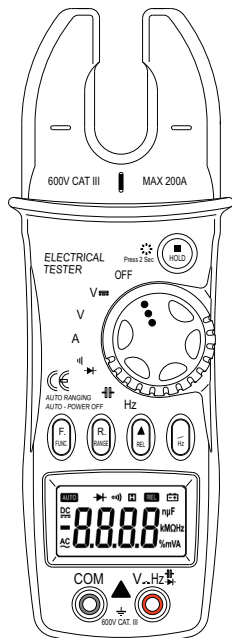


# MASTECH®

## MS2600

### DIGITAL CLAMP METER OPERATION MANUAL



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## 1. SAFETY INFORMATION









The open jaw digit electrical tester has been designed according to IEC1010 – 1 and IEC1010 – 2 – 032 concerning safety requirements for electrical measuring instruments and hand – held current clamps with an overvoltage category (CAT III) and pollution 2.

The open jaw digit electrical tester complies with the requirements of the following European Community Directives: 89/336/EEC ( Electromagnetic Compatibility ) and 73/23/EEC (Low Voltage) as amended by 93/68/EEC (CE Marking).

However, electrical noise or intense electromagnetic fields in the vicinity of the equipment may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit.

Users should exercise care and take appropriate precautions to avoid misleading.

## 2. SYMBOL EXPLANATION

	Important safety information, refer to the operating manual.
	Dangerous voltage may be present.
	Earth ground.
	Double insulation (Protection class II).
	AC – Alternating Current.
	DC – Direct current.
	Battery.
	Conforms to European Union directives

## 3. SAFETY PRECAUTIONS

- Follow all safety and operating instructions to ensure maximum personal safety during the operation and to ensure the meter is used safely and is kept in good operating condition.
- Read these operating instructions thoroughly and completely before operating your meter. Pay particular attention to WARNINGS, which will inform you of potentially dangerous procedures. The instructions in these warnings must be followed.
- Always inspect your meter and test leads for any sign of damage or abnormality before every use. If any abnormal conditions exist (i.e. broken test leads, cracked cases, display not reading, etc.), do not attempt to take any measurements.
- Do not expose the instrument to direct sunlight, extreme temperature or moisture.
- Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing; rubber shoes, rubber mat, or any approved insulating material.
- You always are careful when working with voltages above 60V dc or 30V ac rms. Keep fingers behind the probe barriers while measuring.
- Never use the meter to measure voltages that might exceed the maximum allowable input value of any function.
- Never touch exposed wiring, connections or any live circuit when attempting to take measurements.

## 4. MAINTENANCE

- Before opening the case, always disconnect test leads from all energized circuits.
- Never use the meter unless the back cover is in place and fastened completely.
- Do not use abrasives or solvents on the meter. To clean it using a damp cloth and mild detergent only.
- Qualified and trained service technicians should only perform calibration and repair of the meter.
- Do not attempt calibration or service unless trained and another person capable of rendering first aid and resuscitation is present.

## 5. GENERAL DESCRIPTION

The meter is an autorange professional open jaw digit electrical tester with 3999 counts. For measuring DC and AC voltage, AC current, Resistance, Capacitance, Frequency, duty cycle, Diode and Continuity Test with battery operated.

## 6. PANEL DESCRIPTION

### 6.1 Transformer jaws

Pick up the AC current flowing through the conductor.

### 6.2 Hold button

When this button is pushed, the display will keep the last reading and "H" symbol will appear on the LCD until pushing it again.

When this button is pressed more than two second, the light of display is on until pressing it more than two second again.

### 6.3 Rotary switch

This Rotary Switch is used to select functions and power supply of the meter on or off.

## 6.4 Function button

### 6.4.1F. Func.

In  $\rightarrow \text{H}$  or  $\text{H}$   $\Omega$  range, press this button to select  $\rightarrow \text{H}$  or  $\text{H}$  or  $\Omega$  function. Different symbol of function will appear on the LCD.

