



MEASURING EQUIPMENT

Model 703
True RMS Multimeter

Model 701
Multimeter

User's Manual

WARNING!

SOURCES LIKE SMALL HAND-HELD RADIO TRANSCEIVERS, FIXED STATION RADIO AND TELEVISION TRANSMITTERS, VEHICLE RADIO TRANSMITTERS AND CELLULAR PHONES GENERATE ELECTROMAGNETIC RADIATION THAT MAY INDUCE VOLTAGES IN THE TEST LEADS OF THE MULTIMETER. IN SUCH CASES THE ACCURACY OF THE MULTIMETER CANNOT BE GUARANTEED DUE TO PHYSICAL REASONS.

Basic Specifications

DC Voltage	: 0 to 1000 V
AC Voltage	
703 (True RMS)	: 15 mV to 1000 V (@ 40 Hz to 20 kHz)
701	: 0 to 1000 V (@ 40 Hz to 400 Hz)
Basic Accuracy	: DC voltage – 0.5%
	AC voltage – 0.75%
DC Current	: 0 to 10 A (20 A for 30 seconds)
AC Current	
703 (True RMS)	: 20 μ A to 10 A (20 A for 30 seconds)
701	: 0 to 10 A (20 A for 30 seconds)
Resistance	: 0 to 40 M Ω
Capacitance	: 0.01 nF to 100 μ F
Frequency	: 0.5 Hz to 10 MHz
Duty Cycle	: 0.1 % to 99.9 % for 0.5 Hz to 500 kHz (pulse width > 2 μ sec.)
Diode Test	: 2.5 V
Continuity Check	: Beep at Approx. < 10 Ω (response time < 1 ms)
Temperature (703 only):	–40°C to 1300°C (–40°F to 2372°F)



Warning

Read “ Safety Information ” before using this Meter.

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1. SAFETY INFORMATION

This manual contains information and warnings that must be followed for operating the meter safely and maintaining the meter in a safe operating condition. If the meter is not used in a manner specified in this manual, the protection provided by the meter may be impaired.

The Model 703 and Model 701 comply with IEC 1010-1 (1995), UL 3111-1 (6. 1994), EN 61010-1 (1995), CSA C 22.2 No. 1010.1 - 92 ; Overvoltage 1 000V Category III.

TERMS IN THIS MANUAL

A **Warning** identifies conditions and actions that could pose serious hazards to the user. A **Caution** identifies conditions and actions that could cause damage the meter or the equipment under test.

Warning

Do not expose the meter to rain or moisture in order to reduce the risk of fire or electric shock. To avoid any electrical shock hazard, observe the proper safety precautions when working with voltages above 60 V dc or 30V ac rms, these voltage levels pose a potential shock hazard to the user. Inspect test leads, connectors and probes for damaged insulation or exposed metal before using the meter. If any defects are found, replace them immediately. Do not touch test lead tips or the circuit being tested while power is applied to the circuit under test. Always keep your fingers behind the finger guards of the test leads during measurement. Do not measure any circuit that draws more than the protection fuse's current rating. Do not attempt the protection fuse's voltage rating. Never attempt a voltage measurement with the test lead inserted into the mA μ A or A input terminal. When servicing the meter, use only specified replacement parts. Remove test leads from the meter before you open the battery door. Do not operate the meter with the battery door removed or loosened. To avoid false readings, which could result in possible electric shock or personal injury, replace the battery as soon as the low battery indicator appears. Avoid working alone.

Caution

Disconnect the test leads from the test points before changing functions. Disconnect circuit power and discharge all high voltage capacitors before testing resistance, continuity, capacitance or diodes. Always set the meter to the highest range and work downward for an unknown value in the manual ranging mode. Before measuring current, check the meter's fuses and turn power OFF to the circuit before connecting the meter to the circuit.

