

# **BK PRECISION®**

Model: 392 and 393

## Handheld Digital Multimeters

USER MANUAL





## **Safety Summary**

The following safety precautions apply to both operating and maintenance personnel and must be observed during all phases of operation, service, and repair of this instrument. Before applying power, follow the installation instructions and become familiar with the operating instructions for this instrument.

If this device is damaged or something is missing, contact the place of purchase immediately.

This manual contains information and warnings that must be followed to ensure safe operation as well as maintain the meter in a safe condition.

### ***DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE***

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

### ***KEEP AWAY FROM LIVE CIRCUITS***

Instrument covers must not be removed by operating personnel. Component replacement and internal adjustments must be made by qualified maintenance personnel. Disconnect the power cord before removing the instrument covers and replacing components. Under certain conditions, even with the power cable removed, dangerous voltages may exist. To avoid injuries, always disconnect power and discharge circuits before touching them.

### ***DO NOT SUBSTITUTE PARTS OR MODIFY THE INSTRUMENT***

Do not install substitute parts or perform any unauthorized modifications to this instrument. Return the instrument to B&K Precision for service and repair to ensure that safety features are maintained.

## **WARNINGS AND CAUTIONS**

**WARNING** and **CAUTION** statements, such as the following examples, denote a hazard and appear throughout this manual. Follow all instructions contained in these statements.

A **WARNING** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.

A **CAUTION** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of part or all of the product.

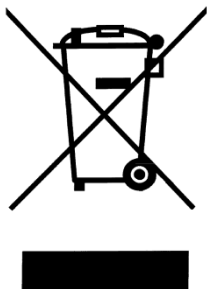
### **WARNING**

To avoid potential fire or shock hazard:

- Disconnect all leads, power adapter, and USB cable before opening the battery cover.
- Do not turn on the instrument while the battery cover is removed.
- Use only the included insulated test leads and power adapter supplied with the instrument.
- Observe all markings and ratings on the instrument before connecting to the instrument.
- While making measurements, verify that the performance ratings of instruments and accessories that are used meet the correct safety levels of the instrument.
- Do not insert metal objects into any of the connectors.
- Use the meter only as specified in this manual
- Test the meter on a known voltage before using it to determine if hazardous voltage is present.
- Never ground yourself when taking electrical measurements.

## Compliance Statements

**Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)**



**This product is subject to Directive 2002/96/EC of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE) , and in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and otherwise observe all applicable requirements.**

# CE Declaration of Conformity

The power supply meets the requirements of 2006/95/EC Low Voltage Directive and 2004/108/EC Electromagnetic Compatibility Directive with the following standards.

## Low Voltage Directive

- EN 61010-1  
Safety requirements for electrical equipment for measurement, control, and laboratory use-Part 1: General requirements

## EMC Directive

- EN 61326-1: 2006

## Safety Symbols



Electrical Shock hazard.



Caution, refer to the operating user manual for warning information to avoid hazard or personal injury and prevent damage to instrument.

- CATI**      **Category I overvoltage conditions.**  
Measurement instruments whose measurement inputs are not intended to be connected to the mains supply. The voltages in the environment are typically derived from a limited-energy transformer or a battery.
- CATII**      **Category II overvoltage conditions.**  
Measurement instruments whose measurement inputs are meant to be connected to the mains supply at a standard wall outlet or similar sources.
- CATIII**      **Category III overvoltage conditions.**  
Measurement instruments whose measurement inputs are meant to be connected to the mains installation of a building.
- CATIV**      **Category IV overvoltage conditions.**  
Measurement instruments whose measurement inputs are meant to be connected to the source of power for a given building.

## Environmental Conditions

The instrument may be operated in the following environment.

Operating Environment	0 °C to 40 °C
Storage Humidity	0 – 85% R.H.
Storage Environment	-20 °C to +70 °C
Pollution degree	Pollution degree 2
Measurement Category	CAT III, CAT IV

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# 1 General Information

## 1.1 Product Overview

The B&K Precision 392 and 393 handheld digital multimeters provide standard measurement functions, which include AC and DC voltage, AC and DC current, resistance, capacitance, diode, and continuity.