### 6.4.2R. Range

Press this button to select auto and manual range. When a function with auto and manual mode is selected, the meter enters auto range at first. To change to manual range, push this button once.

When the meter operates in manual ranging mode, push this button to change range to the higher one and hold this button for more than 3 seconds to return to auto range mode.

### 6.4.3 $\Delta$ REL







Push the button to get relative measurement mode, "REL" annunciate display on LCD. But store the displayed reading as a reference value. In the Relative mode, the value shown on the LCD is always the difference between the stored reference value and the present reading. If the new reading is the same as the reference value, the display will be zero.

### 6.4.4 % Hz

Push the button is used to select frequency or duty cycle measurement.

## 6.5 LCD DISPLAY



	Low battery indication
<b>AUTO</b>	Auto range indication
<b>REL</b>	Relative measurement indication
<b>H</b>	Hold data indication
	DC input indication
	AC input indication
	Diode test indication
	Continuity indication
	Polarity indication
nμF	Capacitance measurement unit
kMΩ	Ohm measurement unit
Hz	Frequency measurement unit
mVA	Current measurement unit
%	Duty cycle measurement indication

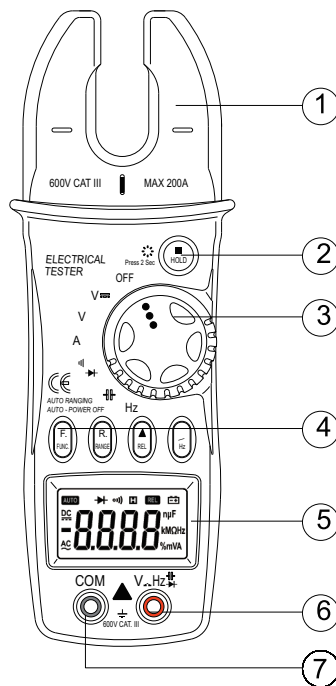
### 6.6“VHz” jack

This is positive input terminal for volt, diode, resistance, frequency, duty cycle and capacitance measurement connection is made to it using the red test lead.

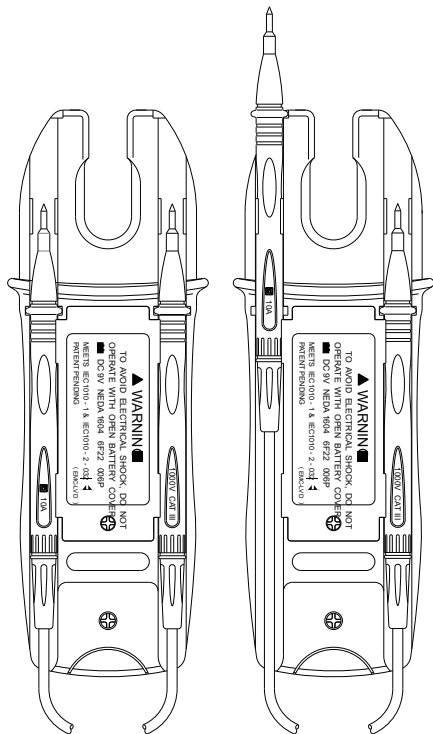
### 6.7“COM” jack

This is negative (ground) input terminal for all measurement modes except current. Connection is made to it using the black test lead.

## 6.8 LAYOUT (FORWARD)



## 6.9 LAYOUT (BACKWARD)



## 7. OPERATING INSTRUCTIONS

### 7.1 DC VOLTAGE MEASUREMENT

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired V  $\overline{\text{---}}$  position. Select the desired DC voltage range, or set automatic range.
3. When the magnitude of voltage to be measured is unknown, always start with the highest range.
4. Connect the test lead tips in parallel with the circuit to be measured. Be careful not to touch any electrical conductors.
5. The polarity of the red lead connection will be indicated along with the voltage value.
6. Read the measure result directly from the display.

