

- It is not allowed to operate the calibrator at the working field where there exists flammable gas or explosive gas or vapor .It is very dangerous to operate the calibrator in such a surrounding.
- Never apply more than 30V between any two terminals, or between any terminal and earth ground.

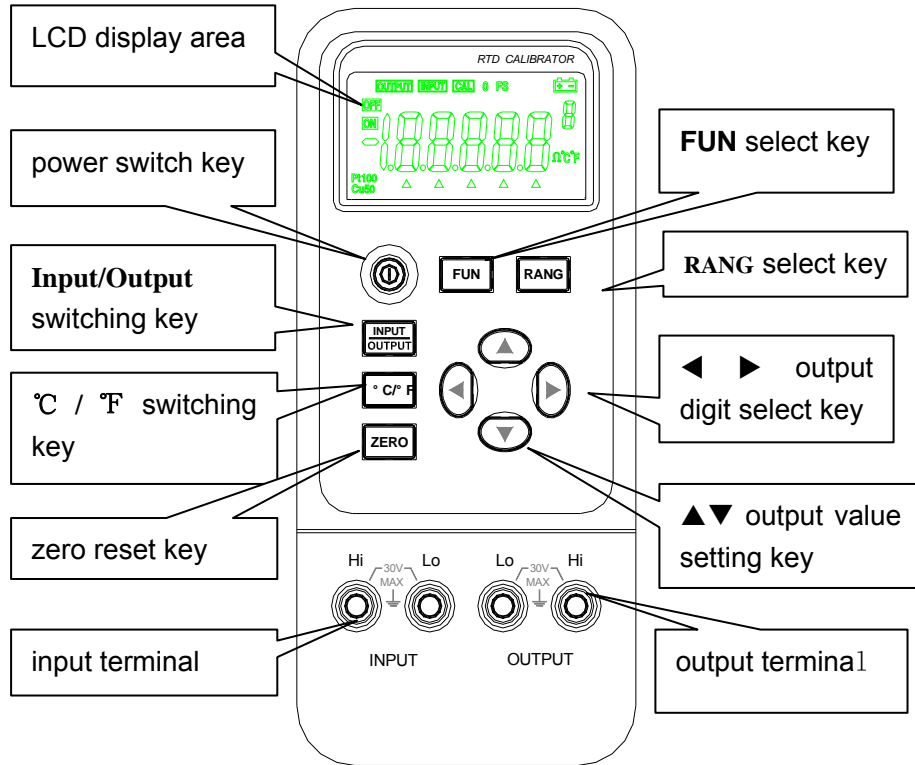
 **Caution**

- **Disassembly:** No one is allowed to remove the split case (top & bottom) of the calibrator except professionals.
- **In use:** The calibrator can't perform both input and output simultaneously. No direct connection can be made between both input and output.
- **Maintenance:** Periodically wipe the case with a damp cloth and detergent; do not use any corrosive solvents.

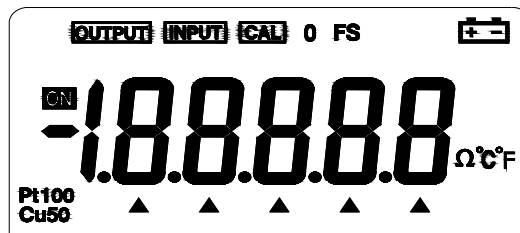
Note



- To keep the calibrator in a designed accuracy, it needs warming up 5 minutes before it is put into operation.
- If any user requires a higher accuracy of the calibrator, he should make contact with our manufacturer.
- If the automatic reference-junction temperature compensation of the calibrator deviates from its designed accuracy, the user is requested to make contact with our manufacturer.

