



An ISO 9001:2008 Company



TEMPERATURE CALIBRATOR Model KM-CAL-801

This Calibrator is a source for Volts, Ohms RTD & Thermocouples. It gives output of Volts in 2 ranges 100mV & 1000mV & also gives output of Ohms in 2 ranges 400Ω & 4000Ω & output for calibrating R, S, B, E, K, J, T & N type Thermocouples. It also gives output for RTD Pt1000 & Cu50. It has very high accuracy 0.05%.



Preliminary Data

GENERAL SPECIFICATIONS

- * Basic Accuracy : $\pm 0.05\%$
- * Display : 5 Digit LCD display.
- * Max. Allowable Voltage : 30V..
- * Operating Temperature Range : 0 ~ 50°C.
Humidity range : $\leq 80\%$ RH
- * Storage Temperature Range : $\leq -10^\circ\text{C} \sim 55^\circ\text{C}$
Humidity range : $\leq 90\%$ RH
- * Temperature Coefficient : $0.1 \times$ (dedicated Accuracy) % / °C (5°C ~ 18°C, 28°C ~ 40°C)
- * Power : 1.5V x 2 alkaline batteries.
- * Power Consumption : about 60m / 3V.
- * Dimension : 180 (L) x 90 (W) x 47 (D) mm (with protector)
- * Weight : About 500g

SAFETY :

Complies with IEC1010 (safety standard issued by International Electrician Committee)

ACCESSORIES :

User Manual, Test lead CF-36, (Clips for probe),
Holster & Carrying case.

ELECTRICAL SPECIFICATIONS - KM-CAL-801

OUTPUT FUNCTION

Output	Range	Output Range	Resolution	Accuracy	Remarks
DC Voltage	100mV	-10.00 ~ 110.00mV	0.01mV	$\pm 0.05\% \pm 30\mu\text{V}$	The max. Output current $\pm 2\text{mA}$
	1000mV	-100.0 ~ 1100.0mV	0.1mV	$\pm 0.05\% \pm 0.3\text{mV}$	
OHM	400Ω	0.0 ~ 400.0Ω	0.1Ω	$\pm 0.05\% \pm 0.2\Omega$	$\pm 0.5 \sim \pm 3\text{mA}$ Affiliated resistance of test lead is excluded. The range of incentive current is from 0.05mA to 3mA & the maximum output is less than or equals to 2V.
	4000Ω	0 ~ 4000Ω	1Ω	$\pm 0.05\% \pm 2\Omega$	$\pm 0.05 \sim \pm 0.3\text{mA}$ Affiliated resistance of test lead is excluded. The range of incentive current is from 0.05mA to 3mA & the maximum output is less than or equals to 2V.
Thermo-couple	R	-40 ~ 1760°C	1°C	$\pm 0.05\% + 3^\circ\text{C}$ (Less than or equals to 100°C)	Employs ITS-90 temperature standard The accuracy does not include the error of interior temperature compensation sensor the range of interior temperature compensation sensor is from -10 to 50°C & the error compensation is less than or equals to 0.5°C
	S	-20 ~ 1760°C	1°C	$\pm 0.05\% + 2^\circ\text{C}$ (more than 100°C)	
	B	400 ~ 1800°C	1°C	$\pm 0.05\% + 3^\circ\text{C}$ (400 ~ 600°C) $\pm 0.05\% + 2^\circ\text{C}$ (more than 600°C)	
	E	-200.0 ~ 1000.0°C	0.1°C	$\pm 0.05\% + 2^\circ\text{C}$ (Less than or equals to -100°C) $\pm 0.05\% + 1^\circ\text{C}$ (more than -100°C)	
	K	-200.0 ~ 1370°C	0.1°C		
	J	-200.0 ~ 1200.0°C	0.1°C		
	T	-200.0 ~ 400.0°C	0.1°C		
N	-200.0 ~ 1300.0°C	0.1°C			
RTD	Cu10	-10.0°C ~ 250.0°C	0.1°C	$\pm 0.05\% + 0.6^\circ\text{C}$	Incentive Current is $\pm 0.5 \sim \pm 3\text{mA}$ When the incentive current is $\pm 0.1 \sim 0.5\text{mA}$, add 0.5°C additional error
	Cu15	-50.0°C ~ 150.0°C	0.1°C		
	Pt10385	-200.0°C ~ 850.0°C	0.1°C		Incentive Current is $\pm 0.05 \sim \pm 0.3\text{mA}$
	Pt100385	-200.0°C ~ 850.0°C	0.1°C		
	Pt200385	-200°C ~ 630°C	0.1°C		
	Pt500385	-200.0 ~ 1200.0°C	0.1°C		
	Pt1000385	-200.0°C ~ 630.0°C	0.1°C		

All Specifications are subject to change without prior notice.



