

## User's Guide

**EXTECH**  
INSTRUMENTS

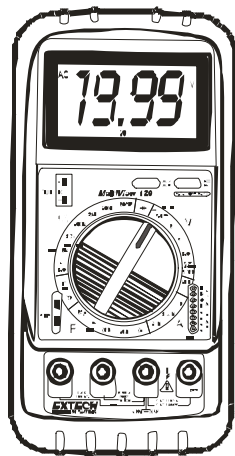
## MultiView™ Series Digital MultiMeters

### Models:

**MV110**

**MV120**

**MV130**



## WARRANTY

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year 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.

## REPAIR AND CALIBRATION SERVICES

**Extech offers complete repair and calibration services** for all of the products we sell. For periodic calibration, NIST certification or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to ensure calibration integrity.

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### Tech Support Hotlines

781-890-7440 ext. 200  
[extech@extech.com](mailto:extech@extech.com)  
[www.extech.com](http://www.extech.com)

## ***Introduction***

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Congratulations on your purchase of Extech model MV-110, MV-120, or MV-130 digital multimeter. Properly used, this meter will provide many years of reliable service. The meters contains a large 3-1/2 or 4-1/2 digit LCD with adjustable viewing angle and provides such measurement functions as: DC and AC voltage, DC and AC current, resistance, temperature, frequency, capacitance, hFe, battery, square wave output, diode, and continuity check depending upon the model.

## ***Safety***

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### **International Safety Symbols**

**WARNING:** This indicates that a potentially hazardous condition which, if not avoided, could result in death or serious injury.

**CAUTION:** This indicates that a potentially hazardous condition which, if not avoided, could result in injury or damage to the meter.



Refer to the manual  
for further information



Hazardous voltages  
may be present.



Double insulation

## Safety Precautions

1. **WARNING:** Improper use of this meter can cause damage, shock, injury or death. Read and understand this users 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 or replace 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.

# Specifications

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## General Specifications

<b>Display</b>	1999 count 3 1/2 digit, adjustable angle (MV-110, MV-120) 19999 count 4 1/2 digit, adjustable display (MV-130)
<b>Sample Rate</b>	Approximately 2 - 3 per second
<b>Input warning</b>	Alarm sounds with test leads in the A or 10A socket and the wrong function is selected.
<b>Fuse Protection</b>	2A (A socket), 0.2A (mA socket), 10A or 20A range not fused
<b>Power Supply</b>	9V battery (NEDA 1604 or equivalent)
<b>Range selection</b>	Manual
<b>Over-range Indication</b>	"1"
<b>Auto Off</b>	Unit switches off after 15 minutes of inactivity
<b>Low Battery Indication</b>	battery symbol
<b>Operating Temperature / Humidity</b>	32 <sup>0</sup> F to 104 <sup>0</sup> F (0 <sup>0</sup> C to 40 <sup>0</sup> C) / < 75% RH
<b>Storage Temperature</b>	14 <sup>0</sup> F to 122 <sup>0</sup> F (-10 <sup>0</sup> C to 50 <sup>0</sup> C)
<b>Dimension / Weight</b>	7.3 x 3.5 x 1.3" (185x89x32mm) LxWxH / approx. 9.7 oz. (300 grams)

## Electrical Specifications

Function (model)	Range	Accuracy % Rdg. + digits	Resolution	Input Protection	Comments
DCV (MV-110, MV-120)	200mV	$\pm(0.5\% + 1 \text{ digit})$	0.1mV	250V rms	Input impedance > 10M $\Omega$
	2, 20, 200V		0.001,0.01,0.1V	1000VDC	
	1000V	$\pm(0.8\% + 2 \text{ digit})$	1V	750VAC	
DCV (MV-130)	200mV	$\pm(0.05\% + 3 \text{ digits})$	0.01mV	250V rms	
	2, 20, 200V		0.0001,0.001,0.01V	1000VDC	
	1000V	$\pm(0.1\% + 5 \text{ digits})$	0.1V	750VAC	
ACV (MV-110, MV-120)	200mV	$\pm(1.2\% + 3 \text{ digits})$	0.1V	1000VDC	Input impedance > 1M $\Omega$ Frequency range: <200V: 40 to 400Hz, < 750V: 40 to 200Hz
	2, 20, 200V	$\pm(0.8\% + 3 \text{ digits})$	0.001,0.01,0.1V	750VAC	
	750V	$\pm(1.2\% + 3 \text{ digits})$	1V		
ACV (MV-130)	2, 20, 200V	$\pm(0.8\% + 10 \text{ digits})$	0.0001,0.001,0.01V	1000VDC	
	750V	$\pm(1.0\% + 15 \text{ digits})$	0.1V	750VAC	
DCA (MV-110)	20 $\mu$ A	$\pm(2.0\% + 5 \text{ digits})$	0.01 $\mu$ A	2A,250V fuse	
	200 $\mu$ A, 2, 20 mA	$\pm(0.8\% + 1 \text{ digits})$	0.1 $\mu$ A, 0.001,0.01mA		
	200mA, 2A	$\pm(1.2\% + 1 \text{ digits})$	0.1mA, 0.001A		
	10A	$\pm(2.0\% + 5 \text{ digits})$	0.01A	not fused	
DCA (MV-120)	20, 200 mA	$\pm(0.8\% + 1 \text{ digits})$	0.01, 0.1mA	0.2A,250V fuse	
	20A	$\pm(2.0\% + 5 \text{ digits})$	0.01A	not fused	

