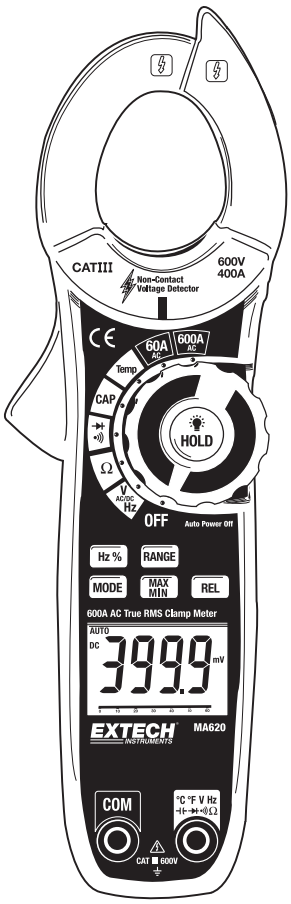
User's Guide

EXTECH INSTRUMENTS
A FLIR COMPANY

600Amp AC True RMS Clamp Meter

Model MA620



Introduction

Congratulations on your purchase of this Extech MA640 True RMS Clamp Meter. This meter measures AC Current, AC/DC Voltage, Resistance, Capacitance, Frequency, Diode Test, Duty Cycle and Continuity. Special features include Thermocouple Temperature and Non-Contact Voltage detection. The double molded case is designed for heavy duty use. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Safety

International Safety Symbols

This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.

This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present

Double insulation

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

CAUTION This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.

PER IEC1010 OVERVOLTAGE INSTALLATION CATEGORY

OVERVOLTAGE CATEGORY I

Equipment of OVERVOLTAGE CATEGORY I is equipment for connection to circuits in which measures are taken to limit the transient overvoltages to an appropriate low level.

Note – Examples include protected electronic circuits.

OVERVOLTAGE CATEGORY II

Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.

Note – Examples include household, office, and laboratory appliances.

OVERVOLTAGE CATEGORY III

Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.

Note – Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

OVERVOLTAGE CATEGORY IV

Equipment of OVERVOLTAGE CATEGORY IV is for use at the origin of the installation.

Note – Examples include electricity meters and primary over-current protection equipment

SAFETY NOTES

- Do not exceed the maximum allowable input range of any function.
- Do not apply voltage to meter when resistance function is selected.
- Set the function switch OFF when the meter is not in use.
- Remove the battery if meter is to be stored for longer than 60 days.

WARNINGS

- Set function switch to the appropriate position before measuring.
- When measuring volts do not switch to current/resistance modes.
- Do not measure current on a circuit whose voltage exceeds 600V.
- When changing ranges always disconnect the test leads from the circuit under test.

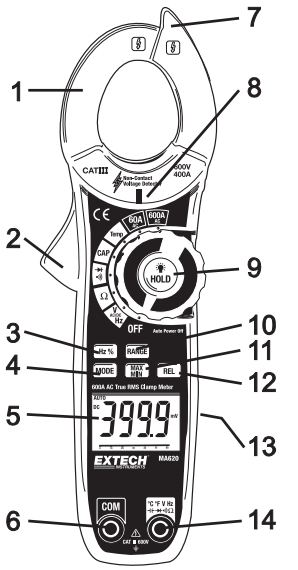
CAUTIONS

- Improper use of this meter can cause damage, shock, injury or death. Read and understand this user manual before operating the meter.
- Always remove the test leads before replacing the battery or fuses.
- 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.
- Use great care when making measurements if the voltages are greater than 25VAC rms or 35VDC. These voltages are considered a shock hazard.
- Always discharge capacitors and remove power from the device under test before performing Diode, Resistance or Continuity tests.
- Voltage checks on electrical outlets can be difficult and misleading because of the uncertainty of connection to the recessed electrical contacts. Other means should be used to ensure that the terminals are not "live".
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Function	**Maximum Input**
A AC	600A DC/AC
V DC, V AC	600V DC/AC
Resistance, Capacitance, Frequency, Diode Test	250V DC/AC
Type K Temperature	30V DC, 24V AC 250V DC/AC