INTERNATIONAL ELECTRICAL SYMBOLS

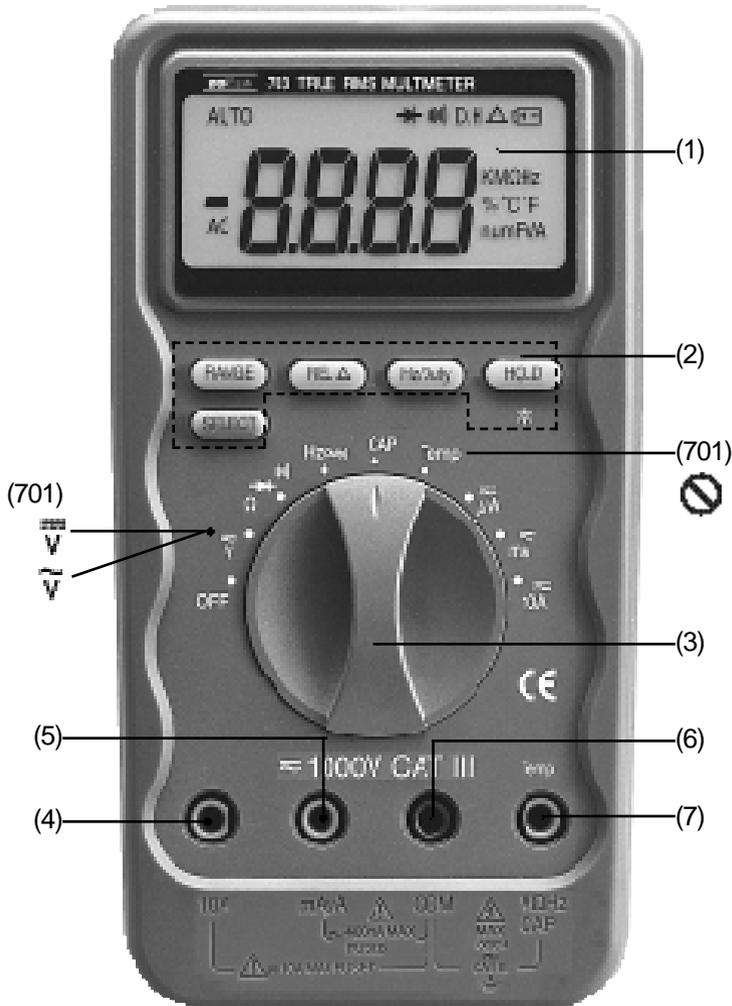
	AC (Alternating Current)
	DC (Direct Current)
	Either AC or DC
	Caution! Refer to the explanation in this manual.
	Caution! Dangerous voltage (Risk of electric shock)
	Earth (Ground)
	Double insulation or Reinforced insulation
	Fuse
	Not Applicable to Identified Model
	Battery

2. ELECTROMAGNETIC COMPATIBILITY (EMC)

The meters meet EN61326 : 1997 A1 : 1998. See the backside of this manual's cover page.

3. CONTROLS AND INDICATORS

Although this manual describes the operation of both Model 701 and Model 703, all illustrations and examples assume use of Model 703.



- (1) 3-3/4 digit, 4000 count LCD display
- (2) Push-buttons for special functions & features
- (3) Selector to turn the power ON or OFF and select a function
- (4) Input terminal for 10A (20A for 30 sec.) current measurement function
- (5) Input terminal for milli-amps and micro-amps current measurement function
- (6) Common (Ground reference) input terminal for all measurement functions
- (7) Input terminal for all functions EXCEPT current (A, mA, μ A) measurement functions

Glossary of Terms for Digital Multimeters

Average sensing RMS calibrated

RMS (Root-Mean-Square) is the term used to describe the effective or equivalent DC value of an AC signal. Most digital multimeters use average sensing RMS calibrated technique to measure RMS values of AC signals. This technique is to obtain the average value by rectifying and filtering the AC signal. The average value is then scaled upward (that is, calibrated) to read the RMS value of a sine wave. In measuring pure sinusoidal waveform, this technique is fast, accurate, and cost effective. However, in measuring non-sinusoidal waveforms, significant errors can be introduced because of different scaling factors relating average to RMS values.

True RMS

True RMS is a term which identifies a DMM that accurately responds to the effective RMS value regardless of the waveform shapes such as square, sawtooth, triangle, pulse trains, spikes, and transient glitches as well as distorted waveforms with the presence of harmonics.

Non-sinusoidal waveforms may cause :

- Overheated transformers, generator and motors to burn out faster than normal
- Circuit breakers to trip prematurely
- Fuses to blow
- Neutrals to be overheated due to the triplen harmonics present on the neutral
- Bus bars and electrical panels to vibrate

Crest Factor

Crest Factor is the ratio of the Crest (instantaneous peak) value to the True RMS value, which is commonly used to define the dynamic range of a True RMS DMM. A pure sinusoidal waveform has a Crest Factor of 1.414. A badly distorted sinusoidal waveform normally has a much higher Crest Factor.

NMRR (Normal Mode Rejection Ratio)

NMRR is the DMM's ability to reject unwanted AC noise effect which can cause inaccurate DC measurements. NMRR is typically specified in terms of dB (decibel). The Meter has a NMRR specification of > 60dB at 50Hz/60Hz, which means a good ability to reject the effect of AC noise in DC measurements.

CMRR (Common Mode Rejection Ratio)

Common mode voltage is voltage existing on both the **COM** and **Voltage** input terminals of a DMM, with respect to ground. CMRR is a DMM's ability to reject common mode voltage effect which can cause digit rattle or offset in voltage measurements. The Meter has a CMRR specification of > 60dB at DC to 60 Hz in AC volts measurement function and > 120 dB at DC, 50Hz and 60Hz in DC volts measurement function.

