LIST OF PRODUCTS

- ✶ Digital Multimeter
- ✶ AC Clamp Adaptor
- ✶ Thermo Anemometer
- ✶ Distance Meter
- ✶ Network Cable Tester
- ✶ Earth Resistance Tester
- ✶ DC Power Supplies
- ✶ Calibrators
- ✶ Frequency Counter
- ✶ Phasing Sticks
- ✶ Waterproof Pen Testers
- ✶ EMF Detector
- ✶ Digital AC & AC/DC Clampmeter
- ✶ AC/DC Current Adaptor
- ✶ Thermo Hygrometer
- ✶ Digital Lux Meter
- ✶ Power Factor Regulator
- ✶ Digital Panel Meters
- ✶ High Voltage Detector
- ✶ Gas Analysers
- ✶ Function Generator
- ✶ Battery Tester
- ✶ Solar Power Meter
- ✶ Wood, Paper & Grain Moisture Meter
- ✶ Transistorised Electronic Analog & Digital Insulation Resistance Testers(upto 10 KV)
- ✶ Digital Sound Level Meter & Sound Level Calibrator
- ✶ Digital contact & Non-contact Type Tachometer
- ✶ Digital Non-contact (infrared) Thermometer
- ✶ Maximum Demand Controller/Digital Power Meter
- ✶ Digital Hand Held Temperature Indicators

KUSAM-MECO®

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Website : www.kusamelectrical.com

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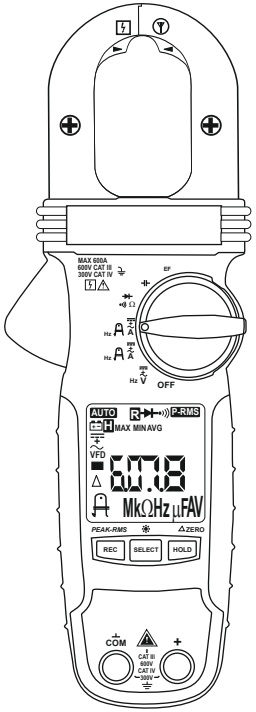
AC+DC TRUE RMS DIGITAL CLAMPMETER WITH VFD, EF-DETECTION, AmpTip™ FUNCTION FOR LOW CURRENT MEASUREMENT

MODEL - KM 078

OPERATION MANUAL

KUSAM-MECO®

TRMS
DIGITAL CLAMPMETER
MODEL - KM 078



KUSAM-MECO®

I. 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 manner not specified by the manufacturer, the protection provided by the instrument may be impaired.

The meter protection rating, against the users, is double insulation per UL/IEC/EN61010-1 Ed. 3, IEC/EN61010-2-033 Ed. 1, CAN/CSA C22.2 No. 61010-1 Ed. 3, IEC/EN61010-2-032 Ed. 2 & IEC/EN61010-031 Ed. 1.1 :

Measurement Category III 600V & Category IV 300V AC & DC.

Per IEC610-1 (2010) OVERVOLTAGE CATEGORY

OVERVOLTAGE CATEGORY II (CAT II) is for equipment intended to be supplied from the building wiring. It applies both to plug-connected equipment and to PERMANENTLY CONNECTED EQUIPMENT.

OVERVOLTAGE CATEGORY III (CAT III) is for equipment intended to form part of a building wiring installation. Such equipment includes socket outlets, fuse panels, and some MAINS installation control equipment.

OVERVOLTAGE CATEGORY IV (CAT IV) is for equipment installed at or near the origin of the electrical supply to a building, between the building entrance and the main distribution board. Such equipment may include electricity tariff meters and primary over current protection devices.

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.

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. Before and after hazardous voltage measurements test the voltage function on a known source such as line voltage to determine proper meter functioning.

Keep your hands/fingers behind the hand/finger barriers (of the meter and the test leads) that indicate the limits of safe access of the hand-held part during measurement. Inspect test leads, connectors and probes for damaged insulation or exposed metal before using the instrument. If any defects are found, replace them immediately. Only use the test lead provided with the equipment or UL Listed Probe Assembly rated CAT III 600V or better.