### Features:

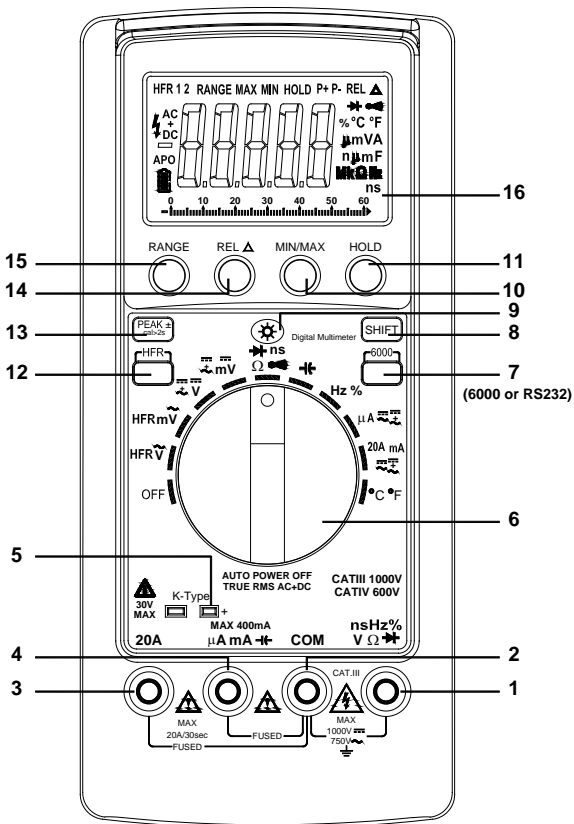
- 60,000 Count display resolution
- DC Voltage measurement up to 1000 V
- AC Voltage measurement up to 750 V
- AC and DC Current up to 20 A
- USB interface for remote communication (model 393)

## 1.2 Package Contents

Please inspect the instrument mechanically and electrically upon receiving it. Unpack all items from the shipping carton, and check for any obvious signs of physical damage that may have occurred during transportation. Report any damage to the shipping agent immediately. Save the original packing carton for possible future reshipment. Every multimeter is shipped with the following contents:


- **1 x 392 or 393 Digital Multimeter**
- **1 x 9 V Battery (inside battery compartment)**
- **1 x User Manual**
- **1 x Pair of TL 35A DMM test leads**
- **1 x USB cable (model 393 only)**
- **1 x CD utility software (model 393 only)**
- **1 x Replacement fuse (500 mA)**
- **1 x K-Type thermocouple**
- **1 x Certificate of Compliance card**
- **1 x Accessories pamphlet**

### 1.3 Front Panel Overview



### Figure 1 - Front Panel View

## Front Panel Description

①	<b>VΩHz%ns→+</b>	The positive input terminal for Voltage, Ohms, Frequency, Duty Cycle, Conductance, Diode measurements. Connection is made using the red test lead.
②	<b>COM</b>	The negative (ground) input terminal for all measurement modes. Connection is made to it using the black test lead.
③	<b>20A</b>	The positive input terminal for up to 20 A current measurement.
④	<b>μAmA</b> 	The positive input terminal for μA, up to 400 mA, and capacitive measurements.
⑤	<b>K-Type</b>	The thermocouple input terminal for temperature measurements.
⑥	<b>Function/Range Rotary Switch</b>	Selects the function and desired range.
⑦	<b>6000/RS232</b>	392 models, this switches between 6000 and 60000 counts. 393 models this enables computer interface.
⑧	<b>Shift</b>	Cycles through the available secondary options of each function indicator.
⑨	<b>Backlight</b>	Press to activate LCD backlight for approximately 3 minutes.
⑩	<b>MAX/MIN</b>	“MAX” displays the maximum value measured. “MIN” displays the minimum value measured. Pressing button for more than 2 seconds exits this mode.
⑪	<b>HOLD</b>	Displays the current value on the display even if the leads are removed from device under test. Pressing the button again returns to current reading measurement mode.
⑫	<b>HFR</b>	Toggles between “HFR1” (High Frequency Rejection > 1kHz and “HFR2” (High Frequency Rejection > 100kHz) on AC voltage ranges.