Burden Voltage

Burden voltage is a voltage drop across the input terminals of a current-measuring device, caused by internal shunt resistance. Burden voltage contributes measurement error, and should be as low as practical.

Temperature Coefficient

Temperature Coefficient is a factor used to calculate the change in indication or output of an instrument with changes in temperature. Uncompensated changes in temperature contribute uncertainty by an amount determined by the temperature coefficient to instrument.

4. ROTARY SWITCH AND PUSHBUTTON OVERVIEW

Turning the Meter On

To turn the meter on, turn the rotary switch from **OFF** to any switch setting.

Rotary Switch

Turn the meter on by selecting any measurement function. The meter presents a standard display for that function (range, measurement units, etc.). Use the SELECT button to select any rotary switch alternate function.

When you turn the rotary switch from one function to another, a display for the new function appears. Button choices made in one function do not carry over into another function.

OFF. Turns the meter off.

 . (Model 703). Volts ac rms and Volts dc.

 . (Model 701). Volts ac.

 . (Model 701). Volts dc.

 . Access to resistance measurement, continuity test and diode test.

Hz (Duty). Frequency measurement. Duty cycle is also displayed if it is toggled by the Hz / Duty button.

CAP. Capacitance measurement.

Temp (Model 703 only). Temperature measurement in degrees Centigrade or Fahrenheit. Changing the reading mode should be preset at the factory.

 Micro-amps ac rms and micro-amps dc measurements (Model 703).
 Micro-amps ac and micro-amps dc measurements (Model 701).

 Milli-amps ac rms and milli-amps dc measurements (Model 703).
 Milli-amps ac and milli-amps dc measurements (Model 701).

- A.** Amperes ac rms and amperes dc measurements (Model 703)
Amperes ac and amperes dc measurements (Model 701)

Pushbuttons

The buttons activate features that augment the function selected with the rotary switch.

RANGE. Use the RANGE button to manually select a range. Press and hold RANGE button for two seconds to return the meter to auto range mode. The meter is in auto range mode when the AUTO indicator is on. The RANGE selection function is not available in **Hz** (Duty), **CAP**, and **Temp** modes.

The range and units are displayed on the LCD.

REL. Use this button to set the meter to relative () mode and make relative measurements. Relative zero allows the user to offset the meter consecutive measurements with the displaying reading as the reference value. Practically all displaying readings can be set as relative reference value. Press the **REL** button momentarily to activate and to exit relative zero mode.

Hz/Duty. Press this button to toggle between the Hz measurement mode and the Duty measurement mode when the selector switch is set to Hz (Duty), \bar{V} , $\mu\bar{A}$, \bar{mA} and $10\bar{A}$.

HOLD. Press this button to turn **hold** mode ON and OFF. When the **hold** mode is activated, the meter beeps, freezes the display, and displays the **D.H** indicator on the LCD. **HOLD** mode freezes the display for later view.

Backlight. Press the **HOLD** () button for two seconds to turn the backlight ON or OFF, when the HOLD function is simultaneously activated with the D.H symbol on the display. Press the HOLD button momentarily again to activate the Backlight function only.

SELECT. Press this button to toggle between the dc measurement mode and the ac measurement mode when the rotary selector switch is set to \bar{V} (Model 703 only), $\mu\bar{A}$, \bar{mA} and $10\bar{A}$. And also press this button to cycle through $\bar{\Omega}$ or $\bar{\Omega}$ or $\bar{\Omega}$ measurement mode when the rotary selector switch is set to $\bar{\Omega}$.

5. METER OPERATION

Voltage (\bar{V} or \bar{V} , \bar{V}) Measurements

Voltage is the difference in electrical potential between two points.

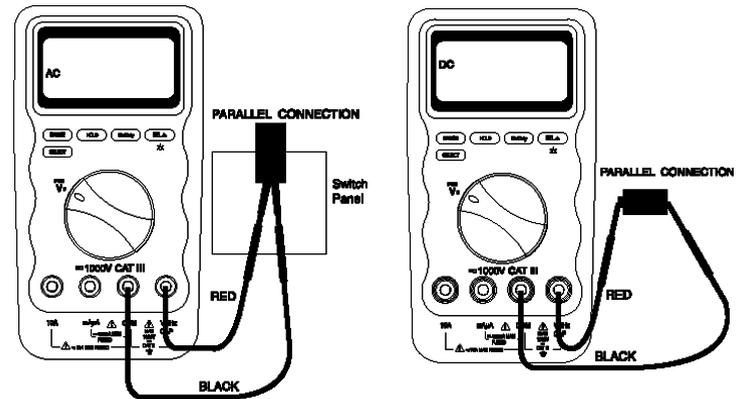
The polarity of ac (alternating current) voltage varies over time, while the polarity of dc (direct current) voltage is constant over time.

