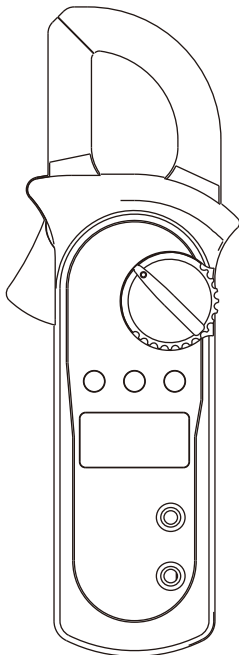


User Manual

Digital Clamp Multimeter

model no.: MSR-C600



Overview

This Operating Manual covers information on safety and cautions. Please read the relevant information carefully and observe all the Warnings and Notes strictly.

Warning

To avoid electric shock or personal injury, read the “Safety Information” and carefully before using the Meter.

MSR-C600 is 2000-count stable, safe and reliable digital clamp multimeter. It is designed with large-scale integrated circuits and A/D converter as the core as well as the overload protection and novel structure, which make it a superb tool for electricians.

The Meter can measure AC/DC voltage, AC current, resistance, diode, continuity and so on.

Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully for any missing or damaged part:

Item	Description	Qty
1	Digital Clamp Multimeter	1 pc
2	Carrying Pouch	1 pc
3	User Manual	1 pc

Safety Information

This Meter complies with the standard IEC61010: Pollution Degree 2, Overvoltage Category (CAT. II 600V, CAT. III 300V) and Double Insulation.

CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than CAT. III.

CAT. III: Distribution level, fixed installation, with smaller transient overvoltages than CAT. IV

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.


In this manual, a Warning identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A Note identifies the information that user should pay attention to.

Warning













To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.

- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical model number or electrical specifications before using the Meter.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding. If the value to be measured is unknown, use the maximum **range** and reduce the range step by step until a satisfactory reading is obtained.
- When measurement has been completed, disconnect test leads from the circuits under test, remove the testing leads away from the input terminals of the Meter and turn the Meter power off.
- The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement to prevent damage of the Meter.
- To avoid electric shock, do not carry out the measurement when the Meter's back case and battery compartment are not closed.
- Do not input higher than 600V between the Meter's terminals and the grounding to avoid electric shock and damages to the Meter.
- When the Meter working at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken for there is danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
- Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.
- When using the test leads, keep your fingers behind the finger guards.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity and diode.
- Replace the battery as soon as the battery indicator  appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- When servicing the Meter, use the replacement parts with the same model or identical electrical specifications.

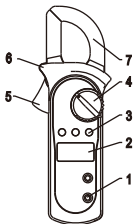
- To avoid any damage to the meter or any accident, do not alter the internal circuit of the Meter randomly.
- Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing.
- No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
- The Meter is suitable for indoor use.
- Turn the Meter off when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has been used for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

International Electrical Symbols

	AC (Alternating Current).
	DC (Direct Current).
	AC or DC.
	Grounding.
	Double Insulated.
	Deficiency of Built-In Battery
	Continuity Test.
	Diode.
	Fuse.
	Warning. Refer to the Operating Manual.
	Danger of High Voltage
	Conforms to Standards of European Union.

The Meter Structure

1. Input Terminals
2. LCD Display
3. Functional Buttons
4. Rotary Switch
5. Trigger: Push/release it to open/close the clamp jaw.
6. Hand Guards: to protect user's hand from touching the dangerous area.
7. Transformer Jaws: designed to pick up the AC current flowing through the conductor. It could transfer current to voltage.



(Figure 1)

Rotary Switch

Below table indicated for information about the rotary switch positions.

Rotary switch positions	Function
OFF	Power is turned off.
$V \text{ --- }$	DC voltage measurement
$V \sim$	AC voltage measurement
Ω	Resistance measurement
$\bullet \text{) } \rightarrow \leftarrow$	Continuity/diode test
$A \sim 2/20A$	AC current measurement from 0.001A to 400A
$A \sim 200/400A$	

Functional Buttons

Below table indicated for information about the functional button operations.

HOLD \boxed{H}	Press HOLD \boxed{H} to enter and exit the Hold mode in any mode, the Meter beeps.
MAX	Press MAX to start recording and updating of maximum values.
SELECT	Press SELECT button to switch between $\rightarrow \leftarrow$ and $\bullet \text{) } \leftarrow$.

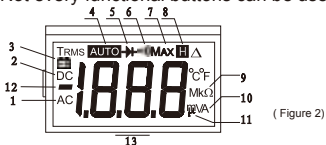
Functional Buttons

Not every functional buttons can be used on every rotary switch positions.

