

Instruction Manual

Model 2710 Pen-type Digital Multimeter



Limited Three Year Warranty

B+K Precision warrants to the original purchaser that its product and the component parts thereof, will be free from defects in workmanship and materials for a period of three years from the date of purchase.

B+K Precision will, without charge, repair or replace, at its option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form a sales receipt.

To obtain warranty coverage in the U. S. A. this product must be registered by completing and mailing the enclosed warranty card to B+K Precision, 1031 Segovia Circle, Placentia, CA 92870 within fifteen (15) days from proof of purchase.

Exclusions : This warranty does not apply in the event of misuse or abuse of the product or as result of unauthorized alternations or repairs. It is void if the serial number is altered, defaced or removed.

B+K Precision shall not be liable for any consequential damages, including without limitation damages resulting from loss of use.

Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

Date Purchased : _____

INTRODUCTION

1-1 Unpacking and Inspection

Upon removing your new Digital Multimeter from its packing, you should have the following items :

1. Digital Multimeter.
2. Test lead (one black).
3. Test probe set.
4. Operations manual.
5. Test Clip (black)
6. Carrying case.

1-2 Meter Safety


Terms as Marked on Equipment


 **ATTENTION** — Refer to manual.

 **DOUBLE INSULATION** — Protection Class II

 **DANGER** — Risk of electric shock.




Symbols in This Manual

 This symbol indicates where cautionary or other information is found in the manual.


 **Battery.**

1-3 Front Panel

Refer to Figure 1 and to the following numbered steps to familiarize yourself with the meter's front panel controls and connectors.

1. **Digital Display** — The digital display has 3200 counts LCD readout with 65 segments analog bar graph, auto polarity, decimal point,  "AC,DC,RANGE,"  (H),  (M, Ω , or K, Ω , or Ω) and Unit annunciators.
2. **Function Switch** — Select the Function and Range desired.
3. **COM Input Terminal** — Ground input connector.

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4. **V- Ω Input Terminal** — Positive input connector for Volts, Ohms and Diode.
5. **Range Button (Manual Range)** — "RANGE" button is pushed to select manual ranging and to change ranges. When "RANGE" button is pushed once, "RANGE" annunciator on the LCD is appeared. Push "RANGE" button to select appropriate range to be used. Push "RANGE" switch and hold 2 seconds to return to Autoranging.
6.  (V, \bar{V} , Ω , \rightarrow) **Selection Switch** — Push the blue button alternately to measure AC Voltage or DC Voltage in the voltage or to measure resistor or continuity or diode in Ω , \rightarrow mode.
7. **Hold (H) button** — This button is used to hold measured value for all functions, and then "H" annunciator is displayed. Conversions are made but the display is not updated.

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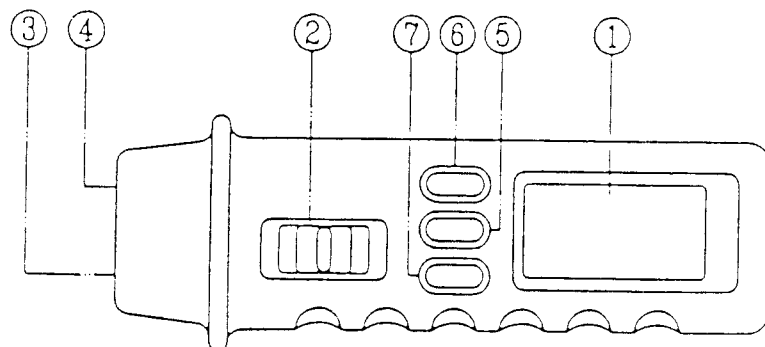


Figure 1

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SPECIFICATIONS


2-1 General Specifications

This instrument has been designed in accordance with UL 1244 and IEC publication 1010 Pt 1, Class I Safety Requirements for Electrical Equipment for measurement, Control and laboratory use. This level of safety can only be guaranteed while the limits of 2.2 are observed.

Display : The Liquid crystal Display (LCD) with a maximum reading of 3200 , and 65 segments bar graph.

Polarity Indication : Automatic , positive implied , negative indicated.

Overrange Indication : "OL" or "-OL".

Low Battery Indication : "  " is displayed when the battery voltage drops below operating Voltage.

