RadioShack

46-Range • PC Interface Digital Multimeter

22-812

Thank you for purchasing your 46-Range • PC Interface Digital Multimeter from ***RadioShack****. The meter measures voltage, current, resistance, capacitance, and frequency. It's ideally suited for field, lab, shop, and home applications. You can also connect the meter to your computer and use the supplied software to log and graph measurements. Please read this user's guide before installing, setting up, and using your new multimeter.*

What's Included

Digital Multimeter
Rubber Boot
Fuse F12A/250V (2)
Test Leads (2)
CD-ROM
User's Guide
RS-232 Cable
Fuse F500mA/250V (2)

www.radioshack.com

Read and follow these safety precautions.

- Never apply voltages to the meter that exceed the limits given in the specifications. Never apply more than 1000V DC or 750V RMS AC between the input jacks and ground.
- Use extreme caution when working with voltages above 100V. Always disconnect power from the circuit you are measuring before you connect test leads to high-voltage points.
- Never connect the test leads to a voltage source when you set the meter's function dial to))/⊳, Ω/⊣⊢, **LOGIC/Hz**, ≅/**µA/A**, or ≅/**mA/A**.
- Always discharge any capacitors of the circuit under test before you attach test leads.
- Always turn off power and disconnect the test leads from the circuit you are testing before you replace the meter's battery or fuse. Never operate the meter unless its back cover and battery cover are in place and fully closed.
- Never try to probe with both test leads at the same time or hold both test leads in one hand.
- The test leads supplied with your meter are rated for 1000 volts. Use only test leads of the same rating with the meter. You can order replacement leads from your local ***RadioShack*** store.
- Do not use a fuse brand or rating other than those specified here. Doing so might damage your meter.
- Because many AC/DC sets have a potentially hot chassis, be sure the top of your workbench and the floor underneath it are made of non-conductive materials.
- Your multimeter is designed primarily to measure household AC voltages. Because of the dangers inherent in measuring three-phase circuits, WE STRONGLY RECOMMEND YOU DO NOT USE THIS METER TO MEASURE 3-PHASE, LINE-TO-LINE VOLTAGE. If you still want to, put on protective clothing—a face shield and fireproof gloves and upper body protection is required before measuring. If you do not have this protection, DO NOT MEASURE THESE CIRCUITS.
- To reduce the risk of fire or shock hazard, do not expose this product to rain or moisture. For indoor use only.
- When you are not using the meter, always turn it off.
- If this equipment is used in a manner not specified in this user's guide, the protection provided by the equipment may be impaired.

This meter is fully calibrated and tested. Under normal use, no further adjustment should be necessary. If the meter requires repair, do not try to adjust it yourself. Take it to your local ***RadioShack*** store.

Special Panel Markings

⚠	**CAUTION**: Risk of electric shock! Refer to the complete operating instructions.
⚠	**CAUTION**: Be extremely careful when making high-voltage measurements; DO NOT TOUCH TERMINALS OR PROBE ENDS.
⧈	The meter is protected by double insulation.
1 K V ⎓ 750V ~ 400mA MAX	The maximum voltage that this meter can measure is 1000V DC or 750V AC. The maximum current that this terminal can measure is 400mA DC and AC.
+10A MAX FUSED	The maximum current you can measure at this jack is 10 amps DC/AC. This jack is fuse-protected.
CAT. II	This equipment is rated for INSTALLATION CATEGORY II (3600VA max).
500V MAX ⏚	To avoid electrical shock or instrument damage, do not connect the common input terminal (**–COM** jack) to any source that exceeds 500 volts with respect to earth/ground.
WARNING: Shock Hazard if guard not installed.	The sliding guard on the front of the meter protects against electrical shock. Do not remove the guard.

Care and Maintenance

Keep the meter dry; if it gets wet, wipe it dry immediately and make sure that the meter is completely dry before using it. Use and store the meter only in normal temperature environments. Handle the meter carefully; do not drop it.

To keep the meter looking new, occasionally wipe it with a cloth slightly dampened with water. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the meter.

AUTO - Appears in the auto range mode. The meter automatically enters the auto range mode when you turn it on.

°C/°F/ ⎓ V – Displays temperature / measures DC volts.

dBm / ~ V – Measures AC voltage in dBm or volts.

⎓ / µA/A – Measures current.

⎓ / mA/A – Measures current.

Ω / ⊣⊢ – Measures ohms and capacitance.