2. Instrument Panel Layout and Function



Explanation of LCD Display Area




- a) **OUTPUT**: Press the key (**INPUT/OUTPUT**) when the symbol 'output' appears in the display, denoting the calibrator in an output state.
- b) **INPUT**: Press the key (**INPUT/OUTPUT**) when the symbol 'input' appears in the display, denoting the calibrator in an input state.
- c) **CAL**: When this symbol appears, it denotes the calibrator in a state of calibration.
- d) **0 FS**: This symbol appears with the calibrator getting into a calibration state, denoting that the zero point or the full scale point is in calibration.
- e) : When this symbol appears, it denotes that the battery is nearly used up and needs replacing now. (Refer to subsection 3.1)
- f) : When this symbol appears, it denotes that the output digits need setting.
- g) $\Omega^{\circ}\text{C}^{\circ}\text{F}$: These symbols denote the individual units of current values of input or output.
- h) **ON**: This symbol denotes that the signal of input or output is in a turn-on state.
- i) Pt100, Cu50: These symbols denote the types of RTDs.

3. Replacing the battery

 **Warning**

- The power supply connected to the calibrator must be shut down and then the test leads need removing prior to replacing the battery.

3.1 When the symbol  appears in the display, it denotes that the battery is nearly used up and needs replacing according to the following steps:

- 1) Turn off the power switch of the calibrator and then remove the test leads.
- 2) Remove the holster from the calibrator. Open the battery cover at the back of the calibrator by releasing the lock in the indicated direction.
- 3) Replace the used-up battery with a new one. Put the battery cover back and lock it in the indicated direction.
- 4) Put the holster back onto the calibrator.

4. Power-On/Off of Calibrator

4.1 Power-key operation

Press the power key to turn on the power supply of the calibrator. Then press it again to hold it in one second and the power will be off. When the power is turned on, the calibrator starts to make self-diagnosis internally and the full screen is in display. After this, appropriate operation should be carried out.

Note

- **Power-on:** To ensure the correct operation of the calibrator with power on, it is good practice to turn off the power supply pausing 5 seconds, and then restart the calibrator.

4.2 Automatic power-off

By the shipping time, the calibrator setting is made in the factory like this :In case there is no operation of the calibrator within 10 minutes after power-on, it will cut off the power automatically. However, users can decide whether they want to use the function of the automatic power-off

or not. The setting can be done by themselves. (See section 7 for reference)

5. Output from Calibrator

The output terminal of the calibrator produces the RTD-simulating temperature signal or simulating resistance set by the user.

! Caution

- Do not apply voltage to the output terminal during the operation. If any improper voltage is applied to the output terminal, it will cause damage to the internal circuit.

Output Operation Procedure

Function Operation	Range Operation	Display	Set Range
OHM 400 Ω		000.0 Ω	000.0 to 400.0 Ω
RTD Pt100	Pt100 ↓ Cu50	000.0°C 000.0°C	-200°C to 850°C -50°C to 150°C

5.1 Simulating Output from Resistance or RTD

Note

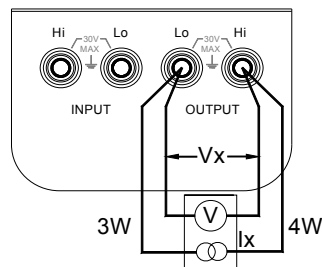
- **Resistance simulation:** The calibrator produces the simulated resistance up to 400 Ω at the output terminal. The method of simulating resistance output is to send out an appropriate voltage 'VX' according to the exciting current 'IX' produced by the calibrated instrument. Because R (set resistance) = V_x (output voltage) / I_X (exciting current), the calibrated device must provide an exciting current to the calibrator. In order to produce correct

simulated output , the exciting current should range from 0.5mA to 2mA.

Note

- **Resistance simulation:** A 4-wire system is designed for the resistance output during the calibration. If the user adopts a two-wire system, he should take into consideration the error (ca.0.1 Ω) arising from the lead resistance of the test leads. If the capacitance between the resistance output terminal of the calibrator and the tested instrument is more than 0.1 μ f, the calibrator will produce improper resistance.

- 1) Insert one end of the test lead into the output jack of the calibrator



and connect the other end with the input of the user's instrument as shown in the following diagram: (the dedicated test leads supplied with the calibrator can be made into a 3-wire or 4-wire system for output according to user's requirement.)