This Clamp-on meter is designed to apply around or remove from uninsulated hazardous live conductors. But still, individual protective equipment must be used if hazardous live parts in the installation where measurement is to be carried out could be accessible.

CAUTION :

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

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II. 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
	Application around and removal from hazardous live conductors is permitted.

III. CENELEC Directives :

The instruments conform to CENELEC Low-voltage directive 2006/95/EC and Electromagnetic compatibility directive 2004/108/EC.

IV. SPECIAL FEATURES :

1. Unique AmpTip™ low-current measurement function.
2. VFD (Variable Frequency Drive) function.
3. MAX/MIN/AVG Recording mode (Auto ranging)
4. Non-Contact EF-Detection (NCV)
5. Back-lighted easy-to-read LCD display
6. Fast 80ms Peak-RMS mode to capture in-rush currents
7. Relative-Zero mode

V. SPECIFICATIONS :

GENERAL SPECIFICATIONS :

Display : 3-5/6 digits 6000 counts
Polarity : Automatic
Jaw opening & Conductor diameter : 35mm max
Update Rate : 5 per second nominal
Operating Temperature : 0ºC to 40ºC
Relative Humidity : Maximum relative humidity 80% for temperature up to 31ºC decreasing linearly to 50% relative humidity at 40ºC
Pollution degree : 2
Storage Temperature : -20ºC to 60ºC, < 80% R.H. (with battery removed)
Altitude : Operating below 2000m
Temperature Coefficient : Nominal 0.15 × (specified accuracy)/ºC @(0ºC—18ºC or 28ºC—40ºC), or otherwise specified
Sensing : True RMS
Low Battery : Below approx. 2.85V for Capacitance & Hz, Below approx. 2.5V for other functions
APO Timing : Idle for 32 minutes
Power Consumption : Typical 13mA for current function.
APO Consumption : 5μA typical
Power Supply : 1.5V AAA Size battery X 2
Dimension : 223(L) x 76(W) x 37(H)mm
Weight : Approx. 234gm.
Accessories : Test leads set, User Manual, Soft carrying case.

SAFETY :

Safety : Double insulation per UL/IEC/EN61010 -1 Ed. 3, IEC/EN61010-2-033 Ed. 1, CAN/CSA C22.2 No. 61010-1 Ed. 3, IEC/EN61010-2-032 Ed. 2 & IEC/ EN61010-031 Ed. 1.1.
Measurement Category : CAT III 600V & CAT IV 300V AC & DC.
Transient Protection : 6.0kV (1.2/50μs surge).
Overload Protection :

Current & Hz functions via jaws : 600A DC/AC rms at < 400Hz

Voltage & 3-Phase Rotation functions via terminals : 660VDC/ 920VAC rms

Other functions via terminals : 600VDC/ VAC rms.

E.M.C. :

Meets EN61326-1 : 2006 (EN55022, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11) :

DCA and DC+ACA Functions, in an RF field of 1V/m :
Total Accuracy = Specified Accuracy + 20 digits @ 405MHz
Ohm Functions, in an RF field of 1V/m :
Total Accuracy = Specified Accuracy + 25 digits
Other Functions, in an RF field of 3V/m :
Total Accuracy = Specified Accuracy + 20 digits

VFD-V & Hz for fundamental V/Hz of most Variable-Frequency-Drives.

Rugged fire retarded casing with battery access door.

ELECTRICAL SPECIFICATIONS :

Accuracy is ± (% of reading digits + number of digits) or otherwise specified @ 23ºC ± 5ºC. Maximum Crest Factor < 2.5:1 at full scale & < 5:1 at half scale or otherwise specified, and with frequency spectrum not exceeding the specified frequency bandwidth for non-sinusoidal waveforms.

Regular Clamp-on AC Current :

Range	Resolution	Accuracy[1) 2)]
50Hz ~ 100Hz		
60.00 A[3)]	10 mA	±(1.8%rdg + 5dgts)
600.0 A	100 mA	
100Hz ~ 400Hz		
60.00 A[3)]	10 mA	±(2.0%rdg + 5dgts)
600.0 A	100 mA	

1) Induced error from adjacent current-carrying conductor : < 0.01A/A

2) Maximum Crest Factor <2:1 at full scale & <4:1 at half scale.