•))) / ⊳⊢ – Checks continuity and diodes.

LOGIC/Hz – Measures logic (HI/LO) / frequency.

h_{FE} – Measures the gain of small-signal bipolar transistors.

OFF – Switches off the meter.

Rubber Boot – Protect the meter and store the test leads using the clips on the back.

Sliding Guard

WARNING: THE GUARD PROTECTS AGAINST ELECTRIC SHOCK. DO NOT REMOVE IT.

+ 10A MAX FUSED – Plug the red lead into this jack to measure current higher than 400 mA.

SELECT – Press to toggle measurement options within a function.

RANGE – Selects auto or manual ranging.

Press to enter the manual range mode and press to select different ranges.

Hold down about 2 seconds to exit the manual range mode.

HOLD – Press to hold all indications on the display.

To cancel hold, press **HOLD** again or set the function dial to another setting.

REL Δ – Takes relative measurements.

Hz/DUTY/WIDTH – Measures frequency, duty cycle, and pulse width.

MAX/MIN – Stores maximum and minimum readings.

Function/Power dial

Rotate to turn the meter on/off. Rotate to select the measurements, then press **SELECT** to choose the function.

Test leads

Installing the Battery

Your meter requires one 9V battery (not supplied) for power.

When ▭ appears or the meter stops operating properly, replace the battery.

1. Remove the rubber boot if it is attached.
2. Turn off your meter. Loosen the screw and remove the battery cover.
3. Snap a fresh 9V battery (not supplied) onto the terminals of the battery clip in the battery compartment.
4. Replace the battery cover and secure it with the screw.

Battery Notes:

- Dispose of old batteries promptly and properly. Do not burn or bury them.
- Use only a fresh battery of the required size and recommended type.
- If you do not plan to use the meter for a month or more, remove the battery. Batteries can leak chemicals that can destroy electronic parts.

Replacing the Fuses

If the meter does not work, replace one or both of the fuses. The spare 500mA, 250V ceramic fuse and a 12A, 250V ceramic fuse are inserted in the plastic holders inside the meter's cabinet near the top of the meter.

1. Turn off the meter and disconnect the test leads.
2. Use a Phillips screwdriver to loosen the screws from the back cover and gently pull apart the case.
3. Pull the red ribbon to pop out the fuse.
4. Remove the spare fuse from the plastic holder and insert it into the fuse holder through the loop of the attached ribbon. Check the rating of the fuse carefully and choose the proper one.
5. Replace the back cover and secure it with the screws.

For the most accurate reading, the temperature should be between 65° and 83°F (18° and 28°C), with a maximum of 75% relative humidity.

Testing the Display

To test the meter's display, turn off the meter, then hold down **HOLD** while turning on the meter. The meter turns on and all segments on the display appear. Release **HOLD** to end the test.

Using the Stand

You can fold out the stand on the back of the meter to place it upright on a flat surface for easier viewing.

Connecting Test Leads

Remove the plastic plugs before using your test leads.

Slide up the guard on the front of the meter if necessary. Plug the black test lead's right-angled end into **–COM** (common), then plug the red test lead's right-angled end into **+V.Ω.mA**. If you want to measure current higher than 400mA, plug the red test lead's right-angled end into **+10A MAX** instead of **+V.Ω.mA.**

WARNING:

- Although the test leads are rated for 1000 volts, the maximum rating of this meter is 1000 volts DC/750 volts RMS AC. Do not try to measure voltage greater than 1000 volts DC/750 volts RMS AC.
- The meter sounds a warning tone when you set it to measure anything except current and you connect a test lead to **+10A MAX**. This reminds you not to touch the circuit with the test leads.

Using Power Lock

Your meter automatically turns off about 30 minutes when left unattended. Press any button to turn the meter back on. Follow these steps to set the meter so it does not turn off automatically.

1. Turn off your meter.
2. Hold down **HOLD** and **SELECT** simultaneously, then turn on the meter. **PLoc** appears until you release both buttons.

To reactivate the meter's auto power off function, turn off the meter then turn it back on.

Using Monitor

The meter's monitor feature displays the minimum or maximum value measured and stores those values. If the meter measures a value higher than the stored maximum value or lower than the stored minimum value, it updates the stored value with the new value. The meter automatically sets itself to manual mode and disables auto power off when you use it to monitor.