\bar{V} function defaults at **dc**. Press **SELECT** button momentarily to select **ac**.

Range available in volts functions are :

400 mV, 4 V, 40 V, 400 V, and 1000V

When measuring voltage, the meter acts like a $10M\Omega$ ($10 \times 10^6\Omega$) impedance in parallel with the circuit. This loading effect can cause measurement errors in high-impedance circuits. In most cases, the error is negligible (0.1 % or less) if the circuit impedance is 10 k Ω or less.



Tips for measuring voltage

- In 400 mV range, displayed value may fluctuate when disconnecting input terminals. This is normal.
- AC voltage measuring circuit in Model 703 is of root-mean-square (True RMS) value system so the meter can accurately measure ac voltage of non-sinusoidal waveforms including harmonics caused by various non-linear loads.

- To improve the accuracy of dc voltage measurements taken in the presence of ac voltages (such as, measuring the dc voltage of an amplifier in the presence of an ac signal), measure the ac voltage first. Note the just measured ac voltage range and select a dc voltage range that is the same or higher than the ac voltage range. This method improves the dc voltage accuracy by preventing the input protection circuits from being activated.

 **Warning**

To avoid the risk of electrical shock and instrument damage, input voltages must not exceed 1000 V dc or ac (rms). Do not attempt to take any unknown voltage measurement that may be in excess of 1000 V dc or ac (rms).

Resistance (Ω , 

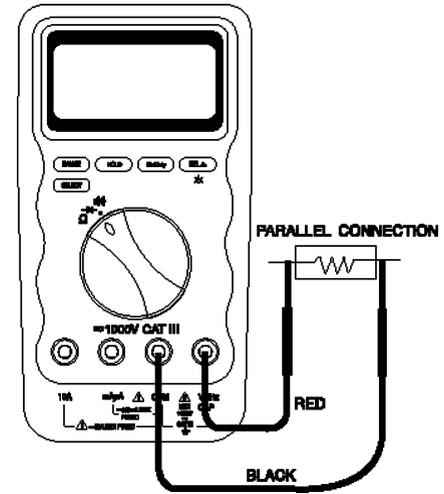
Caution

To avoid damaging the meter or the equipment under test, remove all power from the circuit and discharge all high-voltage capacitors before measuring resistance.

Resistance is an opposition to current flow. The unit of resistance is the ohm (Ω). The meter measures resistance by sending a small current through the circuit.

Ranges available in resistance functions are :

400.0 Ω , 4.000 k Ω , 40.00 k Ω , 400.0 k Ω , 4 M Ω , and 40 M Ω



Tips for measuring resistance

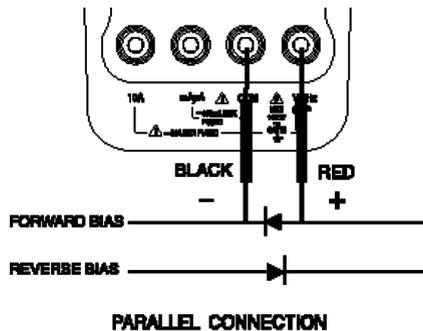
- Because the meter's test current flows through all possible paths between the test probe tips, the measured value of a resistor in a circuit is often different from the resistor's rated value.
- The test leads can add 0.1 Ω to 0.2 Ω of error to resistance measurements. To measure the resistance of the leads, touch the probe tips together and read the resistance. If necessary, you can press the REL button to automatically subtract this value.
- The resistance function can produce enough voltage to forward-bias silicon diode or transistor junctions, causing them to conduct. Do not use the 40 M Ω range for measuring the in-circuit resistance to avoid this.
- When measuring large resistance, reading may be unstable due to environmentally induced electrical noise. In this case, directly connect the resistor to input terminals of the meter or shield the resistor at potential of the COM input terminal to obtain stable reading.
- For resistance above 1 M Ω , the display may take a few seconds to stabilize. This is normal for high resistance readings..
- The meter has a circuit to protect the resistance range from over-voltage. However, to prevent accidentally exceeding the protection circuit's rating and to ensure a correct measurement, NEVER CONNECT THE LEADS TO A SOURCE OF VOLTAGE when the rotary switch is set to Ω or 

Diode () Test

Caution

Discharge all high-voltage capacitors before testing diodes. Large value capacitors should be discharged through an appropriate resistance load.

Use the diode test to check diodes, transistors, silicon controlled rectifiers (SCRs), and other semiconductor devices. The test sends a current through a semiconductor junction, then measures the junction's voltage drop.