Sampling : 2 times / sec for digit , 12 times/ sec for analog bargraph.

Auto Power Off : Approx. 10 minutes.

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2-2 Environmental Conditions :

Indoor use.

Maximum Altitude : 2000 meter.

Installation Category : IEC 1010 600V, Cat II , 300V, Cat III .

Pollution Degree : 2 .

Operating Ambient : 0 °C to 50 °C , 0 to 80% R.H.

Storage Temperature : -20 °C to 60 °C , 0 to 80% R.H. when battery removed from meter.

Temperature Coefficient : 0.15 x (Spec.Acc'y)/ °C , < 18 °C or >28 °C.

Power Requirements : IEC LR03 , AM4 or AAA size 1.5Vx2.

Battery Life : Alkaline 800 hours

Dimensions (W x H x D) : 42mm x 145mm x24mm

Accessories : Battery (installed) and operators manual.

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2-3 Electrical Specifications

Accuracy is + (%reading + number of digits) at 23 °C ± 5 °C , less than 80 % R.H.

(1) DC Volts

Range	Resolution	Accuracy	Over voltage protection
300mV	100 μ V	± (0.7% + 2dgt)	600V DC or 600V rms
3V	1mV		
30V	10mV		
300V	100mV		
600V	1V		

Input Impedance : 10M Ω .

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(2) AC Volts

Range	Resolution	Accuracy	Over voltage protection
3V	1mV	± (1.7%rdg + 5dgt) 40Hz to 500Hz	600V DC or 600V rms
30V	10mV		
300V	100mV		
600V	1V		

* Frequency Response : 40Hz ~ 300Hz for 3V Range.

Input Impedance : 10M Ω // less than 100pF

The reading will be a little rolling approximately 2 ~ 5 counts over 200V

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(3) Resistance

Range	Resolution	Accuracy	Overload Protection
300 Ω	0.1 Ω	± (1.2%rdg + 4dgt)	600V DC or 600V rms
3K Ω	1 Ω		
30K Ω	10 Ω	± (1.0%rdg + 2dgt)	
300K Ω	100 Ω		
3M Ω	1K Ω	± (1.5%rdg + 3dgt)	
30M Ω	10K Ω	± (3%rdg + 5dgt)	

Open circuit Voltage : 1.3V approx.

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(4) Diode Check and Continuity

Range	Resolution	Accuracy	Max. Test Current	Max. Open Circuit Voltage
	1mV	± (1.5%rdg + 5dgt) *	1.5mA	3.3V

* For 0.4V ~ 0.8V.

Overload Protection : 600V DC/AC rms max.

Continuity : Built-in buzzer sound when resistance is less approximately than 20 Ω .

(5) Auto Power Off


The meter will automatically shut itself off after approximately 10 minutes after power on. The meter can be turned back on by pushing "RANGE" key button.

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OPERATION

This instrument has been designed and tested in accordance with IEC Publication 1010 "Safety Requirements for Electronic Measuring Apparatus", and has been supplied in a safe condition. This instruction manual contains some information and warning which have to be followed by the user to ensure safe operation and to retain the instrument in safe condition.

3-1 Preparation and Caution before Measurement.

1. Before measurement, warm up for at least 60 seconds.
2. When the function switch selector is changed during measurement, be sure do so only after removing the test leads from the equipment.
3. If the equipment is used near noise generating equipment, be aware that display may become unstable or indicate large errors.
4.  Maximum rated voltage to earth for voltage measurements terminals is 600V AC/DC CAT. II.

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3-2 Voltage Measurements

1. Connect the red test probe to the "V- Ω " input terminal and the other (black) test lead to the "COM" terminal.
2. Set the function switch to " \tilde{V} , \overline{V} " position.
3. Push the blue key to the ACV or DCV function.
4. Connect the test probe and lead to the device to be measured.

WARNING


TO AVOID ELECTRICAL SHOCK, HAZARD OR DAMAGE TO METER, DO NOT ATTEMPT TO MEASURE VOLTAGE THAT MIGHT EXCEED 600 VOLT DC OR 600 VOLT AC. DO NOT APPLY MORE THAN 600 DC OR AC RMS BETWEEN THE COMMON INPUT TERMINAL AND EARTH GROUND.

