FEATURES

- 3-1/4 digit LCD display with functional annunciators.
- Analog Bar graph.
- Basic accuracy: DCV ± 0.1%.
- Resolution of 100 μV, 1μA, 0.1 Ω, 1 pF.
- Autoranging.
- Auto power off prolongs battery life.
- Five dc voltage ranges: 400 mV to 1000 V.
- Five ac voltage ranges: 400 mV to 750 V.
- Four dc current ranges: 4 mA to 20 A.
- Four ac current ranges: 4 mA to 20 A.
- Six resistance ranges: 400 0 to 40 MΩ.
- Five capacitance ranges: 4 nF to 40 μF.
- Five frequency ranges: 100 Hz to 500 kHz.
- Temperature measurements: °F, °C.
- Diode test function: measures forward voltage drop.
- Audible continuity tester.
- Audible warning buzzer if probe inserted into wrong jack.
- Data hold function freezes value on display.
- Max/Min reading recorder.
- Relative mode measurements.
- Auto polarity, auto zero.
- Overrange indication on all ranges.
- Fused mA range.
- Fused 20 A range.
- Safety type test leads.
- Shock resistant case in bolster withstands 10-foot drop.

SPECIFICATIONS

RESISTANCE Auto/Manual ranging.

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Max Open Circuit Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 Ω</td>
<td>0.1 Ω</td>
<td>±(0.5% rdg + 4 digt)</td>
<td>0.4 V</td>
</tr>
<tr>
<td>4 kΩ</td>
<td>1 kΩ</td>
<td>±(0.5% rdg + 4 digt)</td>
<td></td>
</tr>
<tr>
<td>40 kΩ</td>
<td>10 kΩ</td>
<td>±(0.5% rdg + 4 digt)</td>
<td></td>
</tr>
<tr>
<td>4 MΩ</td>
<td>1 MΩ</td>
<td>±(0.5% rdg + 4 digt)</td>
<td></td>
</tr>
<tr>
<td>40 MΩ</td>
<td>10 MΩ</td>
<td>±(0.5% rdg + 4 digt)</td>
<td></td>
</tr>
</tbody>
</table>

Overload Protection: 0.5 A (600 V) fast blow ceramic fuse on mA input
20 A (600 V) fast blow ceramic fuse on 20 A input.

FREQUENCY COUNTER Auto ranging.

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Sensitivity (sin wave)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Hz</td>
<td>0.01 Hz</td>
<td>±(0.2% rdg + 10 digt)</td>
<td>40 mV</td>
</tr>
<tr>
<td>1 kHz</td>
<td>0.1 Hz</td>
<td>±(0.1% rdg + 6 digt)</td>
<td></td>
</tr>
<tr>
<td>10 kHz</td>
<td>1 Hz</td>
<td>±(0.1% rdg + 6 digt)</td>
<td></td>
</tr>
<tr>
<td>100 kHz</td>
<td>10 Hz</td>
<td>±(0.2% rdg + 20 digt)</td>
<td></td>
</tr>
<tr>
<td>500 kHz</td>
<td>100 Hz</td>
<td>±(0.2% rdg + 20 digt)</td>
<td></td>
</tr>
</tbody>
</table>

Overload Protection: 500 VDC or peak AC

TEMPERATURE Auto/Manual Ranging

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>−50°C to 400°C</td>
<td>0.1°C</td>
<td>±(0.8% rdg + 2°C)</td>
<td>60 mV to 237°C</td>
</tr>
<tr>
<td>400°C to 1300°C</td>
<td>1°C</td>
<td>±(1.0% rdg + 2°C)</td>
<td>1°F</td>
</tr>
<tr>
<td>−50°F to 400°F</td>
<td>0.1°F</td>
<td>±(0.8% rdg + 4°F)</td>
<td></td>
</tr>
<tr>
<td>400°F to 237°C</td>
<td>1°F</td>
<td>±(1.0% rdg + 4°F)</td>
<td></td>
</tr>
</tbody>
</table>