Normal forward voltage drop (forward biased) for a good silicon diode is between 0.4 V to 0.9 V. A reading higher than that indicates a leaky (defective) diode. A zero reading indicates a shorted (defective) diode. An **OL** indicates an open diode (defective).

Reverse the test leads connections (reverse biased) across the diode. The display shows **OL** if the diode is good. Any other readings indicate the diode is shorted or resistive (defective).

Continuity () Test

The continuity function detects intermittent opens and shorts lasting as little as 1 millisecond. These brief contacts cause the meter to emit a short beep. This function is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete wire.

Caution

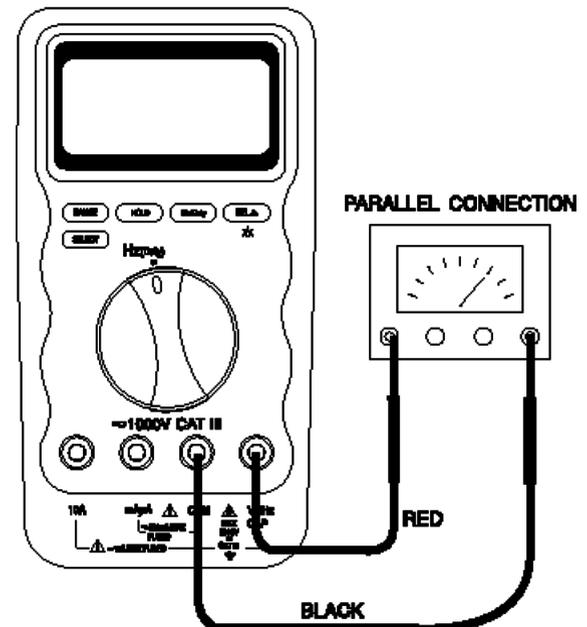
Using resistance and continuity function in a live circuit will produce false results and may damage the instrument. In many cases the suspicious components must be disconnected from the circuit under test to obtain accurate results.

Frequency (Hz) Measurements

Frequency is the number of cycles a signal completes each second. The meter measures the frequency of a voltage or current signal by counting the number of times the signal crosses a threshold level each second.

To measure the frequency of a voltage or current signal, press the Hz/Duty button momentarily while measuring volts or currents.

The available frequency ranges are 5 Hz, 50 Hz, 500 Hz, 5 kHz, 50 kHz, 500 kHz, 5 MHz and 10 MHz.



Tips for measuring frequency

- In frequency, the meter is always autoranging.
- When disconnecting the input terminals, the overload sign may be displayed or the display may unsteadily fluctuate. This is typical.

Duty Cycle Measurements

Duty Cycle (or Duty Factor) is the percentage of time a signal is above or below a trigger level during one cycle.

The duty cycle mode is optimized for measuring the ON or OFF time of logic and switching signals. Systems such as electronic fuel injection systems and switching power supplies are controlled by pulses of varying width, which can be checked by measuring duty cycle.

Press the Hz/Duty button to toggle between the Hz mode and the Duty Cycle mode when the rotary selector knob is set to Hz (Duty), \overline{V} , $\overline{\mu A}$, \overline{mA} , or $10A$.

Capacitance Measurements

Caution

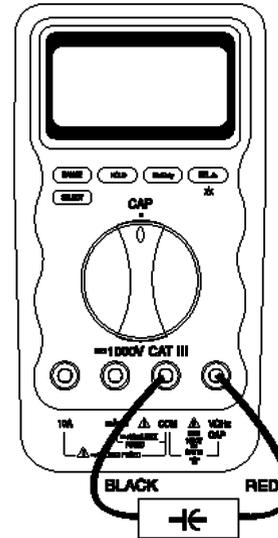
To avoid damaging the meter or the equipment under test, remove all power from the circuit and discharge all high-voltage capacitors before measuring capacitance. Large value capacitors should be discharged through an appropriate resistance load. Use the dc voltage function to confirm that the capacitor is discharged.

Capacitance is the ability of a component to store an electrical charge. The unit of capacitance is the farad (F). Most capacitors are in the nanofarad (nF) to microfarad (μF) range.

The available capacitance ranges are 40nF, 400 nF, 4 μF , 40 μF , and 100 μF .

Tips for measuring capacitance

- In capacitance, the Meter is always autoranging.
- In 40 nF range, the readings are probably unstable due to environmentally induced electrical noise and floating capacity of the test leads. Therefore, directly connect the object to be measured to the input terminals.