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NOTICE

UNSTABLE DISPLAY MAY OCCUR ESPECIALLY AT 300mV RANGE, EVEN THOUGH YOU DON'T PUT TESTED LEADS INTO INPUT TERMINALS. IN THIS CASE, IF AN ERRONEOUS READING IS SUSPECTED, SHORT THE "V- Ω " TERMINAL AND THE "COM" TERMINAL, AND MAKE SURE THE ZERO DISPLAY.

3-3 Resistance Measurement

1. Connect the red test probe to the "V- Ω " terminal and the other (black) test lead to the "COM" terminal.
2. Set the function switch to " Ω , \rightarrow  " position and push the blue key to select resistance function.
3. For correct reading, ensure that the device being tested contains no voltage.
4. Connect the test leads across the resistor to be measured. In order to ensure the best accuracy in measurement of low resistance, short the test leads before measurement and memory the test probe resistance in mind. This necessary to subtract for the resistance of the test leads themselves.

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3-4 Continuity Check by Buzzer

1. Connect the red test probe to the "V-Ω" terminal and the other black test lead to the "COM" terminal.
2. Set the function switch to "Ω →" position, and push the blue key to select continuity function.
3. Connect the test probe and lead to the circuit to be measured. The buzzer will sound if the resistance of the circuit measured is lower than 20 Ω.

3-5 Diode Check

1. Set the function switch at "Ω →" position, and push the blue key to select diode function.
2. Connect black test lead to "COM" terminal and red probe to "V-Ω" input terminal.
3. Connect test probe and lead to the diode normally the forward voltage drop of good silicon diode is shown between 400V to 900V. If the diode under test is defective, "000" (short circuit) or "OL" (non-conductance) is displayed.
Reverse check of diode if the diode under test is defective "000" or other value are to be displayed.

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4-1 MAINTENANCE REPLACEMENT

WARNING

TO REDUCE RISK OF ELECTRIC SHOCK DISCONNECT TEST LEADS BEFORE OPENING CASE.

1. **Test lead Assembly** : Part No. TL 9 Max 1KV.
2. **Battery Replacement** :
The meter is powered by two 1.5V battery. Refer to Figure 2 and use the following procedure to replace the battery.
 1. **Disconnect the test leads and turn the meter off.** Remove the test probe and lead from the input terminals.
 2. Position the meter face down. Remove the screw from the case bottom.

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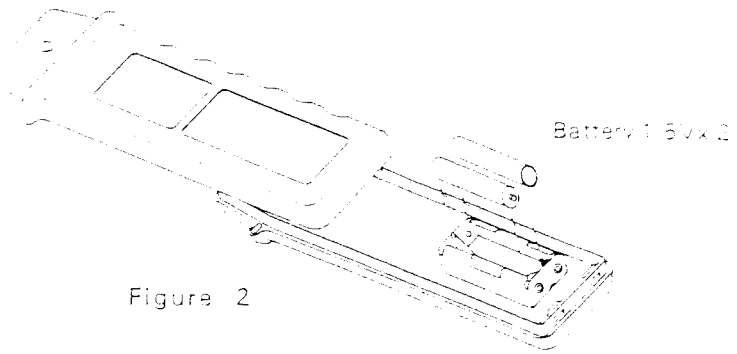
3. Lift the end of the case bottom unit it gently unsnaps from the case top at the end nearest the input terminal.
4. Lift the battery from the battery box.
5. Reinsert the new battery into the battery box.
6. Replace the case top and case bottom. Reinstall the screw.

4-2 General Maintenance

1. Repairs or servicing not covered in this manual should only be performed by qualified personal.
2. Periodically wipe the case with a dry cloth and detergent do not use abrasives or solvents.

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1 SCREW



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Service Information

Warranty Service : Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

Non-Warranty Service : Please return the product in the original packaging to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges contact the factory before shipping the product. Return all merchandise to B+K Precision with pre-paid shipping. The flat-rate repair charge includes return shipping to locations in North America. For overnight shipments and non-North America shipping fees contact B+K Precision.

Include with the instrument your complete return shipping address, contact name, phone number and description of problem.