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LIST OF PRODUCTS

- * Digital Multimeter
- * AC Clamp Adaptor
- * Thermo Anemometer
- * Distance Meter
- * Network Cable Tester
- * Earth Resistance Tester
- * DC Power Supplies
- * Calibrators
- * Frequency Counter
- * Phasing Sticks
- * Waterproof Pen Testers
- * EMF Detector
- * Wood, Paper & Grain Moisture Meter
- * Transistorised Electronic Analog & Digital Insulation Resistance Testers(upto 10 KV)
- * Digital Sound Level Meter & Sound Level Calibrator
- * Digital contact & Non-contact Type Tachometer
- * Digital Non-contact (infrared) Thermometer
- * Maximum Demand Controller/Digital Power Meter
- * Digital Hand Held Temperature Indicators
- * Digital AC & AC/DC Clampmeter
- * AC/DC Current Adaptor
- * Thermo Hygrometer
- * Digital Lux Meter
- * Power Factor Regulator
- * Digital Panel Meters
- * High Voltage Detector
- * Gas Analysers
- * Function Generator
- * Battery Tester
- * Solar Power Meter



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TEMPERATURE CALIBRATOR

MODEL - KM -CAL 801

OPERATION MANUAL

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Section One Safe Use

To ensure safe use, the meter and manual employ the following symbols;

⚠ Warning: identifies conditions and actions that may pose hazard(s) to the user and avoid methods.

⚠ Caution: identifies conditions and actions that may damage the meter or the equipment under test and avoid methods.

⚠ Note: Reminds Users of knowledge of symbols for the operation and explanations of the features.

To avoid possible electric shock or any other dangers, please do follow the under-mentioned rules :

⚠ Warning :

- Do not operate the meter around explosive gas, vapor, or dust, which is extreme dangerous.
- Never apply voltage exceeding 30V between any two terminals and earth ground terminals.

⚠ Caution:

- Do not open the meter's case except for the professional technicians.
- Use a damp cloth with neutral detergent for cleaning the meter periodically. Do not use abrasives or solvents.

△ Note :

- To ensure accuracy, preheat for 5 minutes after power-on.
- Please contact the manufacture or dealers if the Users have higher accuracy requirement.

Section Two Components and function of Meter's Panel

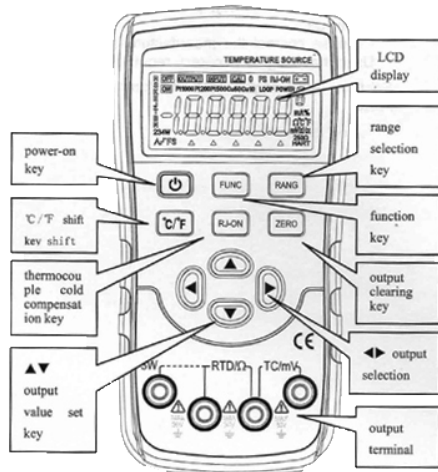


Illustration for LCD display area



- OUTPUT : indicates the meter is in output state.
- CAL : indicates the meter is in calibration state.
- 0 FS : indicates the present calibrated zero point or full point etc. when the meter is in calibration state.
- RJ-ON : indicates the meter has undergone cold junction compensation work (See Section 5.2).
- ⊕⊕ : indicates the batteries are exhausting and needs replacement (See Section 3.2).
- ▲ : indicates present set output value.
- mv ,Ω , °C , °F : indicates the unit for present output value.
- ON : indicates connection of output signals.
- Pt10, Pt100, pt200, pt500, Cu50, Cu10 : indicates graduated no. of thermal resistance (RTD) .
- R, S, K, E, J, T, B, N : indicates graduated no of thermocouple (TC).