1. Set the meter to any function except **°C/°F**, **dBm**, **•))**, **⊳⊲**, **LOGIC**, or **^{h}FE**.
2. Connect the test leads to the circuit.
3. Press **RANGE** to select a suitable range for monitor measurement.
4. Press **MAX/MIN** to record the maximum and minimum values. **Max** appears. Press **MAX/MIN** to read the currently selected maximum value (when **Max** appears) or minimum value (when **Min** appears).
5. To pause monitoring, press **HOLD**. **Hold** appears. To continue monitoring, press **HOLD** again. **Hold** disappears.

To exit monitor mode, press **MAX/MIN** for more than 2 seconds. **Max** or **Min** disappears.

Note: When the meter is set to its voltage or current function and the input is out of the setting's range, **OF** appears and **Max** or **Min** flashes on the left side of the display.

Range Selection

Set the meter to the different measurement ranges. The unit of measure that appears on the display shows the currently set range. Note the position of the decimal. If **0.000 V** appears, the meter is set to measure less than 4 volts. If **0000V** appears, the meter is set to measure up to 1000 volts.

Read the range in volts, ohms, capacitance, or amps as indicated by the position of the decimal point.

Range	Display	Range	Display	Range	Display
400 mV	**ddd.d mV**	4 mA	**d.ddd mA**	400 kΩ	**ddd.d kΩ**
4 V	**d.ddd V**	40 mA	**dd.dd mA**	4 MΩ	**d.ddd MΩ**
40 V	**dd.dd V**	400 mA	**ddd.d mA**	40 MΩ	**dd.dd MΩ**
400 V	**ddd.d V**	4 A	**d.ddd A**	4 nF	**d.ddd nF**
1000 V DC /750 V AC	**dddd V**	10 A	**dd.dd A**	40 nF	**dd.dd nF**
		400 Ω	**ddd.d Ω**	400 nF	**ddd.d nF**
		4 kΩ	**d.ddd kΩ**	4 µF	**d.ddd µF**
400 µA	**ddd.d µA**	40 kΩ	**dd.dd kΩ**	40 µF	**dd.dd µF**

Taking Relative Measurement

The meter allows you to take measurements with zero offset or other values as reference using the **REL Δ** button.

Use zero offset as reference

1. Set the meter to any function except **°C/°F**, **dBm**, **•))**, **⊳⊲**, **LOGIC**, or **^{h}FE**.
2. Disconnect test leads for capacitance, or touch the test leads together for other functions to measure zero offset.
3. When you see the reading, hold down **REL Δ**. **Rel Δ** appears.
4. Take a measurement. You will get the actual value of the measured component.

Use baseline as reference

1. Set the meter to any function except **°C/°F**, **dBm**, **•))**, **⊳⊲**, **LOGIC**, or **^{h}FE**.
2. Press **RANGE** to select a suitable range for relative measurement if necessary.
3. Connect the test leads to the component whose measurement you want to use as a baseline.
4. When you see the reading, hold down **REL Δ**. **Rel Δ** appears. The meter sets to manual range.
5. Take a measurement. You will get the relative value of the measured component to the baseline. If the measured value is lower than baseline, the meter will show a negative relative value.

To reset a relative measurement, press **REL Δ** again or set the function dial to another setting.

Displaying Temperature

You can use an optional thermocouple module (not supplied) to measure temperature with your meter.

WARNING: Do NOT use the thermocouple to measure objects when the voltage is above 30 V RMS and 42.4 V peak or 60V DC.

1. Set the function dial to **°C/°F/ ⎓ V**.
2. Unplug both test leads from the meter, plug the thermocouple's common plug into **–COM** (common), then plug the thermocouple's **+V** plug into **+ V.mA.Ω**.
3. Press **SELECT** to select temperature measurement. Then press **RANGE** to toggle between Celsius and Fahrenheit, **C** or **F** appears.
4. Touch the thermocouple's sensor head to the object you want to test.

Measuring DC/AC Voltage

WARNING: Do NOT try to measure a DC voltage above 1000 volts or an AC voltage above 750 volts RMS, and never clamp a test lead to a hot wire (usually red, black, or blue in AC wiring circuits). If one lead is clamped to a hot wire and you touch the meter's other probe, you could receive an electric shock.

1. To measure DC voltage, set the function dial to **°C/°F/ ⎓ V** and press **SELECT** to select DC voltage measurement.

   To measure AC voltage, set the function dial to **dBm/~V** and press **SELECT** to select dBm or volts unit.