Overload Protection: 60 VDC or 24 VAC rms
SAFETY

WARNING
An electrical shock causing 10 milliamperes of current to pass through the heart will stop most humans hearts. Voltage at low as 35 volts dc or ac rms should be considered dangerous and hazardous since it can produce a fatal current under certain conditions. Higher voltages are even more dangerous. Observe the following precautions:

1. Do not exceed the following input ratings. Personal injury or damage to the instrument may result.
   - DC VOLTS: 1100 V (dc or peak ac)
   - AC VOLTS: 1100 V (dc or peak ac)
   - OHMS: 500 (dc or peak ac)
   - mA: 500 mA (fuse protected)
   - 20 A: 20 A (fuse protected)
   - COM: Do not float more than 500 volts from earth ground.
   - LOGIC: 500 V (dc or peak ac)

2. Remove test leads before replacing batteries or fuses, and before performing any servicing on the multimeter.
3. Use only the safety type test leads supplied with the multimeter.
4. Turn off equipment while making test connections in high-voltage circuits. Discharge high-voltage capacitors after removing power.
5. For voltage or current measurements in high-voltage equipment, do not touch equipment, tester or test leads while power is applied.
6. If possible, familiarize yourself with the equipment being tested and the location of its high-voltage points. However, remember that high voltage may appear at unexpected points in defective equipment.
7. Use an insulated floor mat or floor mat to stand on, and an insulated work bench surface; make certain such surfaces are not damp or wet.

DIODE CHECK

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Max Test Current</th>
<th>Max Open Circuit Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 V</td>
<td>1 mV</td>
<td>± (1.0% rdg + 1.0 rdg)</td>
<td>0.6 mA</td>
<td>3.2 VDC</td>
</tr>
</tbody>
</table>

Overload Protection ................. 500 V DC or peak AC

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Range</th>
<th>Response Time</th>
<th>Description</th>
<th>Open Circuit Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 Ω</td>
<td>Approx. 100 ms</td>
<td>Buzzers sounds below approx. 40 W</td>
<td>0.4 VDC</td>
</tr>
</tbody>
</table>

Overload Protection ................. 500 V DC or peak AC

CAPACITANCE Auto/Manual Ranging

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 nF</td>
<td>1 pF</td>
<td>± (2.0% rdg + 20 rdg)</td>
</tr>
<tr>
<td>40 nF</td>
<td>10 pF</td>
<td>± (2.0% rdg + 4 rdg)</td>
</tr>
<tr>
<td>400 nF</td>
<td>100 pF</td>
<td>± (2.0% rdg + 4 rdg)</td>
</tr>
<tr>
<td>4 µF</td>
<td>1 nF</td>
<td>± (2.0% rdg + 4 rdg)</td>
</tr>
<tr>
<td>40 µF</td>
<td>10 nF</td>
<td>± (2.0% rdg + 4 rdg)</td>
</tr>
</tbody>
</table>

Overload Protection ................. 500 V DC or peak AC

*Accuracy using relative mode to zero meter.

8. Keep “one hand in the pocket” while handling an instrument probe. Be particularly careful to avoid contacting a nearby metal object that could provide a good ground return path.

9. When using a probe, touch only the insulated portion. Never touch the exposed tip portion.

10. Some equipment with a two-wire ac power cord, including some with polarized power plugs, is the “hot chassis” type. This includes most recent television receivers and audio equipment. A plastic or wooden cabinet insulates the chassis to protect the customer. When the cabinet is removed for servicing, a serious shock hazard exists if the chassis is touched. Not only does this present a dangerous shock hazard, but damage to test instruments or the equipment under test may result. To make measurements in “hot chassis” equipment, always connect an isolation transformer between the ac outlet and the equipment under test. The B-K Precision Model TR-110 or TR-1101 Isolation Transformer, or Model 1663 or 1665 AC Power Supply is suitable for most applications. To be on the safe side, treat all two-wire ac powered equipment as “hot chassis” unless you are sure it has an isolated chassis or an earth ground chassis.