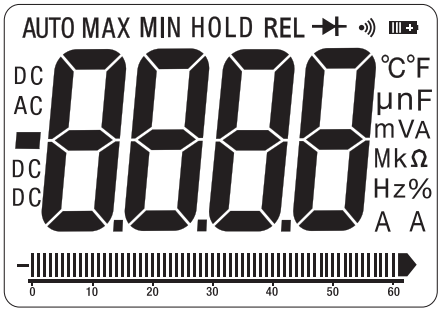
Description

Meter Description



1. Current clamp
2. Clamp opening trigger
3. Hx % Button
4. MODE Button
5. LCD Display
6. Common Input jack
7. NCV sensor
8. NCV LED indicator
9. HOLD/BACKLIGHT Button and FUNCTION switch
10. RANGE Button
11. MAX-MIN Button
12. RELATIVE Button
13. Battery compartment (rear)
14. Positive Input jack

Display icons Description



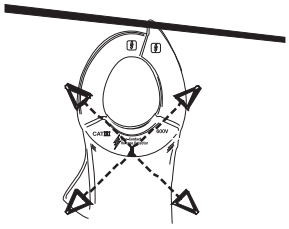
HOLD	Data Hold
AUTO	Autoranging
DC	Direct Current
AC	Alternating Current
MAX	Max reading
MIN	Min reading
	Low battery
REL	Relative
V	Volts (Voltage)
Ω	Ohms (Resistance)
A	Amperes (Current)
F	Farad (Capacitance)
Hz	Hertz (Frequency)
%	Duty Ratio
°F and °C	Fahrenheit and Celsius units (Temperature)
n, m, µ, M, k	Unit of measure prefixes: nano, milli, micro, mega, and kilo
•))	Continuity test
	Diode test

Operation

NOTES: Read and understand all **Warning** and **Caution** statements in this operation manual prior to using this meter. Set the function select switch to the OFF position when the meter is not in use.

Non-Contact Voltage Detector

WARNING: Risk of Electrocution. Before use, always test the Voltage Detector on a known live circuit to verify proper operation**.**



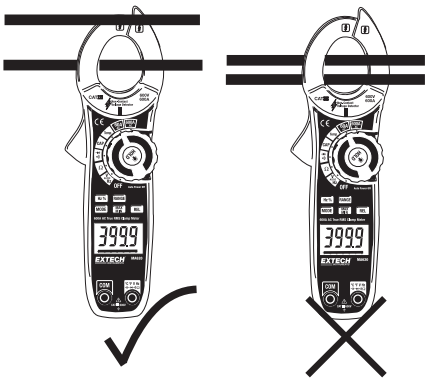
1. Rotate the Function switch to any measurement position.
2. Place the detector probe tip on the conductor to be tested.
3. If AC voltage is present, the NCV detector light will turn on with a steady red light.

NOTE: The conductors in electrical cord sets are often twisted. For best results, move the probe tip along a length of the cord to assure placing the tip in close proximity to the live conductor.

NOTE: The detector is designed with high sensitivity. Static electricity or other sources of energy may randomly trip the sensor. This is normal operation.

AC Current Measurements

WARNING: Disconnect the test leads before making clamp measurements.



1. Rotate the Function switch to the **600A** AC position
2. Press the trigger to open jaw. Fully enclose only one conductor.
3. Read the current value in the display.
4. If the value is less than 60A, rotate the function switch to the **60A** position to improve resolution.

AC/DC Voltage Measurements

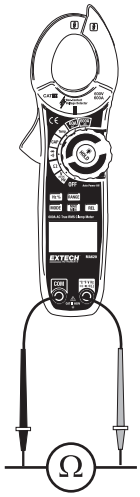
CAUTION: Do not measure voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

1. Rotate the function switch to the **V** position.
2. Press the **MODE** button to select AC or DC Voltage.
3. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive **V** jack.
4. Touch the black test probe tip to the negative side of the circuit.
   Touch the red test probe tip to the positive side of the circuit.
5. Read the voltage value in the display.

Resistance Measurements

Note: Remove power from the device under test before making resistance measurements

1. Rotate the function switch to the **Ω** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive **V** jack.
3. Touch the black test probe tip to one side of the device.
   Touch the red test probe tip to the other side of the device.
4. Read the resistance value in the display.