2. If the meter is set to automatic range control, the meter automatically moves to the range that gives the best reading.

   To set manual range control, press **RANGE** then change the range (if necessary) by pressing **RANGE**.

3. Touch the test leads to the circuit you want to test.

Notes:

- When the meter is set to the 400mV range, **OF** continues to appear even after you remove an over-range input signal. This is not a malfunction.Touch the test leads together or connect them to a circuit, then **OF** disappears.
- 0 dBm is equal to the consumption power on a 600-ohm resistor with 0.775V voltage drop.

You can also follow steps 1-3 above to measure AC voltage superimposed on a DC voltage source bias while ignoring the DC voltage, but never try to measure an AC voltage that is riding on a DC source bias where the peak AC voltage exceeds 1000 V with respect to earth ground.

Measuring DC/AC Current

To measure DC/AC current, you must break the circuit and connect the test leads to two circuit connection points. The connection must be in series with the circuit under test.

WARNING:

- Never connect the test leads across a voltage source. Doing so can damage the meter or the circuit under test. The maximum input limit for AC/DC current measurement is 10A.
- If you do not know the amount of current in the circuit you are measuring, always connect the red test lead to **+10A MAX.**

1. Rotate the function dial to **≋/µA/A** for 0.4/4mA and 4/10A ranges or **≋/mA/A** for 40/400mA and 4/10A ranges, and press **SELECT** to measure AC current (~ appears) or DC current (~ disappears).
2. Power off the circuit under test and discharge all capacitors.
3. Plug the black test lead into **-COM** and the red test lead into the appropriate jack. Connect the meter's test leads in series with the circuit.
4. Apply power and read the current value. If the measurement is less than 400mA and the red test lead is connected to **+10A MAX**, power off the circuit.

   If your measurement exceeds the selected range, **OF** appears until the measured current is reduced to the selected range.

5. Move the red test lead to **+ V.mA.Ω**.
6. Rotate the function dial to **≋/µA/A** or **≋/mA/A** depending on the value you measured in Step 4.
7. Reapply power to the circuit.

If you are measuring DC current and the current's polarity is negative, - appears before the value.

Measuring Resistance

1. Power off the circuit under test and discharge all capacitors.
2. Rotate the function dial to **Ω / ⊣⊢** and press **SELECT** until **Ω** (ohm), **KΩ** (kilohm), or **MΩ** (megohm) appears.
3. Touch the test leads across the resistor, or remove one of the leads of the component from its circuit and touch the test leads across the resistor.

Notes:

- With no resistance connected across the test leads (meaning resistance is infinite), **OF** appears when you measure resistance. This is normal.
- If you are measuring resistance of about 1MΩ or more, the display might take a few seconds to stabilize. This is normal.
- To calculate and measure a very small resistance, touch the test leads together to measure the meter's internal resistance, and then substract this value from the measurement. Refer also to **"Taking Relative Measurements"** on page 11.

Measuring Capacitance

The capacitance measuring circuit in your meter charges a connected capacitor to a specific voltage level, then discharges the capacitor to a lower voltage. The meter measures the amount of time it takes to discharge the capacitor.

1. Power off the circuit under test and discharge all capacitors.
2. Rotate the function dial to Ω / ⊣⊢ and press **SELECT** until **nF** or **µF** appears.
3. Attach the red test lead to the positive side of the capacitor and attach the black test lead to the negative side. Or, remove one of the leads of the capacitor from its circuit and connect the test leads to the capacitor's matching (positive or negative) terminals. The measured value appears.

Notes:

- The voltages applied across electrolytic capacitors affect their measured value. That is, a measurement taken with a low voltage will be lower than one taken with a voltage near the capacitor's voltage rating. Since this meter cannot use high voltage to set the electrolyte, it cannot measure the absolute value of capacitance.
- For low-value capacitors, the measurement might be very close to the meter's actual input capacitance. Use the meter's relative feature to measure low capacitance values.
- Capacitance measurement accuracy depends on the measurement method and differs with different types of capacitors. The meter's measurement is for reference only.

Checking Continuity

You can use the meter to check for shorted or open electrical circuits.

1. Power off the circuit under test and discharge all capacitors.
2. Rotate the function dial to •))) / ⊳⊢ and press **SELECT** until •))) appears.
3. Touch the test leads across the circuit you want to measure.

   Shrt appears and the buzzer sounds if the circuit resistance is less than about 50 ohms (meaning the circuit is continuous or shorted).