- 2) Press the key (**INPUT/OUTPUT**) when the symbol **OUTPUT** appears in the display. It denotes that the calibrator is in an output state.
- 3) Press the key (**FUN**) to select the function of resistance or RTD when the corresponding unit ' Ω ' or ' $^{\circ}$ C' and 'Pt100' appears in the display.

- 4) During the use of the RTD function, press the key (**RANG**) to select a corresponding type.
- 5) Press the key (◀) / (▶) to select the set digits for output.
- 6) Press the key (▲) / (▼) to change the value of the set digits. The value can do carry or number decrement automatically, Hold the pressed key in one second and the value will keep varying.
- 7) Press the key (**ZERO**) and the output will be directly set to 000.0 °C.
- 8) Press the key (°C/°F) to select the temperature unit '°C' or '°F'.

6. Calibrator Measurement

Warning

- During the operation, never apply more than 30V between any two terminals, or between any terminal and earth ground .Any voltage more than 30V will not only cause damage to the calibrator, but also lead to possible personal injury.

Caution

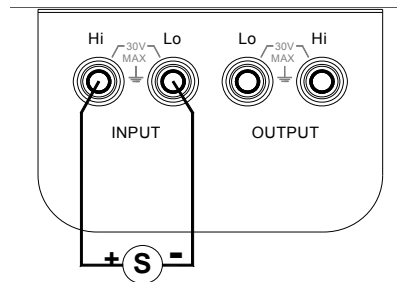
- During the operation, do not apply a voltage exceeding the measuring range to the input terminal, which will cause possible damage to the calibrator.
- During the operation, special care should be taken not to apply a heavy current to the input terminal. Any improper electric connection will cause damage to the calibrator and the instrument to be measured.

Measurement Operation Procedure

Function Operation	Range Operation	Measuring Range
OHM 400 Ω		000.0 to 450.0 Ω
RTD Pt100	Pt100 ↓ Cu50	-200 to 850°C -50 to 150°C

6.1 Measuring Resistance and RTD

- 1) Insert one end of the test lead into the input jack of the calibrator and connect the other end to the output of the user's instrument as



shown in the following diagram:

- 2) Press the key (**INPUT/OUTPUT**) when the symbol **INPUT** appears in the display. It denotes that the calibrator is in an input state.
- 3) Press the key (**FUN**) to select the desired measurement function when the corresponding unit and the type of RTD appear in the display.
- 4) To use the function of RTD, press the key (**RANG**) to select the corresponding type of RTD.
- 5) The display indicates '000.0' first, denoting a wait followed by displaying the measured result. The refreshing rate of displaying the measurement is about once per second if the measured value exceeds the measuring range, the display will indicate the symbol '-OL-'.
- 6) Press the key (**°C/°F**) to select the temperature unit '°C/°F'.

7. Other Features

The following operation makes it possible for the calibrator to change its automatic power-off function.

- 1) Cut off the power supply of the calibrator.
- 2) Press the key (**POWER**) to make a full screen display. Then release the key (**POWER**) immediately followed by pressing the

key (RANG) when the calibrator gets into a maintenance state. The display indicates the symbol 'AP-XX'.

3) Press the key (▼) when the symbol 'AP-OF' appears in the display, denoting that there is no automatic power-off function available to the calibrator, and when the symbol 'AP-ON' appears, denoting that the calibrator has recovered the automatic power-off function.

4) Cut off the power supply again to exit the maintenance state.

8. Performance Capabilities

Output function & Specification (applicable to temperature range from 18 to 28 °C, within one year after calibration).