13	<b>PEAK+ Cal&gt;2S</b>	Records the peak+ and peak- values of a measurement with a response time as low as 1ms. Pressing the button for more than 2 seconds will exit the mode.
14	<b>REL Δ</b>	Pressing the REL button enters the Relative mode where the meter will use the displayed value at the time of the button press as an offset value and that value will be subtracted from the display of future measurements. While taking measurements in REL mode you can press the REL button again to show the measured value without the REL offset value. Pressing the REL button for more than 2 seconds exits the mode.
15	<b>RANGE</b>	Press the Range button to select the Manual Range mode. The meter remains in the range it was in when the button is pressed. Each press of the RANGE button will cycle through the available ranges. Pressing the button for more than 2 seconds will exit the Manual Range mode and will go back to the Auto Range mode.
16	<b>Display</b>	Displays the measured values, selected function mode, and annunciators.

## 2 Getting Started

### 2.1 Using the Digital Multimeter

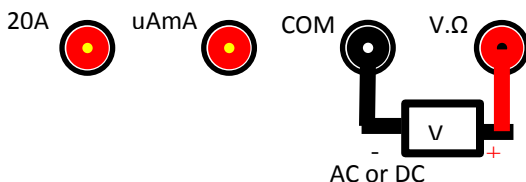
With no signal present, set the rotary switch to the desired measurement function. Ensure proper insertion of the test leads so they correspond with the type of measurement you wish to perform, see the following instructions to understand the proper lead configuration for each measurement type.

### 2.2 DC and AC Voltage Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform.

Follow these steps to make a measurement.

1. Connect the negative (-) side with the black test lead to the **COM** input.
2. Connect the positive (+) side with the red test lead to the **VΩHz** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



**Figure 2 - Connection for AC or DC Voltage Measurement**

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**WARNING:**

**Never connect more than 750 V AC or 1000 V DC  
across the input terminals.**

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## 2.3 DC and AC Current Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform.

Current measurements can be made in low current or high current mode. In low current measurement mode, you can measure up to 400 mA. Connect to the low current **mA** terminal and select one of the two ranges. In high current measurement mode, you can measure up to 20 A by selecting one of the two ranges and connecting to the **20 A** input terminal.

**DC Current ranges:** 600  $\mu$ A (low), 6000  $\mu$ A (low), 60 mA (low), 400 mA (low), and 20 A (high).

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### CAUTION:

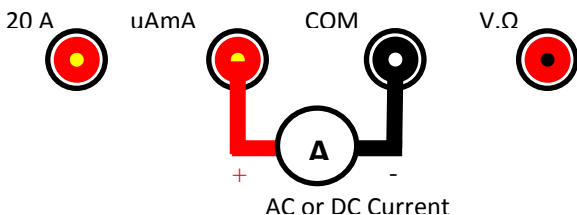
**Always connect the test leads to the instrument inputs first before connecting the DUT to avoid potential shock hazard.**

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### *Low Current Measurements (< 400 mA)*

Follow these steps to make measurements < 400 mA.

1. Connect the negative (-) side with the black test lead to the **COM** input.
2. Connect the positive (+) side with the red test lead to the **mA** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



**Figure 3 - Connection for Low AC or DC Current Measurement**

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**WARNING:**

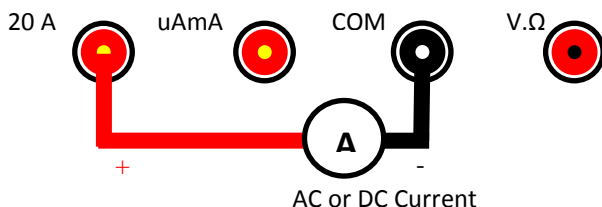
**Do not connect more than 400 mA DC current across the mA input terminal or the protection fuse will be tripped.**

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## ***Higher Current Measurements (Up to 20 A)***

Follow these steps to make measurements up to 20 A.

1. Connect the negative (-) side with the black test lead to the **COM** input.
2. Connect the positive (+) side with the red test lead to the **20 A** input.
3. Probe with the test leads to the DUT and take the measured reading on display.
4. If measuring more than 10 A, keep measurement time shorter than 30 seconds followed by a 10 minute cool down period.



**Figure 4 - Connection for Higher AC or DC Current Measurement**

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**WARNING:**

**Do not connect more than 20 A DC current across the 20 A input terminal or the protection fuse will be tripped.**

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## 2.4 Make Resistance Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform.

