LIST OF PRODUCTS

* Digital Multimeter
* Digital AC & AC/DC Clampmeter
* AC Clamp Adaptor
* AC/DC Current Adaptor
* Transistorised Electronic Analog & Digital Insulation Resistance Testers
* Digital Sound Level Meter & Sound Level Calibrator
* Digital contact & Non-contact Type Tachometer
* Digital Non-contact (infrared) Thermometer
* Thermo Hygrometer
* Thermo Anemometer
* Wood Moisture Meter
* Distance Meter
* Digital Hand Held Temperature Indicators
* Digital Lux Meter
* Network Cable Tester
* Power Factor Regulator
* Maximum Demand Controller/Digital Power Meter

KUSAM-MECO®

E-mail : sales@kusam-meco.co.in

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TWIN DISPLAY VERSATILE CLAMP-ON MULTIMETER MODEL - 2799

OPERATION MANUAL

KUSAM-MECO

TWIN DISPLAY VERSATILE CLAMP-ON MULTIMETER

MODEL - 2799



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TAKE MEASUREMENTS 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 or 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 changed 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 you 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. *you can easily exceed those ratings. The best way to avoid damage is to use a clampmeter with high current measuring capacity. To prevent excess current from flowing through your meter, 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 "Safety Information" and "Rules for Safe Operation"carefully before using the Meter.

Digital Clampmeter Model - 2799 (hereafter referred to as "the Meter") is a 3¾ digits Clampmeter with steady operations, and highly reliable hand-held measuring instrument having different measurement positions. The Clampmeter can not only measure AC/DC Voltage, AC Current, (Clamp-on), AC/DC mA/mA, Temperature,Resistance, Capacitance, Frequency, Diode & Continuity Test but also has MAX HOLD, DATA 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 Clamp-on Multimeter. 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	Carrying Case	1 piece

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

CENELEC Directives

The instrument conform to CENELEC Low-voltage directive 72/23/EEC and Electromagnetic compatibility directive 89/336/EEC.

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Safety

This manual contain 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 manufacture, the protection provided by the instrument may be impaired.

The meter meets the requirements for double insulation to IEC61010-2-032, EN61010-2-032, UL61010B-2-032, IEC61010-1 2nd Ed., EN61010-1Ed., UL61010-1 2nd Ed. :Category III 600 Volts AC and DC.

PER IEC61010 OVER VOLTAGE 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.

FEATURES :

- **Auto power off**
- **Rugged fire retarded casing with splash proof Construction**
- **Fully auto ranging on all functions.**
- **Overload protection on all ranges.**
- **Diode test & fast audible continuity**
- **Data-hold, max. display function**
- **Simultaneous A+V, A+Ω, A+°C**

GENERAL SPECIFICATIONS :

Display : 3¾ digits 4000 counts LCD Display

Update Rate : 3 per second nominal

Polarity : Automatic

Low Battery : Below approx. 2.4V

Operating Temperature : 0°C to 40°C

Relative Humidity : Maximum relative humidity 80% for temperature upto 31°C decreasing linearly to 50% relative humidity at 40°C

Altitude : operating below 2000m

Storage Temperature : -20°C to 60°C, <80% R.H. (With battery removed)

Temperature Coefficient : nominal 0.15 x (specified accuracy) / °C @ (0°C - 18°C or 28°C - 40°C) or otherwise specified.

Sensing : Average sensing .

Overload Protections :

ACA Clamp-on Jaws : AC 600A rms continuous

+/mA & COM terminals : 600VDC/VAC rms

Transient Protection : 6.5KV (1.2/50ms surge)

Safety : Meets IEC61010-2-032, EN61010-2-032, UL61010B-2-032, IEC61010-1 2nd Ed., EN61010-1 2nd Ed., UL61010-1 2nd Ed.

Measurement Category : III 600V AC & DC.

Pollution degree : 2

E.M.C. : Meets EN61326(1997, 1998/A1), EN61000-4-2 (1995,2000/A2), & EN61000-4-3 (2002)

In an RF field of 3V/m :

Capacitance function is not specified

mA function : Total Accuracy= Specified Accuracy + 65 digits

Other function ranges : Total Accuracy= Specified Accuracy + 45 digits

Performance above 3V/m is not specified.

Power Supply : standard 3V coin 2 battery. (IEC-CR2032).

Power Consumption : 2.8 mA typical except that 3.3mA typical for ACA function.

APO Timing : Idle for 30 minutes.

APO Consumption : 5mA typical except that 40mA typical on voltage function.

Dimension : 190(L) **x** 63(W) **x** 32(H)mm

Weight : 139 gm approx.