3) Add 10d to the specified accuracy @ < 9A.

AmpTip™ Clamp-on AC Current :

Range	Resolution	Accuracy[1) 2) 3)]
50Hz ~ 60Hz		
60.00 A	10 mA	±(1.5%rdg + 5dgts)

1) Induced error from adjacent current-carrying conductor : < 0.01A/A.

2) Specified with Relative Zero Δ mode applied to offset the non-zero residual readings, if any.

3) Add 10d to the specified accuracy @ < 4A.

Diode Tester :

Range	Resolution	Accuracy[1)]
2.000 V	1 mV	±(1.5%rdg + 5dgts)

Test Current : 0.3mA typically

Open Circuit Voltage : < 3.5VDC typically

Regular Clamp-on DC Current :

Range	Resolution	Accuracy[1) 2)]
60.00 A[3)]	10 mA	±(2.0%rdg + 5dgts)
600.0 A	100 mA	

1) Induced error from adjacent current-carrying conductor : < 0.01A/A

2) Specified with DC-Zero mode applied to offset the non-zero residual readings, if any.

3) Add 10d to the specified accuracy @ < 9A.

AmpTip™ Clamp-on DC Current :

Range	Resolution	Accuracy[1) 2) 3)]
60.00 A	10 mA	±(2.0%rdg + 5dgts)

1) Induced error from adjacent current-carrying conductor : < 0.01A/A.

2) Specified with DC-Zero mode applied to offset the non-zero residual readings, if any.

3) Add 10d to the specified accuracy @ < 4A.

Regular Clamp-on DC+AC Current :

Range	Resolution	Accuracy[1) 2)]
DC, 50Hz ~ 100Hz		
60.00 A[3)]	10 mA	±(2.2%rdg + 7dgts)
600.0 A	100 mA	
100Hz ~ 400Hz		
60.00 A[3)]	10 mA	±(2.7%rdg + 7dgts)
600.0 A	100 mA	

1) Induced error from adjacent current-carrying conductor : < 0.01A/A

2) Specified with DC-Zero mode applied to offset the non-zero residual readings, if any.

3) Add 10d to the specified accuracy @ < 9A.

AC Voltage (with Digital Low-pass Filter) :

Range	Resolution	Accuracy
50Hz ~ 60Hz		
600.0 V	0.1 V	±(1.0%rdg + 5dgts)

Input Impedance : 10MΩ, 100pF nominal

DC Voltage :

Range	Resolution	Accuracy
600.0 V	0.1 V	±(1.0%rdg + 5dgts)

Input Impedance : 10MΩ, 100pF nominal

DC+AC Voltage (with Digital Low-pass Filter) :

Range	Resolution	Accuracy
DC, 50Hz ~ 60Hz		
600.0 V	0.1 V	±(1.2%rdg + 7dgts)

Input Impedance : 10MΩ, 100pF nominal

Resistance :

Range	Resolution	Accuracy
600.0 Ω	0.1 Ω	±(1.0%rdg + 5dgts)
6.000 KΩ	1 Ω	
60.00 KΩ	10 Ω	

Open Circuit Voltage : 1.0VDC typical

Capacitance :

Range	Resolution	Accuracy[1)]
200.0 μF	0.1 μF	±(2.0%rdg + 4dgts)
2500 μF	1 μF	

[1)] Accuracies with film capacitor or better.

Hz Line Level Frequency :

Function	Sensitivity[1)] (Sine RMS)	Range
600 V	50 V	5.00Hz~999.9Hz
60 A (AmpTip™)	20 A	50.00Hz~400.0Hz
60 A	20 A	50.00Hz~400.0Hz
600 A		

Accuracy : ±(1%rdg + 5dgts)

[1)] DC-bias, if any, not more than 50% of Sine RMS.