11. When testing ac powered equipment, remember that ac line voltage is usually present on some power input circuits such as on-off switch, fuses, power transformer, etc. Any time the equipment is connected to an ac outlet, even if the equipment is turned off.

12. Never work alone. Someone should be nearby to render aid if necessary. Training in CPR (cardiopulmonary resuscitation) first aid is highly recommended.

GENERAL SPECIFICATIONS

Display: 3-3/4 digit liquid crystal display (LCD) with a maximum reading of 3999, 9999 for any measurement.

Analog Bar Graph: 42 segments with measurements 20 times per second.

Polarity: Automatic (+) or negative polarity indication.

Overrange Indication: “1” displayed.

Low Battery Indication: “F” displayed.

Sampling rate: 2 measurements per second, nominal, 1 time per second for capacitance and frequency measurements.

Temperature:

1. Full Operation .......... 0 to +50°C ±0.05°C R.H.
2. Storage ......... -20°C to 60°C at <80% R.H.

Batteries: 500 hours typical (alkaline).

Auto Power Off: Meter automatically shuts down after approx. 30 minutes of inactivity.

Dimensions: (95 x W x D): 15.5” x 3.4” x 7.5” (273 mm x 87 mm x 189 mm).

Weight: 12.4 oz. (352 g) including battery.

Supplied Accessories: Test leads (pair), temperature probe, battery, instruction manual, protective holster.

WARRANTY

LIMITED THREE-YEAR WARRANTY

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

MAXTEC will, without charge, repair or replace, at its option, defective product or component parts upon delivery to an authorized B-K Precision service center, or the factory service department, accompanied by proof of the purchase date in the form of a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty registration card to MAXTEC, B-K Precision, 6470 West Cortland Street, Chicago, Illinois 60635 within fifteen (15) days from the date of purchase.

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. It is void if the serial number is altered, defaced or removed.

MAXTEC 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 also have other rights which vary from state to state.

For your convenience, we suggest you contact your B-K Precision distributor, who may be authorized to make repairs or can refer you to the nearest service contractor. If warranty service cannot be obtained locally, please send the unit to B-K Precision Service Department, 6470 West Cortland Street, Chicago, Illinois 60635, properly packaged to avoid damage in shipment.

B-K Precision Test Instruments warrants products sold only in the U.S.A. and its overseas territories. In other countries, each distributor warrants the B-K Precision products which it sells.
TILT STAND AND PROBE HOLDER USE

TILT STAND AND HANGER

The tilt stand and hanger are located on the back of the case. The tilt stand, Figure 1, can be used to position the unit at approximately a 45 degree angle of the bench top. The hanger clip can be used to support the meter on top of a panel as shown in Figure 2 or to suspend the meter from a wire, strap or screw as shown in Figure 3.

Figure 1.

Figure 2.

Figure 3.

CURRENT MEASUREMENTS

WARNING

For current measurements, the meter must be connected in series with the lead. If incorrectly connected in parallel with the lead, the meter presents a very low impedance (almost a short) which may burn the fuse or damage the equipment under test.

NOTE

A warning tone will be heard if the test lead is connected to mA input jack while the knob is not set to mA range. A warning tone will also be heard if the test lead is connected to 20 A input jack while the knob is not set to 20 A range.

1. To measure dc current, set the function switch to the desired A range.
2. To measure ac current, set the function switch to the desired A range.
3. For current measurements under 400 mA, connect the red test lead to the mA jack and the black test lead to the COM jack (set the Function/Range switch to the 20 A position). For current measurements greater than 3 A, high current test leads are recommended.
4. For current measurements above 400 mA, connect the red test lead to the 20 A jack and the black test lead to the COM jack (set the Function/Range switch to the 20 A position).
5. Remove power from the circuit under test and open the normal circuit path where the measurement is to be taken. Connect the meter in series with the circuit.
6. Apply power and read the value from the display.