Section Three Maintenance

This section provides some basic maintenance procedures. Repair, calibration, and servicing not covered in this manual must be performed by described in this manual, contact a Service Center

1) General maintenance

- Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents.
- Take out the batteries if the meter won't be used for a long time.
- Dirt or moisture in the terminals can affect readings.

Clean the terminals as follows :

- 1) Turn the meter off and remove all test leads.
- 2) Shake out any dirt that may be in terminals.
- 3) Soak a new swab with alcohol. Clean each terminal with the swab.

2) Replacing the batteries :

The meter is powered by two LR 6 alkaline batteries

⚠ Warning

To avoid electrical shock or personal injury:

- Remove test leads from the meter before opening the battery door.
- Close and latch the battery door before using the meter.

⚠ Note

- The new and old batteries can not be mixed.
- Make sure the battery's odes are in accordance with the marks illustrated in battery pool when replacing them.
- Take out the batteries if the meter won't be used for a long time.
- Dispose the old batteries in accordance with local law.

Replace the batteries as follows (See Figure 3-1):

- 1) Turn the rotary switch to OFF and remove the test leads from the terminals;
- 2) Take off the support of the meter, remove the battery door by a standard- blade screwdriver, and then take off the battery case;
- 3) Replace with two new batteries;
- 4) Reinstall the battery case, spin the screws and tighten screws.



Section Four Power on/Power off the Meter

1) Turn on/off the meter :

Press (power) key to electrify the meter, and repress (power) key more than 1 second to cut off the power.

When turning on the power, the meter starts to make inner diagnose and display in full screen, and then undertakes corresponding operation.

△ Note

To ensure correct electrifying operation, please wait for 5 second to turn on the meter again after cutting off the power.

2) Automatically turn off the power

The default factory value is set as; the meter will automatically turn off if no operation has been made within 15 minutes.

The Users can set by themselves to choose whether using this function or not (See Section Six).

Section Five Output of the Meter

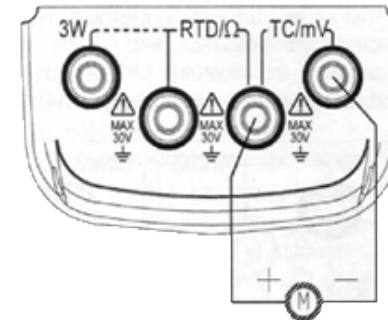
The meter generates DC current or simulate resistance set by the Users form the corresponding output terminal (OUTPUT).

△ Caution

Do not apply any voltage terminal otherwise damage to interior circuit may occur if the voltage is not proper.

1)DC Voltage output

- 1) Insert the testing probe into the jack of the meter's output terminal (TC/mV), and connect the other end with input terminal of the Users' meter, see Figure 5-1;
- 2) Press (FUN) key, select V function, and display 'mV' unit;
- 3) Press (RANG) key, select range 100.00mV or 1000.0mV;
- 4) Press (◀) / (▶) key, select output set bit;



- 5) Press (▲) / (▼) key, change the value of set bit, and the value can carry or abdicate automatically, and hold the key, the value will alter constantly after one second.
- 6) Press the (ZERO) key, the output will be set as 000.00mV or 0000.0mV.

2) Thermocouple (TC) simulate output

- 1) Insert the testing probe into the jack of the meter's output terminal (TC/mV), and connect the other end with input terminal of the Users' meter, see Figure 5-1;
- 2) Press (FUN) key, select thermocouple (TC) function, and display 'C' unit and 'R' graduation no.
- 3) Press (RANG) key, select corresponding graduation no.
- 4) Press (◀) / (▶) key, select output set bit;
- 5) Press (▲) / (▼) key, change the value of set bit, and the value can carry or abdicate automatically, and hold the key, the value will change constantly after one second.

