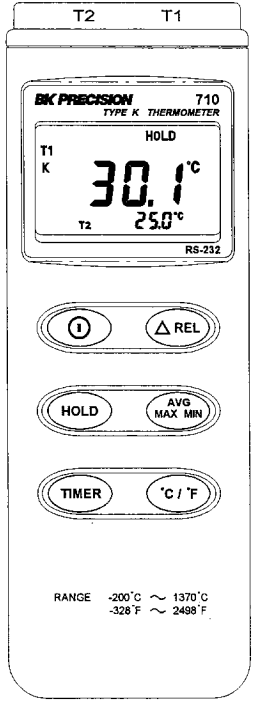
BK PRECISION 710

Instruction Manual



CE

TYPE K THERMOMETER

CONTENTS

I. Introduction:

This instrument is a digital thermometer for use with any K-type thermocouple as temperature sensor.
Temperature indication follows National Bureau of Standards and IEC584 temperature/voltage table for K-type thermocouples.

II. Specifications:

Numerical Display:
4 digital liquid crystal display

Measurement Range:
-200°C ~ 1370°C -328°F ~ 2498°F

Resolution:
-200°C~ 200°C 0.1°C ; 200°C ~1370°C 1°C
-200°F~ 200°F 0.1°F ; else 1°F

Maximum Voltage at Thermocouple Input:
60V DC, or 24Vrms AC

Environmental:

- Operating Temperature and Humidity:
  0°C ~50°C (32°F ~ 122°F) ; 0 ~ 80% RH
- Storage Temperature and Humidity:
  -10°C to 60°C (14°F ~ 140°F); 0 ~ 80% RH
- Altitude up to 2000 meters.

Accuracy: at (23 ± 5°C)

Range	Accuracy
-200°C ~ 200°C	±(0.3% reading + 1°C)
200°C ~ 400°C	±(0.5% reading + 1°C)
400°C~1370°C	±(0.3% reading + 1°C)
-328°F ~ -400°F	±(0.5% reading + 2°F)
-200°F ~ 200°F	±(0.3% reading + 2°F)
200°F ~ 400°F	±(0.5% reading + 2°F)
400°F ~ 2498°F	±(0.3% reading + 2°F)

For T1-T2 Measurement, the accuracy is
±(0.5% T1-T2 reading + 2°C)
or ±(0.5% T1-T2 reading + 2°F)

Temperature Coefficient:
For ambient temperatures from 0°C ~ 18°C and 28°C ~ 50°C, for each °C ambient below 18°C or above 28°C add the following tolerance into the accuracy spec.

0.01% of reading + 0.03°C (0.01% of reading + 0.06°F)

Note:
The basic accuracy Specification does not include the error of the probe please refer to the probe accuracy specification for additional details.

Sample Rate: 0.6 times per second

Dimension: 184 x64 x30mm

Weight: 210g Approx.(7.4oz)

Accessory:
K Type Bead Probe, Battery, Carrying Case, Instruction Menu.

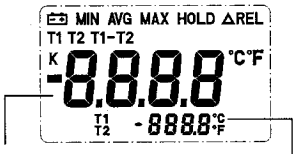
Option:
Soft Ware Package (Program, RS232 Connection Cable) , AC Adapter.

Power requirement:
9 Volt Battery, NEDA 1604 or JIS 006P or IEC6F22

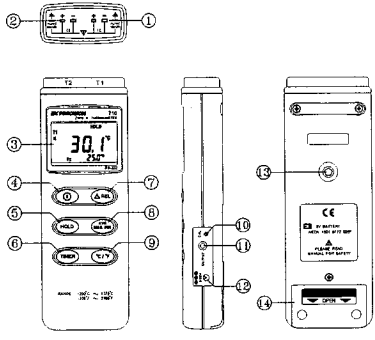
Battery Life:
Approx. 100hrs with alkaline battery

AC Adapter:
9VDC ±15% 100mA ; Plug Diameter: 3.5x1.35mm

III. Symbol Definition and Button Location:



- : This indicates that the minus temperature is sensed.
°C °F : Centigrade and Fahrenheit indication.
K : Thermocouple Type Indication
HOLD : This indicates the value present when the Hold button was pressed.
MAX : The Maximum value is now being displayed
MIN : The Minimum value is now being displayed
AVG : The Average value is now being displayed.
△REL : The reading is now under Relative Mode.
: The Battery is not sufficient for proper operation.