   Open appears and the meter's buzzer does not sound if the circuit resistance is greater than about 50 ohms (meaning the circuit is not continuous).

Checking Diodes

You can check diodes, transistors, and other semiconductors for opens, shorts, and normal operation, and determine the forward voltage and polarity for diodes. You can also check LEDs.

1. Power off the circuit under test and discharge all capacitors.
2. Rotate the function dial to •))) / ⊳⊢ and press **SELECT**. ⊳⊢ appears.
3. Connect the test leads to the device you want to check, or remove one of the leads of the component from its circuit and connect the test leads to the component. Note the first reading.
4. Reverse the test leads and note the second reading.

If one reading shows a value and the other is overrange (**OF** appears) the device is good. If **OF** appears during both readings, the device is open. If both values are very small or zero, the device is shorted.

Notes:

- When you test a silicon-type semiconductor, the values might vary depending on the temperature.
- The values that appear during a diode check show the actual forward voltage (2.0V max). If the voltage exceeds 2.0V, **OF** appears. The meter cannot check this diode.
- **To check polarity of an unmarked diode**: Connect the test leads to the two sides of the diode. Measure and note the voltage. Then, reverse the test leads, measure and note the second reading. The side of the diode where the meter shows a higher voltage using the red test lead is the anode (+) side. The side of the diode where the meter shows **OF** using the red test lead is the cathode (–) side.

Measuring Logic

WARNING: Do NOT apply more than 5 V DC between terminals. This could damage the meter or the circuit being tested.

1. Rotate the function dial to **LOGIC/Hz** and press **SELECT** once. **LO** appears.
2. Connect the test leads to the device you want to check.

LO appears if the logic is low (the voltage is lower than 1.0V). **Hi** appears if the logic is high (the voltage is higher than 2.0V) The actual voltage appears if the logic is between 1 and 2 V.

Measuring Frequency/Duty Cycle/Pulse Width

The meter can measure frequency from 10 Hz to 4 MHz and duty cycle and pulse width with a signal frequency from 10 Hz to 100 kHz. The amplitude of the signal should not be larger than 10V peak.

1. Rotate the function dial to **LOGIC/Hz** and press **SELECT** until **Hz**, **KHz**, or **MHz** appears.

   Otherwise, press **Hz/DUTY/WIDTH** to select duty cycle function (**%** appears) or pulse width function (**µS** or **mS** appears).

2. If you are measuring frequency, press **RANGE** if necessary to select manual range then press **RANGE** until the range you want appears.

3. Connect the black test lead to a ground reference for the signal, and connect the red test lead to the signal source.

Measuring AC Voltage/AC Current Frequency

The meter can measure the frequency of an AC voltage, with or without a DC source bias.

WARNING: To avoid electrical shock and damage to the meter, never try to measure a frequency of more than 1 kHz between AC 40 volts RMS and 750 volts RMS.

1. If you are measuring AC voltage with a DC source bias, set the function dial to **dBm / ~ V**. Otherwise, set the function dial to **°C/°F/ ⎓ V**.

   To measure AC current frequency, rotate the function dial to **≂ / µA/A** for 0.4/4mA and 4/10A ranges or **≂ / mA/A** for 40/400mA and 4/10A ranges.

2. To select the frequency function, press **Hz/DUTY/WIDTH** until **Hz**, **kHz**, or **MHz** appears.

3. To select the duty cycle or pulse width function, press **Hz/DUTY/WIDTH** until **%** appears (to select duty cycle) or until **µS** or **mS** appears (to select pulse width).

4. If **%, µS,** or **mS** appears and you want to select the frequency function again, press **Hz/DUTY/WIDTH** until **Hz**, **kHz**, or **MHz** appears.

5. Connect the test leads to the device you want to check.

Notes:

- If the function dial is set to **dBm / ~ V** and you want to set the meter for maximum sensitivity when measuring a new signal, press **SELECT** to select the ACV function then press **Hz/DUTY/WIDTH** to select the frequency function.
- To change back to ACV measurement, press **SELECT** once then press **SELECT** again to select the AC V display mode (dBm or volts). Press **SELECT** twice to set the meter back to the AC A measurement function.
- If the meter is set to measure current, it cannot measure the frequency of a signal with DC bias.