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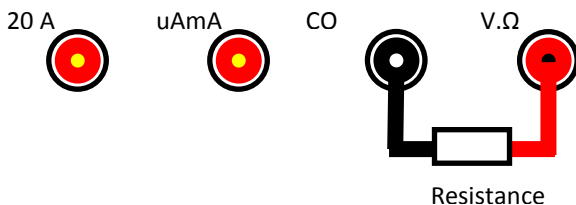
### CAUTION:

**Always connect the test leads to the instrument inputs first before connecting the DUT to avoid potential shock hazard.**

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Follow these steps to make a measurement.

1. Connect the black test lead to the **COM** input. Note that the measurement voltage polarity is positive on **COM** input.
2. Connect the red test lead to the **V $\Omega$ Hz%** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



**Figure 2 - Connection for Resistance Measurement**

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### WARNING:

**Do not apply more than 1000 V DC across the terminals or they will be damaged.**

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## 2.5 Make Diode Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform. Press the shift button to cycle to the diode function.

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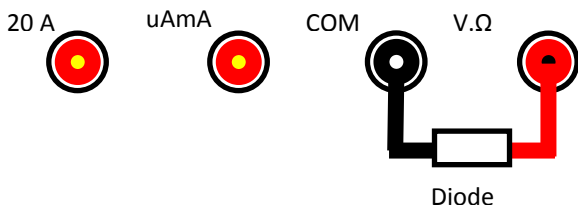
**CAUTION:**

**Always connect the test leads to the instrument inputs first before connecting the DUT to avoid potential shock hazard.**

---

Follow these steps to make a measurement.

1. Connect the black test lead to the **COM** input.
2. Connect the red test lead to the **V $\Omega$ Hz%ns** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



**Figure 3 - Connection for Diode Measurement**


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**WARNING:**

**Do not apply more than 1000 V DC across the terminals or they will be damaged.**

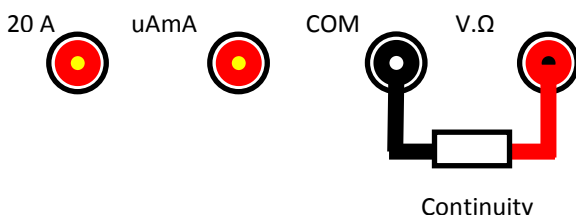
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## 2.6 Continuity Test

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform. Press the shift button to display the continuity icon .

Follow these steps for continuity testing:

1. Connect the black test lead to the **COM** input.
2. Connect the red test lead to the **V $\Omega$ Hz** input.
3. Connect the two leads together to verify that the continuity function is working properly. The instrument should have a continuous beep sound.
4. Probe with the test leads to the DUT and take the measured reading on display.
5. If continuity is good, it will have a continuous beep sound.



**Figure 4 - Connection for Continuity Test**

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**WARNING:**

**Do not apply more than 1000 V DC across the terminals or they will be damaged.**

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## **2.7      Make Capacitance Measurements**

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform.

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**WARNING:**

**Fully discharge the capacitor before connecting it to any of the inputs or it may damage the instrument.**

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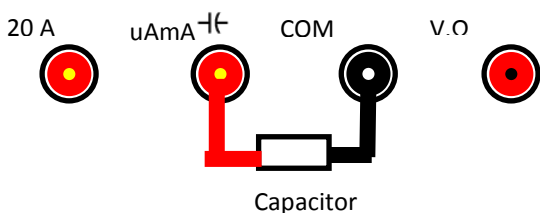
**CAUTION:**

**Always connect the test leads to the instrument inputs first before connecting the DUT to avoid potential shock hazard.**

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Follow these steps to make a capacitance measurement.

1. Connect the black test lead to the **COM** input. This will connect to the negative side of your capacitor.
2. Connect the red test lead to the **uAmA**  input. This will connect to the positive side of your capacitor.
3. Probe with the test leads to the DUT and take the measured reading on display.
4. When the capacitor to be tested is connected, if “dIS.C” symbol is indicated on the LCD, it means there is voltage present in the capacitor under test and it needs to be discharged before testing can continue.



**Figure 5 - Connection for Capacitance Measurement**

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**WARNING:**

**Do not apply more than 1000 V DC across the terminals or they will be damaged.**

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## **2.8 Make Temperature Measurements**

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform. Press the shift button to switch between C and F.

Follow these steps to make a temperature measurement.