Non-Contact EF-Detection :

Typical Voltage	Bar-Graph Indication
20V (tolerance : 10V~36V)	-
55V (tolerance : 23V~83V)	- -
110V (tolerance : 59V~165V)	- - -
220V (tolerance : 124V~330V)	- - - -
440V (tolerance : 250V~1000V)	- - - - -

Indication : Bar-graph segments & audible beep tones proportional to the field strength. Detection Frequency : 50/60Hz.
Detection Antenna : Inside the top side of the stationary jaw.
Probe-Contact EF-Detection : For more precise indication of live wires, such as distinguishing between live and ground connections, use one single probe to test via terminal COM for direct contact EF-Detection with best sensitivity.

Audible Continuity Tester :

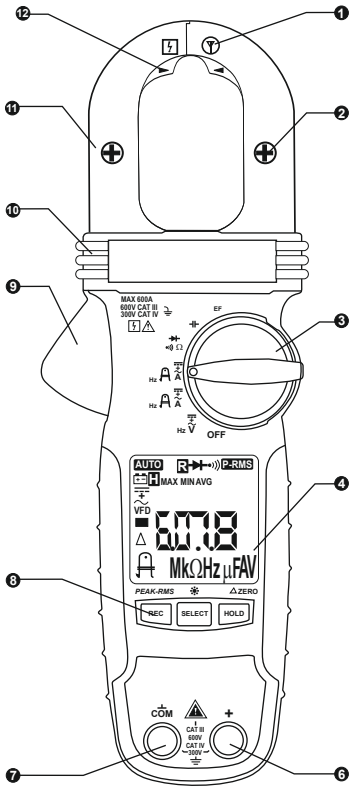
Audible Threshold	Between 10Ω and 250Ω.
Response time	32ms approx.

PEAK-rms (ACV & ACA) :

Response	80ms to >90%

VI. PRODUCT DESCRIPTION :

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



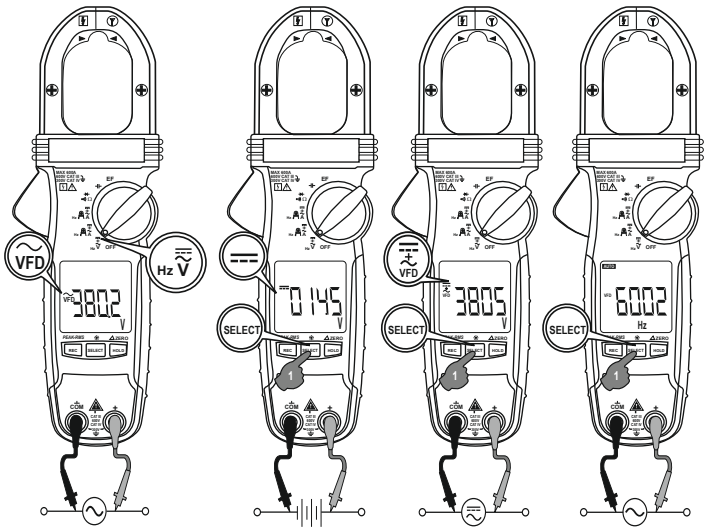
1. Antenna area for Non-Contact EF-Detection
2. Jaw center indicator (with DCA polarity) at where best current accuracy is specified.
3. Rotary Selector to turn the power ON/OFF and Select a function.
4. 3-5/6 digits 6000 counts numeric LCD display.
6. Input Jack for all functions EXCEPT non-invasive DCA, DC+ACA, or ACA current functions.
7. Common (Ground reference) Input Jack for all functions EXCEPT non-invasive DCA, DC+ACA, or ACA current functions.
8. Push-buttons for special functions & features.
9. Jaw trigger for opening the clamp jaw.
10. Hand/Finger Barrier to indicate the limits of safe access of the meter.
11. Clamp Jaw for DC or AC current magnetic field pick up.
12. Additional center indicator for AmpTip™ Low-current function, at where best AmpTip™ current accuracy is specified.

VII. OPERATION :

WARNING : Before and after hazardous voltage measurements, test the voltage function on a known source such as line voltage to determine proper meter functioning.