Output	Range	Output Range	Resolution	Accuracy	Remark
OHM	400 Ω	0.0 to 400.0 Ω	0.1 Ω	± 0.05% of set value ± 0.2 Ω	± 1mA exciting current Notes 1 & 2
RTD	Pt100	-200.0 to 850.0 °C	0.1 °C	± 0.05% of set value ± 0.6 °C	± 1mA exciting current, use Pt100-385. measuring current 1mA Notes 1 & 2
	Cu50	-50.0 to 150.0 °C	0.1 °C		± 1mA exciting current Notes 1 & 2

Input Function & Specification (applicable to temperature range from 18 to 28°C ,within one year after calibration)

Input	Range	Input Range	Resolution	Accuracy	Remark
OHM	400 Ω	0.0to 450.0 Ω	0.1 Ω	± 0.05% of means. value ±0.2Ω	± 1mA means. current Notes 1 & 2
RTD	Pt100	-200.0 to 850°C	0.1°C	± 0.05% of set value ± 0.6°C	± 1mA exciting current, use Pt100-385. measuring current 1mA Notes 1 & 2
	Cu50	-50.0 to 150.0°C	0.1°C		± 1mA exciting current Notes 1 & 2

Note 1: without accessory lead resistance

Note 2: range of exciting current: 0.5mA to 2mA;
max. output voltage: ≤2V

Note 3: temperature coefficient : ±0.005% of range per°C for the
temperature ranges from 0 to 18°C and from 28 to 50°C

General Specifications

- Power supply: single 9v battery (ANSI/NFPA 1604A or IEC6LR619V alkaline)
- Battery life: ca.25 hours
- Max. permitted voltage: 30v (between any two terminals or between any terminal and earth ground)
- Operating temperature: 0°C to 50°C
- Operating relative humidity: ≤80% RH
- Storage temperature: ≤-10°C to 55°C
- Storage humidity: ≤90% RH
- Size: 200×100×40 mm(with holster)

- Weight: 550g (with holster)
- Accessories: operation instruction, a set of CF-36 industrial test lead (with alligator clips)
- Option: AC power-supply adapter (VCPS) and a set of CF-31-A industrial test lead (with probe clips)
- Safety: certified as compliant to IEC1010 provisions (safety standard issued by International Electrotechnical Commission)

9. Calibration

Note

- To ensure the designed accuracy of the calibrator, it is recommendable to calibrate your calibrator once a year. The following recommended standard equipment is used to perform the calibration which serves as an example.

! Caution

- During the operation, never apply more than max. permitted voltage to the input of the calibrator ,otherwise the overvoltage will lead to possible damage to the input section.
- During the operation, avoid any short circuit and never apply more than the max. permitted voltage to the output of the calibrator and the co-working standard device, otherwise any maloperation will cause possible damage to their internal circuits.

9.1 Selecting Standard Equipment Calibrating output characteristics

Calib.Item	Standard Equipment	Input Range	Accuracy	Recommend
OHM 400 Ω	Digital meter standard source	Max.2v $\pm 1\text{mA}$ excit.	$\pm (10\text{ppm}+5\mu\text{v})$ $\pm (80\text{ppm}+0.03\mu\text{A})$	1281(FLUKE) 5520A(FLUKE) Or equivalent

Calibrating Input Characteristics

Calib.Item	Standard Equipment	Output Range	Accuracy	Recmd
OHM 400 Ω	standard source	Max.450 Ω	\pm 28ppm	5520A(FLUKE) or equivalent

9.2 Ambient Condition for Calibration

Ambient temperature: $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$

Relative humidity: 45 to 75% RH

Warming-up :

- The standard equipment must be warmed up to the given time.
- Do not connect the calibrator to the power supply until it has been exposed to the calibrating ambient condition for 24 hours. Then set the calibrator to a state of non-automatic shutdown followed by warming up to 0.5 hour.

Note

- Power supply for calibration: During the calibration, the battery needs replacing with a new one.