BK PRECISION®

**MODEL CH-100
CLAMP HEAD FOR PEN-STYLE DMM**

P/N : 480-798-9-001
Printed in Taiwan

Limited Three Year Warranty

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Date Purchased : _____

INTRODUCTION

1-1 Unpacking and Inspection

Upon removing your new current transducer from it's packing, you should have the following items :

1. Current Transducer.
2. Instruction manual.

1-2 Meter Safety

Terms as Marked on Equipment.

ATTENTION : Refer to manual.

DOUBLE INSULATION : Protection Class II.

DANGER : Risk of electric shock.

Symbols in This Manual.

This symbol indicates where cautionary or other information is found in the manual.

1-3 Front View

Refer to Figure 1 and to the following numbered steps to familiarize yourself with the transducer.

1. **Transformer Jaws** — Designed to pick up the a.c. current following through the conductor.
2. **Hand Guard** — Designed to protect user for safety.
3. **Trigger** — Press the lever to open the transformer jaws.

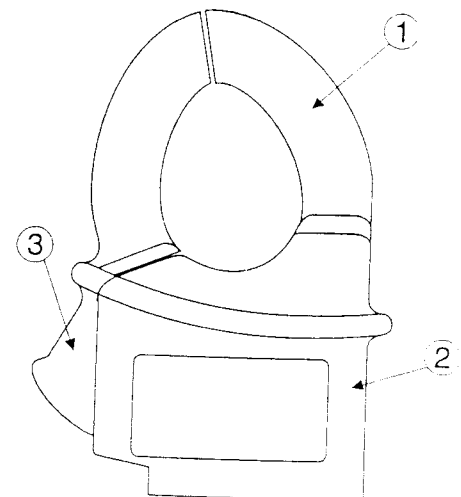
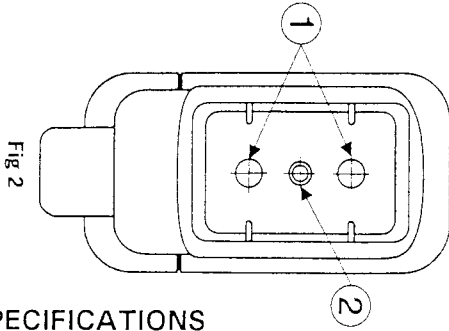


Fig 1.

1-4 Bottom View

Refer to Figure 2 and to the following numbered steps to familiarize yourself with the transducer.

1. **Output Plugs** — Output terminals.
2. **Adjusting Hole** — For service personnel use only.



SPECIFICATIONS

2-1 General Specifications

Current Range :0.1A to 300A a.c. RMS

Output Voltage :1mV a.c. per 0.1Amp a.c.

Type of Sensing : Induction coil sensing for AC current.

Temperature Coefficient : $0.2 \times (\text{Spec Acc'y}) / ^\circ\text{C}$, $< 18^\circ\text{C}$ or $> 28^\circ\text{C}$.

Maximum Output Impedance : 120Ω.

Maximum Jaw Opening : 30mm.

Maximum Conductor Size:29mm diameter.

Size : 72mm(W) x 102mm(L) x 36mm(D).

Weight : 150grams.

Accessories : Manual.

2-2 Environmental conditions

Indoor Use.


Maximum Altitude : 2000 Meter.

Installation Category : IEC 1010 600V, CAT II.

Pollution Degree : II.

Operating Ambient : 0 °C to 45 °C < 75% R.H.

Storage Temperature : -20 °C ~ 60 °C.

 THIS INSTRUMENT MUST NOT BE USED ON UNINSULATED CONDUCTORS AT A VOLTAGE GREATER THAN 600V ac/dc.

2-3 Electrical Specification

Accuracy is \pm (%reading + number of Ampere) at $23^\circ\text{C} \pm 5^\circ\text{C}$, less than 75% R.H.

Range	Measure	Output	Accuracy
300A	3Amp	0.030V	$\pm(1.9\% + 0.5A)$ 50 ~ 60Hz
	30Amp	0.300V	
	300Amp	3.000V	

OPERATION

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3-1 Precautions and Preparations for measurement

1. Do not apply the voltage to the output plugs.
2. Do not use or store this instrument in a high temperature or high humidity environment and do not store the unit indirect sunlight.
3. Do not measure current before the unit is not combined with DMM.
4. If the instrument is used near noise generating equipment, be aware that output voltage may become unstable or get more errors.