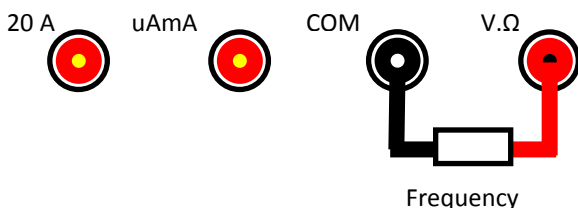
1. Plug the K-type thermocouple directly into the meter.
2. Apply the thermocouple bead tip to the sample you would like to measure the temperature of.
3. Take measured reading from the display.

## 2.9 Make Frequency Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform.

Follow these steps to make a temperature measurement.

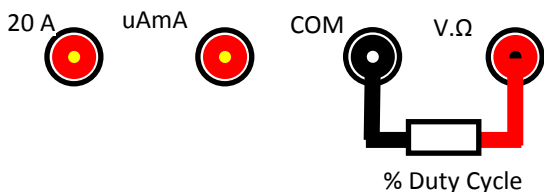
1. Connect the black test lead to the **COM** input.
2. Connect the red test lead to the **V $\Omega$ Hz%ns $\rightarrow$ +** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



## 2.10 Percent Duty Cycle Measurements

Turn the rotary switch to the corresponding symbol for the measurement you would like to perform. Press the shift button to switch between Hz and %.

1. Connect the black test lead to the **COM** input.
2. Connect the red test lead to the **V $\Omega$ Hz%ns $\rightarrow$ +** input.
3. Probe with the test leads to the DUT and take the measured reading on display.



## 2.11 Auto Power Off

Auto power off occurs approximately after 30 minutes when there has been no interaction with the meters knobs or buttons. If an auto power off event occurs, change the position of the rotary knob to turn the meter back on again. To disable the auto power off feature, press and hold the MAX/MIN button while rotating the rotary switch from off to any position. When the auto power off feature is disabled, the LCD will no longer display the APO annunciator on the left side of the display.

## 3 PC Communication

The 393 digital multimeter comes with application software, which provides most of the controls that emulate the front panel of the instrument.

The software is included on the supplied CD or can be downloaded at [www.bkprecision.com](http://www.bkprecision.com).

Remote communication is supported using the software only. Remote commands are not available.

## 4 Specifications

- **Display:** 60000 counts, 60 segments analog bar graph
- **Polarity:** Automatic, (-) negative polarity indication
- **Overrange Indication:** (OL) or (-OL) is displayed
- **Low Battery Indication:** Indicates current capacity of battery. When BATTERY is fully depleted, the display will show " bAtt " with a continuous beep sound. The meter then shuts down in 5 seconds and no further measurement is allowed.
- **Measurement Rate:** 2 measurements/sec nominal, 20 measurements/sec for analog bar graph
- **Operating Environment:** 0°C to 50°C at < 70% R.H
- **Storage Environment:** -20°C to 60°C at < 80% R.H
- **Temperature Coefficient:** 0.1 × (specified accuracy) Per °C. (0°C to 18°C, 28°C or 50°C)
- **Auto Power Off:** Approx. 30 minutes
- **Altitude:** 6561.7 ft (2000 m)
- **Power:** single 9V battery
- **Battery Life:** 50 hours typical with alkaline
- **Size (H × W × D):** 7.8 × 3.6 × 1.7 inches (198 × 90 × 44 mm)
- **Weight:** Approx. 14.1 oz. / 400 grams (including battery)

Accuracy is given as ± (% of reading + number of least significant digits) at 18°C to 28°C, with relative humidity up to 70%.

## Voltage

### DC Volts

RANGE	RESOLUTION	Accuracy	Input Impedance
600 mV	0.01 mV	$\pm(0.08\% \text{ rdg} + 5 \text{ dgt})$	10 M $\Omega$
6 V	0.1 mV		11 M $\Omega$
60 V	1 mV		10 M $\Omega$
600 V	10 mV		10 M $\Omega$
1000 V	100 mV		10 M $\Omega$