### 7.2 AC VOLTAGE MEASUREMENT

1. Insert the black and red test leads into the **COM** and **VHz** input terminals respectively.
2. Set rotary switch at desired V~ position. Select the desired AC voltage range, or set automatic range. When the magnitude of voltage to be measured is unknown, always start with the highest range.
3. Connect the test lead tips in parallel with the circuit to be measured. Be careful not to touch any electrical conductors.
4. Read the measure result directly from the display.

### 7.3 AC CURRENT MEASUREMENT

1. Set the rotary switch at A~ position.  
To clamp one conductor in Transformer jaws only, making sure that the jaw is around the conductor.
2. Read the measure result directly from the display.

## 7.4 RESISTANCE MEASUREMENT

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired  $\rightarrow \text{||} \text{||}$   $\Omega$  position.
3. Push F.FUNC. button to select .
4. If the resistance being measured exceeds the maximum value of the range selected or the input is not connected, an overrange indication "OL" will be display and the higher range has to be selected.
5. Read the measure result directly from the display.

### NOTE:

If the resistance being measured exceeds the maximum value of the range selected or the input is not connected, an overrange indication "OL" will be displayed.

When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been discharged fully.

For measuring resistance above 1M, the meter may take a few seconds to get stable reading. This is normal for high resistance measurements.

When the input is not connected, i.e. at open circuit, the figure "OL" will be displayed for the overrange condition.

## 7.5 DIODE MEASUREMENT

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired  $\rightarrow \text{||} \text{||}$   $\Omega$  position.
3. Push F.FUNC. button to select .
4. The red lead should be connected to the anode and the black lead to the cathode of the diode.
5. The typical voltage drop should be about 0.6V for silicon diode or 0.3V for germanium diode.
6. If the diode is reverse biased or there is an open circuit the reading displayed will be "OL".

## 7.6 CONTINUITY TESTING

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired  $\rightarrow \text{||} \text{||}$   $\Omega$  position.
3. Push F.FUNC. button to select  $\text{||} \text{||}$  .
4. If continuity exists (i.e., resistance less than 30) built – in buzzer will sound.

## 7.7 CAPACITANCE MEASUREMENT

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Turn the rotary switch to  $\rightarrow \text{||} \text{||}$  position.
3. Connect test leads across the capacitor under measurement and be sure that the polarity of connection is observed (Note: The polarity of the red lead connection is positive "+").
4. Read the measure result directly from the display.

## 7.8 MEASURING FREQUENCY

### NOTE:

The input voltage should be between 1V and 10V rms. ac. If the voltage is more than 10V rms. Reading may be out of the accuracy range.

1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired Hz position.
3. Push % Hz. button to select frequency mode and connect the test lead tips in parallel with the circuit to be measured. Be careful not to touch any electrical conductors.
4. The signal amplitude must also be greater than the sensitivity level.
5. Determine that the amplitude level of the signal to be measured is not greater than the input voltage limit (250V DC/AC rms.).
6. Read the measure result directly from the display.

## 7.9 DUTY CYCLE TEST


1. Insert the black and red test leads into the COM and VHz input terminals respectively.
2. Set rotary switch at desired Hz position.  
Push % Hz. button to select % mode and connect the
3. test lead tips in parallel with the circuit to be measured.  
Be careful not to touch any electrical conductors.
4. Read the measure result directly from the display.

## 8. SPECIFICATIONS

Accuracy is given as  $\pm$ (% of reading + number of least significant digits) at 18°C to 28°C, with relative humidity up to 80%.

All specifications assume less than 1 year since calibration.

### 8.1 GENERAL

Maximum voltage	CAT III 600V.
Display	LCD3999 counts. updates 2-3/sec.
Ranging method	Auto / Manual
Polarity indication	"-" displayed for negative polarity
Overrange indication	Only figure "OL" on the display
Jaw capability	12mm (Max conductor size)
Power	Battery 9V  IEC 6F22 JIS 006P NEDA 1604 type.
Operating	0°C to 40°C
Storage temperature	-10°C to 50°C
Temperature coefficient	0.1×specified accuracy /°C ( <18°C or >28°C )
Altitude	2000m
Size	192mm×68mm×43mm
Weight	Approx. 230g.