3-2 AC Current Measurement

1. Set the DMM at ACV Function and 3V range.
2. Insert the Transducer with DMM and combined firmly.
3. Press the trigger to open transformer jaws and clamp one conductor only, making sure that the jaw is firmly closed around the conductor, then read the reading from the digital display of DMM.

MAINTENANCE

To keep the instrument clean, wipe the case with a dry cloth and detergent, do not use abrasives or solvents. Any adjustment, maintenance and repair shall be conducted by a service personnel.

Service Information

Warranty Service : Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

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B+K Precision

P/N: 480-797-9-001
Printed in Taiwan

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Instruction Manual

CE

MODEL TP-30B
MULTIMETER TEMPERATURE ADAPTER

Limited Three Year Warranty

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Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

INTRODUCTION

1-1 Unpacking and Inspection

Upon removing your new Thermocouple Module from its packing, you should have the following items:

1. Thermocouple Module.
2. K-type Bead Thermocouple.
3. Operator's manual.


1-2 Meter safety

Terms as Marked on Equipment.

 **ATTENTION** Refer to manual.

 **BATTERY**

Symbols In This Manual.

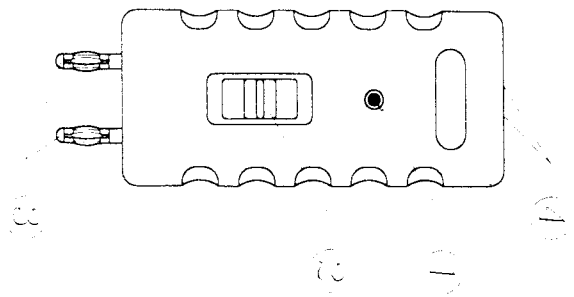
 This symbol indicates where cautionary or other information is found in the manual.

1-3 Front Panel

Refer to Figure 1 and the following numbered steps to familiarize yourself with the meter's front panel controls and connectors.

1. **LED** : Power on display. (Flashing).
2. **Function Switch** : Slide switch used to select measuring function.
3. **Output Plugs** : Voltage output.
4. **Thermocouple Input Connector** : This is used to connect the thermocouple.

Figure 1



SPECIFICATIONS

2-1 General Specifications

This thermometer conforms to the temperature / voltage tables of the National Bureau of Standards and to the IEC 584 Standards for K-type.

1. **Temperature Scale** : Celsius or Fahrenheit user selectable.
2. **Input** : Single K-type thermocouple.
3. **Output to Meter** : 1mV/dc per °C or °F.
4. **Measurement Range** : -50°C ~ 1000°C , -58°F ~ 1832°F
5. **Low Battery Indication** :
 1. Turn to power off.
 2. Insert the "output plugs (V and COM)" to the input terminals of multimeter to "DCV" range.
 3. Read the display on the multimeter. Replace the battery , if the reading is less than 7.1V
6. **Temperature Coefficient** : 0.1 x (spec.Accuracy) / °F , < 64°F or > 82°F , (0.15 x (spec.Accuracy) / °C , < 18°C or > 28°C)
7. **Power Requirements** : Standard 9V battery , NEDA 1604 JIS 006P or IEC6F22 Size.

8. **Battery Life** : Alkaline 300 hours.
 9. **Dimensions** : 122mm(L) x 46mm(W) x 30mm(D)
 10. **Weight (including battery)** : 114 gms.
 11. **Accessories** : K-type bead thermocouple , battery (installed), operator's manual.

2-2 Environmental Conditions

1. **Indoor Use.**
2. **Operating Ambient** : 0% to 80% R.H. (0 to 35°C) , 0% to 70% (35 to 50°C) R.H.
3. **Storage Temperature** : -20°C ~ 60°C 0 to 80% R.H. with battery removed from meter.

2-3 Electrical Specifications

Measurement Range	Accuracy	Input Protection
-50°C ~ -20°C	±(2.0% rdg + 2°C)	60Vdc & 24Vrms
-58°F ~ -4°F	±(2.0% rdg + 4°F)	
-19°C ~ 350°C	±(0.5%rdg + 2°C)	
-3°F ~ 662°F	±(0.5%rdg + 4°F)	
351°C ~ 500°C	±(2.0%rdg + 2°C)	
663°F ~ 932°F	±(2.0% rdg + 4°F)	
501°C ~ 1000°C	±(2.9% rdg + 2°C)	
933°F ~ 1832°F	±(2.9% rdg + 4°F)	

Thermocouple Characteristics : K-Type Thermocouple

50BK bead thermocouple

Temperature Range : -40°C to 204°C (-40°F to 399.2°F).