Rotary Switch Positions	Functional Buttons		
	SELECT	MAX	HOLD \boxed{H}
$V \text{ ---}$	N/A	•	•
$V \sim$	N/A	•	•
Ω	N/A	N/A	•
$\cdot\cdot\cdot)) \rightarrow$	•	N/A	•
$A \sim 2/20A$	N/A	•	•
$A \sim 200/400A$	N/A	•	•

Display Symbols (See Figure 2)

Not every functional buttons can be used on every rotary switch positions.



(Figure 2)

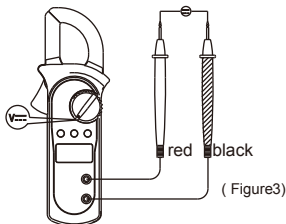
No.	Symbol	Description
1	AC	Indicator for AC voltage or current
2	DC	Indicator for DC voltage
3		The battery is low. Δ Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
4	AUTO	The Meter is in the auto range mode in which the Meter automatically selects the range with the best resolution.
5	\rightarrow	Test of diode.
6	$\cdot\cdot\cdot))$	The continuity buzzer is on.
7	MAX	Maximum reading displayed
8	\boxed{H}	Date hold is active.
9	$\Omega, k\Omega, M\Omega$	Ω : Ohm. The unit of resistance. $k\Omega$: kilohm. 1×10^3 or 1000 ohms. $M\Omega$: Megaohm. 1×10^6 or 1,000,000 ohms.
10	A	Amperes (amps). The unit of current.
11	mV, V	Volts. The unit of voltage. mV: Millivolt. 1×10^{-3} or 0.001 volts
12	—	Indicates negative reading
13	OL	The input value is too large for the selected range.

Measurement Operation

A. DC Voltage measurement

Warning

To avoid harms to you or damages to the Meter from electric shock, do not attempt to measure voltages higher than 600V AC/DC, although readings may be obtained.



The DC Voltage ranges are: 200.0mV, 2.000V, 20.00V, 200.0V and 600V.

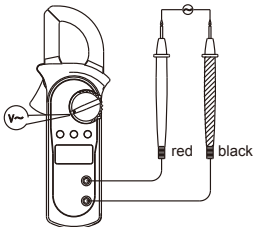
To measure DC voltage, connect the Meter as follows:

1. Insert the red test lead into the $V\Omega$ terminal and the black test lead into the COM terminal.
2. Set the rotary switch to V_{DC} .
3. Connect the test leads across with the object being measured. The measured value shows on the display.

Note

- In each range, the Meter has an input impedance of 10M Ω . This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10k Ω , the error is negligible (0.1 or less).
- When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

B. Measuring AC Voltage (See Figure 4)



(Figure 4)

Warning

To avoid harms to you or damages to the Meter from electric shock, do not attempt to measure voltages higher than 600V AC/DC, although readings may be obtained.

The AC Voltage ranges are: 2.000V, 20.00V, 200.0V and 600V

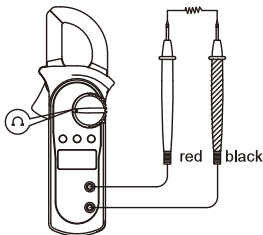
To measure AC voltage, connect the Meter as follows:

1. Insert the red test lead into the **V Ω** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **V \sim**
3. Connect the test leads across with the object being measured.
The measured value shows on the display.

Note

- In each range, the Meter has an input impedance of $10M\Omega$. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to $10k\Omega$, the error is negligible (0.1 or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

C.Measuring Resistance (See Figure 5)



(Figure 5)

⚠ Warning

To avoid harms to you, do not attempt to input voltages higher than 60V DC or 30V rms AC.

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

The resistance ranges are:

200.0 Ω , 2.000k Ω , 20.00k Ω , 200k Ω , 2.000M Ω and 20.00M Ω .

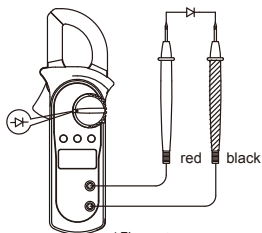
To measure resistance, connect the Meter as follows:

1. Insert the red test lead into the **V Ω** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to Ω .
3. Connect the test leads across with the object being measured.
The measured value shows on the display.

Note:

The test leads can add 0.1Ω to 0.3Ω of error to resistance measurement.