Overload protection: 1000 V DC or 750 V AC RMS

### AC Volts (True RMS)

Range	Resolution	Accuracy (45 Hz - 2 kHz) / HFR2	Input Impedance
600 mV	0.01 mV	$\pm(1.0\% \text{ rdg} + 20 \text{ dgt})(1)$	10 M $\Omega$
6 V	0.1 mV	$\pm(1.5\% \text{ rdg} + 20 \text{ dgt})(2)$	11 M $\Omega$
60 V	1 mV	$\pm(1.0\% \text{ rdg} + 20 \text{ dgt})(1)$	10 M $\Omega$
600 V	10 mV	$\pm(1.5\% \text{ rdg} + 20 \text{ dgt})(2)$	10 M $\Omega$
750 V	100 mV	$\pm(2.0\% \text{ rdg} + 20 \text{ dgt})(3)$	10 M $\Omega$
		$\pm(2.0\% \text{ rdg} + 20 \text{ dgt})(4)$	10 M $\Omega$

Range	Resolution	Accuracy (45 - 60 Hz) / HFR1	Input Impedance
600 mV	0.01 mV	$\pm(2.0\% \text{ rdg} + 20 \text{ dgt})$	10 M $\Omega$
6 V	0.1 mV		11 M $\Omega$
60 V	1 mV		10 M $\Omega$
600 V	10 mV		10 M $\Omega$
750 V	100 mV		10 M $\Omega$

### AC+DC Volts (True RMS)

Range	Resolution	Accuracy (45 Hz - 2 kHz)	Input Impedance
600 mV	0.01 mV	$\pm(1.5\% \text{ rdg} + 30 \text{ dgt})(1)$	10 M $\Omega$
6 V	0.1 mV	$\pm(2.0\% \text{ rdg} + 30 \text{ dgt})(2)$	11 M $\Omega$
60 V	1 mV	$\pm(1.0\% \text{ rdg} + 30 \text{ dgt})(1)$	10 M $\Omega$
600 V	10 mV	$\pm(2.0\% \text{ rdg} + 30 \text{ dgt})(2)$	10 M $\Omega$
750 V	100 mV	$\pm(2.5\% \text{ rdg} + 30 \text{ dgt})(3)$	10 M $\Omega$
		$\pm(2.5\% \text{ rdg} + 30 \text{ dgt})(4)$	10 M $\Omega$

(1) For frequency range 45 Hz to 500 Hz.

(2) For frequency range 500 Hz to 1 kHz.

(3) For frequency range 1 kHz to 2 kHz.

(4) For frequency range 45 Hz to 1 kHz.

Crest factor: 3 at full scale and 6 at half scale

AC Coupled True RMS specified from 2% to 100% of range

HFR1 (High Frequency Reject): >1 kHz

HFR2 (High Frequency Reject): >100 kHz

Peak hold accuracy:  $\pm(3.0\% \text{ rdg} + 500 \text{ dgt})$  for frequency 45 Hz to 500 Hz at 60 V AC to 750V AC

Overload protection: 1000 V DC or 750 V AC RMS

# Current

## DC Current

Range	Resolution	Accuracy
600 $\mu$ A	0.01 $\mu$ A	$\pm(0.5\% \text{ rdg} + 10 \text{ dgt})$
6000 $\mu$ A	0.1 $\mu$ A	
60 mA	1 $\mu$ A	
400 mA	10 $\mu$ A	$\pm(1.0\% \text{ rdg} + 10 \text{ dgt})$
20 A	1 mA	$\pm(2.0\% \text{ rdg} + 10 \text{ dgt})$

## AC Current (True RMS)

Range	Resolution	Accuracy (45 Hz - 1 kHz)
600 $\mu$ A	0.01 $\mu$ A	$\pm(1.5\% \text{ rdg} + 20 \text{ dgt})$
6000 $\mu$ A	0.1 $\mu$ A	
60 mA	1 $\mu$ A	
400 mA	10 $\mu$ A	
20 A	1 mA	$\pm(2.5\% \text{ rdg} + 20 \text{ dgt})$

## AC+DC Current (True RMS)

Range	Resolution	Accuracy (45 Hz - 1 kHz)
600 $\mu$ A	0.01 $\mu$ A	$\pm(2.0\% \text{ rdg} + 30 \text{ dgt})$
6000 $\mu$ A	0.1 $\mu$ A	
60 mA	1 $\mu$ A	
400 mA	10 $\mu$ A	
20 A	1 mA	$\pm(3.0\% \text{ rdg} + 30 \text{ dgt})$

Burden Voltage:

500 mV on 600  $\mu$ A & 60 mA ranges

2 V on 6000  $\mu$ A, 400 mA, 20 A ranges

Input protection:

0.5 A/1000 V fast blow ceramic fuse (6.3x32mm) on  $\mu$ A/mA input.

20 A/600 V fast blow ceramic fuse (10x38mm) on 20 A input.

20 A Input: >10 A for 30 sec. max, then a 10 min. cooling period.

Crest factor: 3 at full scale and 6 at half scale

AC Coupled True RMS specified from 2% to 100% of range

Peak hold accuracy:  $\pm(3.5\% \text{ rdg} + 500 \text{ dgt})$  at 45 Hz to 500 Hz on

AC current ranges



## Resistance

Range	Resolution	Accuracy	Open Circuit Voltage
600 $\Omega$	0.01 $\Omega$	$\pm(0.3\% \text{ rdg} + 20 \text{ dgt})$	-3.0 V DC typical
6 k $\Omega$	0.1 $\Omega$	$\pm(0.3\% \text{ rdg} + 10 \text{ dgt})$	-1.2 V DC typical
60 k $\Omega$	1 $\Omega$	$\pm(0.3\% \text{ rdg} + 10 \text{ dgt})$	-1.2 V DC typical
600 k $\Omega$	10 $\Omega$	$\pm(0.3\% \text{ rdg} + 10 \text{ dgt})$	-1.2 V DC typical
6 M $\Omega$	100 $\Omega$	$\pm(1.0\% \text{ rdg} + 10 \text{ dgt})$	-1.2 V DC typical
60 M $\Omega$	1 k $\Omega$	$\pm(3.0\% \text{ rdg} + 20 \text{ dgt})$	-1.2 V DC typical

Overload protection: 600 V DC or 600 V AC RMS

## Continuity Test

Range	Audible Threshold	Response Time	Open Circuit Voltage
600 $\Omega$	<40 $\Omega$	Approximately 100 ms	-3.0 V DC typical

Overload protection: 600 V DC or 600 V AC RMS

## Diode Test

Range/ Resolution	Test Current	Accuracy	Open Circuit Voltage
2 V / 1 mV	0.5 mA typical	$\pm(2.0\% \text{ rdg} + 10\text{dgt})$	3.0 V DC typical

Audible indication: Less than 0.05 V DC

Overload protection: 600 V DC or 600 V AC RMS

## Conductance (6000 counts)

Range	Resolution	Accuracy	Open Circuit Voltage
60 nS	0.01 nS	$\pm(1.0\% \text{ rdg} + 10 \text{ dgt})$	-0.7 V DC typical

Equivalent resistance range: 16.7 M $\Omega$  to 100 G $\Omega$

(S = Siemens = 1 /  $\Omega$ )

Overload protection: 600 V DC or 600 V AC RMS

## Capacitance (6000 counts)

Range	Resolution	Accuracy
6 nF	0.001 nF	$\pm(3.0\% \text{ rdg} + 30 \text{ dgt})$
60 nF	0.01 nF	$\pm(3.0\% \text{ rdg} + 10 \text{ dgt})$
600 nF	0.1 nF	$\pm(3.0\% \text{ rdg} + 10 \text{ dgt})$
6 $\mu\text{F}$	0.001 $\mu\text{F}$	$\pm(3.0\% \text{ rdg} + 10 \text{ dgt})$
60 $\mu\text{F}$	0.01 $\mu\text{F}$	$\pm(3.0\% \text{ rdg} + 10 \text{ dgt})$
600 $\mu\text{F}$	0.1 $\mu\text{F}$	$\pm(3.0\% \text{ rdg} + 10 \text{ dgt})$
6 mF	1 $\mu\text{F}$	$\pm(5.0\% \text{ rdg} + 10 \text{ dgt})$

Overload protection: 600 V DC or 600 V AC RMS

## Temperature

Range	Resolution	Accuracy	Sensor Type
-50°C - 0°C	0.1° C	$\pm(2.0\% \text{ rdg} + 3^\circ\text{C})$	K-type Thermocouple
0°C - 400°C	0.1° C	$\pm(1.0\% \text{ rdg} + 1^\circ\text{C})$	
400°C - 1300°C	0.1° C	$\pm(2.0\% \text{ rdg} + 3^\circ\text{C})$	
-58°F - 32°F	0.1° F	$\pm(2.0\% \text{ rdg} + 6^\circ\text{F})$	
32°F - 750°F	0.1° F	$\pm(1.0\% \text{ rdg} + 2^\circ\text{F})$	
750°F - 2372°F	0.1° F	$\pm(2.0\% \text{ rdg} + 6^\circ\text{F})$	