Jaw opening & Conductor diameter : 26mm max.

Accessories : Test leads (pair), batteries installed, Manual, Carrying Case & Banana plug type- K bead probe Bk60 x 1

Optional Accessories : Banana pins to type-K socket plug adapter Bk32.

ELECTRICAL SPECIFICATIONS :

Accuracy is ±(% reading digits + number of digits) otherwise specified, at 23°C ±5°C & less than 75% R.H.

AC VOLTAGE (50Hz ~ 500Hz)

Range	Resolution	Accuracy
4.000V	0.001 V	±(1.5%rdg+5dgts)
40.00V	0.01 V	
400.0V	0.1 V	
600V	1 V	±(2.0%rdg+5dgts)

CMRR : > 60dB @ DC to 60Hz, Rs =1kW
Input Impedance : 10MW, 30pF nominal

DC VOLTAGE

Range	Resolution	Accuracy
400.0 mV	0.1 mV	±(0.3%rdg+4dgts)
4.000V	0.001 V	±(0.5%rdg+3dgts)
40.00V	0.01 V	
400.0V	0.1 V	
600V	1 V	±(1.0%rdg+4dgts)

NMRR : > 50dB @ 50/60 Hz
CMRR : > 120dB @ DC, 50/60Hz, Rs=1kW
Input Impedance : 10MW, 30pF nominal
(1000MWfor 400.0mV range)

AC CURRENT (Clamp-on) (50Hz / 60Hz)

Range	Resolution	Accuracy[1)2)3)]
40.00 A	0.01 A	±(1.5%rdg+8dgts)
400.0 A	0.1 A	
600 A	1 A	

1) Induced error from adjacent current-carrying conductor : 0.05/A

2) Specified accuracy is from 10% to 100% of range & for measurements made at the jaw center. When the conductor is not positioned at the jaw center, position errors introduced are:
Add 2% to specified accuracy for measurements made BEYOND jaw marking lines (toward jaw opening)

3) Add 8d to specified accuracy @ reading <10% of range

Max Hold

Specified accuracy ± 50 digits for changes > 25ms in duration.

Resistance

Range	Resolution	Accuracy
400.0 W	0.1 W	±(0.8%rdg+8dgts)
4.000 KW	0.001 KW	±(0.6%rdg+4dgts)
40.00 KW	0.01 KW	
400.0 KW	0.1 KW	
4.000 MW	0.001 MW	±(1.0%rdg+4dgts)
40.00 MW	0.01 MW	±(2.0%rdg+4dgts)

Open Circuit Voltage : 0.4VDC typical

Audible Continuity Tester

Audible threshold : between 20Ω and 120Ω

DIODE TEST

Open Circuit Voltage	Test Current (Typical)
< 1.6 VDC	0.25 mA

DC mA

Range	Accuracy	Burden Voltage
400.0 mA	± (2.0%rdg+4dgts)	2.8 mV/mA
2000 mA	± (1.2%rdg + 3dgts)	

AC mA

Range	Accuracy	Burden Voltage
50Hz - 500Hz		
400.0 mA	± (2.0%rdg+5dgts)	2.8 mV/mA
2000 mA	± (1.5%rdg + 5dgts)	

CAPACITANCE

Range [1)]	Accuracy [2) 3)]
500.0nF, 5.000mF, 50.00mF, 500.0mF, 3000mF	± (3.5%rdg + 6dgts)

1) Additional 50.00nF range accuracy is not specified

2) Accuracies with film capacitor or better

3) Specified with battery voltage above 2.8V (approximately half full battery).
Accuracy decreases gradually to 12% at low battery warning voltage of approximately 2.4V.

FREQUENCY

Function	Sensitivity (Sine RMS)	Range
400.0 mV	350 mV	10Hz - - 2kHz
4.000 V	1 V	10Hz - - 5kHz
40.00 V	32 V	10Hz - - 100kHz
400.0 V	100 V	10Hz - - 10kHz
600 V	500 V	10Hz - - 5kHz
400.0 mA	500 mA	10Hz - - 30kHz
2000 mA	500 mA	10Hz - - 30kHz

Display counts : 5000 **Best resolution :** 0.001Hz
Accuracy : ±(0.5% rdg + 4 dgts)

TEMPERATURE

Range	Accuracy
-20°C ~ 300°C	± (2%rdg + 3°C)
-4°F ~ 572°F	± (2%rdg + 6°F)

Type-K thermocouple range & accuracy not included.