MAX/MIN HOLD MODE

1. MAX/MIN mode will store and display the maximum or minimum value measured by the meter.
2. Select the desired function (MAX/MIN is not operational in “Hz” function).
3. Connect the meter to the point to be measured.
4. To observe the minimum value recorded, momentarily depress the MAX/MIN button. The “MIN” annunciator will be displayed along with the minimum recorded reading. The meter will record and hold any new minimum that occurs during the measurement.
5. To observe the maximum value recorded, momentarily depress the MAX/MIN button again. The “MAX” annunciator will be displayed along with the maximum recorded reading. The meter will record and hold any new maximum that occurs during the measurement.

DATA HOLD

Data hold can be used when making voltage, current, or frequency measurements. When switched to the ON position the display will freeze. The test leads can then be disconnected without affecting the data display.

RESET

Cleans all stored readings and resets the meter.

STORE AND RECALL

Memory can be used to store any single reading. When MEM is pressed the memory annunciator comes on, the present reading is stored in memory and can be recalled at any time by pressing READ.

RELATIVE

When the REL button is pressed the present reading becomes the zero reading and all subsequent readings are displayed relative to this value. This function is cleared by pressing the RESET button which returns the meter to normal operation.

LEAD STORAGE

The holster provides a means of storing the test leads when not in use. Refer to Figure 5 and proceed as follows:

1. Press the probe end of the test leads into the storage slots with the end of the probes pointing toward the top of the unit.
2. Press the leads into the lead slots to prevent the leads from unrolling.
3. Wrap both test leads together in the storage channel near the bottom of the holster leaving about a foot of test lead.
4. Turn the unit over, then plug the end of the test leads into the COM and CX +, −VII Hz connectors on the front of the unit.

Figure 4.

Figure 5.
SYMBOLS

See instruction manual for further precautionary information.

High voltage terminal: up to 1000 volts may be present if connected to high voltage.

COM
Common input terminal.

Diode test.

Contact to earth ground or point not more than 500 volts from earth ground.

1100 V MAX Maximum input rating of V-O terminal with respect to COM input terminal.

Continuity test.

V ACV.

V DCV.

A ACA.

D DCA.

OPTIONAL ACCESSORIES

Sheathed Temperature Probe for Irnemater and General Purpose . . . Model TP-1
Sheathed Temperature Probe for Air and Gas . . . . Model TP-2
Replacement Test Leads . . . . . . . Model TL-1
Deluxe Test Leads . . . . . . . Model TL-2
Accessory Tips for Deluxe Test Leads . . . . . Model TL-3
High Current Test Leads . . . . . . . Model FP-10
Demodulator Probe . . . . . . . . . Model PR-23
High Voltage Probe (60 kVDC) . . . . . Model PR-28
High Voltage Probe (6 kVDC) . . . . . Model HV-6

OPERATING INSTRUCTIONS

1. Display, 3 3/4 digit (3999 maximum) with automatic decimal point, analog bar graph, low battery and full annunciators for functions and unit of measurement.

2. READ. Switches the HOLD mode and displays reading stored in memory.

3. MEM. Stores present reading in memory.

4. RESET. Resets all meter functions.

5. PWR RST. Restores power after auto power shut-off.

6. Function/Range Switch. Selects function for autoranging modes and function and range for manual ranging modes: V, mV, V, Hz, Ohms (continuity), diode test, Hz, C, mF, mV, mA, 40 mA, 20 A, nA, 40 mA, 400 mA and 240 V, °F.

7. Type K Receptacle. Input for type K thermocouple probe.

8. 20 A Jack. Input for up to 20 A ac or dc current range. For measurements greater than 3 A high current test leads are recommended.

9. mA Jack. Input for dc or ac current up to 400 mA.

10. COM Jack. Input for common or reference test lead for all measurements. Connect to earth ground or reference point not more than 500 V MAX (dc + ac peak) from earth ground.

11. C x V/DHz. Input for dc and ac voltage, resistance, frequency, continuity, capacitance or diode test.

12. REL Δ Switch. Sets present reading as the zero reference.

13. RANGE Switch. Select manual ranging mode or changes ranges.


15. MIN/MAX switch. Activates maximum and minimum record feature.

RANGE SELECTION

1. Autoranging mode is automatically selected when unit is turned on.

2. To change ranges manually, momentarily depress RANGE button. "MANU" annunciator on display indicates that the meter is in the manual ranging mode. Press again to advance to next higher range.