Overload protection: 30 V DC or 30 V AC RMS

## % Duty Cycle

Range	Resolution	Accuracy (5V logic)	Pulse Width
5% to 95%	0.1%	$\pm(2.0\% \text{ rdg} + 10 \text{ dgt})$	>10 $\mu\text{s}$

Frequency range:

5% to 95% (40 Hz to 1 kHz)

10% to 90% (1 kHz to 10 kHz)

20% to 80% (10 kHz to 20 kHz)

Overload protection: 600 V DC or 600 V AC RMS

## Frequency

Range	Resolution	Accuracy	Trigger Level 1
60 Hz	0.001 Hz	$\pm(0.1\% \text{ rdg} + 10 \text{ dgt})$	>1.5 V
600 Hz	0.01 Hz		>1.5 V
6 kHz	0.1 Hz		>1.5 V
60 kHz	1 Hz		>1.5 V
600 kHz	10 Hz		>1.5 V
6 MHz	100 Hz		>2.5 V, <5.0 V
10 MHz	1 kHz		>2.5 V, <5.0 V

Minimum input range: >6 Hz

Minimum pulse width: >100 ns

Duty cycle limits: >30% and <70%

Overload protection: 600 V DC or 600 V AC RMS

## 10 Maintenance

Do not expose the LCD display to direct sunlight for long periods of time.

### Cleaning

If the instrument requires cleaning, disconnect it from all power sources and clean only with a mild detergent and water. Be sure the instrument is completely dry before reconnecting it to any power source.

To clean the exterior surface:

1. Remove loose dust on the outside of the instrument and probes with a lint-free cloth.
2. Use a soft cloth dampened with water to clean the instrument.

**Note: To avoid damaging the surface of the instrument and probes, do not use any chemically abrasive cleaning agents.**

### BATTERY AND FUSE REPLACEMENT

#### WARNING

TO AVOID ELECTRICAL SHOCK, DISCONNECT THE TEST LEADS AND ANY INPUT SIGNALS BEFORE REPLACING THE BATTERY. REPLACE ONLY WITH SAME TYPE OF BATTERY.

1. Disconnect test leads from any live source, turn the rotary switch to OFF, and remove the test leads from the input terminals.
2. The bottom case is secured to the top case by four screws. Using a Phillips-head screwdriver, remove the screws from the bottom case and remove the bottom case.
3. Remove battery and replace with a new equivalent " NEDA 1604 " 9-volt battery.
4. Fuse: F1 / 0.5A / 1000V fast blow ceramic fuse (6.3 x 32 mm size)
5. Fuse: F2 / 20A / 600V fast blow ceramic fuse (10 x 38 mm size).
6. Replace the bottom case and reinstall the screws.

## SERVICE INFORMATION

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**Warranty Service:** Please go the support and service section on our website [www.bkprecision.com](http://www.bkprecision.com) to obtain an RMA #. Return the product in the original packaging with proof of purchase to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors and accessories that you are using with the device.

**Non-Warranty Service:** Please go the support and service section on our website [www.bkprecision.com](http://www.bkprecision.com) to obtain an RMA #. Return the product in the original packaging to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors and accessories that you are using with the device. Customers not on an open account must include payment in the form of a money order or credit card. For the most current repair charges please refer to the service and support section on our website.

Return all merchandise to B&K Precision Corp. with pre-paid shipping. The flat-rate repair charge for Non-Warranty Service does not include return shipping. Return shipping to locations in North America is included for Warranty Service. For overnight shipments and non-North American shipping fees please contact B&K Precision Corp.

B&K Precision Corp.  
22820 Savi Ranch Parkway  
Yorba Linda, CA 92887  
[www.bkprecision.com](http://www.bkprecision.com)  
714-921-9095

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

## LIMITED THREE-YEAR WARRANTY

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B&K Precision Corp. warrants to the original purchaser that its products and the component parts thereof, will be free from defects in workmanship and materials for a period of **three years** from date 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 of a sales receipt.

To help us better serve you, please complete the warranty registration for your new instrument via our website [www.bkprecision.com](http://www.bkprecision.com)

**Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. The warranty is void if the serial number is altered, 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 limitations 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.

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