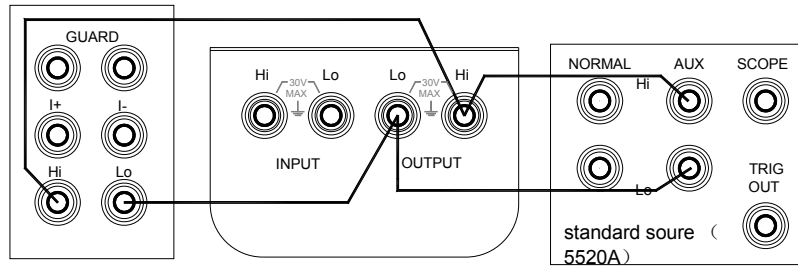
9.3 Operating Output Calibration

Operating calibration in order of items and calibration points in the following table:

Item No.	Output Range	Calib.Point
1	OHM /400	O
		FS
		O FS
		-O
		-FS
		-O FS

- 1) The calibration wiring diagram is shown as follows:

digital meter (1281)



- 2) Press the key (**FUN**) & (**RANG**) first, and then press the key (**POWER**) to enter the calibrator in a state of calibrating the resistance output when the display indicates the symbols 'OUTPUT', 'CAL 0', 'ON' and the unit 'Ω'.
- 3) Set the digital meter and the standard source to a corresponding range, and then set the standard source to +1mA output.
- 4) With the output stabilized, operate the keys (◀) / (▶) and (▲) / (▼) to set the indication of the calibrator in identity with the reading of the digital meter.
- 5) Press the key (**ZERO**) and the display will flash, denoting that the calibrated point has been stored.
- 6) Press the key (**RANG**) to display the symbol 'CAL FS'. With the output stabilized, repeat the operation of steps 4 and 5.
- 7) Press the key (**RANG**) to display the symbol 'CAL 0 FS'. With the output stabilized, repeat the operation of steps 4 and 5.
- 8) Set the standard source to -1mA output.
- 9) Press the key (**RANG**) to display the symbols 'CAL 0', '-'. With the output stabilized, repeat the operation of steps 4 and 5.
- 10) Press the key (**RANG**) to display the symbols 'CAL FS', '-'. With the output stabilized, repeat the operation of steps 4 and 5.
- 11) Press the key (**RANG**) to display the symbols 'CAL 0 FS', '-'. With the output stabilized, repeat the operation of steps 4 and 5.

Note

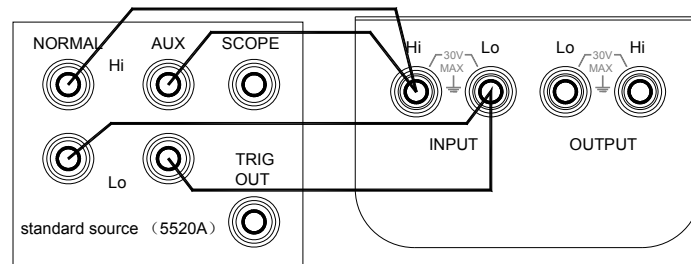
- **Exciting current:** The direction of the exciting current must be in line with the calibration point, otherwise the display will not flash, denoting that the storing of calibrated point is invalid.

9.4 Operating Input Calibration

Operating calibration in order of items and calibration points in the following table:

Item .No	Input Range	Calib. Point
1	OMH/400	FS:400 Ω

- 1) The calibration wiring is shown in the following diagram:



- 2) Press the key (**FUN**) to the calibrator in a state of the 400 Ω input calibration. Then the display indicates the symbols **INPUT**, **CAL 0**, **ON**, '400 Ω '.
- 3) Set the standard source to a corresponding range.
- 4) Set the standard source output to the indication of the calibrator. With the output stabilized, press the key (**ZERO**) when the display starts flashing, denoting that the calibrated point has been stored.
- 5) Now cut off the power supply again and the calibrator will quit the calibration state.

10. Points for Attention to Use of Operation

Instruction

- The present operation instruction is subject to change without notice.
- The content of the operation instruction is regarded as correct. Whenever any user finds its mistakes, omission, etc., he or she is requested to contact the manufacturer.
- The present manufacturer is not liable for any accident and hazard arising from any maoperation.
- The functions described in this operation instruction should not be used as grounds to apply this product to a particular purpose.