Button Location:

① T1 K type temperature sensor connector
② T2 K type temperature sensor connector
③ LCD display
④ ON/OFF button
⑤ HOLD button
⑥ T1,T2,T1-T2 control button
⑦ Relative readout button
⑧ MAX MIN Average control button
⑨ °C, °F control button
⑩ Offset calibration screw
⑪ Digital output connector
⑫ AC power adapter connector
⑬ Tripod connector
⑭ Battery cabinet cover

IV. Operation Instructions:

4.1 Power-Up

Press the ⏻ key to turn the thermometer On or OFF.

4.2 Connection of Thermocouples

For measurement, plug the thermocouple into the input connectors.

4.3 selecting the Temperature Scale

When the meter is first powered on, the default scale setting is set at Celsius (°C) scale. The user may change it to Fahrenheit (°F) by pressing " **°C/°F** " button and vice versa to Celsius.

4.4 Data-Hold Operation

The user may hold the present reading and keep it on the display by pressing the " **HOLD** " button. When the held data is no longer needed, one may release the data-hold operation by pressing " **HOLD** " button again.

When the meter is under Data Hold operation, the "△REL", (AVG MAX MIN) and " °C/°F " button are disabled.

4.5 T1,T2,T1-T2 Display Control:

One may select T1,T2 or T1-T2 to show on the main display by pressing (T1 T2 T1-T2) button. When T1 or T2 is select to show on the main display, the other temperature will be shown on the second display. When one select T1-T2 to show on the main display, T1 and T2 will be shown on the second display alternately.

4.6 Relative Operation for Main Display:

When the "△REL" button is pressed, the meter will memorize the present reading and the difference between the new reading and the memorized data will be shown on the display. Press the "△REL" button again to exit the Relative operation.

4.7 MAX/MIN/AVG Operation for Main Display:

When the (AVG MAX MIN) button is pressed the meter will enter the MAX/MIN mode. Under this mode the maximum value, minimum value and average value of latest 8 readings is kept in the memory simultaneously and updated with every new reading.

When the MAX symbol is display, the Maximum is shown on the display.

Press (AVG MAX MIN) again, then the NIN symbol is on the display and also the minimum reading.

Press (AVG MAX MIN) again, the AVG symbol is on the display and also the average reading.

Press (AVG MAX MIN) again, MAX, MIN and AVG will blink together. This means that all these data is updated in the memory and the reading is the present temperature.

One may press (AVG MAX MIN) to circulate the display mode among these options.

When the meter is under operation, "△REL" and " °C/°F " are disabled.

To exit the MAX/MIN mode, one may press and hold (AVG MAX MIN) for two seconds.

4.8 Auto Power Off:

By default, when the meter is powered on, it is under auto power off mode. The meter will power itself off after 30 minutes if no key operation or RS232 communication. Key combination at power on or RS232 communication can disable auto power off.

One may press and hold " HOLD " button and then power on the meter and there will be two successive beeps to indicate that auto power off is disabled.

4.9 Low Battery Condition

When the battery voltage is under proper operation requirements, the [+-] symbol will show on the LCD and the battery will need to be replaced with new one.

4.10 Calibration Point:

Room Temperature 23 ± 3°C

Input	0 °C	190 °C	1000 °C	1900 °F
Adjust VR	VR1	VR2	VR3	VR4
Tolerance	± 0.1 °C	± 0.1 °C	± 1 °C	± 1 °F

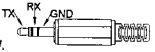
Normally, performing offset Calibration with thermal stabled ice water through VR1 will give a very good calibration result.

4.11 Digital Output:

The Digital Output is a 9600bps N 81 serial interface.

The RX is a 5V normal high input port.

The TX is a 5V normal high output port.



The command of Digital Output is list below.