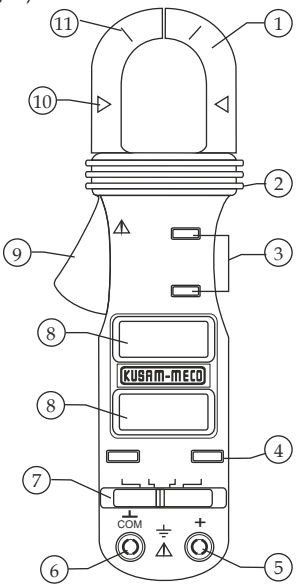
Rules for Safe Operation (1)

- Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors and Clamps.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for Continuity. Replace damaged test leads with indentical electrical Specifications before using the Meter.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- The rotary switch should be placed in the right position and no any changeover of range shall be made while measurement is conducted to prevent damage of the Meter.
- When measurement is taken at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken for there is danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
- Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after the meter is dampened.

- Do not touch 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 busbars, switch them off before insertion & removal of the current clamp jaws. Contact with the conductor could result in electric shock. Keep your hands / fingers behind the hand / finger barriers that indicate the limits of safe access of the meter & the test leads during measurements.
- Disconnect the test leads from the test points before changing meter functions.
- Disconnect circuit power and discharge all high -voltage capacitors before testing resistance, continuity, diodes, or current.
- Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Turn the Meter power off when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has not been used for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

CLAMPMETER STRUCTURE

(See fig. 1)



(Figure 1)

1) Transformer Clamp Jaw for AC current magnetic field pick up.
2) Hand/Finger Barrier to indicate the Limits of safe access of the meter during measurement.
3) Push-buttons for special functions & features. Also as power ON/OFF buttons for ACA function.
4) Push-buttons for special functions & features on Slide-switch Selector functions.

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) 3¾ digits 4000 counts LCD display

9) Jaw trigger for opening the transformer clamp.

10) Jaw center indicators, at where best ACA accuracy is specified.

11) Jaw marking lines for ACA position error indication

Functional Buttons

■ **HOLD H**

The hold feature freezes the display for later view. Press the **HOLD** button momentarily to activate and to exit the hold feature in the following function(s):

Upper display ACA function

■ **MAX H**

The max feature compares and displays the measured maximum value as fast as 30ms with auto-ranging capability. Press the **Max** button for 1 second or more to activate and to exit the max feature in the following function(s):

Upper display ACA function.

■ **Auto-ranging**

Where there is more than one measuring range under a selected meter function, the LCD annunciator "**a**" turns on. The meter will automatically switch to the best resolution range when making measurements. No manual ranging selection is required.

■ **Auto Power Off (APO)**

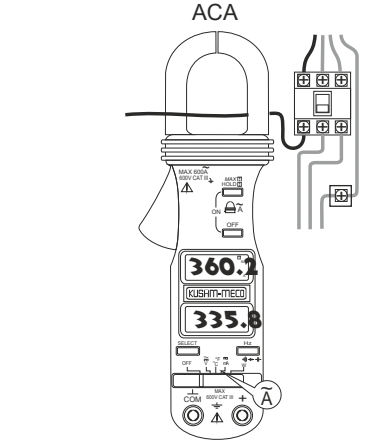
When the meter is on, the Auto Power Off (APO) feature will switch the meter into a sleep mode automatically to extend battery life after approximately 30 minutes of no slide-switch nor push button operations. To wake up the meter from APO, press the buttons momentarily or set the slide-switch to the OFF position and then slide back on again. Always set the slide-switch to the OFF manually when the meter is not in use.

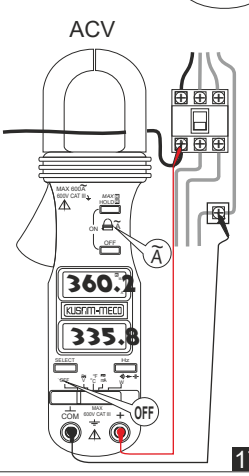
International Electrical Symbols

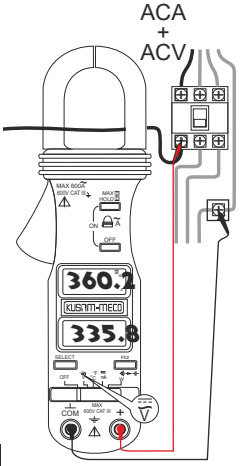
~	AC (Alternating Current).
⎓	DC (Direct Current).
≂	Both DC & AC.
⏚	Grounding.
⧈	Double Insulated.
⊟	Deficiency of Built-In Battery.
•)))	Continuity Test.
→|	Diode.
⎯▯⎯	Fuse.
⚠	Warning ! Refer to the Operating Manual.
⚠	Caution ! Risk of Electric Shock.

