

User's Guide



MultiTec™ Series

Digital MultiMeters with PC Interface

Models: MT310
 MT320
 MT330



WARRANTY

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for three years from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization. **A Return Authorization (RA) number must be issued before any product is returned to Extech.** The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

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Introduction

Congratulations on your purchase of Extech model MT310, MT320, or MT330 digital multimeter. Properly used, this meter will provide many years of reliable service. All models measures AC/DC Voltage/Current, Resistance, Frequency and Capacitance. All models are Autoranging and include a PC Interface feature. The MT320 and MT330 also measure temperature. The Model MT330 is True RMS responding.

Safety

International Safety Symbols



Refer to the manual
for further information



Hazardous voltages
may be present.



Double insulation

UL Listed

The UL mark does not indicate that this product has been evaluated for the accuracy of its readings.

Safety Precautions

1. Improper use of this meter can cause damage, shock, injury or death. Read and understand this user manual before operating the meter.
2. Make sure any covers or battery doors are properly closed and secured.
3. Always remove the test leads before replacing the battery or fuses.
4. Inspect the condition of the test leads and the meter itself for any damage before operating the meter. Repair any damage before use.
5. Do not exceed the maximum rated input limits.
6. Use great care when making measurements if the voltages are greater than 25VAC rms or 35VDC. These voltages are considered a shock hazard.
7. Always discharge capacitors and remove power from the device under test before performing Capacitance, Diode, Resistance or Continuity tests.
8. Remove the battery from the meter if the meter is to be stored for long periods.
9. To avoid electric shock, do not measure AC current on any circuit whose voltage exceeds 250V AC.
10. Voltage checks on electrical outlets can be difficult and misleading because of the uncertainty of connection to the electrical contacts. Other means should be used to ensure that the terminals are not "live".

Specifications

Function	Ranges	Accuracy
DC Voltage (V DC)	400.0mV	$\pm(0.3\% \text{ reading} + 5 \text{ digits})$
	4.000V, 40.00V, 400.0V,	$\pm(0.1\% \text{ reading} + 5 \text{ digits})$ MT330 $\pm(0.3\% \text{ reading} + 5 \text{ digits})$ MT320 $\pm(0.5\% \text{ reading} + 5 \text{ digits})$ MT310
	1000V	$\pm(0.5\% \text{ reading} + 5 \text{ digits})$
AC Voltage (V AC) (Model MT330 True RMS)	100.0-400.0mV	$\pm(1.5\% \text{ reading} + 5 \text{ digits})$
	4.000V, 40.00V, 400.0V	$\pm(1.0\% \text{ reading} + 5 \text{ digits})$ (40Hz to 1kHz)
	700.0V	$\pm(1.5\% \text{ reading} + 5 \text{ digits})$
DC Current (A DC)	400.0 μ A, 4000 μ A, 40.00mA, 400.0mA	$\pm(1.2\% \text{ reading} + 10 \text{ digits})$
	20.00A	$\pm(2\% \text{ reading} + 10 \text{ digits})$
AC Current (A AC) (Model MT330 True RMS)	400.0 μ A, 4000 μ A, 40.00mA, 400.0mA	$\pm(1.5\% \text{ reading} + 10 \text{ digits})$ (40Hz to 1kHz)
	20.00A	$\pm(2\% \text{ reading} + 10 \text{ digits})$

Function	Ranges	Accuracy
Resistance	400.0Ω, 4.000kΩ, 40.00kΩ, 400.0kΩ, 4000kΩ	±(0.5% reading + 10 digits)
	40.00MΩ	±(1% reading + 5 digits)
Frequency	500.0mHz	Not specified
	5.000Hz, 50.00Hz, 500.0Hz, 5.000kHz, 50.00kHz, 500.0kHz, 5.000MHz, 10.00MHz	±(0.1% reading + 2 digits) (250mVac peak minimum)
Capacitance	40.00nF, 400.0nF, 4.000uF, 40.00uF, 100.0uF	± (2% reading + 10 digits)
Temp °F (MT320 and MT330 only)	0.0-212.0°F	± (3° + 5 digits)
	212.0 – 400.0°F	± (3% reading + 5 digits)
	400.0 - 2000°F	
Temp °C (MT320 and MT330 only)	-20.0 – 100.0°C	± (3° + 5 digits)
	100.0 – 400.0°C	± (3% reading + 5 digits)
	400.0 - 1370°C	

Input Limit Specifications

Function	Maximum Input
V DC or V AC	1000V DC or AC Peak, < 10 seconds
mA DC/AC	400mA DC/AC, fused 250V, 0.5A
A DC/AC	20A DC/AC, < 30 seconds (every 15min); Fused 250V, 20A
Frequency	250V DC or AC peak
Resistance	250V DC or AC peak, <10 seconds
Duty Cycle	250V DC or AC peak