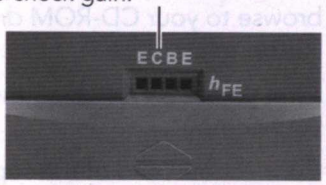
Measuring ^{h}FE

You can use the meter to measure the DC gain of small-signal, bipolar transistors in the ^{h}FE range of 1000.

CAUTION: To avoid damaging the meter, do not try to check a transistor if you do not know its type and pinout.

1. Set the function dial to **^{h}FE**.
2. Unplug both test leads from the meter, then slide down the guard on the front of the meter.
3. Insert the transistor you want to check into the **^{h}FE** socket, matching the pinout of the transistor with the labels on the socket. The transistor's value appears.

^{h}FE Socket - Insert a transistor to check gain.



You can connect your meter to a computer, letting you conveniently monitor, record, and log data over a long period of time. You can even use your meter to display oscilloscope information on your computer. For example, you can record changes in temperature in a refrigerator or voltage changes in a circuit over a long period of time.

System Requirement

Windows® XP, Windows ME, Windows 2000, Windows 98 or Windows 95, with all of the following:

- VGA or SVGA video adapter
- at least 32 MB RAM
- Microsoft-compatible mouse

Installing the Meter's Software and Hardware

1. Turn on your computer and start the installed Windows operating system.
2. Insert the software CD into your CD-ROM drive. The CD starts automatically. If it does not, browse to your CD-ROM drive and open **setup.exe**.
3. After you finish installing the software, restart your computer.
4. Connect one end of the supplied RS-232 cable to the jack on top of the meter, then connect the other end to your computer's serial port. The supplied cable fits only one way. Do not force it.

Configuring and Using the Meter and Software

After connecting, you must configure your meter and the Meter View software so that they can work with each other.

1. Click **Start**, **Programs**, then **Meter View** on your computer. The Meter View software starts.
2. Turn on your meter. Then hold down **SELECT** and **RANGE** together. RS232 appears.
3. On your computer, select the COM port where you connected the meter by pulling down **Option** then **COM Port**, then clicking **COM1**, **COM2**, **COM3**, or **COM4**.

4. Then click the icon , or pull down **Run** then click **Start** to set up the meter to work with your computer. Data is transmitted from your meter to your computer. The display you see on the meter also appears on your computer.

Notes:

- If you select the wrong COM port, an error message appears. Repeat step 3 to select the correct COM port.
- If the Meter View software stops communicating with the meter, check the connection between the meter and the computer and make sure RS232 still appears on the meter's display.
- The Meter View software includes installation files and a Help Guide. You can find more detailed information in the Help Guide. To read this guide, click **Start**, **Programs**, **Meter View**, then select **Help**.

Accuracies at 73.4°F (23°C) ±5°, <75% RH

DC VOLTS (Maximum Measurement: 1000V)

400mV	± 0.3% of Reading, ± 4 in Last Digit
4V to 40V	± 0.3% of Reading, ± 3 in Last Digit
400V	± 0.5% of Reading, ± 3 in Last Digit
1000V	± 0.5% of Reading, ± 4 in Last Digit

AC VOLTS (Maximum Measurement: 750Vrms at 50/60 Hz, Average Responses, RMS Calibrated, AC Coupled)

400mV	± 0.5% of Reading, ± 4 in Last Digit
4V to 40V	± 0.5% of Reading, ± 3 in Last Digit
400V	± 0.6% of Reading, ± 3 in Last Digit
750V	± 0.8% of Reading, ± 4 in Last Digit

dBm ACCURACY (–31.8dBm to +59.7dBm at 50/60 Hz sine wave)
..... ± 0.3dBm, ± 2 in Last Digit

DC CURRENT (Maximum Measurement: 10A)

400µA, 40mA, 4A	± 0.8% of Reading, ± 5 in Last Digit
4mA, 400mA	± 0.6% of Reading, ± 3 in Last Digit
10A	± 1.0% of Reading, ± 5 in Last Digit

AC CURRENT (Average Responds, RMS Calibrated, 10A Maximum, DC Coupled)

400µA, 40mA, 4A	± 1.0% of Reading, ± 5 in Last Digit
4mA, 400mA	± 0.8% of Reading, ± 3 in Last Digit
10A	± 1.2% of Reading, ± 5 in Last Digit

RESISTANCE

400Ω	± 0.4% of Reading, ± 5 in Last Digit
4kΩ, 40kΩ, 400kΩ	± 0.3% of Reading, ± 3 in Last Digit
4.0MΩ	± 0.6% of Reading, ± 3 in Last Digit
40MΩ	± 1.5% of Reading, ± 5 in Last Digit

CAPACITANCE

4nF	± 3.0% of Reading, ± 40 in Last Digits
40nF	± 3.0% of Reading, ± 10 in Last Digits
400nF, 4µF, 40µF	± 2.0% of Reading, ± 4 in Last Digit

Note: Accuracy with film capacitor or better, specified from 9.5% of full scale to full scale except 4.0nF range from 0.5nF to full scale.