ACV, DCV, DC+ACV, Line-level Hz & EF (NCV), functions :

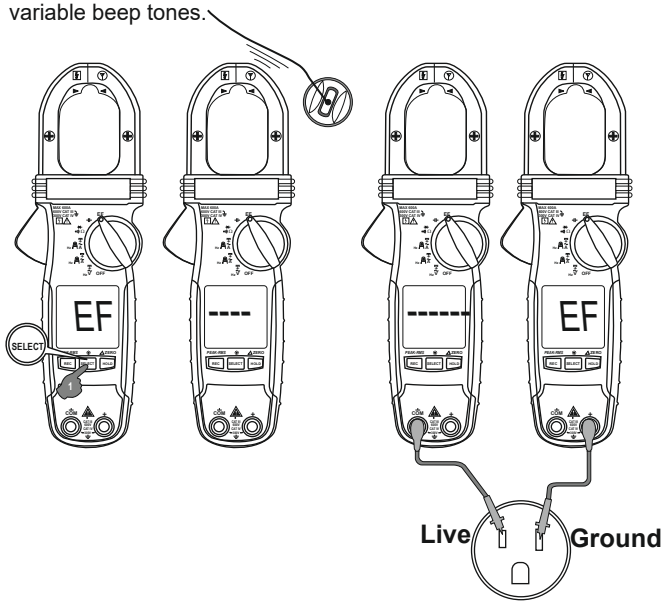
Inputs, other than that of **EF** as described below, are made through the test lead terminals **COM/+**. Defaults at **ACV*** Function. Press **SELECT** button momentarily to select **DCV, DC+ACV, Line-level Hz** or **EF**** (NCV) functions in sequence.



Note : ACV(and hence AC+DCV & Line-level Hz) function is equipped with digital low-pass filter, & is capable of dealing with**VFD** (Variable Frequency Drive) signals. It also improves ACV reading stability in noisy electrical environments.

Electric Field EF-Detection

The meter displays "**EF**" when it is ready. Signal strength is indicated as a series of bar-graph segments on the display together with variable beep tones.



- **Non-Contact EF-Detection :** An antenna is located along the top-right end of the stationary clamp jaw, which detects electric field that surround energized 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 one single probe to test via terminal **COM** for direct contact EF-Detection with best sensitivity.

CAUTION & WARNING for Non-Invasive (Clamp-on) Current Measurements :

CAUTION :

(Application and Removal of the Clamp-on Jaws) For non-invasive current measurements, press the jaw trigger and clamp the jaws around conductor(s) of only one single pole of a circuit for load current measurement. Make sure the jaws are completely closed, or else it will introduce measurement errors. Enclosing conductor(s) of more than one pole of a circuit may result in differential current (like identifying leakage current) measurement. Align the conductor(s) to the Jaws center indicators (Regular or AmpTip™ indicators where applicable) as much as possible to get the best measuring accuracy. For removal, press the jaw trigger and remove the jaws from the conductor(s).

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

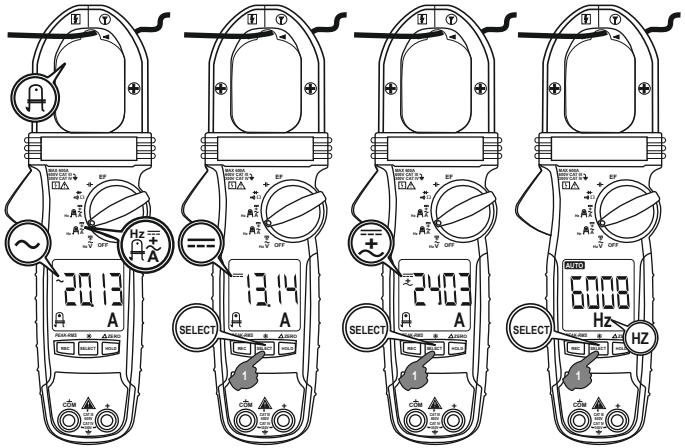
WARNING :

Do not use the meter to measure currents above the rated frequency (400Hz). Circulating currents may cause the magnetic circuits of the Jaws reach a hazardous temperature.