General Specifications

Duty Cycle	0.1% to 99.9%
Diode Test	Test voltage of 1.5V (max)
Continuity Check	Audible tone if the resistance is less than 60 Ω
Input Impedance	10M Ω (VDC and VAC), 100M Ω in the 400mV range
Display	4000 count (3 $\frac{3}{4}$ digit) LCD, Model MT330 with back lighting
Overrange indication	LCD displays "OL"
Polarity	Auto positive polarity; Minus (-) sign for negative polarity
Low Battery Indication	Battery symbol indicates low battery condition.
Power Supply	One 9V battery (NEDA 1604)

Fuses	μ A, mA ranges: 500mA/250V ceramic; 20A range: 20A/250V ceramic
Operating Temperature	32°F to 104°F (0°C to 40°C)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Accuracy Temperature	64°F to 82°F (18°C to 28°C)
Relative Humidity	< 80% RH operating, (<70% RH storage)
Dimensions / Weight	3.5x7x1.3" (88x178x33mm) / 0.7lb (315g)

Description

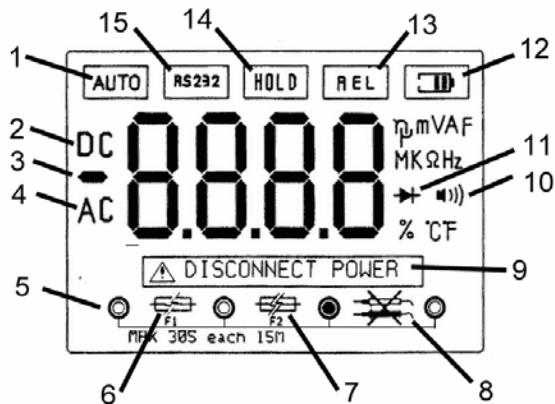
Meter (MT330 pictured)

1. 3 3/4 Digit (4000 count) Liquid Crystal Display (LCD).
2. Function keys
3. Rotary function switch
4. 20A, mA/ μ A, COM, V/Hz/ Ω /Capacitance input jacks.
5. Temperature probe input socket (MT320 and MT330 only).
6. RS232 PC interface connector



Display

1. AutoRange mode
2. DC current or voltage
3. Negative (minus) sign
4. AC current or voltage
5. Input jack status icons
6. 20A blown fuse indicator
7. uA/mA blown fuse indicator
8. Incorrect test lead insertion indicator (active in Capacitance, Hz, Ohms, Diode, Continuity and ACV/DCV modes)
9. Power warning for Ohm, Cap and Diode
10. Continuity symbol
11. Diode symbol
12. Low Battery symbol
13. Relative mode indicator
14. Range hold indicator
15. PC interface indicator



Operation

Measurement Preparations and Considerations

1. ALWAYS push the power key to the OFF position when the meter is not in use. This meter has Auto Power OFF that automatically shuts the meter OFF if 30 minutes elapse without activity. To recover from Auto OFF, press any key. (Alternately, press the POWER key, wait three seconds, and press the POWER key again).
2. If "OL" appears on the display during a measurement, the measurement exceeds the range selected. Change to a higher range.

AC or DC Voltage Measurements


1. Set the function switch to the "**V**" position
2. Press the "**DC/AC**" key until "**DC or AC**" appears on the LCD.
3. Insert the black test lead into the negative **COM** jack and the red test lead into the positive **V** jack.
4. Touch the test probe tips to the circuit under test.
5. Read the voltage on the display

AC or DC Current Measurements

CAUTION: Do not make current measurements on the 20A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead into the negative **COM** jack.
2. For current measurements up to $4000\mu\text{A}$, set the function switch to the " **μA** " position and insert the red test lead into the **mA- μA** jack.
3. For current measurements up to 400mA, set the function switch to the "**mA**" position and insert the red test lead into the **mA- μA** jack.
4. For current measurements up to 20A AC, set the function switch to the "**20A**" position and insert the red test lead into the **20A** jack.
5. Press the DC/AC key until "**AC or DC**" appears on the display.
6. Remove power from the circuit under test and open the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit and touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display.

Resistance and Continuity Measurements

1. Set the function switch to the "OHM" position.
2. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive jack.
3. For Continuity, press the "DC/AC" key until the "  " symbol appears on the display.
4. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
5. For Resistance tests, read the resistance on the display.
6. For Continuity tests, If the resistance is < 60 ohms, an audible tone sounds (LCD also shows the actual resistance).

Capacitance Measurements

1. Set the function switch to the "**CAP**" position.
2. Insert the black lead into the negative **COM** jack and the red test lead into the positive CAP jack.
3. Touch the test leads to the capacitor to be tested and read the measured value.