- For high-resistance measurement ($>1M\Omega$), it is normal taking several seconds to obtain a stable reading.
- If Ω reading with shorted test leads is not $\leq 0.5\Omega$, check for loose test leads, wrong function selected, or enabled data hold function.
- The LCD displays **OL** indicating open-circuit or the tested resistor value is higher than the maximum range of the Meter
- Resistance measurement is default to auto range mode.
- Measuring the tested object that is already removed from the in-line circuit can help to obtain a more accurate reading.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

D. Testing Diodes (See Figure 6)**Warning**

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before testing diodes.

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, then measure the voltage drop across the junction. A good silicon junction drops between $0.5V$ and $0.8V$.

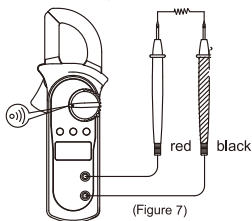
To test the diode out of a circuit, connect the Meter as follows:

1. Insert the red test lead into the \rightarrow \rightarrow Ω terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to \rightarrow \rightarrow \rightarrow
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and the black test lead on the component's cathode.

Note

- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- Connect the test leads to the proper terminals as said above to avoid error display.
- The LCD will display OL indicating either open circuit or wrong polarity connection.
- The unit of diode is volt (V), displaying the forward voltage drop readings.
- Measuring the tested object that is already removed from the in-line circuit can help to obtain a more accurate reading.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

E. Testing for Continuity (See Figure 7)



Warning

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring continuity.

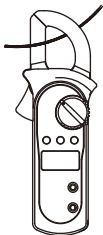
To test for continuity, connect the Meter as follows:

1. Insert the red test lead into the $V\Omega$ terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to diode symbol and press **SELECT** button to select diode symbol measurement mode.
3. The buzzer sounds if the resistance of a circuit under test is less than 50Ω .
4. The buzzer may or may not sounds if the resistance of a circuit under test is between 50Ω to 120Ω .
5. The buzzer does not sound if the resistance of a circuit under test is higher than 120Ω .

Note

- The buzzer beeps 5 times continuously on around 1 minute before entering the sleep mode. When it is just before entering the sleep mode, it will have one long beep to warn you.
- The LCD displays **OL** indicating the circuit being tested is open.
- When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test and remove testing leads from the input terminals.

F. Measuring AC Current (See Figure 8)



(Figure 8)

Warning

To avoid electric shock, never measure current while the test leads are inserted into the input terminals and disconnect test leads and tested circuit connection.

Never attempt an in-circuit current measurement where the open-circuit voltage between the circuit and the ground is greater than 600V

Use proper function and range for the measurement.

The measurement ranges of current are: 2.000A, 20.00A, 200.0A and 400A.

To measure current, do the following:

1. Set the rotary switch to 2/20A \sim or 200/400 A \sim
2. Press the trigger to open the transformer jaws.
3. Center the conductor within the transformer jaw. then release the Meter slowly until the transformer jaw is completely closed, Make sure the conductor to be tested is placed at the center of the transformer jaw, otherwise it will cause deviation.
4. The measured value shows on the display, it is a effective value of sine wave (mean value response)

Note:

- To obtain accurate reading, measure only one conductor at each time.
- When current measurement has been completed, disconnect the connection between the conductor under test and the jaw, and remove the conductor away from the transformer jaw of the Meter.

Sleep Mode


To preserve battery life, the Meter automatically turns off if you do not turn the rotary switch or press any button for around 15 minutes.

The Meter can be activated by turning the rotary switch or pressing any button with the following conditions:

The Hold function will be cancelled if the Meter is activated by pressing the **HOLD** button. To disable the Sleep Mode function, press and hold **HOLD** button while turning on the Meter.

Specifications

1. General Specifications:

- Maximum voltage including transient overvoltage between any terminals and grounding: 600V rms
- Display: Maximum display 1999
- Auto Polarity Display
- Overloading : Display OL or -OL
- Low Battery Indication : Display 
- Measurement Speed : Updates 3 times/second.
- Measurement Deviation : When the conductor being measured is not placed in a correct position during AC current measurement, it will cause $\pm 1\%$ reading deviation.
- Drop Test : 1 meter drop test passed.
- Max. Jaw Opening : 28mm diameter.
- Tested Max. Current conductor size : 26mm diameter.
- Power : 2pcs of 1.5V battery (AAA)
- Battery Life : typically 150hours (alkaline battery)
- Sleep Mode (can be disabled)
- Dimensions (H x W x L) : 30mm x 76mm x 208mm.
- Weight : Approximate 260g (battery included)