Temperature (Temp) Measurements [Model 703 only]

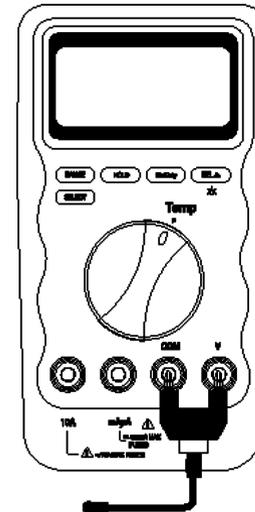
The meter comes with temperature reading in either Centigrade or Fahrenheit preset at the factory. The reading mode can be changed at the factory only.

The **SELECT** function is not available in Temperature mode.

WARNING

Do not apply thermocouple to circuits exceeding 30V rms, 42.4V peak or 60V dc.

Be sure to insert the banana plug K-type temperature bead probe TP7 with correct + - polarities. You can also use a thermocouple probe adapter TP1 A (Optional purchase) to adapt other standard K-type temperature probes.



Current (μA , mA , 10A) Measurements



Warning

Never attempt an in-circuit current measurement where the open-circuit potential to earth is greater than 1000V. You may damage the meter or be injured if the fuse blows during such a measurement.

Caution

Check the meter fuses before measuring current. Use the proper terminals, function, and range for current measurements. Never place the probes in parallel with any circuit or component when the test leads are plugged into the current terminals.

Current is the flow of electrons through a conductor. To measure current, you must open the circuit under test, then place the meter in series with the circuit.

The available current ranges are :

400.0 μA , 4000 μA , 40.00 mA, 400.0 mA, 4.000 A, and 10.00 A

The meter defaults at **dc**. Press **SELECT** button momentarily to select **ac**.

To measure dc or ac current,

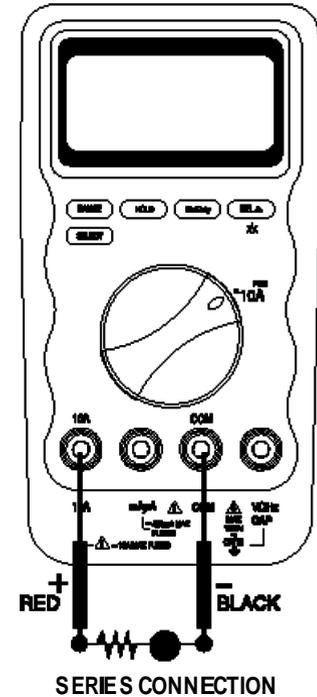
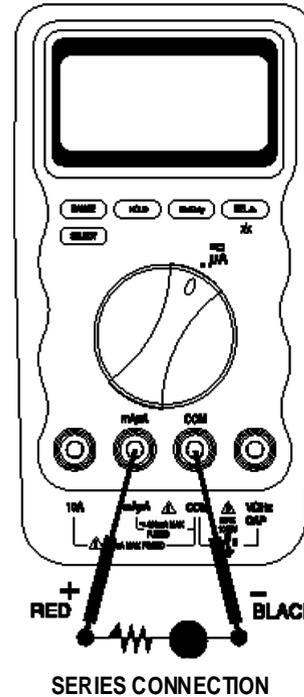
1. Turn off power to the circuit and discharge all high-voltage capacitors.
2. Insert the black lead into the **COM** terminal and the red lead into an input terminal appropriate for the measurement range as the following table.

Range	Input	Ranges
μA	mA μA	400.0 μA , 4000 μA
mA	mA μA	40.00 mA, 400.0 mA
10A	10A	4.000 A, 10.00 A

To avoid blowing the meter's 440 mA fuse, use the mA μA terminal only if you are sure the current is less than 400 mA.

3. Open the current path to be tested. Touch the red probe to the more positive side of the break and touch the black probe to the more negative side of the break. (Reversing the leads will produce a negative reading, but will not damage the meter.)

4. Turn on power to the circuit and read the display.
5. After measuring current, turn off power to the circuit and discharge all high-voltage capacitors. Disconnect the meter and restore the circuit to normal operation.



Tips for measuring current

- When measuring a 3-phase system, special attention should be taken to the phase to phase voltage which is significantly higher than the phase to earth voltage. To avoid exceeding the voltage rating of the protection fuse(s) accidentally, always consider the phase to phase voltage as the working voltage for the protection fuse(s).
- When measuring current, the meter's internal shunt resistors develop a voltage across the meter's terminals called "burden voltage". This voltage drop may affect precision circuits or measurements.

Auto / Manual Range Operation

Press the **RANGE** button momentarily to select manual-ranging in volts, ohms, and currents measurement function, and the meter will remain in the range it was in, when the LCD annunciator **AUTO** turns off.

Press the button momentarily again to step through the ranges.

Press and hold the RANGE button for 2 seconds to resume auto-ranging.

Manual-ranging feature is not available in Hz (Duty), CAP, Temp,  and  functions.