RS232 command	Function	Remarks
K(ASC 4BH)	Ask for model No.	Send 4 bytes
D(ASC 44H)	Ask for main display Range, Data, Unit	Send 22 bytes
B(ASC 42H)	Ask for secondary display Range, Data, Unit	Send 22 bytes
S(ASH 53H)	Ask Status	Send 13 bytes
H(ASC 48H)	Hold button	
T(ASC 54H)	TIMER button	
M(ASC 4DH)	AVG/MAX/MIN button	
N(ASC 4EH)	Exit AVG/MAX/MIN mode	
R(ASC 52H)	REL button	

C(ASC 43H)	C/F button	
A(ASC 41H)	Inquire all encoded data	Send encoded 8 byte

- **Command K:**

  Return 4 bytes. For example, when sends command "K" to meter, it will return "3","0","1", ASCII(13) .

- **Command D:**

  Return data of main window.
  Range: T1, T2, T1-T2 (7bytes), the unused characters is left as space ASC(13).
  Data: ± 9999.9,-OL,OL
  (7bytes include polarity and decimal point), Unit: C,F(5bytes)
  When the meter receive the D command, it will send :
  Range□Data□Unit. (where □ represent space (ASC(20H))
  For example:
  T1□□□□□□-199.9□□C□□□□
  (0x13) represent T1,- 199.9°C, The total byte number should be 7+1+7+1+5+chr(13)=22Bytes

- **Command B:**

  Return the contents in the second display.

- **Command S:**

  Return the operation mode HOLD□MAX□REL, if the mode is not entered, the related characters will be left as space.
  For example:
  when the meter is under MAX display, the meter will return:
  □□□□□MAX□□□□

- **Command T:**

  Equivalent to one pushing on the HOLD button.

- **Command M:**

  Equivalent to one pushing on the HOLD AVG/MAX/ MIN button and no message is returned.

- **Command R:**

  Equivalent to one pushing on the REL button and no message is returned.

- **Command R:**

  Equivalent to one pushing on the REL button and no message is returned.

- **Command C:**

  Equivalent to one pushing on the C/F button and no message is returned.

- **Command A:**

  1nd BYTE:

  The first byte is the start byte , it value is 2.

  2nd BYTE:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
C/F	Low Bat	Hold	REL	K/J	MAX/AVG/MIN		

  bit 2 bit 1 bit0
  0 0 0 → normal mode
  0 0 1 → MAXIMUN mode
  0 1 0 → MINIMUN mode
  1 0 0 → AVG mode
  1 1 1 .→ calculate MAX/MIN/AVG in back-ground and lcd "MAX""AVG""MIN" will flash.
  bit3:1→0→K TYPE 1→J TYPE
  bit4:1→REL
  bit5:1- HOLD 0→not HOLD
  bit6:1→LOW BATTERY 0→BATTERY NORMAL
  bit7:1→C 0→F

  3nd BYTE:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
		point	minus	OL	point	minus	OL

  bit0:1→main window value is OL 0→not OL
  bit1:1→main window value is minus, 0→main window value is plus.
  bit2:1→4th byte and 5th byte represent #### 0→4th byte and 5th byte represent ###.#
  bit3:1→sub window value is OL 0→not OL
  bit4:1→sub window value is minus, 0→sub window value is plus.

bit5:1→6th byte and 7th byte represent #### 0→6th byte and 7th byte represent ###.#

bit7 bit6:

00→Main window is T1-T2,sub window is T1

01→Main window is T1-T2, sub window is T2

10→Main window is T1, sub window is T2

11→Main window is T2, sub window is T1

4th BYTE: first two BCD code of main window value.

5th BYTE: last two BCD code of main window value

6th BYTE: first two BCD code of sub window value.

7th BYTE: last two BCD code of sub window value.

8th BYTE: The last byte is the end byte , it value is 3, first and last byte are used to check frame error.

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: 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 Corp. 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 Corp..

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

Limited one-Year Warranty

B&K Precision Corp. 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 one years from the data of purchase.

B&K Precision Corp. 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 Corp., 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 a result of unauthorized alternations or repairs. It is void if the serial number is alternated, defaced or removed.

B&K Precision Corp. 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.

Model Number: _____ Date Purchased: _____