Non-Invasive AmpTip™ Low-Current Functions :

ACA, DCA, DC+ACA & Hz :

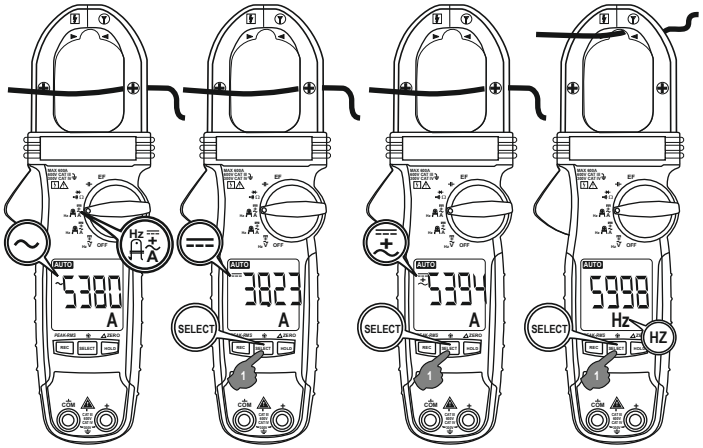
Input is made via the clamp jaws with best accuracy specified near the jaw tip area for small conductors low-current measurements. Defaults at **ACA** function. Press **SELECT** button momentarily to select the subject functions in sequence.



Non-Invasive Regular Current Functions :

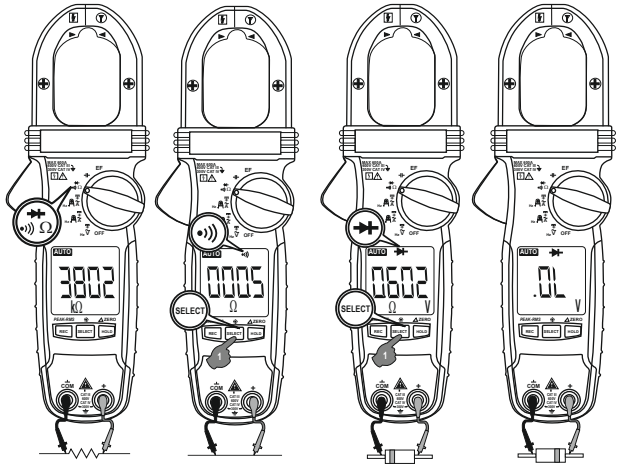
ACA, DCA, DC+ACA & Hz :

Input is made via the clamp jaws with best accuracy specified at the jaw center for regular current measurements. Press **SELECT** button momentarily to select the subject functions in sequence.



Ω Resistance, •)) Continuity & ⇻ Diode functions :

Inputs are made through the test lead terminals **COM/+**. Defaults at Ω **Resistance**. Press **SELECT** button momentarily to select the subject functions in sequence.



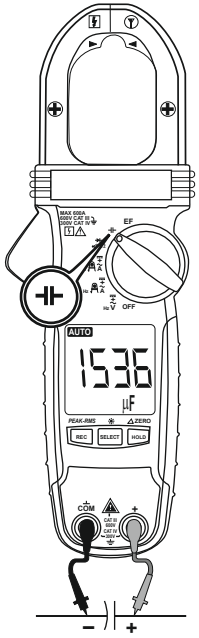
Note : When using diode test function, normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective). Reverse the test leads connections (reverse biased) across the diode. The digital display shows OL if the diode is good. Any other readings indicate the diode is resistive or shorted (defective).

CAUTION :

Using Resistance, Continuity or Diode function in a live circuit will produce false results and may damage the meter. In many cases the suspected component(s) must be disconnected from the circuit to obtain an accurate measurement reading.

⊣⊢ Capacitance functions :

Inputs are made through the test lead terminals **COM/+**. Defaults at **⊣⊢Capacitance**.



CAUTION :

1. Using Capacitance function in a live circuit will produce false results and may damage the meter. In many cases the suspected component(s) must be disconnected from the circuit to obtain an accurate measurement reading.

2. When using Capacitance function, discharge capacitor(s) before making any measurements. Large value capacitors should be discharged through an appropriate resistance load.

Using the Complementary Beeper feature :

The Complementary Beeper feature is selected in Power-up option. Press and hold the **REC** button while turning the meter on to enable. If the segments indicate a clockwise movement, the beeper sounds a single long beep per segment cycle. If the segments indicate a counter clockwise movement, the beeper sounds 3 short beeps per segment cycle.