## 8.2 DC VOLTAGE

Range	Resolution	Accuracy
4V	1mV	$\pm(0.7\%$ of rdg + 1 digits)
40V	10mV	
400V	0.1V	
1000V	1V	$\pm(0.8\%$ of rdg + 3 digits)

Input Impedance: 10M

Overload Protection: 1000V DC or 700V AC RMS

## 8.3 AC VOLTAGE

Range	Resolution	Accuracy
4V	1mV	$\pm(0.8\%$ of rdg + 5 digits)
40V	10mV	
400V	0.1V	
700V	1V	$\pm(1.0\%$ of rdg + 10 digits)

Input Impedance: 10M

Frequency range: 40Hz to 400Hz.

Overload Protection: 1000V DC or 700V AC RMS

## 8.4 AC CURRENT

Range	Resolution	Accuracy
200A	0.1A	$\pm(3.0\%$ of rdg + 3 digits)

Overload Protection: 240A for 60 seconds maximum.

Frequency range: 50Hz to 400Hz.



## 8.5 RESISTANCE

Range	Resolution	Accuracy
400Ω	0.1Ω	±(1.2% of rdg + 1 digits)
4kΩ	1Ω	
40KΩ	10Ω	
400kΩ	0.1kΩ	
4MΩ	1kΩ	
40MΩ	10kΩ	±(2.0% of rdg + 3 digits)

Overload Protection: 250V dc or rms. ac for all ranges.

## 8.6 CAPACITANCE MEASUREMENT

Range	Resolution	Accuracy
40nF	10pF	±(4.0% of rdg + 10 digits)
400nF	0.1nF	
4μF	1nF	
40μF	10nF	



Overload Protection: 250V dc or rms. ac for all ranges.

## 8.7 FREQUENCY MEASUREMENT

Range	Resolution	Accuracy
40Hz	0.01Hz	±(2.0% of rdg + 1 digits)
400Hz	0.1Hz	
4kHz	1Hz	
40kHz	10Hz	
100kHz	0.1kHz	

Measurement range: 1V to 10V rms. 10Hz to 100kHz.

## 8.8 AUDIBLE CONTINUITY AND DIODE

Range	Description
	If continuity exists (about less than 30Ω), built-in buzzer will sound.
	Show the approx. Forward voltage of the diode.
Duty cycle: 0.1% to 99.9%	


## 9. AUTO POWER OFF

To extend the battery life, Auto Power Off function is provided. If no key operations of range changing happen about 30 minutes, the meter will be turned off automatically. To turn it on, rotate the rotary switch or push any function buttons only.

## 10. REPLACING THE BATTERY

### WARNING

**To avoid electrical shock or personal injury, remove the test leads and any input signals before replacing the battery. Replace only with same type of battery.**

When the electrical tester displays the “” mark or the backlight be not very lit, the battery must be replaced to maintain proper operation. Use the following procedure to replacing the battery:

- 1.The Rotary Switch is used to select OFF. Disconnect test leads from any live source and remove the test leads from the input terminals.
- 2.Remove screws on the battery cover and open the cover.
- 3.Remove the exhausted battery and replace with a new 9-voltage battery (IEC 6F22 JIS 006P NEDA 1604 type).
- 4.Never use the multimeter unless the battery cover is in place and fastened fully.

## 11.ACCESSORIES

- Operator’s instruction manual
- Set of test leads
- Gift box
- 9 volt battery (IEC 6F22 JIS 006P NEDA 1604 type).

### CAUTION:

Using this appliance in an environment with a strong radiated radio-frequency electromagnetic field (approximately 3V/m ) may influence its measuring accuracy.