Function	Range	Accuracy % rdg. + digits	Resolution	Input Protection	Comments
<b>DCA</b> <b>(MV-130)</b>	2, 20, 200mA	$\pm(0.8\% + 10 \text{ digits})$	0.0001,0.001,0.01mA	0.2A,250V fuse	Frequency: 40 to 400Hz Maximum input: 10A (MV-110, MV-130), 20A (MV-120) Average responding 15 sec. max @ 20A
	10A	$\pm(2.0\% + 10 \text{ digits})$	0.001A	not fused	
<b>ACA</b> <b>(MV-110)</b>	20 $\mu$ A	$\pm(3.0\% + 7 \text{ digits})$	0.01 $\mu$ A	2A,250V fuse	
	200 $\mu$ A	$\pm(1.8\% + 3 \text{ digits})$	0.1 $\mu$ A		
	2, 20mA	$\pm(1.0\% + 3 \text{ digits})$	0.001, 0.01mA		
	200mA, 2A	$\pm(1.8\% + 3 \text{ digits})$	0.1mA, 0.001A		
	10A	$\pm(3.0\% + 7 \text{ digits})$	0.01A	not fused	
<b>ACA</b> <b>(MV-120)</b>	20, 200 mA	$\pm(1.0\% + 3 \text{ digits})$	0.01,0.1mA	0.2A,250V fuse	
	20A	$\pm(3.0\% + 7 \text{ digits})$	0.01A	not fused	
<b>ACA 6</b> <b>(MV-130)</b>	2, 20 200mA	$\pm(1.0\% + 10 \text{ digits})$	0.0001,0.001,0.01mA	0.2A,250V fuse	
	10A	$\pm(2.0\% + 10 \text{ digits})$	0.001A	not fused	
<b>Resistance</b> <b>(MV-110, MV-120)</b>	200 $\Omega$	$\pm(0.8\% + 3 \text{ digits})$	0.1 $\Omega$	250V	
	2, 20, 200k $\Omega$ , 2M $\Omega$	$\pm(0.8\% + 1 \text{ digits})$	1, 10, 100 $\Omega$ ,1k $\Omega$	DC or ACrms	
	20M $\Omega$	$\pm(1.0\% + 2 \text{ digits})$	10k $\Omega$		
	200M $\Omega$	$\pm(5.0\% \text{ rdg} + 10\text{d}) + 10 \text{ dig}$	100k $\Omega$		
<b>Resistance</b> <b>(MV-130)</b>	200 $\Omega$	$\pm(0.2\% + 5 \text{ digits})$	0.01 $\Omega$		
	2, 20, 200k $\Omega$ , 2M $\Omega$	$\pm(0.2\% + 1 \text{ digits})$	0.1, 1, 10, 100 $\Omega$		
	20M $\Omega$	$\pm(0.5\% + 5 \text{ digits})$	1k $\Omega$		

Function	Range	Accuracy % rdg + digits	Resolution	Input Protection	Comments
Capacitance (MV-120)	2,20,200nF 2,20 $\mu$ F	$\pm(2.5\% + 3 \text{ digits})$	1,10,100pF 1nF, 10nF		Test Freq: 400Hz Test V: 40mV
Capacitance (MV-130)	2,20,200nF 2,20 $\mu$ F	$\pm(2.5\% + 10 \text{ digits})$	0.1,1,10,100pF 1nF		
Temperature (MV-120)	-18 to 400°C 0 to 752°F	$\pm(0.75\% + 4 \text{ digits})$	1°C/F		Type K Thermocouple
	-40 to 1000°C -40 to 1832°F	$\pm(1.6\% + 15 \text{ digits})$			
Frequency (MV-130)	20kHz	$\pm(1.5\% + 10 \text{ digits})$	1Hz	250VAC/VDC	Sensitivity: 100mV
Diode test		Forward DC current approx. 1mA, Reverse DC voltage approx. 3V			
Transistor hFE	0 to 1000	Base current approx. 10 $\mu$ A, Vce approx 2.8V			
Continuity		Buzzer sounds when R < 30 $\Omega$			
Battery check (MV-110)	1.5V	30 $\Omega$ Internal resistance			
	9.0V	1.8k $\Omega$ Internal resistance			
Square Wave (MV-110)		Approx. 50Hz, 4-6V			

Note: Accuracy is specified for a period of one year after calibration and at 18 °C to 28 °C (64 °F to 82 °F) RH: 75% max.



