

### Model 9999

### 15 FUNCTIONS 9 RANGES



#### SPECIAL FEATURES :

- Inrush Current Measuring Function for DC & AC
- Synchronous measurement of Inrush Current (100mS) for measuring the true starting current for motors, lighting, breaker etc.
- Recessed safety designed input jacks.
- Good for PWM trouble shooting & in noisy environment measurement.

#### FEATURES :

- High Accuracy, Digital Reading
- ACA/DCA measurement upto 999.9A
- Indoor use
- Overload Protection on all ranges
- Diode & Continuity Test
- Auto Power Off
- Low Battery Indication
- Instant Continuity Buzzer
- Data Hold, Peak Hold & Max Hold Functions.
- Relative Zero Mode function.

#### GENERAL SPECIFICATIONS :

- \* Sensing : TRUE RMS
- \* Jaw Opening Size : 46.5 mm
- \* Display : 4 digits 9999 counts large LCD display
- \* Display Size : 27 mm x 55 mm
- \* Crest Factor : Less than equal to 3
- \* Pollution Degree : 2
- \* Low Battery : The "LO" is displayed when the battery Voltage drops below the operating level.
- \* Over range indication : "O.L." indicated
- \* Measurement Rate : 2 times per second, nominal
- \* Operating Temperature : 0°C to 50°C, at <70% R.H.
- \* Storage Temperature: -20°C to 60°C, at <80% R.H. With battery removed from meter.
- \* Accuracy stated at ambient temperature 18°C to 28°C (65°F to 82°F), <70% R.H.
- \* Temperature Coefficient : 10% of applicable accuracy per °C (5% per °F) out side the range of 18 to 28°C (65°F to 82°F)
- \* Altitude : 2000m
- \* Power Supply : 9V battery
- \* Dimension : 250(H) X 100(W) X 46(D) mm
- \* Weight : Approx. 425 gm (battery included)

#### ACCESSORIES :

Test leads, Carrying Case, Battery installed, User's Manual & Banana plug K-Type Thermocouple, Thermocouple Adaptor

#### SAFETY :

- All input are protected to EN61010-1, CAT III 600V.
- Withstand Voltage : 6000V

### ELECTRICAL SPECIFICATIONS - 9999

Accuracy is ± (% reading digits + number of digits ) or otherwise specified, at 23°C ± 5°C & less than equal to 80% R.H.

#### AC CURRENT

Range	Resolution	Accuracy
0-999.9A	0.1 A	±(2%rdg + 5dgt) on 20-100Hz ±(6%rdg + 5dgt) on 100-400Hz

Crest Factor : <3@ 0 to 500A; <2.5@ 500 to 600A  
<1.42@ 600 to 1000A

Overload Protection : 1000A AC max. for 1 min.  
\*Accuracy specified for measurements taken at the centre of the clamp.

#### DC CURRENT

Range	Resolution	Accuracy
0-999.9A	0.1 A	±(2%rdg + 5dgt)

Input Impedance : 1M  
Overload Protection : 600V DC/AC rms

#### AC VOLTAGE

Range	Resolution	Accuracy
0-600.0V	0.1 V	±(1%rdg + 5dgt)

Overload Protection : 600V DC/AC rms

#### DC VOLTAGE

Range	Resolution	Accuracy
0-999.9	0.1	±(1.5%rdg + 5dgt)
1000-9999	1	

Overload Protection : 600V DC/AC rms

#### TEMPERATURE

Range	Resolution	Accuracy
0-999.9A	0.1 A	±(2%rdg + 5dgt)

Overload Protection : 1200A DC max. for 1 min.  
\*Accuracy specified for measurements taken at the centre of the clamp.

#### TEMPERATURE (K-Type Thermocouple)

#### TEMPERATURE (K-Type Thermocouple)

Range	Accuracy
-40°C ~ 1200°C	±(0.5%rdg + 1°C)
-40°F ~ 2200°F	±(0.5%rdg + 2°F) (Not including Thermocouple error)

Resolution : 0.1°C on -40°C-999.9°C  
0.1°C on 1000°C-1200°C  
0.1°F on -40°F-999.9°F  
1°F on 1000°F-2200°F

Overload Protection : 600V DC/AC rms  
Supplied Thermocouple is suitable for measurement upto 250°C.

#### AC VOLTAGE

Range	Resolution	Accuracy
0-600.0V	0.1 V	±(1%rdg + 5dgt) on 20-100Hz ±(6%rdg + 5dgt) on 100-400Hz

Input Impedance : 1M  
Overload Protection : 600V DC/AC rms

#### CAPACITANCE

Range	Resolution	Accuracy
0-999.9 F	0.1 F	±(5%rdg + 10dgt)

Overload Protection : 600V DC/AC rms

#### DIODE TEST

Test Current	Test Voltage
0.2mA ± 0.1 mA	<3.0V DC

Accuracy : ±(3.0%rdg + 3dgt)  
Resolution : 1mV  
Overload Protection : 600V DC/AC rms

#### FREQUENCY

Range	Accuracy
20-400.0Hz	±(0.5%rdg + 5dgt)

Resolution : 0.1Hz  
Sensitivity : 5V rms. TTL signal  
≥5A @ 20-100Hz  
≥10A @ 100-400Hz  
Overload Protection : 600V DC / AC rms

#### CONTINUITY

Audible Indication	< 30
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Overload Protection : 600V DC/AC rms

All Specifications are subject to change without prior notice

What is Inrush Current? Why is it important?

## INTRODUCTION

Due to high cost of Electricity, coupled with power shortage all over the country, especially in cities & small towns in India, it is necessary to install high efficiency motors in industry. While they consume less electricity than their older, less efficient counterparts, they are more likely to trip the circuit protector (circuit breakers) when they're started, which are caused by the initial start up current - or "inrush current". This starting current is several times greater than their normal running current. In a three-phase motor, for example, starting current or "in-rush current" generally lasts between 75-150 milliseconds with a current spike between 500% and 1200%. Although for a very short duration, this current surge creates problems.

The consequence of inrush current is mostly called a "nuisance trip" of the circuit protector. If the protector is not designed to handle the amount of inrush current that is present, the device can trip upon energizing the circuit or during circuit operation.

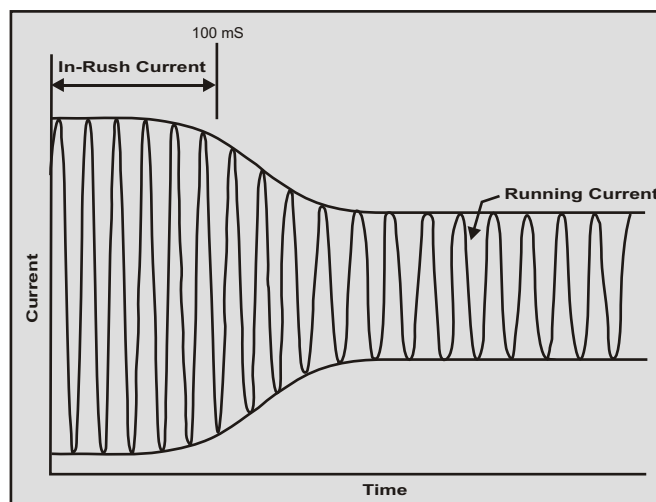
Excessive inrush current may also shorten the life of switches and circuit protectors. Switches are most likely to be damaged since the current spike occurs as the contacts are closed, causing the contacts to become pitted. In severe cases, the heat generated due to excess current can weld switches.

Because of this, precise measurement of inrush current is all the more necessary; it's a critical element of motor installation. **KUSAM-MECO** has a new unique Clamp meter that can accurately measure inrush current.

The **KUSAM-MECO** clamp meter uses a unique circuitry and high-speed digital signal processing to filter out electronic "noise" and capture the starting inrush current **as the circuit protector sees it**.

## NUISANCE TRIPPING

The issue of nuisance tripping of circuit breakers or overload heating by motors was considered when deciding the specification of a new clamp meter. A useful feature would be the ability to accurately measure inrush current.



Motor starting current

For achieving this important feature in the new Clampmeter. Model-9999, **KUSAM-MECO** examined existing methods that have been used to perform this function, such as peak hold, max hold, and min/max hold. Measurements by these methods are inadequate, since none of them give readings that accurately depict the current the circuit protector experienced.

After studying motor starting current profiles, **KUSAM-MECO** introduced Clamp meter with inrush function as a highly accurate method to measure actual startup current. One of the most common problems with previous methods of measuring inrush was that **the measurements weren't necessarily synchronized with the motor start-up, so measurements were not only inaccurate but unrepeatable as well**.

In order to avoid this pitfall, the **KUSAM-MECO** clampmeter 9999 inrush function is triggered by rising current in the start-up phase. The technician first "arms" the inrush function of the clamp meter. The meter is then triggered by the inrush current. Once triggered, it takes a large number of samples during a 100 millisecond period and then digitally filters and processes the samples to calculate the actual starting current. **This results in a highly accurate, synchronous indication of the start current not previously available in any other clamp meter**



An ISO 9001:2008 Company

# USE TRUE RMS WHEN MEASURING AC WAVEFORMS

The waveforms on today's AC power lines are anything but clean. Electronic equipment such as office computers, with their switching power supplies, produce harmonics that distort power-line waveforms. These distortions make measuring AC voltage inaccurate when you use an averaging DMM.

Average voltage measurements work fine when the signal you're measuring is a pure sine wave, but errors mount as the waveform distorts. By using true RMS measurements, however, you can measure the equivalent heating effect that a voltage produces, including the heating effects of harmonics. Table 1 shows the difference between measurements taken on averaging DMMs & those taken on true RMS DMMs. In each case, the measured signal's peak-to-peak value is 2V. Therefore, the peak value is 1V.

For a 1-V peak sine wave, the average & RMS values are both 0.707V. But when the input signal is no longer a sine wave, differences between the RMS values & the average reading values occur. Those errors are most prominent when you are measuring square waves & pulse waveforms, which are rich in harmonics.

Table 1. Average versus true RMS comparison of typical waveforms.

Waveform	Actual Pk-Pk	True RMS Reading	Average Reading	Reading Error
Sine Wave	2.000	0.707	0.707	0%
Triangle Wave	2.000	0.577	0.555	-3.8%
Square Wave	2.000	1.000	1.111	+11.1%
Pulse (25% duty Cycle)	2.000	0.433	0.416	-3.8%
Pulse (12.5% duty Cycle)	2.000	0.331	0.243	-26.5%
Pulse (6.25% duty Cycle)	2.000	0.242	0.130	-46.2%

One limitation to making true RMS measurements is crest factor, and you should consider crest factor when making AC measurements. Crest factor is the ratio of a waveform's peak ("crest") voltage to its RMS voltage. Table 2 shows the crest factors for ideal waveforms.

Table 2. Crest factors of typical waveforms.

Waveform	Crest Factor
DC	1.000
Square Wave	1.000
Sine Wave	1.414
Triangle Wave	1.732
Pulse (25% duty Cycle)	1.732
Pulse (12.5% duty Cycle)	2.646
Pulse (6.25% duty Cycle)	3.873

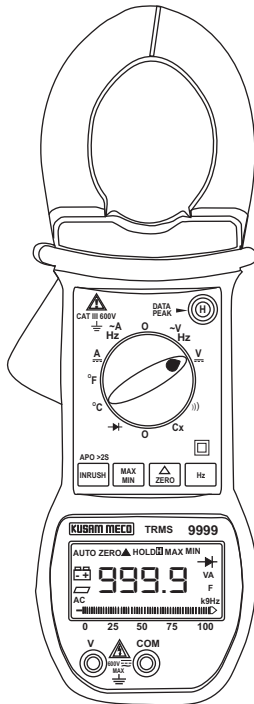
A DMM's specifications should tell you the maximum crest factor that the meter can handle while maintaining its measurement accuracy. True RMS meters can handle higher crest factors when a waveform's RMS voltage is in the middle of the meter's range setting. Typically, a DMM may tolerate a crest factor of 3 near the top of its scale but it might handle a crest factor of 5 that's in the middle of the range. Therefore, if you're measuring waveforms with high crest factors (greater than 3), you should adjust the DMM so the measured voltage is closest to the center of the measurement range.

Another limitation of true RMS is speed. If you're measuring relatively clean sine waves, then you can save time & money by using an averaging DMM. True RMS meters cost more than averaging meters and can take longer to produce measurements, especially when measuring millivolt-level AC signals. At those low levels, true RMS meters can take several seconds to stabilize a reading. Averaging meters won't leave you waiting.

**KUSAM-MECO**

# TRUE RMS AC/DC DIGITAL CLAMP METER

## MODEL - 9999



**KUSAM-MECO**

**TAKE MEASUREMENT CAREFULLY AND YOU'LL  
SPARE YOUR METER AND YOURSELF, SOME PAIN**

Nearly every electrical engineer has a hand held digital clamp meter (Tongtester). We sometimes take them for granted, until we damage them or "burn them out". If you incorrectly connect your clamp meter to a circuit, or if you have the clamp meter on wrong setting, you damage the meter and possibly hurt yourself. You can also get into trouble if you try to measure the voltage across a charged capacitor.

Clamp meter users frequently burn their meters by trying to measure current the same way as they measure voltage. Remember, you measure voltage across a circuit, and current through a circuit. When you use the current input, your clamp meter becomes a low impedance circuit element.

Even if you correctly insert your clamp meter in to the circuit, you can still damage your meter. Don't try to measure current in excess of your meter's capacity. Check the current capacity of the Clamp meter.

If you are measuring current in industrial environment to prevent accident disconnect your test leads from the circuit under test whenever you change Clamp meter functions. Set your meter to the correct function, say current, and its highest range for the setting. If the reading is small, change the range to the next lower range till the reading can be read with the best possible accuracy. When measuring voltage, connect the test leads before your apply power to your circuit. To be safe, start by setting your meter to its highest range first.

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**Overview**


 **Warning**

**To avoid electric shock or personal injury, read the “Rules for Safe Operation” carefully before using the Meter.**

Digital Clampmeter Model - 9999 (hereafter referred to as “the Meter”) is a 4 digits True RMS Clampmeter with steady operations, and highly reliable hand-held measuring instrument having different measurement functions. The Clampmeter not only can measure AC Current, AC/DC Voltage, Frequency, Resistance, it can also test DC Current, "INRUSH" Current, Capacitance, Temperature, Diode Test. It also has Data Hold, Peak Hold, Max Hold & Full Icon Display.

**Terms in this manual**

 **Warning** : identifies conditions and actions that could result in serious injury or even death to the user.

 **Caution** : identifies conditions and actions that could cause damage or malfunction in the instrument.









**Unpacking Inspection**

Open the package case and take out the Clampmeter. Check the following items carefully to see any missing or damaged part :

Item	Description	Qty.
1	English Operating Manual	1 piece
2	Test Lead	1 pair
3	K-Type Thermocouple	1 piece
4	Thermocouple Adaptor	1 piece

In the event you find any Part missing or damaged, please contact your dealer immediately.

**FEATURES :**


-  INRUSH Current measuring function.
-  High - Accuracy, Digital Reading.
-  Large LCD of 21mm (h) for Easy Reading.
-  Instant Continuity Buzzer.
-  Overload Protection on all Ranges.
-  Recessed Safety Designed Input Jacks.
-  Data Hold, Peak Hold And Max Hold Functions
-  Relative zero function.

**GENERAL SPECIFICATIONS**

**Jaw size :** Maximum Conductor 46.5 mm .

**Display :** 4 digit liquid crystal display (LCD) with a maximum reading of 9999.

**Overrange :** "OL" mark indication.

**Low battery indication:** The " " is displayed when the battery voltage drops below the operating level.

**Measurement rate :** 2 times per second, nominal.

**Operating environment :** 0°C to 50°C at <70%R.H.

**Storage Temperature :** -20°C to 60°C at <80%R.H.  
with battery removed from meter.

**Accuracy stated at ambient temperature 18°C to 28°C(65°F to 82°F), <70% R.H.**

**Temperature Coefficient :** 10% of applicable accuracy per °C(5% per °F) out side the range of 18 to 28°C (65 °F to 82°F)

**Indoor use.**

**Altitude up to 2000m.**

**Safety Conformance :** All input are protected to EN61010-1, 600V CAT III. Pollution degree II.  
EMC-instrument unspecified for use in EMC field.

**Power :** Single standard 9V battery.

**Dimensions :** 250mm(H)X100mm(W)X46mm(D).

**Weight :** Approx. 425gms.. including battery.

**ELECTRICAL SPECIFICATION :**

**AC CURRENT TRMS** (accuracy : at the center of CT)

Range	Resolution	Accuracy
0 to 999.9A	0.1 A	± (2% rdg + 5dgts) on 20 to 100Hz
		± (6% rdg + 5dgts) on 100 to 400Hz

**Crest Factor :** <3@ 0 to 500A

<2.5 @ 500 to 600A

<1.42 @ 600 to 1000A

**Overload Protection :** 1000A AC max for 1 minute

**DC CURRENT** (accuracy: at the center of CT)

Range	Resolution	Accuracy
0 to 999.9A	0.1 A	± (2% rdg + 5dgts)

**Overload Protection :** 1200A DC max for 1 minute.

**DC VOLTS**

Range	Resolution	Accuracy
0 to 600.0V	0.1 V	± (1% rdg + 5dgts)

**Input Impedance :** 1 M

**Overload Protection :** 600V DC/AC rms.

**AC VOLTS TRMS**

Range	Resolution	Accuracy
0 to 600.0V	0.1 V	± (1% rdg + 5dgts) on 20 to 100Hz
		± (6% rdg + 5dgts) on 100 to 400Hz

**Input Impedance :** 1 M

**Overload Protection :** 600V DC/AC rms.

### RESISTANCE (Autorange)

Range	Resolution	Accuracy
0 to 999.9	0.1	± (1.5%rdg + 5dgts)
1000 to 9999	1	

**Overload Protection** : 600V DC / AC rms

### CAPACITANCE

Range	Resolution	Accuracy
0 to 999.9 F	0.1 F	± (5%rdg + 10dgts)

**Overload Protection** : 600V DC / AC rms.

### TEMPERATURE (K-Type Thermocouple)

Range	Accuracy
-40°C to 1200°C	± (0.5%rdg + 1°C)
-40°F to 2200°F	± (0.5%rdg + 2°F) (not including thermo couple error)

**Resolution** : 0.1°C on -40°C to 999.9°C  
 1°C on 1000°C to 1200°C  
 0.1°F on -40°F to 999.9°F  
 1°F on 1000°F to 2200°F

**Overload Protection** : 600V DC / AC rms

**NOTE** : Supplied Thermocouple is suitable for measurement upto 250°C, for higher Temperature measurement use separate T. C. probe.

### FREQUENCY

Range	Resolution	Accuracy
20 to 400.0Hz	0.1Hz	± (0.5%rdg + 5dgts)

**Sensitivity** : 5Vrms. TTL signal

5A@20 to 100Hz

10A@100 to 400Hz

**Overload Protection** : 600V DC / AC rms

### DIODE TEST

<b>Accuracy</b>	± (3.0%rdg + 3dgts)
<b>Resolution</b>	1 mV
<b>TEST CURRENT</b>	0.2mA ± 0.1 mA
<b>TEST VOLTAGE</b>	<3.0V DC

**Overload Protection** : 600V DC / AC rms.

### CONTINUITY

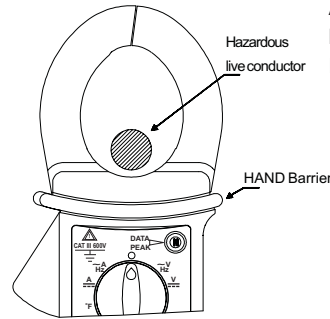
<b>Audible indication</b>	< 30
<b>OL. PROTECTION</b>	600V DC/AC rms.

**SAFETY INFORMATION**

The following safety information must be observed to ensure maximum personal safety during the operation of this meter.

1. Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
2. This meter is not recommended for high voltage industrial use, for example, not for measurements of 440V AC or 600V AC industrial power mains. The unit is intended for use with low energy circuits to 600V AC/DC or high energy circuit to 250V AC or DC.
3. Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V DC or 30V AC rms. Such voltages pose a shock hazard.
5. When using the probes, keep your fingers behind the finger guards on the probes.
6. Measuring voltage which exceeds the limits of the Clampmeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.

**WARNING :-** Typical meter applications are near exposed lethal voltages. Use caution when taking measurements. Before the meter is connected to any circuit, review the safety information.



Always keep hands behind the meter HAND Barrier.

**International Electrical Symbols**

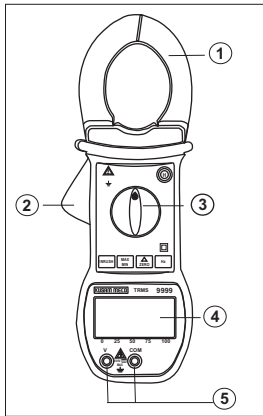
	Dangerous Voltage
	See Explanation in Manual
	AC Alternating Current.
	Double Insulation (Protection Class II)
	DC (Direct Current).
	Ground
	Both DC & AC
	Deficiency of Built in Battery.
	Continuity Test
	Diode
	Fuse

**Warning :-**

Not to be exposed to dripping or splashing environment.



## The Clampmeter Structure



- 1) TRANSFORMER JAWS :**  
Pick up the AC current flowing through the conductor.
- 2) TRIGGER :**  
Press the lever to open the transformer jaws. When the lever is released, the jaws will close again.
- 3) FUNCTION SELECTOR :**  
To Select ACV, ACA, DCV, DCA, RESISTANCE, FREQUENCY, CAPACITANCE, TEMP., DIODE & CONTINUITY.
- 4) LCD DISPLAY :**  
A 4 digit display (maximum reading 9999) indicates measured values, and features symbols indicating function, Data - Hold, Peak Hold, Max Hold, Low Battery, Continuity, Diode along with 40 Segment Analog Bar Graph.
- 5) INPUT JACKS (V +, and COM-) :**  
Test leads are inserted into these jacks for Voltage, Resistance, Frequency, Capacitance, Temperature measurements and Continuity & Diode Checks.

## FUNCTIONAL BUTTONS

### POWER ON THE METER

Turn on the meter : To select power on option. Turn the rotaryswitch from "zero" position to any switch position.

Turn off the meter: Turn the range rotaryswitch into "zero" position to turn off the meter.

### AUTOMATIC POWER OFF

The display blanks and the meter enters the APO mode if you have not changed the rotary switch position or pressed a button for 10 minutes.

In APO mode the "AUTO" is displayed. While in APO mode, change the rotary switch to turn the meter on.

### INRUSH current & APO Function Button :

In "INRUSH" current function, the meter takes a large number of samples precisely at the beginning of the starting current for a 100-milli second period and then digitally filters and processes the samples to calculate the actual starting current. The "INRUSH" function is enabled at the ACA and DCA range.

1. Press the "INRUSH" button before the inrush current measurement and display shows "----".
2. Press the trigger to open transformer jaws and clamp on to one conductor only, and turn on the motor.
3. Read the INRUSH current directly from display.  
Press and hold down the "INRUSH" button for more than 2 seconds to disable/enable the APO mode, and the "AUTO" turn off.

### MAX/MIN Function Button

Press the "MAX/MIN" button to enter the MAX, MIN recording mode. (Displays the Maximum reading, Minimum reading).

To pause max/min function without erasing stored values, press **H**. The " HOLD " is displayed. Press "MAX/MIN" button and hold down the "MAX/MIN" button for more than 2 seconds or turn the rotary switch to exit the MAX/MIN function.

### ZERO $\Delta$ Function Button

Press "ZERO $\Delta$ " button to enter the relative mode and zero the display, and store the displayed as a reference value. In relative mode, the " $\Delta$ " is displayed.

Press and hold down the "ZERO $\Delta$ " button for more than 2 seconds to exit the relative mode.

### Display HOLD & PEAK Function Button

In display HOLD mode, the meter holds the reading on the display.

In PEAK mode, the meter displays the PEAK value of measured value, PEAK function is enabled at ACV, DCV, ACA and DCA range.

Press **H** button to activate display HOLD. The " HOLD " is displayed.

Press **H** button again to activate PEAK function.

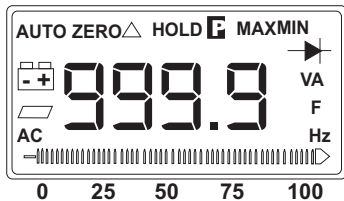
The " **F** " is displayed.

Press **H** button again to resume normal operation.

### Hz Function Button

Select the function by rotary switch whose frequency is to be checked i.e. "A" or "V". Then press the 'Hz' button to measure the frequency of that function (A or V).

**Display Symbols**



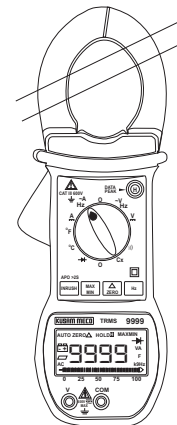
No.	Symbol	Meaning
1		Dangerous Voltages.
2		The battery is low ⚠ Warning : To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator appears.
3	AC	Indicator for AC voltage or current, The displayed value is the TRMS value.
4	—	Indicates negative reading.
5		Test of diode.
6	HOLD	Data hold is active.
7		The continuity buzzer is on.
8	A	A : Amperes (amps) The unit of current.
9	V	V : Volts. The unit of voltage.
10	Hz	Hz : frequency.
11	f	f : Unit of Capacitance.
12	, k ,	: Ohm. The unit of resistance. K : kilo-ohm. $1 \times 10^3$ or 1000 ohms.
13		Peak reading in current range
14	MAX/MIN	Max/Min reading in the function/range measured

**OPERATION**

Before taking any measurements, read the safety Information section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.

**A) AC CURRENT MEASUREMENT**

1. Set the range rotary switch to "A".
2. Press the trigger to open transformer jaws and clamp onto one conductor only. Read the current directly on the display. It is recommended that the conductor be placed at the center of the closed jaws for maximum accuracy.

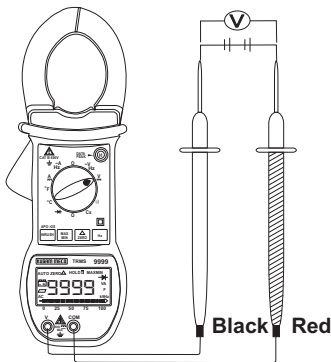


**B) DC CURRENT MEASUREMENT**

1. Set the range rotary switch to "**A**".
2. Press "ZERO $\Delta$ " button to off set the residual magnetic of jaws. The " $\Delta$ " is displayed.
3. Press the trigger to open transformer jaws and clamp on to one conductor only. Read the current directly on the display. It is recommended that the conductor be placed at the center of the closed jaws for maximum accuracy.

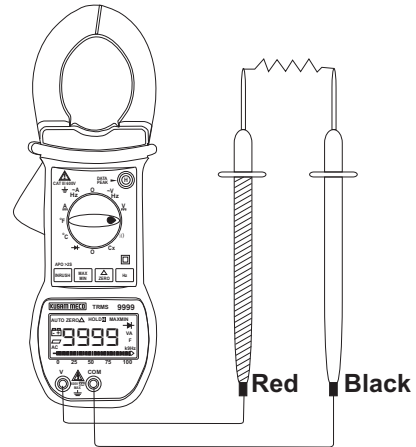


**C) VOLTAGE MEASUREMENTS**



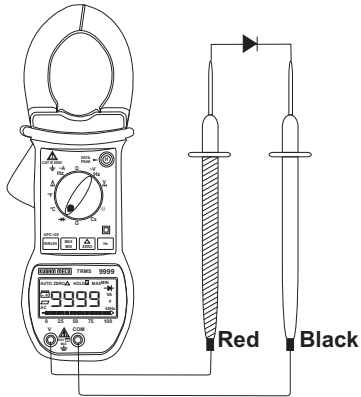
1. Connect the red test lead to the "V " jack and the black test lead to the "COM" jack.
2. Set the range rotary switch to the desired voltage range.
3. Connect the test leads to the device or circuit being measured.
4. For DC, a (-) sign is displayed for negative polarity, positive polarity is implied.

**D) RESISTANCE MEASUREMENTS**



1. Set the range rotary switch to position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "V " jack and the black test lead to the "COM" jack.
4. Touch the probes to the test points. The value indicated in the display is the measured value of resistance in ohms.

## E) MEASURING DIODES & CONTINUITY



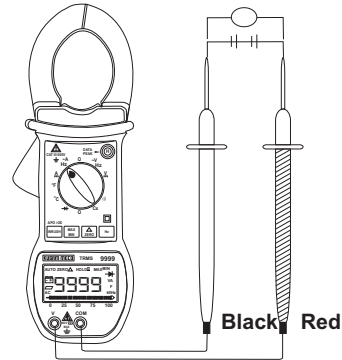
### Diode Tests

1. Set the range rotary switch to  $\rightarrow|$  position.
2. Remove power from the equipment under test.
3. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
4. Reverse probes. If the diode is good, "OL" is displayed. If the diode is shorted, "0.000" or another number is displayed.
5. If the diode is open, "OL" is displayed, in both directions.
6. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1k . In this case the diode must be disconnected from the circuit for accurate testing.

## CONTINUITY MEASUREMENTS

1. Set the range rotary to  $\rightarrow))$  position. The " $\rightarrow|$ " is displayed.
2. Turn off power to the circuit under test. External voltage across the components causes invalid readings.
3. Connect the test leads to the two points at which continuity is to be tested. The buzzer will sound if the resistance is less than approximately 30 .

## F) FREQUENCY MEASUREMENT



1. Set the range rotary switch to the  $\sim$ AHz or  $\sim$ VHz position, and press "Hz" button, the Hz is displayed.
2. In ACV range, connect the red test lead to the "V" jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement and read the frequency from the display.
4. In ACA range, refer to AC Current Measurement. Press 'Hz' button.
5. Read the frequency from the display.

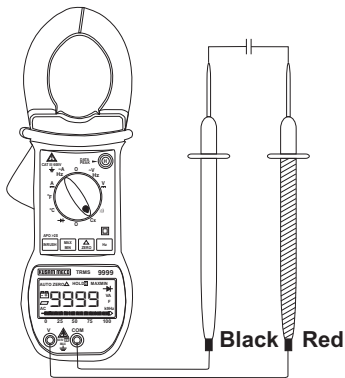
### G) Temperature Measurements (K-type)

1. Set the range rotary switch to the °C or °F position.
2. Use the socket to connect the thermocouple and V, COM jack.
3. Read the temperature from the display.

**NOTE :** Supplied Thermocouple is suitable for measurement upto 250°C, for higher Temperature measurement use separate T. C. probe.

### H) Capacitance Measurements

1. Set the range rotary switch to the "Cx" position. The " F" is displayed. Press (ZERO ) to zero the display.
2. Discharge capacitors before trying to measure it.
3. Connect the "+" lead to the "V " jack and the "-" lead to the "COM" jack.
4. Read the capacitance directly from the display.




## MAINTENANCE

### Warning

Remove test leads before changing battery or fuse or performing any servicing.

### Battery Replacement

Power is supplied by a 9 volt battery. The "+" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery case. Remove the battery from battery contacts.

Install new battery in the battery contacts. Close the battery case and fix the two screws on the back of the meter.

### Cleaning

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

**KUSAM-MECO**

MUMBAI  
**TEST CERTIFICATE**  
**DIGITAL CLAMPMETER**

This Test Certificate warrants that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. 9999

SERIAL NO. \_\_\_\_\_

DATE: \_\_\_\_\_

ISO 9001  
REGISTERED



**KUSAM-MECO**

**WARRANTY**

Each "KUSAM-MECO" product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a "KUSAM-MECO" authorized dealer.

This warranty does not apply for damaged IC's, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in "KUSAM-MECO's" opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

"KUSAM-MECO" authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of "KUSAM-MECO".

"KUSAM-MECO's" warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a "KUSAM-MECO" authorized service center within the warranty period.

**KUSAM-MECO**

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. "KUSAM-MECO" SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER.

All transaction are subject to Mumbai Jurisdiction.

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