Hold :

Hold feature freezes the display for later view. LCD "H" turns on. Press the **HOLD** button momentarily to toggle the hold feature.

Record mode :

Press **REC** button momentarily to activate MAX/MIN/AVG recording mode. LCD "R" & "**MAX MIN AVG**" turn on. The meter beeps when new MAX (maximum) or MIN (minimum) reading is updated. AVG (Average) reading is calculated over time. Press the button momentarily to read the MAX, MIN and AVG reading in sequence. Press the button for 1 second or more to exit this mode. Auto-Power-Off is disabled automatically in this mode.

Relative-Zero (Δ) mode :

Relative-Zero allows the user to offset the meter consecutive measurement with the main display displaying reading as the reference value. LCD "Δ" turns on. Press the Δ (**HOLD**) button for one second or more to toggle Relative-Zero mode.

DC-Zero mode is set instead of Relative-Zero mode, however, to only offset the non-zero DCA residuals caused by magnetic hysteresis of the jaws as in DCA & DC+ACA functions. Press the Δ ZERO (HOLD) button for one second or more to activate / re-activate this mode. Apply this mode before making any single DCA or DC+ACA measurement for best measuring accuracy. The meter shows "dc_0" shortly to confirm activation before continuing measurements. The beeper will sound 3 short beeps, however, to warn for null activation if the residual is beyond a reasonable hysteresis reading of -5 to 5 DCA.

80ms PEAK-RMS mode :

Press **PEAK-RMS** button for one second or more to toggle **PEAK-RMS** mode to capture inrush current or voltage RMS values in duration as short as 80ms. LCD P-RMS turns on. Auto-Power-Off is disabled automatically in this mode.

Backlighted LCD display :

Press the **SELECT** button for 1 second or more to toggle the LCD backlight. The backlight will also be turned off automatically after 32 seconds to extend battery life.

Intelligent Auto-Power-Off (APO) :

The Auto-Power-Off (APO) mode turn the meter off automatically to extend battery life after approximately 32 minutes of no specified activities, where applicable :

1. Rotary switch or push button operations.
2. Significant measuring readings of above 8.5% of ranges.
3. Non-OL readings for Resistance, Continuity or Diode function.
4. Non-zero readings for Hz function.
5. Significant movement indication as in Phase Rotation functions.

In other words, the meter will intelligently avoid entering the APO mode when it is under normal measurements. To wake up the meter from APO, press the **SELECT** button momentarily and release, or turn the rotary switch OFF and then back on. Always turn the rotary switch to the OFF position when the meter is not in use.

V. 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 manual.

If the instrument voltage-resistance input terminal has subjected to high voltage transient (caused by lightning or switching surge to the system under test) by accident or abnormal conditions of operation, the protective impedance components in series might be blown off (become high impedance) like open fuses to protect the user and the instrument. Most measuring functions through this terminal might then be open circuit. Such components should only be replaced by qualified technician. Refer to the WARRANTY section for obtaining warranty or repairing service.

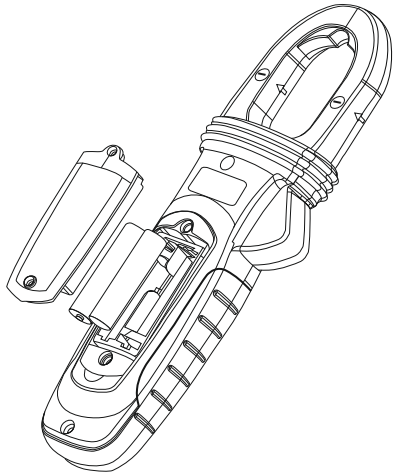
Cleaning and Storage :

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 periods of longer than 30 days, remove the batteries and store them separately.

Battery replacement :

The meter uses standard 1.5V AAA Size (IEC R03) battery X 2.

Loosen the 2 captive screws from the battery cover case. Lift the battery cover case. Replace the batteries. Replace battery cover case. Re-fasten the screws.



KUSAM-MECO®

MUMBAI

TEST CERTIFICATE

TRMS DIGITAL CLAMPMETER

This Test Certificate warrantees 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. **KM 078**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
REGISTERED

QC
KUSAM-MECO
PASS

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.

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.