## ***Description (MV120 pictured)***

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1. Display release button
2. AC/DC selection on models MV110, MV120
3. Hold Button on model MV130.
4. Power ON/OFF button
5. LCD display
6. Transistor socket
7. Function rotary switch
8. Capacitance socket (MV120, MV130)
9. V/F/Ohms socket
10. COM socket
11. Low Amperage socket
12. 10/20 Amp socket
13. Type K thermocouple input socket (MV120 only).



## ***Operation***

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### **General Procedures**

1. Apply power via ON/OFF switch. If the low battery symbol appears, replace the battery.
2. Set the function switch to the correct position before taking measurements.
3. Press the Display Release Button and set the display to a convenient viewing angle.

### **AC/DC Voltage Measurements (DO NOT EXCEED MAX INPUT LIMIT OF 1000VDC)**

1. Connect the black test lead to the meter's COM socket and the red lead to the meter's "V $\Omega$ F" socket.
2. Set the rotary switch to a "V" position range higher than the expected voltage.
3. Press the "DC / AC" button to select AC or DC measurement (for models MV-110 and MV-120 only).
4. Connect the test leads to the unit under test (load, circuit, etc.)
5. The value of the measured voltage will appear in the LCD display.

### **Resistance Measurement**

1. Connect the black test lead to the COM socket and the red lead to the V/ $\Omega$  socket.
2. Set the rotary switch to the " $\Omega$ " range required.
3. Connect the test leads to the unit under test.
4. The value of the measured resistance will appear in the LCD display.

## Diode Measurements

1. Connect the black test lead to the COM-socket and the red lead to the  $V\Omega$  socket.
2. Set the rotary switch to the "Diode" symbol position
3. Connect the test leads to the diode under test.
4. The value of the forward voltage drop (0.3 to 0.6V) or the open circuit voltage (2.6V approx.) will appear in the LCD display for a good diode.

## AC/DC Current Measurements

**(If the magnitude of current is unknown, select the highest meter range and then reduce the range as needed)**

1. Connect the black test lead to the meter's COM-socket and the red lead to either the "A" socket if measuring less than 2A or the "10A/20A" socket if measuring less than 10A or 20A
2. Set the rotary switch to the "A" position as required. Always select the highest range when unsure of the current value.
3. Press the "DC / AC" button to select AC or DC measurement.
4. Connect the test leads in series with the unit under test (load, circuit, etc.)
5. The value of the measured current will appear in the LCD.
6. Negative DC current will appear with a "-" sign.

**NOTE:** The mA and A ranges are protected by a 0.2A or a 2A fuse. The 10A or 20A ranges are not fuse protected.  
Always replace blown fuses with fuses of the identical type.

### **Continuity Measurements (Remove power or voltage from the device under test)**

1. Connect the black test lead to the COM-socket and the red lead to the  $V\Omega$  socket.
2. Set the rotary switch to the "Continuity" symbol position
3. The continuity buzzer will sound if the measured resistance is  $< 30\Omega$

### **Battery Measurements (MV-110 only)**

1. Connect the black test lead to the COM-socket and the red lead to the  $V\Omega$  socket.
2. Set the rotary switch to the 1.5V or 9V position
3. The meter will display the voltage under load of the tested battery.

### **Square Wave Output (MV-110 only) Note: Remove power or voltage from the device under test**

1. Connect the black test lead to the COM-socket and the red lead to the  $V\Omega$  socket.
2. Set the rotary switch to the "square wave symbol" position
3. The meter will output a 50Hz square wave.

### **Capacitance Measurements (MV-120, MV-130 only) Note: Remove power or voltage from the device under test**

1. Insert the capacitor in the CAP socket.
2. Set the rotary switch to the proper capacitance position.
3. The value of the measured capacitor will appear in the LCD.

### **Temperature Measurements (MV-120 only)**

1. Insert the type K thermocouple mini-connector into the "K" socket.
2. Set the rotary switch to the °F or °C position.
3. The value of the measured temperature will appear in the LCD.

### **Transistor hFe Measurements**

1. Move the rotary select switch to the hFe position
2. Plug the transistor under test into the appropriate transistor input jacks on the meter front.
3. For transistor types PNP and NPN, the meter has matching input sockets. Also, for each leg of the transistor (E, B, and C) the meter has matching input sockets. Plug the transistor into the sockets that match its type.
4. Read the hFe value on the LCD display.

### **Auto Power Shut-Off**

To conserve battery power, the meter will automatically power down if it has not been used for more than 15 minutes.

### ***Battery Replacement***

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Remove the test leads from the meter and remove the screw from the battery compartment cover (rear bottom). Lift off the cover, replace the battery, and replace battery cover.