Diode Test

1. Set the function switch to "**▶**" position.
2. Press the "**DC/AC**" key until the "**▶**" symbol appears on the display.
3. Insert the black lead into the negative **COM** jack and the red test lead into the positive jack
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
5. Reverse the test lead polarity by reversing the red and black leads. Note this reading.
6. The diode or junction can be evaluated as follows:
 - A. If one reading shows a value and the other reading shows OL, the diode is good.
 - B. If both readings show OL, the device is open.
 - C. If both readings are very small or 0, the device is shorted.

Frequency / Duty Cycle Measurements

1. Set the function switch to the "HZ" position
2. Insert the black lead into the negative **COM** jack and the red test lead into the positive **Hz** jack
3. Touch the test probe tips to the circuit under test.
4. Read the frequency on the display
5. Press the "**Hz/Duty**" button to display duty cycle in %.

Temperature Measurements (MT320 and MT330 only)

WARNING: To avoid electric shock, disconnect test leads from any source of voltage before making a temperature measurement. Be sure that the thermocouple has been removed before changing to any other measurement function.

1. Set the function switch to the "°F or °C" position as desired.
2. Insert the Temperature Probe into the Temperature Socket.
3. Touch the Temperature Probe tip to the device under test.
4. Wait 30 seconds for the measurement to stabilize then read the LCD.

Auto / Manual Range

The meter powers up in Auto Range mode. For Manual range applications, follow these steps:

1. Press the "**RANGE**" key. The "**AUTO**" indicator will extinguish and the currently selected range will be held.
2. Press the "**RANGE**" key to step through the available ranges until you select the range desired.
3. Press and hold the "**RANGE**" key for 2 seconds to exit the manual ranging mode and return to "**AUTO**" mode.

Data Hold

1. Press the "**HOLD**" key to "freeze" the display, the "**HOLD**" indicator will appear.
2. Press the "**HOLD**" key to return to normal operation.

Relative Mode

The relative measurement feature allows the user to make measurements relative to a stored reference value. A reference value can be stored and measurements can be made in comparison to that value. The displayed value is the difference between the reference value and the measured value.

1. Perform any measurement as described in the operating instructions.
2. Press the **"REL"** button to store the present reading and the **"REL"** indicator will appear on the display.
3. The display will now indicate the difference between the stored value and the measured value.

LCD Backlight (model MT330 only)

1. Press and hold the **"HOLD"** key for approx. 2 seconds, the **"HOLD"** indicator will appear and the backlight will be activated.
2. Press the **"HOLD"** key momentarily to turn off the **"HOLD"** icon.
3. Press and hold the **"HOLD"** key for approx. 2 seconds to turn off the backlight. The **"HOLD"** icon will appear.
4. Press the **"HOLD"** key momentarily to turn off the **"HOLD"** icon.

Maintenance

WARNING: To avoid electrical shock, disconnect the test leads from any source of voltage before removing the back cover or the battery/fuse door. Do not operate your meter until the battery/fuse door are in place and fastened securely.

Cleaning the Meter: Wipe the case occasionally with a damp cloth. DO NOT use chemicals, cleaning solvents, abrasives or detergents.

Replacing the Batteries

1. When the battery drops below the operating voltage, the battery symbol will appear in the right-hand side of the LCD display. The battery should be replaced at this point.
2. Remove power from the meter and disconnect the test leads from the meter.
3. Open the battery/fuse door by loosening the two screws on the rear battery/fuse cover using a Phillips head screwdriver.
4. Clip the battery into battery holder, observing the correct polarity.
5. Place the battery into the battery/fuse compartment.
6. Put the battery/fuse door back in place. Secure with the two screws.
7. Dispose of batteries safely.

Replacing the Fuses

1. Open the battery/fuse door by loosening the two screws on the battery/fuse door using a Phillips head screwdriver.
2. Remove the old fuse from its holder by gently pulling it out.
3. To access the 20A fuse, remove the third screw under the tilt stand, remove the back cover and gently lift the printed circuit boards.
4. Install the new fuse into the holder.
5. Always use a fuse of the proper size and value (0.5A/250V fast blow for the 400mA range 20A/250V fast blow for the 20A range).
6. Put the battery/fuse door back in place. Insert the screws and tighten securely.

PC Interface

Installation

1. Start Windows 95/98.
2. Insert the program disk into the floppy drive (drive A: for example)
3. Select "**START**" and then "**RUN**" from the Windows menu.
4. Type "**A:\SETUP.EXE**" in the "**OPEN**" box and select "**OK**"
5. Follow the installation instructions on the screen.

Operation

1. Connect the RS-232 cable between the meter's DB-9 connector (top of meter) and the PC's serial port.
2. Select the "**Multimeter**" icon in the "**START / PROGRAM**" menu.
3. Select "**Setup**" from the Main Menu bar and then "**Com Port**". Choose the desired COM port.
4. Select "**RUN**" from the Main Menu bar and then "**START**" to begin displaying measurements.
5. Read the "**HELP**" screen for details on operating the software.
6. Select "**FILE**" in the Main Menu bar and then "**Exit**" to quit the program