Auto - Power - Off

The Auto-Power-Off feature automatically turns the meter off to extend battery life after approximately 30 minutes of no activities. To turn on the meter after Auto-Power-Off, turn the rotary switch from OFF to any function (ON).

6. MAINTENANCE



Warning

To avoid electrical shock or personal injury, remove the test leads and any input signals before replacing the battery or fuses. To prevent damage or injury, install only the same type of fuses or equivalents.

Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents.

Clean the input terminals as follows :

1. Turn the meter off and remove all test leads.
2. Shake out any dirt that be in the terminals.
3. Soak a new swab with alcohol and work the swab around in each terminal.

If the meter is not to be used for periods of longer than 60 days, remove the battery and store it separately.

Battery and Fuse Replacement

The meter uses a single standard 9V battery (NEDA 1604, JIS006P, IEC 6F 22), a 1000 V/440 mA IR 10 kA fast acting F fuse (F₇₁) for mA μ A current input, and a 1000 V/11 A IR 10KA fast acting F fuse (F₇₂) for A current input. The (F₇₁) 440 mA, (F₇₂) 11 A fuse must be replaced by qualified service personnel only.

Trouble Shooting

If the meter fails to operate even with the battery or fuse replacements, check it twice over according to operating procedure as described in this manual.

If the meter's V/ Ω input terminal has subjected to high voltage transient (caused by lightning or switching surge to the system) by accident or abnormal operating conditions, the series fusible resistors will be blown off like fuses in order to protect the user and the meter. Most measuring functions through this terminal will then be open circuit.

In this case, the series fusible resistors and the spark gaps should be replaced by qualified personnel.

7. SPECIFICATIONS

Safety & Compliances

Maximum voltage between any terminal and earth ground	: 1000 V ac/dc
Compliances	: Complies with CSA C22.2 No 1010.1-92, ANSI/ISA-S82, 01-94 to 1000 V Overvoltage Category III.
Certifications	: UL & cUL standard UL 3111-1 Listed CE-marking certificated
Surge Protection	: 8 kV peak per IEC 1010.1-92
 Fuse Protection for mA or μ A inputs	: 1000 V / 440 mA IR 10 kA FAST fuse
 Fuse Protection for A input	: 1000 V / 11 A IR 10 kA FAST fuse

Physical Specifications

Display (LCD)	: Digital – 4000 counts display; updates 5 times/sec.
Operating Temperature	: 0°C to 40°C
Storage Temperature	: -20°C to 60°C
Temperature Coefficient	: nominal 0.15 x (specified accuracy) / °C @ (0°C to 18°C or 28°C to 40°C), or otherwise specified
Relative Humidity	: 0 % to 80 % @ (0°C to 35°C) 0 % to 70 % @ (35°C to 40°C)
Altitude	: Operating – up to 2000m Storage – 10000m
Battery Type	: Single 9V battery –NEDA 1604, JIS 006P or IEC 6F 22

Battery Life	: 250 hrs. typical (with backlight off) [703] 750 hrs. typical (with backlight off) [701]
Shock Vibration	: Per MIL-T-PRF 28800 for Class II instruments
Pollution Degree	: 2
Electromagnetic Compatibility (EMC)	: Susceptibility – Commercial Limits for EN 50082-1 Emissions – Commercial Limits for EN 50081-1
Size (H x W x L)	: 40.5 x 92 x 172 mm
Weight	: Approx. 386g
Calibration Interval	: 1 year

Feature Summary

Backlight	: For clear readings in poorly lighted areas
Fast Autoranging	: Meter automatically selects the best range momentarily
HOLD	: Holds readings on display
Continuity / Open test	: Beeper sounds
Battery/Fuse Access Door	: battery or fuse replaceable without voiding calibration
High-Impact Overmolded Case	: Protective holster features

Electrical Specifications

Accuracy is given as \pm [(% of reading) + (number of digits)] at 18°C to 28°C with relative humidity up to 80%, for a period of one year after calibration.
True RMS responding accuracies are specified from 5% to 100% of range or otherwise specified; Crest Factor < 3:1 at full scale and < 6:1 at half scale.

DC Voltage

Range	Resolution	Accuracy	
		701	703
400 mV	100 μ V	0.5 % + 2	0.5 % + 2
4 V	1 mV		
40 V	10 mV		
400 V	100 mV		
1000 V	1 V	0.75 % + 3	0.75 % + 3

NMRR : > 60dB @ 50/60 Hz
 CMRR : > 120 dB @ DC, 50/60 Hz, Rs=1k Ω
 Input Impedance : 10 M Ω , 30 pF nominal
 (50 M Ω , 100 pF nominal for 400 mV range)

AC Voltage

Range	Resolution	Accuracy			
		40 Hz – 400 Hz		400 Hz – 1 kHz	1 kHz – 20 kHz
		701	703	703	
400 mV	100 μ V	0.75 % + 3	2.0 % + 10	2.0 % + 10	
4 V	1 mV		0.75 % + 3	2.0 % + 3	
40 V	10 mV			2.0 % + 3	
400 V	100 mV		2.0 % + 3		2.0 % + 3
1000 V	1 V	1.0% + 5	1.0 % + 5	2.0% + 5 ^{*1}	–

CMRR : > 60dB @ DC to 60 Hz, Rs = 1 K Ω
 Input Impedance : 10 M Ω , 30 pF nominal
 (50 M Ω , 100 pF nominal for 400 mV range)

*1: Accuracy for 400 Hz to 1 kHz

DC Current

Range	Resolution	Accuracy	
		701	703
400 μ A	0.1 μ A	1.0% + 2	1.0% + 2
4000 μ A	1 μ A		
40 mA	10 μ A		
400 mA	100 μ A		
4 A	1 mA	1.5 % + 5	1.5 % + 5
10 A	10 mA		

AC Current

Range	Resolution	Accuracy		
		40 Hz – 400 Hz		400 Hz – 10 kHz
		701	703	703
400 μ A	0.1 μ A	1.0 % + 5	1.0 % + 5	1.5 % + 5
4000 μ A	1 μ A			
40 mA	10 μ A			
400 mA	100 μ A			
4 A	1 mA	1.5 % + 10	1.5 % + 10	2.0 % + 10
10 A	10 mA			

Resistance

Range	Resolution	Accuracy	
		701	703
400 Ω	0.1 Ω	1.0 % + 5	1.0 % + 5
4 k Ω	1 Ω	0.5 % + 3	0.5 % + 3
40 k Ω	10 Ω		
400 k Ω	100 Ω		
4 M Ω	1 k Ω	1.0 % + 5	1.0 % + 5
40 M Ω	10 k Ω	1.5 % + 10	1.5 % + 10

Open Circuit Voltage : < 1.3 V dc

Continuity

Audible threshold	: the beeper sounds if the measured resistance is lower than 10 Ω, and turns off when greater than about 60 Ω.
Response time	: < 1 msec.

Diode Test

Range	Accuracy	Test Current (Typical)	Open Circuit Voltage
4V	2%	0.25 mA	< 1.5 V dc

Capacitance

Range	Resolution	Accuracy *1	
		701	703
*1 40 nF	10 pF	2.5% + 10	2.5% + 10
400 nF	100 pF		
4 μF	1 nF		
40 μF	10 nF		
100 μF	100 nF		

*1. Accuracy with film capacitor or better

Using Mode

Frequency and Duty Cycle

Range	Resolution	Accuracy		Remark
		701	703	
5 Hz	0.001 Hz	0.05% + 3	0.05% + 3	Minimum frequency : 0.5 Hz Sensitivity : 5 Hz–1 MHz, > 250 mV 1 MHz–10 MHz, > 350 mV
50 Hz	0.01 Hz			
500 Hz	0.1 Hz			
5 kHz	1 Hz			
50 kHz	10 Hz			
500 kHz	100 Hz			
5 MHz	1 kHz			
10 MHz	10 kHz			
0.1% to 99.9%	0.1%	0.5 Hz to 500 kHz (pulse width > 2 μsec.) (0.1% + 0.05% per kHz + 1 count) for 5 V input (Logic signals only)		

Temperature (Model 703 only)

Range	Resolution	Accuracy
- 40°C to -10°C (-40°F to 14°F)	1 °C 1 °F	3% ± 5°C (3% ± 5°F)
- 10°C to 400°C (14°F to 752°F)	1 °C 1 °F	1% ± 3°C (1% ± 3°F)
400°C to 1300°C (752°F to 2372°F)	1 °C 1 °F	3% of reading (3% of reading)

* This specification is effective at the ambient temperature of 23°C (73.4 °F) only.

Frequency Counter Sensitivity

Range	Minimum Sensitivity (RMS Sine Wave)	
	40 Hz to 10 kHz	40 Hz to 20 kHz
V (4 V to 1000 V)	500 mV	500 mV
μA (400 μA to 4 mA)	> 15 % F.S. of AC range	Not Specified
mA (40 mA to 400 mA)	> 15 % F.S. of AC range	Not Specified
A (4.0 A to 10 A)	> 45 % F.S. of AC range	Not Specified

Burden Voltage (A, mA, μA)

Function	Range	Burden Voltage (typical)
mA / μA	400 μA	150 μV / μA
	4000 μA	150 μV / μA
	40 mA	3.3 mV / mA
	400 mA	3.3 mV / mA
10 A	4 A	0.03 V / A
	10 A	0.03 V / A