6) Automatic compensation meter with temperature cold junction compensation directly, press (RJ- ON) key to start the automatic compensation function of cold junctions of this meter, and it will output the necessary temperature thermoelectric force, and display 'RJ-ON'(See Section Seven for the accuracy of cold junction compensation),and:

Output thermoelectric force = the corresponding thermoelectric force of set temperature - the corresponding thermoelectric force of room temperature

- The Users need to wait for 2 seconds when starting the interior cold junction compensation of the meter and the meter will make automatic compensation every 10 seconds
- When the operation ambient temperature change, the Users need to wait until the interior compensation sensor stabilizes
- If the Users do not use the automatic compensation function of this meter, press the (RJ-ON) key and the symbol 'RJ-ON' will not display any more(about 10 minutes)and then use

7) Press (ZERO) key, the output will be set as 0000°C R ,S graduation) ,400° (B graduation) 0000.0°C (other graduation)

8) Press (°C / F) key, select Centigrade or Fahrenheit unit.

3) Resistance or thermal resistance (RTD) simulate output

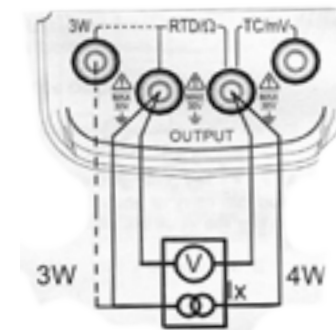
△ Note

- **Resistance simulate** : The meter generates a simulate resistance value ranging from 400 Ω to 4000 Ω form

the output terminal (RTD / Ω). The output method for simulate resistance is that the meter outputs corresponding voltage "V_x" according to incentive current "I_x" generated by the calibrated meter, and for the R (set resistance) equals to V_x (output voltage) /I_x(incentive current), thus the calibrated body should supply a simulate current to this meter. For realizing the correct simulate output of 400Ω ,the incentive current should be within + 0.5~+3mA range; for simulate output of 4000Ω, the incentive current should be within + 0.05~+0.3mA range.

△ Note

Resistance simulate : when the output resistance is 4-wired for calibration, the error generated by the resistance (approximately 0.1 W) of test lead should be considered if the Users employ two wires connection method; The meter may generate incorrect resistance value if the capacity between the output terminals and the measured meter is higher than 0.1 uf.



Figur 5-1

1. Insert the testing probe into the jack of the meter's output terminal (RTD/ Ω), and connect the other end with input terminal of the Users' meter, see Figure 5-2; (the dedicated testing probe supplied by the meter can be connected as three-wired or four-wired output as required by the Users)
2. The LCD shows 'OUTPUT' indicating the meter is in output state.
3. Press (FUN) key, select resistance or thermal resistance (RTD) function, and display ' Ω ' or ' $^{\circ}$ C' and thermal resistance 'Pt100' graduation no.
4. In thermal resistance (RTD) function, press (RANG) key select corresponding graduation no.
5. Press (◀) / (▶) key select output set bit;
6. Press (▲) / (▼) key, change the value of set bit, and the value can carry or abdicate automatically, and hold the key, the value will change constantly after one second.
7. Press (ZERO) key, the output will be set as 000.0 $^{\circ}$ C
8. Press ($^{\circ}$ C / $^{\circ}$ F) key, select Centigrade or Fahrenheit unit.

Section Six Function Setting

The following operation can change the automatic power off function on the meter:

1. When the meter is in power-off state, press (power) key and the LCD displays in full. loose (power) key and press (RANG) key, the meter enters into maintenance state and the LCD displays 'AP -XX'

2. Press (▼) key and the LCD displays symbol 'AP - OF' the meter stops automatically power-off function; The LCD displays symbol 'AP-ON' the meter restores automatically power-off function. and the meter exit from maintenance state if cutting off the power again.

Section Seven Performance Index

Accuracy is specified for a period of one year after calibration, at 23 \pm 5 $^{\circ}$ C, with relative humidity to 75%. Accuracy specification are give as : ([% of reading] + [number of least significant digits]) (Counts" refers to the number of increments or decrements of the least significant digit).