Measurement Operation

A) ACA Current clamp-on function







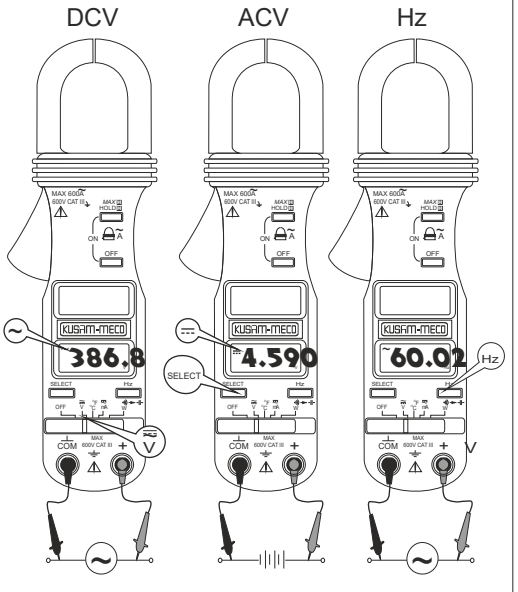
- Inputs are made through the clamp jaws for non - invasive ACA current measurements. Press the **OFF** push button momentarily to power on and off the separate ACA function display. The **HOLD** push button can also be used as the ACA function power on hotkey. This twin display ACA function can be used simultaneously with the voltage or any other slide - switch functions when making measurements.

Caution

For non-invasive ACA current measurements, 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 differential current (like identifying leakage current) measurement. Locate the conductor(s) at the jaws center 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 will affect measurement accuracy. Keep the jaws away from them as much as possible to minimize influence.

B) DC Voltage, AC Voltage, Hz Frequency functions



Inputs are made through the test leads terminals. Slide-switch on default at DC Voltage. Press **SELECT** button momentarily to select AC voltage.

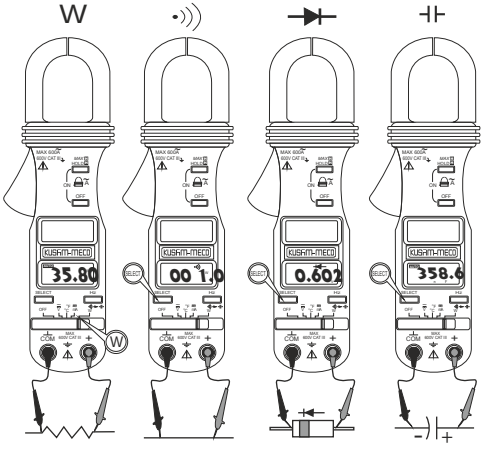
Press the Hz push-button momentarily to activate Hz Frequency function in the following slide-switch functions.

DCV, ACV, DCmA & ACmA via the test leads.

Note : DC 400.0 mV range is designed with 1000MW high input impedance for least current drain in measuring small signals, and can cope better with most commercially available voltage output transducers/ adapters. The non-zero display reading is normal when the meter inputs are open circuit, which will not affect actual measurement accuracy. The meter will show close to zero reading when the inputs are shorted. Open input is actually a floating condition, which is not a zero-volt input-condition.

Note : Hz input sensitivity varies automatically with function range selected while activating the Hz function. Lowest range has the highest sensitivity, and the highest range has the lowest sensitivity. Activating the Hz function WHILE measuring the specific function signal (auto ranging) can automatically select the best sensitivity range to avoid electrical noise which may cause unstable Hz reading. However, If the Hz reading shows zero due to insufficient sensitivity, activate the Hz function before measuring the specific function signal (the meter is then in the lowest range) can select the highest sensitivity range.

C) Resistance, Continuity, Diode & Capacitance Functions :-



Caution

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

W Resistance and •)) Continuity functions

- Input are made the test leads terminals. Side-switch on defaults at W. Press SELECT button momentarily to select . •)) Continuity function which is convenient for checking wiring connections and operation of switches. A continuous beep tone indictes a complete wire.

Diode test function

- Inputs are made through the test leads terminals. Slide-switch on defaults at W. Press SELECT button momentarily 2 times to select 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 the 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).