2. Environmental Restrictions:

- The Meter is suitable for indoor use.
- Altitude : Operating: 2000m Storage: 10000m
- Safety/ Compliances : IEC 61010 CAT.II 600V, CAT.III 300V over voltage and double insulation.
- Temperature and Humidity: Operating: $0^{\circ}\text{C}\sim 30^{\circ}\text{C}$ ($\leq 75\% \text{ R.H.}$); $30^{\circ}\text{C}\sim 40^{\circ}\text{C}$ ($\leq 70\% \text{ R.H.}$); $40^{\circ}\text{C}\sim 50^{\circ}\text{C}$ ($\leq 45\% \text{ R.H.}$); Storage: $-20^{\circ}\text{C}\sim +60^{\circ}\text{C}$ ($\leq 75\% \text{ R.H.}$)

3. Accuracy Specifications

Accuracy: $\pm(a\% \text{ reading} + b \text{ digits})$, guarantee for 1 year.

Operating temperature: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Relative humidity: $\leq 75\% \text{R.H}$

A. AC Voltage: Auto Ranging

Range	Resolution	Accuracy	Overload Protection
2.000V	1mV	$\pm(1.2\%+5)$	600V rms
20.00V	10mV		
200.0V	100mV		
600V	1V	$\pm(1.5\%+5)$	

Remarks:

- Input impedance: $10\text{M}\Omega < 100\text{pF}$
- Display sinewave RMS(AVG response)
- Frequency response: 40Hz~1kHz.
- To adjust reading in accordance with effective value

B. DC Voltage: Auto Ranging

Range	Resolution	Accuracy	Overload Protection
200.0mV	0.1mV	$\pm(0.8\%+3)$	600V rms
2.000V	1mV	$\pm(0.8\%+1)$	
20.00V	10mV		
200.0V	100mV		
600V	1V	$\pm(1\%+3)$	


Remarks: Input impedance: $10\text{M}\Omega$.

C. Resistance: Auto Ranging

Range	Resolution	Accuracy	Overload Protection
200.0 Ω	100m Ω	$\pm(1.2\%+2)$	600Vp
2.000k Ω	1 Ω	$\pm(1\%+2)$	
20.00k Ω	10 Ω		
200.0k Ω	100 Ω		
2.000M Ω	1k Ω	$\pm(1.2\%+2)$	
20.00M Ω	10k Ω	$\pm(1.5\%+2)$	

Remarks: Input impedance: $10\text{M}\Omega$.


D. Continuity Test

Range	Resolution	Accuracy	Overload Protection
	100mΩ	Around $\leq 50\Omega$ the buzzer beeps	600Vp

Remark:

- Open circuit voltage approximate 0.45V.
- The buzzer may or may not beeps when the resistance of a circuit under test is between 50Ω and 120Ω
The buzzer may not beep when the resistance of a circuit under test is greater than 120Ω .

E. Diode Test

Range	Resolution	Accuracy	Overload Protection
	1mV	Display approximate forward voltage drop: 0.5V~0.8V	600Vp

Remarks: Open circuit voltage approximate 1.48V.

F. AC Current: Auto Ranging

Range	Resolution	Accuracy	Frequency Response	Overload Protection
2.000A	0.001A	$<1A(4\%+40)$ $\geq 1A(3\%+30)$	50Hz~60Hz	400A rms
20.00A	0.01A	$\pm(3\%+12)$ $\leq 4A$ $\pm(2\%+8)$	50Hz~60Hz	400A rms
200.0A	0.1A	$\pm(1.5\%+5)$		
400A	1A			

Remarks:

- Displays sinewave RMS (AVG response)
To adjust reading in accordance with RMS value

Maintenance

This section provides basic maintenance information including battery replacement instruction.

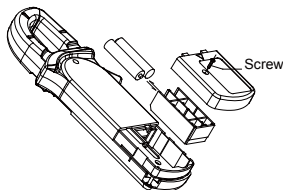
Warning

Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electrical shock or damage to the Meter, do not get water inside the case.

A. General Service


- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.
- Turn the Meter power off when it is not in use.
- Take out the battery when it is not using for a long time.
- Do not use or store the Meter in a place of humidity, high temperature, explosive, inflammable and strong magnetic field.

B. Replacing the Battery (See Figure 9)



(Figure 9)

Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator “” appears.

Make sure the transformer jaw and the tets leads are disconnected from the circuit being tested before opening the case bottom.

To replace the battery:

1. Turn the Meter off and remove all the connections from the input terminals
2. Turn the Meter's case top down.
3. Remove the screw from the battery compartment, and separate the battery compartment from the case bottom.
4. Remove the old battery from the battery compartment.
5. Replace the battery with 2pcs of new 1.5V (AAA) battery.
6. Rejoin the case bottom and the battery compartment, and reinstall the screw.



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