Output	Range	Output Range	Resolution	Accuracy	Illustration
DCV	100mV	-10.00~110.00mV	0.01mV	0.05%+30uV	Max. output current+2mA
	100mV	-100.00~1100.00mV	0.1mV	0.05%+0.3mV	
OMH	400 Ω	0.0~400.0 Ω	0.1 Ω	0.05%+0.2 Ω	\pm 0.5~ \pm 3mA Note 1,Note2
	4000 Ω	0.0~4000.0 Ω	1 Ω	0.05%+2 Ω	\pm 0.05~ \pm 0.3mA Note 1,Note2
TC	R	-40~1760 $^{\circ}$ C	1 $^{\circ}$ C	0.05%+3 $^{\circ}$ C (less than or equals to 100 $^{\circ}$ c) 0.05%+2 $^{\circ}$ c (more than 100 $^{\circ}$ c)	Employs ITS-90 temperature standard Note3
	S	-20~1760 $^{\circ}$ C	1 $^{\circ}$ C	0.05%+3 $^{\circ}$ c(400~600 $^{\circ}$ c) 0.05%2 $^{\circ}$ c(more than 600 $^{\circ}$ c)	
	B	400~1800 $^{\circ}$ C	1 $^{\circ}$ C	0.05%+2 $^{\circ}$ C (less than or equals to -100 $^{\circ}$ c) 0.05%+1 $^{\circ}$ c (more than -100 $^{\circ}$ c)	
	K	-200.0~1370 $^{\circ}$ C	0.1 $^{\circ}$ C		

	J	-200.0~1200.0°C	0.1°C		
	T	-200.0~400.0°C	0.1°C		
	N	-200.0~1300.0°C	0.1°C		
RTD	Cu10	-10.0°C~250.0°C	0.1°C	0.05%+0.6°C	incentive current is ±0.5~±3mA
	Cu50	-50°C~15.00°C	0.1°C	0.05%+0.6°C	
	Pt10 385	-200.0°C~850.0°C	0.1°C	0.05%+0.6°C	when the incentive current is ±0.1~0.5mA, add 0.5°C additional error
	Pt100 385	-200.0~850.0°C	0.1°C	0.05%+0.6°C	
	Pt200 385	-200°C~630°C	0.1°C	0.05%+0.6°C	incentive current is ±0.05~±0.3mA
	Pt500 385	-200°C~630°C	0.1°C	0.05%+0.6°C	
Pt1000 385	-200.0°C~630.0°C	0.1°C	0.05%+0.6°C		

Note 1: Affiliated resistance of test lead is excluded

Note 2: The rang of incentive current is from 0.05mA to 3mA, and the maximum output is less than or equals to 2V

Note 3: The accuracy does not include the error of interior temperature compensation sensor the range of interior temperature compensation sensor is from -10 to 50°C, and the error compensation is less than or equals to 0.5°C

General Feature

- **Power** : two 1.5V alkaline batteries (Lr6)
- **Power consumption** : about 50m/3V

- **maximum allowed voltage** : 30V (within terminal or between & earth ground)
- **operation temperature rang** : 0°C~50°C
- **operation humidity rang** : 80%RH
- **storage temperature rang** : -10°C~55°C
- **storage humidity rang** : 90%RH
- **temperature coefficient** : 1x(dedicated accuracy) %/C (5°C~18°C 28°C~40°C)
- **measurement** : 180 (L) X 90(W) X 47 (D) mm (with protected)
- **weight** : about 500g
- **accessory** : User's Manual, industrial testing lead CF-36 (clips for probe)
- **safety** : complies with IEC 1010 (Safety standard issued by International Electrician Committee)

Section Eight Note for the Manual

- 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, ect he or she is requested to contact the manufacturer;
- The present manufacture is not liable for any accident and hazard arising from the customer misuse or inadvertent operation.
- The functions described in this operation instruction should not be used as ground to apply this product to a particular purpose.

MUMBAI

TEST CERTIFICATE

TEMPERATURE CALIBRATOR

This Test Certificate warrants that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. **KM-CAL 801**

SERIAL NO. _____

DATE: _____

ISO 9001
REGISTERED



WARRANTY

Each "KUSAM-MECO" product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a "KUSAM-MECO" authorized dealer.

This warranty does not apply for damaged Ic's, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in "KUSAM-MECO's" opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

"KUSAM-MECO" authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of "KUSAM-MECO".

"KUSAM-MECO's" warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a "KUSAM-MECO" authorized service center within the warranty period.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. "KUSAM-MECO" SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER.