

### SPECIAL FEATURES :

- 2000A AC Clamp-on + Full Multimeter ranges
- AC True RMS Voltage & Current functions
- Autocheck feature (Automatic DCV, ACV & Ohms selection)
- Fully Autoranging on all functions
- Back lighted display & Data Hold function

### GENERAL SPECIFICATIONS :

- \* Sensing : True RMS sensing
- \* Jaws opening size : 45mm max.
- \* Display : 3-5/6 digits 6000 counts
- \* Update Rate : 5 per second nominal
- \* Polarity : Automatic
- \* Operating Temperature : 0°C - 40°C
- \* Relative Humidity : Max. R.H. 80% for temperature upto 31°C decreasing linearly to 50% R.H. at 40°C
- \* Storage Temperature : -20°C to 60°C, < 80% R.H. (With battery removed)

### SAFETY :

- Safety : Meets IEC 61010-2-032(1994), EN61010-2-031(1995), UL3111-2-032 (1999)
- Measurement Category : CAT III 600VAC & VDC.
- Pollution degree : 2
- Overload Protection : ACA Clamp-on jaws : AC 2000A rms continuous + & COM terminals (all functions) : 600VDC & VAC rms

### ACCESSORIES :

Test leads (pair), Batteries installed, Users Manual, Carrying Case

- Non-Contact & Probe Contact EF-Detection
- Lo-Z Voltage to drain Ghost Voltages (Auto-V position)
- High Voltage frequency with auto-ranging trigger levels
- Overload-Alert ON > 600V AC/DC (Beeps & OL indication)
- Fast Audible Continuity & Diode Test

- \* Altitude : Operating below 2000m
- \* Temperature Coefficient : Nominal 0.15 x (specified accuracy) / °C @ (0°C ~ 18°C or 28°C ~ 40°C) or otherwise specified.
- \* Low Battery Indication : Below approx. 2.4 V
- \* Power Supply : Standard 1.5V AAA battery X 2
- \* Power Consumption : 2.8mA typical
- \* APO Consumption : 230 A typical on Voltage & Current function
- \* APO Timing : Idle for 3 minutes
- \* Dimension : 224(L) x 78(W) x 40(H)mm
- \* Weight : approx. 220gm

- E.M.C. : Meets EN61326 (1997,1998/A1), EN61000 -4-2 (1995) & EN61000-4-3 (1996)  
In an RF Field of 3V/m :  
Capacitance function is not specified.  
Other function ranges :  
Total accuracy = Specified accuracy+ 45 digits  
Performance above 3V/m is not specified
- Battery Cover with probe holders
- Rugged fire retarded casing

### 20 FUNCTIONS 21 RANGES

### Model - 2772



### ELECTRICAL SPECIFICATIONS : 2772

Accuracy : ± ( % reading + number of digits)

#### ACA CLAMP-ON CURRENT

Range	Resolution	Accuracy <sup>1) 2) 3)</sup>
<b>50Hz / 60Hz</b>		
400.0 A	100 mA	±(1.5%rdg + 5dgt)
2000 A	1 A	

Crest Factor : < 2 at full scale & < 4 at half scale

<sup>1)</sup> Add 8d to specified accuracy while reading is below 10% of range.

<sup>2)</sup> Induced error from adjacent current-carrying conductor : < 0.06A/A.

<sup>3)</sup> Specified accuracy is for measurement made at the jaw center. When the conductor is not positioned at the jaw center, position errors introduced are:

Add 1% to specified accuracy for measurements made WITHIN jaws marking lines (away from jaws opening). Add 4% to specified accuracy for measurements made BEYOND jaws marking lines (toward jaws opening).

#### RESISTANCE

Range	Resolution	Accuracy <sup>1)</sup>
6.000 k <sup>2)</sup>	1	±(1.2%rdg + 6dgt) <sup>3)</sup>
60.00 k	10	±(1.0%rdg + 4dgt)
600.0 k	100	
6.000 M	1 k	±(2.0%rdg + 4dgt)

Open Circuit Voltage : 0.4VDC typical

<sup>1)</sup> Cool down interval 2 minutes after over 50V measurements in Auto-V position.

<sup>2)</sup> Beeper ON while reading < 0.025 k

<sup>3)</sup> Add 40d to specified accuracy while reading is below 20% of range.

#### NON-CONTACT EF-DETECTION

Typical Voltage	Bar Graph Indication
15V to 85V	-
40V to 130V	--
60V to 210V	---
90V to 300V	----
above 120V	-----

Indication : Bar graph segments & audible beep tones proportional to the field strength

Detection Frequency : 50/60Hz

Detection Antenna : Top side of the stationary jaw

Probe-Contact EF-Detection : For more precise indication of live wires, use the Red(+) probe for direct contact measurement

#### AC VOLTAGE

Range	Resolution	Accuracy
<b>50Hz / 60Hz</b>		
6.000 V	1 mV	±(1.5%rdg + 5dgt)
60.00 V	10 mV	
600.0 V	100 mV	±(2.0%rdg + 5dgt)
<b>50Hz ~ 500Hz</b>		
6.000 V	1 mV	±(2.0%rdg + 5dgt)
60.00 V	10 mV	
600.0 V	100 mV	±(2.5%rdg + 5dgt)

CMRR : > 60dB @ DC to 60 Hz; Rs = 1k

Hi-Z ACV Input Impedance : 5 M , 90pF nominal

AutoCheck Lo-Z DCV Input Impedance :

Initially 1.6k , 90pF nominal ; Impedance increases significantly as display voltage increases from 50V (typical). Typical impedances vs display voltages for reference are:

15k	@ 100V
100k	@ 300V
210k	@ 600V

AutoCheck ACV Threshold : > 2V AC (50 / 60Hz) nominal

Crest Factor : < 1.6:1 at full scale & < 3.3:1 at half scale

#### CAPACITANCE

Range	Resolution	Accuracy <sup>1)</sup>
100.0 nF <sup>2)</sup>	100 pF	±(3.5%rdg + 5dgt) <sup>3)</sup>
1000 nF	1 nF	
10.00 F	10 nF	
100.0 F	100 nF	
2000 F	1 F	

1) Accuracies with film capacitor or better.

2) Accuracy below 50 nF is not specified

3) Specified with battery voltage above 2.8V approx. (half full battery).

Accuracy decreases gradually to 12% at low battery warning voltage of approx 2.4V

#### DC VOLTAGE

Range	Resolution	Accuracy
6.000 V	1 mV	±(0.5%rdg + 3dgt)
60.00 V	10 mV	±(1.0%rdg + 5dgt)
600.0 V	100 mV	±(2.0%rdg + 5dgt)

NMRR : > 30 dB @ 50 Hz / 60 Hz

CMRR : > 100 dB @ DC, 50 Hz / 60 Hz; Rs = 1k

Hi-Z DCV Input Impedance : 5 M , 90pF nominal

AutoCheck DCV Threshold :

> + 1.5VDC or < -1.0VDC nominal

AutoCheck Lo-Z DCV Input Impedance :

Initially 1.6k , 90pF nominal ;

Impedance increases significantly as display voltage increases from 50V (typical). Typical impedances vs display voltages for reference are:

15k	@ 100 V
100k	@ 300 V
210k	@ 600 V

#### FREQUENCY

Voltage Range	Sensitivity (Sine RMS)	Range
6.000 V	4 V	10Hz ~ 30KHz
60.00 V	30 V	10Hz ~ 1KHz
600.0 V	60 V	10Hz ~ 1KHz

Accuracy : ±(0.5%rdg + 4dgt)

Max display : 9999 counts

#### 600 with CONTINUITY BEEPER

Range	Accuracy
600.0 k	±(2.0%rdg + 8dgt) <sup>1)</sup>

Continuity Beeper Response : <100 S

Open Circuit Voltage : 0.4VDC typical

Audible Threshold : between 10 and 300

<sup>1)</sup> Add 40d to specified accuracy while reading is below 20% of range

#### DIODE TESTER

Open Circuit Voltage	<1.6V DC
Test Current	0.4mA typical

Audible Threshold : between 0.015V and 0.080V

All Specifications are subject to change without prior notice



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.

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**KUSAM-MECO**

# 2000 A AC CLAMP- ON MULTIMETER 2772



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### SAFETY

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

The meter meets the requirements for double insulation to IEC61010-2-032(1994), EN61010-2-032(1995), UL3111-2-032(1999):

Category III 600 Volts ac and dc

### PER IEC61010 OVERVOLTAGE INSTALLATION CATEGORY OVERVOLTAGE CATEGORY II

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

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

### OVERVOLTAGE CATEGORY III

Equipment of **OVERVOLTAGE CATEGORY III** is equipment in fixed installations.

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

### OVERVOLTAGE CATEGORY IV

Equipment of **OVERVOLTAGE CATEGORY IV** is for use at the origin of the installation. Note - Examples include electricity meters and primary over-current protection equipment.

### TERMS IN THIS MANUAL

**WARNING** identifies conditions and action 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.

**WARNING**

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. The meter is intended only for indoor use.

To avoid electrical shock hazard, observe the proper safety precautions when working with voltages above 60 VDC or 30 VAC 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 instrument. 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 being measured. To avoid accidentally short circuit of bare (uninsulated) hazardous live conductors or bus bars, switch them off before insertion and removal of the current clamp jaws. Contact with the conductor could result in electric shock. Keep your hand/fingers behind the hand/finger barrier that indicate the limits of safe access of the meter and the test leads during measurement.

**CAUTION**

Disconnect the test leads from the test points before changing meter functions.

**GENERAL SPECIFICATION:**

<b>Display</b>	: 3- 5/6 digits 6000 counts LCD display(s)
<b>Update Rate</b>	: 5per second nominal
<b>Polarity</b>	: Automatic
<b>Jaw opening &amp; Conductor diameter</b>	: 45mm max
<b>Low Battery</b>	: Below approx. 2.4V
<b>OperatingTemperature</b>	: 0°C to 40°C
<b>Relative Humidity</b>	: Maximum relative humidity 80% for Temperature up to 31°C Decreasing linearly to 50% relative Humidity at 40°C
<b>Altitude</b>	: Operating below 2000m
<b>Storage Temperature</b>	: -20°C to 60°C, < 80% R.H. (With battery removed)
<b>Temperature Coefficient</b>	: nominal 0.15x(specified accuracy)/°C@(0°C -18°C or 28°C-40°C), or other- wise specified
<b>Sensing</b>	: True RMS
<b>Pollution degree</b>	: 2
<b>Safety</b>	: Meets IEC61010-2- 032(1994), EN61010-2- 032(1995), UL3111-2- 032 (1999). Category III 600Volts ac & dc

**Transient protection** : 6.5kV (1.2/50 $\mu$ s surge)

**E.M.C.** : Meets, EN61326(1997, 1998/A1) EN61000-4-2(1995), and EN61000-4-3(1996)

In an RF field of 3V/m;

Capacitance function is not specified.

Total Accuracy = Specified Accuracy + 45 digits performance above 3V/m is not specified

**Overload Protection** : ACA Clamp-on jaws :  
AC 2000A rms  
Continuous + & COM terminals (all functions) :  
600VDC/VAC rms

**Power Supply** : standard 1.5V AAA  
Size battery x 2

**Power Consumption** : 2.2 mA typical

**APO Timing** : Idle for 3 minutes

**APO Consumption** : 40 $\mu$ A typical on all functions except that 230 $\mu$ A typical on voltage & current functions.

**Dimension** : (L)224mm ,(W)78mm, (H)40mm

**Weight** : 220gm approx.

**Accessories** : Test leads(pair), batteries installed, soft carrying case & user's manual.

**ELECTRICAL SPECIFICATIONS :**

Accuracy is  $\pm$ (% reading digits + number of digits) or otherwise specified, at 23°C  $\pm$ 5°C & < 75% R.H. True RMS ACV & ACA clamp-on accuracies are specified from 5% to 100% of range or otherwise specified. Maximum Crest Factor are as specified below, and with frequency spectrums besides fundamentals, fall within the meter specified AC bandwidth for non-Sinusoidal wave forms.

**AC VOLTAGE**

RANGE	Accuracy
<b>50Hz / 60Hz</b>	
6.000V, 60.00V	1.5% + 5d
600.0V	2.0% + 5d
<b>50Hz ~500Hz</b>	
6.000V, 60.00V	2.0% + 5d
600.0V	2.5% + 5d

CMRR : >60dB @ DC to 60Hz,  $R_s = 1K\Omega$

Hi-ZACV Input Impedance : 5M $\Omega$ , 90pF nominal

AutoCheck™ Lo-ZACV input impedance:

Initially 1.6k $\Omega$ , 90 pF nominal;

Impedance increases significantly as display voltage increase from 50V (typical). Typical impedance Vs display voltages for reference are:

15k $\Omega$  @100V

100k $\Omega$  @300V

210k $\Omega$  @600V

AutoCheck™ ACV Threshold:

>2VAC (50/60Hz) nominal

True RMS

Crest Factor: <1.6:1 a at full scale & <3.3 : 1 at half scale.

## DC VOLTAGE

Range	Accuracy
6.000V	0.5% + 3d
60.00V	1.0% + 5d
600.0V	2.0% + 5d

NMRR : >30dB @ 50/60Hz

CMRR : >100dB @DC, 50/60Hz, RS = 1kΩ

Hi-Z DCV Input Impedance : 5MΩ, 90pF nominal

AutoCheck™ Lo-Z DCV input impedance:

Initially 1.6kΩ, 90 pF nominal;

Impedance increase significantly as display voltage increase from 50V (typical). Typical impedance Vs display voltages for reference are:

15kΩ @100V

100kΩ @300V

210kΩ @600V

AutoCheck™ DCV Threshold:

> +1.5VDC or < -1.0 VDC nominal

## ACA Current (Clamp-on)

Range	Accuracy <sup>1)2)3)</sup>
<b>50Hz / 60Hz</b>	
400.0A, 2000A	1.5% + 5d

True RMS Crest Factor :

< 2.0 : 1 at full scale & < 4.0 : 1 at half scale

<sup>1)</sup>Add 8d to specified accuracy while reading is below 10% of range

<sup>2)</sup>Induced error from adjacent current-carrying conductor : < 0.06A/A

<sup>3)</sup>Specified accuracy is for measurements made at the jaw center. When the conductor is not positioned at the jaw center, position errors introduce are : Add 1% to specified accuracy for measurements made WITHIN jaw marking lines (away from jaw opening) Add 4% to specified accuracy for measurements made BEYOND jaw marking lines (toward jaws opening)

## Ohms

Range	Accuracy <sup>1)</sup>
6.000kΩ <sup>2)</sup>	1.2% + 6d <sup>3)</sup>
60.00 kΩ , 600.0 kΩ	1.0% + 4d
6.000MΩ	2.0% + 4d

Open Circuit Voltage : 0.4VDC typical

<sup>1)</sup> Cool down interval 2 minutes after over 50V measurements in Auto-VΩ position

<sup>2)</sup> Beeper on while reading < 0.025kΩ

<sup>3)</sup> Add 40d to specified accuracy while reading is below 20% of range

## Capacitance

Range	Accuracy <sup>1)</sup>
100.0nF <sup>2)</sup> , 1000nF, 10.00μF , 100.0μF 2000μF	3.5% + 5d <sup>3)</sup>

<sup>1)</sup> Accuracies with film capacitor or better

<sup>2)</sup> Accuracy below 50nF is not specified

<sup>3)</sup> Specified with battery voltage above 2.8V (Approx. Half full battery). Accuracy decrease gradually to 12% at low battery warning voltage of approximately 2.4V.

## Frequency

Voltage Range	Sensitivity (Sine RMS)	Range
6.000V	4V	10Hz~ 30kHz
60.00V	30V	10Hz~ 1kHz
600.0V	60V	10Hz~ 1kHz

Accuracy: 0.5% 4d

Max display: 9999 counts

## Diode Tester

Open Circuit Voltage	Test Current
<1.6 VDC	0.4mA (typical)

Audible Threshold: Between 0.015V and 0.080V

**600Ω with Continuity Beeper**

Range	Accuracy
600.0Ω	2.0%+8d <sup>1)</sup>

Continuity Beeper Response:< 100μs

Open Circuit Voltage: 0.4VDC typical

Audible Threshold: between 10Ω and 300Ω

<sup>1)</sup> Add 40d to specified accuracy while reading is below 20% of range

**Non-contact EF-Detection**

Typical Voltage	Bar Graph Indication
15V To 85V	-
40V To 130V	--
60V To 210V	---
90V To 300V	----
ABOVE 120V	-----

Indication: Bar graph segments & audible








Beep tones proportional to the field strength

Detection Frequency: 50/60Hz

Detection Antenna: Top side of the stationary jaw

Probe-ContactEF-Detection: For more precise indication of live wires, use the red (+) probe for direct contact measurements.

**INTERNATIONAL ELECTRICAL SYMBOLS**

	Caution ! Refer to the explanation in this Manual
	Caution ! Risk of electric shock
	Earth (Ground)
	Double Insulation or Reinforced insulation
	Fuse
	AC--Alternating Current
	DC--Direct Current

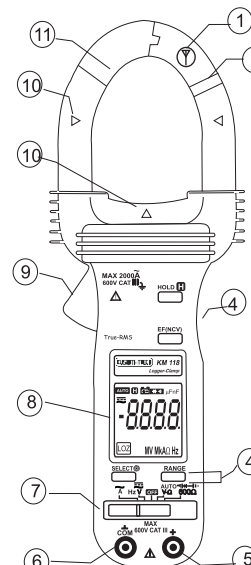
**2) CENELEC Directives**

The instruments conform to CENELEC Low-voltage directive 73/23/EEC and Electromagnetic compatibility directive 89/336/EEC

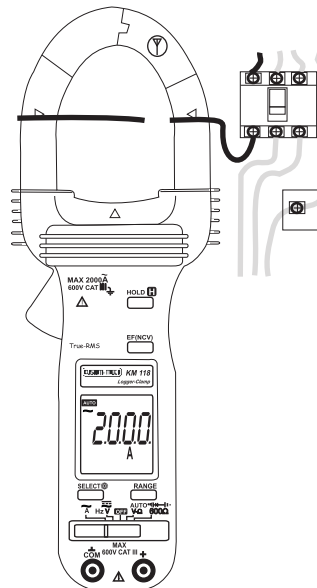


## 3) PRODUCT DESCRIPTION

This user's manual uses only representative model (s) for illustrations. Please refer specification details for function availability to each model.

- 
- 1) Non-Contact EF-Detection (NCV): antenna position.
  - 2) Jaw marking lines for ACA position error indication
  - 3) Hand/Finger Barrier to indicate the limits of safe access to the jaws during current measurements
  - 4) Push-buttons for special functions & features
  - 5) Input Jack for all functions EXCEPT non-invasive ACA current function
  - 6) Common (Ground reference ) Input Jack for all functions EXCEPT non-invasive ACA current function
  - 7) Slide-switch Selector to turn the power ON/OFF and Select a function
  - 8) 3-5/6 digits 6000 counts LCD display
  - 9) Jaw trigger for opening the transformer clamp jaws
  - 10) Jaw center Indicators, at where best accuracy is specified
  - 11) Transformer Clamp Jaws for AC current magnetic field pick up.

## 4) OPERATION



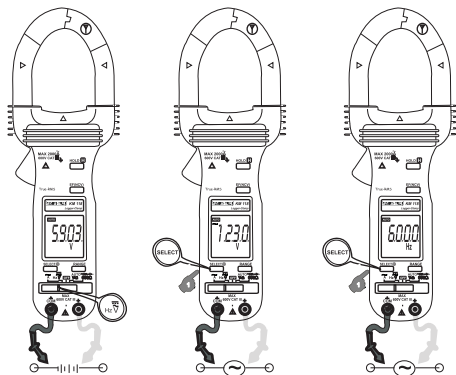
### ACA Current clamp-on function

Set the slide-switch function-selector to the  $\tilde{A}$  position. Inputs are made through the clamp jaws for non-invasive ACA current measurements.

### CAUTION

- Press the jaw trigger and clamp the jaws around only one single conductor of a circuit for load current measurement. Make sure the jaws are completely closed, or else it will introduce measurement errors. Enclosing more than one conductor of a circuit will result in different current (like identifying leakage current) measurement.

•Adjacent current-carrying devices such as transformers, motors and conductor wires will affect measurement accuracy. Keep the jaws away from them as much as possible to minimize influence.



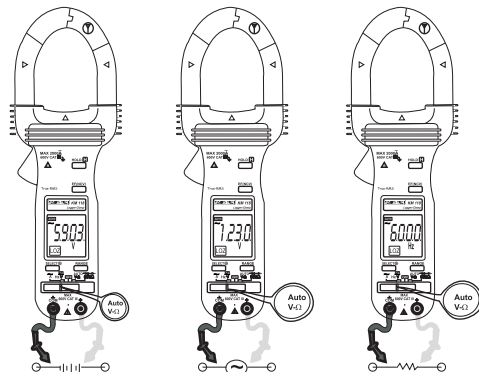
## Hi-Z DCV ,ACV & Line -Level Hz functions

Set the slide-switch function selector to the  $\overline{\text{V}}$  position selects common impedance(Hi-Z) voltage measurements. Input impedance is set at approximately 5M $\Omega$  to minimize loading on circuits under tests. DCV is the default function. Press SELECT button momentarily to select ACV. The AC annunciator “~” turns on. Press momentarily again to activate the Line -Level Hz function.

### Note:

•Line-Level Hz input sensitivity varies automatically with ACV range selected when Line-Level Hz is selected.AC 6V range has the highest and AC 600V range has the lowest sensitivity. Measuring the signal in ACV function WHILE selecting Line-Level Hz functions in that ACV range automatically sets the most appropriate sensitivity for higher voltage applications .

This can avoid electrical noises as in 110/220V line voltage applications for example. If the reading shows zero due to insufficient signal levels,select Line-Level Hz function BEFORE Making measurements(at AC 6V range) will set the highest sensitivity.



## AutoCheck™ mode

Set the slide-switch function selector to the  $\overline{\text{V}}$  position. This innovative AutoCheck™ feature automatically selects measurement function of DCV, ACV or Resistance( $\Omega$ ) based on the input via the test leads.

- With no input, the meter displays "AUTO" when it is ready.
- With no voltage signal but a resistance below 6M $\Omega$  is present, the meter displays the resistance value. When below 25 $\Omega$ (0.025K $\Omega$ ) is present, the meter further gives a continuity beep tone.
- When a signal above the threshold of +1.5VDC, -1VDC or 2VAC up to the rated 600V is present, the meter displays the voltage value in appropriate DC or AC, whichever larger in peak magnitude.

● **Overload-Alert Feature:**

When above rated 600V is present, the meter displays "OL" with a warning beep tone for over-range indication. Disconnect the test leads from the signal immediately to avoid hazards.

**Note:**

● **Range-Lock Feature:**

When a measurement reading is being displayed in AutoCheck™ mode, press the RANGE button momentarily 1 time can lock the function range it was in. The LCD annunciator "AUTO" turns off. Range-lock can speed up repetitive measurements. Press the button momentarily repeatedly to step through the ranges. Press and hold the button for 1 second or more to resume AutoCheck™ mode.

● **As Hazardous -Alert:**

When making resistance measurements in AutoCheck™ mode, an unexpected display of voltage reading alerts you that the object under test is being energized.

● **Ghost- voltage buster:**

Ghost-Voltages are unwanted stray signals coupled from adjacent hard signals, which confuse common multimeter voltage measurements. Our AutoCheck™ mode provides low (ramp up) input impedance (approx. 1.6kΩ) at low voltage) to drain. Ghost voltages leaving mainly hard signal values on meter readings. It is an invaluable feature for precise indication of hard signal, such as distinguishing between hot and open wires(to ground) in electrical installation applications.

**WARNING:**

- AutoCheck™ mode input impedance increases abruptly from initial 1.6kΩ to a few hundred kΩ's on high voltage hard signals. "LoZ" displays on the LCD to remind the users of being in such low impedance mode. Peak initial load current, while probing directly to 600VAC for example, can be up to 530 mA(600V x 1.414/ 1.6kΩ)

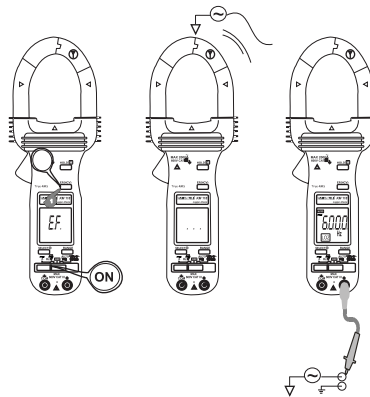
Decreasing abruptly to approx. 4mA(600V x 1.414 /210kΩ) within a fraction of a second. Do not use AutoCheck™ mode on circuits that could be damaged by such low input impedance. Instead, use slide-switch function selector™ common input impedance Modes(Hi-Z of approx., 5MΩ) to minimize loading for such circuits .

**Manual or Auto-ranging**

When the function selected has more than one range, press the RANGE button momentarily selects manual-ranging. The meter remains in the range it was in. The LCD annunciator "AUTO" turns off. Press the button momentarily again to step through the ranges. Press and hold the button for 1 second or more to resume auto-ranging.

**Note:**

- ◆ Manual-ranging features is not available to 600Ω/4mA/1- functions.
- ◆ To use Manual-ranging feature in AutoCheck™ mode, please see "Range-Lock Features" as explained in footnotes of AutoCheck™ mode section

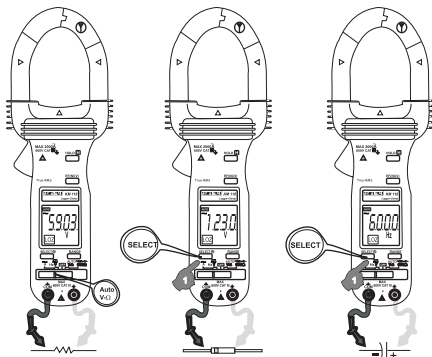


## Electric Field EF-Detection

At any function, press the EF(NCV) button momentarily to toggle to EF-Detection feature. The meter displays "EF". When it is ready. Signal strength is indicated as a series of bar-graph segments on the display plus variable beep tones.

- **Non-contact EF- Detection(NCV):** An antenna is located along the top of the stationary jaw (See  $\odot$  symbol on the jaw), which detects electric field surrounds current-carrying conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.

- **Probe-Contact EF-Detection:** For more precise indication of live wires, such as distinguishing between live and ground connections, use the Red(+)- test probe for direct contact measurements.



## 600 $\Omega$ $\rightarrow$ $\leftrightarrow$ $\leftarrow$ functions.

Set the slide-switch function selector to the 600  $\Omega$   $\rightarrow$   $\leftrightarrow$   $\leftarrow$  position.

- 600  $\Omega$  Resistance range with Audible -continuity is the default function. It is an extended low resistance range to complement the Resistance( $\Omega$ )function in AutoCheck™ mode.

Audible-Continuity response time is also improved drastically (from that of AutoCheck™ mode.) Under such stand-alone range architecture. Audible Continuity is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete circuit.

- Press **SELECT** button momentarily selects Diode test function. The reading shows the approximate voltage drop across the test leads. When forward biased, normal forward voltage drop for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode(defective). A zero reading indicates a shorted diode(defective), and the meter gives a continuous beep warning. 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 resistive or shorted(defective)
- Press **SELECT** button momentarily AGAIN selects Capacitance function. Capacitance measurement time varies with capacitance value. Only a few seconds is required for measuring values of below 100 $\mu$ F. However, one minute or more is required for measuring extreme values of around 2000  $\mu$  F.

## HOLD $\square$

The Hold feature the display for later viewing. Press the HOLD  $\square$  button momentarily to toggle to the Hold feature. The annunciator " $\square$ " turns on.

## Backlight display

Press the SELECT button for 1 second or more turn on or off the display back light feature.

## Auto Power Off (APO)

The meter turns off intelligently after approximately 3 minutes of neither significant measurement nor button/switch activity. To wake up the meter from APO, press any button or turn the rotatory selector to OFF and back on again. Always turn the rotary selector to off when the meter is not in use.

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## 5) MAINTENANCE WARNING

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

### Trouble Shooting

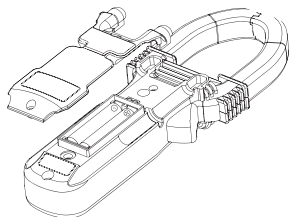
If the instrument fails to operate, check batteries and test leads etc., and replace as necessary. Double check operating procedure as described in this user's manual. If the instrument voltage-resistance input terminal has been subjected to high voltage transient (caused by lightning or switching surge to the system) by accident or abnormal conditions of operation, the series fusible resistors will be blown off (become high impedance) like fuses to protect the user and the instrument. Most measuring functions through this terminal will then be open circuit. The series fusible resistors and the spark gaps should then be replaced by qualified technician. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service

### Battery replacement

The meter uses standard 1.5V AAA Size battery x 2. Loosen the 2 captive screws from the battery cover case. Lift the battery cover case. Replace the batteries. Replace the battery cover case. Re-fasten the screws.

### Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for period of longer than 60 days, remove the batteries and store them separately



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## MUMBAI TEST CERTIFICATE CLAMP-ON MULTIMETER

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. 2772

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

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

ISO 9001  
REGISTERED



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## **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.

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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.

**KUSAM-MECO**

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