Tolerances : ±(2.2°C or 0.75%) from 0°C to 204°C , ±(4.0°F or 0.75%) from 32°F to 399.2°F.

±(2.2°C or 2.0%) from -40°C to 0°C , ±(4.0°F or 0.75%) from -40°F to 32°F.

Wire Length : 1m. with miniature plug. Teflon tape insulated.

3-2 Temperature Measurements

1. Connect the plug of the thermocouple to the connector of the thermometer.
2. Select the °C / °F function desired.
3. Insert the "Output Plugs (V and COM)" to the input terminals (V and COM) of Multimeter. Observe the proper polarity of reading will be inaccurate.
4. Set the Multimeter to "DC mV or V" range.
5. Use the sensing point of thermocouple to measure the surface to be measured.
6. Read the stable reading.
7. "Warning" : Do not measure the surface that the potential exceeds 60V d.c. or 24V r.m.s.

MAINTENANCE

⚠ TO AVOID ELECTRICAL SHOCK REMOVE TEST THERMOCOUPLE BEFORE OPENING THE COVER.

4-1 General Maintenance

1. To keep the instrument clean, wipe the case with a dry cloth and detergent. do not use abrasives or solvents
2. Any adjustment maintenance and repair shall be by a skilled person about temperature technology . To maintain a thermocouple in good condition , shall observe the following items.
 - Avoid excess bending .
 - Don't overheat the thermocouple.
 - Avoid chemical reactions that can damage the thermocouple.

4-2 Battery Replacement

The meter is powered by a alkaline 9V battery .Refer to Figure 2 and use the following procedure to replace the battery.

1. Disconnect the output plugs and turn the meter off. Remove the connector of the thermocouple from connector of the meter.
2. Position the meter face down. Remove the screw from the bottom case.
3. Remove the bottom case.
4. Carefully disconnect the battery from bottom case.
5. Replace with a new 9V battery and reinstall the bottom case and screw.

OPERATION

This instrument is designed to use external K-type thermocouple as temperature sensor. Temperature indication follows National Bureau of Standards and IEC 584 temperature / Voltage tables for K-type Thermocouple supplied with the thermometer.

⚠ WARNING : TO AVOID ELECTRICAL SHOCK . DO NOT USE THIS INSTRUMENT WHEN VOLTAGES AT THE MEASUREMENT SURFACE EXCEED 24V r.m.s. AC OR 60V DC. TO AVOID DAMAGE OR BURNS . DO NOT MAKE TEMPERATURE MEASUREMENTS IN MICROWAVE OVENS.

3-1 Preparation and Caution before Measurement

1. Before measurement , warm up for at least 30 seconds , after connecting the thermocouple to the connector of thermometer.
2. If the instrument is used near noise generating equipment , be aware that the voltage output may become unstable or indicate large errors.

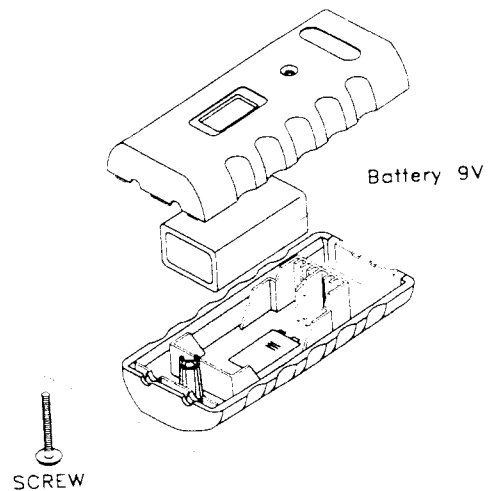


Figure 2

Service Information

Warranty Service : Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

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B+K Precision
1031 Segovia Circle
Placentia, CA 92870
Phone : 714-237-9220
Facsimile : 714-237-9214

P/N: 480-797-9-001
Printed in Taiwan

Include with the instrument your complete return shipping address, contact name, phone number and description of problem.