Capacitance function

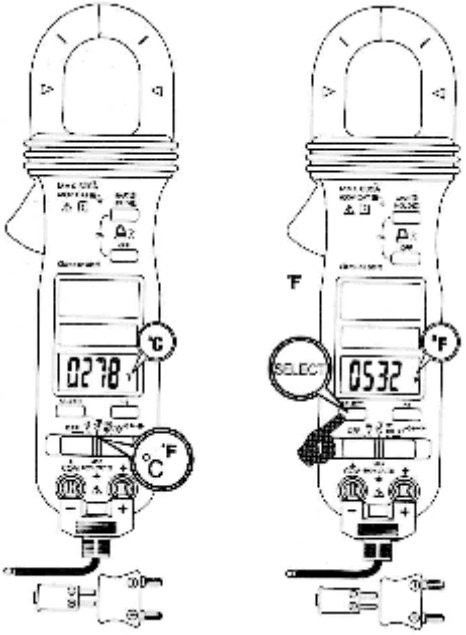
- Inputs are made through the test leads terminals. Slide -switch on default at W. Press **SELECT** button momentarily 3 times to select Capacitance function.

Caution

- Discharge capacitors before making any measurement Large Value capacitors should be discharged through an appropriate resistance load.

TEMPERATURE FUNCTION

Be sure to insert the banana plug type-K temperature bead probe Bk60 with correct **+ -** polarities. Slide-switch on defaults at degree C (Celsius). Press **SELECT** button momentarily to select degree F (Fahrenheit). You can also use a plug adapter Bkb32 (Optional purchase) with banana pins to type-K socket to adapt other type-K standard mini plug temperature probes.



D) DC / AC mA Current Function

Inputs are made through the test leads terminals. Slide-switch on defaults at DC. Press SELECT button momentarily to select AC.

Application notes:

1) The DC mA function is designed especially for HVAC / R flame sensor applications. The 0.1mA resolution is useful for identifying the minute current changes in flame detector

applications. Flame signal current check should indicate steady flame signal of at least 2mA for a rectification type, or 1.5mA for an ultraviolet type (8mA for self checking systems). If a flame signal current with inadequate strength or fluctuation beyond 10%, check the following to avoid the risk of unwanted flame relay dropout :

A) For gas or oil flames (Minipeeper) :

- Low supply voltage
- Detector location
- Defective detector wiring
- Dirty viewing windows
- Faulty Minipeeper

b) For oil flames (Photocell) :

- Detector location & wiring
- Smoky flame or poorly adjusted air shutter
- Faulty Photocell
- Temperature over 165°F (74°C) at photocell

c) For gas flames (Flame Rod) :

- Ignition interference (A flame signal current difference with the ignition both on and off greater than 0.5mA indicates the presence of ignition interference).
- Insufficient ground (must be at least 4 times the detector area)
- Flame lifiting off burner head (ground), or not continuously in contact with the flame rod.
- Temperature in excess of 600° F (316°C) at the flame electrode insulator causing short to ground.

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 lighting or switching surge to the system) by accident or abnormal conditions or operation, the series fusible resistors will be blown off (become high impendence) 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 of obtaining warranty or repairing service.]

Cleaning and Storage

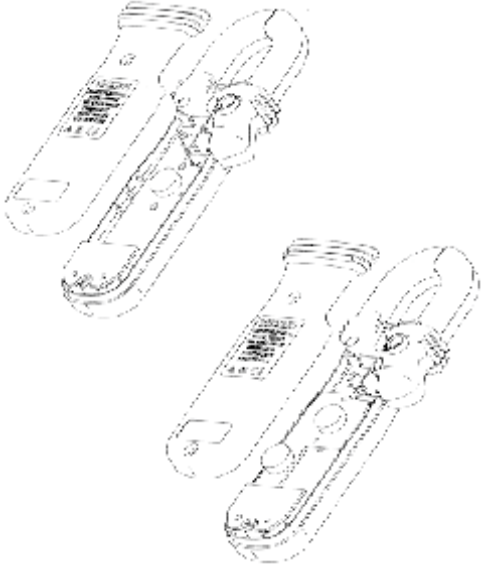
Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not be used for periods of longer than 60 days, remove the batteries and store them separately.

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Battery replacement

The meter uses standard 3V lithium coin cells two batteries (ANSI/NEDA-5004LC, IEC-CR2032). One battery is used for the slide switch functions and the other battery is used for the dual display ACA function separately.

Loosen the two screws from the case bottom and remove the bottom case. Slide and take the battery out the side of the holder and replace with a new battery (observe polarity). Replace the bottom case. Re-fasten the screws.



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MUMBAI

TEST CERTIFICATE

DIGITAL CLAMP-ON MULTIMETER

This Test Certificate guarantees 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. **2799**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
REGISTERED

QC
KUSAM-MECO
PASS

LIMITED 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 guarantee 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, 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 Limited 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.