Continuity Test

1. Rotate the function switch to the •))) position.
2. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive **V** jack.
3. Press the **MODE** button to select continuity •))).
4. Touch the black test probe tip to one side of the device.
   Touch the red test probe tip to the other side of the device..
5. Touch the test probe tips across the circuit or component under test.
6. If the resistance is < 60Ω, a tone will sound.

Diode Test

1. Rotate the function switch to the ⟶| position.
2. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive **V** jack
3. Press the **MODE** button to select diode test ⟶| .
4. Touch the test probe tips to the diode or semiconductor junction under 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:
   - If one reading displays a value (typically 0.400V to 01.800V) and the other reading displays **OL**, the diode is good.
   - If both readings display **OL** the device is open.
   - If both readings are very small or '0', the device is shorted.

Capacitance Measurements

WARNING: To avoid electric shock, discharge the capacitor before measuring.

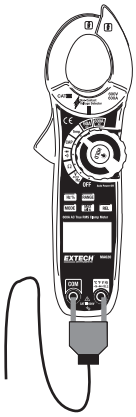
1. Rotate the function switch to the **CAP** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive ⊣⊢ jack.
3. Touch the black test probe tip to one side of the device.
   Touch the red test probe tip to the other side of the device.
4. Read the capacitance value in the display.

Note: For very large values of capacitance measurement time can be several seconds before the final reading stabilizes.

Frequency and Duty Ratio Measurements

1. Rotate the function switch to the **Hz** Position.
2. Press the **MODE** button to select AC Voltage
3. Press the **HZ %** button to select HZ
4. Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **Hz** jack.
5. Touch the black test probe tip to one side of the device. Touch the red test probe tip to the other side of the device.
6. Read the Frequency value on the display.
7. Press the **HZ %** button to select %
8. Read the Duty Ratio on the display.

Type K Temperature Measurements



1. Rotate the function switch to the **Temp** position.
2. Press the MODE button to select °F or °C.
3. Insert the Temperature Probe into the input jacks.
4. Place the temperature probe tip where needed.
5. Read the temperature on the display.

Note: In case of an open input or a temperature overrange, the meter will display "**OL"**.

Data Hold

To freeze the LCD reading, press the **HOLD** button. While data hold is active, the **HOLD** icon appears on the LCD. Press the **HOLD** button again to return to normal operation.

MAX/MIN

1. Press the **MAX/MIN** button to activate the MAX/MIN recording mode. The display icon "**MAX**" will appear. The meter will begins recording and displaying the maximum value measured.
2. Press the **MAX/MIN** button and "**MIN**" will appear. The meter will display the minimum value measured during the recording session.
3. To exit MAX/MIN mode press and hold the **MAX/MIN** button for 2 seconds.

RANGE

In the Voltage, Resistance, Frequency or Temperature function the meter automatically selects the best range for the measurements being made. For measurement situations requiring that a range be manually selected, perform the following:

1. Press the **RANGE** button. The "**AUTO"** display icon will turn off.
2. Press the **RANGE** key to step through the available ranges. Observe the decimal point and units displayed until the preferred range is located.
3. To exit the Manual Ranging mode and return to Autoranging, press and hold the **RANGE** key for 2 seconds.

LCD Backlight

The LCD is equipped with backlighting for easier viewing, especially in dimly lit areas.

Press and hold the **HOLD/** button for 2 seconds to turn the backlight on. The backlight will automatically turn off after 5 seconds.

Automatic Power OFF

In order to conserve battery life, the meter will automatically turn off after approximately 15 minutes of operation. The meter will beep shortly before the meter shuts off. If a button is pressed, the APO timer will reset. If the meter is allowed to shut off, turn the function switch to the OFF position and then to the function again to restart.

Low battery indication

When the icon appears in the display, the battery should be replaced. Refer to the battery replacement procedure in the maintenance section.

Maintenance

WARNING: To avoid electrical shock, disconnect the meter from any circuit, remove the test leads from the input terminals, and turn OFF the meter before opening the case. Do not operate the meter with an open case.

Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for 60 days or more, remove the battery and store it separately.

Battery Replacement

1. Remove the Phillips head screws that secures the rear battery door
2. Open the battery compartment
3. Replace the 9V battery
4. Secure the battery compartment door

Warranty

EXTECH INSTRUMENTS CORPORATION(a FLIR company) 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 to 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 or visit our website www.extech.com for contact information. 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.

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

Specifications

Function	Range	Resolution	Accuracy (% of reading + digits)
AC Current 50/60 Hz **True RMS**	60.00 AAC	0.01A	±(2.8% + 8 digits)
	600.0 AAC	0.1A	±(3.0% + 8 digits)
AC Voltage **True RMS**	6.000 VAC	0.001V	±(1.8% + 8 digits)
	60.00 VAC	0.01V	
	600.0 VAC	0.1V	
DC Voltage	600.0 mVDC	0.1mV	±(1.5% + 2 digits)
	6.000 VDC	0.001V	
	60.00 VDC	0.01V	
	600.0 VDC	0.1V	
Resistance	600.0Ω	0.1Ω	±(1.0% + 4 digits)
	6.000kΩ	0.001kΩ	±(1.5% + 2 digits)
	60.00kΩ	0.01kΩ	
	600.0kΩ	0.1kΩ	
	6.000MΩ	0.001MΩ	±(2.5% + 3 digits)
	60.00MΩ	0.01MΩ	±(3.5% + 5 digits)
Capacitance	40.00nF	0.01nF	±(4.0% + 20 digits)
	400.0nF	0.1nF	±(3.0% + 5 digits)
	4.000µF	0.001µF	
	40.00µF	0.01µF	
	400.0µF	0.1µF	±(4.0% + 10 digits)
	4000µF	1µF	±(5.0% + 10 digits)
Frequency	10Hz to 10kHz	0.01Hz to 0.01khz	±(1.5% + 2 digits)
	Sensitivity: 15Vrms		
Duty Cycle	0.5% to 99.0%	0.1%	±(1.2% + 2 digits)
	Pulse width: 100µs to 100ms, Frequency: 10Hz to 10kHz		
Temperature Type K	-4 to - 1400°F	0.1° <800°; 1° >800°	±3% reading + 9°F/5°C
	-20 to 760°C	0.1° <400°; 1° >400°	
	Specification does not include probe accuracy		

General Specifications

Clamp jaw opening	1.5" (40mm) approx.
Display	6000 count backlit LCD
Continuity check	Threshold 60Ω; Test current < 0.35mA
Diode test	Test current of 0.9mA typical; Open circuit voltage **[** 2.8VDC typical
Low Battery indication	Battery symbol is displayed
Over-range indication	'OL' display
Measurement rate	2 readings per second, nominal
Thermocouple sensor	Type K thermocouple required
Input Impedance	10MΩ (VDC and VAC)
AC current bandwidth	50/60Hz
AC voltage bandwidth	50 to 400Hz
AC response	True rms (AAC and VAC)
Crest Factor	3.0 in 60A and 600A ranges, (50/60Hz and 5% to 100% of range)
Operating Temperature	41°F to 104°F (5°C to 40°C)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Operating Humidity	Max 80% up to 87°F (31°C) decreasing linearly to 50% at 104°F(40°C)
Storage Humidity	<80%
Operating Altitude	7000ft. (2000meters) maximum.
Battery	One (1) 9V Battery (NEDA 1604)
Auto power OFF	After approx. 15 minutes, with disable
Dimensions & Weight	9.2x3x1.53" (232x77x39mm); 9.56 oz. (271g)
Safety	For indoor use and in accordance with the requirements for double insulation to IEC1010-1 (2001): EN61010-1 (2001) Overvoltage Category III 600V and Category II 1000V, Pollution Degree 2.
Approvals	CE,

Support line (781) 890-7440

Technical support: Extension 200; E-mail: support@extech.com

Repair & Returns: Extension 210; E-mail: repair@extech.com

Product specifications subject to change without notice

For the latest version of this User's Guide, Software updates, and other up-to-the-minute product information, visit our website: www.extech.com