3. To return to autoranging mode, depress and hold RANGE button for one second or longer.

4. If quantity to be measured is unknown start with highest range, or use autoranging mode.

5. When an overrange is indicated (4 flashes and a beep signal) switch to the next higher range.

AUTO POWER OFF

1. The meter will automatically shut off if the Function/Range switch position is not changed within 30 minutes.

2. To restore operation, press PWR RST button.

NOTE ON ANALOG BARGRAPH

The analog bargraph feature is activated for measurements of voltage, current, resistance, frequency, and capacitance. Its update speed of 20 measurements/sec is 10 times that of the digital display. This makes it suitable for measuring coarse adjustments of these parameters, or indicating the direction of change of a varying quantity.

VOLTAGE MEASUREMENTS

1. To measure dc voltage, set function switch to V.

2. To measure ac voltage, set function switch to V or mV.

3. Connect red test lead to C x V/DHz jack and black test lead to COM jack.

4. Connect test leads to points of measurement.

5. For dc, a (-) sign is displayed for negative polarity; (+) positive polarity is implied.

RESISTANCE MEASUREMENTS

1. Set the function switch to Ω.

2. Remove power from equipment under test.

3. Connect red test lead to C x V/DHz jack and the black test lead to the COM jack. Read lead is (+) polarity.

4. Connect test leads to the points of measurement.

CONTINUITY MEASUREMENTS

1. Set the function switch to OFF position.


3. Buzzer sounds when resistance is less than about 40 kΩ.

FREQUENCY MEASUREMENTS

1. Set the Function/Range switch to Hz for frequency measurement.

2. Connect the red test lead to the C x V/DHz jack and the black test lead to the COM jack.

3. Connect the test leads to the point of measurement and read the frequency from the display.

DIODE TEST

1. Set function switch to OFF position.

2. Connect red test lead to the C x V/DHz jack and black test lead to the COM jack. Red lead is (+) polarity.

3. To check forward voltage (V(f)), connect the red test lead to anode and black lead to the cathode of the diode. Diodes and semiconductor junctions with normal V(f) of less than approximately 0.3 V can be checked.

4. Display indicates the forward voltage. Normal diode voltages are approximately 0.6 V for germanium diodes, 0.7 V for silicon diodes, and 1.6 V for light emitting diodes (LED). An overrange indicates an open diode. A shorted diode reads near 0 V.

5. Reverse test lead connections to diode. Reading should be the same as with open test leads (an overrange indication). Lower readings indicate a leaky diode.

CAPACITANCE MEASUREMENTS

Never apply an external voltage when in the Cs position. Damage to the meter may result. Always short capacitor leads together before connecting to meter.

1. Set the Function/Range switch to Cs (capacitance).

2. Connect the C x V/DHz jack to the capacitor. Observe polarity when measuring polarized capacitors.

3. Read the capacitance directly from the display. A shorted capacitor will indicate an overrange. An open capacitor will indicate near zero on all ranges.

4. For maximum accuracy, step to the desired range in manual ranging, then press the REL Δ button to zero out test lead capacitance before the measurement.

USEFUL CONVERSIONS

<table>
<thead>
<tr>
<th>pF</th>
<th>nF</th>
<th>µF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>10,000</td>
<td>10</td>
<td>0.01</td>
</tr>
<tr>
<td>100,000</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>1,000,000</td>
<td>1,000</td>
<td>1.0</td>
</tr>
</tbody>
</table>

pF = picofarads (10^-12), nF = nanofarads (10^-9), µF = microfarads (10^-6)

TEMPERATURE MEASUREMENTS

1. Set function switch to desired temperature range: °C or °F.

2. Connect a Type K thermocouple probe to the temperature input jack. Jack on meter accepts a standard Type K thermocouple plug.

3. Take temperature measurement using the thermocouple probe and read the temperature from the display.