PULSE WIDTHS (Frequency Range: 10Hz to 100kHz)
1µS to 90mS (at +5/–0V square wave): ..... ± 5% of Reading, ±2 in Last Digit

K-TEMPERATURE MODE

This is a special voltage mode, to be used with an optional thermocouple module that can be attached to the meter. This mode automatically converts the 1mV per °C or °F voltage into a readout that appears as a temperature. In these modes, the unit can show up to ± 999°C or °F.

The accuracy of these modes is determined by the external device and the accuracy of the DC volt mode. The temperature range of the newer 1mV per degree C probes is generally between –50°C and 1000°C.

FREQUENCY

Accuracy

400Hz, 4k, 40k, 400kHz, 4MHz: ..... ± 0.1% of Reading, ± 4 in Last Digit

Sensitivity

The function dial set to **LOGIC/Hz** (10Hz – 4MHz)

400Hz, 4k, 40kHz	50 mVrms
400kHz	100 mVrms
4MHz	250 mVrms

For AC voltage frequency, the function dial set to **°C/°F / V** (maximum measuring frequency 1 kHz for signal above 40V)

10Hz to 1 kHz	70 mVrms
1kHz to 10 kHz	400 mVrms

For AC voltage frequency, the function dial set to **dBm ~ V** (maximum measuring frequency 1 kHz for signal above 40V)

10 Hz to 200 Hz	300 mVrms
200 Hz to 1 kHz	0.4 Vrms
1 kHz to 10 kHz	4 Vrms

For AC current frequency

400µA/4mA	10 Hz to 30 kHz: 250µArms
40mA/400mA	10 Hz to 30 kHz: 25mArms
4A/10A	10 Hz to 10 kHz: 2.5Arms

DUTY CYCLE (Frequency Range: 10 Hz to 100 kHz)
10% – 90% (at +5V/-0V Square wave) ..... ± 2 digits/kHz, ± 2 in last digit
Note: Duty cycle accuracy depends on input signal frequency.

DIODE MODE

Open Circuit Voltage ..... < 2.8Vdc
Test Current ..... 1 mA Typical

LOGIC MODE

Min. High-Level Voltage ..... 2.0V ± 0.2V
Max. Low-Level Voltage ..... 1.0V ± 0.2V

CONTINUITY BEEPER

Continuity (short) ..... ≤ 50 ± 30 Ohms
Open ..... > 50 ± 30 Ohms
Open Circuit ..... < 2.8 Volts
Short Circuit Current ..... < 2.0 mA

GENERAL

Maximum Common Mode Voltage ..... 500VDC or RMS AC
Sleep Mode Timing ..... 30 ± 10 Minutes
Range Up Detect Value ..... Overflow (>4000 Counts)
Range Down Detect Value ..... 380 Counts
Low Battery Indication ..... 6.3V ± 0.3 V
Sleep Mode Current ..... 10 µA Normal, 20µA Max.
Input Impedance ..... DCV/ACV: 10Mohm
Power Source ..... One 9V battery (not supplied)
Operating Temperature ..... 41° to 104°F (5° to +40°C)
Storage Temperature ..... – 4° to 140°F (–20° to +60°C)
Humidity ..... Maximum Relative Humidity 80% for temperatures up to 87°F (31°C),
.....decreasing linearity to 50% relative humidity at 104°F (40°C)
Pollution Degree.....2
Dimensions (H × W × D) ..... 7 × 3 7/16 × 1 11/16 Inches (178 × 88 × 43 mm)
Weight ..... Approx 10.44 oz (296 g)

Specifications are subject to change and improvement without notice. Actual product may vary from the product images in this document.

Notes:

Limited Warranty

This product is warranted by ***RadioShack*** against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from ***RadioShack*** company-owned stores and authorized ***RadioShack*** franchisees and dealers. For complete warranty details and exclusions, check with your local ***RadioShack*** store.

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04/04

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